

Test of: Nanit N151 Smart Baby Monitor  
To: FCC CFR 47 Pt 15.247 (DTS) & ISSED RSS-247  
Report No.: UDIS01-U6 Rev A Addendum

**ADDENDUM TEST REPORT**





Test of: Nanit N151 Smart Baby Monitor

To: FCC CFR 47 Pt 15.247 (DTS) & ISSED RSS-247

Test Report Serial No.: UDIS01-U6 Rev A Addendum

This report supersedes: NONE

This is an Addendum Report to show compliance for modifications made to the Nanit N151. MiCOM Labs Test Report UDIS01-U6 Rev A is the original complete test report.

**Applicant:** UdiSense Inc. (DBA: Nanit)  
244 Fifth Avenue  
Suite # 2702,  
New York, NY 10001  
USA

**Product Function:** Wireless Video Baby Monitor

**Issue Date:** 8<sup>th</sup> October 2018

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

**MiCOM Labs, Inc.**  
575 Boulder Court  
Pleasanton California 94566  
USA  
Phone: +1 (925) 462-0304  
Fax: +1 (925) 462-0306  
[www.micomlabs.com](http://www.micomlabs.com)



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



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**To:** FCC CFR 47 15.247 (DTS) & ISED RSS-247  
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## 1. ACCREDITATION, LISTINGS & RECOGNITION

### 1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) [www.a2la.org](http://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>



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## 1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

| 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<br>4143A-3 |
| 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 |   |

EU MRA – European Union Mutual Recognition Agreement.

NB – Notified Body

APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. 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

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### 1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) [www.a2la.org](http://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>



United States of America – Telecommunication Certification Body (TCB)  
Industry Canada – Certification Body, CAB Identifier – US0159  
Europe – Notified Body (NB), NB Identifier - 2280  
Japan – Recognized Certification Body (RCB), RCB Identifier - 210



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## 2. DOCUMENT HISTORY

| Document History     |                                 |   |
|----------------------|---------------------------------|---|
| Revision             | Date                            | Comments  |
| Draft                | 8 <sup>th</sup> August 2018     | Draft report for client review.   |
| Rev A                | 13 <sup>th</sup> August 2018    | Initial release.  |
| Addendum Rev A Draft | 19 <sup>th</sup> September 2018 | Updated testing to show compliance after customer modifications to the radio circuitry. |
| Addendum Rev A       | 8 <sup>th</sup> October 2018    | Initial Addendum release  |
|                      |                                 |   |
|                      |                                 |   |
|                      |                                 |   |

In the above table the latest report revision will replace all earlier versions.

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### 3. TEST RESULT CERTIFICATE

|   |   |
|---|---|
| <b>Manufacturer:</b> UdiSense Inc. (DBA: Nanit)<br>244 Fifth Avenue<br>Suite # 2702,<br>New York, NY 10001<br>USA | <b>Tested By:</b> MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton<br>California 94566 USA |
| <b>Model:</b> N151  | <b>Telephone:</b> +1 925 462 0304   |
| <b>Type Of Equipment:</b> 802.11 b/g/n  | <b>Fax:</b> +1 925 462 0306   |
| <b>S/N's:</b> N151AWZ18367NQ  |   |
| <b>Test Date(s):</b> 11-12 <sup>th</sup> Sept. 2018   | <b>Website:</b> www.micomlabs.com   |

| STANDARD(S)  | TEST RESULTS       |
|--|--------------------|
| FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & ISED RSS-247 | EQUIPMENT COMPLIES |

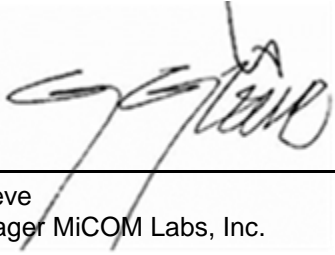
MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

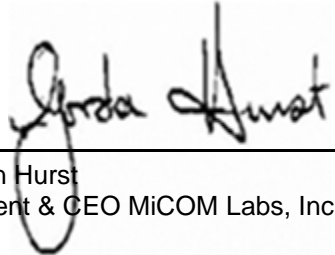
#### Notes:

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.

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



  
\_\_\_\_\_  
Graeme Grieve  
Quality Manager MiCOM Labs, Inc.

  
\_\_\_\_\_  
Gordon Hurst  
President & CEO MiCOM Labs, Inc.

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## 4. REFERENCES AND MEASUREMENT UNCERTAINTY

### 4.1. Normative References

| REF. | PUBLICATION            | YEAR                                 | TITLE   |
|------|------------------------|--------------------------------------|---|
| I    | KDB 662911 D01 & D02   | Oct 31 2013                          | Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band |
| II   | KDB 558074 D01 v04     | 5th April 2017                       | Guidance for performing compliance measurements on Digital Transmission Systems (DTS) operating under section 15.247.   |
| III  | A2LA                   | August 2017                          | R105 - Requirement's When Making Reference to A2LA Accreditation Status   |
| IV   | ANSI C63.10            | 2013                                 | American National Standard for Testing Unlicensed Wireless Devices  |
| V    | ANSI C63.4             | 2014                                 | 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                                  |
| VI   | CISPR 32               | 2015                                 | Electromagnetic compatibility of multimedia equipment - Emission requirements   |
| VII  | ETSI TR 100 028        | 2001-12                              | Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics  |
| VIII | FCC 47 CFR Part 15.247 | 2016                                 | Radio Frequency Devices; Subpart C – Intentional Radiators  |
| IX   | ICES-003               | Issue 6 Jan 2016; Updated April 2017 | Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.   |
| X    | M 3003                 | Edition 3 Nov.2012                   | Expression of Uncertainty and Confidence in Measurements  |
| XI   | RSS-247 Issue 2        | Feb 2017                             | Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices   |
| XII  | RSS-Gen Issue 5        | April 2018                           | General Requirements for Compliance of Radio Apparatus  |
| XIII | FCC 47 CFR Part 2.1033 | 2016                                 | FCC requirements and rules regarding photographs and test setup diagrams.   |
| XIV  | KDB 789033 D02 V02r01  | 14th December, 2017                  | Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E  |



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#### **4.2. Test and Uncertainty Procedure**

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.

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## 5. PRODUCT DETAILS AND TEST CONFIGURATIONS

### 5.1. Technical Details

| Details                          | Description  |
|----------------------------------|--|
| Purpose:                         | Test of the Nanit N151 to FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & ISSED RSS-247.         |
| Applicant:                       | UdiSense Inc. (DBA: Nanit)<br>244 Fifth Avenue<br>Suite # 2702,<br>New York, NY 10001<br>USA |
| Manufacturer:                    | Same as applicant.   |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton California 94566 USA                     |
| Test report reference number:    | UDIS01-U6 Rev A Addendum   |
| Date EUT received:               | 10 <sup>th</sup> September 2018  |
| Standard(s) applied:             | FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & ISSED RSS-247                                    |
| Dates of test (from - to):       | 11-12 <sup>th</sup> Sept. 2018   |
| No of Units Tested:              | 1  |
| Product Family Name:             | Nanit Smart Baby Monitor   |
| Model(s):                        | N151   |
| Location for use:                | Indoors  |
| Declared Frequency Range(s):     | 2400 - 2483.5 MHz  |
| Type of Modulation:              | CCK, OFDM  |
| EUT Modes of Operation:          | 2400 - 2483.5 MHz:<br>b; g; n: HT-20, HT-40;   |
| Declared Nominal Output Power:   | 17dBm  |
| Transmit/Receive Operation:      | Duplex   |
| Rated Input Voltage and Current: | 5V <sub>DC</sub> , 2A  |
| Operating Temperature Range:     | 10 to 40 °C  |
| ITU Emission Designator:         | 802.11b: 12M0G1D<br>802.11g: 16M6D1D<br>802.11n HT-20: 17M6D1D<br>802.11n HT-40: 36M0D1D     |
| Equipment Dimensions:            | 3 1/8 x 3 1/8 x 1 1/2 inch   |
| Weight:                          | 4 oz.  |
| Hardware Rev:                    | MP   |
| Software Rev:                    | 1.1.4.4.2  |

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## **5.2. Scope of Test Program**

### **Nanit N151**

The scope of the test program was to test the Nanit N151 Smart Baby Monitor 802.11 configurations after manufacturer modifications to the RF circuitry in the frequency range 2400 - 2483.5 MHz; for compliance against the following specifications;

#### **FCC CFR 47 Part 15 Subpart C 15.247 (DTS)**

Radio Frequency Devices; Subpart C – Intentional Radiators.

#### **ISSED RSS-247**

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

The following Product description was provided by the manufacturer:

Nanit smart video baby monitor is a wireless camera that is mounted above a crib and uses machine learning and computer vision algorithms to analyze the baby's sleep, providing parents actionable insights to help them extend and improve the baby's sleep.

This is an Addendum Report to show compliance as a result of manufacturing modifications made- Radiated Transmitter Spurious Testing was performed, for complete test report see MiCOM Labs Test Report UDIS-U6 Rev A.

For a list of manufacture's changes see section 5.7

**Nanit N151**





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

| Type | Description                 | Manufacturer | Model | Serial no.     | Delivery Date               |
|------|-----------------------------|--------------|-------|----------------|-----------------------------|
| EUT  | Wireless Video Baby Monitor | Nanit        | N151  | N151AWZ18367NQ | 10 <sup>th</sup> Sept. 2018 |

### 5.4. Antenna Details

| Type     | Manufacturer | Model   | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|----------|--------------|---------|--------|------------|---------|--------|-------|----------------------|
| integral | Pulse        | SZ0845W | Dipole | 5.42       | -       | 360    | -     | 2400 - 2483.5        |
| integral | Pulse        | SZ0845W | Dipole | 4.69       | -       | 360    | -     | 5150 - 5250          |
| integral | Pulse        | SZ0845W | Dipole | 4.69       | -       | 360    | -     | 5250 - 5350          |
| integral | Pulse        | SZ0845W | Dipole | 4.69       | -       | 360    | -     | 5470 - 5725          |
| integral | Pulse        | SZ0845W | Dipole | 4.69       | -       | 360    | -     | 5725 - 5850          |

BF Gain - Beamforming Gain  
Dir BW - Directional BeamWidth  
X-Pol - Cross Polarization

### 5.5. Cabling and I/O Ports

| Port Type | Max Cable Length | # of Ports | Screened | Conn Type | Data Type | Environment          |
|-----------|------------------|------------|----------|-----------|-----------|----------------------|
| USB       | 10-30m           | 1          | Shielded | USB-C     | Digital   | End-User<br> Indoors |

### 5.6. Test Configurations

Results for the following configurations are provided in this report:

| Operational Mode(s)<br>(802.11a/b/g/n) | Data Rate with Highest Power<br>MBit/s | Channel Frequency (MHz) |          |          |
|--|--|-------------------------|----------|----------|
|  |  | Low                     | Mid      | High     |
| 2400 - 2483.5 MHz                      |  |                         |          |          |
| 11b                                    | 1                                      | 2,412.00                | 2,437.00 | 2,462.00 |

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## **5.7. Equipment Modifications**

The following modifications were made by the manufacturer as part of sustainability:

1. Change in the dimensions of the ferrite absorbent sheet on the Main board:
  - Original dimensions were 40x35mm.
  - New dimensions are 40x28mm.
2. Change in the FPC cable connecting the Main and IR board:
  - Original cable had ferrite absorbent sheet covering it.
  - New cable is shielded and does not have the sheet covering it.
3. Replaced zero Ohm resistor (ref R208) on the Main board with 1.6pF  $\pm$  0.05pF capacitor.

## **5.8. Deviations from the Test Standard**

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

1. NONE



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## 6. TEST SUMMARY

List of Measurements

| Test Header                                 | Result   | Data Link                 |
|---|----------|---------------------------|
| Emissions                                   | Complies | -                         |
| (1) Radiated Emissions                      | Complies | <a href="#">View Data</a> |
| (i) TX Spurious & Restricted Band Emissions | Complies | <a href="#">View Data</a> |

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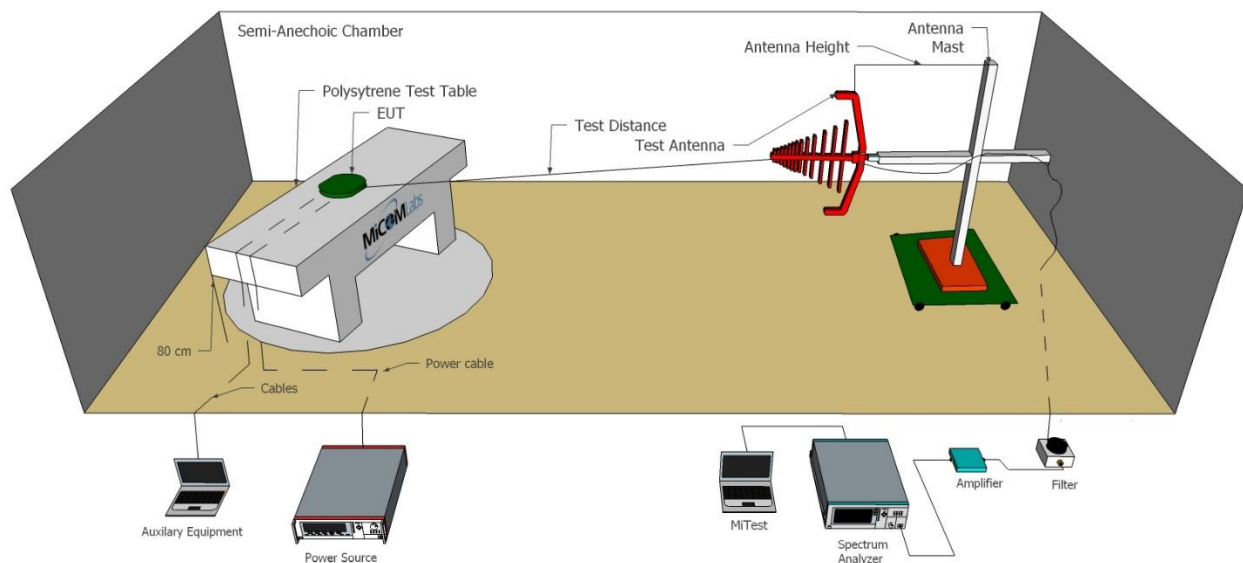


## 7. TEST EQUIPMENT CONFIGURATION(S)

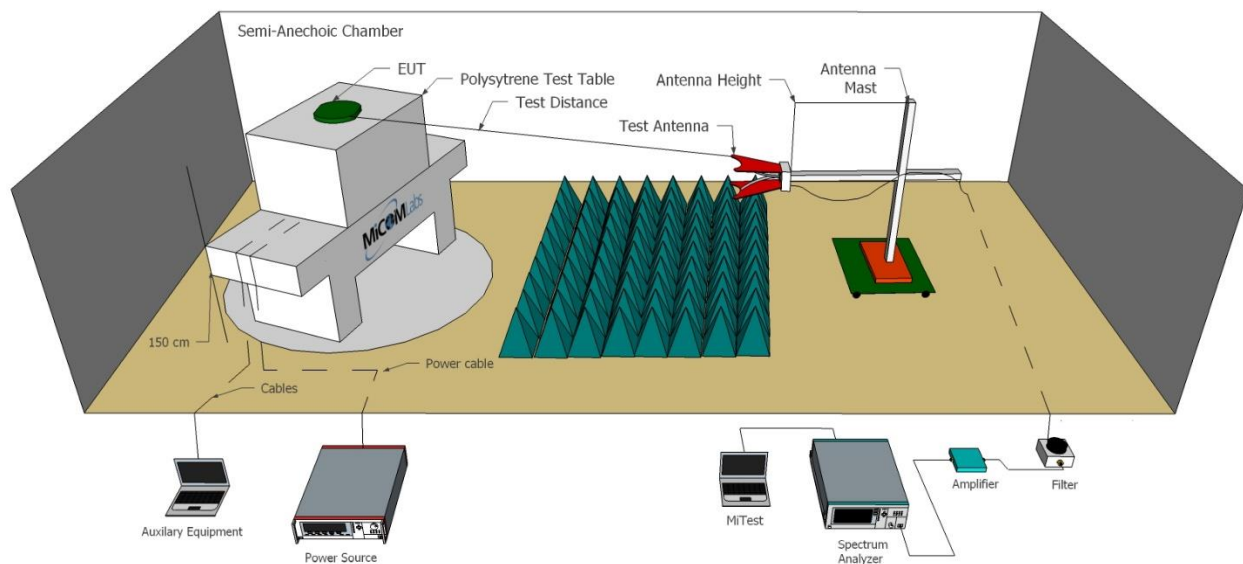
### 7.1. Radiated Emissions - 3m Chamber

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

Radiated Emissions Below 1GHz Test Setup



Radiated Emissions Above 1GHz Test Setup



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A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

| Asset# | Description                                       | Manufacturer         | Model#                                  | Serial#    | Calibration Due Date |
|--------|---|----------------------|---|------------|----------------------|
| 170    | Video System Controller for Semi Anechoic Chamber | Panasonic            | WV-CU101                                | 04R08507   | Not Required         |
| 298    | 3M Radiated Emissions Chamber Maintenance Check   | MiCOM                | 3M Chamber                              | 298        | 21 Jan 2019          |
| 377    | Band Rejection Filter 5150 to 5880MHz             | Microtronics         | BRM50716                                | 034        | 6 Nov 2018           |
| 378    | Rohde & Schwarz 40 GHz Receiver with Generator    | Rhode & Schwarz      | ESIB40                                  | 100107/040 | 12 Oct 2018          |
| 396    | 2.4 GHz Notch Filter                              | Microtronics         | BRM50701                                | 001        | 6 Nov 2018           |
| 399    | ETS 1-18 GHz Horn Antenna                         | ETS                  | 3117                                    | 00154575   | 12 Oct 2018          |
| 406    | Amplifier for Radiated Emissions                  | MiCOM Labs           | 40dB 1 to 18GHz Amp                     | 0406       | 12 Oct 2018          |
| 410    | Desktop Computer                                  | Dell                 | Inspiron 620                            | WS38       | Not Required         |
| 411    | Mast/Turntable Controller                         | Sunol Sciences       | SC98V                                   | 060199-1D  | Not Required         |
| 412    | USB to GPIB Interface                             | National Instruments | GPIB-USB HS                             | 11B8DC2    | Not Required         |
| 413    | Mast Controller                                   | Sunol Science        | TWR95-4                                 | 030801-3   | Not Required         |
| 414    | DC Power Supply 0-60V                             | HP                   | 6274                                    | 1029A01285 | Cal when used        |
| 415    | Turntable Controller                              | Sunol Sciences       | Turntable Controller                    | None       | Not Required         |
| 416    | Gigabit ethernet filter                           | ETS-Lingren          | Gigafoil 260366                         | None       | Not Required         |
| 447    | MiTest Rad Emissions Test Software                | MiCOM                | Rad Emissions Test Software Version 1.0 | 447        | Not Required         |
| 480    | Cable - Bulkhead to Amp                           | SRC Haverhill        | 157-3050360                             | 480        | 6 Nov 2018           |
| 481    | Cable - Bulkhead to Receiver                      | SRC Haverhill        | 151-3050787                             | 481        | 6 Nov 2018           |
| 482    | Cable - Amp to Antenna                            | SRC Haverhill        | 157-3051574                             | 482        | 6 Nov 2018           |
| 510    | Barometer/Thermometer                             | Control Company      | 68000-49                                | 170871375  | 11 Dec 2018          |

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## 8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by [MiTest](#). [MiTest](#) is an automated test system developed by MiCOM Labs. [MiTest](#) is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.



The MiCOM Labs "[MiTest](#)" Automated Test System" (Patent Pending)

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## 9. TEST RESULTS

### 9.1.1. Radiated Emissions

| Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions |  |                            |             |
|--|--|----------------------------|-------------|
| <b>Standard:</b>   | FCC CFR 47: Part 15.205<br>ISED RSS-GEN:8.9, 8.10                                  | <b>Ambient Temp. (°C):</b> | 20.0 - 24.5 |
| <b>Test Heading:</b>   | Radiated Spurious Emissions  | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>  | ANSI C63.10: 6.3, 6.5 & 6.6,<br>6.10<br>KDB 558074 D01 Measurement<br>Guidance V04 | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>  | See Normative References   |                            |             |

#### Test Procedure for Radiated Spurious and Band-Edge Emissions ([Restricted Bands](#))

Testing 30 – 10,000 MHz was performed in an 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 nearest the limits were chosen for maximization and formal measurement using a CISPR Compliant receiver. 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. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. 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.

$$FS = R + AF + CORR - FO$$

where:

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

#### Example:

Given receiver input reading of 51.5 dBmV; 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 (FS) of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 \text{ dBmV/m}$$

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:

$$\text{Level (dBmV/m)} = 20 * \text{Log (level (mV/m))}$$

$$40 \text{ dBmV/m} = 100 \text{ mV/m}$$

$$48 \text{ dBmV/m} = 250 \text{ mV/m}$$

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#### Restricted Bands of Operation (15.205)

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| Frequency Band    |                     |               |             |
|-------------------|---------------------|---------------|-------------|
| MHz               | MHz                 | MHz           | GHz         |
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15    |
| 0.495-0.505       | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | Above 38.6  |
| 13.36-13.41       |                     |               |             |

(b) Except as provided 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 §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

- (1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.
- (2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.
- (3) Cable locating equipment operated pursuant to §15.213.
- (4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.
- (5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

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- (6) Transmitters operating under the provisions of subparts D or F of this part.
- (7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.
- (8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).
- (9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).
- (e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

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#### 9.1.1.1. TX Spurious & Restricted Band Emissions

##### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |          |
|---------------------------------|----------------|------------------------|----------|
| <b>Antenna:</b>                 | Pulse SZ0845W  | <b>Variant:</b>        | 802.11b  |
| <b>Antenna Gain (dBi):</b>      | 5.42           | <b>Modulation:</b>     | CCK      |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> | 99       |
| <b>Channel Frequency (MHz):</b> | 2412.00        | <b>Data Rate:</b>      | 1 MBit/s |
| <b>Power Setting:</b>           | 19             | <b>Tested By:</b>      | JMH      |

##### Test Measurement Results

| Num                | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB  | Level dBµV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
|--------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| <a href="#">#1</a> | 2411.58       | 51.73    | -1.76         | -12.32 | 37.65        | Fundamental      | Vertical | 159    | 0       | --           | --        |            |
| <a href="#">#2</a> | 4823.90       | 67.84    | -2.52         | -12.43 | 52.89        | Max Peak         | Vertical | 163    | 289     | 74.0         | -21.1     | Pass       |
| <a href="#">#3</a> | 4823.90       | 63.55    | -2.52         | -12.43 | 48.60        | Max Avg          | Vertical | 163    | 289     | 54.0         | -5.4      | Pass       |

Test Notes: EUT connected to and powered by laptop. 2.4G notch in front of amp to prevent overload.

Note: click the links in the above matrix to view the graphical image (plot).

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#### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |          |
|---------------------------------|----------------|------------------------|----------|
| <b>Antenna:</b>                 | Pulse SZ0845W  | <b>Variant:</b>        | 802.11b  |
| <b>Antenna Gain (dBi):</b>      | 5.42           | <b>Modulation:</b>     | CCK      |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> | 99       |
| <b>Channel Frequency (MHz):</b> | 2437.00        | <b>Data Rate:</b>      | 1 MBit/s |
| <b>Power Setting:</b>           | 19             | <b>Tested By:</b>      | JMH      |

#### Test Measurement Results

| 1000.00 - 18000.00 MHz |               |          |               |        |              |                  |          |        |         |              |           |            |
|------------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| Num                    | Frequency MHz | Raw dBμV | Cable Loss dB | AF dB  | Level dBμV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
| <a href="#">#1</a>     | 2437.97       | 57.36    | -1.78         | -12.10 | 43.48        | Fundamental      | Vertical | 151    | 0       | --           | --        |            |
| <a href="#">#2</a>     | 4873.99       | 67.90    | -2.51         | -12.61 | 52.78        | Max Peak         | Vertical | 176    | 317     | 74.0         | -21.2     | Pass       |
| <a href="#">#3</a>     | 4873.99       | 64.14    | -2.51         | -12.61 | 49.02        | Max Avg          | Vertical | 176    | 317     | 54.0         | -5.0      | Pass       |

Test Notes: EUT connected to and powered by laptop. 2.4G notch in front of amp to prevent overload.

Note: click the links in the above matrix to view the graphical image (plot).

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#### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |          |
|---------------------------------|----------------|------------------------|----------|
| <b>Antenna:</b>                 | Pulse SZ0845W  | <b>Variant:</b>        | 802.11b  |
| <b>Antenna Gain (dBi):</b>      | 5.42           | <b>Modulation:</b>     | CCK      |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> | 99       |
| <b>Channel Frequency (MHz):</b> | 2462.00        | <b>Data Rate:</b>      | 1 MBit/s |
| <b>Power Setting:</b>           | 19             | <b>Tested By:</b>      | JMH      |

#### Test Measurement Results

| 1000.00 - 18000.00 MHz |               |          |               |        |              |                  |          |        |         |              |           |            |
|------------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| Num                    | Frequency MHz | Raw dBµV | Cable Loss dB | AF dB  | Level dBµV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBµV/m | Margin dB | Pass /Fail |
| <a href="#">#1</a>     | 2461.46       | 58.09    | -1.79         | -11.95 | 44.35        | Fundamental      | Vertical | 151    | 0       | --           | --        |            |
| <a href="#">#2</a>     | 4924.05       | 66.30    | -2.56         | -12.35 | 51.39        | Max Peak         | Vertical | 178    | 291     | 74.0         | -22.6     | Pass       |
| <a href="#">#3</a>     | 4924.05       | 61.98    | -2.56         | -12.35 | 47.07        | Max Avg          | Vertical | 178    | 291     | 54.0         | -6.9      | Pass       |

Test Notes: EUT connected to and powered by laptop.

Note: click the links in the above matrix to view the graphical image (plot).

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## **A. APPENDIX - GRAPHICAL IMAGES**

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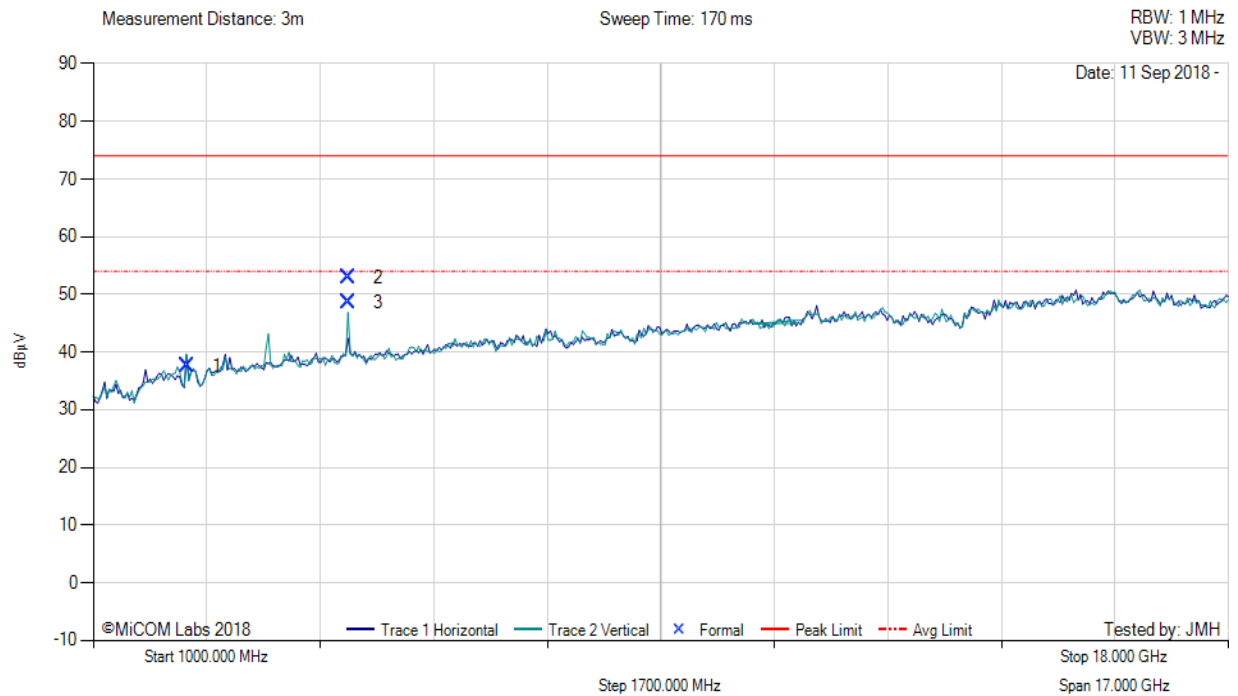
## A.1. Emissions

### A.1.1. Radiated Emissions

#### A.1.1.1. TX Spurious & Restricted Band Emissions



Variant: 802.11b, Test Freq: 2412.00 MHz, Power Setting: 19, Duty Cycle (%): 99



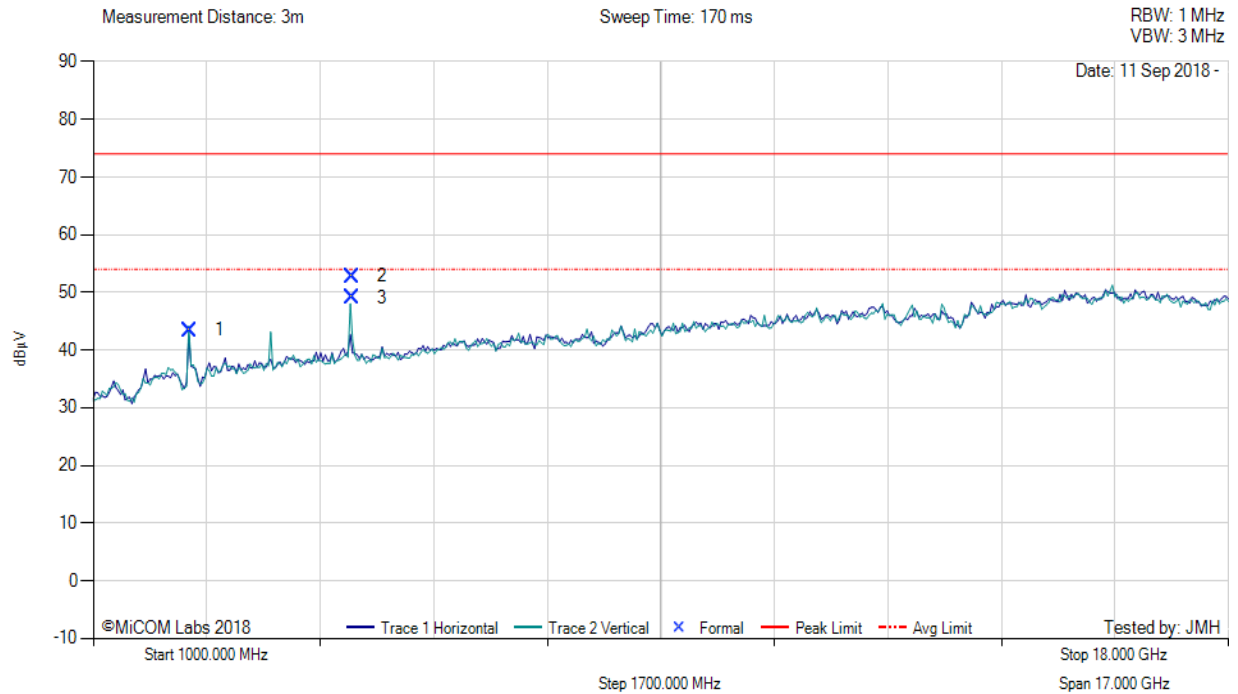
| 1000.00 - 18000.00 MHz |               |          |               |        |              |                  |          |        |         |              |           |            |
|------------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| Num                    | Frequency MHz | Raw dBμV | Cable Loss dB | AF dB  | Level dBμV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
| 1                      | 2411.58       | 51.73    | -1.76         | -12.32 | 37.65        | Fundamental      | Vertical | 159    | 0       | --           | --        |            |
| 2                      | 4823.90       | 67.84    | -2.52         | -12.43 | 52.89        | Max Peak         | Vertical | 163    | 289     | 74.0         | -21.1     | Pass       |
| 3                      | 4823.90       | 63.55    | -2.52         | -12.43 | 48.60        | Max Avg          | Vertical | 163    | 289     | 54.0         | -5.4      | Pass       |

**Test Notes:** EUT connected to and powered by laptop. 2.4G notch in front of amp to prevent overload.

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Variant: 802.11b, Test Freq: 2437.00 MHz, Power Setting: 19, Duty Cycle (%): 99

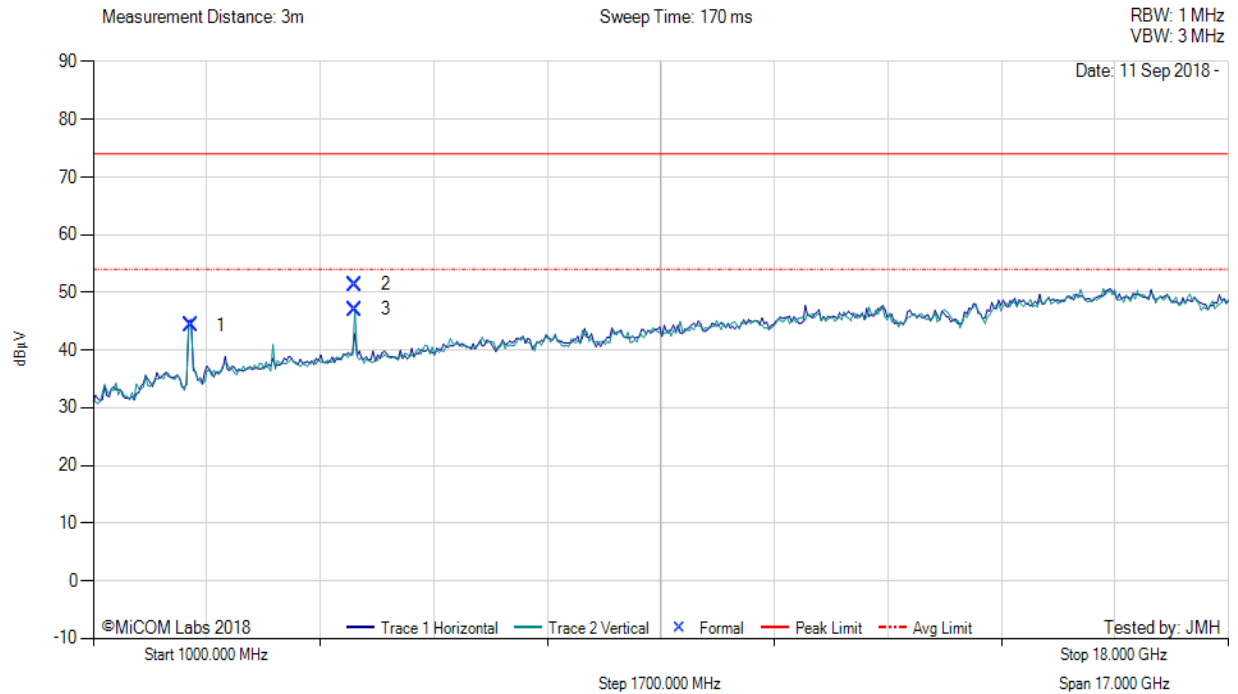


| 1000.00 - 18000.00 MHz |               |          |               |        |              |                  |          |        |         |              |           |            |
|------------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| Num                    | Frequency MHz | Raw dBμV | Cable Loss dB | AF dB  | Level dBμV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
| 1                      | 2437.97       | 57.36    | -1.78         | -12.10 | 43.48        | Fundamental      | Vertical | 151    | 0       | --           | --        |            |
| 2                      | 4873.99       | 67.90    | -2.51         | -12.61 | 52.78        | Max Peak         | Vertical | 176    | 317     | 74.0         | -21.2     | Pass       |
| 3                      | 4873.99       | 64.14    | -2.51         | -12.61 | 49.02        | Max Avg          | Vertical | 176    | 317     | 54.0         | -5.0      | Pass       |

**Test Notes:** EUT connected to and powered by laptop.

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Variant: 802.11b, Test Freq: 2462.00 MHz, Power Setting: 19, Duty Cycle (%): 99



| 1000.00 - 18000.00 MHz |               |          |               |        |              |                  |          |        |         |              |           |            |
|------------------------|---------------|----------|---------------|--------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| Num                    | Frequency MHz | Raw dBμV | Cable Loss dB | AF dB  | Level dBμV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBμV/m | Margin dB | Pass /Fail |
| 1                      | 2461.46       | 58.09    | -1.79         | -11.95 | 44.35        | Fundamental      | Vertical | 151    | 0       | --           | --        |            |
| 2                      | 4924.05       | 66.30    | -2.56         | -12.35 | 51.39        | Max Peak         | Vertical | 178    | 291     | 74.0         | -22.6     | Pass       |
| 3                      | 4924.05       | 61.98    | -2.56         | -12.35 | 47.07        | Max Avg          | Vertical | 178    | 291     | 54.0         | -6.9      | Pass       |

**Test Notes:** EUT connected to and powered by laptop.

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