

Test of Spectralink Wireless IP Telephone

To: FCC 47 CFR Part 15.101

Test Report Serial No.: SPEC27-PCA 3.1 Rev A



TEST REPORT

FROM



Test of Spectralink Wireless IP Telephone

to

To FCC 47 CFR Part 15.101

Test Report Serial No.: SPEC27-PCA 3.1 Rev A

This report supersedes: NONE

Applicant: Spectralink Corporation
2560 55th Street,
Boulder, Colorado, 80301
USA

Product Function: Wireless IP Telephone

Copy No: pdf Issue Date: 29th January 2014

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.

575 Boulder Court
Pleasanton, CA 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



Title: Spectralink Wireless IP Telephone
To: FCC 47 CFR Part 15.101
Serial #: SPEC27-PCA 3.1 Rev A
Issue Date: 29th January 2014
Page: 3 of 31

This page has been left intentionally blank



TABLE OF CONTENTS

ACCREDITATION, LISTINGS & RECOGNITION	5
ACCREDITATION & LISTINGS.....	5
RECOGNITION.....	6
PRODUCT CERTIFICATION	7
1. TEST RESULT CERTIFICATE	9
2. REFERENCES AND MEASUREMENT UNCERTAINTY	10
2.1. Normative References	10
2.2. Test and Uncertainty Procedures.....	11
3. PRODUCT DETAILS AND TEST CONFIGURATIONS	12
3.1. Technical Details.....	12
3.2. Scope of Test Program	13
3.3. Equipment Model(s) and Serial Number(s)	15
3.4. Antenna Details.....	15
3.5. Cabling and I/O Ports.....	15
3.6. Test Configurations.....	16
3.7. Equipment Modifications	16
3.8. Deviations from the Test Standard	16
4. TEST EQUIPMENT CONFIGURATION(S).....	17
4.1. Digital Emissions Test Set-up (0.03 – 1 GHz)	17
5. TEST SUMMARY	18
6. TEST RESULTS.....	19
6.1. Device Characteristics	19
6.1.1. <i>Radiated Emissions</i>	19
6.1.2. <i>AC Wireline Conducted Emissions (150 kHz – 30 MHz)</i>	22
7. PHOTOGRAPHS.....	26
7.1. Test Setup – Radiated Emissions	26
7.2. Test Setup – ac Wireline Emissions.....	28
8. TEST EQUIPMENT	30

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

ACCREDITATION, LISTINGS & RECOGNITION

ACCREDITATION & LISTINGS

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



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

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

Presented this 27th day of March 2012.



President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to February 28, 2014
Revised November 11, 2013

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

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



RECOGNITION

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

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 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	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.

Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing

Phase II – recognition for both product testing and certification

N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.

Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

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

PRODUCT CERTIFICATION

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



The American Association for Laboratory Accreditation

"World Class Accreditation"

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA


for technical competence as a

Product Certification Body

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

Presented this 27th day of March 2012.




President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to February 28, 2014
Revised November 11, 2013

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)

TCB Identifier – US0159

Industry Canada – Certification Body

CAB Identifier – US0159

Europe – Notified Body

Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB)

RCB Identifier - 210

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



Title: Spectralink Wireless IP Telephone
To: FCC 47 CFR Part 15.101
Serial #: SPEC27-PCA 3.1 Rev A
Issue Date: 29th January 2014
Page: 8 of 31

DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	29 th January 2014	
Rev A	29 th January 2014	Initial Release

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



Title: Spectralink Wireless IP Telephone
To: FCC 47 CFR Part 15.101
Serial #: SPEC27-PCA 3.1 Rev A
Issue Date: 29th January 2014
Page: 9 of 31

1. TEST RESULT CERTIFICATE

Manufacturer: Spectralink Corporation 2560 55th Street, Boulder, Colorado, 80301 USA	Tested By: MiCOM Labs, Inc. 575 Boulder Court Pleasanton California, 94566, USA
EUT: Wireless IP Telephone	Telephone: +1 925 462 0304
Model(s): 8753/8741	Fax: +1 925 462 0306
S/N's: Development Model	
Test Date(s): 28th January 2014	Website: www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.101	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:



TESTING CERT #2381.01

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

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

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
i.	FCC 47 CFR Part 15, Subpart C	2013	Title 47: Telecommunication PART 15—RADIO FREQUENCY DEVICES Subpart C—Intentional Radiators
ii.	RSS-210 Annex 8	2010	Radio Standards Specification 210, Issue 8, Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
iii.	FCC OET KDB 662911	4 th April 2011	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
iv.	DA 00-705	2000	FCC DA 00-705 “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” released March 30, 2000
v.	RSS-GEN	2010	Radio Standards Specification-Gen, Issue 3, General Requirements and Information for the Certification of Radiocommunication Equipment
vi.	FCC 47 CFR Part 15, Subpart B	2010	47 CFR Part 15, SubPart B; Unintentional Radiators
vii.	ICES-003	2004	Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard Digital Apparatus; Issue 4
viii.	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ix.	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
x.	M 3003	Edition 2 Jan. 2007	Expression of Uncertainty and Confidence in Measurements
xi.	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
xii.	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
xiii.	A2LA	July 2012	Reference to A2LA Accreditation Status – A2LA Advertising Policy

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



Title: Spectralink Wireless IP Telephone
To: FCC 47 CFR Part 15.101
Serial #: SPEC27-PCA 3.1 Rev A
Issue Date: 29th January 2014
Page: 11 of 31

2.2. Test and Uncertainty Procedures

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

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

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

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

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Spectralink Wireless IP Telephone Wireless IP telephone to FCC Part 15.247 and Industry Canada RSS-210 regulations.
Applicant:	Spectralink Corporation 2560 55th Street, Boulder, Colorado, 80301 USA
Manufacturer:	Celestica (Thailand) Ltd 49/18 Moo 5, Laem Chabang Industrial Estate Tungskhla, Chonburi, Thailand 20230
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton, California 94566 USA
Test report reference number:	SPEC27-PCA 3.1 Rev A
Date EUT received:	24 th October 2013
Standard(s) applied:	FCC 47 CFR Part 15.101
Dates of test (from - to):	28th January 2014
No of Units Tested:	One: Radiated Testing, USB Data Transfer
Type of Equipment:	Wireless IP Telephone
Manufacturers Trade Name:	Spectralink
Model(s):	8753/8741
Location for use:	Indoor
Declared Frequency Range(s):	2400 - 2483.5 MHz & 5725 – 5850 MHz
Hardware Rev	930-0002-005REVM1
Software Rev	Build 3796
Rated Input Voltage and Current:	3.6 Vdc (Battery)
Operating Temperature Range:	Declared range 0° to +40°C
Equipment Dimensions:	144.6 (h) x 77.2 (w) x 27.3 (t) mm
Weight:	250 grams
Primary function of equipment:	Wireless Telephony with USB Data Communication

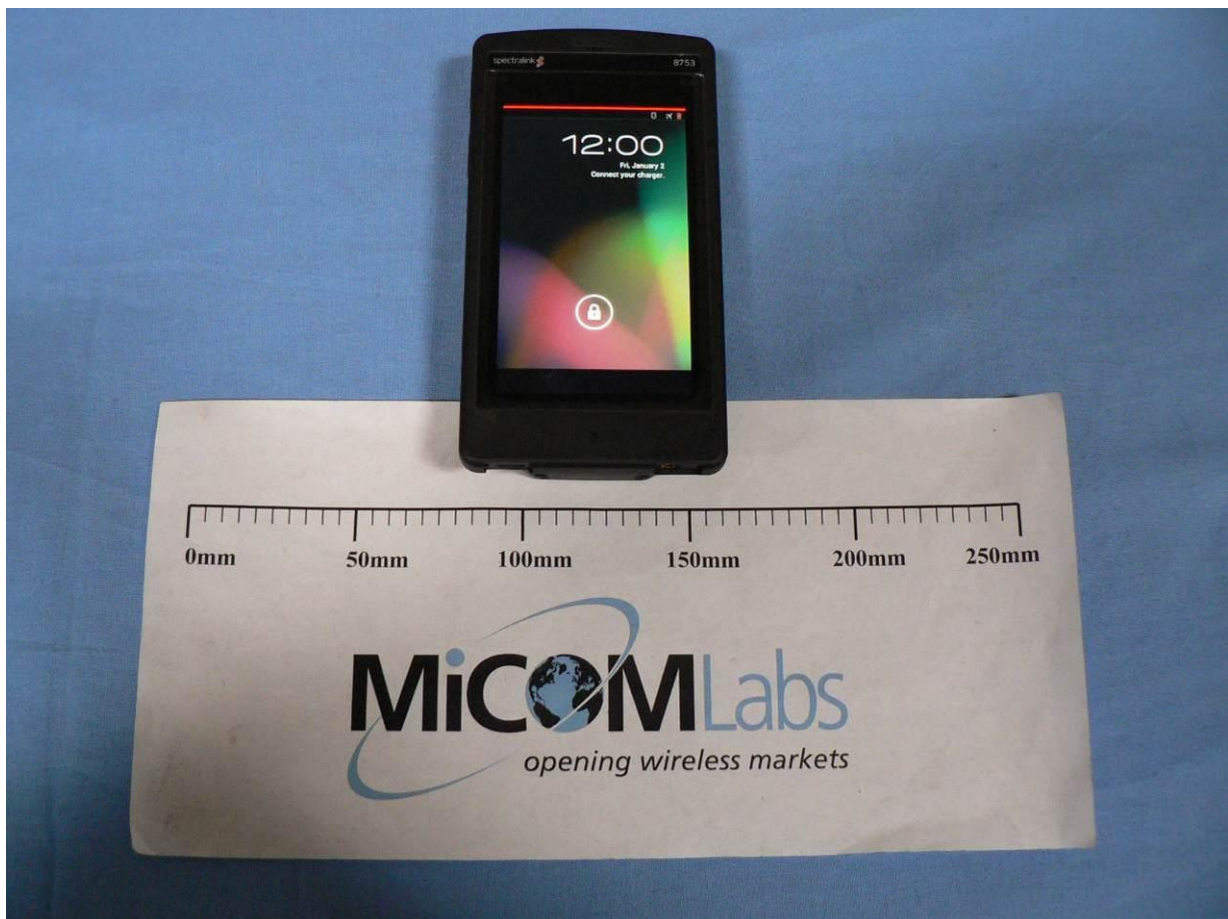
This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

3.2. Scope of Test Program

Spectralink Wireless IP Telephone RF Testing

The scope of the test program was to test the Spectralink Wireless IP Telephone for compliance against FCC 47 CFR Part 15.101 specification for certification purposes.

Spectralink Wireless IP Telephone (Front)



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

Spectralink Wireless IP Telephone (Rear)



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

Equipment Type	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Wireless IP Phone (Radiated Test Phone)	Spectralink	8741	Development Model
Support	Laptop PC	IBM	Thinkpad	None
Support	Printer	Hewlett Packard	HP	None
Support	Mouse	Dell		None

3.4. Antenna Details

Antenna Type	Manufacturer	Model Number	Antenna Gain (dBi)	
			2.4 GHz	5 GHz
Plated on PCB	Spectralink	Not Applicable	1.2	4.0

3.5. Cabling and I/O Ports

Number and type of I/O ports

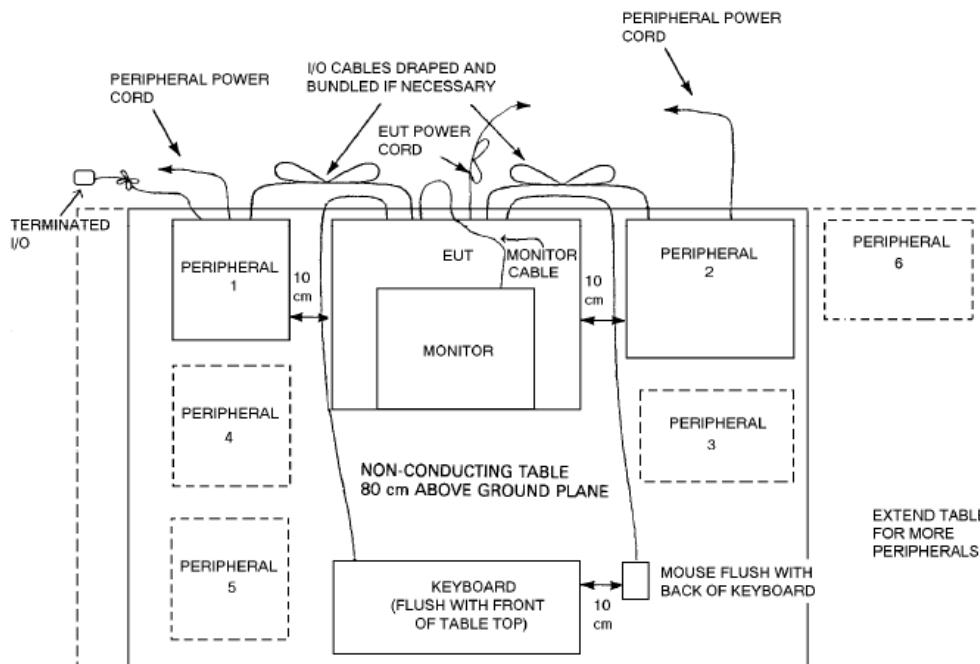
1. 1 x Micro USB On The Go (OTG) + Charging

3.6. Test Configurations

Radiated emission testing was performed on the 8741 Wireless IP Telephone. No wireless communications were enabled during the test period. USB data communication was performed from the laptop to the telephone USB port. A large file was transferred during the emissions testing to exercise the USB port. Data emanated from the laptop to the IP Phone.

NOTE: USB data communication limited to a maximum speed provided by release 1.2. Data rates higher than the 1.2 release will not comply with radiated emission limits.

Test configuration per ANSI 63.4



3.7. Equipment Modifications

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

1. NONE

3.8. Deviations from the Test Standard

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

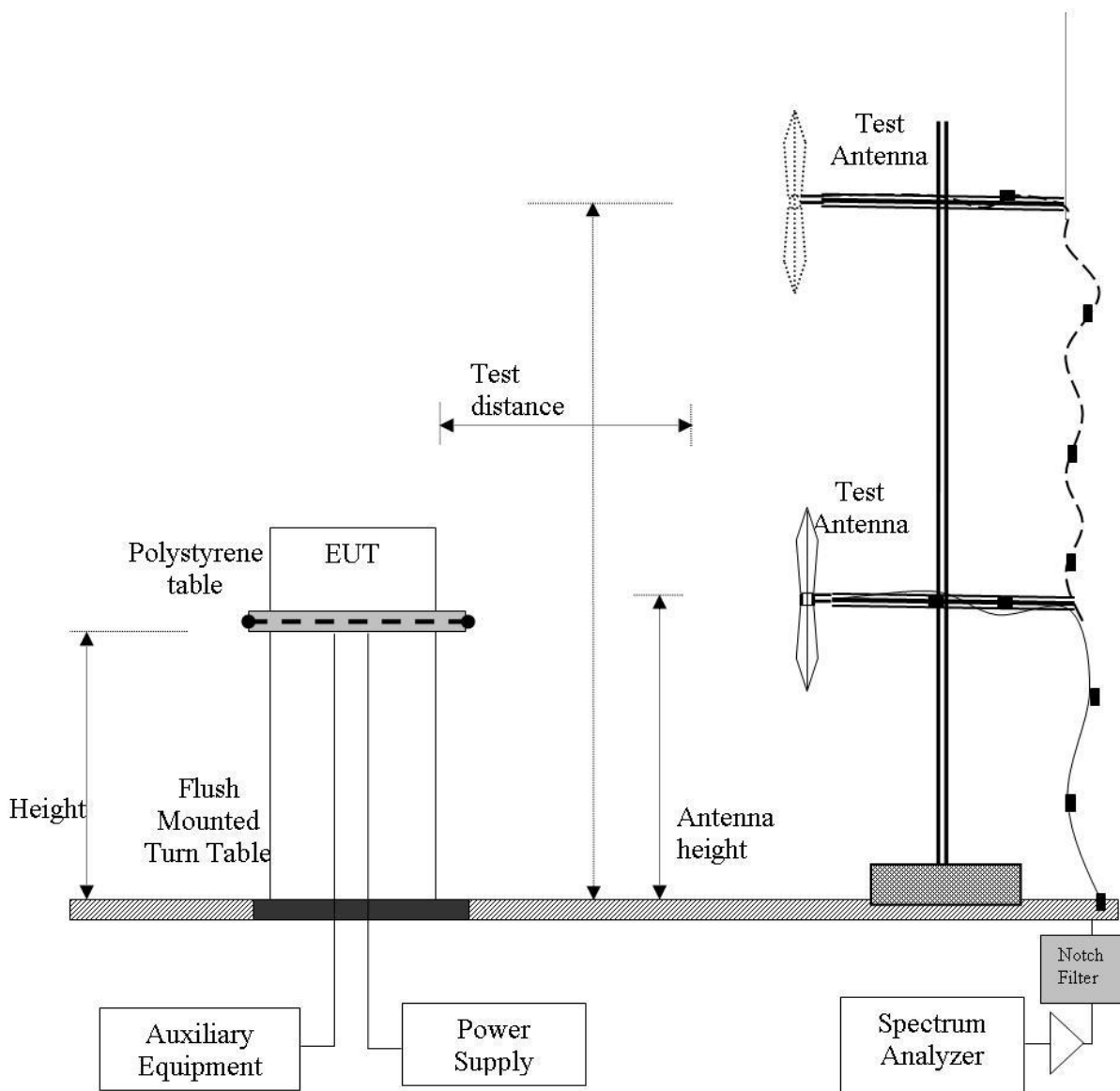
1. NONE

4. TEST EQUIPMENT CONFIGURATION(S)

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

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

Digital Emission Measurement Setup – Below 1 GHz



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



5. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR 47 Part 15.101**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.101	Radiated Emissions	Digital Emissions	Radiated	Complies	6.1.1
	Ac Wireline Emissions	Ac Mains	Conducted	Complies	6.1.2

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

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

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

6. TEST RESULTS

6.1. Device Characteristics

6.1.1. Radiated Emissions

Test Procedure

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

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

Field Strength Calculation

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

$$FS = R + AF + CORR$$

where:

FS = Field Strength

R = Measured Receiver Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss

AG = Amplifier Gain

For example:

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

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

Conversion between dB μ V/m (or dB μ V) and μ V/m (or μ V) are done as:

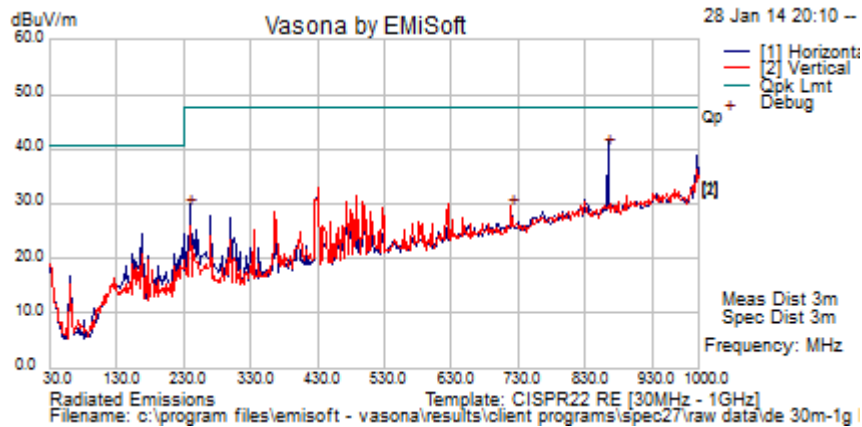
$$\text{Level (dB}\mu\text{V}/\text{m)} = 20 * \text{Log (level (\mu\text{V}/\text{m}))}$$

$$40 \text{ dB}\mu\text{V}/\text{m} = 100\mu\text{V}/\text{m}$$

$$48 \text{ dB}\mu\text{V}/\text{m} = 250\mu\text{V}/\text{m}$$



Test Freq.	NA	Engineer	JMH
Variant	Digital Emissions	Temp (°C)	19.5
Freq. Range	30 MHz - 1000 MHz	Rel. Hum.(%)	35
Power Setting	NA	Press. (mBars)	1007
Antenna	NA		
Test Notes 1	File Transfer on Unit B. Maximum data transfer limited to USB Release 1.2		
Test Notes 2	Battery powered		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	PoI	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
864.138	40.7	7.0	-7.6	40.110	Peak [Scan]	H	98	-1	47.5	-7.4	Pass	
240.083	43.1	4.8	-18.7	29.1	Peak [Scan]	H	98	-1	47.5	-18.4	Pass	
720.269	32.0	6.6	-9.3	29.2	Peak [Scan]	H	98	-1	47.5	-18.3	Pass	

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

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



Specification

Limits

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

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

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

§15.209 (a) and Industry Canada RSS-Gen §7.2.5 Limit Matrix

Frequency(MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

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

Traceability

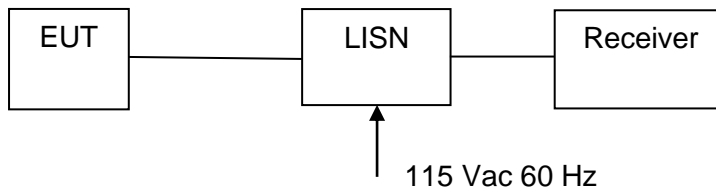
Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

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

Test Procedure

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

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

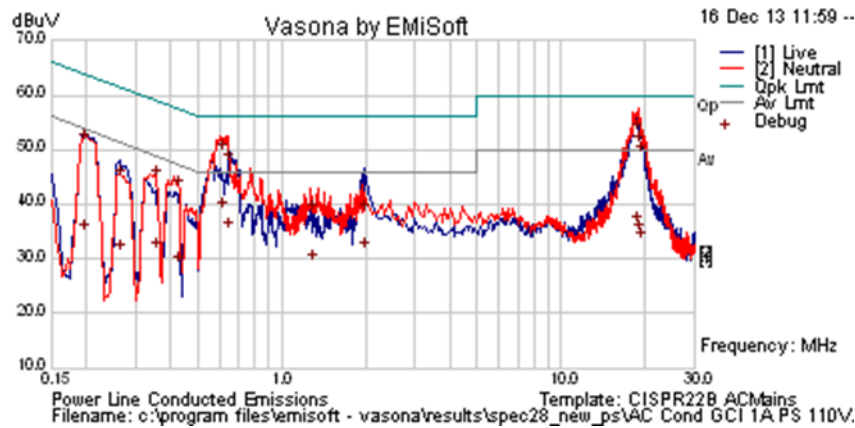
Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

Ambient conditions.

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



Test Freq.	N/A	Engineer	JMH
Variant	AC Line Emissions	Temp (°C)	11
Freq. Range	0.150 MHz - 30 MHz	Rel. Hum.(%)	27
Power Setting	Maximum	Press. (mBars)	1002
Antenna	Not Applicable		
Test Notes 1	110V 60 Hz PS GCI 1 A		



Formally measured emission peaks

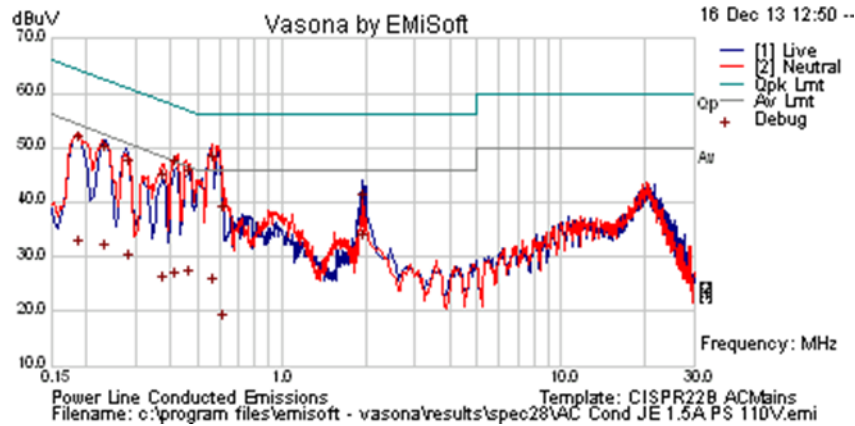
Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.195	41.1	9.9	0.1	51.1	Quasi Peak	Live	63.82	-12.8	Pass	
0.195	24.7	9.9	0.1	34.6	Average	Live	53.82	-19.2	Pass	
0.261	21.0	9.9	0.1	30.9	Average	Live	51.4	-20.5	Pass	
0.261	34.6	9.9	0.1	44.6	Quasi Peak	Live	61.4	-16.8	Pass	
0.352	21.3	9.9	0.1	31.3	Average	Neutral	48.92	-17.6	Pass	
0.352	34.6	9.9	0.1	44.5	Quasi Peak	Neutral	58.92	-14.4	Pass	
0.423	32.9	9.9	0.1	42.8	Quasi Peak	Neutral	57.39	-14.6	Pass	
0.423	18.8	9.9	0.1	28.7	Average	Neutral	47.39	-18.6	Pass	
0.614	39.3	10.0	0.1	49.4	Quasi Peak	Neutral	56	-6.6	Pass	
0.614	28.7	10.0	0.1	38.7	Average	Neutral	46	-7.3	Pass	
0.638	37.6	10.0	0.1	47.7	Quasi Peak	Neutral	56	-8.3	Pass	
0.638	25.1	10.0	0.1	35.1	Average	Neutral	46	-10.9	Pass	
1.273	28.3	10.0	0.1	38.4	Quasi Peak	Neutral	56	-17.7	Pass	
1.273	19.1	10.0	0.1	29.2	Average	Neutral	46	-16.9	Pass	
1.953	21.2	10.0	0.1	31.4	Average	Live	46	-14.6	Pass	
1.953	28.2	10.0	0.1	38.4	Quasi Peak	Live	56	-17.7	Pass	
18.699	24.9	10.5	0.7	36.1	Average	Neutral	50	-13.9	Pass	
18.699	41.9	10.5	0.7	53.1	Quasi Peak	Neutral	60	-6.9	Pass	
18.980	39.6	10.5	0.7	50.8	Quasi Peak	Neutral	60	-9.2	Pass	
18.980	23.6	10.5	0.7	34.8	Average	Neutral	50	-15.2	Pass	
19.094	37.9	10.5	0.7	49.2	Quasi Peak	Neutral	60	-10.8	Pass	
19.094	21.9	10.5	0.7	33.1	Average	Neutral	50	-16.9	Pass	

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

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



Test Freq.	N/A	Engineer	JMH
Variant	AC Line Emissions	Temp (°C)	11
Freq. Range	0.150 MHz - 30 MHz	Rel. Hum.(%)	27
Power Setting		Press. (mBars)	1002
Antenna			
Test Notes 1	110V 60 Hz JE1.5A Power Supply		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.186	21.4	9.9	0.1	31.4	Average	Neutral	54.2	-22.8	Pass	
0.186	40.6	9.9	0.1	50.6	Quasi Peak	Neutral	64.2	-13.6	Pass	
0.232	38.8	9.9	0.1	48.8	Quasi Peak	Live	62.38	-13.6	Pass	
0.232	20.5	9.9	0.1	30.5	Average	Live	52.38	-21.9	Pass	
0.279	36.2	9.9	0.1	46.2	Quasi Peak	Live	60.83	-14.7	Pass	
0.279	18.7	9.9	0.1	28.7	Average	Live	50.83	-22.1	Pass	
0.374	14.9	9.9	0.1	24.8	Average	Neutral	48.42	-23.6	Pass	
0.374	33.5	9.9	0.1	43.5	Quasi Peak	Neutral	58.42	-15.0	Pass	
0.408	15.7	9.9	0.1	25.6	Average	Neutral	47.69	-22.1	Pass	
0.408	36.0	9.9	0.1	45.9	Quasi Peak	Neutral	57.69	-11.8	Pass	
0.459	15.7	9.9	0.1	25.7	Average	Neutral	46.7	-21.0	Pass	
0.459	34.4	9.9	0.1	44.4	Quasi Peak	Neutral	56.7	-12.3	Pass	
0.564	14.3	9.9	0.1	24.3	Average	Neutral	46	-21.7	Pass	
0.564	36.9	9.9	0.1	46.9	Quasi Peak	Neutral	56	-9.1	Pass	
1.948	22.2	10.0	0.1	32.3	Average	Live	46	-13.7	Pass	
1.948	29.8	10.0	0.1	39.9	Quasi Peak	Live	56	-16.1	Pass	

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

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

Specification

Limit

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 $\mu\Omega$ line impedance stabilization network (LISN), see §15.207 (a) matrix below. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

§15.207 (a) Limit Matrix

The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

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

Traceability

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

7. PHOTOGRAPHS

7.1. Test Setup – Radiated Emissions



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

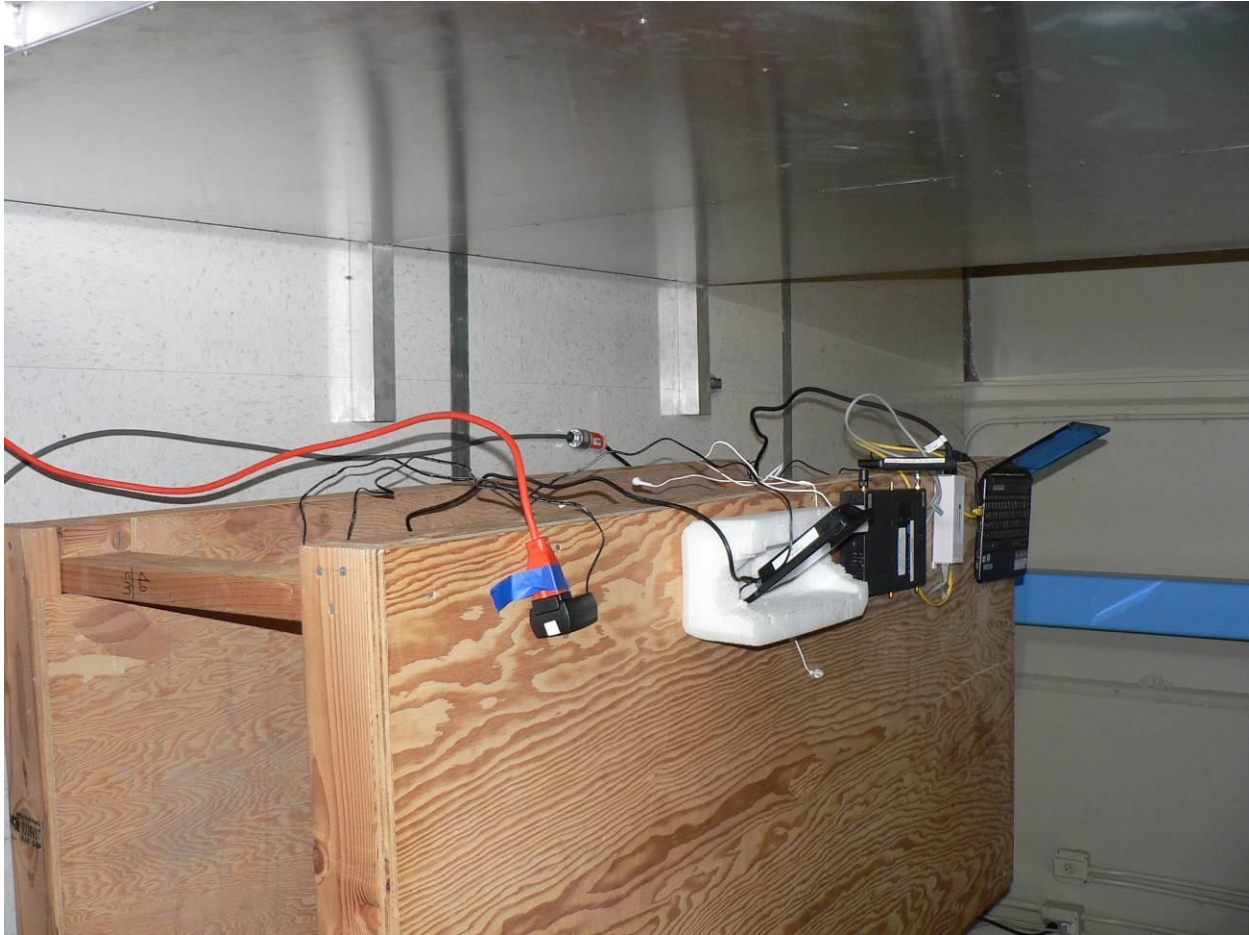


This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

7.2. Test Setup – ac Wireline Emissions



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





8. TEST EQUIPMENT

Asset #	Instrument	Manufacturer	Part #	Serial #	Calibration Due Date
0117	Power Sensor	Hewlett Packard	8487D	3318A00371	18 th Oct 14
0223	Power Meter	Hewlett Packard	EPM-442A	US37480256	18 th Oct 14
0376	Power Sensor	Agilent	U2000A	MY51440005	28 th Oct 14
0390	Power Sensor	Agilent	U2002A	MY50000103	17 th Oct 14
0158	Barometer /Thermometer	Control Co.	4196	E2846	8 th Jan 14
0193	EMI Receiver	Rhode & Schwartz	ESI 7	838496/007	2 nd Dec 13
0287	EMI Receiver	Rhode & Schwartz	ESIB40	100201	31 st Jul 14
0378	EMI Receiver	Rhode & Schwartz	ESIB40	100107/040	17 th Jul 14
0338	30 - 3000 MHz Antenna	Sunol	JB3	A052907	14 th Aug 14
0399	1-18 GHz Horn Antenna	EMCO	3117	00154575	10 th Oct 14
0252	SMA Cable	Megaphase	Sucoflex 104	None	N/A
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	N/A
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001	N/A
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623	N/A
0359	DFS Test System	Aeroflex	PXI-1042	300001/004	21 st Oct 14
0299	DFS Test Software	Aeroflex	PXI Module	Version 7.1.0	N/A
0502	EMC Test Software	EMISoft	Vasona	5.0051	N/A
0503	RF Conducted Test Software	National Instruments	Labview	Version 8.2	N/A
0398	RF Conducted Test Software	MiCOM Labs ATS	--	Version 1.8	N/A
0380	RF Switch	MiCOM Labs	MIC001	MIC001	20 th Dec 13

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



575 Boulder Court
Pleasanton, California 94566, USA
Tel: 1.925.462.0304
Fax: 1.925.462.0306
www.micomlabs.com