Test of: Nanit N151 Smart Baby Monitor

To: FCC CFR 47 Pt 15.407 & ISED RSS 247

Report No.: UDIS01-U8 Rev A Addendum

ADDENDUM TEST REPORT

TEST REPORT

FROM

Test of: Nanit N151 Smart Baby Monitor

To: FCC CFR 47 Pt 15.407 & ISED RSS 247

Test Report Serial No.: UDIS01-U8 Addendum Rev A

This report supersedes: NONE
This is an Addendum Report to show compliance for modifications made to the Nanit N151. MiCOM Labs Test Report UDIS01-U8 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:	8th 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

TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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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 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

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 April 2017*).

American Association for Laboratory Accreditation Corporate Seal 1978 District of Columbia A2LA

Presented this 14th day of May 2018.

President and CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2019

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

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 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2 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) 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

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 test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

MiCOM LABS

Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 14th day of May 2018

President and CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2019

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

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

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	8th August 2018	Draft report for client review.
Rev A	13th August 2018	Initial release.
Rev A Addendum Draft	19th September 2018	Updated testing to show compliance after customer modifications to the radio circuitry.
.Rev A Addendum	8th October 2018	Initial Addendum release
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In the above table the latest report revision will replace all earlier versions.

3. TEST RESULT CERTIFICATE

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

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart E 15.407& 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:

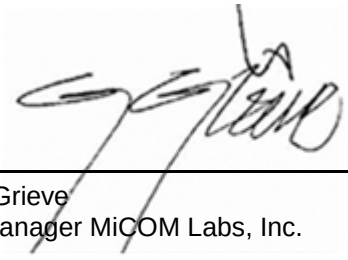
1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

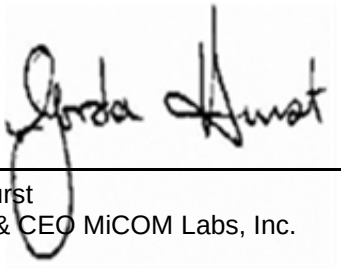
3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:



Graeme Grieve
Quality Manager MiCOM Labs, Inc.



Gordon Hurst
President & CEO MiCOM Labs, Inc.

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 905462 D07 v02	22nd August 2016	Test guidance to demonstrate compliance for U-NII devices subject to DFS requirements.
III	KDB 926956 D01 v02	22nd August 2016	U-NII Device Transition Plan
IV	A2LA	August 2017	R105 - Requirement's When Making Reference to A2LA Accreditation Status
V	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
VI	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
VII	CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements
VIII	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
IX	FCC 06-96	Jun 30 2006	Memorandum Opinion and Order
X	FCC 47 CFR Part 15.407	2016	Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices
XI	ICES-003	Issue 6 Jan 2016; Updated April 2017	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
XII	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XIII	RSS-247 Issue 2	Feb 2017	Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and License-Exempt Local Area Network (LE-LEN) Devices
XIV	RSS-Gen Issue 5	April 2018	General Requirements for Compliance of Radio Apparatus
XV	FCC 47 CFR Part 2.1033	2016	FCC requirements and rules regarding photographs and test setup diagrams.
XVI	KDB 905462 D02 v02	April 8 2016	Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection.
XVII	KDB 789033 D02 V02r01	14th December, 2017	Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

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.

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Nanit Smart Baby Monitor to FCC CFR 47 Part 15 Subpart E 15.407 & ISED RSS-247. Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5150 to 5250 MHz, 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection.
Applicant:	UdiSense Inc. (DBA: Nanit) 244 Fifth Avenue Suite # 2702, New York, NY 10001 USA
Manufacturer:	Same as applicant.
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	UDIS01-U8 Rev A Addendum Draft
Date EUT received:	23rd July 2018
Standard(s) applied:	FCC CFR 47 Part 15 Subpart E 15.407 & ISED RSS-247
Dates of test (from - to):	23rd July - 1st August, 11th – 12th Sept. 2018
No of Units Tested:	3
Product Family Name:	Nanit Smart Baby Monitor
Model(s):	N151
Location for use:	Indoors
Declared Frequency Range(s):	5150 - 5250 MHz; 5250 - 5350 MHz; 5470 - 5725 MHz; 5725 - 5850 MHz;
Type of Modulation:	CCK, OFDM
EUT Modes of Operation:	a; n: HT-20, HT-40;
Declared Nominal Output Power:	17 dBm
Transmit/Receive Operation:	Duplex
Rated Input Voltage and Current:	$5V_{DC}$, 2A
Operating Temperature Range:	10 to 40 °C
ITU Emission Designator:	802.11a: 20M4D1D 802.11n HT-20: 20M7D1D 802.11n HT-40: 47M4D1D
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

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 ranges 5150 - 5250 MHz; 5250 - 5350 MHz; 5470 - 5725 MHz; 5725 - 5850 MHz; for compliance against the following specifications:

FCC CFR 47 Part 15 Subpart E 15.407
Subpart E – Unlicensed National Information Infrastructure Devices

ISED RSS 247
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-U8 Rev A.

For a list of manufacture's changes see section 5.7

Nanit N151

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	10th 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	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 |Indoors|

5.6. Test Configurations

Results for the following configurations are provided in this report:

Operational Mode(s) (802.11a/b/g/n)	Data Rate with Highest Power MBit/s	Channel Frequency (MHz)		
		Low	Mid	High
5150 - 5250 MHz				
11a	6	5,180.00	*	*
5250 - 5350 MHz				
11a	6	*	*	5,320.00
5470 - 5725 MHz				
11a	6	5,500.00	5,580.00	5,700.00
5725 - 5850 MHz				
11a	6	5,745.00	5,785.00	5,825.00

* Frequencies verified to have radiated emissions profiles within 1 dB of previous with no significant peaks.

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 +-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

6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
Peak Transmit Power	Complies	See Note 1
26 dB & 99% Bandwidth	Complies	See Note 1
6 dB & 99% Bandwidth	Complies	See Note 1
Power Spectral Density	Complies	See Note 1
Dynamic Frequency Selection (DFS)	Complies	-
Channel Availability Check	Not Required – Note 2	-
Channel Close / Transmission Time	Complies	See Note 1
Non-Occupancy Period	Complies	See Note 1
Probability of Detection	Not Required – Note 2	-
Detection Bandwidth	Not Required – Note 2	-
Radiated	Complies	-
TX Spurious & Restricted Band Emissions	Complies	View Data
Restricted Edge & Band-Edge Emissions	Complies	View Data
Digital Emissions	Not Tested	See test report UDIS01-U2
AC Wireline	Not Tested	See test report UDIS01-U2

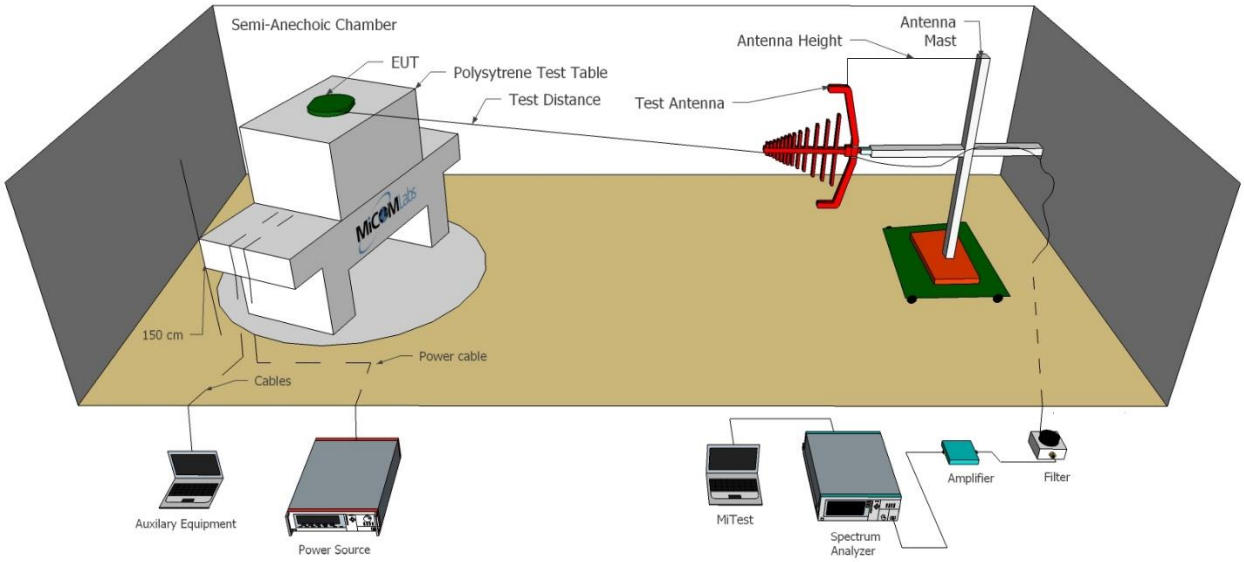
Note 1: See Test Report UDIS01-U6 Rev A
Note 2: EUT is a Client device without Radar Detection. These tests are not required for such equipment.

7. TEST EQUIPMENT CONFIGURATION(S)

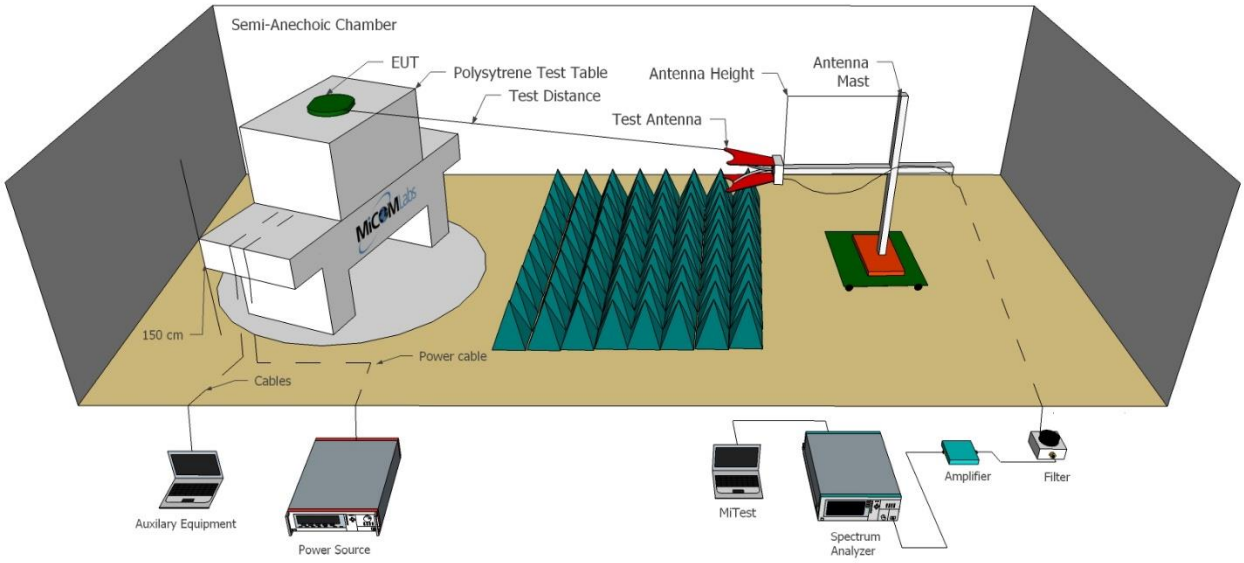
7.1. Radiated Emissions - 3m Chamber

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



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

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)

9. TEST RESULTS

9.1. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (b), 15.205, 15.209	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)
Peak emission: 74 dBuV/m
Average emission: 54 dBuV/m

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

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

$$E = \frac{1000000 \times \sqrt{30P}}{3}$$ µV/m

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

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.

(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).

9.1.1. TX Spurious & Restricted Band Emissions

Equipment Configuration for Restricted Band Spurious Emissions			
Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5180.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	5184.59	73.08	-2.67	-12.03	58.38	Fundamental	Vertical	100	0	--	--	
#2	10359.21	58.26	-3.86	-5.61	48.79	Peak (NRB)	Horizontal	194	10	--	--	Pass
#3	15539.44	63.62	-4.76	-2.12	56.74	Max Peak	Vertical	197	204	68.2	-11.5	Pass
#4	15539.44	49.63	-4.76	-2.12	42.75	Max Avg	Vertical	197	204	54.0	-11.3	Pass
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

Note: click the links in the above matrix to view the graphical image (plot).
Note2: Emissions profile in this band a very similar to previous, further formal testing for this band is not required.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5320.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	5318.44	79.17	-2.67	-12.18	64.32	Fundamental	Vertical	200	0	--	--	
#2	10640.72	63.14	-4.21	-5.00	53.93	Max Peak	Horizontal	183	143	68.2	-14.3	Pass
#3	10640.72	49.33	-4.21	-5.00	40.12	Max Avg	Horizontal	183	143	54.0	-13.9	Pass
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

Note: click the links in the above matrix to view the graphical image (plot).
Note2: Emissions profile in this band a very similar to previous, further formal testing for this band is not required.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5500.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	3666.75	65.31	-2.15	-11.67	51.49	Max Peak	Vertical	137	235	68.2	-16.7	Pass
#2	3666.75	59.72	-2.15	-11.67	45.90	Max Avg	Vertical	137	235	54.0	-8.1	Pass
#3	5500.25	70.81	-2.70	-11.62	56.49	Fundamental	Vertical	100	0	--	--	
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

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

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5580.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	3720.12	67.01	-2.21	-11.72	53.08	Max Peak	Vertical	98	236	68.2	-15.2	Pass
#2	3720.12	61.58	-2.21	-11.72	47.65	Max Avg	Vertical	98	236	54.0	-6.4	Pass
#3	5580.06	74.37	-2.77	-11.43	60.17	Fundamental	Vertical	100	0	--	--	
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

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

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5745.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	3829.99	70.85	-2.20	-11.79	56.86	Max Peak	Vertical	100	229	68.2	-11.4	Pass
#2	3829.99	65.97	-2.20	-11.79	51.98	Max Avg	Vertical	100	229	54.0	-2.0	Pass
#3	5738.61	63.73	-2.75	-10.96	50.02	Fundamental	Vertical	100	336	--	--	
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

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

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5785.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	3856.71	71.22	-2.21	-11.61	57.40	Max Peak	Vertical	132	229	68.2	-10.8	Pass
#2	3856.71	66.43	-2.21	-11.61	52.61	Max Avg	Vertical	132	229	54.0	-1.4	Pass
#3	5784.20	59.55	-2.76	-10.78	46.01	Fundamental	Vertical	100	0	--	--	
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

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

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Pulse SZ0845W	**Variant:**	802.11a
Antenna Gain (dBi):	4.69	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	94
Channel Frequency (MHz):	5825.00	**Data Rate:**	6 MBit/s
Power Setting:	20	**Tested By:**	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**
#1	3883.37	73.12	-2.24	-11.75	59.13	Max Peak	Vertical	107	221	68.2	-9.1	Pass
#2	3883.37	66.83	-2.24	-11.75	52.78	Max Avg	Vertical	107	221	54.0	-1.2	Pass
#3	5823.72	64.59	-2.81	-10.77	51.01	Fundamental	Vertical	100	0	--	--	
Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload												

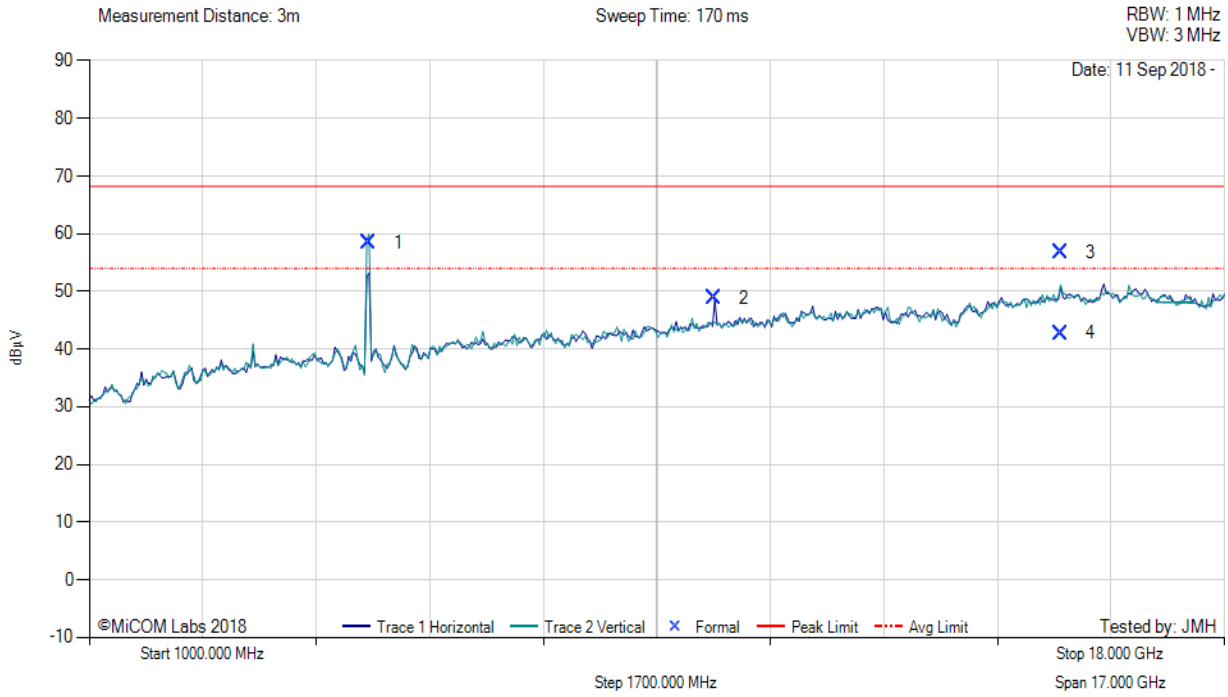
Note: click the links in the above matrix to view the graphical image (plot).

A. APPENDIX - GRAPHICAL IMAGES

A.1. Radiated

A.1.1. TX Spurious & Restricted Band Emissions

Variant: 802.11a, Test Freq: 5180.00 MHz, Power Setting: 20, Duty Cycle (%): 99

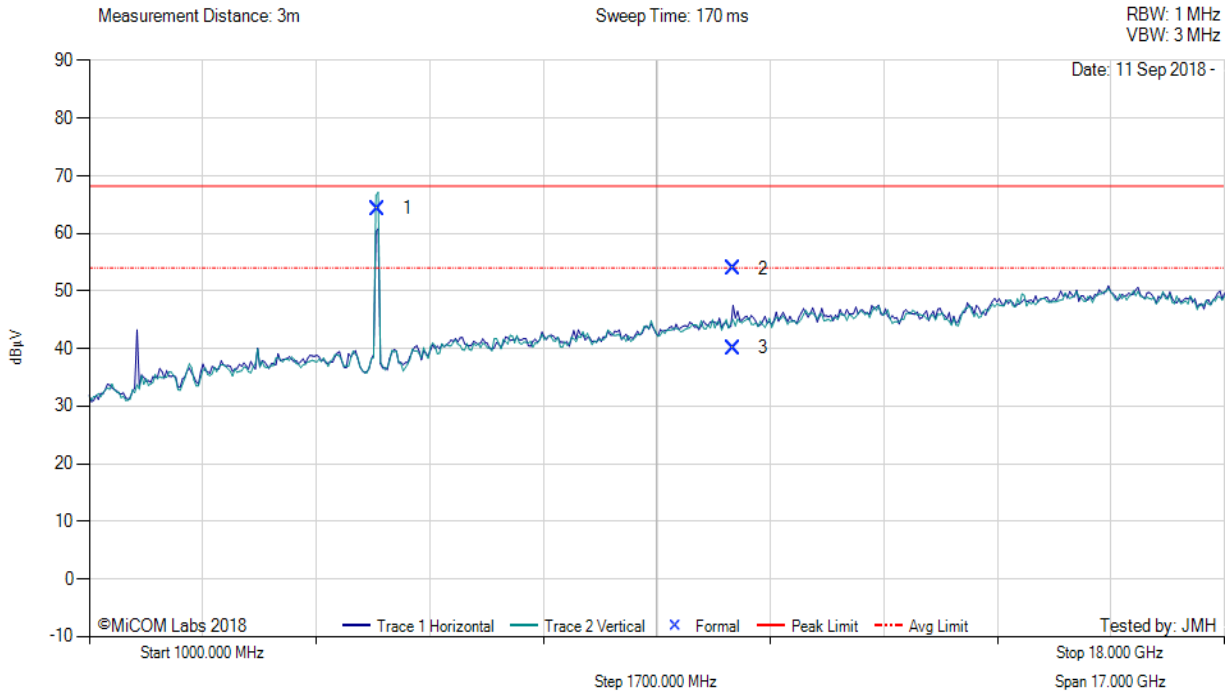


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5184.59	73.08	-2.67	-12.03	58.38	Fundamental	Vertical	100	0	--	--	
2	10359.21	58.26	-3.86	-5.61	48.79	Peak (NRB)	Horizontal	194	10	--	--	Pass
3	15539.44	63.62	-4.76	-2.12	56.74	Max Peak	Vertical	197	204	68.2	-11.5	Pass
4	15539.44	49.63	-4.76	-2.12	42.75	Max Avg	Vertical	197	204	54.0	-11.3	Pass

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5320.00 MHz, Power Setting: 20, Duty Cycle (%): 99

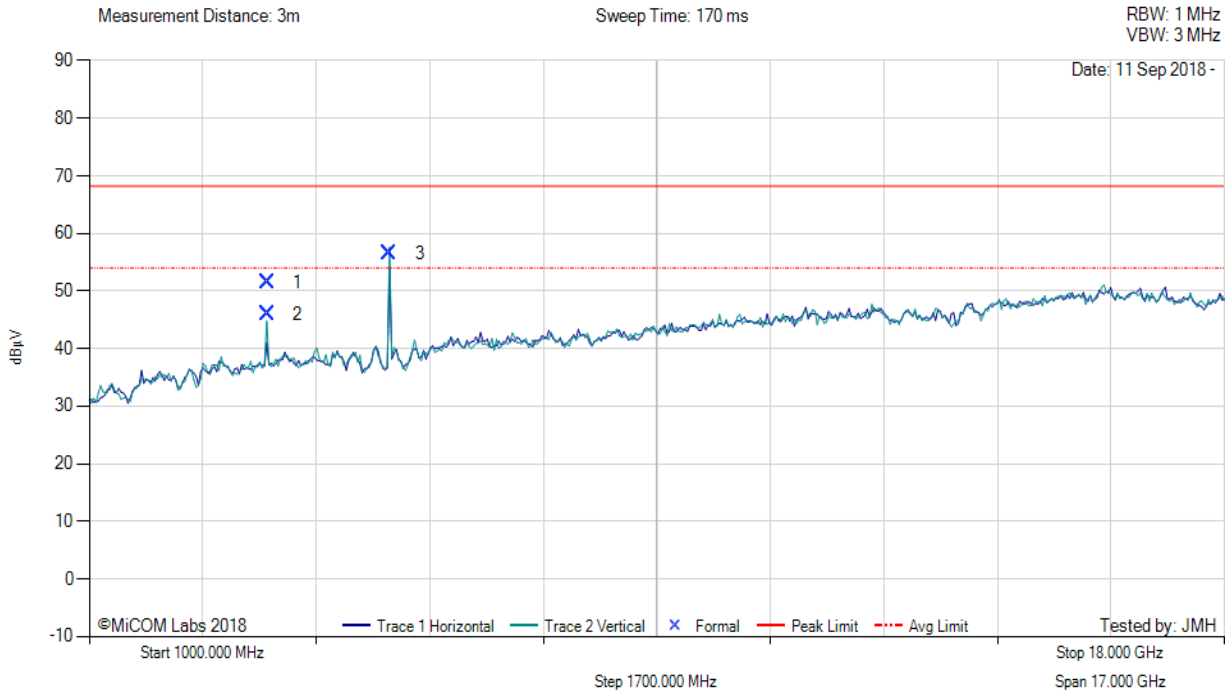


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5318.44	79.17	-2.67	-12.18	64.32	Fundamental	Vertical	200	0	--	--	
2	10640.72	63.14	-4.21	-5.00	53.93	Max Peak	Horizontal	183	143	68.2	-14.3	Pass
3	10640.72	49.33	-4.21	-5.00	40.12	Max Avg	Horizontal	183	143	54.0	-13.9	Pass

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5500.00 MHz, Power Setting: 20, Duty Cycle (%): 94

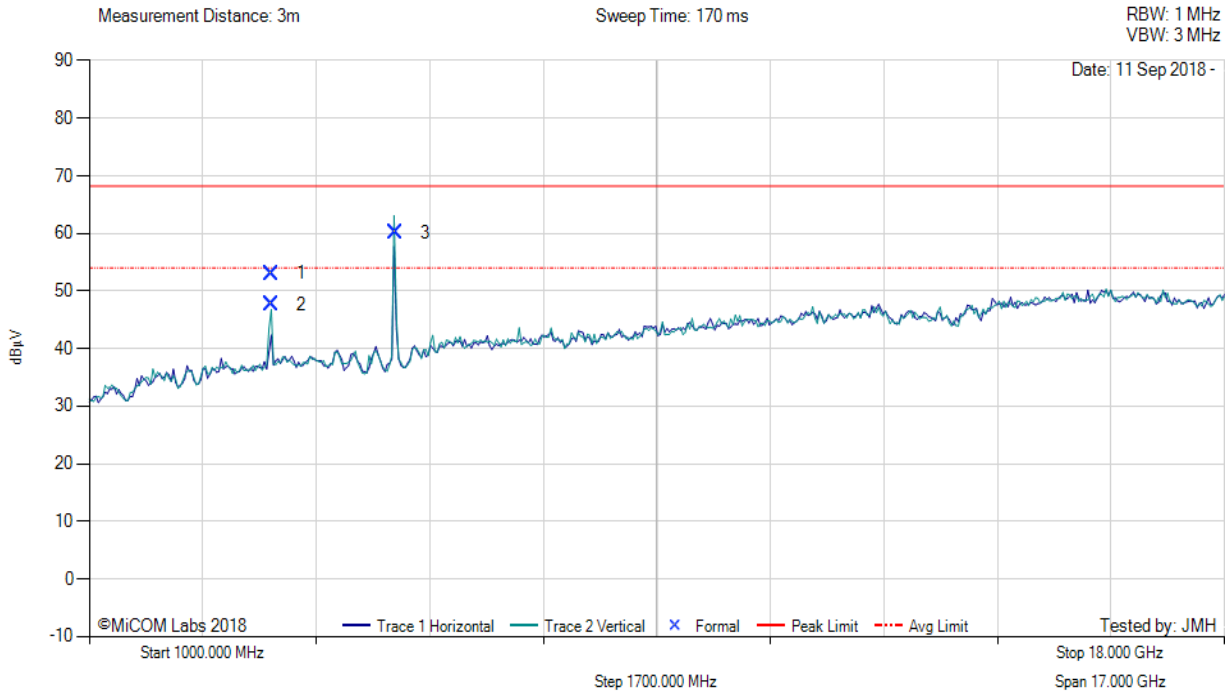


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3666.75	65.31	-2.15	-11.67	51.49	Max Peak	Vertical	137	235	68.2	-16.7	Pass
2	3666.75	59.72	-2.15	-11.67	45.90	Max Avg	Vertical	137	235	54.0	-8.1	Pass
3	5500.25	70.81	-2.70	-11.62	56.49	Fundamental	Vertical	100	0	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5580.00 MHz, Power Setting: 20, Duty Cycle (%): 94

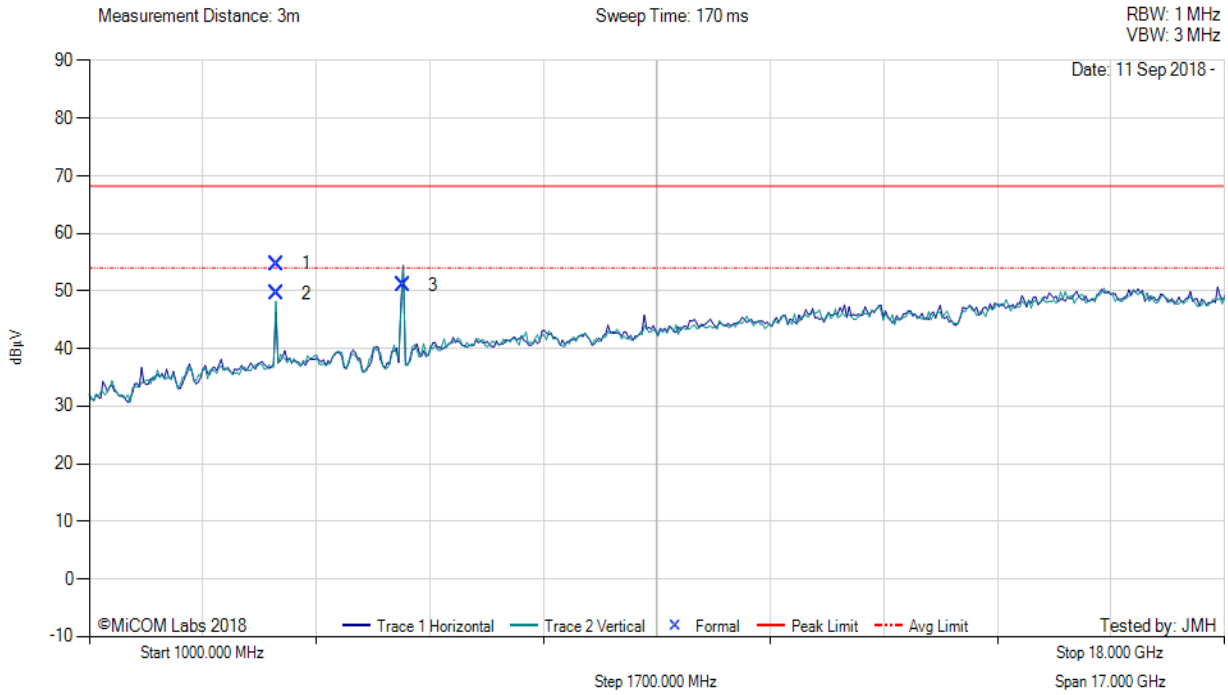


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3720.12	67.01	-2.21	-11.72	53.08	Max Peak	Vertical	98	236	68.2	-15.2	Pass
2	3720.12	61.58	-2.21	-11.72	47.65	Max Avg	Vertical	98	236	54.0	-6.4	Pass
3	5580.06	74.37	-2.77	-11.43	60.17	Fundamental	Vertical	100	0	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5700.00 MHz, Power Setting: 20, Duty Cycle (%): 94

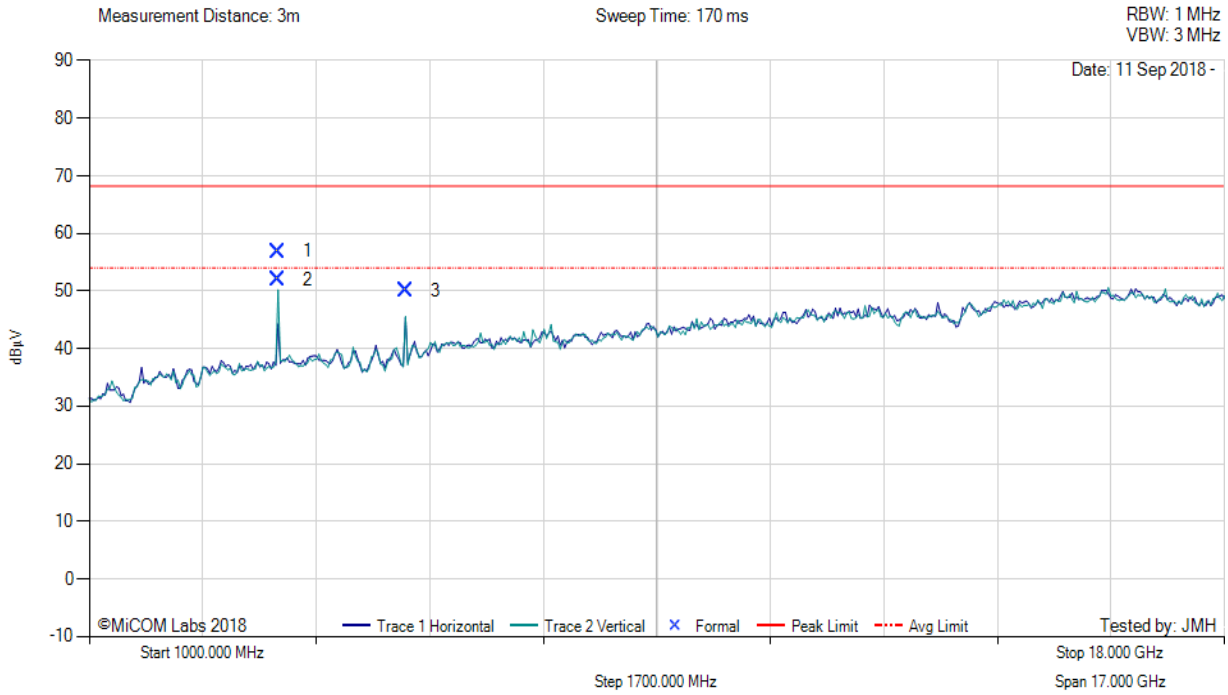


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3800.04	68.51	-2.22	-11.60	54.69	Max Peak	Vertical	105	238	68.2	-13.5	Pass
2	3800.04	63.39	-2.22	-11.60	49.57	Max Avg	Vertical	105	238	54.0	-4.4	Pass
3	5694.51	64.78	-2.77	-10.98	51.03	Fundamental	Horizontal	100	0	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5745.00 MHz, Power Setting: 20, Duty Cycle (%): 94

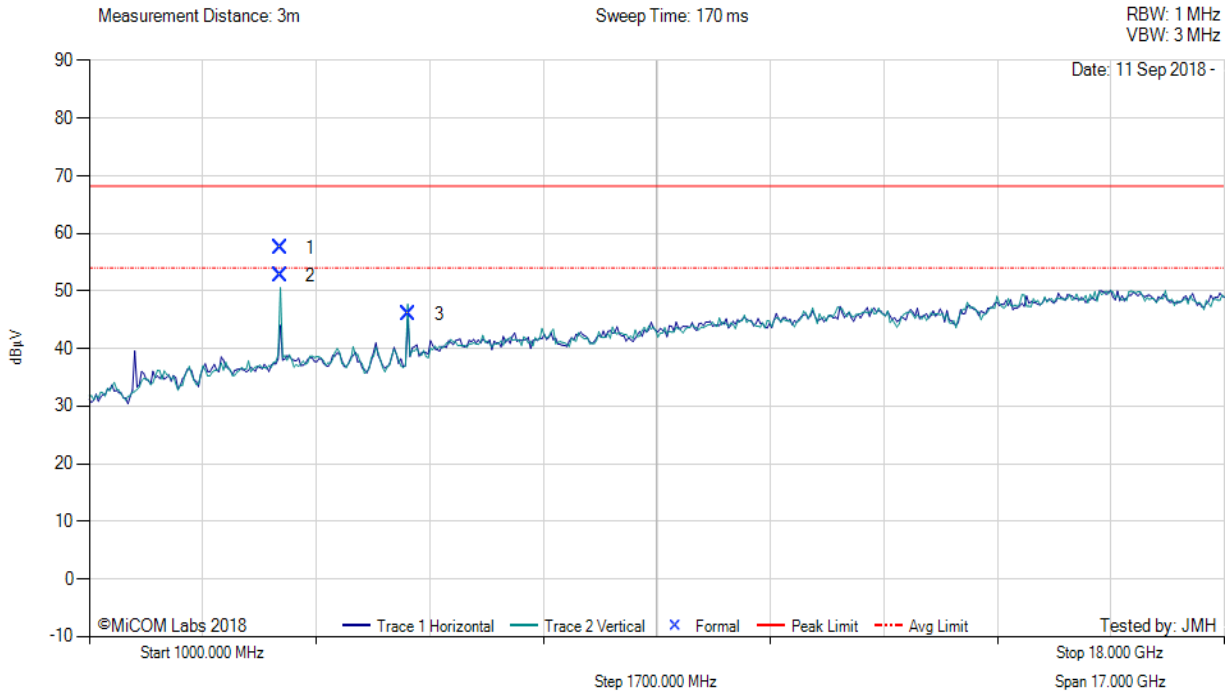


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3829.99	70.85	-2.20	-11.79	56.86	Max Peak	Vertical	100	229	68.2	-11.4	Pass
2	3829.99	65.97	-2.20	-11.79	51.98	Max Avg	Vertical	100	229	54.0	-2.0	Pass
3	5738.61	63.73	-2.75	-10.96	50.02	Fundamental	Vertical	100	336	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5785.00 MHz, Power Setting: 20, Duty Cycle (%): 94

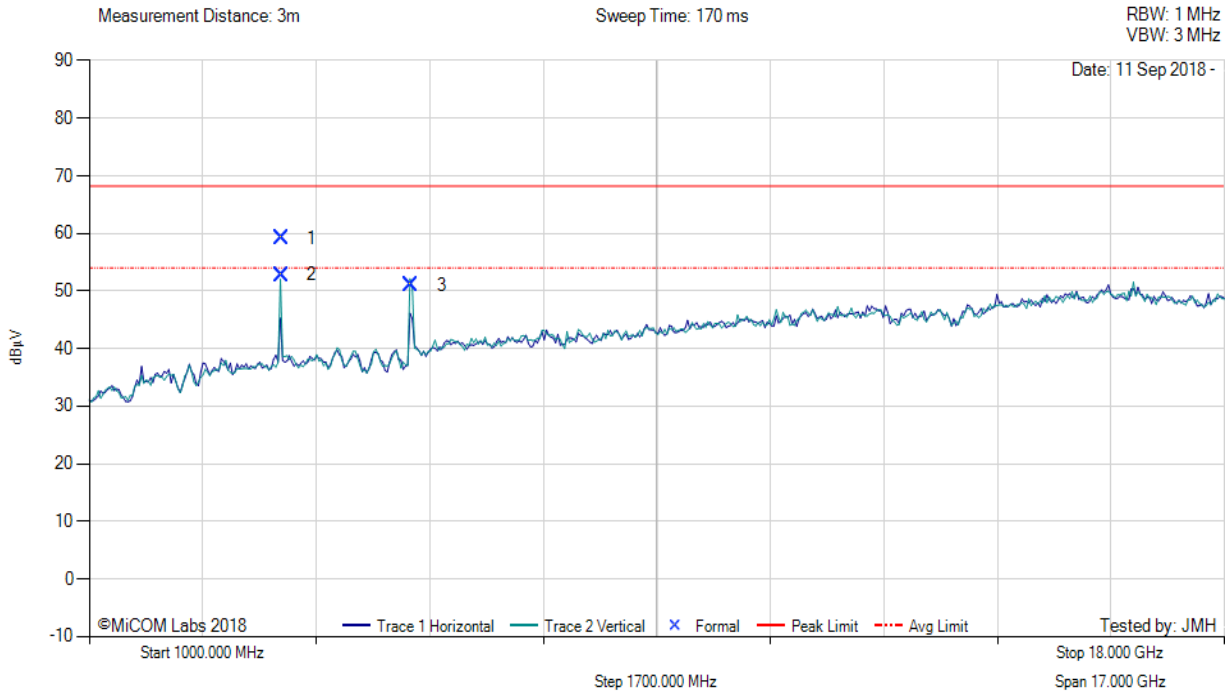


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3856.71	71.22	-2.21	-11.61	57.40	Max Peak	Vertical	132	229	68.2	-10.8	Pass
2	3856.71	66.43	-2.21	-11.61	52.61	Max Avg	Vertical	132	229	54.0	-1.4	Pass
3	5784.20	59.55	-2.76	-10.78	46.01	Fundamental	Vertical	100	0	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

Variant: 802.11a, Test Freq: 5825.00 MHz, Power Setting: 20, Duty Cycle (%): 94



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	3883.37	73.12	-2.24	-11.75	59.13	Max Peak	Vertical	107	221	68.2	-9.1	Pass
2	3883.37	66.83	-2.24	-11.75	52.78	Max Avg	Vertical	107	221	54.0	-1.2	Pass
3	5823.72	64.59	-2.81	-10.77	51.01	Fundamental	Vertical	100	0	--	--	

Test Notes: EUT connected to and powered by laptop. 5G notch in front of amp to prevent overload

back to matrix

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