REGULATORY COMPLIANCE TEST REPORT

FCC CFR47 Part 15 SubPart B & ISED ICES-003

Report No.: ALNT92-U2 Rev A

Company: Alien Technology, LLC.

Model ALR-H460

REGULATORY COMPLIANCE TEST REPORT

Test of: Alien Technology, LLC. ALR-H460

To: FCC CFR 47 Part 15B & ISED ICES-003

Test Report Serial No.: ALNT92-U2 Rev A

This report supersedes: NONE

Applicant:	Alien Technology, LLC. Inc. 845 Embedded Way San Jose, California 95138 USA
Product Function	H460 Handheld Reader Kit
Issue Date:	29th August 2019

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
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A2LA ACCREDITED
TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

Table of Contents

1. ACCREDITATION, LISTINGS & RECOGNITION 4
1.1. TESTING ACCREDITATION 4
1.2. RECOGNITION 5
1.3. PRODUCT CERTIFICATION 6
2. DOCUMENT HISTORY 7
3. TEST RESULT CERTIFICATE 8
4. REFERENCES AND MEASUREMENT UNCERTAINTY 9
4.1. Normative References 9
4.2. Test and Uncertainty Procedure 10
5. TEST SUMMARY 11
6. PRODUCT DETAILS AND TEST CONFIGURATIONS 12
6.1. Scope Of Test Program 12
6.2. Technical Details 13
6.3. External A.C/D.C. PoE Adaptor 15
6.4. Equipment Model(s) and Serial Number(s) 15
6.5. Antenna Details 15
6.6. Cabling and I/O Ports 15
6.7. Equipment Modifications 15
6.8. Deviations from the Test Standard 15
6.9. Test Configurations 15
7. TEST RESULTS 17
7.1. EMC EMISSIONS TEST RESULTS 17
7.1.1. Radiated Emissions 17
7.1.1.1. Measurement Results: 30-1000MHz 22
7.1.2. AC Mains Power Input/Output Ports 26
7.1.2.2. Measurement Results 30

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*).

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	23rd July 2019	Draft report for client review.
Draft #2	11th August 2019	2nd draft for comment
Rev A	29th August 2019	Initial Release
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In the above table the latest report revision will replace all earlier versions.

3. TEST RESULT CERTIFICATE

Manufacturer:	Alien Technology, LLC. Inc. 845 Embedded Way San Jose, California 95138 USA	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	ALR-H460	**Telephone:**	+1 925 462 0304
Equipment Type:	Hand-held RFID Reader	**Fax:**	+1 925 462 0306
S/N's:	HC720A190500227		
Test Date(s):	20th June – 10th July 2019	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15B & ISED 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.

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)	FCC CFR 47 Part 15, Subpart B	2018	Title 47 CFR Part 15, Sub Part B; Unintentional Radiators
(ii)	ICES-003, Issue 6	2017	Information Technology Equipment (ITE) – Limits and methods of measurement.
(iii)	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
(iv)	M 3003	Edition 2 Dec. 2007	Expression of Uncertainty and Confidence in Measurements
(v)	LAB34	Edition 1 August 2002	The expression of uncertainty in EMC Testing
(vi)	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
(vii)	A2LA	August 2018	R105 - Requirement's When Making Reference to A2LA Accreditation Status

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.

MiCOM Labs, 575 Boulder Court, Pleasanton, California 94566 USA, Phone: +1 (925) 462 0304, Fax: +1 (925) 462 0306, www.micomlabs.com

5. TEST SUMMARY

List of Measurements

The following table represent the list of measurements required under the FCC CFR 47 Part 15 B and ISED ICES-003 standards;

TABLE OF REQUIRED TESTS – Emissions

Test Standard	Description	Limits	Compliance
FCC Part 15B & ICES-003	Radiated Emissions	Class B	Complies
FCC Part 15B & ICES-003	Conducted Emissions - ac power I/O port	Class B	Complies

6. PRODUCT DETAILS AND TEST CONFIGURATIONS

6.1. Scope Of Test Program

Alien Technology, LLC. ALR-H460

The scope of the test program was to test the Alien Technology, LLC. ALR-H460 for compliance against the following specifications:

- FCC CFR 47 Part 15, Subpart B - Title 47 CFR Part 15, SubPart B; Unintentional Radiators
- ICES-003, Issue 6 - Information Technology Equipment (ITE) – Limits and methods of measurement.

Co-Location or Combination Operational Modes

	BT	Wi-Fi	Cell Data	RFID
BT	--	No	Yes	Yes*
Wi-Fi	No	--	No	Yes*
Cell Data	Yes	No	--	Yes*
RFID	Yes*	Yes*	Yes*	--
*Does not operate simultaneously. Either Cell Data OR Wi-Fi OR BT				

6.2. Technical Details

Details	Description
Purpose:	Test of the Alien Technology, LLC. ALR-H460 to FCC Part 15B and ISED ICES-003 including co-location of transmitter testing
Applicant:	Alien Technology, LLC. Inc. 845 Embedded Way San Jose, California 95138 USA
Manufacturer:	Alien Technology, LLC. Inc.
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	ALNT92-U2 Draft
Date EUT received:	17th July 2019
Standard(s) applied:	FCC CFR 47 Part 15B
Dates of test (from - to):	18th July to 19th July 2019
No of Units Tested:	1
Product Family Name:	Handheld reader assembly
Model(s):	ALR-H460
Location for use:	Indoor/Outdoor
Declared Frequency Range(s):	See following Declared Frequency Range(s) matrix
Type of Modulation:	GSM / GPRS: GMSK EDGE: 8PSK WCDMA: AMR/RMC12.2Kbps HDPA/HSUPA HSPA+ LTE: QPSK / 16QAM 802.11b/g/n HT20/n HT40 802.11a/n HT20/HT40 Bluetooth 2.1 BDR (1Mbps): GFSK Bluetooth 2.1 EDR (2Mbps): π/4-DQPSK Bluetooth 2.1 EDR (3Mbps) : 8-DPSK Bluetooth 4.0 - LE (1Mbps): GFSK RFID: PR-ASK
EUT Modes of Operation:	LTE, 802.11b/g/a/n, FHSS, Bluetooth
Declared Nominal Output Power:	See following Declared Frequency Range(s) matrix
Transmit/Receive Operation:	Transceiver
Rated Input Voltage and Current:	5 Vdc 1 A
Operating Temperature Range:	-20 to+50 ºC
ITU Emission Designator:	See following Declared Frequency Range(s) matrix
Equipment Dimensions:	3.5 x 6.0 x 7.0 in
Weight:	1.5 lb
Hardware Rev:	0501090-001_01
Software Rev:	OS: C72A_MT6735_V1.1_GIT938ee72_20171205 RFID: v3.7.16

Declared Frequency Range(s)

NOTE: The following matrix was client declared

Technology	Frequency Range	O/P Power	ITU Emissions Designator
GSM850	824.2 MHz ~ 848.8MHz	1.83 Watts	248KGXW
GSM1900	1850.2 MHz ~ 1909.8MHz	0.82 watts	244KGXW/251KG7W
WCDMA Band II	1852.4 MHz ~ 1907.6MHz	0.27 watts	4M23F9W
WCDMA Band IV	1712.4 MHz ~ 1752.6MHz	0.22 watts	4M24F9W
WCDMA Band V	826.4 MHz ~ 846.6MHz	0.35 watts	4M22F9W
LTE Band 2	1850 MHz ~ 1910 MHz	0.21 watts	13M5G7D, 13M5G7D, 18M0G7D, 18M1W7D
LTE Band 4	1710 MHz ~ 1755 MHz	0.2 watts	2M74G7D, 1M11W7D, 18M0G7D, 18M1W7D
LTE Band 7	2500 MHz ~ 2570 MHz	0.21 watts	13M5G7D, 13M6W7D, 18M0G7D, 18M1W7D
LTE Band 12	699 MHz ~ 716 MHz	0.017 watts	4M54G7D, 4M54W7D, 9M04G7D, 9M03W7D
LTE Band 17	704 MHz ~ 716 MHz	0.16 watts	4M54G7D, 4M54W7D, 9M03G7D, 9M04W7D
WLAN 2.4GHz	2412 MHz ~ 2472 MHz	0.17 watts	12M6G1D, 16M4D1D 17M6D1D, 35M8D1D
WLAN 5GHz Band 1	5150 MHz ~ 5250 MHz	0.14 watts	16M7D1D, 15M7D1D 36M2D1D
WLAN 5GHz Band 2	5250 MHz ~ 5350 MHz	0.15 watts	16M7D1D, 15M7D1D 36M2D1D
WLAN 5GHz Band 3	5470 MHz ~ 5725 MHz	0.17 watts	16M5D1D, 17M7D1D
WLAN 5GHz Band 4	5725 MHz ~ 5850 MHz	1.13 watts	16M5D1D, 17M7D1D 36M2D1D
Bluetooth	2402 MHz ~ 2480 MHz	0.0039 watts	1M03D1D, 1M04F1D 1M32G1D, 1M29G1D
RFID	902 ~ 928 MHz	1.2 watts	78K0A1D, 78K0K1D
GPS	1575.42MHz		

6.3. External A.C/D.C. PoE Adaptor

Charging Station
Manufacturer: GME Technology Model: GME10D-050200FUu I: 100 – 240 V_{AC} 0.28 MAX, 50-60 Hz 0: 5Vdc 2 A

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

Type (EUT/ Support)	Equipment Description	Manufacturer	Model No.	Serial No.
EUT	H460 Handheld Reader Kit	Alien Technology, LLC.	ALR-H460	HC720A190500227

6.5. Antenna Details

No antennas were tested as part of this program.

6.6. Cabling and I/O Ports

Port Type	Port Description	Qty	Screened (Yes/ No)	Length
USB	USB Data/Power	1	Yes	< 3m

6.7. Equipment Modifications

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

1. NONE

6.8. Deviations from the Test Standard

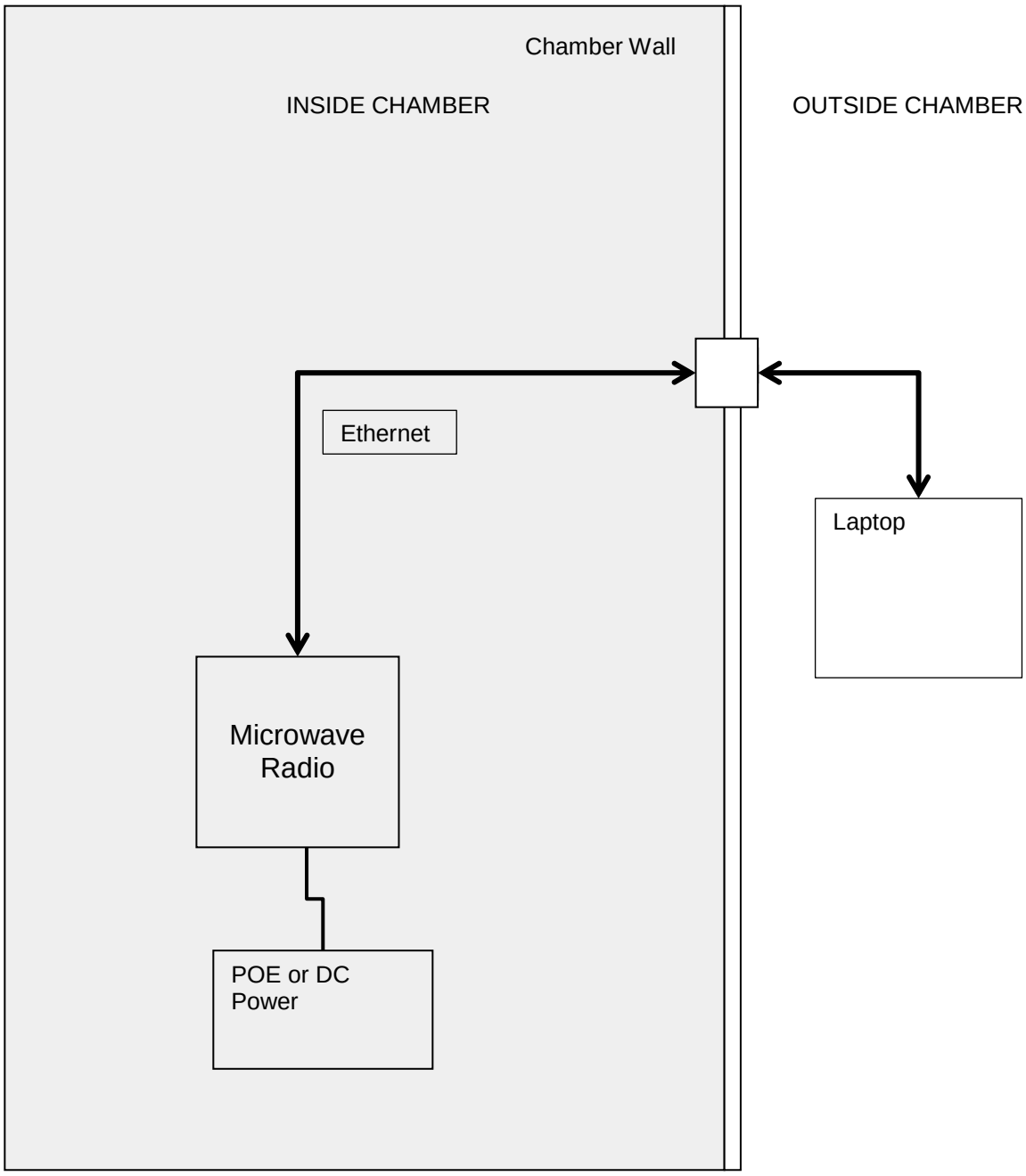
The following deviations from the test standard were required in order to complete the test program:

1. NONE

6.9. Test Configurations

Results for the following configurations are provided in this report:
Radiated Emissions powered by the Charging Station with LTE, WiFi, and FHSS Radio being active.
AC Wireline Emissions powered by the Charging Station with LTE, WiFi, and FHSS Radio being active.

Diagram of EUT Configuration for Emissions Measurements



7. TEST RESULTS

7.1. EMC EMISSIONS TEST RESULTS

7.1.1. Radiated Emissions

FCC, Part 15 Subpart B §15.109
Industry Canada ICES-003 Section 6.2

Test Procedure

Testing 30 – 1,000 MHz was performed in a anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode.

Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR Compliant receiver. Emissions from 30 MHz – 1000 MHz are measured utilizing a CISPR compliant quasi-peak detector with a tuned receiver, using a bandwidth of 120 kHz. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Only the highest emissions relative to the limit are listed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR – FO

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
FO = Distance Falloff Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
NFL = Notch Filter Loss or Waveguide Loss

Field Strength Calculation Example:

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

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

FCC and IC Spurious Emissions Limits

FCC, Part 15 Subpart B §15.109
Industry Canada ICES-003 Section 6.2

Except for Class A digital device, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values.

Limits below 1 GHz:
Class A limits

Frequency(MHz)	Quasi-peak Limit (dBµV/m)	Measurement Distance (meters)	Quasi-peak Limit (dBµV/m)	Measurement Distance (meters)
30 to 88	40	10	49.5	3
88-216	43.5	10	54	3
216-960	46.4	10	56.5	3
960-1000	49.5	10	60	3

Class B limits

Frequency(MHz)	Quasi-peak Limit (dBµV/m)	Measurement Distance (meters)	Quasi-peak Limit (dBµV/m)	Measurement Distance (meters)
30 to 88	29.5	10	40	3
88-216	33	10	43.5	3
216-960	35.6	10	46	3
960-1000	43.5	10	54	3

Limits above 1GHz:

Frequency(MHz)	Average Limit (dBµV/m)	Peak Limit (dBµV/m)	Measurement Distance (meters)	Class (A/B)
1 000 to 6000	54	74	3	Class B

Frequency(MHz)	Average Limit (dBµV/m)	Peak Limit (dBµV/m)	Measurement Distance (meters)	Class (A/B)
1 000 to 6000	60	80	3	Class A

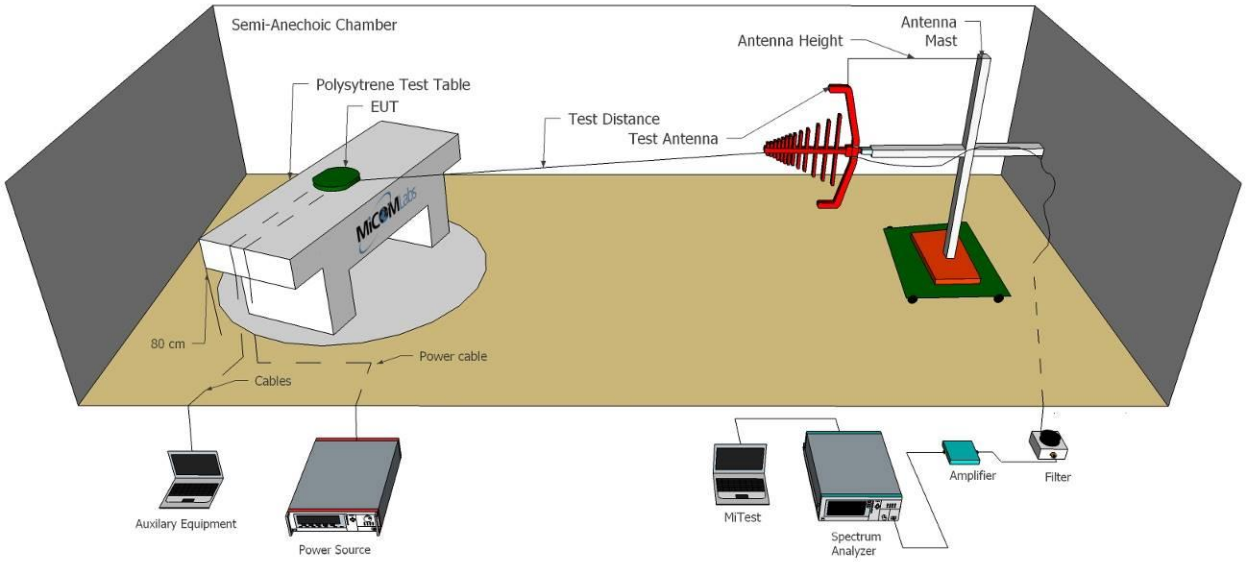
Traceability

Laboratory Measurement Uncertainty	
Measurement uncertainty	+5.6/ -4.5 dB

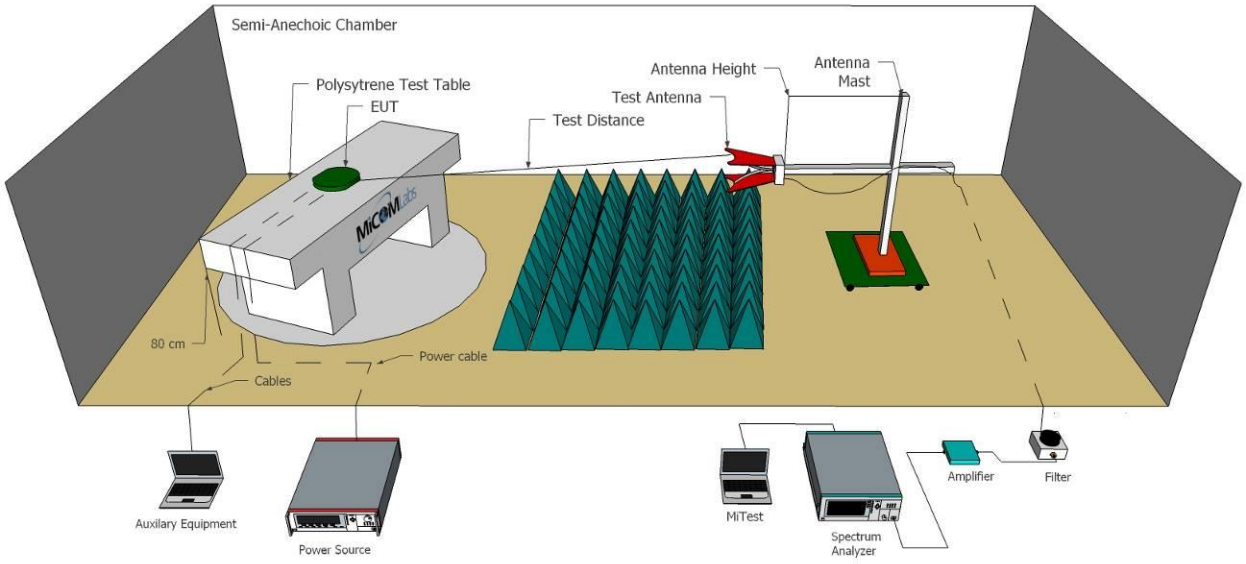
Method
Work instruction WI-EMC-07: Radiated Emissions Test

Radiated Emission Measurement Setup

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.

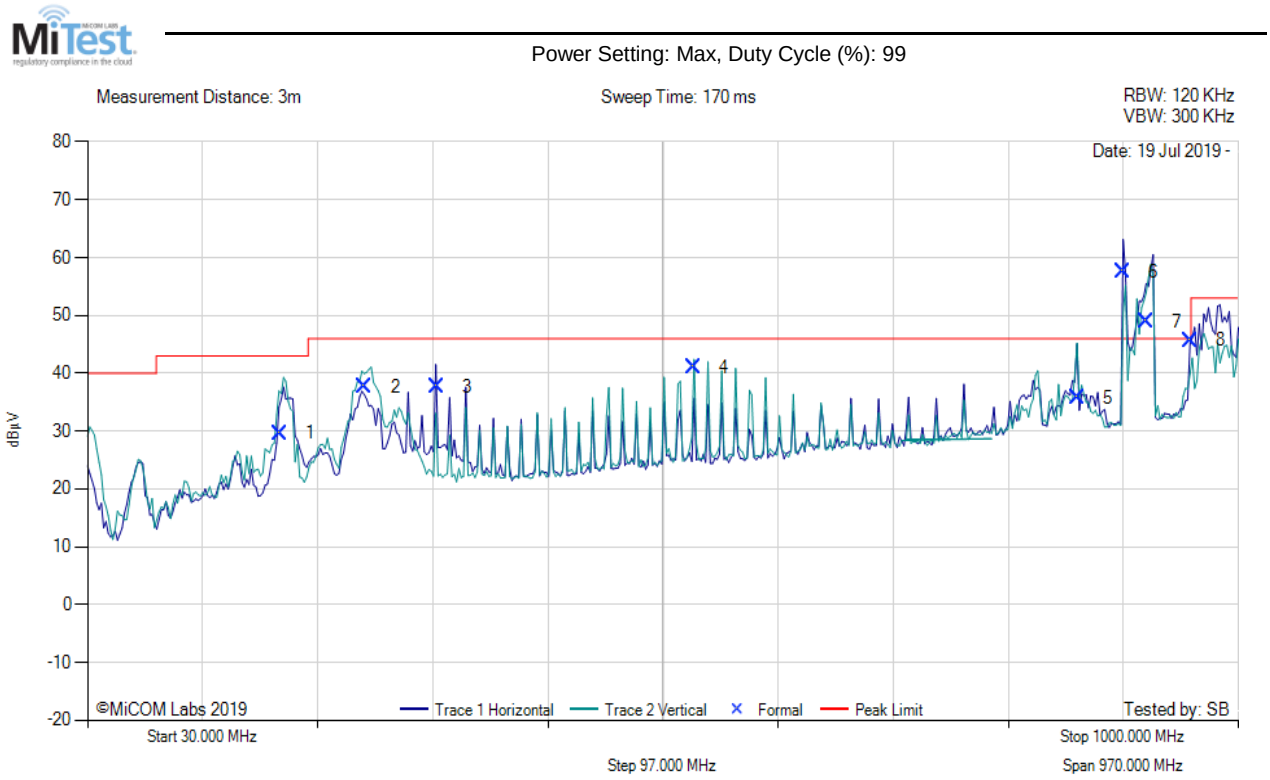
Test Equipment Utilized

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 Sep 2019
301	5470 to 5725 MHz Notch Filter	Microtronics	RBC50704	001	8 Oct 2019
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Apr 2020
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	12 Sep 2019
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
447	MiTest Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	9 Oct 2019
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	9 Oct 2019
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	9 Oct 2019
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2019
87	Uninterruptible Power Supply	Falcon Electric	ED2000-1/2LC	F3471 02/01	Cal when used
CC05	Confidence Check	MiCOM	CC05	None	21 Jul 2019
VLF-1700	Low pass filter DC-1700 MHz	Mini Circuits	VLF-1700	None	8 Oct 2019

7.1.1.1. Measurement Results: 30-1000MHz

Equipment Configuration for Radiated Digital Emissions			
Antenna:	Integral	**Variant:**	802.11b/FHSS/LTE
Antenna Gain (dBi):	Not Applicable	**Modulation:**	OFDM/FHSS/LTE
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	2412.00/902-930/LTE	**Data Rate:**	Not Applicable
Power Setting:	Max	**Tested By:**	SB

Test Measurement Results: Emissions observed above the limit line at 902-928 MHz is the RFID fundamental frequency

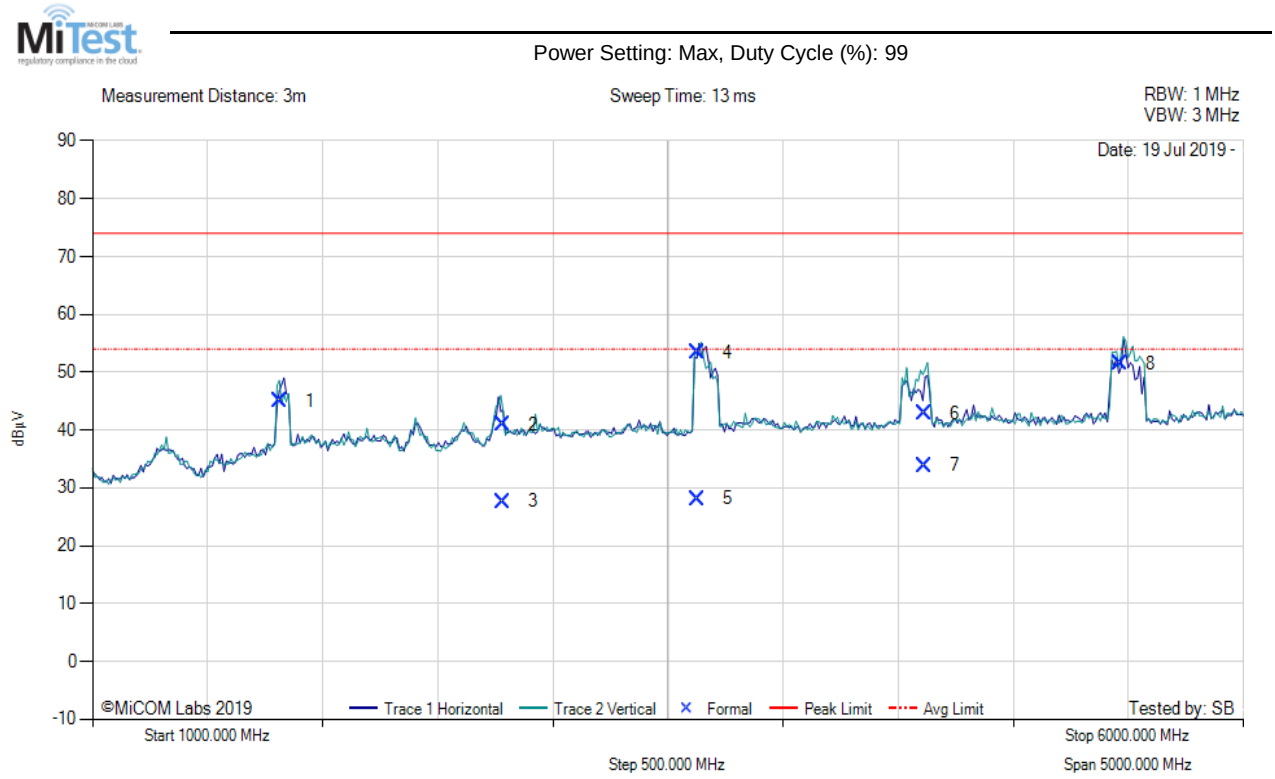


30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	192.25	41.79	4.42	-16.60	29.61	Peak (NRB)	Vertical	137	0	--	--	Pass
2	263.76	48.19	4.71	-15.20	37.70	MaxQP	Vertical	207	175	46.0	-8.3	Pass
3	324.40	46.59	4.92	-13.80	37.71	MaxQP	Horizontal	98	257	46.0	-8.3	Pass
4	540.63	44.77	5.62	-9.40	40.99	Peak (NRB)	Vertical	137	0	--	--	Pass
5	864.03	34.45	6.54	-5.20	35.79	Peak (NRB)	Vertical	137	0	--	--	Pass
6	902.84	55.95	6.65	-5.10	57.50	Peak (NRB)	Horizontal	100	0	--	--	Pass
7	922.37	47.26	6.70	-5.00	48.96	Fundamental	Horizontal	100	0	--	--	
8	959.51	42.99	6.81	-4.10	45.70	Peak (NRB)	Horizontal	137	0	--	--	Pass

Equipment Configuration for Radiated Digital Emissions

Antenna:	Integral	**Variant:**	802.11b/FHSS/LTE
Antenna Gain (dBi):	Not Applicable	**Modulation:**	OFDM/FHSS/LTE
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	2412.00/902-930/LTE	**Data Rate:**	Not Applicable
Power Setting:	Max	**Tested By:**	SB

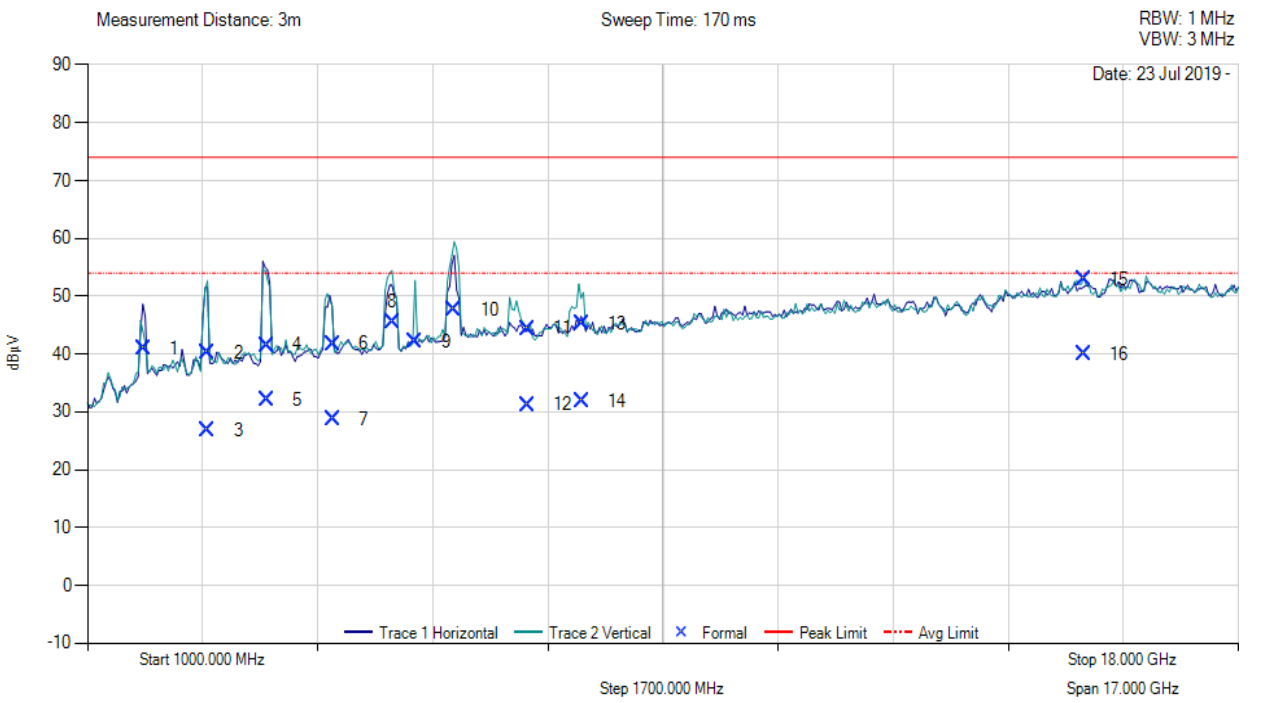
Test Measurement Results



1000.00 - 6000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1811.29	60.85	-1.54	-14.35	44.96	Peak (NRB)	Vertical	153	0	--	--	Pass
2	2780.26	54.76	-1.89	-11.93	40.94	Max Peak	Vertical	98	181	74.0	-33.1	Pass
3	2780.26	41.46	-1.89	-11.93	27.64	Max Avg	Vertical	98	181	54.0	-26.4	Pass
4	3629.04	67.50	-2.17	-11.91	53.42	Max Peak	Vertical	162	175	74.0	-20.6	Pass
5	3629.04	42.19	-2.17	-11.91	28.11	Max Avg	Vertical	162	175	54.0	-25.9	Pass
6	4613.81	57.30	-2.45	-11.95	42.90	Max Peak	Vertical	168	193	74.0	-31.1	Pass
7	4613.81	48.27	-2.45	-11.95	33.87	Max Avg	Vertical	168	193	54.0	-20.1	Pass
8	5464.55	65.91	-2.68	-11.78	51.45	Peak (NRB)	Vertical	153	0	--	--	Pass

Equipment Configuration for Radiated Spurious Emissions (Collocation)			
Antenna:	Integral	**Variant:**	802.11b/FHSS/LTE
Antenna Gain (dBi):	Not Applicable	**Modulation:**	OFDM/FHSS/LTE
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	2412.00/902-930/LTE	**Data Rate:**	Not Applicable
Power Setting:	Max	**Tested By:**	SB

Test Measurement Results



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1829.58	56.51	-1.52	-14.04	40.95	Peak (NRB)	Horizontal	151	0	--	--	Pass
2	2780.42	54.11	-1.89	-11.93	40.29	Max Peak	Vertical	151	358	74.0	-33.7	Pass
3	2780.42	40.62	-1.89	-11.93	26.80	Max Avg	Vertical	151	358	54.0	-27.2	Pass
4	3647.86	55.55	-2.17	-11.85	41.53	Max Peak	Horizontal	159	218	74.0	-32.5	Pass
5	3647.86	46.05	-2.17	-11.85	32.03	Max Avg	Horizontal	159	218	54.0	-22.0	Pass
6	4628.54	56.39	-2.48	-12.12	41.79	Max Peak	Vertical	147	245	74.0	-32.2	Pass
7	4628.54	43.26	-2.48	-12.12	28.66	Max Avg	Vertical	147	245	54.0	-25.3	Pass
8	5504.10	59.81	-2.69	-11.60	45.52	Peak (NRB)	Vertical	151	0	--	--	Pass

Cont'd

9	5842.52	55.84	-2.81	-10.84	42.19	Peak (NRB)	Vertical	151	0	--	--	Pass
10	6417.11	59.90	-2.95	-9.23	47.72	Peak (NRB)	Vertical	151	0	--	--	Pass
11	7493.53	55.38	-2.98	-8.00	44.40	Max Peak	Vertical	127	185	74.0	-29.6	Pass
12	7493.53	42.19	-2.98	-8.00	31.21	Max Avg	Vertical	127	185	54.0	-22.8	Pass
13	8305.98	56.35	-3.33	-7.81	45.21	Max Peak	Vertical	118	123	74.0	-28.8	Pass
14	8305.98	43.04	-3.33	-7.81	31.90	Max Avg	Vertical	118	123	54.0	-22.1	Pass
15	15722.52	59.66	-4.84	-1.94	52.88	Max Peak	Vertical	113	268	74.0	-21.1	Pass
16	15722.52	46.72	-4.84	-1.94	39.94	Max Avg	Vertical	113	268	54.0	-14.1	Pass

7.1.2. AC Mains Power Input/Output Ports

Scope

This test assesses the ability of the EUT to limit its internal noise from being present on the AC mains power input/output ports.

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.

Limits

The equipment shall meet the class A limits given in FCC Part 15: 107. Alternatively, for equipment intended to be used in non-residential environments, the class A limits given in FCC Part 15: 107 may be used.

Limits for conducted disturbance at the mains ports of class B ITE

Frequency of emission (MHz)	Quasi-peak dBuV	Average dBuV
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50
Note 1	* Decreases with the logarithm of the frequency	
Note 2	* The lower limit applies at the boundary between frequency ranges	

Limits for conducted disturbance at the mains ports of class A ITE

Frequency of emission (MHz)	Quasi-peak dBuV	Average dBuV
0.15–0.5	79	66
0.5–30	73	60
Note 1	* The lower limit shall apply at the transition frequency.	

Traceability

All conducted emission measurements are traceable to national standards. The uncertainty of measurement at a confidence level of not less than 95 %, with a coverage factor of k=2, in the range 9 kHz – 30 MHz (Average & Quasi-peak) is ±2.64 dB.

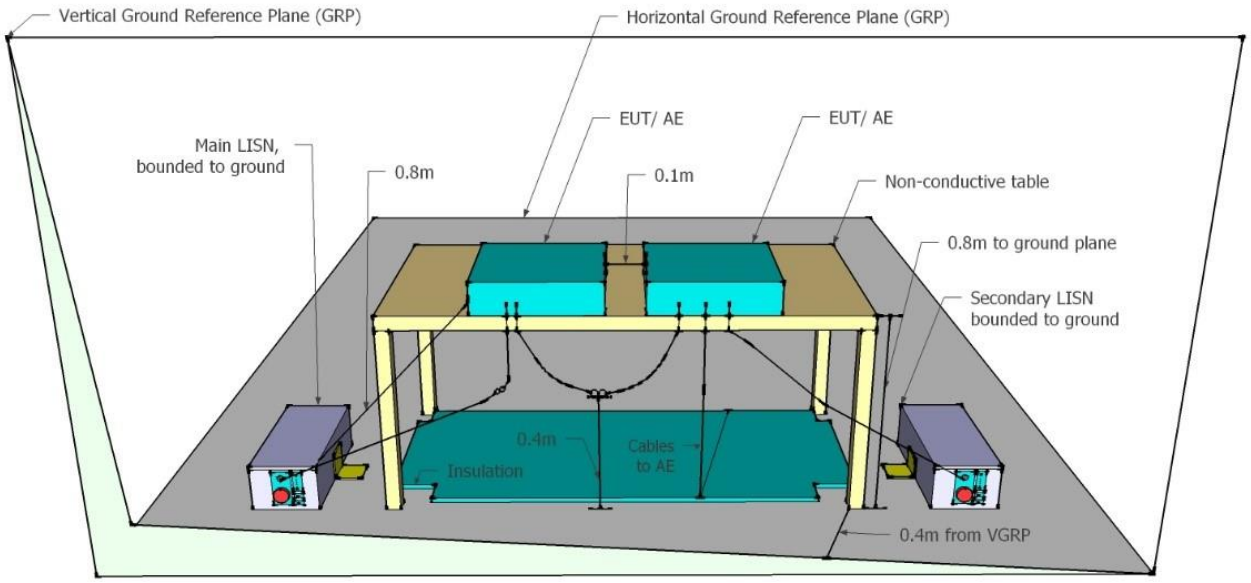
Laboratory Measurement Uncertainty	
Measurement uncertainty	±2.64 dB

Method
Measurements were made per work instruction WI-EMC-01 ‘Measurement of Conducted Emissions’

Test Equipment Utilized

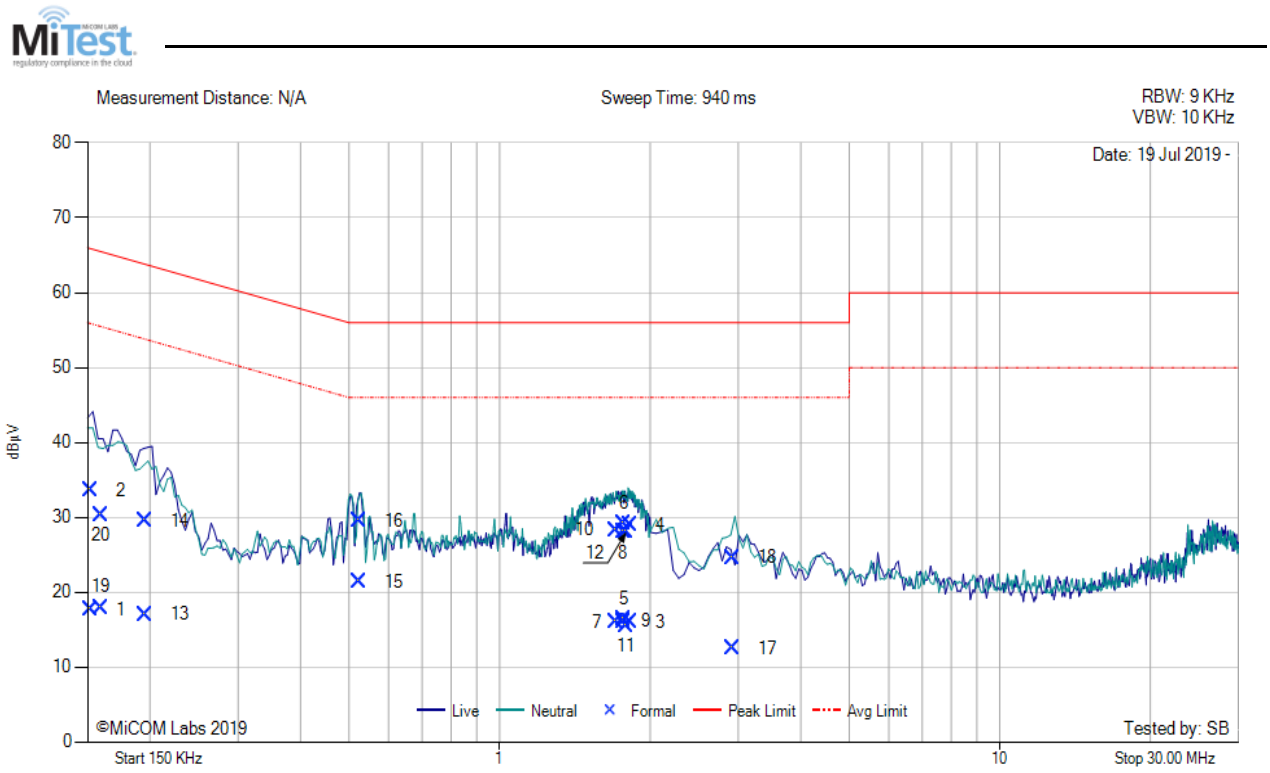
Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
184	Pulse Limiter	Rhode & Schwarz	ESH3Z2	357.8810.52	6 Oct 2019
190	LISN (two-line V-network)	Rhode & Schwarz	ESH3Z5	836679/006	18 Oct 2019
193	Receiver 20 Hz to 7 GHz	Rhode & Schwarz	ESI 7	838496/007	10 Oct 2019
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	2 Aug 2019
295	Conducted Emissions Chamber Maintenance Check	MiCOM	Conducted Emissions Chamber	295	19 Aug 2019
307	BNC-CABLE	Megaphase	1689 1GVT4	15F50B002	11 Sep 2019
316	Dell desktop computer workstation	Dell	Desktop	WS04	Not Required
372	AC Variable PS	California Instruments	1251P	L06951	Cal when used
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	12 Oct 2019
388	LISN (3 Phase) 9kHz - 30MHz	Rohde & Schwarz	ESH2-Z5	892107/022	20 Oct 2019
496	MiTest Conducted Emissions test software.	MiCOM	Conducted Emissions Test Software Version 1.0	496	Not Required
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2019
CCEMC01	Confidence Check.	MiCOM	CCEMC01	None	11 Aug 2019

Test Setup – Power Input / Output Port



7.1.2.2. Measurement Results

Model:	ALR-H460	Configuration tested:	AC POWERED
Input power:	120V_{AC}/60Hz	Standard:	FCC 15B



Num	Frequency MHz	Raw dBµV	Cable Loss dB	Factor dB	Total Correction dBµV	Corrected Value dBµV	Measurement Type	Line	Limit dBµV/m	Margin dB	Pass /Fail
1	0.152	7.69	0.05	9.92	9.97	17.66	Max Avg	Live	55.9	-38.3	Pass
2	0.152	23.59	0.05	9.92	9.97	33.56	Max Qp	Live	65.9	-32.4	Pass
3	1.821	5.92	0.17	9.97	10.14	16.06	Max Avg	Neutral	46.0	-29.9	Pass
4	1.821	18.78	0.17	9.97	10.14	28.92	Max Qp	Neutral	56.0	-27.1	Pass
5	1.773	6.33	0.16	9.96	10.12	16.45	Max Avg	Neutral	46.0	-29.6	Pass
6	1.773	19.05	0.16	9.96	10.12	29.17	Max Qp	Neutral	56.0	-26.8	Pass
7	1.766	5.94	0.16	9.96	10.12	16.06	Max Avg	Live	46.0	-29.9	Pass
8	1.766	17.90	0.16	9.96	10.12	28.02	Max Qp	Live	56.0	-28.0	Pass
9	1.705	6.01	0.15	9.96	10.11	16.12	Max Avg	Neutral	46.0	-29.9	Pass
10	1.705	18.20	0.15	9.96	10.11	28.31	Max Qp	Neutral	56.0	-27.7	Pass
11	1.791	5.45	0.16	9.96	10.12	15.57	Max Avg	Live	46.0	-30.4	Pass
12	1.791	17.97	0.16	9.96	10.12	28.09	Max Qp	Live	56.0	-27.9	Pass

Cont'd

13	0.196	7.07	0.06	9.93	9.99	17.06	Max Avg	Neutral	54.7	-37.6	Pass
14	0.196	19.51	0.06	9.93	9.99	29.50	Max Qp	Neutral	64.7	-35.2	Pass
15	0.523	11.34	0.09	9.92	10.01	21.35	Max Avg	Live	46.0	-24.7	Pass
16	0.523	19.49	0.09	9.92	10.01	29.50	Max Qp	Live	56.0	-26.5	Pass
17	2.926	2.25	0.24	10.01	10.25	12.50	Max Avg	Neutral	46.0	-33.5	Pass
18	2.926	14.35	0.24	10.01	10.25	24.60	Max Qp	Neutral	56.0	-31.4	Pass
19	0.160	8.01	0.05	9.92	9.97	17.98	Max Avg	Neutral	55.7	-37.7	Pass
20	0.160	20.36	0.05	9.92	9.97	30.33	Max Qp	Neutral	65.7	-35.4	Pass

Test Notes: AC Mains 120V, LTE, WiFi, 900 MHz FHSS Radios are active.

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