REGULATORY COMPLIANCE TEST REPORT

FCC CFR 47 Part 15 SubPart C 15.249

Report No.: SIAE01-U4 Rev A

Company: SIAE Microelettronica

Model ALFOplus24

REGULATORY COMPLIANCE TEST REPORT

Test of: SIAE Microelettronica ALFOplus24

To: FCC CFR 47 Part 15 Subpart C 15.249

Test Report Serial No.: SIAE01-U4 Rev A

This report supersedes: NONE

Applicant:	SIAE Microelettronica Inc. 2809 W. Airport Freeway Irving, Texas 75062 USA
Product Function	Point-to-Point Microwave Radio
Issue Date:	23rd July 2019

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

A2LA ACCREDITED
TESTING CERT #2381.01

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 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	18th July 2019	Draft report for client review.
Rev A	23rd July 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:	SIAE Microelettronica, S.p.A. Via Michelangelo Buonarrotti 21 20093 Cologno Monzese (MI) Italy	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	ALFOplus24	**Telephone:**	+1 925 462 0304
Type Of Equipment:	Point-to-Point Microwave Radio	**Fax:**	+1 925 462 0306
S/N's:	101773957000200 101773699000400		
Test Date(s):	20th June – 10th July 2019	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart C 15.249	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	A2LA	August 2018	R105 - Requirement's When Making Reference to A2LA Accreditation Status
II	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
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	CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements
V	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
VI	FCC 47 CFR Part 15.249	2019	Radio Frequency Devices; Subpart C – Intentional Radiators
VII	ICES-003	Issue 6 Jan 2016; Updated April 2017	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
VIII	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
IX	RSS-247 Issue 2	Feb 2017	Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
X	RSS-Gen Issue 5	April 2018	General Requirements for Compliance of Radio Apparatus
XI	FCC 47 CFR Part 2.1033	2019	FCC requirements and rules regarding photographs and test setup diagrams.

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 SIAE Microelettronica ALFOplus24 to FCC 15.249 Radio Frequency Devices; Subpart C – Intentional Radiators
Applicant:	80120 SIAE Microelettronica Inc. 2809 W. Airport Freeway Irving, Texas 75062 USA
Manufacturer:	SIAE Microelettronica, S.p.A. Via Michelangelo Buonarrotti 21 20093 Cologno Monzese (MI) Italy
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	SIAE01-U4
Date EUT received:	17th June 2019
Standard(s) applied:	FCC CFR 47 Part 15 Subpart C 15.249
Dates of test (from - to):	20th June to 10th July 2019
No of Units Tested:	2
Product Family Name:	ALFOplus
Model(s):	ALFOplus24
Location for use:	Outdoor
Declared Frequency Range(s):	24,050 – 24,250 MHz
Type of Modulation:	QAM
EUT Modes of Operation:	Available Bandwidths: 10, 20, 30, 40, 50 MHz
Declared Nominal Output Power:	0 dBm
Transmit/Receive Operation:	Transceiver
Rated Input Voltage and Current:	48 Vdc 1 A 55Vdc 1.1 A
Operating Temperature Range:	-33 to+55 ºC
ITU Emission Designator:	10MHz: 10M0G7W 20 MHz: 20M0G7W 30 MHz: 30M0G7W 40MHz: 40M0G7W 50MHz: 50M0G7W
Equipment Dimensions:	10.7 x 11.3 x 6.1 inches
Weight:	9.5 lbs
Hardware Rev:	0.1
Software Rev:	N10052

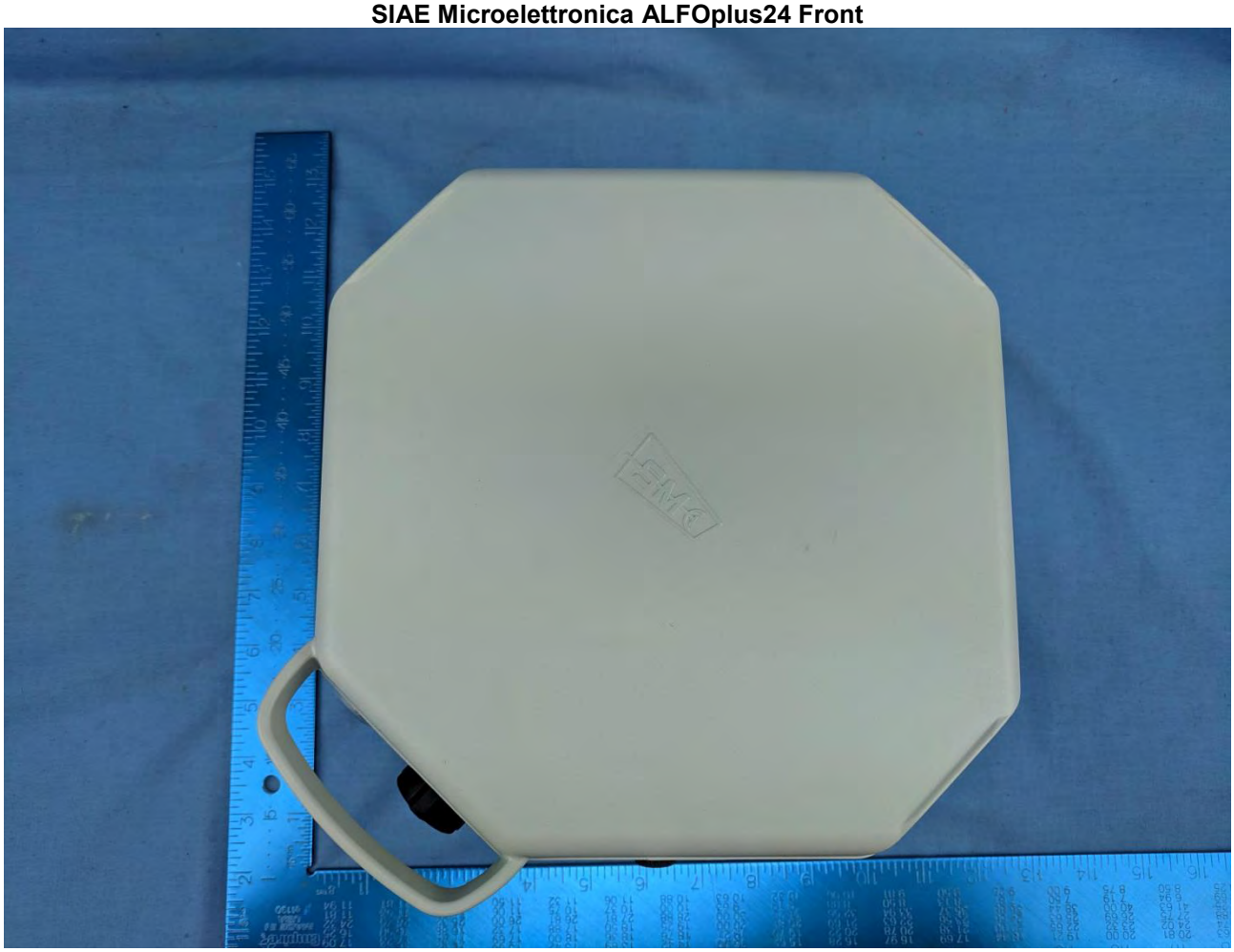
5.2. Scope Of Test Program

SIAE Microelettronica ALFOplus24

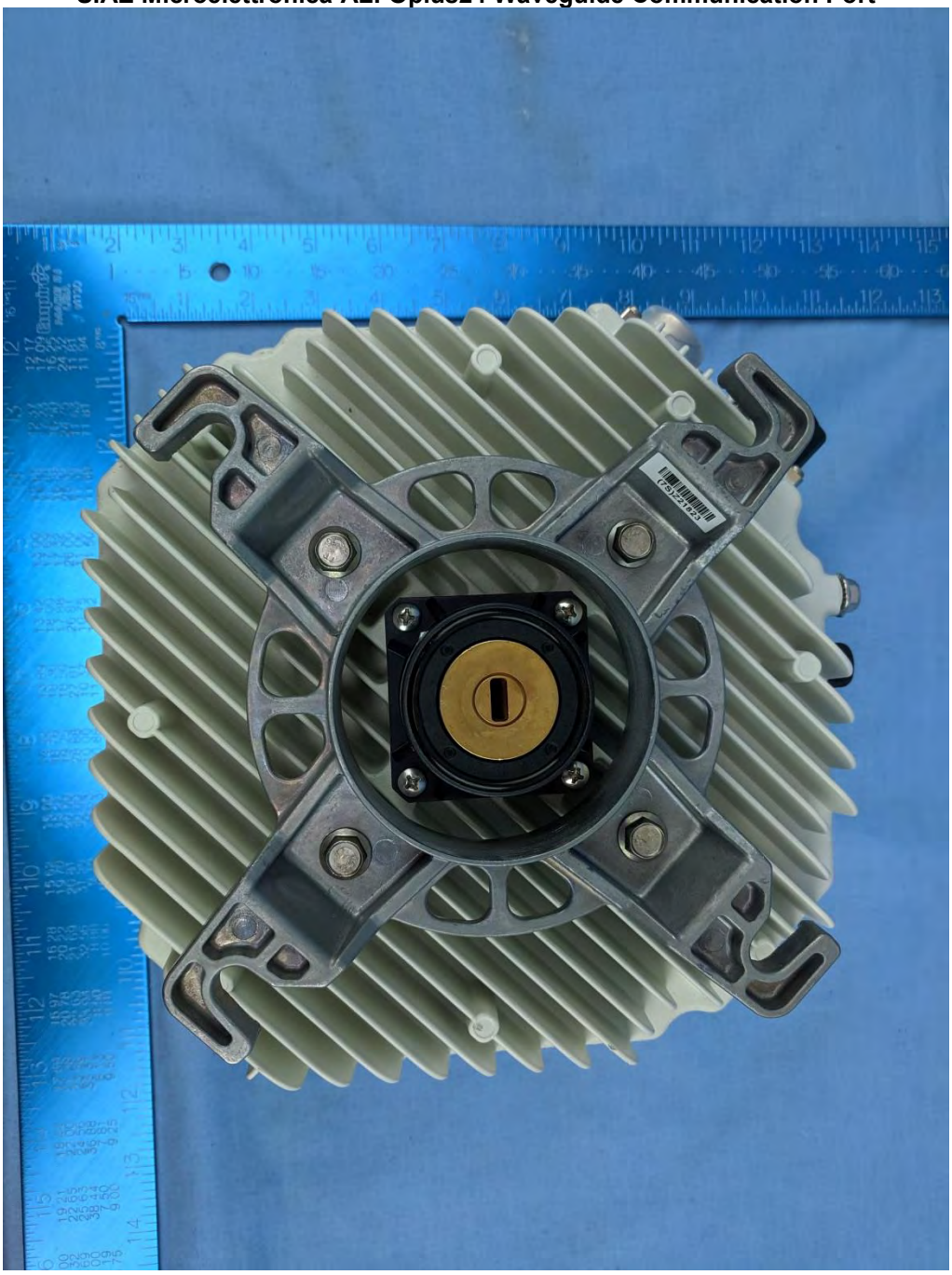
The scope of the test program was to test the SIAE Microelettronica ALFOplus24 in the frequency ranges 24,050 – 24,250 MHz; for compliance against the following specifications:

FCC CFR 47 Part 15 Subpart C 15.249 (24 GHz Point to Point)
Radio Frequency Devices; Subpart C – Intentional Radiators

SIAE Microelettronica ALFOplus24 Front



SIAE Microelettronica ALFOplus24 Waveguide Communication Port



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

Type (EUT/ Support)	Equipment Description	Mfr	Model No.	Serial No.
EUT	Pt to Pt Microwave Radio Low Band	SIAE Microelettronica.	ALFOplus24	101773957000200
EUT	Pt to Pt Microwave Radio High Band	SIAE Microelettronica.	ALFOplus24	101773699000400
Support*	POE	Procet	PT-PSE106GWN-AR	--
Support*	DC Supply	Meanwell	HRP100-48	--

*The support equipment is not sold with the radio equipment

5.4. Antenna Details

Type	Manufacturer	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
Parabolic	Shenglu	Parabolic	35.8	--	3.5	--	21100-24500
Parabolic	RFS	Parabolic	36.3	--	3.5	--	24050-26500

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 (POE In)	Ethernet Port Ethernet (POE In)	1	Yes	> 3m
Ethernet	Ethernet Port	1	Yes	> 3m
Aux In	DC, Serial Console, Align	1	Yes	> 3m
SFP (optional)	Fiber SFP port	1	No	> 3m

5.6. Test Configurations

Results for the following configurations are provided in this report:

Bandwidth(s)	Channel Frequency (MHz)		
	Low	Mid	High
Low Band 24058-24098 MHz			
10 MHz	24058	24078	24098
20 MHz	24063	24078	24093
30 MHz	24068	24078	24088
40 MHz	24073	24078	24083
50 MHz	--	24078	--
High Band 24202 -24242 MHz			
10 MHz	24202	24222	24242
20 MHz	24207	24222	24237
30 MHz	24212	24222	24232
40 MHz	24217	24222	24227
50 MHz	--	24222	--

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

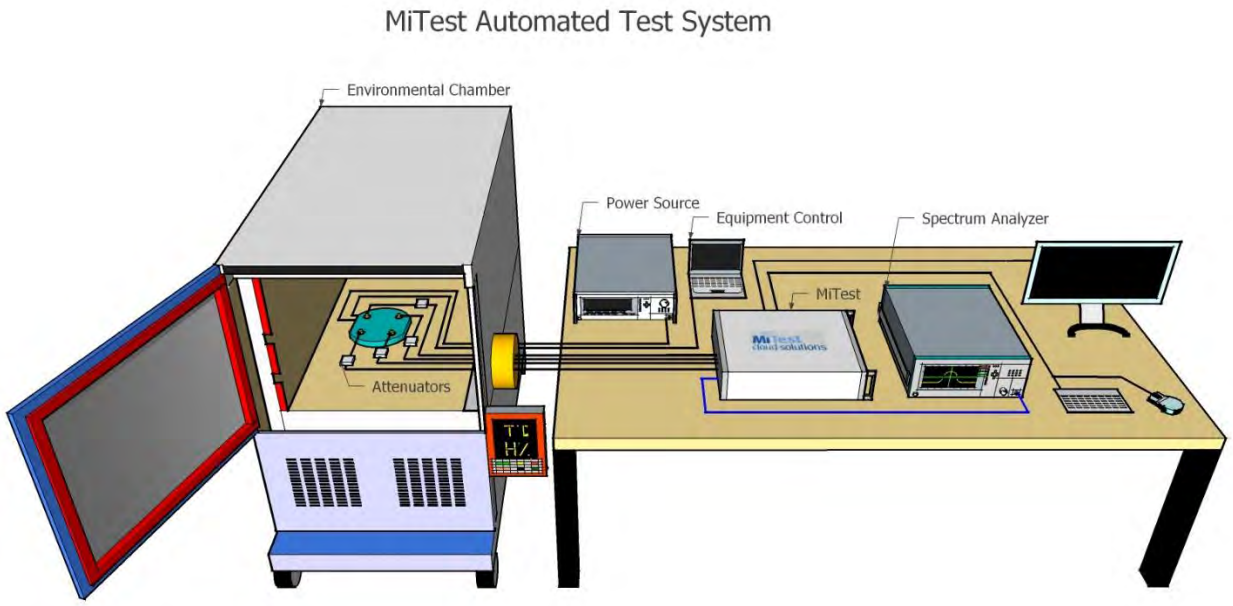
6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
20 dB Bandwidth	Complies	View Data
Frequency Tolerance	Complies	View Data
(2) Radiated Emissions	Complies	-
(i) TX Spurious & Restricted Band Emissions	Complies	View Data
(ii) Fundamental Emissions	Complies	View Data

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted Test Setup



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

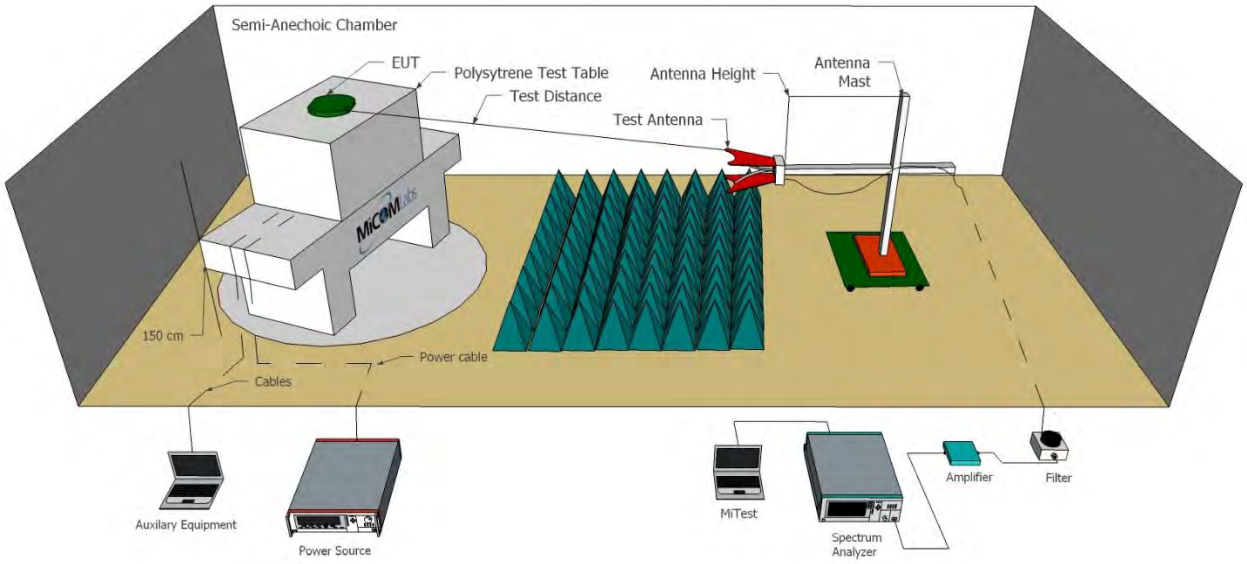
Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
#3 SA	MiTest Box to SA	Fairview Microwave	SCA1814-0101-72	#3 SA	20 Jul 2019
#3P1	EUT to MiTest box port 1	Fairview Microwave	SCA1814-0101-72	#3P1	20 Jul 2019
#3P2	EUT to MiTest box port 2	Fairview Microwave	SCA1814-0101-72	#3P2	20 Jul 2019
#3P3	EUT to MiTest box port 3	Fairview Microwave	SCA1814-0101-72	#3P3	20 Jul 2019
#3P4	EUT to MiTest box port 4	Fairview Microwave	SCA1812-0101-72	#3P4	20 Jul 2019
249	Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2019
361	Desktop for RF#1, Labview Software installed	Dell	Vostro 220	WS RF#1	Not Required
378	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100107/040	12 Oct 2019
398	MiTest RF Conducted Test Software	MiCOM	MiTest ATS	Version 4.1	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
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	20 Sep 2019
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2019
515	MiTest Cloud Solutions RF Test Box	MiCOM	2nd Gen with DFS	515	20 Jul 2019
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	24 Feb 2020

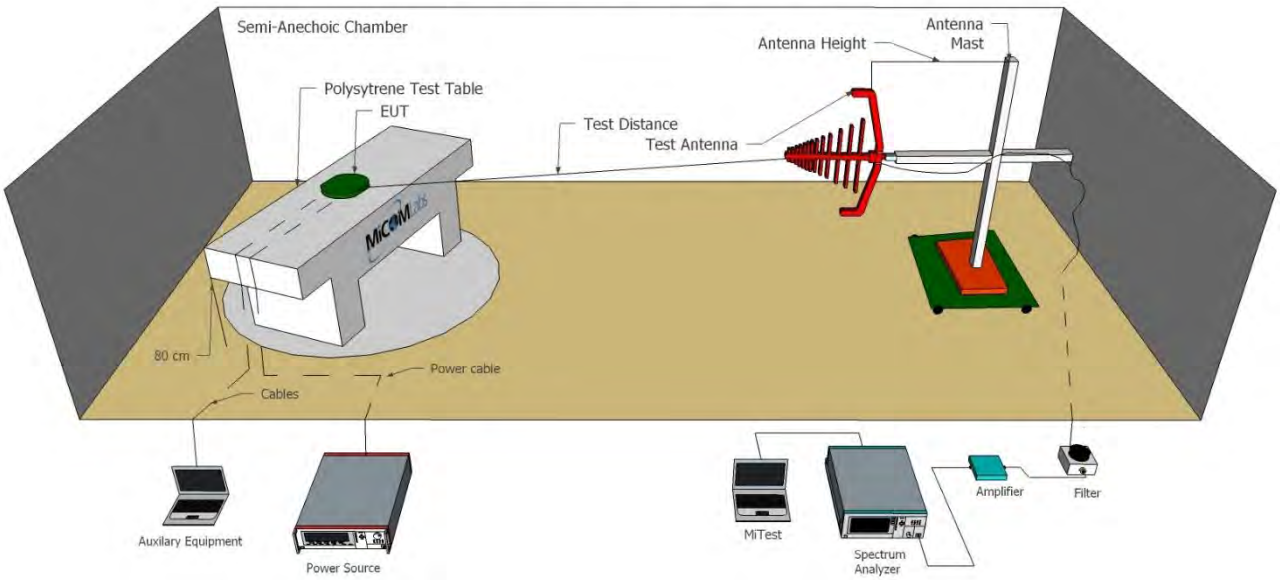
7.2. Radiated Emissions - 3m Chamber

The following tests were performed using the radiated test set-up shown in the diagram below. Radiated emissions above and below 1GHz.

Radiated Emissions Above 1GHz Test Setup



Radiated Emissions Below 1GHz Test Setup



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

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
107	26–40 GHz Horn Antenna	Millimeter Products	261A	None	15 Nov 2019
145	18–26 GHz Horn Antenna	Millimeter Products	261K	None	15 Nov 2019
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Apr 2020
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	12 Oct 2019
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	12 Apr 2020
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Oct 2019
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	12 Apr 2020
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	MiTest Rad Emissions Test Software	MiCOM	Rad Emissions Test Software	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
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	24 Aug 2019
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	24 Aug 2019
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2019
518	Cable - Amp to Antenna	SRC Haverhill	157-3051574	518	24 Aug 2019

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)

9. TEST RESULTS

9.1. 20 dB Bandwidth

Conducted Test Conditions for 20 dB Bandwidth			
Standard:	FCC CFR 47:15.215	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	20 dB Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.215 (c)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for 20 dB and 99% Bandwidth Measurement

The bandwidth at 20 dB and 99 % was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate Low and High frequency.

Testing was performed under ambient conditions at nominal voltage. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported.

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.

Limits for 20 dB Bandwidth
(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Equipment Configuration for 20 dB Bandwidth			
Variant:	10 MHz	**Duty Cycle (%):**	99
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
GHz	a	b	c	d	Highest	Lowest	GHz	MHz
Low Band								
24.058	9.89	--	--	--	9.89	9.89	24.05	-3.11
High Band								
24.242	9.940	--	--	--	9.94	9.94	24.250	-3.11

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Variant:	20 MHz	**Duty Cycle (%):**	99
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
GHz	a	b	c	d	Highest	Lowest	GHz	MHz
Low Band								
24.063	19.81	--	--	--	19.81	19.81	24.05	-3.18
High Band								
24.237	19.88	--	--	--	19.88	19.88	24.250	-3.11

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for 20 dB Bandwidth			
Variant:	30 MHz	**Duty Cycle (%):**	99
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
GHz	a	b	c	d	Highest	Lowest	GHz	MHz
Low Band								
24.068	30.37	--	--	--	30.37	30.37	24.05	-2.94
High Band								
24.232	30.34	--	--	--	30.34	30.34	24.250	-2.77

Variant:	40 MHz	**Duty Cycle (%):**	99
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
GHz	a	b	c	d	Highest	Lowest	GHz	MHz
Low Band								
24.073	40.15	--	--	--	40.15	40.15	24.05	-2.94
High Band								
24.227	40.12	--	--	--	40.12	40.12	24.250	-2.93

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

Variant:	50 MHz	**Duty Cycle (%):**	99
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
GHz	a	b	c	d	Highest	Lowest	GHz	MHz
Low Band								
24.078	50.37	--	--	--	50.37	50.37	24.05	-2.94
High Band								
24.222	50.34	--	--	--	50.34	50.34	24.250	-2.73

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

9.2. Frequency Tolerance

Conducted Test Conditions for Frequency Tolerance			
Standard:	FCC CFR 47:15.249 FCC CFR 47:2.1055	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Frequency Tolerance	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.249 (b)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Frequency Tolerance Measurement

Frequency Stability was measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate frequency.
Method of Measurement: 1 0 dBc

5.6.3 Procedure for Frequency Tolerance Testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

a) At 10 °C intervals of temperatures between −20 °C and +50 °C at the manufacturer's rated supply voltage, and

b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer. If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Limits for Frequency Tolerance
15.249: < 10 ppm

Equipment Configuration for Frequency Tolerance			
Variant:	10 MHz	**Antenna:**	Not Applicable
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	4 QAM	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	24.222 GHz	Measured Frequency	Frequency Error	Frequency Error	Limit	Margin
Temperature	Voltage	Hz	kHz	ppm	ppm	ppm
20 °C	48	24222030060	30.06	1.24	± 10	-8.75897944
20 °C	40.8	24222030060	30.06	1.24	± 10	-8.75897944
20 °C	55.2	24222030060	30.06	1.24	± 10	-8.75897944
-20 °C	48	24222020040	20.04	0.83	± 10	-9.17265296
-10 °C	48	24222040080	40.08	1.65	± 10	-8.34530592
0 °C	48	24222030060	30.06	1.24	± 10	-8.75897944
10 °C	48	24222020040	20.04	0.83	± 10	-9.17265296
20 °C	48	24222010020	10.02	0.41	± 10	-9.58632648
30 °C	48	24222030060	30.06	1.24	± 10	-8.75897944
30 °C	48	24222080160	80.16	3.31	± 10	-6.69061184
40 °C	48	24222020040	20.04	0.83	± 10	-9.17265296

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-02 MEASURING FREQUENCY
Measurement Uncertainty:	±0.86 ppm

9.3. Emissions

9.3.1. Fundamental Emissions

Conducted Test Conditions for Transmitter Conducted Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.249	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Fundamental Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.249 (b)(1)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Fundamental Emissions Measurement

Radiated fundamental emissions are measured in the anechoic chamber at a 1-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

Limits for Fundamental Emissions
Average emission: 128 dBuV/m

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

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Example:
Given receiver input reading of 51.5 dBmV; 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 (FS) of the measured emission is:

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

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

NOTE: As the 10 MHz bandwidth had the highest power spectral density component this was the only bandwidth measurement considered.

9.3.1.1. Fundamental Emissions

Shenglu Antenna

Equipment Configuration for Unwanted Emissions Peak

Variant:	10 MHz	**Duty Cycle (%):**	99
Data Rate:	15328 KBit/s	**Antenna Gain (dBi):**	35.8
Modulation:	4 QAM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Fundamental	Limit	Margin	EUT Power Setting
GHz	(dBuV/m)	(dBuV/m)	dB	
Low Band				
24.058	126.8	128.0	-1.2	- 3.0
24.078	126.6	128.0	-1.2	- 3.0
24.098	126.5	128.0	-1.1	- 3.0
High Band				
24.202	126.1	128.0	-1.2	- 3.0
24.222	126.3	128.0	-1.1	- 3.0
24.242	126.1	128.0	-1.2	- 3.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-05 MEASUREMENT OF SPURIOUS EMISSIONS
Measurement Uncertainty:	<=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB

Note: 10 MHz Bandwidth is worst case emissions for fundamental emissions measurements.

RFS Antenna

Equipment Configuration for Unwanted Emissions Peak			
Variant:	10 MHz	**Duty Cycle (%):**	99
Data Rate:	15328 KBit/	**Antenna Gain (dBi):**	36.3
Modulation:	4 QAM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Fundamental	ERP Limit	Margin	EUT Power Setting
GHz	(dBuV/m)	(dBuV/m)	dB	
Low Band				
24.058	127.2	128.0	-0.8	- 4.0
24.078	127.1	128.0	-0.9	- 3.0
24.098	127.1	128.0	-0.9	- 4.0
High Band				
24.202	127.2	128.0	-0.8	- 3.0
24.222	127.1	128.0	-0.9	- 3.0
24.242	127.1	128.0	-0.9	- 3.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-05 MEASUREMENT OF SPURIOUS EMISSIONS
Measurement Uncertainty:	<=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB

Note: 10 MHz Bandwidth is worst case emissions for fundamental emissions measurements.

9.3.2. Radiated Spurious Emissions

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions (Restricted Bands)			
Standard:	FCC CFR 47:15.249	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.205, 15.209	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions (Restricted Bands)

Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned. Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

Limits for Restricted Bands
Peak emission: 74 dBuV/m
Average emission: 54 dBuV/m
Harmonics: 68 dBuV/m

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

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Example:
Given receiver input reading of 51.5 dBmV; 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 (FS) of the measured emission is:

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

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m
Restricted Bands of Operation (15.205)

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided 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 §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

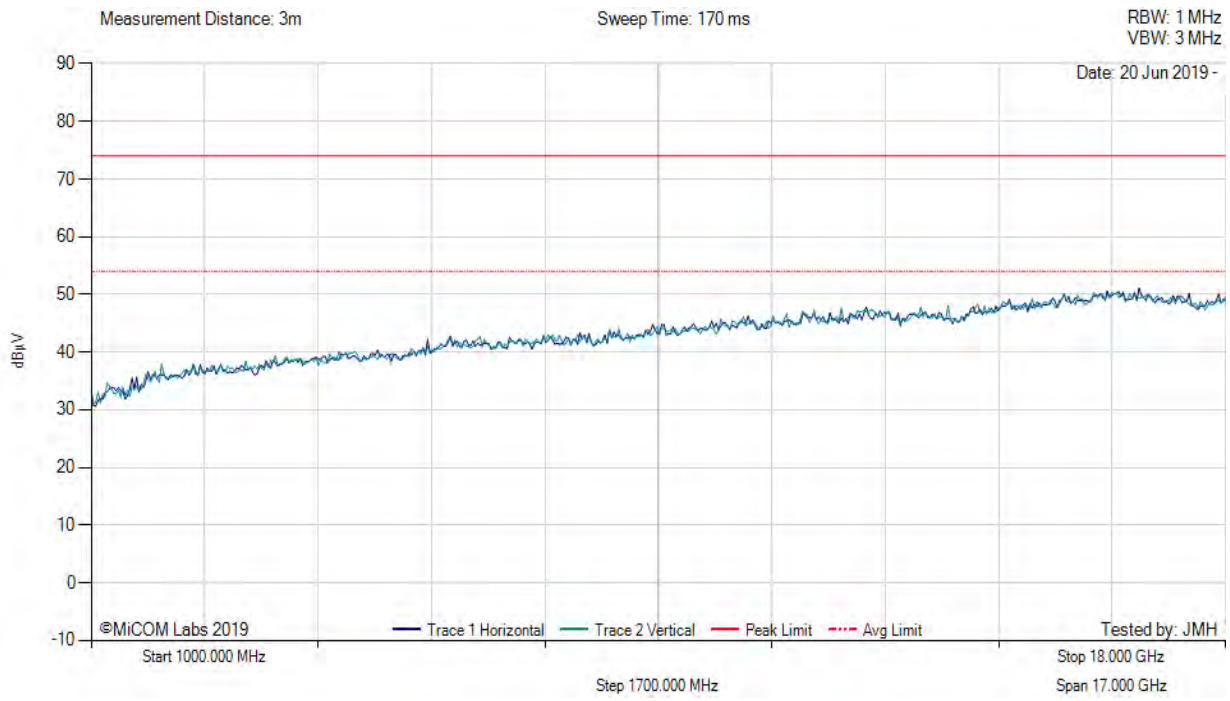
9.3.2.2. TX Spurious Emissions

Transmitter Spurious 1 - 18 GHz

Equipment Configuration for Restricted Band Spurious Emissions			
Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24202.00	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 24202.00 MHz, Power Setting: 0 dBm



There are no emissions found within 6dB of the limit line.

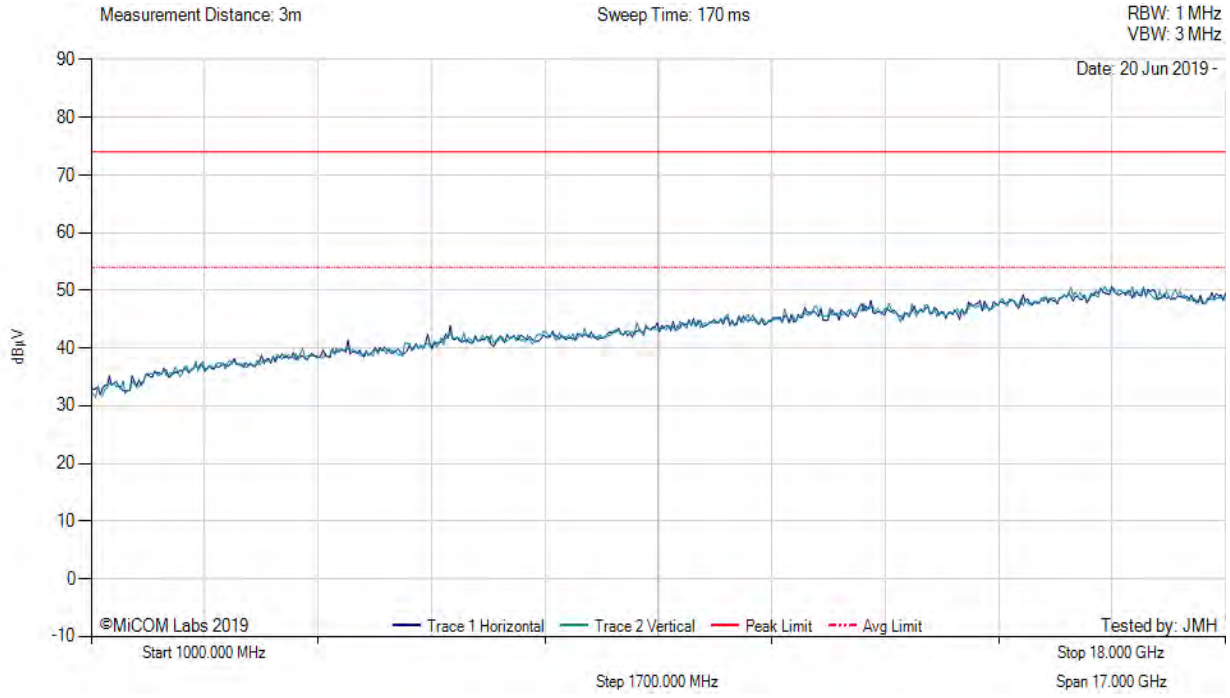
Test Notes: EUT powered by 48V DC, both LANs connected via hub to PC outside chamber.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24220.25	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 24220.25 MHz, Power Setting: 0 dBm



There are no emissions found within 6dB of the limit line.

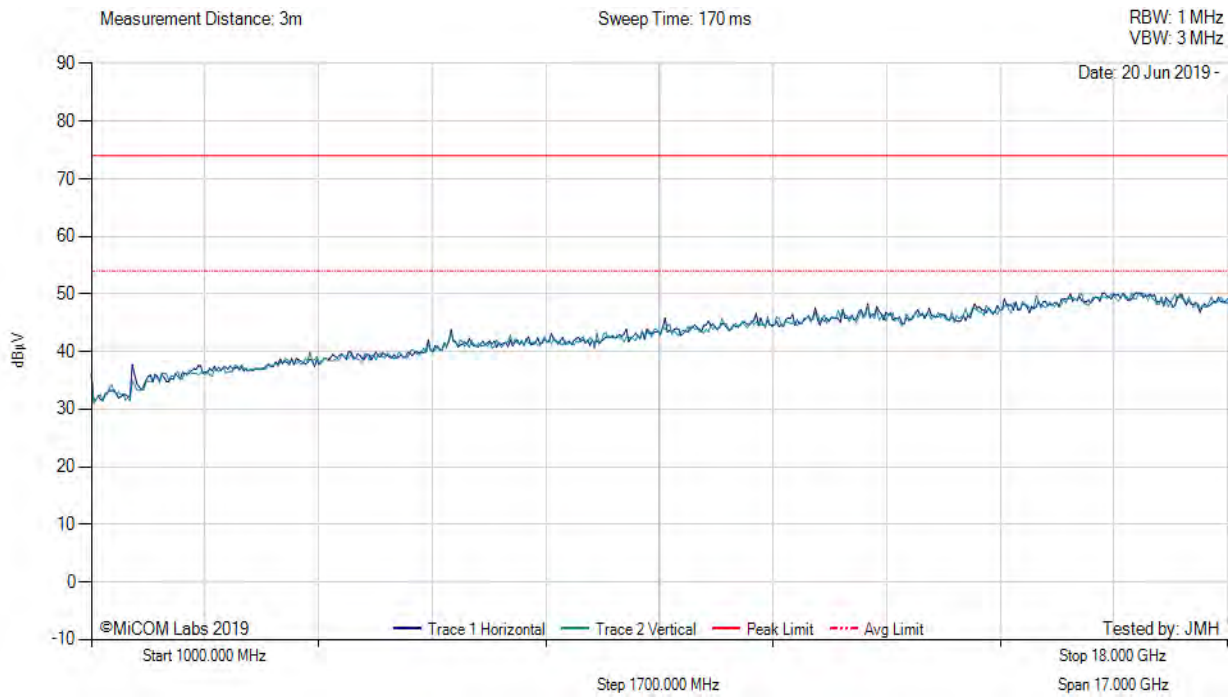
Test Notes: EUT powered by 48V DC, both LANs connected via hub to PC outside chamber.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24242.00	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 24242.00 MHz, Power Setting: 0 dBm



There are no emissions found within 6dB of the limit line.

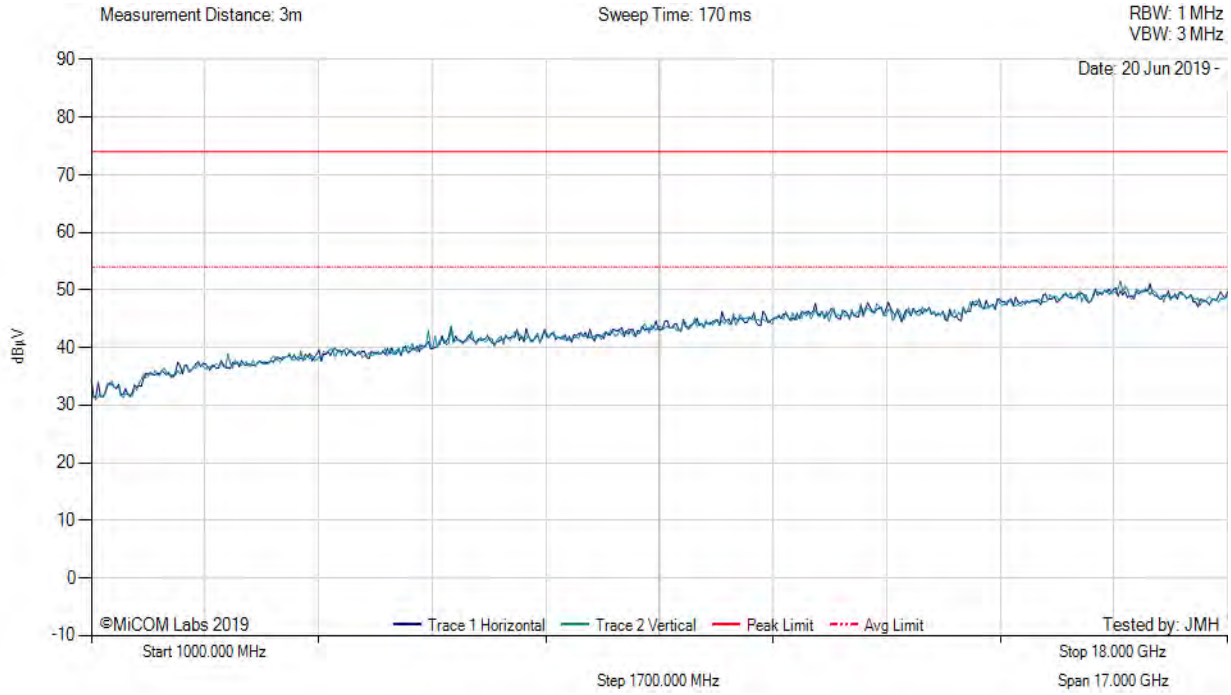
Test Notes: EUT powered by 48V DC, both LANs connected via hub to PC outside chamber.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	RFS	**Variant:**	10 MHz
Antenna Gain (dBi):	36.3	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24202.00	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 24202.00 MHz, Power Setting: 0 dBm



There are no emissions found within 6dB of the limit line.

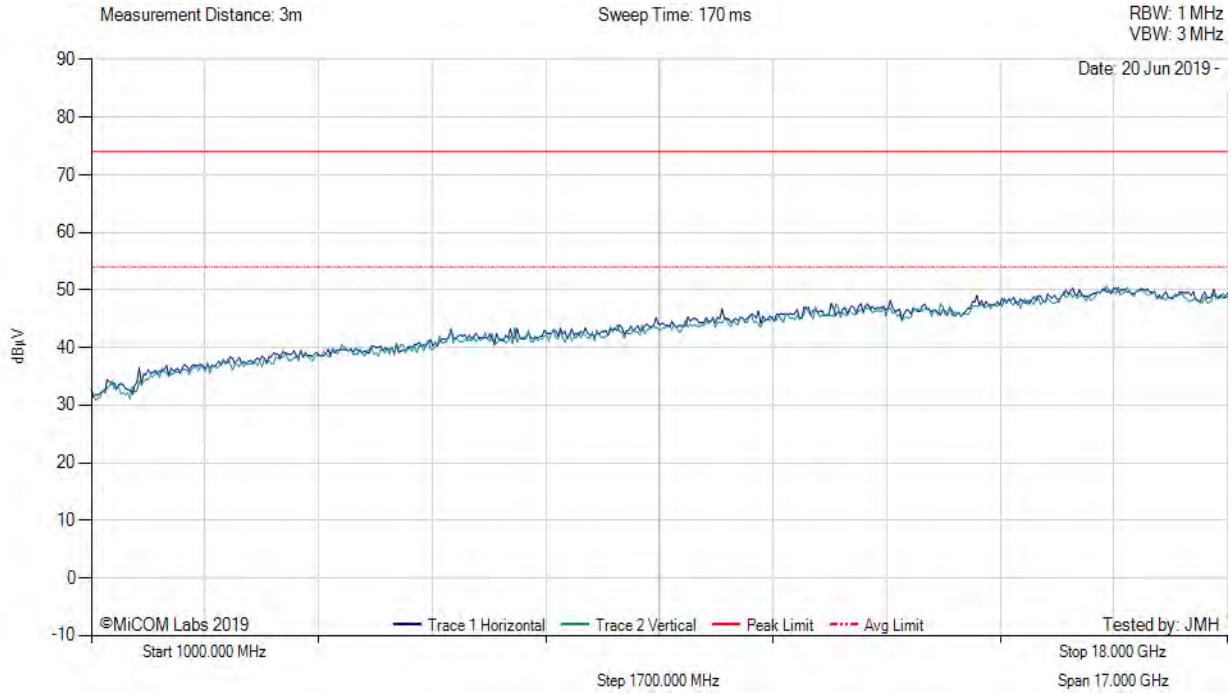
Test Notes: EUT powered by POE, both LANs connected via hub to PS outside chamber.

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	RFS	**Variant:**	10 MHz
Antenna Gain (dBi):	36.3	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24220.25	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 24220.25 MHz, Power Setting: 0 dBm



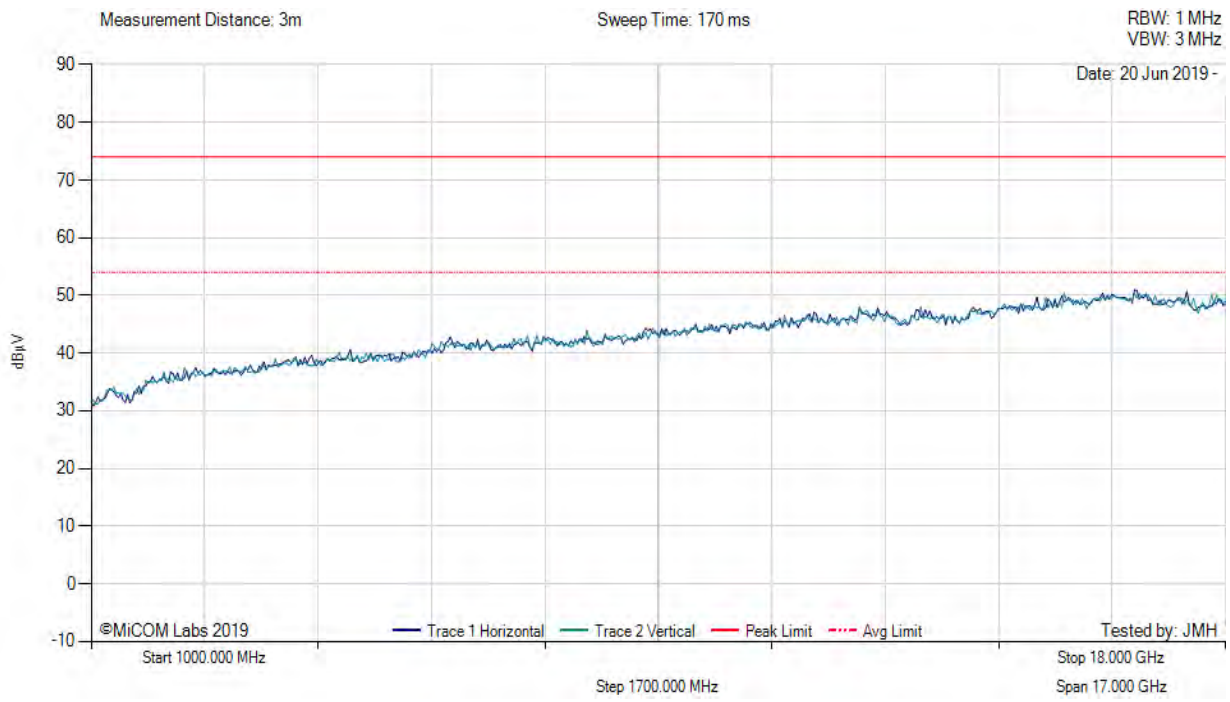
There are no emissions found within 6dB of the limit line.

Test Notes: EUT powered by POE, both LANs connected via hub to PC outside chamber.

Equipment Configuration for Restricted Band Spurious Emissions			
Antenna:	RFS	**Variant:**	10 MHz
Antenna Gain (dBi):	36.3	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24242.00	**Data Rate:**	15328 KBit/s
Power Setting:	0 dBm	**Tested By:**	JMH

Test Measurement Results
Click here to view measurement data...
Test Notes: EUT powered by POE, both LANs connected via hub to PC outside chamber.

Variant: , Test Freq: 24242.00 MHz, Power Setting: 0 dBm



There are no emissions found within 6dB of the limit line.

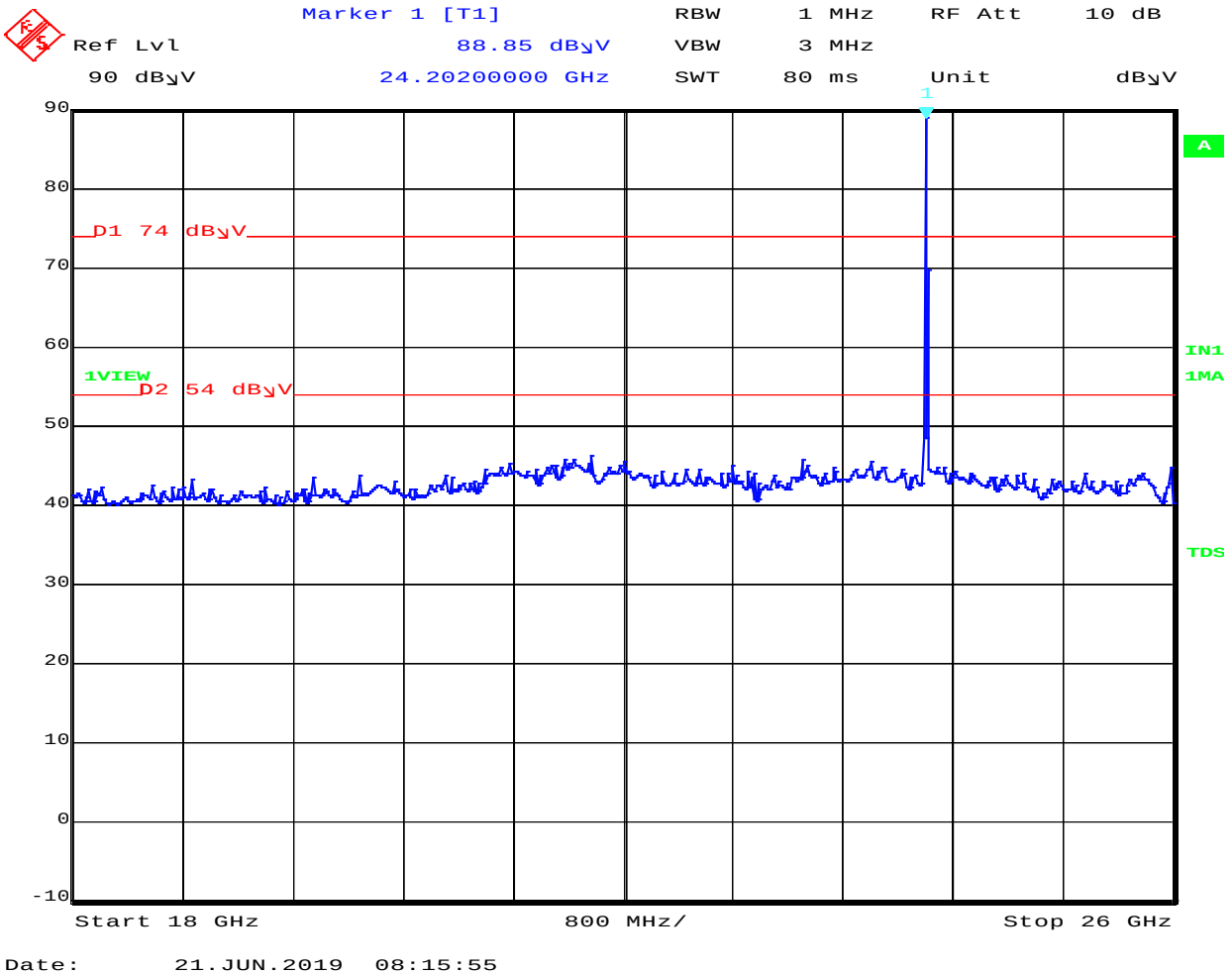
Test Notes: EUT powered by POE, both LANs connected via hub to PC outside chamber.

Transmitter Spurious 18 – 26 GHz

Equipment Configuration for Radiated Emissions 18-26 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,202	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

Test Measurement Results

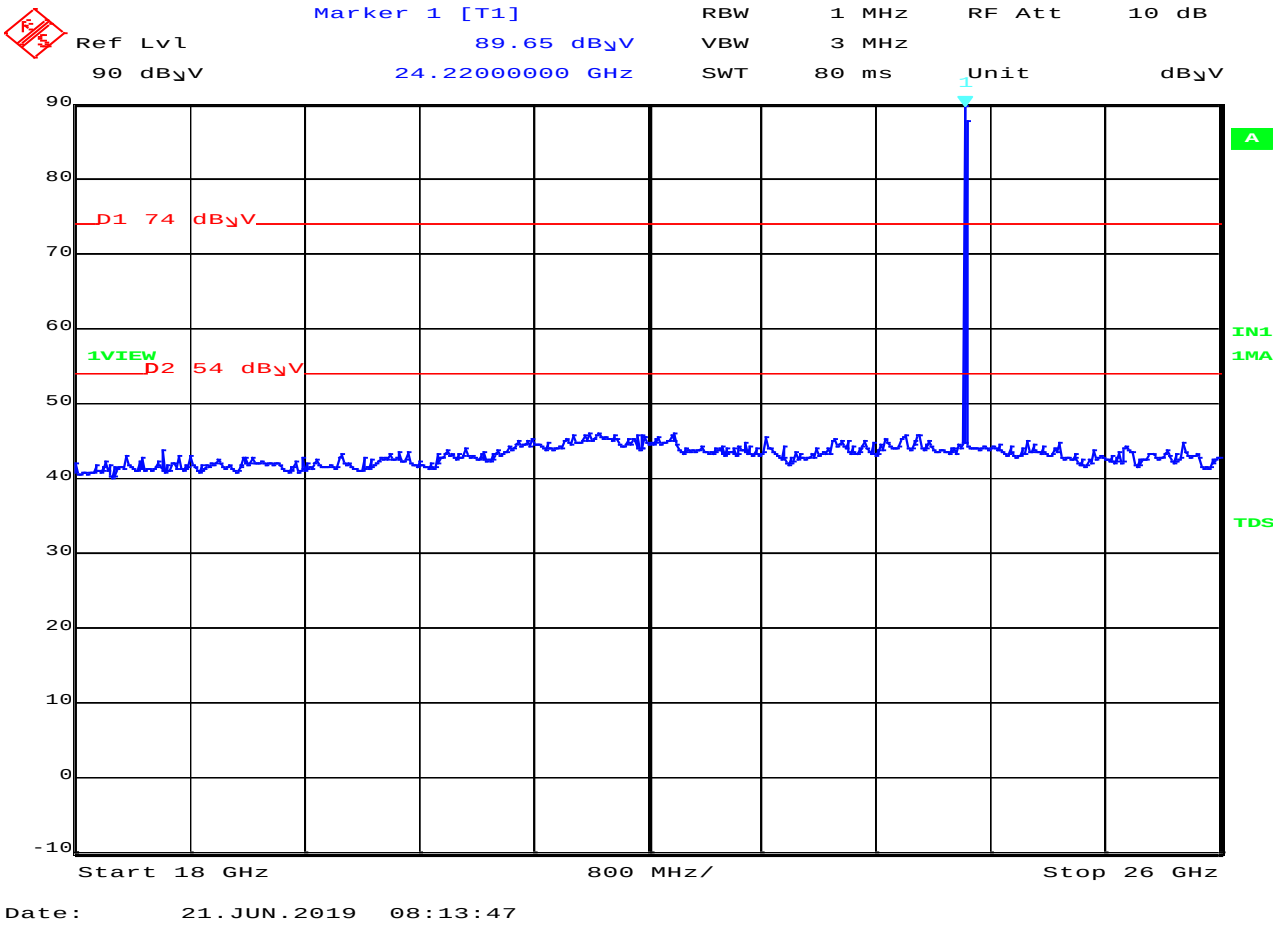


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.202 GHz : Fundamental	Channel Frequency: 24.202 GHz

Equipment Configuration for Radiated Emissions 18-26 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,220	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

Test Measurement Results

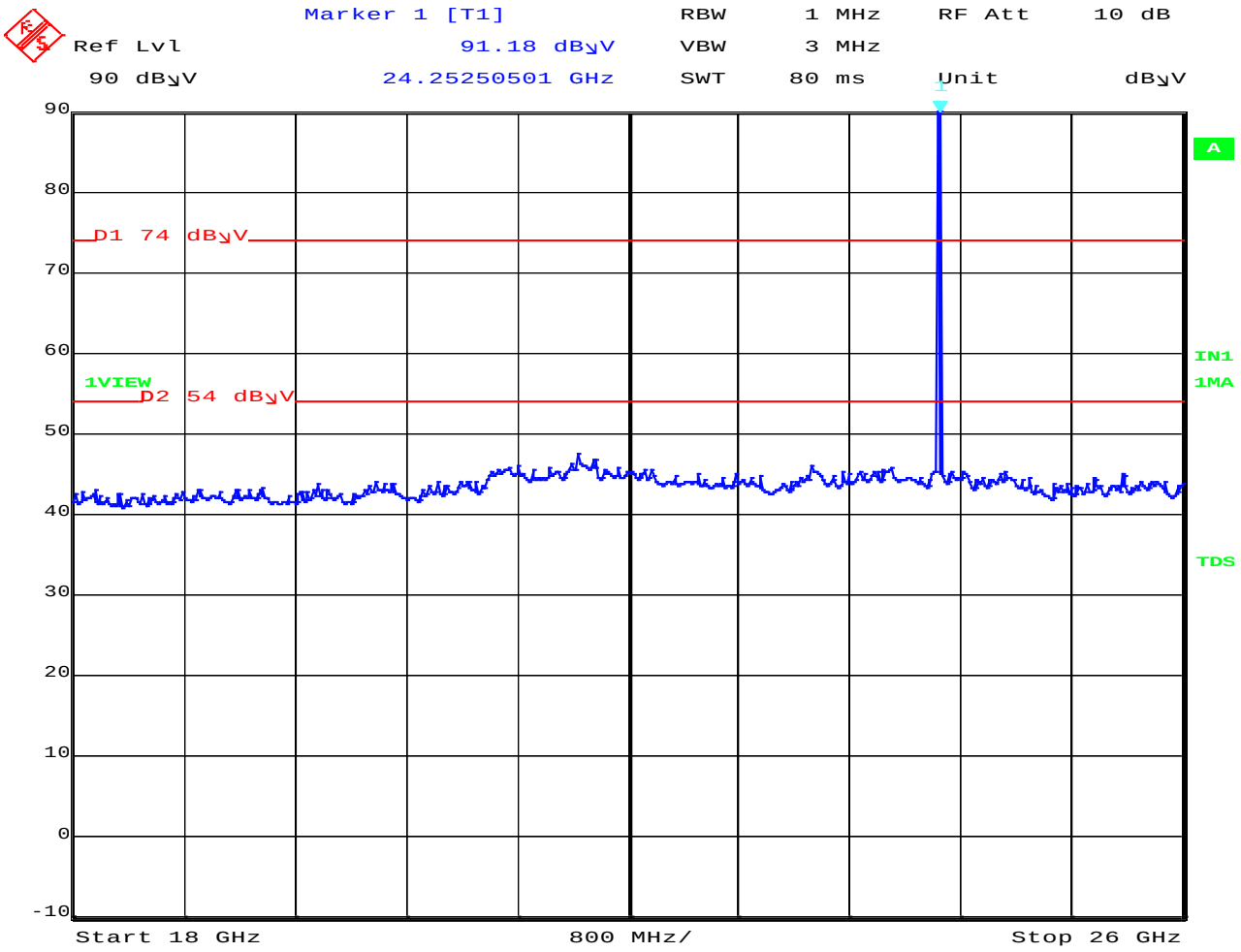


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.220 GHz : Fundamental	Channel Frequency: 24.220 GHz

Equipment Configuration for Radiated Emissions 18-26 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,242	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

Test Measurement Results



Date: 21.JUN.2019 08:17:36

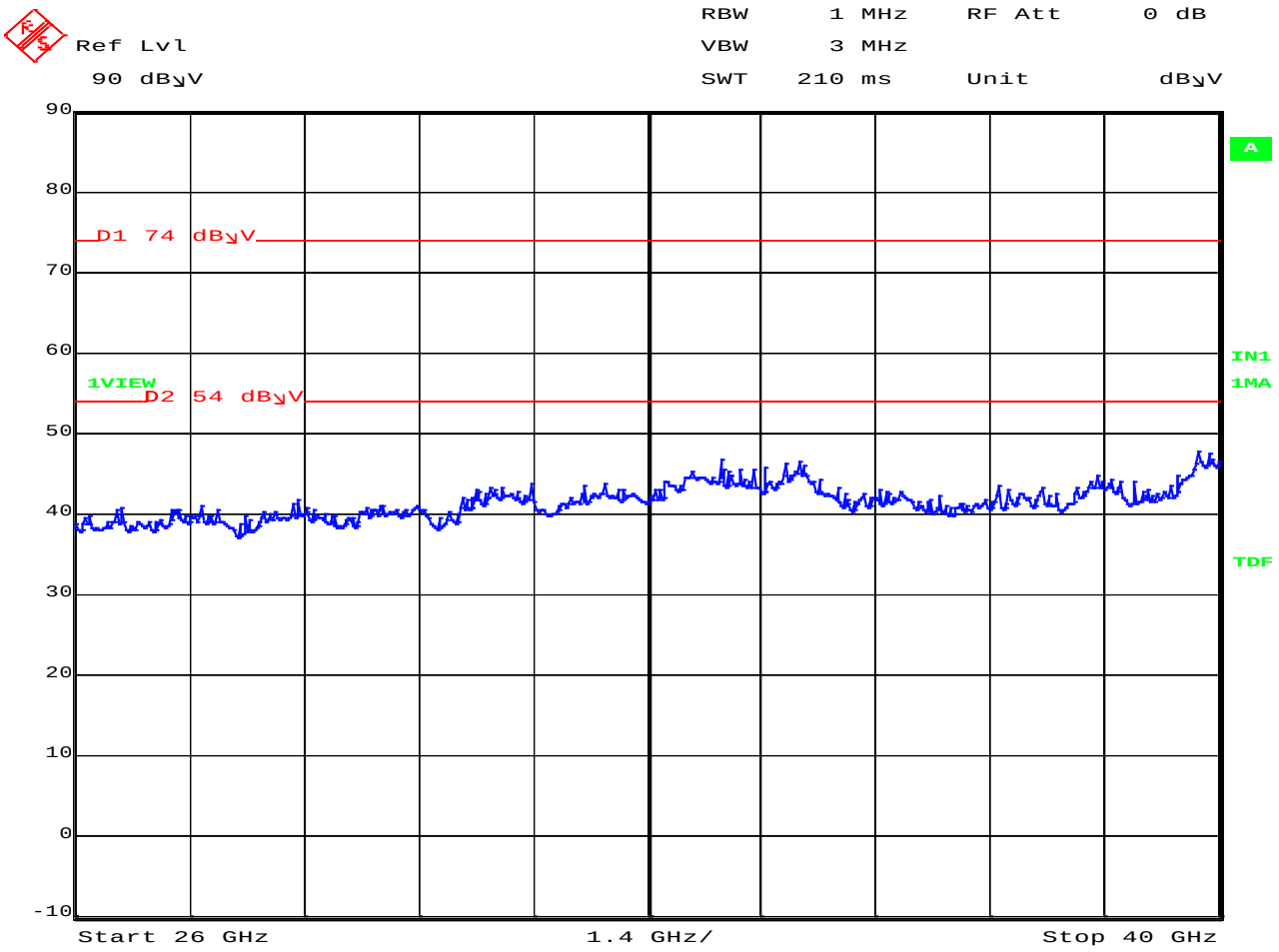
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.252 GHz : Fundamental	Channel Frequency: 24.242 GHz

Transmitter Spurious 26 - 40 GHz

Equipment Configuration for Radiated Emissions 26-40 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,202	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

Test Measurement Results

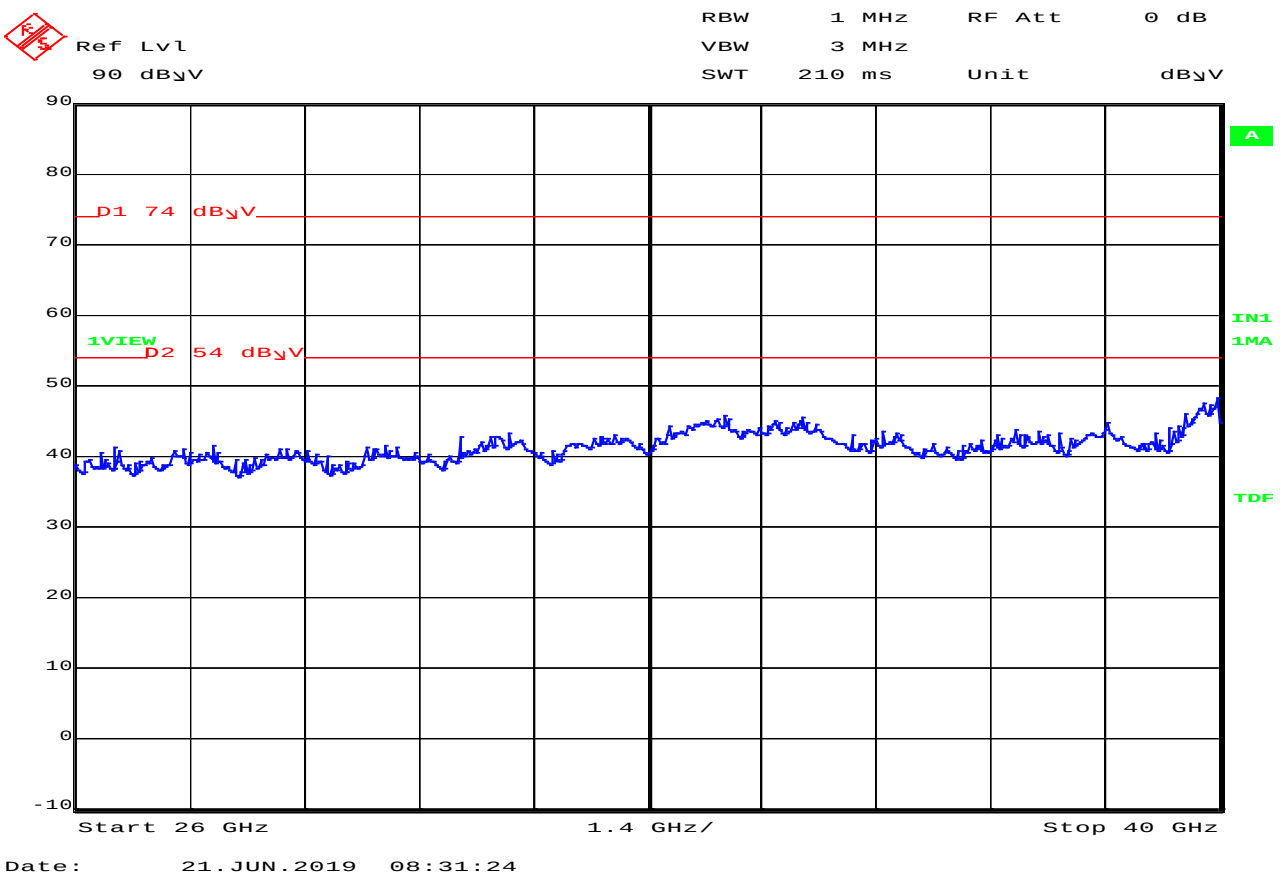


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 24.202 GHz

Equipment Configuration for Radiated Emissions 26-40 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,220	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

Test Measurement Results

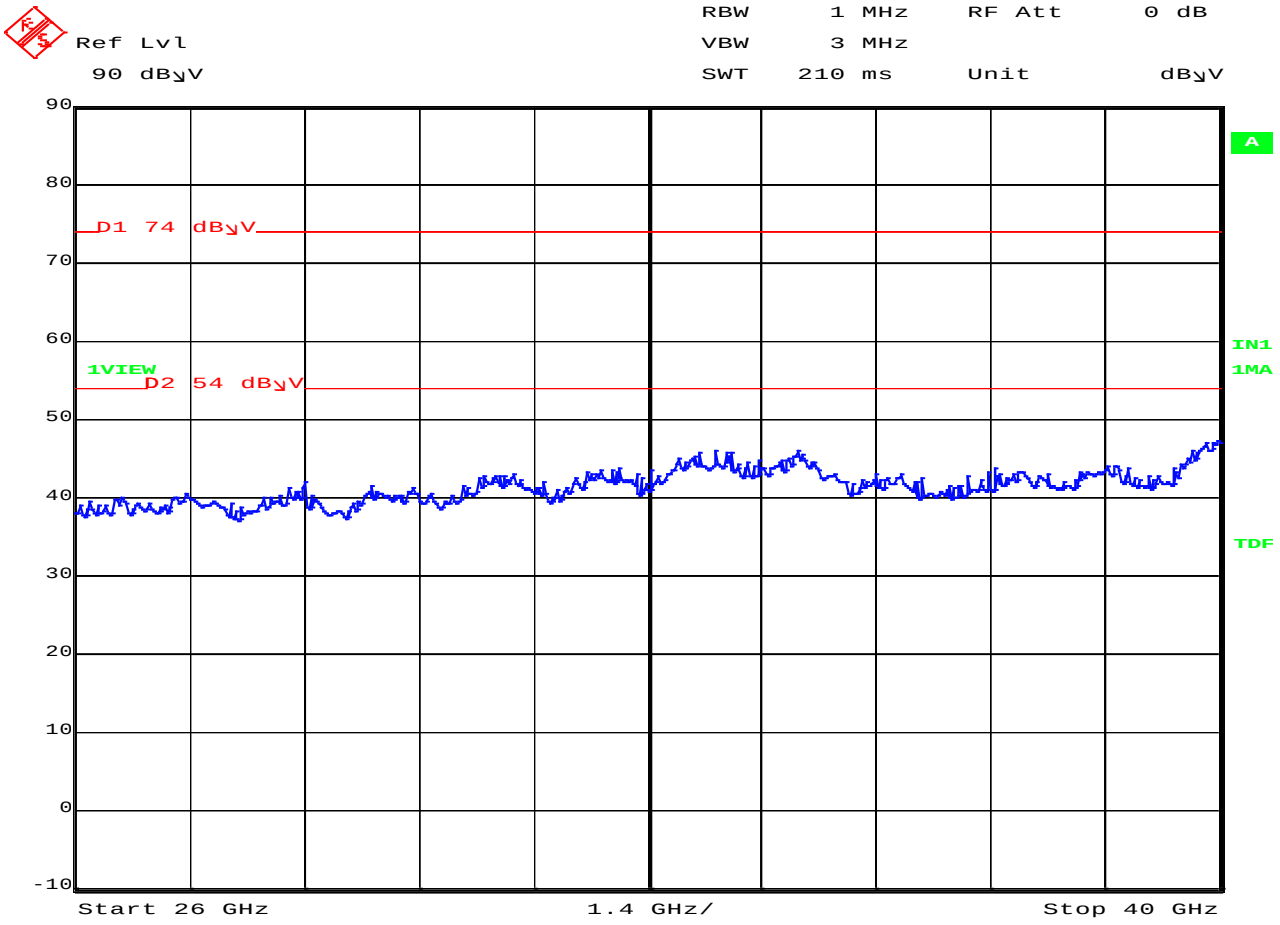


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 24.220 GHz

Equipment Configuration for Radiated Emissions 26-40 GHz

Antenna:	Shenglu	**Variant:**	10 MHz
Antenna Gain (dBi):	35.8	**Modulation:**	4 QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	24,242	**Data Rate:**	
Power Setting:	0	**Tested By:**	JMH

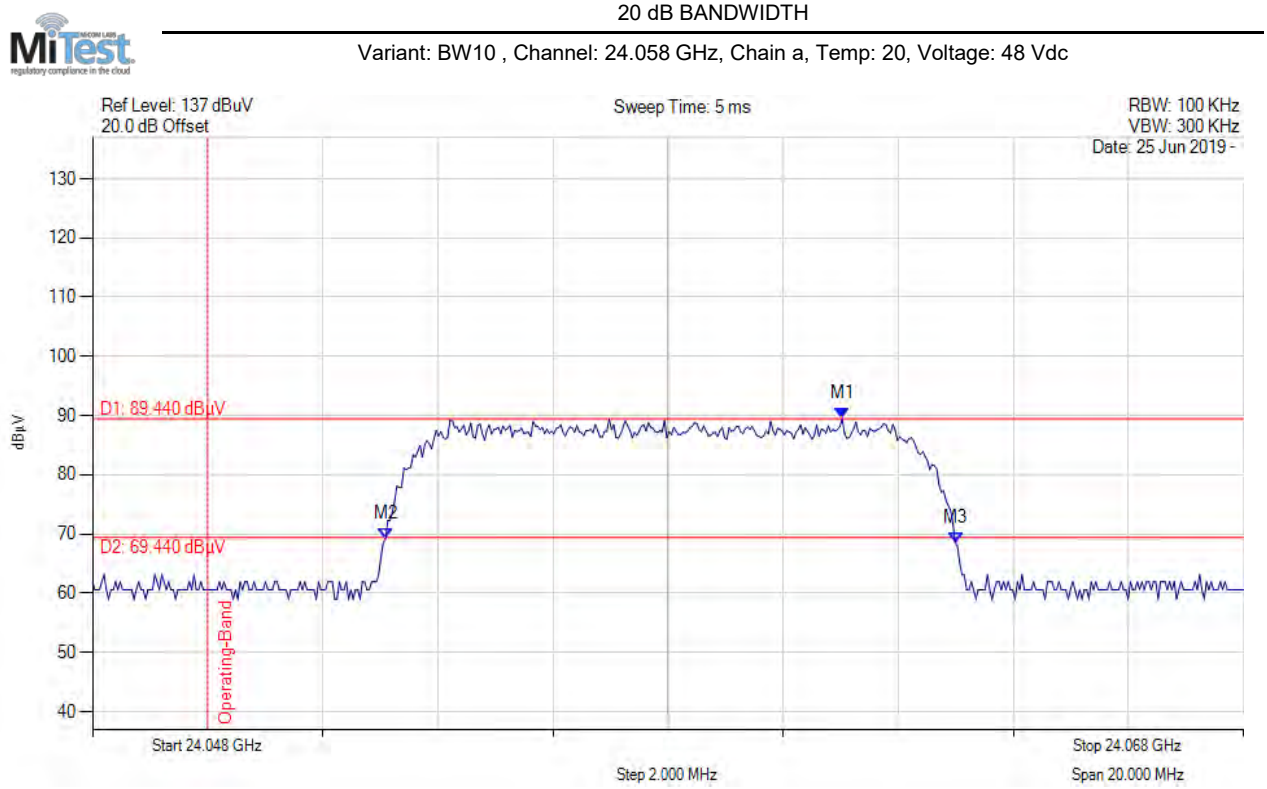
Test Measurement Results



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 24.242 GHz

A. APPENDIX - GRAPHICAL IMAGES

A.1. 20 dB Bandwidth



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.061 GHz : 89.442 dBµV M2 : 24.053 GHz : 69.116 dBµV M3 : 24.063 GHz : 68.565 dBµV Bandwidth: 9.94 MHz	Channel Frequency: 24.058 GHz Operating Band: 24.05 GHz Margin: 3.18 MHz

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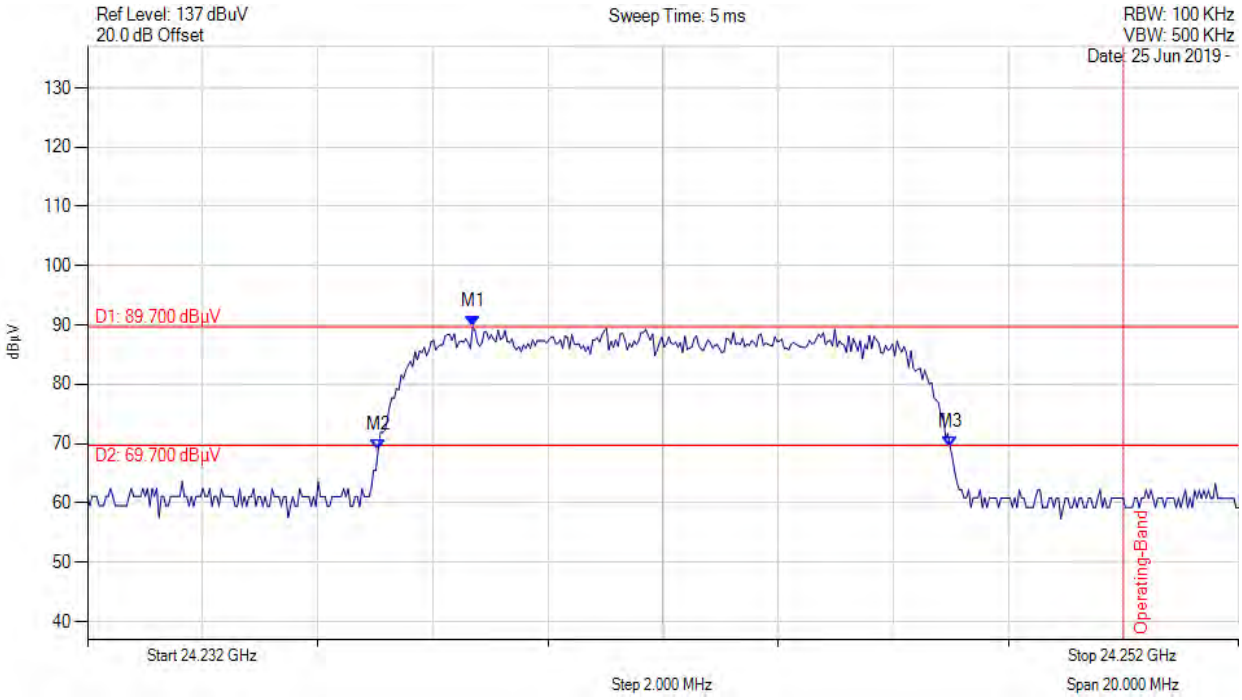
20 dB BANDWIDTH

Variant: BW10, Channel: 24.242 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.239 GHz : 89.697 dBµV M2 : 24.237 GHz : 69.004 dBµV M3 : 24.247 GHz : 69.386 dBµV Bandwidth: 9.89 MHz	Channel Frequency: 24.242 GHz Operating Band: 24.25 GHz Margin: 3.11 MHz

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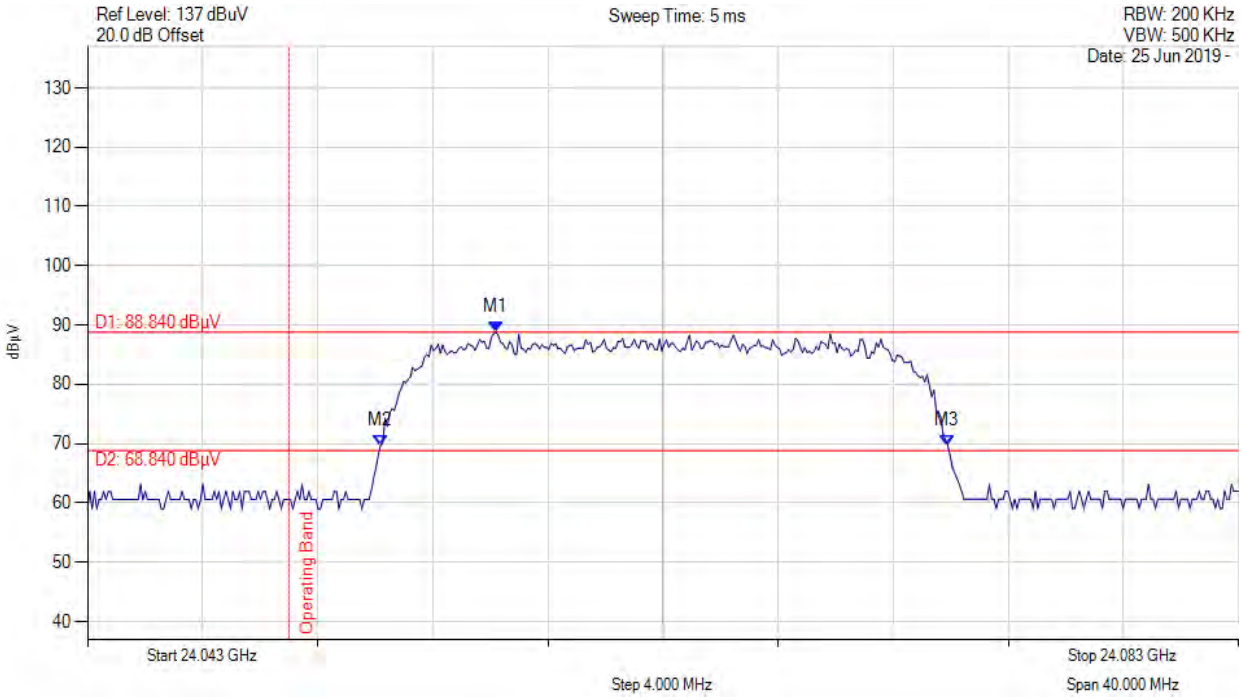
20 dB BANDWIDTH

Variant: BW20, Channel: 24.063 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.057 GHz : 88.842 dBµV M2 : 24.053 GHz : 69.642 dBµV M3 : 24.073 GHz : 69.679 dBµV Bandwidth: 19.81 MHz	Channel Frequency: 24.063 GHz Operating Band: 24.05 GHz Margin: 3.18 MHz

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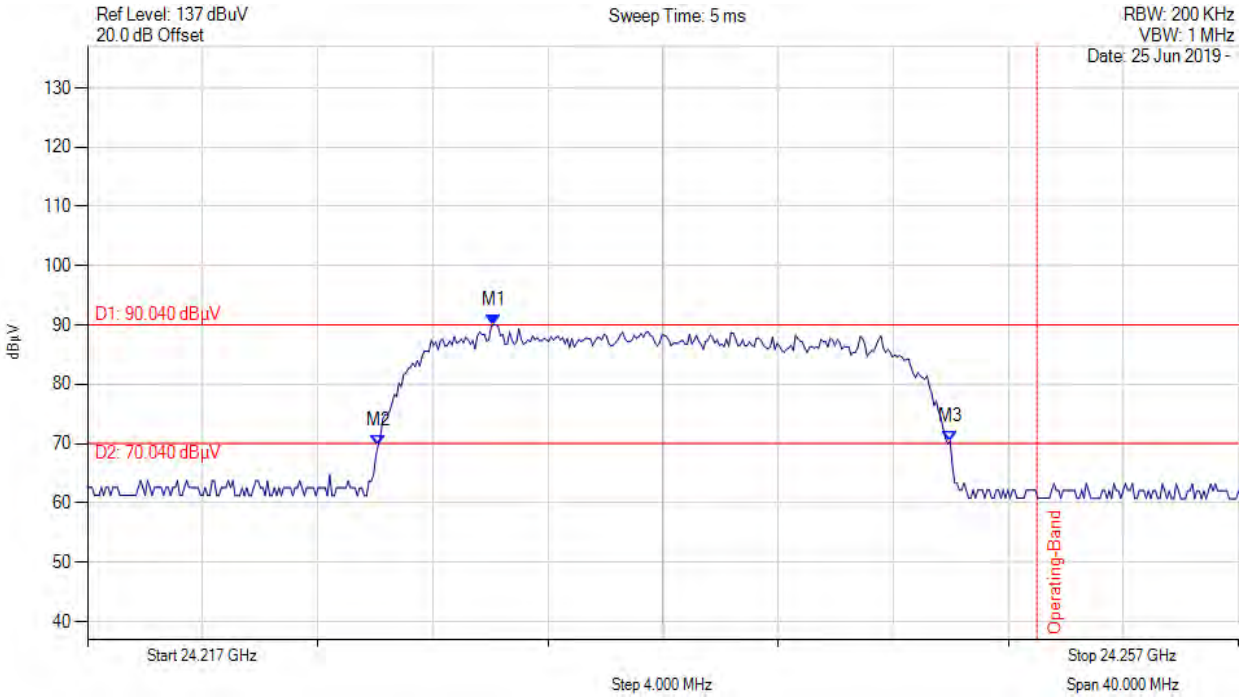
20 dB BANDWIDTH

Variant: BW20, Channel: 24.237 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.231 GHz : 90.036 dBµV M2 : 24.227 GHz : 69.721 dBµV M3 : 24.247 GHz : 70.410 dBµV Bandwidth 19.88 MHz	Channel Frequency: 24.237 GHz Operating Band: 24.25 GHz Margin: 3.11 MHz

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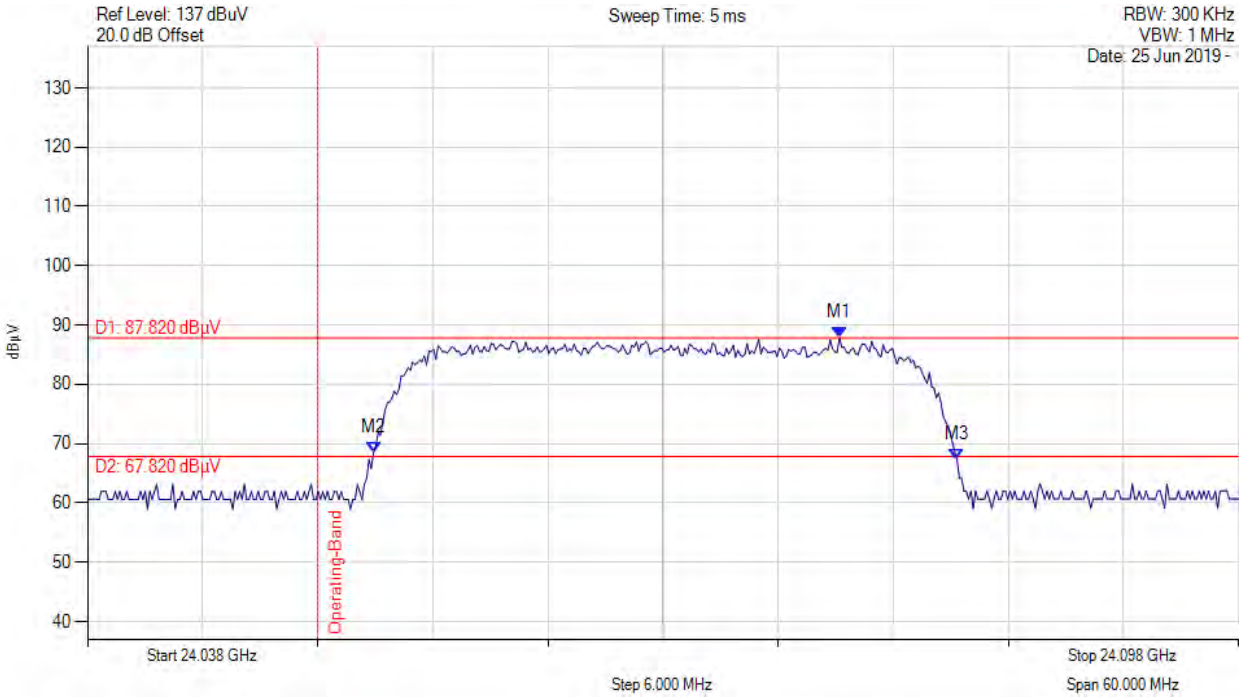
20 dB BANDWIDTH

Variant: BW30, Channel: 24.068 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.077 GHz : 87.818 dBµV M2 : 24.053 GHz : 68.555 dBµV M3 : 24.083 GHz : 67.383 dBµV Bandwidth: 30.37 MHz	Channel Frequency: 24.068 GHz Operating Band: 24.05 GHz Margin: 2.94 MHz

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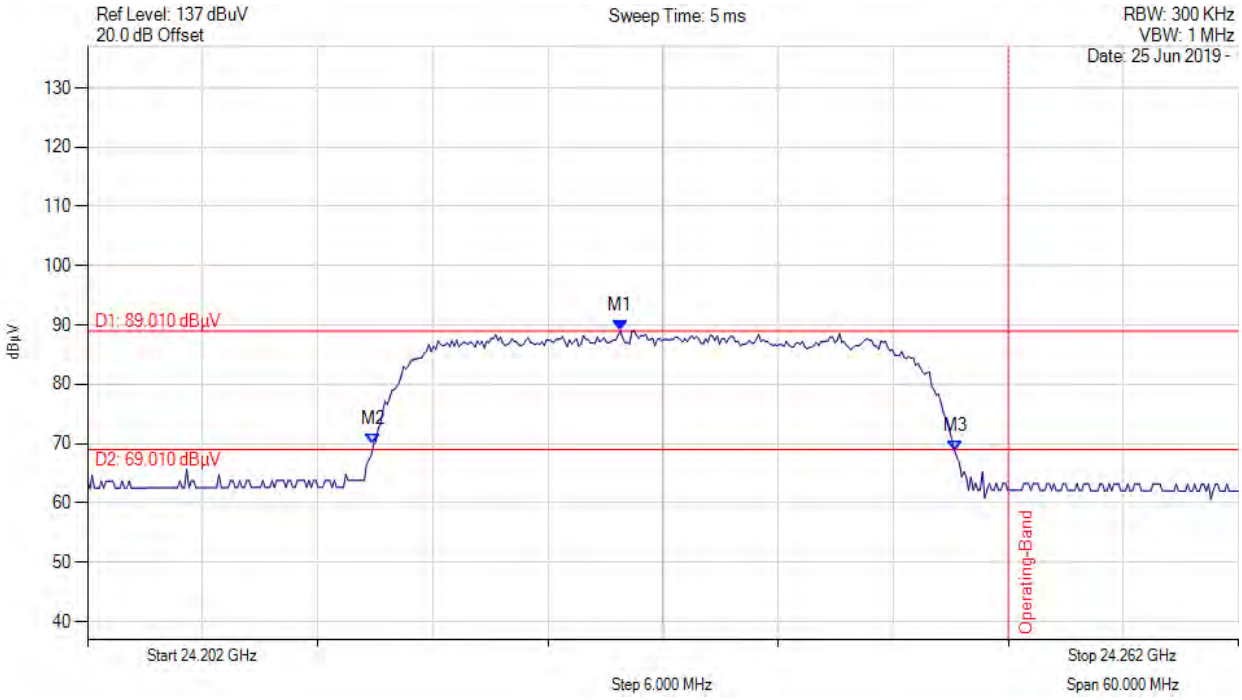
20 dB BANDWIDTH

Variant: BW30, Channel: 24.232 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.230 GHz : 89.007 dBµV M2 : 24.217 GHz : 69.812 dBµV M3 : 24.247 GHz : 68.822 dBµV Bandwidth: 30.34 MHz	Channel Frequency: 24.232 GHz Operating Band: 24.25 GHz Margin: 2.77 MHz

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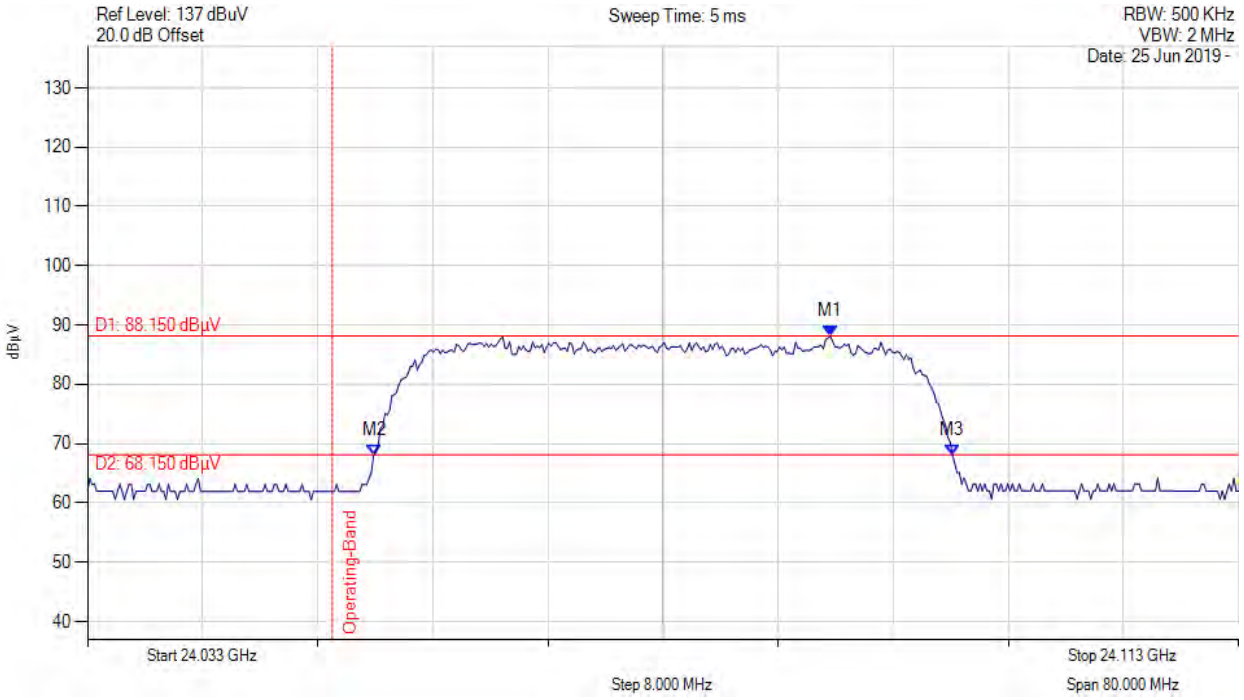
20 dB BANDWIDTH

Variant: BW40, Channel: 24.073 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.085 GHz : 88.154 dBµV M2 : 24.053 GHz : 67.956 dBµV M3 : 24.093 GHz : 68.054 dBµV Bandwidth: 40.15 MHz	Channel Frequency: 24.073 GHz Operating Band: 24.05 GHz Margin: 2.94 MHz

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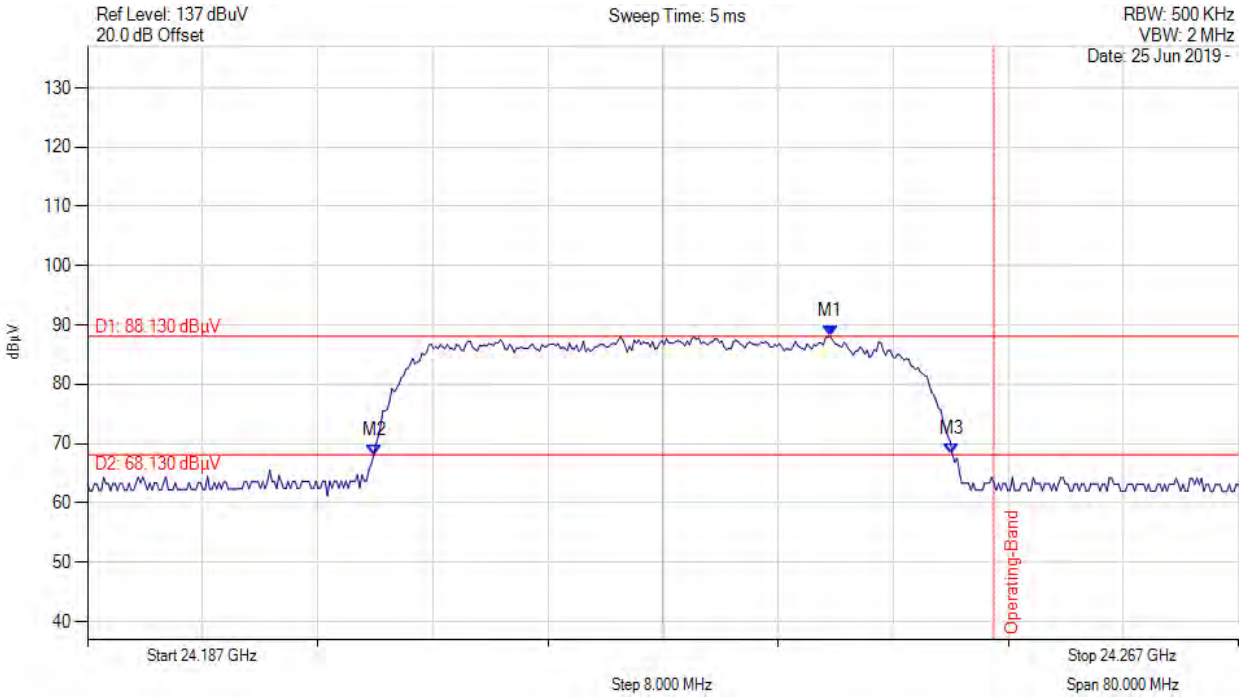
20 dB BANDWIDTH

Variant: BW40, Channel: 24.227 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.239 GHz : 88.125 dBµV M2 : 24.207 GHz : 67.956 dBµV M3 : 24.247 GHz : 68.224 dBµV Bandwidth: 40.12 MHz	Channel Frequency: 24.227 GHz Operating Band: 24.25 GHz Margin: 2.93 MHz

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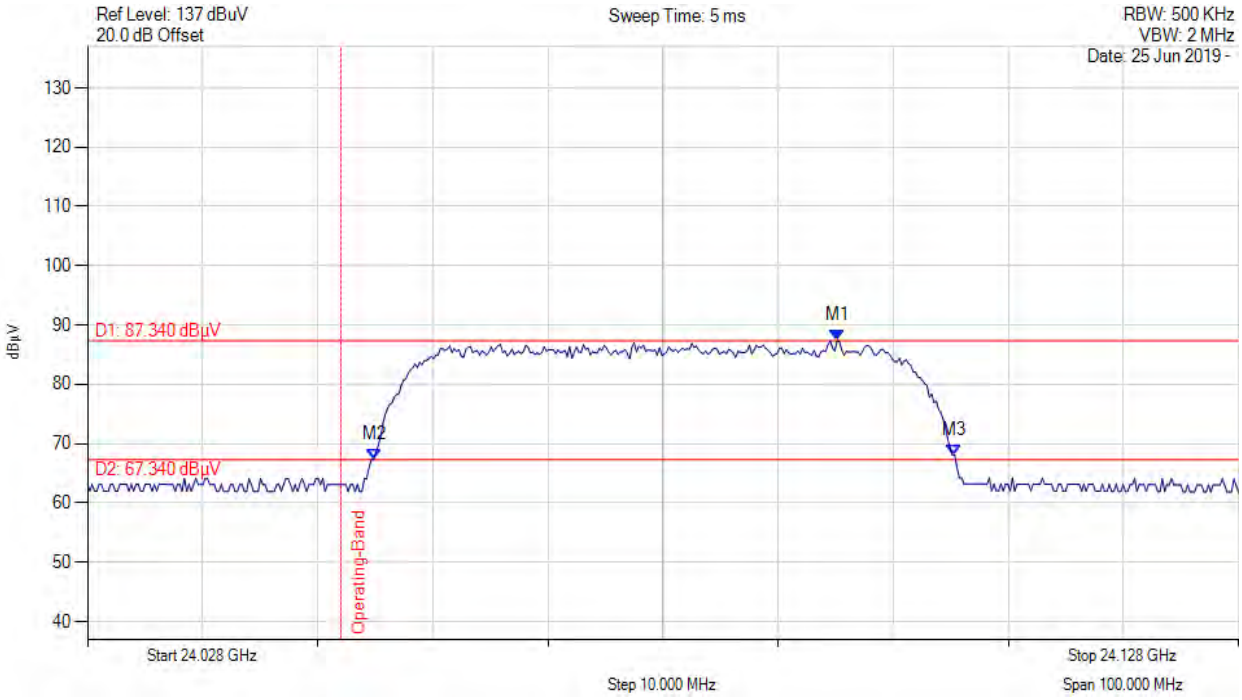
20 dB BANDWIDTH

Variant: BW50, Channel: 24.078 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.093 GHz : 87.343 dBµV M2 : 24.053 GHz : 67.312 dBµV M3 : 24.103 GHz : 68.060 dBµV Bandwidth: 50.37	Channel Frequency: 24.078 GHz Operating Band: 24.05 GHz Margin: 2.94 MHz

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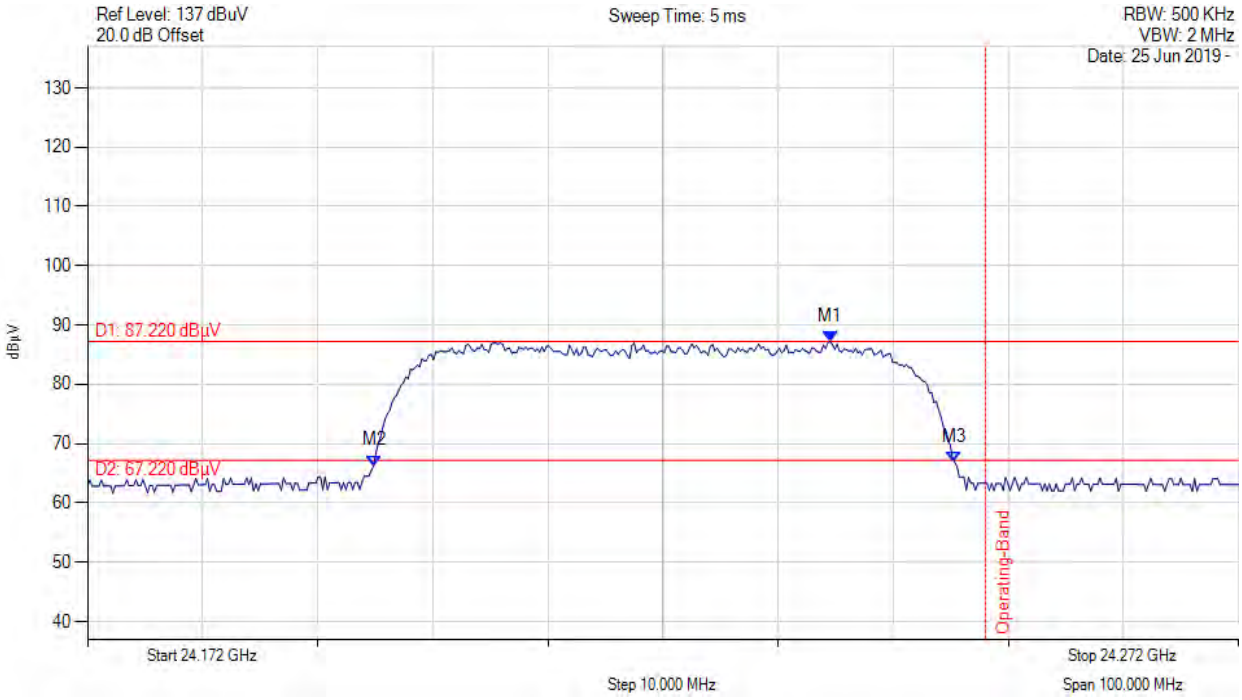
20 dB BANDWIDTH

Variant: BW50, Channel: 24.222 GHz, Chain a, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = AVERAGE Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 24.237 GHz : 87.219 dBµV M2 : 24.197 GHz : 66.289 dBµV M3 : 24.247 GHz : 66.881 dBµV Bandwidth: 50.34 MHz	Channel Frequency: 24.222 GHz Operating Band: 24.25 GHz Margin: 2.73 MHz

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