

Company: Silver Spring Networks

Test of: MicroAP 5
To: FCC CFR 47 Part 15.247 (DTS) &
IC RSS-247 (2400 – 2483.5 MHz)

Report No.: SSNT135-U3_Master Rev A

MASTER TEST REPORT



MASTER TEST REPORT



Test of: Silver Spring Networks MicroAP 5

To: FCC CFR 47 Part 15 15.247 (DTS) &
IC RSS-247 (2400 – 2483.5 MHz)

Test Report Serial No.: SSNT135-U3_Master Rev A

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 to the standard.

| Master Document Number | Addendum Reports |
|------------------------|----------------------|
| SSNT135-U3_Master | SSNT135-U3_Conducted |
| | SSNT135-U3_Radiated |

This report supersedes: NONE

Applicant: Silver Spring Networks
230 W Tasman Drive
San Jose, California 95134
USA

Product Function: Plug in Radio Device

Issue Date: 1st February 2017

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



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>



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 4th 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 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

| Draft History | | |
|---------------|-------------------------------|----------|
| Revision | Date | Comments |
| Draft | 27 th January 2017 | Initial |
| | | |

| Released Document History | | | |
|--------------------------------------|-------------------|-------------------|-----------------|
| Master Revision | Addendum Revision | Date | Comments |
| Rev A, 1 st February 2017 | Rev A Conducted | 1st February 2017 | Initial Release |
| | Rev A Radiated | 1st February 2017 | |
| | | | |
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| | | | |
| | | | |

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

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3. TEST RESULT CERTIFICATE

Manufacturer: Silver Spring Networks
230 W Tasman Drive
San Jose California 95134
USA

Tested By: MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA

Model: NIC 511-NA1-0313, NIC 511-SV1-0313 **Telephone:** +1 925 462 0304

Type Of Equipment: Plug in Radio Device

Fax: +1 925 462 0306

S/N's: 00:13:50:07:00:00:0F:75
00:13:50:07:00:00:0F:70

Test Date(s): 4th January – 16th January 2017

Website: www.micomlabs.com

STANDARD(S)

FCC CFR 47 Part 15 Subpart C 15.247 (DTS)

TEST RESULTS

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 v03r05 | 8th April 2016 | Guidance for performing compliance measurements on Digital Transmission Systems (DTS) operating under section 15.247. |
| III | A2LA | June 2015 | 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 22 | 2008 | Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement |
| 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 | Spectrum Management and Telecommunications; Interference-Causing Equipment Standard. 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 1 | May 2015 | Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |
| XII | RSS-Gen Issue 4 | November 2014 | General Requirements and Information for the Certification of Radiocommunication Equipment |
| XIII | KDB 644545 D03 v01 | August 14th 2014 | Guidance for IEEE 802.11ac New Rules |
| XIV | FCC 47 CFR Part 2.1033 | 2016 | FCC requirements and rules regarding photographs and test setup diagrams. |



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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 Silver Spring Networks MicroAP 5 to FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & IC RSS-247 |
| Applicant: | Silver Spring Networks 230 W Tasman Drive, San Jose California 95134 USA |
| Manufacturer: | Silver Spring Networks |
| Laboratory performing the tests: | MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA |
| Test report reference number: | SSNT135-U3_Master Rev A |
| Date EUT received: | 4 th January 2017 |
| Standard(s) applied: | FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & IC RSS-247 |
| Dates of test (from - to): | 4 th January – 16 th January 2017 |
| No of Units Tested: | 2 |
| Type of Equipment: | Plug in Radio Device |
| Product Family Name: | MicroAP 5 |
| Model(s): | NIC 511-NA1-0313, NIC 511-NA1-0312, NIC 511-SV1-0313, NIC 511-SV1-0312, |
| Location for use: | Indoor/Outdoor |
| Declared Frequency Range(s): | 902 - 928 MHz; 2400 - 2483.5 MHz; |
| Primary function of equipment: | Plug in Radio Device |
| Secondary function of equipment: | Not Provided |
| Type of Modulation: | DTS |
| EUT Modes of Operation: | OFDM, OQPSK |
| Declared Nominal Output Power (Ave): | 30 dBm |
| Transmit/Receive Operation: | Transceiver - Full Duplex |
| Rated Input Voltage and Current: | 4Vdc |
| Operating Temperature Range: | Declared Range -30°C to +70°C |
| ITU Emission Designator: | DTS: OFDM 1M33G1D OQPSK 2M21G1D |
| Equipment Dimensions: | 62.0 mm (W) x 22.8 mm (H) x 110.0 mm (L) |
| Weight: | 0.05 Kg |
| Hardware Rev: | 170-0763-00 |
| Software Rev: | 4.2.0 |

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5.2. Scope Of Test Program

Silver Spring Networks MicroAP 5

The scope of the test program was to test the Silver Spring Networks MicroAP 5, Plug in Radio Device configurations in the frequency ranges 2400 - 2483.5 MHz; for compliance against the following specification:

FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & Industry Canada RSS-247

Radio Frequency Devices; Subpart C – Intentional Radiators and Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Product Description

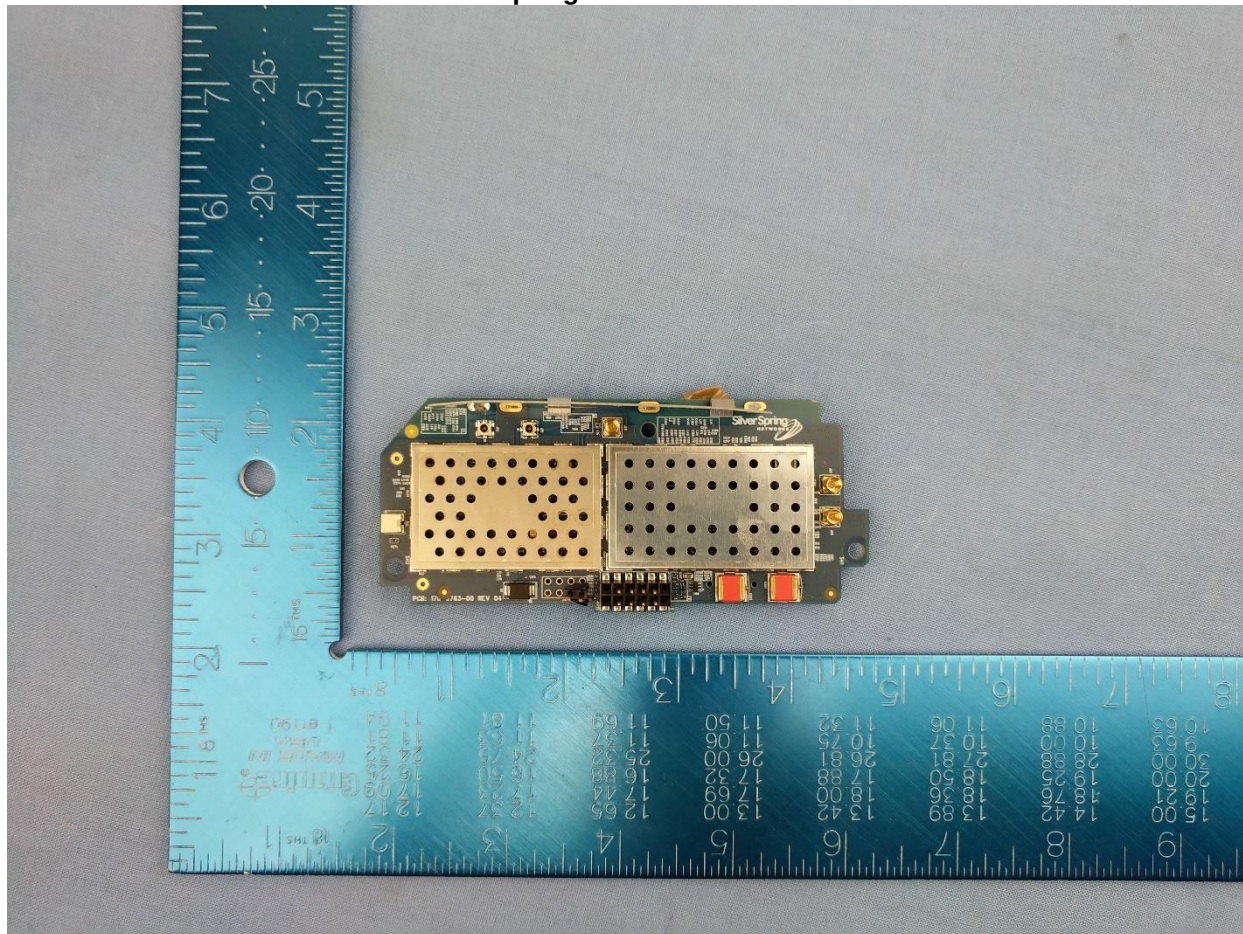
The following product description was provided by the manufacturer.

The Silver Spring Networks MicroAP 5 is a unique implementation of cellular connectivity for meters. Unlike any other point-to-point cellular device, the Silver Spring MicroAP 5 Communications Module supports both cellular/mobile and RF mesh communications simultaneously. Designed to reside in our partner's meters or SocketAP, MicroAP leverages cellular communications for backhaul connectivity and can use the RF mesh communications to connect with other nearby Silver Spring devices using Silver Spring's innovative Micromesh technology.

Co-Location Testing

Co-location measurements were performed on the cellular frequency bands together with the 915 MHz and 2.4 GHz DSSS and FHSS technologies. Test results are available and kept on file by the laboratory.

Silver Spring Networks MicroAP 5



Top View



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

| Type | Description | Manufacturer | Model | Serial no. | Delivery Date |
|------|----------------------|------------------------|-----------|-------------------------|------------------------------|
| EUT | Plug in Radio Device | Silver Spring Networks | MicroAP 5 | 00:13:50:07:00:00:0F:75 | 4 th January 2016 |
| EUT | Plug in Radio Device | Silver Spring Networks | MicroAP 5 | 00:13:50:07:00:00:0F:70 | 4 th January 2016 |

5.4. Antenna Details

| Type | Manufacturer | Model | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|----------|----------------|---------------------|--------|------------|---------|--------|-------|----------------------|
| external | Iarid | TRAB9023NP | 10 | 3.0 | - | 360 | - | 902 - 928 |
| external | Iarid | TRAB9023NP | 10 | 3.0 | - | 360 | - | 2400 - 2483.5 |
| external | Mobile Mark | MGRM-UMB-1C-BLK-120 | 10 | 3.0 | - | 360 | - | 902 - 928 |
| external | Mobile Mark | MGRM-UMB-1C-BLK-120 | 10 | 3.0 | - | 360 | - | 2400 - 2483.5 |
| integral | Tai Sheng Chen | 155-0010-00 | 2 | 2.0 | - | 360 | - | 902 - 928 |
| integral | Tai Sheng Chen | 155-0010-00 | 2 | 5.0 | - | 360 | - | 2400 - 2483.5 |
| external | TAOGLAS | G.30.B108111 | 10 | 1.0 | - | 360 | - | 902 - 928 |
| external | TAOGLAS | G.30.B108111 | 10 | 3.0 | - | 360 | - | 2400 - 2483.5 |
| external | TAOGLAS | GA.107.201111 | 10 | 0.0 | - | 360 | - | 902 - 928 |
| external | TAOGLAS | GA.107.201111 | 10 | 0.0 | - | 360 | - | 2400 - 2483.5 |
| external | WP | WPANT30017-CA | 10 | 3.0 | - | 360 | - | 902 - 928 |
| external | WP | WPANT30017-CA | 10 | 4.5 | - | 360 | - | 2400 - 2483.5 |
| external | WP | WPANT30104-S1C | 10 | 6.0 | - | 360 | - | 902 - 928 |
| external | WP | WPANT30104-S1C | 10 | 0.0 | - | 360 | - | 2400 - 2483.5 |
| external | WP | WPANT40010-C | 2 | 1.0 | - | 360 | - | 902 - 928 |
| external | WP | WPANT40010-C | 2 | 3.5 | - | 360 | - | 2400 - 2483.5 |

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

5.5. Cabling and I/O Ports

* None

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5.6. Test Configurations

Results for the following configurations are provided in this report:

| Channel Spacing (MHz) | Operational Mode(s) (DTS) | Data Rate with Highest Power (Kbps) | Channel Frequency (MHz) | | |
|--------------------------|---------------------------------|---|----------------------------|---------|---------|
| | | | Low | Mid | High |
| 2400 - 2483.5 MHz | | | | | |
| 1.2 | OFDM | 2400.00 | 2401.20 | 2440.80 | 2476.80 |
| 5.0 | OQPSK | 2405.00 | 2405.00 | 2440.00 | 2480.00 |

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 | Data Link |
|---|------------------------------------|-----------|
| Conducted Results | See Report SSNT135-U3_Conducted | |
| 15.247(a)(2) 6 dB & 99% Bandwidth | Complies | |
| 15.247(b), 15.31(e) Conducted Output Power | Complies | |
| 15.247(d) Emissions | Complies | |
| (1) Conducted Emissions | Complies | |
| (i) Conducted Spurious Emissions | Complies | |
| (ii) Conducted Band-Edge Emissions | Complies | |
| 15.247(e) Power Spectral Density | Complies | |
| Radiated Emissions | See Report SSNT135-U3_Radiated | |
| (i) 15.205 Restricted Band Emissions | Complies | |
| (ii) 15.205 Restricted Band-Edge Emissions | Complies | |
| (3) 15.209 Digital Emissions (0.03 - 1 GHz) | Complies | |
| 15.207 AC Wireline Emissions | Not applicable – EUT is DC powered | |

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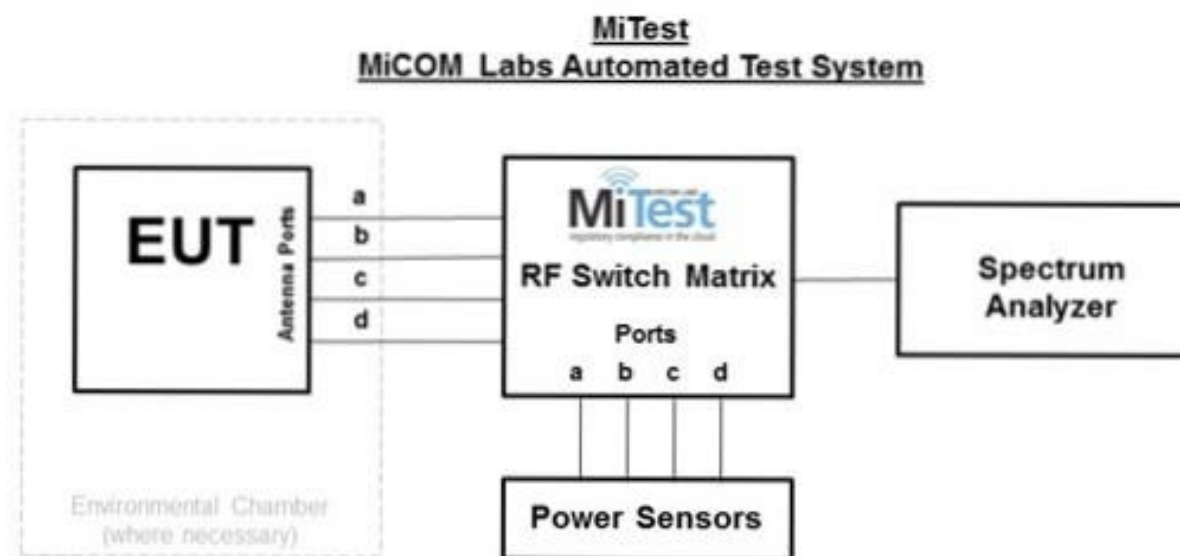
7. TEST EQUIPMENT CONFIGURATION(S)

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. 6 dB & 99% Bandwidth
2. Peak Output Power
3. Power Spectral Density- Peak
4. Conducted Low Band-Edge Emission - Peak
5. Conducted Spurious Emissions - Peak
6. Conducted High Band-Edge Emission - Peak



Conducted Test Measurement 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.



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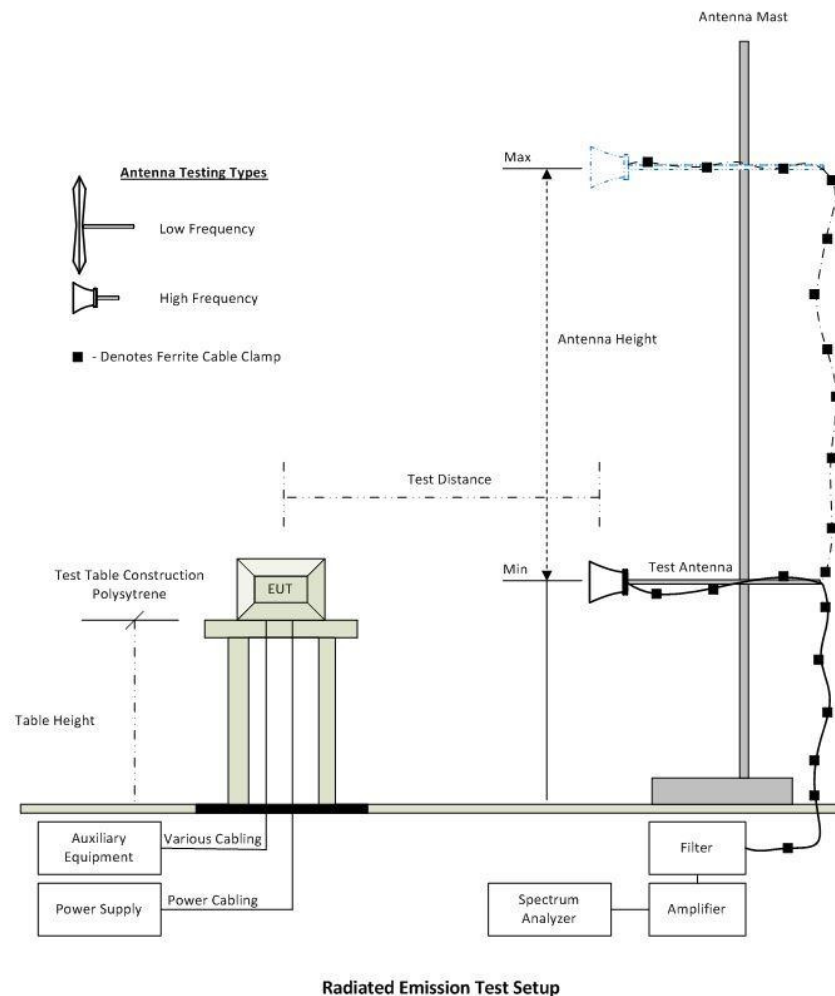
| Asset# | Description | Manufacturer | Model# | Serial# | Calibration Due Date |
|-------------|--|----------------------|----------------------|------------------|----------------------|
| 127 | Power Supply | HP | 6674A | US36370530 | Cal when used |
| 158 | Barometer/Thermometer | Control Company | 4196 | E2846 | 30 Nov 2017 |
| 248 | Resistance Thermometer | Thermotronics | GR2105-02 | 9340 #1 | 21 Oct 2017 |
| 287 | R & S 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 2 May 2017 |
| 378 | Rohde & Schwarz 40 GHz Receiver with Generator | Rhode & Schwarz | ESIB40 | 100107/040 | 4 Aug 2017 |
| 381 | 4x4 RF Switch Box | MiCOM Labs | MiTest RF Switch Box | MIC002 | 2 Jun 2017 |
| 398 | Test Software | MiCOM | MiTest ATS | Version 4.1.0.76 | Not Required |
| 419 | Laptop with Labview Software | Lenova | W520 | TS02 | Not Required |
| 420 | USB to GPIB Interface | National Instruments | GPIB-USB HS | 1346738 | Not Required |
| 440 | USB Wideband Power Sensor | Boonton | 55006 | 9178 | 25 Sep 2017 |
| 442 | USB Wideband Power Sensor | Boonton | 55006 | 9181 | 6 Oct 2017 |
| 445 | PoE Injector | D-Link | DPE-101GL | QTAH1E2000625 | Not Required |
| 460 | Dell Computer | Dell | Optiplex330 | BC944G1 | Not Required |
| 461 | Spectrum Analyzer | Agilent | E4440A | MY46185537 | 13 Aug 2017 |
| 493 | USB Wideband Power Sensor | Boonton | 55006 | 9634 | 10 Mar 2017 |
| 494 | USB Wideband Power Sensor | Boonton | 55006 | 9726 | 10 Mar 2017 |
| 74 | Environmental Chamber Chamber 3 | Tenney | TTC | 12808-1 | 29 Sep 2017 |
| RF#2 GPIB#1 | GPIB cable to Power Supply | HP | GPIB | None | Not Required |
| RF#2 SMA#1 | EUT to Mitest box port 1 | Flexco | SMA Cable port1 | None | 2 Jun 2017 |
| RF#2 SMA#2 | EUT to Mitest box port 2 | Flexco | SMA Cable port2 | None | 2 Jun 2017 |
| RF#2 SMA#3 | EUT to Mitest box port 3 | Flexco | SMA Cable port3 | None | 2 Jun 2017 |
| RF#2 SMA#4 | EUT to Mitest box port 4 | Flexco | SMA Cable port4 | None | 2 Jun 2017 |
| RF#2 SMA#SA | Mitest box to SA | Flexco | SMA Cable SA | None | 2 Jun 2017 |
| RF#2 USB#1 | USB Cable to Mitest Box | Dynex | USB Cable | None | Not Required |

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7.2. Radiated Emissions

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

1. Spurious Emissions
2. Restricted Band-Edge Emissions
3. Radiated Digital Emissions



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 | 30 Nov 2017 |
| 170 | Video System Controller for Semi Anechoic Chamber | Panasonic | WV-CU101 | 04R08507 | Not Required |
| 287 | Rohde & Schwarz 40 GHz Receiver | Rhode & Schwarz | ESIB40 | 100201 | 2 May 2017 |
| 301 | 5470 to 5725 MHz Notch Filter | Microtronics | RBC50704 | 001 | 16 Aug 2017 |
| 302 | 5150 to 5350 MHz Notch Filter | Microtronics | BRC50703 | 002 | 16 Aug 2017 |
| 303 | 5725 to 5875 MHz Notch filter | Microtronics | BRC50705 | 003 | 16 Aug 2017 |
| 330 | Variac 0-280 Vac | Staco Energy Co | 3PN1020B | 0546 | Cal when used |
| 336 | Active loop Ant 10kHz to 30 MHz | EMCO | EMCO 6502 | 00060498 | 26 Sep 2017 |
| 338 | Sunol 30 to 3000 MHz Antenna | Sunol | JB3 | A052907 | 15 Aug 2017 |
| 341 | 900MHz Notch Filter | EWT | EWT-14-0199 | H1 | 16 Aug 2017 |
| 342 | 2.4 GHz Notch Filter | EWT | EWT-14-0203 | H1 | 16 Aug 2017 |
| 343 | 5.15 GHz Notch Filter | EWT | EWT-14-0200 | H1 | 16 Aug 2017 |
| 344 | 5.35 GHz Notch Filter | EWT | EWT-14-0201 | H1 | 16 Aug 2017 |
| 345 | 5.46 GHz Notch Filter | EWT | EWT-14-0202 | H1 | 16 Aug 2017 |
| 346 | 1.6 TO 10GHz High Pass Filter | EWT | EWT-57-0112 | H1 | 16 Aug 2017 |
| 373 | 26III RMS Multimeter | Fluke | Fluke 26 series III | 76080720 | 26 Oct 2017 |
| 377 | Band Rejection Filter 5150 to 5880MHz | Microtronics | BRM50716 | 034 | 16 Aug 2017 |
| 378 | Rohde & Schwarz 40 GHz Receiver with Generator | Rhode & Schwarz | ESIB40 | 100107/040 | 4 Aug 2017 |
| 393 | DC - 1050 MHz Low Pass Filter | Microcircuits | VLFX-1050 | N/A | 16 Aug 2017 |
| 396 | 2.4 GHz Notch Filter | Microtronics | BRM50701 | 001 | 16 Aug 2017 |
| 397 | Amp 10 - 2500MHz | MiCOM Labs | Amp 10 - 2500 MHz | NA | 9 Jun 2017 |
| 399 | ETS 1-18 GHz Horn Antenna | ETS | 3117 | 00154575 | 10 Apr 2017 |
| 406 | Amplifier for Radiated Emissions | MiCOM Labs | 40dB 1 to 18GHz Amp | 0406 | 9 Jun 2017 |
| 410 | Desktop Computer | Dell | Inspiron 620 | WS38 | Not Required |
| 411 | Mast/Turntable Controller | Sunol Sciences | SC98V | 060199-1D | Not Required |

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| | | | | | |
|----------|---|----------------------|---|--------------------|---------------|
| 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 | Rad Emissions Test Software | MiCOM | Rad Emissions Test Software Version 1.0.109 | 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 |
| 465 | Low Pass Filter DC-1000 MHz | Mini-Circuits | NLP-1200+ | VUU01901402 | 2 Jun 2017 |
| 466 | Low Pass Filter DC-1500 MHz | Mini-Circuits | NLP-1750+ | VUU10401438 | 2 Jun 2017 |
| 467 | 2495 to 2650 MHz notch filter | MicroTronics | BRM50709 | 011 | 16 Aug 2017 |
| 468 | Low pass filter | Mini Circuits | SLP-550 | None | 16 Aug 2017 |
| 469 | Low pass filter | Mini Circuit | SLP-1000 | None | 16 Aug 2017 |
| 470 | High Pass filter | Mini Circuits | SHP-700 | None | 16 Aug 2017 |
| 476 | Low Pass dc-2200MHz filter | Mini Circuits | 15542 NLP-2400+ | VUU13801345 | 16 Aug 2017 |
| 480 | Cable - Bulkhead to Amp | SRC Haverhill | 157-157-3050360 | 480 | 2 Jun 2017 |
| 481 | Cable - Bulkhead to Receiver | SRC Haverhill | 151-151-3050787 | 481 | 2 Jun 2017 |
| 482 | Cable - Amp to Antenna | SRC Haverhill | 157-157-3051574 | 482 | 2 Jun 2017 |
| 502 | Test Software for Radiated Emissions | EMISoft | Vasona | Version 5 Build 59 | Not Required |
| 87 | Uninterruptible Power Supply | Falcon Electric | ED2000-1/2LC | F3471 02/01 | Cal when used |
| CC05 | Confidence Check | MiCOM | CC05 | None | 26 Apr 2017 |
| VLF-1700 | Low pass filter DC-1700 MHz | Mini Circuits | VLF-1700 | None | 31 May 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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