



REGULATORY COMPLIANCE TEST REPORT

FCC CFR 47 Part 15.407 & ISSED RSS-247

Report No.: MIKO114-U6 Master Rev A

Company: Mikrotikls SIA

Model Name: RB962UiGS-5HacT2HnT-US

REGULATORY COMPLIANCE TEST REPORT

Company Name: Mikrotikls SIA

Model Name: RB962UiGS-5HacT2HnT-US

To: FCC CFR 47 Part 15.407 & ISED RSS-247

Test Report Serial No.: MIKO114-U6 Master Rev A

This report supersedes: NONE

Applicant: Mikrotikls SIA
Brivibas gatve 214i
Riga, LV-1039
Latvia

Issue Date: 24th May 2021

Test Report Sections	Document Number
Master:	<input checked="" type="checkbox"/> MIKO114-U6 Master
RF Report:	<input type="checkbox"/> MIKO114-U6 RF Report
DFS:	<input type="checkbox"/> MIKO114-U6_DFS_Addendum

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

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. PRODUCT DETAILS AND TEST CONFIGURATIONS	11
5.1. Technical Details	11
5.2. Scope Of Test Program	12
5.3. Equipment Model(s) and Serial Number(s)	13
5.4. Antenna Details	13
5.5. Cabling and I/O Ports	13
5.6. Test Configurations	14
5.7. Equipment Modifications	14
5.8. Deviations from the Test Standard	14
6. TEST SUMMARY	15
7. TEST EQUIPMENT CONFIGURATION(S)	16
7.1. Conducted	16
7.2. DFS - Conducted	18
7.3. Radiated Emissions - 3m Chamber	20
8. MEASUREMENT AND PRESENTATION OF TEST DATA	22

1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2017. 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>



1.2. RECOGNITION

MiCOM Labs, Inc is widely recognized for its wireless testing and certification capabilities. In addition to being recognized for Testing and Certification under Phase 2 Mutual Recognition Agreements (MRA) with Canada, Europe, United Kingdom and Japan, our international recognition includes Conformity Assessment Body (CAB) designation status under agreements with Asia Pacific (APEC) MRA Phase 1 countries giving acceptance of MiCOM Labs test reports. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	MRA Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Test Firm Designation#: US1084
Canada	Industry Canada (ISED)	FCB	APEC MRA 2	US0159 ISED#: 4143A
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	Japan MRA 2	RCB 210
	Japan Approvals Institute for Telecommunication Equipment (JATE)			
	VCCI			
Europe	European Commission	NB	EU MRA 2	A-0012 NB 2280
United Kingdom	Department for Business, Energy & Industrial Strategy (BEIS)	AB	UK MRA 2	AB 2280
Mexico	Instituto Federal de Telecomunicaciones (IFT)	CAB	Mexico MRA 1	US0159
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)			
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)			
Singapore	Infocomm Development Authority (IDA)			
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)			
Vietnam	Ministry of Communication (MIC)			

TCB – Telecommunications Certification Bodies (TCB)

FCB – Foreign Certification Body

CAB – Conformity Assessment Body

NB – Notified Body

AB – Approved Body

MRA – Mutual Recognition Agreement

MRA Phase I - recognition for product testing

MRA 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
UK – Approved Body (AB), AB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	11th May 2021	Draft report for client review.
Rev A	24 th May 2021	Initial release.
.		
.		
.		
.		
.		

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

3. TEST RESULT CERTIFICATE

Manufacturer: Mikrotiks SIA Brivibas gatve 214i Riga LV-1039 Latvia	Tested By: MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model: RB962UiGS-5HacT2HnT-US	Telephone: +1 925 462 0304
Type Of Equipment: Wireless Access Point	Fax: +1 925 462 0306
S/N's: Conducted CC4F0D4D6D6A/051 / r2 Radiated CC4F0D3BE46A /051 / r2	
Test Date(s): 14 - 30 April 2021	Website: www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15.407 & ISSED RSS-247	EQUIPMENT COMPLIES

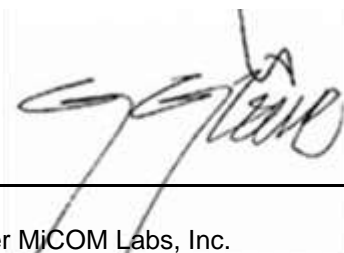
MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

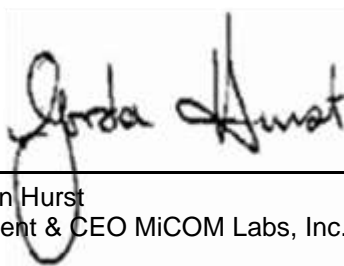
1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:





Graeme Grieve
Quality Manager MiCOM Labs, Inc.



Gordon Hurst
President & CEO MiCOM Labs, Inc.

4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 662911 D01 & D02	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 905462 D07 v02	22nd August 2016	Test guidance to demonstrate compliance for U-NII devices subject to DFS requirements.
III	KDB 926956 D01 v02	22nd August 2016	U-NII Device Transition Plan
IV	A2LA	5th October 2020	R105 - Requirement's When Making Reference to A2LA Accreditation Status
V	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
VI	ANSI C63.4	2014	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
VII	CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements
VIII	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
IX	FCC 06-96	Jun 30 2006	Memorandum Opinion and Order
X	FCC 47 CFR Part 15.407	2020	Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices
XI	ICES-003	Issue 7 ; October 15,2020	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
XII	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XIII	RSS-247 Issue 2	Feb 2017	Digital Transmission Systems (DTSSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
XIV	RSS-Gen Issue 5	2018	General Requirements for Compliance of Radio Apparatus. With Amendments 1: March 2019 and 2: Feb 2021.
XV	FCC 47 CFR Part 2.1033	2020	FCC requirements and rules regarding photographs and test setup diagrams.
XVI	KDB 905462 D02 v02	April 8 2016	Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection.
XVII	KDB 789033 D02 V02r01	14th December, 2017	Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

4.2. Test and Uncertainty Procedure

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

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

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

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Mikrotiks SIA RB962UiGS-5HacT2HnT-US to FCC CFR 47 Part 15.407 & ISED RSS-247 requirements. Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection.
Applicant:	Mikrotiks SIA Brivibas gatve 214i Riga LV-1039, Latvia
Manufacturer:	Mikrotiks SIA
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	MIKO114-U6 Master Rev A
Date EUT received:	12 th April 2021.
Standard(s) applied:	FCC CFR 47 Part 15.407 & ISED RSS-247
Dates of test (from - to):	14 - 30 April 2021
No of Units Tested:	2
Product Family Name:	RB962UiGS
Model(s):	RB962UiGS-5HacT2HnT-US
Location for use:	Indoors
Declared Frequency Range(s):	5250 - 5350 MHz; 5470 - 5725 MHz.
Type of Modulation:	OFDM
EUT Modes of Operation:	5250 - 5350 MHz: 11a; ac-80; HT-20; HT-40; 5470 - 5725 MHz: 11a; ac-80; HT-20; HT-40;
Declared Nominal Output Power (dBm):	24
Transmit/Receive Operation:	Transceiver
Rated Input Voltage and Current:	11 - 57V DC, 1.2 Amp
Operating Temperature Range:	-40 to +70°C
ITU Emission Designator:	11a 17M0D1D HT-20 18M1D1D HT-40 37M0D1D AC-80 76M4D1D
Equipment Dimensions:	114 mm X 137 mm X 29 mm
Weight:	0.75 Kg
Hardware Rev:	r2r2
Firmware Rev:	Router OS v6

5.2. Scope Of Test Program

Mikrotikls SIA RB962UiGS-5HacT2HnT-US

The scope of the test program was to test the Mikrotikls SIA RB962UiGS-5HacT2HnT-US 802.11 configurations in the frequency ranges 5250 - 5350 MHz; 5470 - 5725 MHz for compliance against the following specification:

FCC CFR 47 Part 15.407 & ISED RSS-247

Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5250 to 5350 MHz and 5470 to 5725 MHz bands incorporating Dynamic Frequency Selection.

ISED RSS-247

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

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

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr.	Model No.	Serial No.
EUT	Wireless Access Point	MikroTik	RB962UiGS-5HacT2HnT-US	Conducted CC4F0D4D6D6A/051 / r2 Radiated CC4F0D3BE46A /051 / r2
EUT	AC/DC	CullPower	SAW30-240-1200G	--
Support	Laptop PC 1	Dell	Latitude	None

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
integral	MikroTik	95XKAA15.GN2	Patch	2.0	-	360	-	5250 - 5350
integral	MikroTik	95XKAA15.GN2	Patch	2.0	-	360	-	5470 - 5725
integral	MikroTik	RB962_PIFA_5_5_ANT	PIFA	2.0	-	360	-	5250 - 5350
integral	MikroTik	RB962_PIFA_5_5_ANT	PIFA	2.0	-	360	-	5470 - 5725

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

5.5. Cabling and I/O Ports

Port Type	Port Description	Qty	Screened (Yes/ No)	Length
Ethernet	RJ-45	4	N	>3m
Ethernet POE	RJ-45	1	N	>3m
Antenna	SMA Antenna Ports	0	N	NA
DC Input	DC	1	N	< 1m
USB	USB Slot	1	Y	< 3m
Fiber Transceiver	SFP Slot (not populated)	1	NA	NA

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
5250 - 5350 MHz				
a	6	5,260.00	5,300.00	5,320.00
ac-80	29.3	--	--	5,290.00
HT-20	6.5	5,260.00	5,300.00	5,320.00
HT-40	13.5	5,270.00	--	5,310.00
5470 - 5725 MHz				
a	6	5,500.00	5,580.00	5,720.00
ac-80	29.3	5,530.00	5,610.00	5,690.00
HT-20	6.5	5,500.00	5,580.00	5,720.00
HT-40	13.5	5,510.00	5,550.00	5,710.00

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

6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
Peak Transmit Power	Complies	View Data
26 dB & 99% Bandwidth	Complies	View Data
6 dB & 99% Bandwidth	Not Tested	-
Power Spectral Density	Complies	View Data
Frequency Stability	Not Tested	-
Transmit Power Control (TPC)	Not Tested	-
Dynamic Frequency Selection (DFS)	Complies	Refer to DFS addendum report
Channel Availability Check	Complies	-
Initial CAC	Complies	
Beginning CAC	Complies	
End CAC	Complies	
Channel Close / Transmission Time	Complies	
Non-Occupancy Period	Complies	
Probability of Detection	Complies	
Detection Bandwidth	Complies	
Radiated	Complies	-
TX Spurious & Restricted Band Emissions	Complies	-
MikroTik 95XKAA15.GN2	Complies	View Data
Restricted Edge & Band-Edge Emissions	Complies	-
MikroTik 95XKAA15.GN2	Complies	View Data
Digital Emissions	Not Tested	Note 1*
AC Wireline	Not Tested	Note 1*

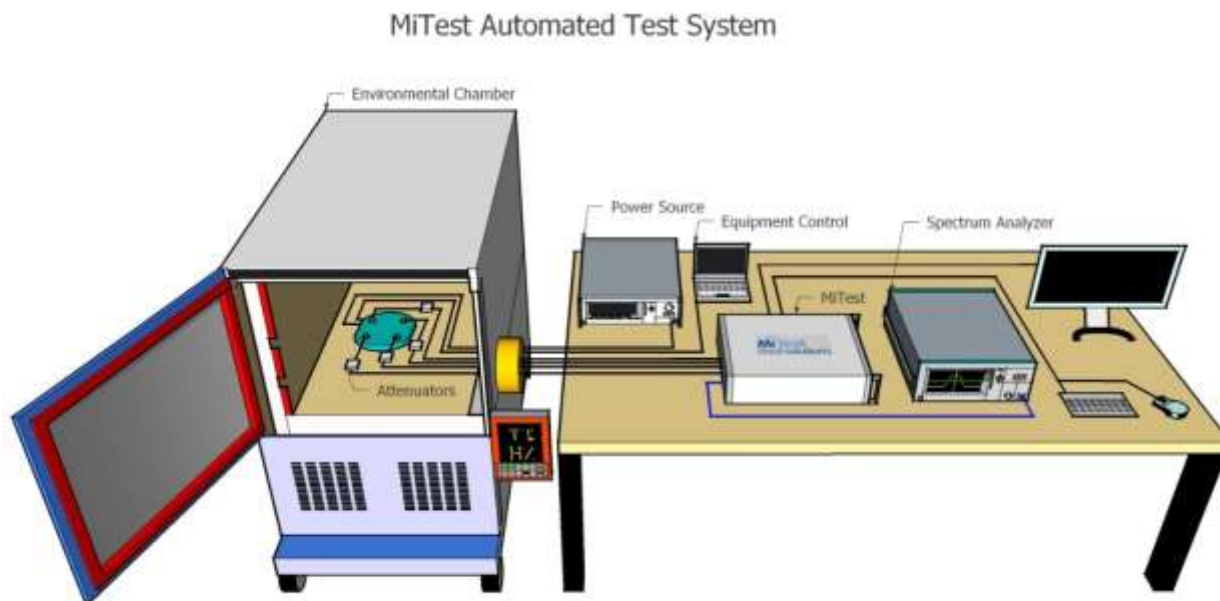
Note 1:

Refer to Rogers Labs Test report # File:Mikrotikls RB962UiGS5HacT2HnT UNII TstRpt 160514b3 Rev 3 Dated August 19 2016.

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted

Conducted RF Emission Test Set-up(s).

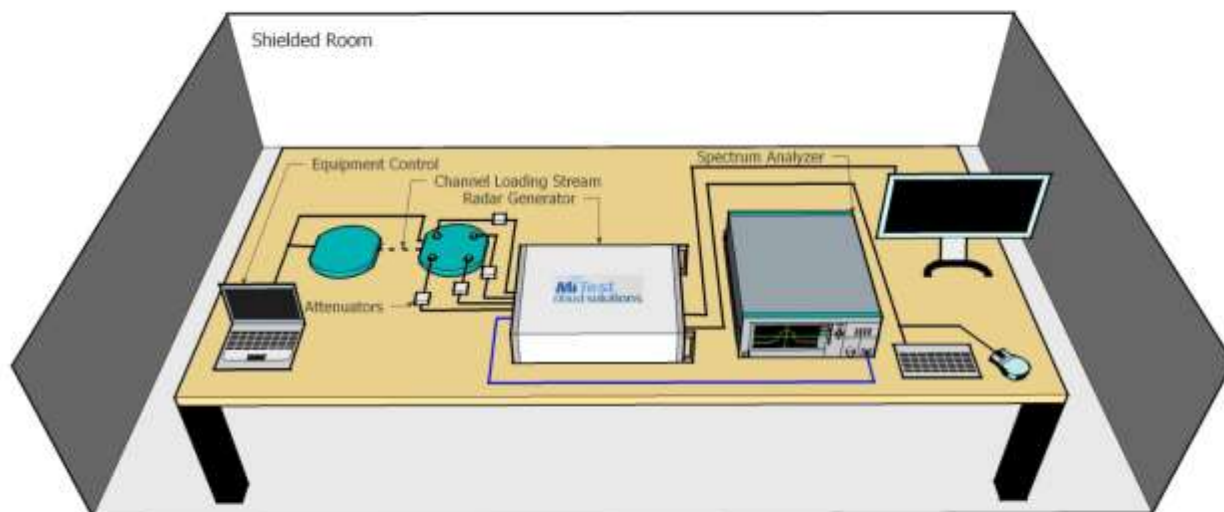


A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
#3 SA	MiTest Box to SA	Fairview Microwave	SCA1814-0101-72	#3 SA	4 Sep 2021
#3P1	EUT to MiTest box port 1	Fairview Microwave	SCA1814-0101-72	#3P1	4 Sep 2021
#3P2	EUT to MiTest box port 2	Fairview Microwave	SCA1814-0101-72	#3P2	4 Sep 2021
#3P3	EUT to MiTest box port 3	Fairview Microwave	SCA1814-0101-72	#3P3	4 Sep 2021
#3P4	EUT to MiTest box port 4	Fairview Microwave	SCA1812-0101-72	#3P4	4 Sep 2021
249	Thermocouple; Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2021
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2021
398	MiTest RF Conducted Test Software	MiCOM	MiTest ATS	Version 4.2.3.0	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
440	USB Wideband Power Sensor	Boonton	55006	9178	22 Sep 2021
441	USB Wideband Power Sensor	Boonton	55006	9179	20 Sep 2021
442	USB Wideband Power Sensor	Boonton	55006	9181	19 Sep 2021
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	20 Sep 2021
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2021
515	MiTest Cloud Solutions RF Test Box	MiCOM	2nd Gen with DFS	515	4 Sep 2021
534	Power Sensor 50 GHz - 70dBm to +20dBm	R&S	NRP50SN	1419.0093K02-100888-SB	26 Feb 2022
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	20 Feb 2022

7.2. DFS - Conducted

Dynamic Frequency Selection (DFS) - Conducted



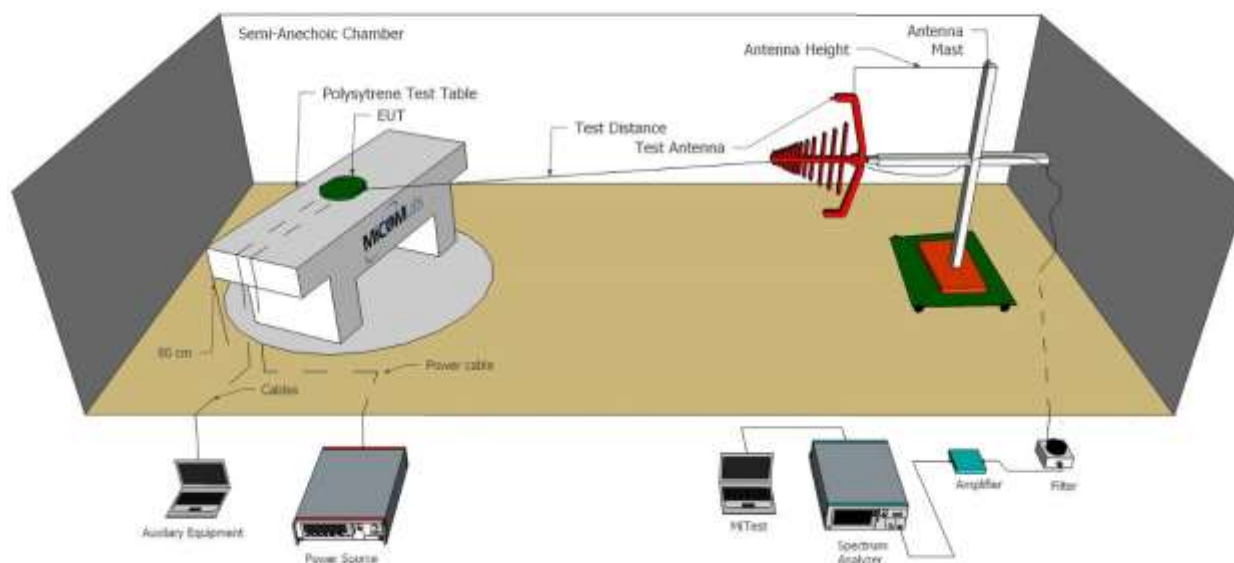
A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
299	Test Software DFS Test System	Aeroflex	DFS test Software	V2.8	Not Required
359	DFS System	Aeroflex	PXI-1042	300001/004	6 Sep 2021
417	Laptop for DFS with DFS software	Lenova	W520	DFS	Not Required
418	PCI-e interface card	National Instruments	Express 8360	174AAC5	Not Required
422	Splitter/Combiner	Pasternack	PE 2031	001	Cal when used
495	RF Power Divider	Micon Precise Corp	91002	495	Cal when used
504	MiTest Cloud Solutions RF Test Box	MiCOM	2nd Gen	504	5 Sep 2021
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2021
533	MiTest DFS Test Software	MiCOM	MiTest DFS Test software Version 2.8	533	Not Required
71	Spectrum Analyser 9KHz-50GHz	HP	8565E	3425A00181	Not Required
DFS PCIe#1	PCIe cable for Aeroflex	National Instruments	PCIe cable	None	Not Required
DFS SMA#1	SMA Cable for DFS	Megaphase	SMA Cable	None	Cal when used
DFS SMA#2	SMA Cable for DFS	Megaphase	SMA Cable	None	Cal when used
DFS SMA#3	SMA Cable for DFS	Megaphase	SMA Cable	None	Cal when used
DFS SMA#4	SMA Cable for DFS	Megaphase	SMA Cable	None	Cal when used

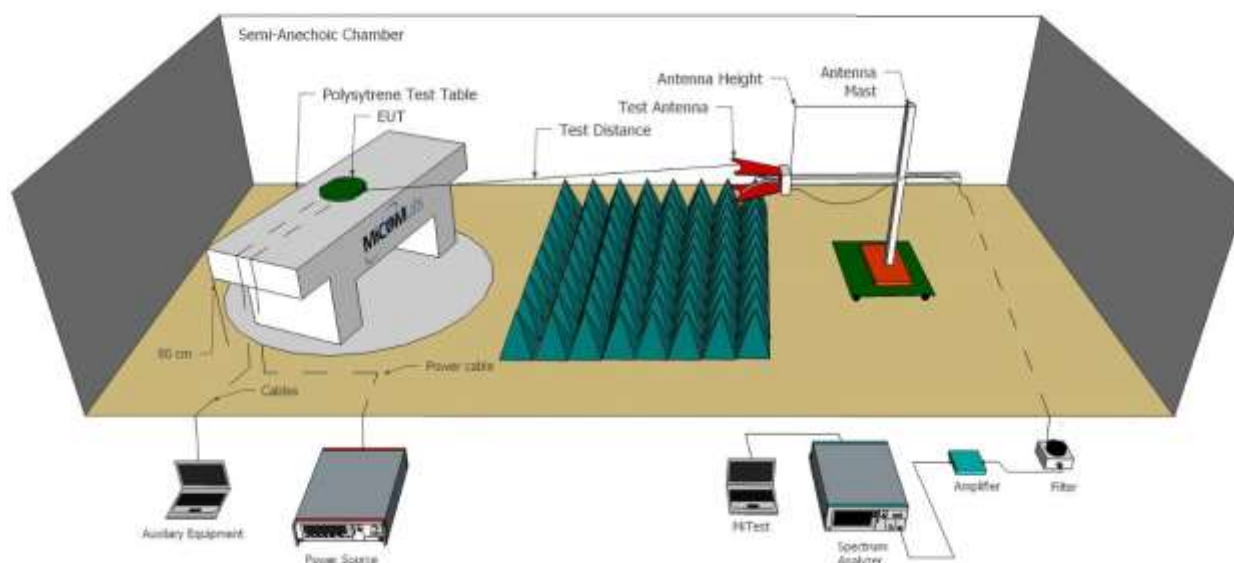
7.3. Radiated Emissions - 3m Chamber

Test Setup for Radiated Emissions for above and below 1 GHz

Radiated Emissions Below 1GHz Test Setup



Radiated Emissions Above 1GHz Test Setup



A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2021
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	26 Sep 2021
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Oct 2021
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	4 Sep 2021
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	9 Sep 2021
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Sep 2021
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	9 Sep 2021
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	4 Sep 2021
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	4 Sep 2021
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	4 Sep 2021
466	Low Pass Filter DC-1500 MHz	Mini-Circuits	NLP-1750+	VUU10401438	4 Sep 2021
467	2495 to 2650 MHz notch filter	MicroTronics	BRM50709	011	4 Sep 2021
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	4 Sep 2021
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	4 Sep 2021
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2021
518	Cable - Amp to Antenna	SRC Haverhill	157-3051574	518	4 Sep 2021

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)



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