

Company: Mimosa Networks

Test of: A5c, A5-14, A5-18

To: 15.407 (non-DFS Bands)

Report No.: MIMO09-U5\_Master Rev A

**MASTER TEST REPORT**



# MASTER TEST REPORT



Test of: Mimosa Networks A5C, A5-14, A5-18

To: FCC CFR 47 Part 15 Subpart E 15.407 (non-DFS Bands)

Test Report Serial No.: MIMO09-U5\_Master Rev A

This report supersedes: NONE

As a result of the 6 Mbyte FCC file size limitation potentially large test reports require to be split into smaller components. This document is the Master document controlling Addendum reports as listed below. This Master document combined with the Addendums demonstrate compliance with the standard

Master Document Number	Addendum Reports
MIMO09-U5_Master	MIMO09-U5_Conducted Addendum
	MIMO09-U5_Radiated Addendum
	MIMO09-U2_(FCC Part15B & ICES-003) A5c
	MIMO09-U3_(FCC Part15B & ICES-003) A5-14, A5-18

Applicant: Mimosa Networks  
469 El Camino Real, Suite 100  
Santa Clara, California 95050  
USA

Product Function: 4.9 - 5.8 GHz Wireless Access Point

Issue Date: 2<sup>nd</sup> August 2016

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

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



**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](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>



### **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 4<sup>th</sup> day of February 2016.



Senior Director of Quality & Communications  
For the Accreditation Council  
Certificate Number 2381.01  
Valid to November 30, 2017

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

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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 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](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>



The certificate features a central title "Accredited Product Certification Body" in blue. Above it are the logos for IAF (International Accreditation Forum) and A2LA (American Association for Laboratory Accreditation). Below the title, it states "A2LA has accredited MICOM LABS, Pleasanton, CA". A paragraph explains the accreditation is based on ISO/IEC 17065:2012. A yellow seal on the left side of the certificate reads "CORPORATE SEAL 1978 AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION A2LA". To the right of the seal, it says "Presented this 4<sup>th</sup> day of February 2016." followed by a signature and the name "Senior Director of Quality & Communications For the Accreditation Council Certificate Number 2381.02 Valid to November 30, 2017". At the bottom of the certificate, a note reads: "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

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**Title:** Mimosa Networks A5c, A5-14, A5-18  
**To:** FCC 15.407 non-DFS Bands  
**Serial #:** MIMO09-U5\_Master Rev A  
**Issue Date:** 2<sup>nd</sup> August 2016  
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## 2. DOCUMENT HISTORY

Draft History		
Revision	Date	Comments
Draft	12 <sup>th</sup> July 2016	Initial

Released Document History				
Master		Addendum Revision	Date	Comments
Revision	Date			
Rev A	2 <sup>nd</sup> August 2016	Conducted Rev A	2 <sup>nd</sup> August 2016	Initial Release
		Radiated Rev A	2 <sup>nd</sup> August 2016	
		Part 15B Rev A (A5c)	26 <sup>th</sup> July 2016	
		Part 15B Rev A (A5)	26 <sup>th</sup> July 2016	

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

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### 3. TEST RESULT CERTIFICATE

<b>Manufacturer:</b> Mimosa Networks 469 El Camino Real, Suite 100 Santa Clara California 95050 USA	<b>Tested By:</b> MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
<b>Model(s):</b> A5c, A5-14, A5-18 <b>Equipment Type:</b> 802.11 a/n/ac Wireless Access Point	<b>Telephone:</b> +1 925 462 0304 <b>Fax:</b> +1 925 462 0306
<b>S/N's:</b> A5-14: 2112696984 A5-18: 2119591877 A5c: 2115237991	
<b>Test Date(s):</b> 21 <sup>st</sup> June – 7 <sup>th</sup> July 2016	<b>Website:</b> www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart E 15.407 (non-DFS Bands), FCC Part 15B & ICES-003	EQUIPMENT COMPLIES

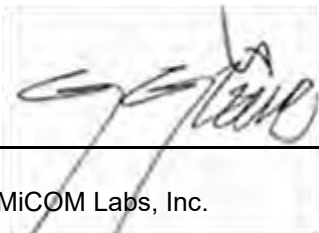
MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

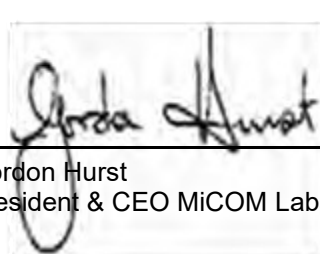
**Notes:**

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 905462 D07 v01r01	8th April 2016	Test guidance to demonstrate compliance for U-NII devices subject to DFS requirements.
III	KDB 926956 D01 v01r06	8th April 2016	U-NII Device Transition Plan
IV	KDB 789033 D02 v01r02	8th April 2016	General UNII Test Procedures New Rules
V	A2LA	June 2015	R105 - Requirement's When Making Reference to A2LA Accreditation Status
VI	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
VII	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
VIII	CISPR 22	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
IX	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
X	FCC 06-96	Jun 30 2006	Memorandum Opinion and Order
XI	FCC 47 CFR Part 15.407	2014	Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices
XII	ICES-003	Issue 6 Jan 2016	Spectrum Management and Telecommunications; Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
XIII	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XIV	RSS-247 Issue 1	May 2015	Digital Transmission Systems (DTSS), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
XV	RSS-Gen Issue 4	November 2014	General Requirements and Information for the Certification of Radiocommunication Equipment
XVI	KDB 644545 D03 v01	August 14th 2014	Guidance for IEEE 802.11ac New Rules
XVII	FCC 47 CFR Part 2.1033	2014	FCC requirements and rules regarding photographs and test setup diagrams.
XVIII	EN 55022	2010 + AC:2011	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

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**To:** FCC 15.407 non-DFS Bands  
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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 Mimosa Networks A5c, A5-14, A5-18 to FCC CFR 47 Part 15 Subpart E 15.407
Applicant:	Mimosa Networks 469 El Camino Real, Suite 100 Santa Clara, California 95050 USA
Manufacturer:	As Applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	MIMO09-U5_Master
Date EUT received:	17 <sup>th</sup> June 2016
Standard(s) applied:	FCC CFR 47 Part 15 Subpart E 15.407
Dates of test (from - to):	21 <sup>st</sup> June – 7 <sup>th</sup> July 2016
No of Units Tested:	4
Type of Equipment:	802.11 a/n/ac Wireless Access Point
Product Family Name:	A5
Model(s):	A5c, A5-14, A5-18
Location for use:	Outdoor
Declared Frequency Range(s):	5150 - 5250 MHz; 5725 - 5850 MHz;
Primary function of equipment:	4.9 - 5.8 GHz Wireless Access Point
Secondary function of equipment:	n/a
Type of Modulation:	OFDM
EUT Modes of Operation:	802.11n ac-20; 802.11n ac-40; 802.11n-ac80
Transmit/Receive Operation:	Transceiver - Half Duplex
Rated Input Voltage and Current:	POE (POE adaptor sold with unit) 55Vdc
Operating Temperature Range:	Declared Range -40°C to +55°C
ITU Emission Designator:	802.11ac-20: 17M8D1D 802.11ac-40: 36M7D1D 802.11ac-80: 77M0D1D
Equipment Dimensions:	A5c: Height 300 mm x Length 151 mm A5-14: Height 321 mm x Length 142 mm A5-18: Height 643 mm x Length 142 mm
Weight:	A5c: 4 lbs A5-14: 4 lbs A5-18: 8 lbs
Hardware Rev:	D
Software Rev:	2.0

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## **5.2. Scope Of Test Program**

### **Mimosa Networks A5-14, A5-18, A5c**

The scope of the test program was to test the Mimosa Networks Models 802.11ac radio with 3 different antenna configurations A5-14, A5-18, and A5c, in the frequency ranges 5150 - 5250 MHz and 5725 - 5850 MHz; for compliance against the following specification:

### **FCC CFR 47 Part 15 Subpart E 15.407**

Radio Frequency Devices; Subpart E – Unlicensed National Information Infrastructure Devices

### **Product Family**

A5-14 : Integral Antennas (see Section 5.4 Antenna Details for antenna)

A5-18 : Integral Antenna (see Section 5.4 Antenna Details for integral antenna gain)

A5c : External Antenna (see Section 5.4 Antenna Details for integral antenna and beam-forming gains)

### **Mimosa Networks A5-14**



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**Mimosa Networks A5-18**



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### Mimosa Networks A5c



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

Type	Description	Manufacturer	Model	Serial no.	Delivery Date
EUT	4.9 - 5GHz Wireless Access Point	Mimosa	A5c	2118161852	17 June 2016
EUT	4.9 - 5GHz Wireless Access Point	Mimosa	A5c	SN114870292	17 June 2016
EUT	4.9 - 5GHz Wireless Access Point	Mimosa	A5-14	2112696984	17 June 2016
EUT	4.9 - 5GHz Wireless Access Point	Mimosa	A5-18	2119591877	17 June 2016

### 5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
external	KP Performance	KPPA-5GHZHV4P65-17 (X4)	Sector Antenna	17.3	-	360	Y	5150 – 5250 5725 - 5850
external	KP Performance	KPPA-5GHZHV4P65-17 (X4)	Sector Antenna	18.0	-	360	Y	5150 – 5250 5725 - 5850
integral	Mimosa	Not Provided	Circular Polarized Panel	8.0	-	360	Y	5150 – 5250 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
Ethernet	100m	1	N		Data

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## 5.6. Test Configurations

Results for the following configurations are provided in this report:

Operational Mode(s) (802.11a/b/g/n/ac)	Data Rate with Highest Power MBit/s	Channel Frequency (MHz)		
		Low	Mid	High
<b>5150 - 5250 MHz</b>				
802.11ac-80	29.3	5,210.00	--	--
802.11ac-20	6.5	5,165.00	5,200.00	5,240.00
802.11ac-40	13.5	5,175.00	--	5,230.00
<b>5725 - 5850 MHz</b>				
802.11ac-80	29.3	5,775.00	--	5,775.00
802.11ac-20	6.5	5,745.00	5,785.00	5,825.00
802.11ac-40	13.5	5,755.00	--	5,795.00

## 5.7. Equipment Modifications

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

1. NONE

## 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	Comments
<b>Conducted Testing</b>	See Report MIMO09-U5_Conducted	
(a) Peak Transmit Power	Complies	
(a) 26 dB & 99% Bandwidth	Complies	
(a)(5) Power Spectral Density	Complies	
<b>Radiated Testing</b>	See Report MIMO09-U5_Radiated	
(b)(2) Radiated Spurious & Band-Edge Emissions	Complies	
KP Performance KPPA-5GHZHV4P65-17 X4	Complies	
Mimosa Networks A5-14	Complies	
Mimosa Networks A5-18	Complies	

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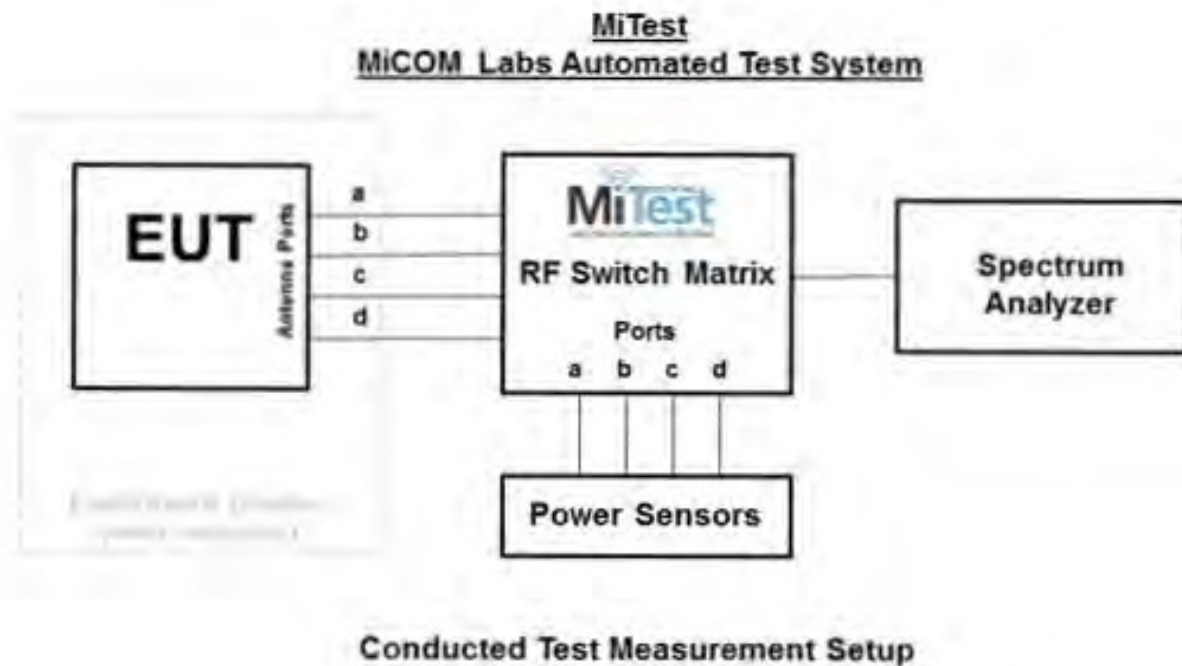
## **7. TEST EQUIPMENT CONFIGURATION(S)**

### **7.1. Conducted**

Conducted RF Emission Test Set-up(s)

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

1. Peak Transmit Power
2. 26 dB & 99% Bandwidth
3. Power Spectral Density



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.



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Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
249	Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	23 Oct 2016
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
361	Desktop for RF#1, Labview Software installed	Dell	Vostro 220	WS RF#1	Not Required
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
380	4x4 RF Switch Box	MiCOM Labs	MiTest RF Switch Box	MIC001	06 Dec 2016
390	USB Power Head 50MHz - 24GHz -60 to +20dBm	Agilent	U2002A	MY50000103	17 Oct 2016
398	Test Software	MiCOM	MiTest ATS	Version 3.0.0.16	Not Required
405	DC Power Supply 0-60V	Agilent	6654A	MY4001826	Cal when used
408	USB to GPIB interface	National Instruments	GPIB-USB HS	14C0DE9	Not Required
436	USB Wideband Power Sensor	Boonton	55006	8731	31 Jul 2016
437	USB Wideband Power Sensor	Boonton	55006	8759	31 Jul 2016
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	13 Aug 2016
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	24 Nov 2016
RF#1 GPIB#1	GPIB cable to Power Supply	HP	GPIB	None	Not Required
RF#1 SMA SA #452	Precision SMA Male RG-402 Spectrun Analyzer	Fairview Microwave	Precision SMA Male RG 402 coax	None	06 Dec 2016
RF#1 SMA#1	EUT to Mitest box port 1	Flexco	SMA Cable port1	None	06 Dec 2016
RF#1 SMA#2	EUT to Mitest box port 2	Flexco	SMA Cable port2	None	06 Dec 2016
RF#1 SMA#3	EUT to Mitest box port 3	Flexco	SMA Cable port3	None	06 Dec 2016
RF#1 SMA#4	EUT to Mitest box port 4	Flexco	SMA Cable port4	None	06 Dec 2016
RF#1 USB#1	USB Cable to Mitest Box	Dynex	USB Cable	None	Not Required

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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
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
170	Video System Chamber Controller	Panasonic	WV-CY101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
302	5150 to 5350 MHz Notch Filter	Microtronics	BRC50703	002	18 Aug 2016
303	5725 to 5875 MHz Notch filter	Microtronics	BRC50705	003	18 Aug 2016
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	15 Aug 2016
343	5.15 GHz Notch Filter	EWT	EWT-14-0200	H1	18 Aug 2016
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
393	DC - 1050 MHz Low Pass Filter	Microcircuits	VLFX-1050	N/A	08 Oct 2016
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	09 Jun 2017
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	10 Oct 2016
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	09 Jun 2017
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
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	Rad Emissions Test Software	MiCOM	Emissions Test Software	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	31 May 2017
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	31 May 2017
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	31 May 2017
482	Cable - Amp to Antenna	SRC Haverhill	157-157-3051574	482	02 Jun 2017

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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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