REGULATORY COMPLIANCE TEST REPORT

FCC CFR 47 15.247, RSS-247 Issue 2

Report No.: HWPD93-U4 Rev A

Company: HP Inc.

Model Name: 0960-4025,0960-4034 and 0960-4745

REGULATORY COMPLIANCE TEST REPORT

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Model Name: 0960-4025,0960-4034 and 0960-4745

To: FCC CFR 47 15.247, RSS-247 Issue 2

Test Report Serial No.: HWPD93-U4 Rev A

This report supersedes: NONE

Applicant: HP Inc.
1115 SE 164th Ave., Suite 210
Vancouver, WA. 98683
USA

Issue Date: 4th August 2020

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
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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 17025:2017. 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

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 17025:2017 *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 24th day of February 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2021

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 and certification capabilities. In addition to being recognized for Testing and Certification under Phase 2 agreements with Canada, Europe and Japan, our international recognition includes Conformity Assessment Body designation under Phase 1 agreements with APEC MRA countries. 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	--	--	A-0012
Europe	European Commission	NB	EU MRA 2	NB 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)	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.

MRA Phase
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 24th day of February 2020

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2021

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	4th August 2020	Draft report for client review. This report is intended as an addendum to prior testing of this product to these standards performed and reported by MiCOM Labs test report HWPD90-U4. The Scope of the test program is to verify continued compliance of models 0960-4025; 0960-4034 and 0960-4745 as they now have a new digital PCB and Radio Diplexer (Same Part, but new Vendor)
Rev A	20th August 2020	Initial Release
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In the above table the latest report revision will replace all earlier versions.

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

3. TEST RESULT CERTIFICATE

Manufacturer:	HP Inc. 1115 SE 164th Ave., Suite 210 Vancouver, WA. 98683 USA	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	0960-4025,0960-4034 and 0960-4745	**Telephone:**	+1 925 462 0304
Equipment Type:	802.11 a/b/g/n SDIO dual band with BT/BLE	**Fax:**	+1 925 462 0306
S/N's:	0960-4025: 1CBFC03D8594 0960-4034: 1CBFC03D84E8 0960-4745: 1CBFC03D85E0		
Test Date(s):	25th June – 21st July 2020	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 15.247, RSS-247 Issue 2	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:

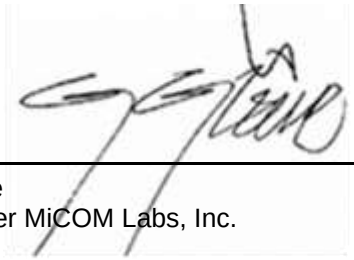
1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

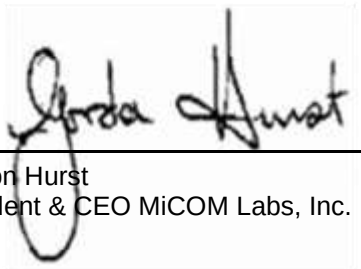
3. Test results apply only to the item(s) tested.

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	KDB 662911 D01 & D02	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 558074 D01 v05r02	2nd April 2019	Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices operating under section 15.247 of the FCC Rules.
III	A2LA	October 2019	R105 - Requirement's When Making Reference to A2LA Accreditation Status
IV	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
V	ANSI C63.4	2014	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
VI	CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements
VII	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
VIII	FCC 47 CFR Part 15.247	2020	Radio Frequency Devices; Subpart C – Intentional Radiators
IX	ICES-003	Issue 6 Jan 2016; Updated April 2019	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
X	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XI	RSS-247 Issue 2	Feb 2017	Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
XII	RSS-Gen Issue 5	March 2019 Amendment 1	General Requirements for Compliance of Radio Apparatus
XIII	FCC 47 CFR Part 2.1033	2020	FCC requirements and rules regarding photographs and test setup diagrams.

4.2 Test and Uncertainty Procedures

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

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

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

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5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Test Program Scope

The scope of this test program is to spot check Radiated Spurious Emissions, Conducted Output Power and PPSD to ensure that the HP Inc., 0960-4025,0960-4034 and 0960-4745 is within the requirements for the following standards:

FCC CFR 47 Part 15 Subpart C 15.247 (DTS)
Radio Frequency Devices; Subpart C – Intentional Radiators

ISED RSS-247 Issue 2
Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and License-Exempt Local Area Network (LE-LEN) Devices

This report is intended as an addendum to prior testing of this product to these standards performed and reported by MiCOM Labs test report HWPD90-U4.

The Scope of the test program is to verify continued compliance of models 0960-4025; 0960-4034 and 0960-4745 as they now have a new digital PCB and Radio Diplexer (Same Part, but new Vendor)

The manufacturer declared that the only difference between these products and prior ones tested is in the chipset diplexer and digital pcb layout.

Verification testing was satisfied by performing the following tests.

Conducted Power
Peak Power Spectral Density
Radiated Spurious Emissions

5.2. EUT Details

Detail	Description
Purpose:	Test of the HP Inc. 0960-4025, 0960-4034 and 0960-4745 for compliance to FCC Part 15.247 and Canada ISED RSS-247 Issue 2.
Applicant:	HP Inc. 1115 SE 164th Ave., Suite 210 Vancouver, WA. 98683 USA
Manufacturer:	Same as Applicant
Test Laboratory:	MiCOM Labs, Inc. 575 Boulder Court, Pleasanton, California 94566, USA
Test report reference number:	HWPD93-U4 Rev A
Date EUT received:	24th June 2020
Dates of test (from - to):	25th June – 21st July 2020
No of Units Tested:	3
Equipment Type:	802.11 a/b/g/n SDIO
Product Name:	VCVRA-1712
Model Nos.:	0960-4025, 0960-4034 and 0960-4745
Serial No.:	0960-4025: 1CBFC03D8594 0960-4034: 1CBFC03D84E8 0960-4745: 1CBFC03D85E0
Type of Modulation:	CCK, OFDM
EUT Modes of Operation:	2400 - 2483.5 MHz: 802.11b; 802.11g; 802.11n-HT-20; 802.11n HT-40;
ITU Emission Designator:	802.11b 12M9G1D 802.11g 17M5D1D 802.11n HT-20 16M6D1D 802.11n HT-40 37M5D1D
Equipment Secondary Function(s):	None
Type of Technology:	802.11 b/g/n
Installation type:	Fixed installation
Construction/Location for Use:	Indoor
Software/Firmware Release:	P130
Hardware Release:	V4
Rated Input Voltage and Current:	3.3V DC +/- 10%, 1A
Equipment Dimensions:	37mm x 40 mm
Temperature:	Nominal: 20 ºC Max: 70ºC Min: -0 ºC
Weight:	0.3 oz

5.3. External A.C/D.C. Power Adaptor

The HP Inc. VCVRA-1712 is powered via DC host 3.3V

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
integral	HP	integral	5	2.5	-	360	-	2400 - 2483.5
[1]external	YAGEO	ANTX300P002B24553	5	0.7	-	360	-	2400 - 2483.5
[2]external	YAGEO	ANTX200P002B24553	5	0.7	-	360	-	2400 - 2483.5

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

[2]additional external antenna YAGEO is identical to [1]external antenna YAGEO with minor difference of u/FL feed cable length which was reduced from 30cm to 20cm. Testing was performed and average antenna gain was found to be the same.

5.5. Cabling and I/O Ports

The following is a description of the cable and input, output ports available on the EUT;

Port Type	Port Description	Qty	Screened (Yes/ No)	Length
Pins	Data and Power	1	N	NA
Flex connector	Data and Power	1	N	< 10 cm

5.6. Equipment Details

The following is a description of supporting equipment used during the test program.

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr.	Model No.	Serial No.
EUT	802.11 a/b/g/n SDIO dual band 2.4G/5GHz WLAN with BT/BLE	HP Inc	Model: HP Inc.'s VCVRA-1712 Part numbers: 0960-4025, 0960-4034 and 0960-4745	0960-4025: 1CBFC03D8594 0960-4034: 1CBFC03D84E8 0960-4745: 1CBFC03D85E0
Support	Styx Test System	HP	PI	0006
Support	AC/DC adaptor	CANKIT	DCAR-052A5	--

5.7. Equipment Modifications

None.

5.8. Deviations from the Test Standard

No deviations from the test standard were required in order to complete the test program:

6. TEST SUMMARY

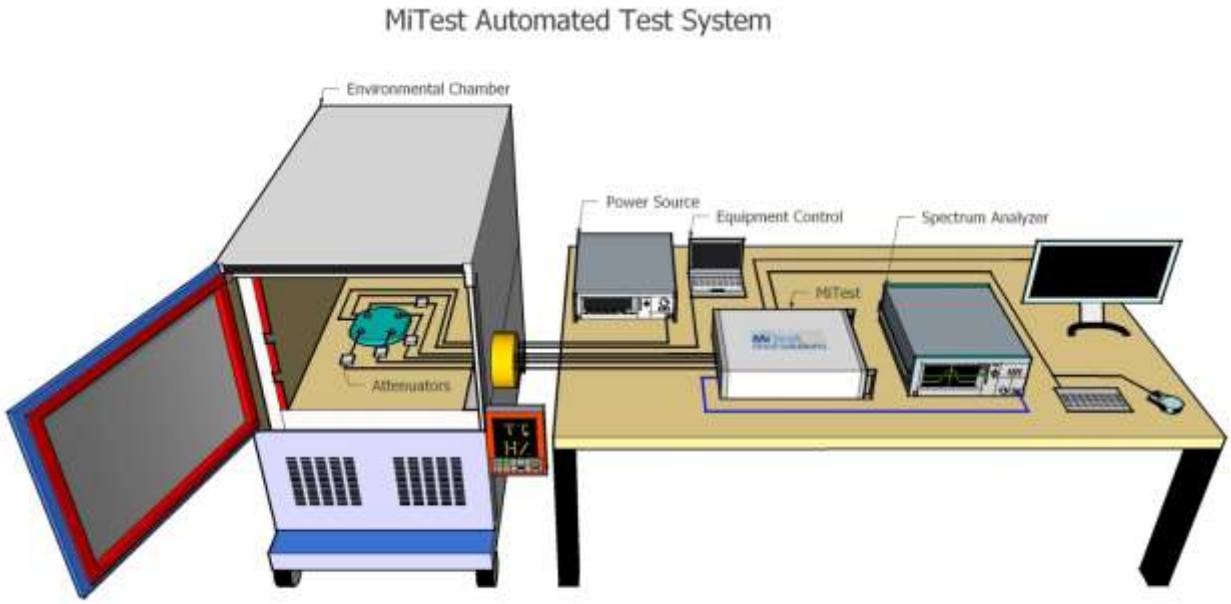
TABLE OF REQUIRED TESTS

Test Standard	Description	Link	Compliance
FCC CFR 47 15.247, ISED RSS-247 Issue 2	Conducted Output Power	View Data	Complies
FCC CFR 47 15.247, ISED RSS-247 Issue 2	Peak Power Spectral Density	View Data	Complies
FCC CFR 47 15.247, ISED RSS-247 Issue 2	Radiated Spurious Emissions	View Data	Complies

The EUT was found to be complaint within the limits specified by the standard(s).

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted Test Setup



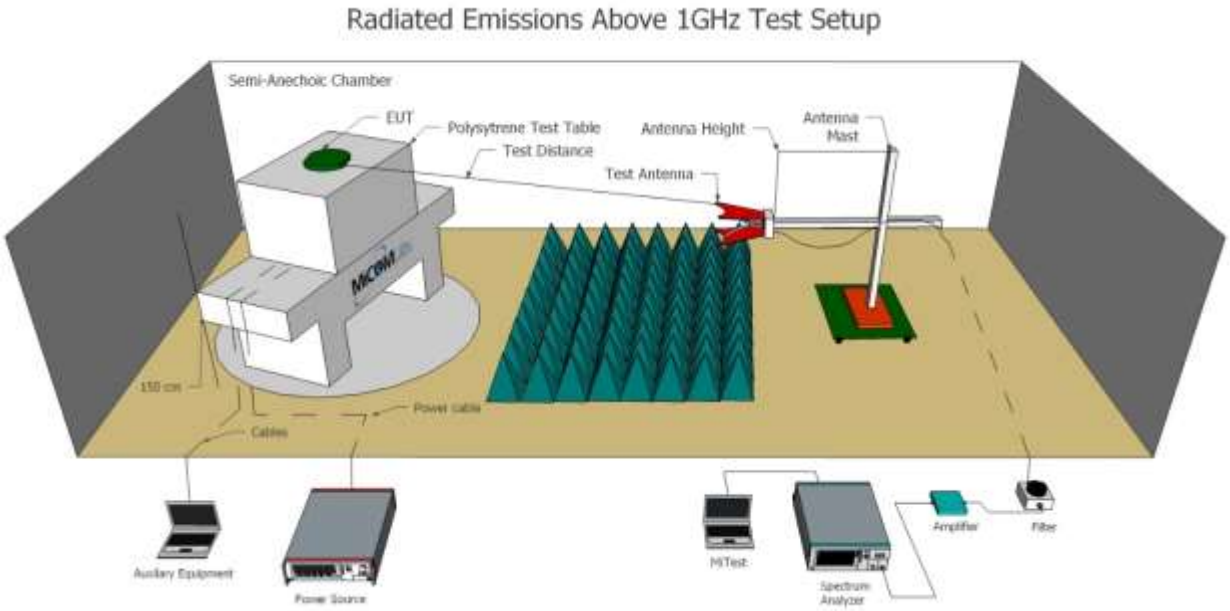
A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
#3 SA	MiTest Box to SA	Fairview Microwave	SCA1814-0101-72	#3 SA	9 Sep 2020
#3P1	EUT to MiTest box port 1	Fairview Microwave	SCA1814-0101-72	#3P1	9 Sep 2020
#3P2	EUT to MiTest box port 2	Fairview Microwave	SCA1814-0101-72	#3P2	9 Sep 2020
#3P3	EUT to MiTest box port 3	Fairview Microwave	SCA1814-0101-72	#3P3	9 Sep 2020
#3P4	EUT to MiTest box port 4	Fairview Microwave	SCA1812-0101-72	#3P4	9 Sep 2020
249	Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2020
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2020
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
440	USB Wideband Power Sensor	Boonton	55006	9178	22 Sep 2020

441	USB Wideband Power Sensor	Boonton	55006	9179	20 Sep 2020
442	USB Wideband Power Sensor	Boonton	55006	9181	19 Sep 2020
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	20 Sep 2020
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2020
515	MiTest Cloud Solutions RF Test Box	MiCOM	2nd Gen with DFS	515	9 Sep 2020
534	Power Sensor 50 GHz -70dBm to +20dBm	R&S	NRP50SN	1419.0093K02-100888-SB	26 Feb 2021
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	20 Feb 2021

7.2. Radiated Emissions - 3m Chamber

Test Setup for Radiated Emissions for above and below 1 GHz



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 2020
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	26 Nov 2020
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Apr 2021
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	3 Sep 2020
396	2.4 GHz Notch Filter	Microtronics	BRM50701	001	3 Sep 2020
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	6 Sep 2020
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Oct 2020
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	9 Sep 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 Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	5 Sep 2020
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	5 Sep 2020
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	9 Sep 2020
466	Low Pass Filter DC-1500 MHz	Mini-Circuits	NLP-1750+	VUU10401438	3 Sep 2020
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	9 Sep 2020
481	Cable - Bulkhead to RCVR	SRC Haverhill	151-3050787	481	9 Sep 2020
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2020
518	Cable - Amp to Antenna	SRC Haverhill	157-3051574	518	9 Sep 2020
CC05	Confidence Check	MiCOM	CC05	None	4 Oct 2020

8. TEST RESULTS

8.1. Conducted Output Power

Conducted Test Conditions for Fundamental Emission Output Power			
Standard:	FCC CFR 47:15.247 ISED RSS-247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (b) & (c) RSS-247: 5.1,5.2, 5.4	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Fundamental Emission Output Power Measurement
Power measurements were made using an average power sensor.

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

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.
Supporting Information
Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

Limits for Fundamental Emission Output Power
(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following for non-frequency hopping systems:

(3) For systems using digital modulation in the 902-928 MHz and 2400-2483.5 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.
(1) Fixed point-to-point operation:
(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(iii) Fixed, point-to-point operation, as used in paragraphs (c)(1)(i) and (c)(1)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

(2) In addition to the provisions in paragraphs (b)(3), (b)(4) and (c)(1)(i) of this section, transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers provided the emissions comply with the following:

(i) Different information must be transmitted to each receiver.

(ii) If the transmitter employs an antenna system that emits multiple directional beams but does not do emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device, i.e., the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels, shall not exceed the limit specified in paragraph (b)(1) or (b)(3) of this section, as applicable. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as follows:

(A) The directional gain shall be calculated as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

(B) A lower value for the directional gain than that calculated in paragraph (c)(2)(ii)(A) of this section will be accepted if sufficient evidence is presented, e.g., due to shading of the array or coherence loss in the beamforming.

(iii) If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the power limit specified in paragraph (c)(2)(ii) of this section. If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the limit specified in paragraph (c)(2)(ii) of this section. In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the limit specified in paragraph (c)(2)(ii) of this section by more than 8 dB.

(iv) Transmitters that emit a single directional beam shall operate under the provisions of paragraph (c)(1) of this section.

Equipment Configuration for Peak Output Power			
Variant:	802.11b	**Duty Cycle (%):**	99.0
Data Rate:	1.00 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	CCK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2412.0	17.86				17.86	30.00	-12.14	19.00
2437.0	20.55				20.55	30.00	-9.45	22.00
2462.0	19.69				19.69	30.00	-10.31	21.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

Equipment Configuration for Peak Output Power			
Variant:	802.11g	**Duty Cycle (%):**	99.0
Data Rate:	6.00 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2412.0	14.74				14.74	30.00	-15.26	16.00
2437.0	18.26				18.26	30.00	-11.74	20.00
2462.0	15.78				15.78	30.00	-14.22	17.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

Equipment Configuration for Peak Output Power			
Variant:	802.11n HT-20	**Duty Cycle (%):**	99.0
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2412.0	14.03				14.03	30.00	-15.97	15.00
2437.0	16.88				16.88	30.00	-13.12	18.00
2462.0	15.06				15.06	30.00	-14.94	16.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

Equipment Configuration for Peak Output Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	99.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2422.0	12.15				12.15	30.00	-17.85	13.00
2437.0	15.91				15.91	30.00	-14.09	17.00
2452.0	13.12				13.12	30.00	-16.88	14.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

8.2. Power Spectral Density

Conducted Test Conditions for Power Spectral Density			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Power Spectral Density	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (e)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Power Spectral Density
The transmitter output was connected to a spectrum analyzer and the measured made in a 3 kHz resolution bandwidth using the analyzer auto-coupled sweep-time. A peak value was found over the full emission bandwidth and the spectrum downloaded for post processing purposes.

Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured separately. The Peak Power Spectral Density is the highest level found across the emission bandwidth. With multiple antenna port measurements the numerical analyzer data from each port is summed (å) and a link to this additional graphic is provided.

Testing was performed under ambient conditions at nominal voltage only.

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

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with multiple transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were post processed and the resulting numerical and graphical data presented.

NOTE:
It may be observed that the spectrum in some antenna port plots break the limit line however this in itself does NOT constitute a failure. In all cases a spectrum summation plot is provided in order to prove compliance. A failure occurs only after the summation of all spectrum plots have been summed and are found to be greater than the limit line.

Supporting Information
Calculated Power = A + 10 log (1/x) dBm
A = Total Power Spectral Density [10 Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
x = Duty Cycle

Limits Power Spectral Density
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Equipment Configuration for Power Spectral Density - Peak			
Variant:	802.11b	**Duty Cycle (%):**	99.0
Data Rate:	1.00 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	CCK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/3KHz)				Amplitude Summation	Limit	Margin
MHz	a	b	c	d	dBm/3KHz	dBm/3KHz	dB
2412.0	-11.708				-11.708	8.0	-19.7
2437.0	-8.950				-8.950	8.0	-17.0
2462.0	-9.609				-9.609	8.0	-17.6

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 Power Spectral Density - Peak			
Variant:	802.11g	**Duty Cycle (%):**	99.0
Data Rate:	6.00 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/3KHz)				Amplitude Summation	Limit	Margin
MHz	a	b	c	d	dBm/3KHz	dBm/3KHz	dB
2412.0	-12.737				-12.737	8.0	-20.7
2437.0	-9.579				-9.579	8.0	-17.6
2462.0	-11.446				-11.446	8.0	-19.4

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 Power Spectral Density - Peak			
Variant:	802.11n HT-20	**Duty Cycle (%):**	99.0
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/3KHz)				Amplitude Summation	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/3KHz**	**dBm/3KHz**	**dB**
2412.0	-13.557				-13.557	8.0	-21.6
2437.0	-10.803				-10.803	8.0	-18.8
2462.0	-13.030				-13.030	8.0	-21.0

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 Power Spectral Density - Peak			
Variant:	802.11n HT-40	**Duty Cycle (%):**	99.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	0.70
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/3KHz)				Amplitude Summation	Limit	Margin
MHz	a	b	c	d	dBm/3KHz	dBm/3KHz	dB
2422.0	-17.678				-17.678	8.0	-25.7
2437.0	-13.213				-13.213	8.0	-21.2
2452.0	-16.509				-16.509	8.0	-24.5

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).

8.3. Radiated Emissions

8.3.1. TX Spurious & Restricted Band Emissions

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions (Restricted Bands)			
Standard:	FCC CFR 47:15.247 ISED RSS-247	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.205, 15.209 ANSI 63.10 Section 11.11 RSS-247 Section 5.5	**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

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:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(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).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

Equipment Configuration for Restricted Band Spurious Emissions

Antenna:	Integral	**Variant:**	CCK
Antenna Gain (dBi):	Not Applicable	**Modulation:**	802.11b
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	2437.00	**Data Rate:**	1 Mbit/s
Power Setting:	22	**Tested By:**	JMH

Test Measurement Results

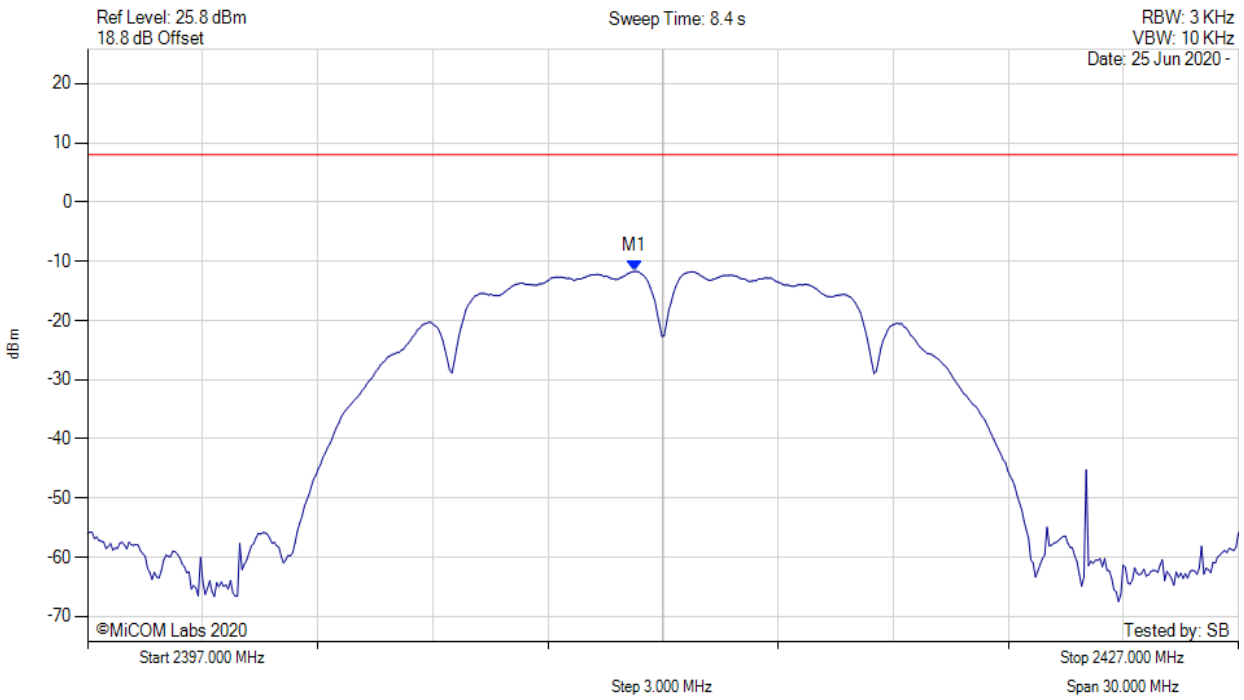
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	1218.42	81.20	1.44	-16.69	65.95	Max Peak	Horizontal	101	233	74.0	-8.1	Pass
#2	1218.42	60.38	1.44	-16.69	45.13	Max Avg	Horizontal	101	233	54.0	-8.9	Pass
#3	1624.69	70.48	1.65	-16.52	55.61	Max Peak	Horizontal	180	153	74.0	-18.4	Pass
#4	1624.69	62.03	1.65	-16.52	47.16	Max Avg	Horizontal	180	153	54.0	-6.8	Pass
#5	2037.64	65.37	1.91	-13.33	53.95	Peak (NRB)	Horizontal	100	360	--	--	Pass
#6	2439.02	55.71	2.00	-12.22	45.49	Fundamental	Horizontal	150	0	--	--	
#7	2755.73	73.67	2.13	-11.98	63.82	Max Peak	Horizontal	183	103	74.0	-10.2	Pass
#8	2755.73	39.87	2.13	-11.98	30.02	Max Avg	Horizontal	183	103	54.0	-24.0	Pass
#9	3249.26	58.79	2.37	-11.77	49.39	Peak (NRB)	Horizontal	100	360	--	--	Pass
#10	4874.00	65.50	2.92	-12.52	55.90	Max Peak	Vertical	146	0	74.0	-18.1	Pass
#11	4874.00	57.02	2.92	-12.52	47.42	Max Avg	Vertical	146	0	54.0	-6.6	Pass
#12	7310.02	60.82	3.62	-7.87	56.57	Max Peak	Vertical	197	183	74.0	-17.4	Pass
#13	7310.02	49.03	3.62	-7.87	44.78	Max Avg	Vertical	197	183	54.0	-9.2	Pass
Test Notes: EUT powered by Host. Connected to Laptop outside chamber. 2.4G notch in front of amp to prevent overload.												

A. APPENDIX - GRAPHICAL IMAGES

A.1. Power Spectral Density

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2412.00 MHz, Chain a, Temp: 20, Voltage: Vdc

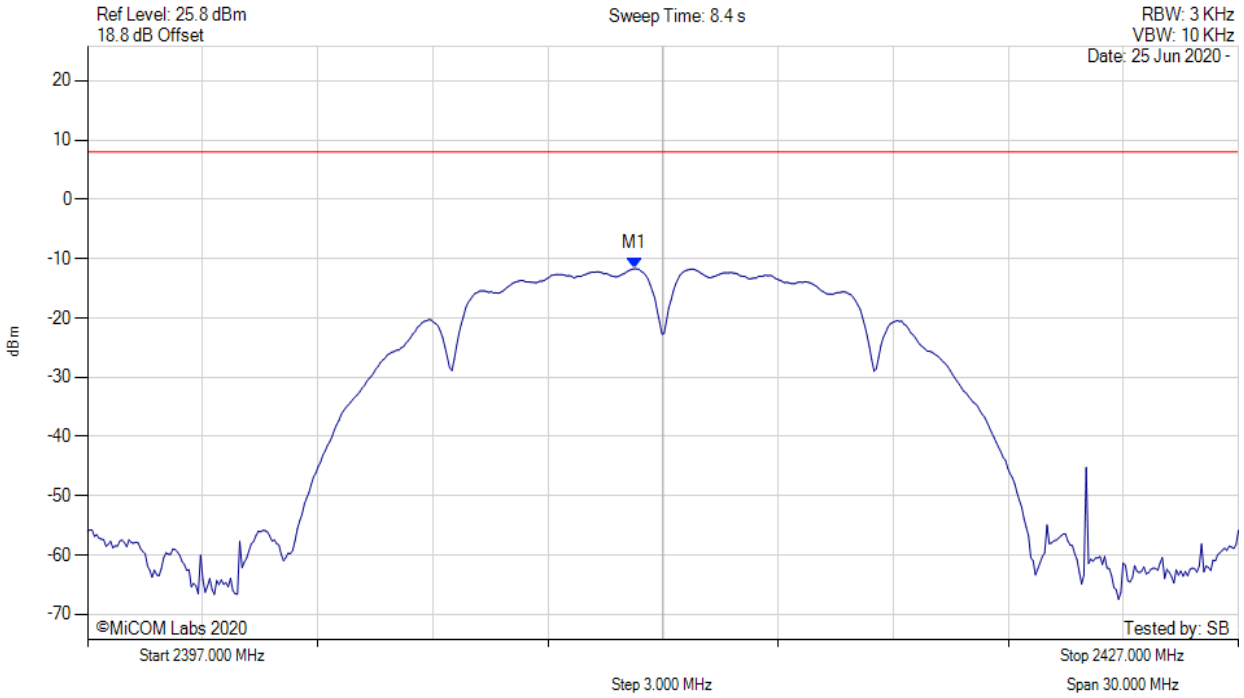


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2411.248 MHz : -11.708 dBm	Limit: ≤ 8.000 dBm Margin: 19.71 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2412.00 MHz, SUM, Temp: 20, Voltage: Vdc

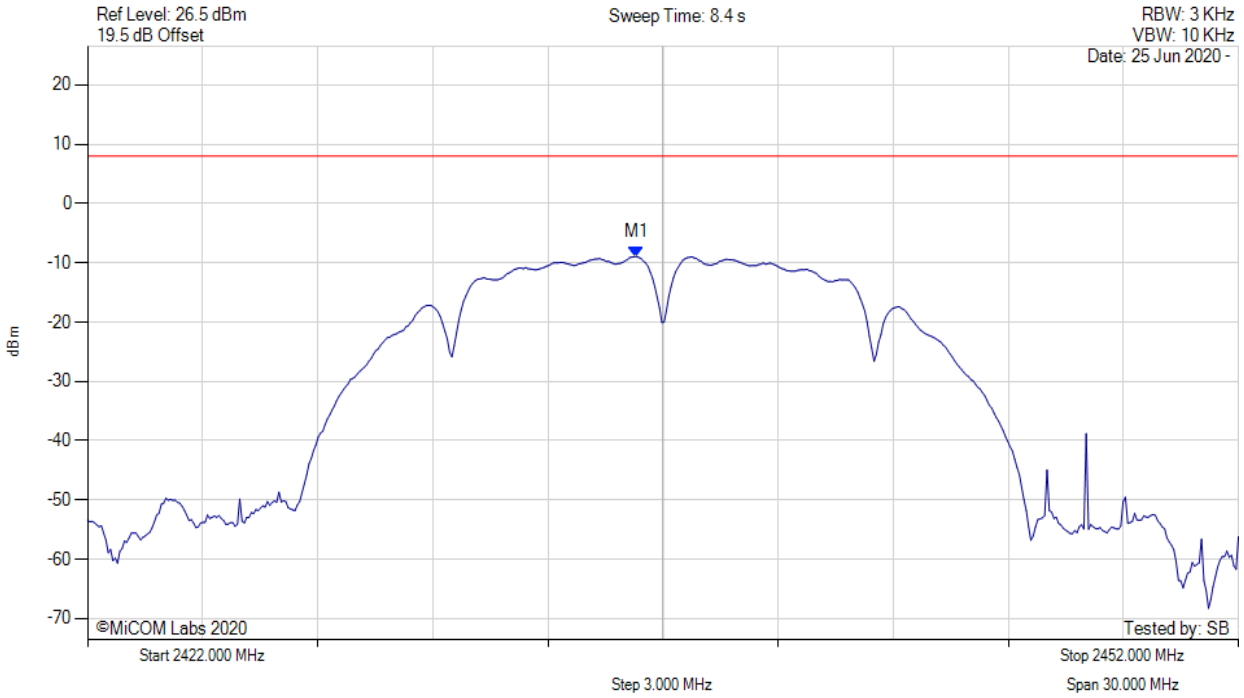


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2411.248 MHz : -11.708 dBm	Limit: ≤ 8.0 dBm Margin: -19.7 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2437.00 MHz, Chain a, Temp: 20, Voltage: Vdc

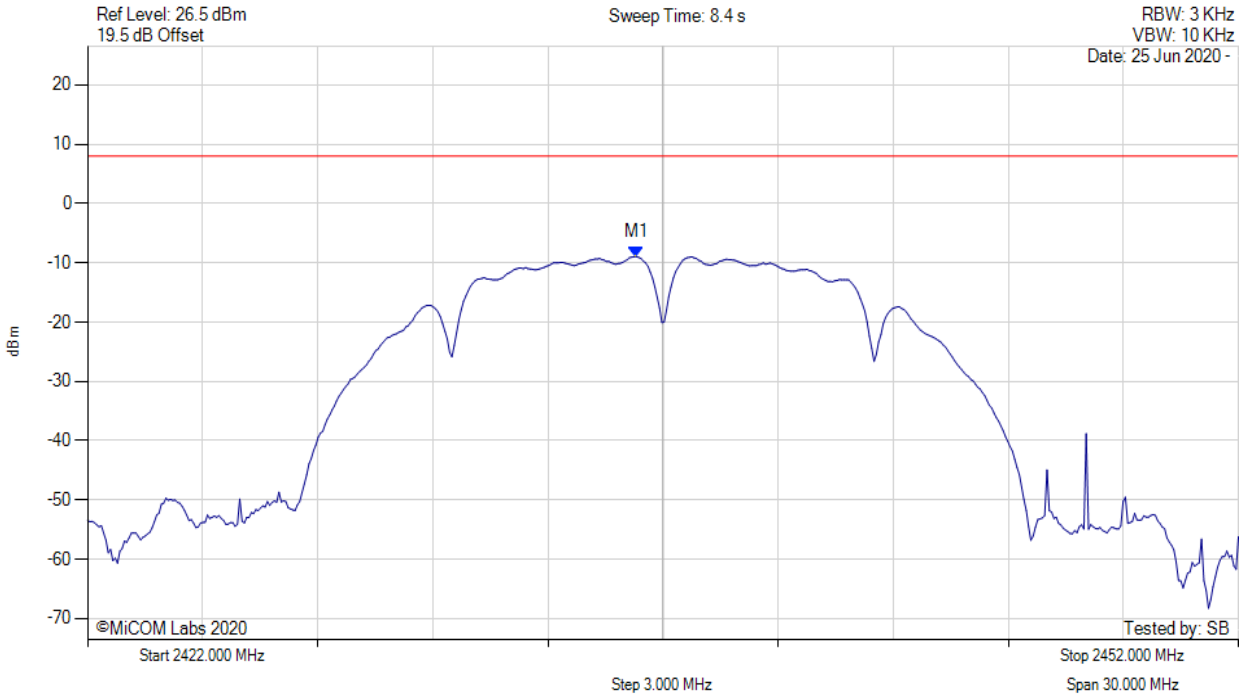


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2436.309 MHz : -8.950 dBm	Limit: ≤ 8.000 dBm Margin: 16.95 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2437.00 MHz, SUM, Temp: 20, Voltage: Vdc

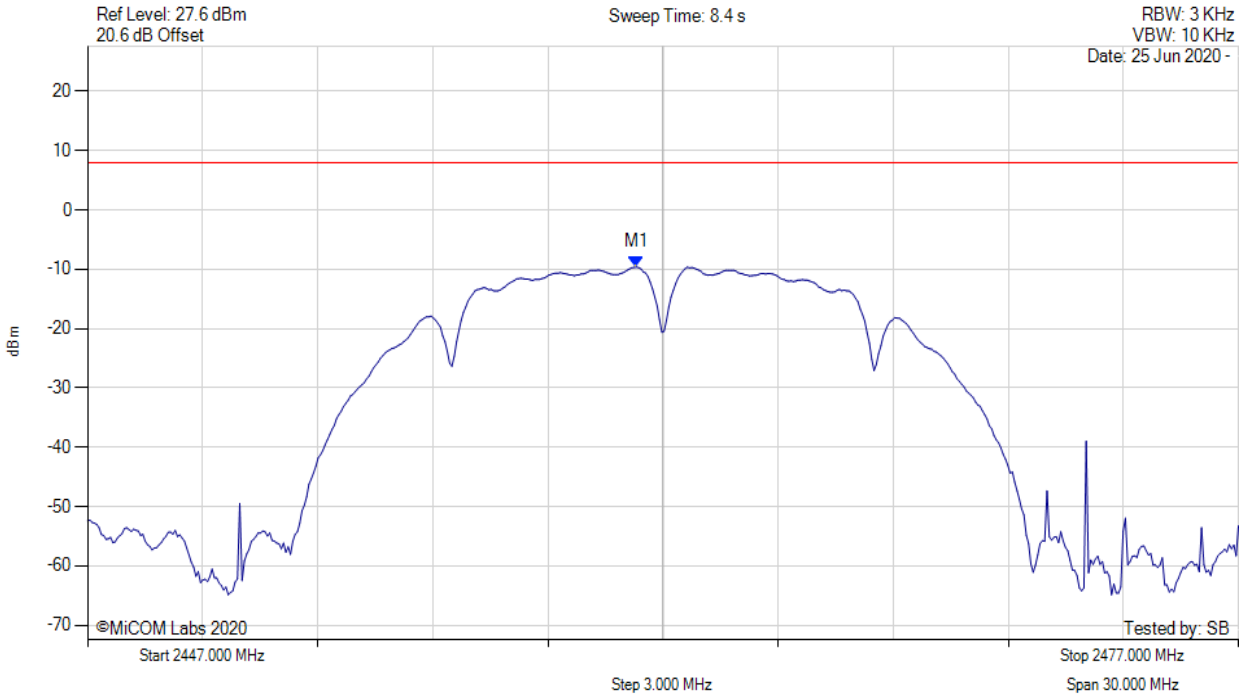


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2436.309 MHz : -8.950 dBm	Limit: ≤ 8.0 dBm Margin: -17.0 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2462.00 MHz, Chain a, Temp: 20, Voltage: Vdc

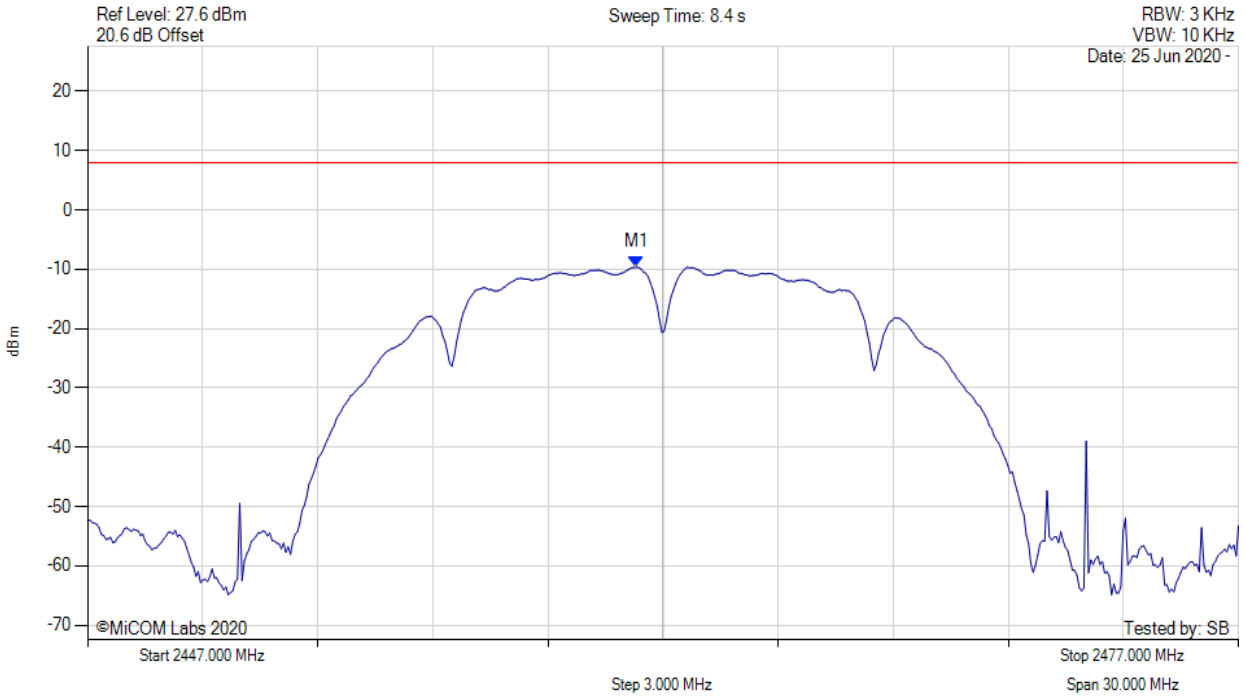


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2461.309 MHz : -9.609 dBm	Limit: ≤ 8.000 dBm Margin: 17.61 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11b, Channel: 2462.00 MHz, SUM, Temp: 20, Voltage: Vdc

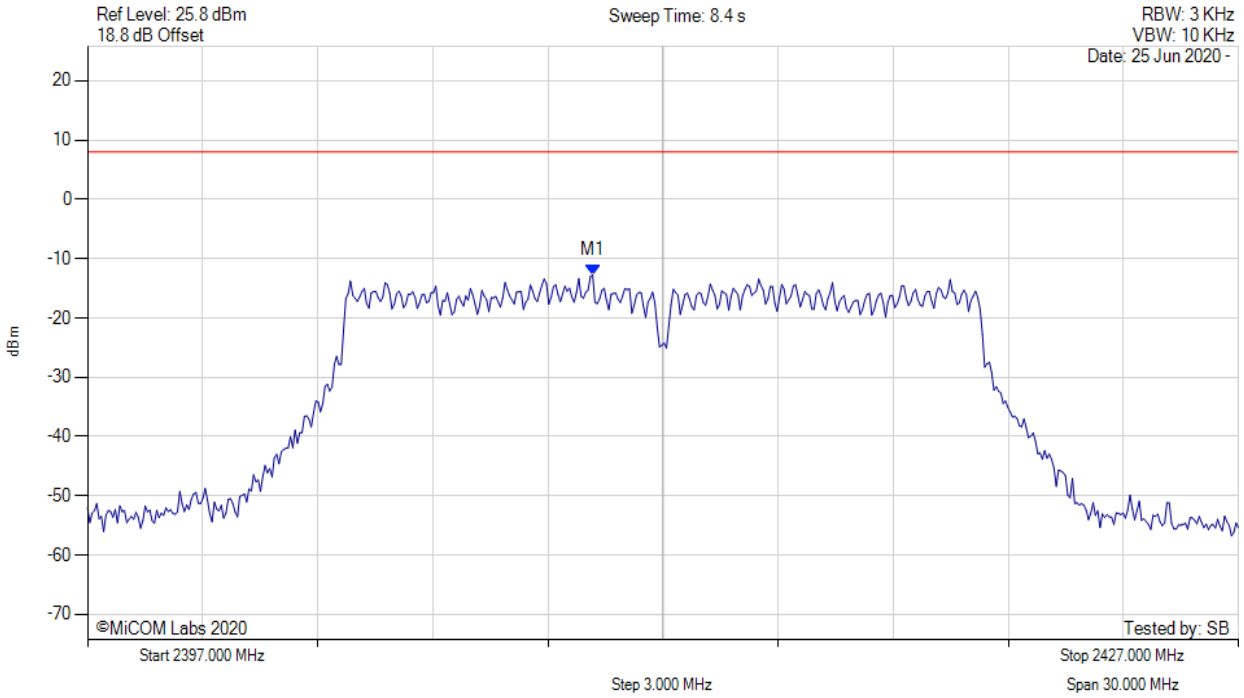


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2461.309 MHz : -9.609 dBm	Limit: ≤ 8.0 dBm Margin: -17.6 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2412.00 MHz, Chain a, Temp: 20, Voltage: Vdc

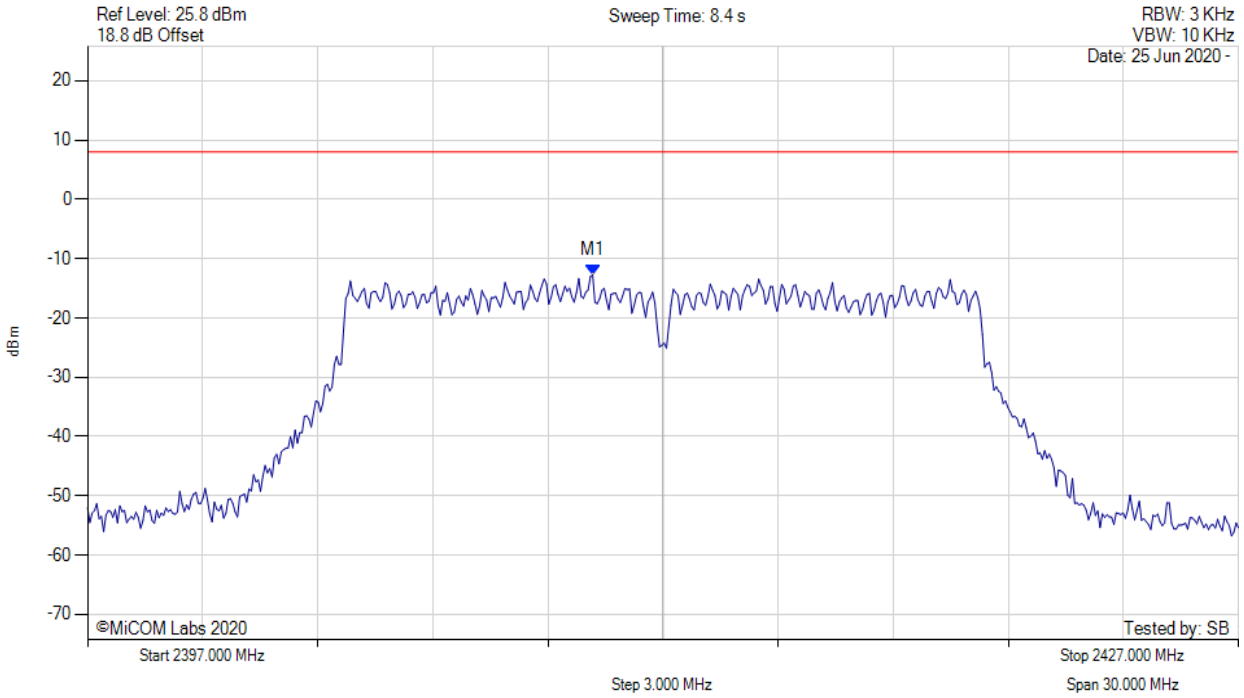


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.166 MHz : -12.737 dBm	Limit: ≤ 8.000 dBm Margin: 20.74 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2412.00 MHz, SUM, Temp: 20, Voltage: Vdc

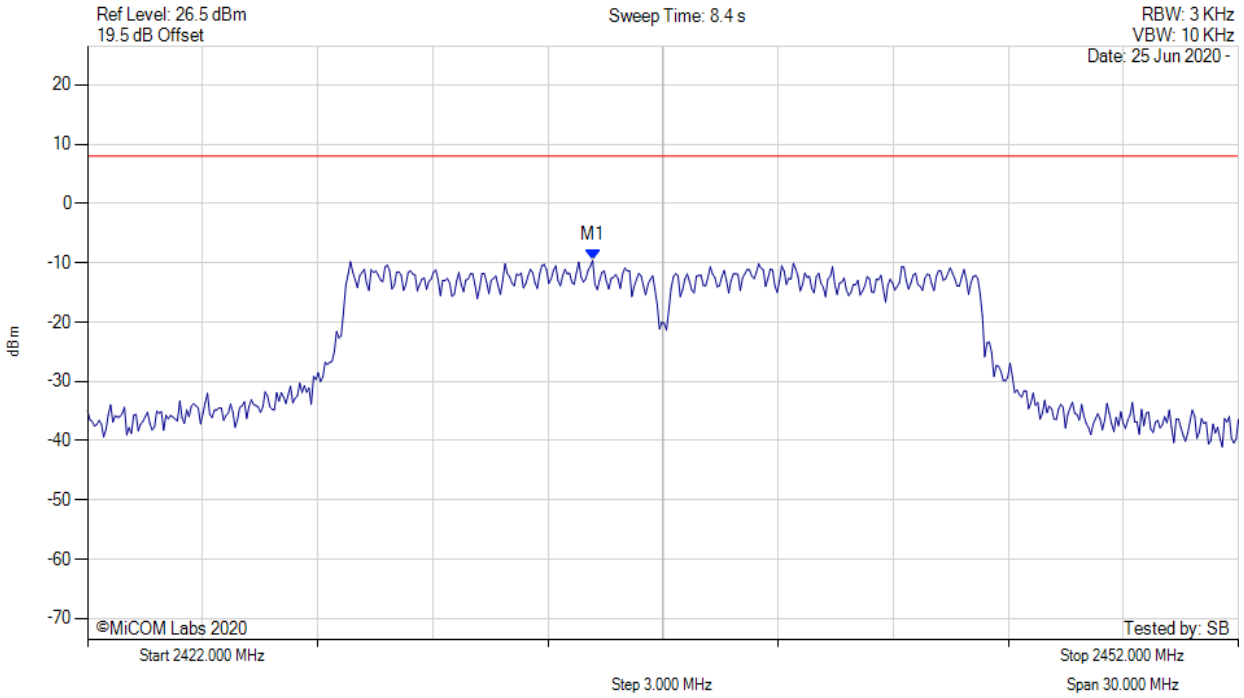


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.166 MHz : -12.737 dBm	Limit: ≤ 8.0 dBm Margin: -20.7 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2437.00 MHz, Chain a, Temp: 20, Voltage: Vdc

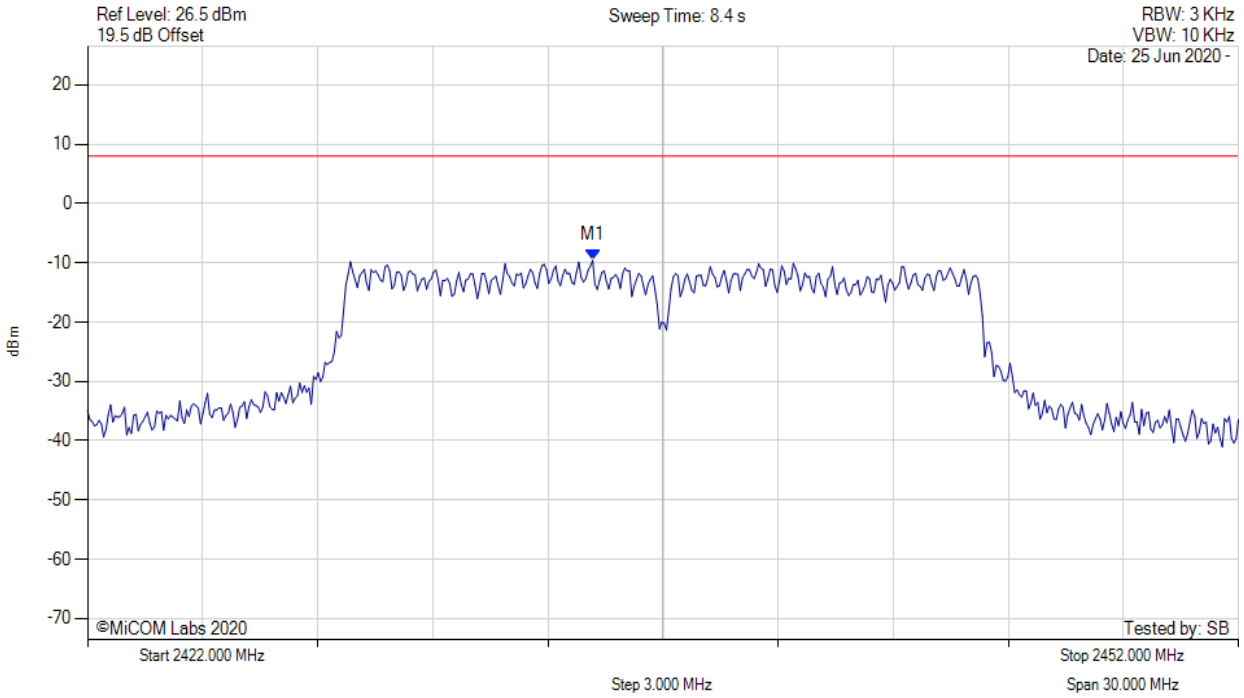


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2435.166 MHz : -9.579 dBm	Limit: ≤ 8.000 dBm Margin: 17.58 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2437.00 MHz, SUM, Temp: 20, Voltage: Vdc

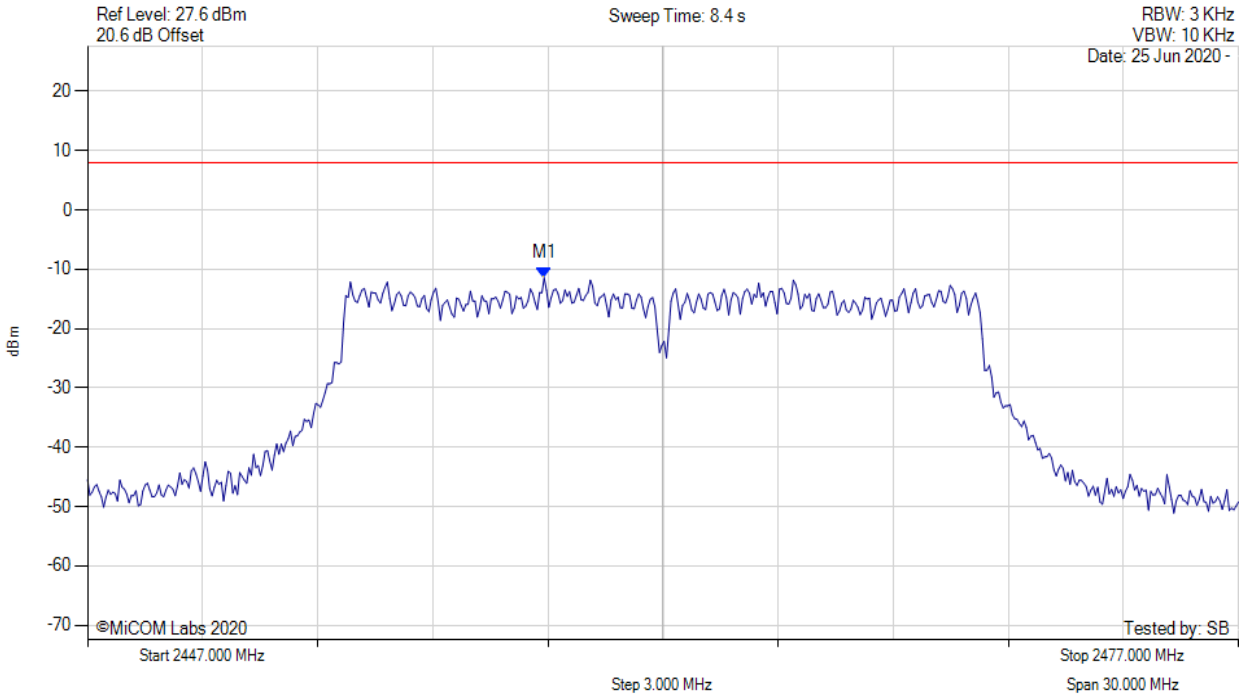


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2435.166 MHz : -9.579 dBm	Limit: ≤ 8.0 dBm Margin: -17.6 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2462.00 MHz, Chain a, Temp: 20, Voltage: Vdc

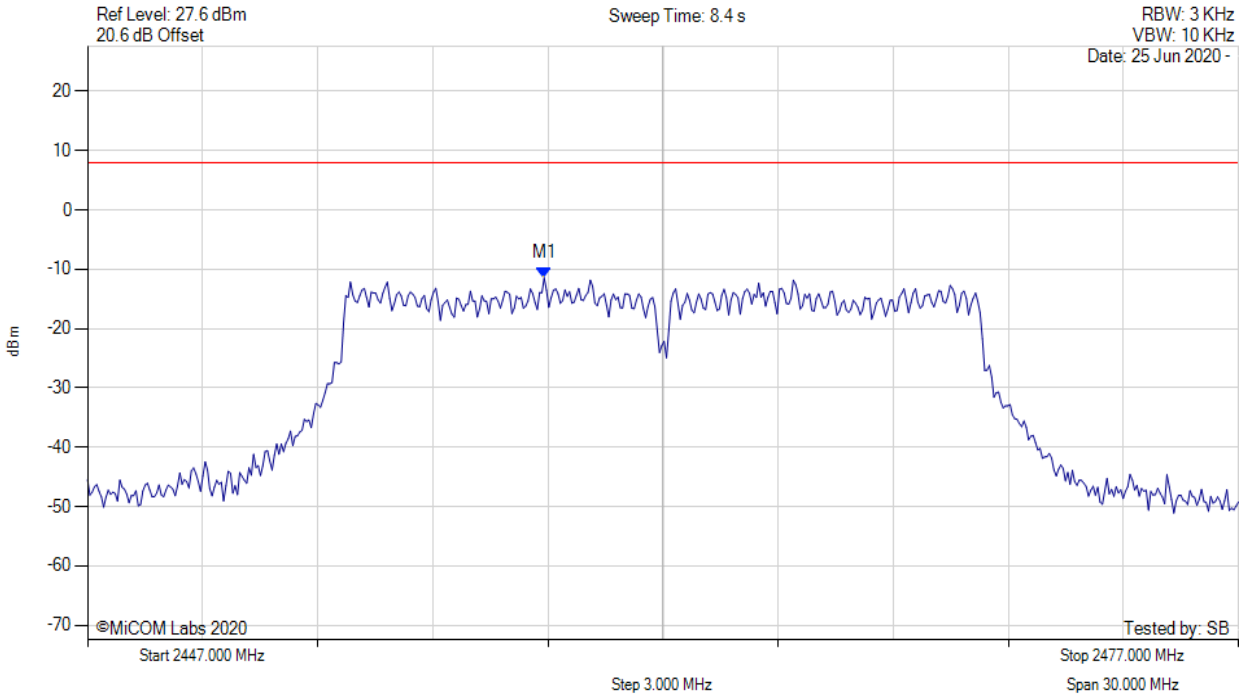


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2458.904 MHz : -11.446 dBm	Limit: ≤ 8.000 dBm Margin: 19.45 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11g, Channel: 2462.00 MHz, SUM, Temp: 20, Voltage: Vdc

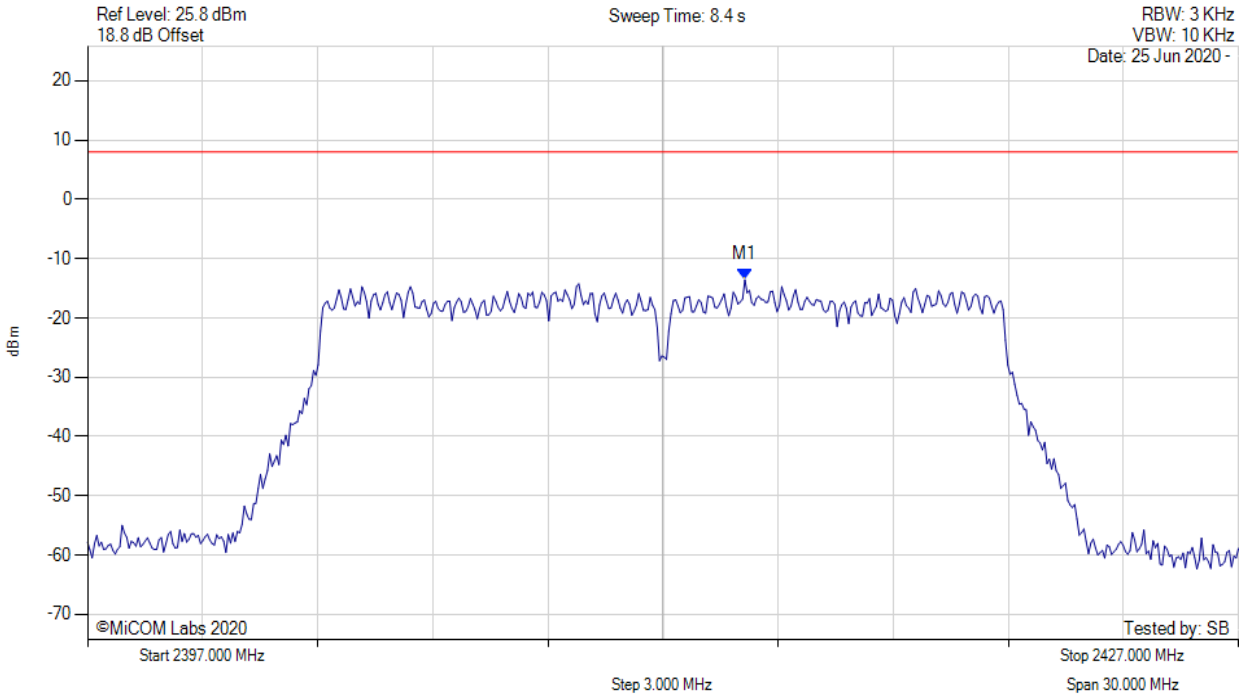


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2458.904 MHz : -11.446 dBm	Limit: ≤ 8.0 dBm Margin: -19.4 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2412.00 MHz, Chain a, Temp: 20, Voltage: Vdc

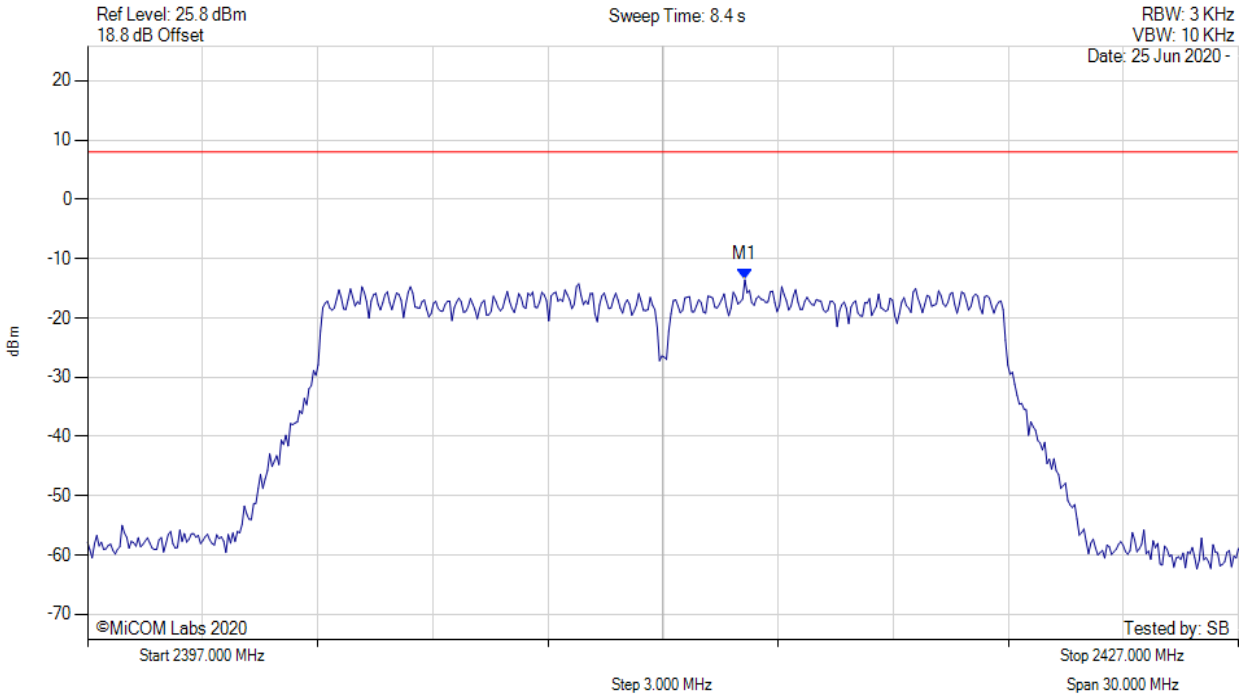


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2414.134 MHz : -13.557 dBm	Limit: ≤ 8.000 dBm Margin: 21.56 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2412.00 MHz, SUM, Temp: 20, Voltage: Vdc

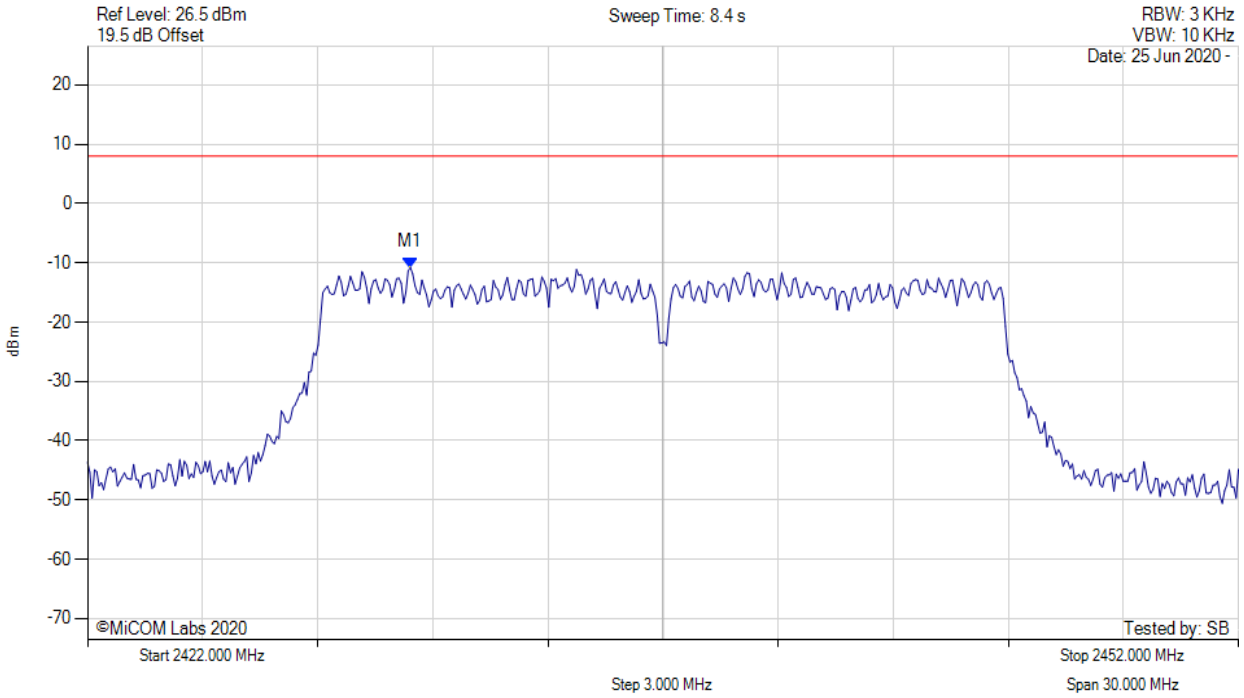


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2414.134 MHz : -13.557 dBm	Limit: ≤ 8.0 dBm Margin: -21.6 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2437.00 MHz, Chain a, Temp: 20, Voltage: Vdc

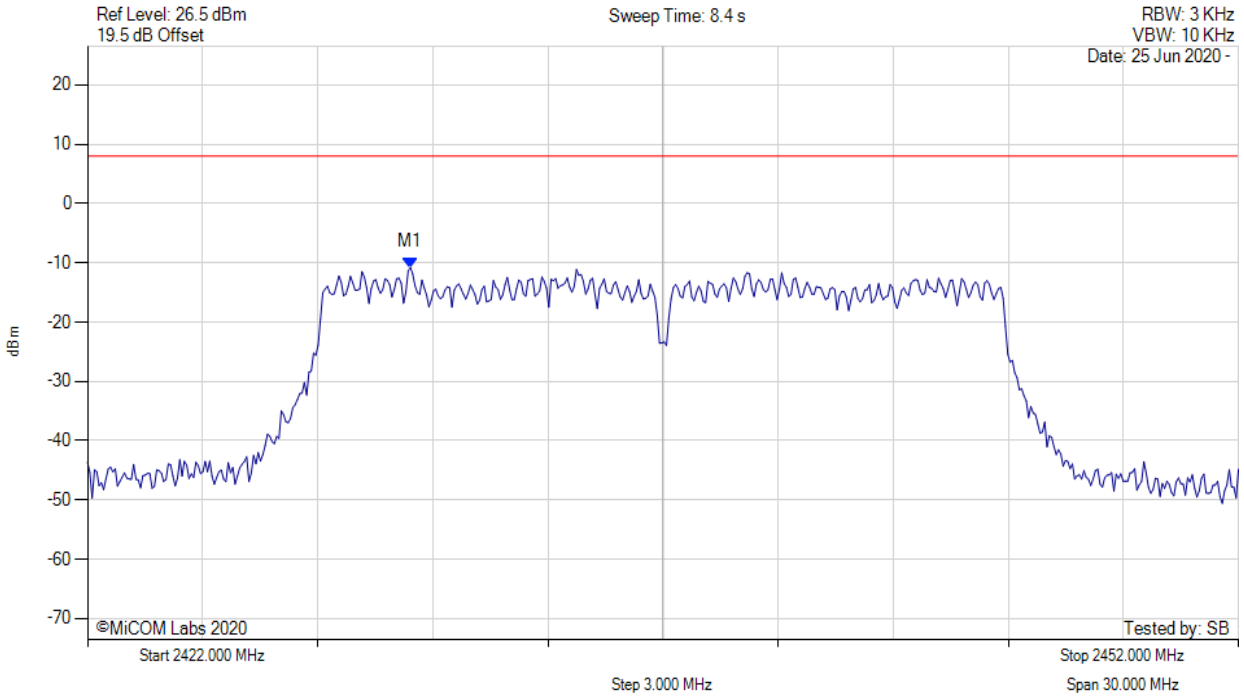


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2430.417 MHz : -10.803 dBm	Limit: ≤ 8.000 dBm Margin: 18.80 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2437.00 MHz, SUM, Temp: 20, Voltage: Vdc

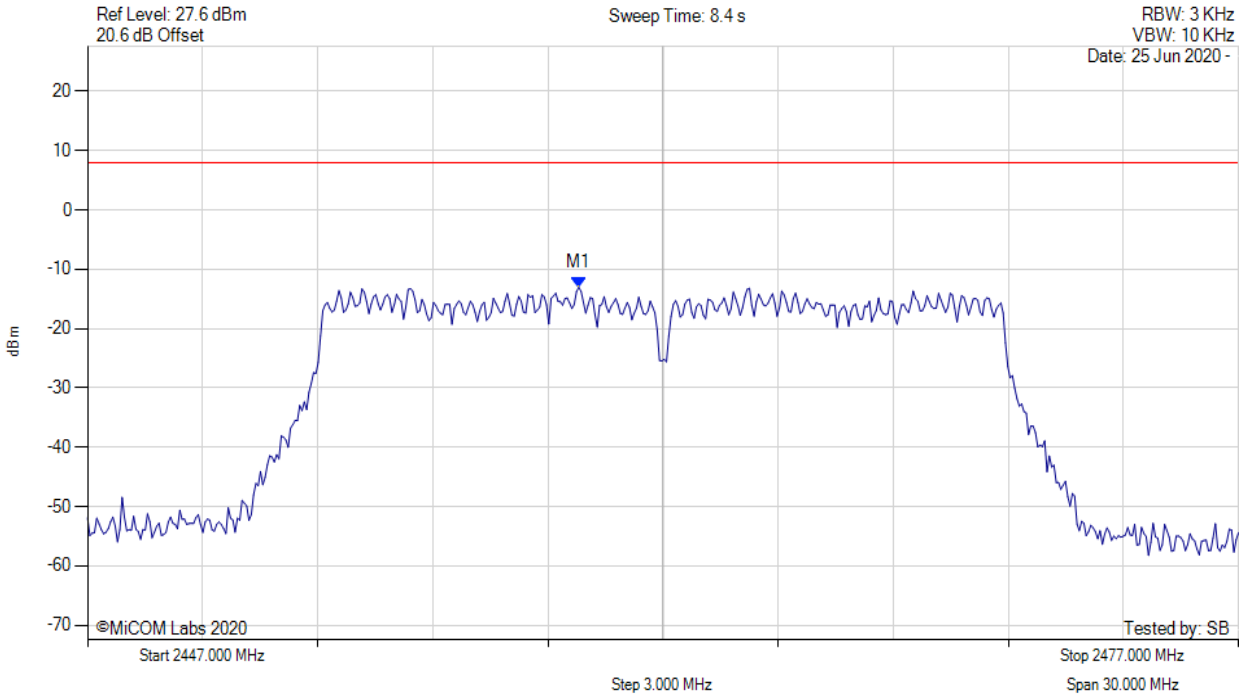


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2430.417 MHz : -10.803 dBm	Limit: ≤ 8.0 dBm Margin: -18.8 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2462.00 MHz, Chain a, Temp: 20, Voltage: Vdc

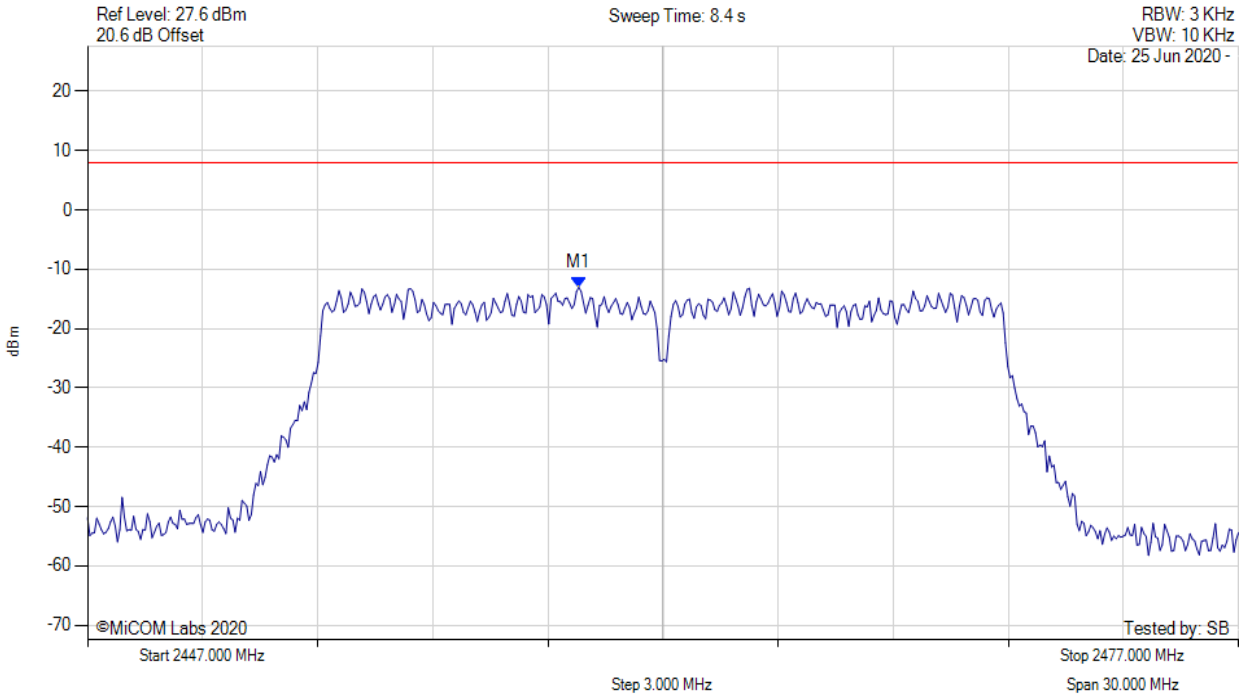


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2459.806 MHz : -13.030 dBm	Limit: ≤ 8.000 dBm Margin: 21.03 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-20, Channel: 2462.00 MHz, SUM, Temp: 20, Voltage: Vdc

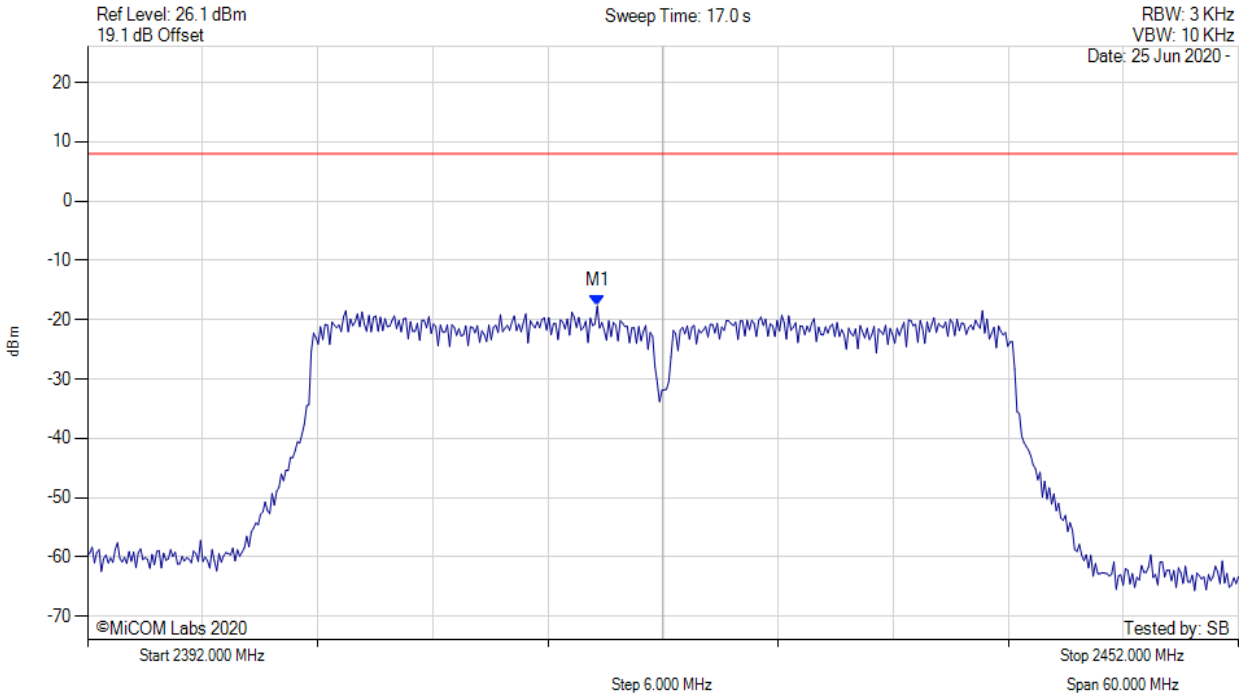


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2459.806 MHz : -13.030 dBm	Limit: ≤ 8.0 dBm Margin: -21.0 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2422.00 MHz, Chain a, Temp: 20, Voltage: Vdc

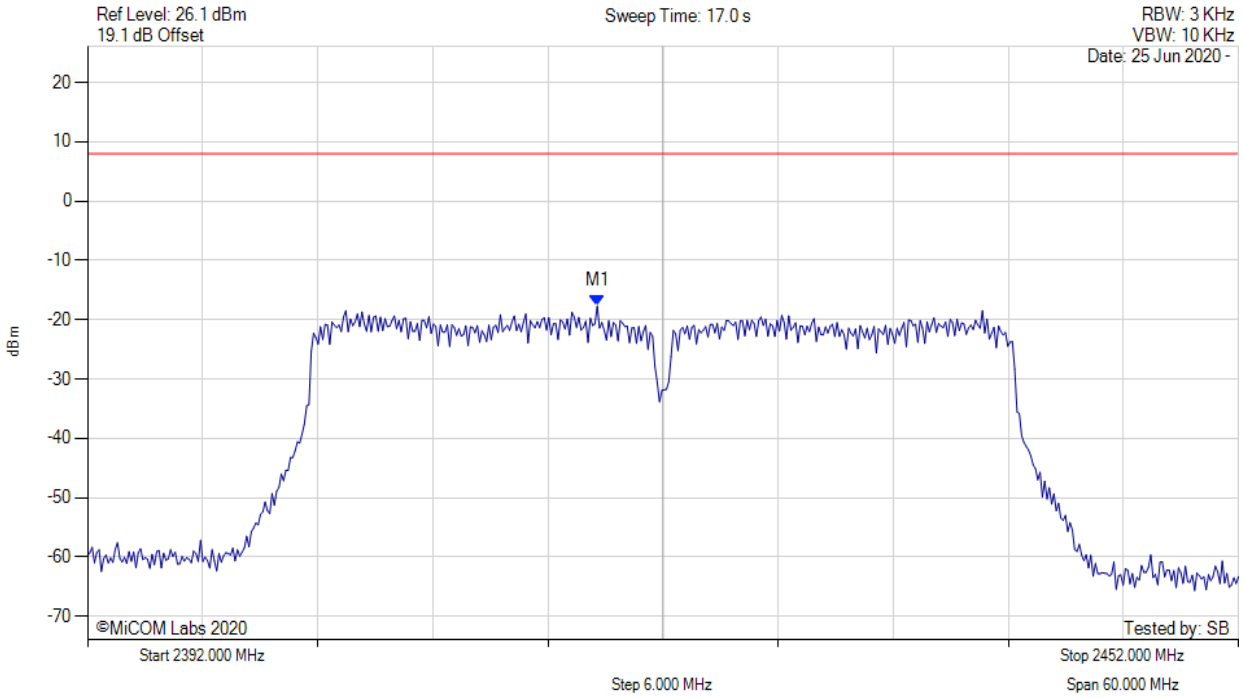


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2418.573 MHz : -17.678 dBm	Limit: ≤ 8.000 dBm Margin: 25.68 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2422.00 MHz, SUM, Temp: 20, Voltage: Vdc

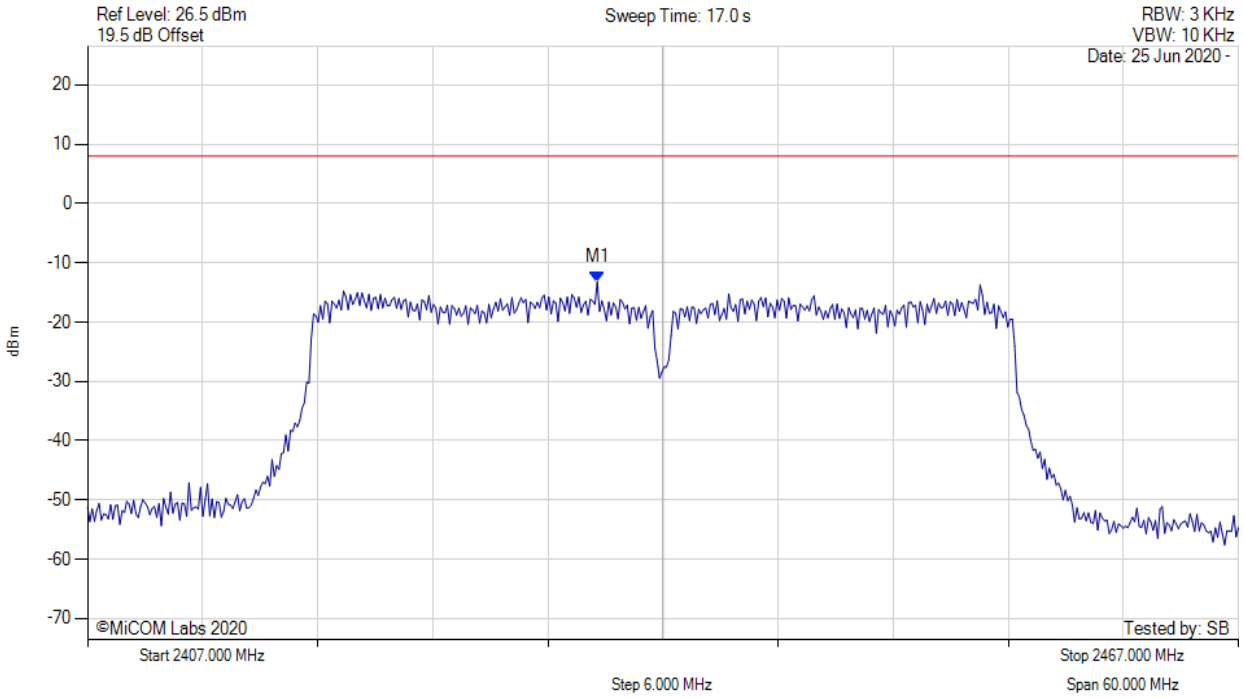


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2418.573 MHz : -17.678 dBm	Limit: ≤ 8.0 dBm Margin: -25.7 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2437.00 MHz, Chain a, Temp: 20, Voltage: Vdc

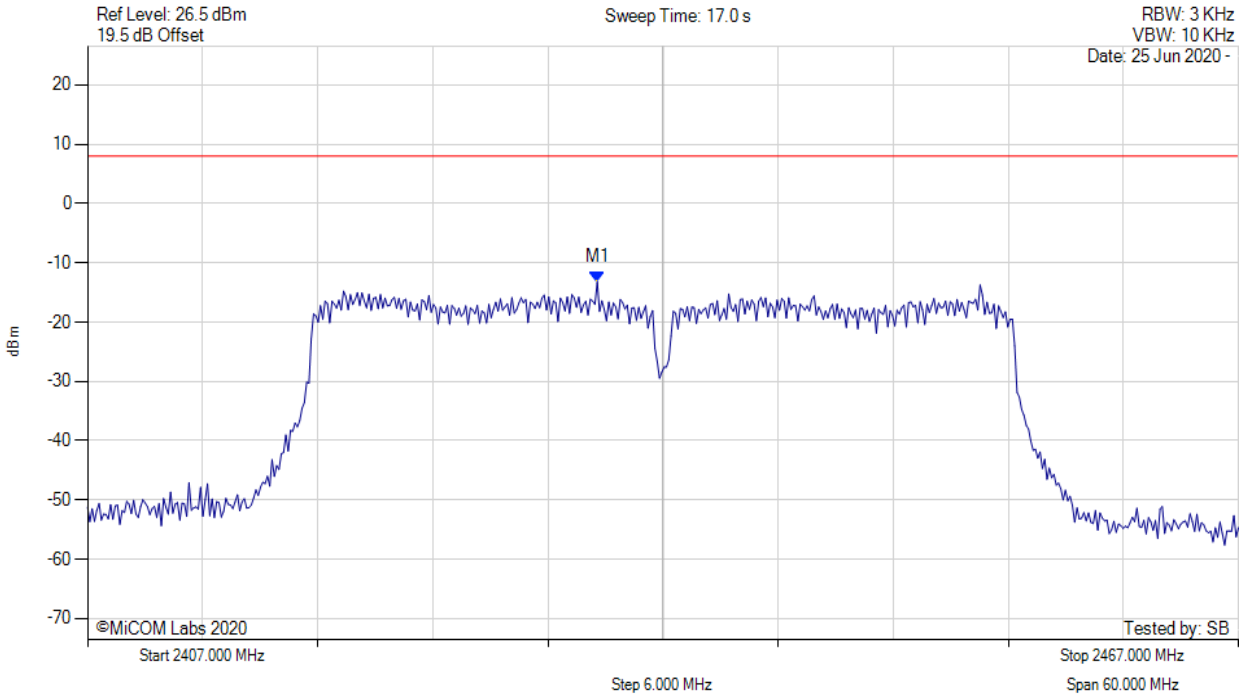


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2433.573 MHz : -13.213 dBm	Limit: ≤ 8.000 dBm Margin: 21.21 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2437.00 MHz, SUM, Temp: 20, Voltage: Vdc

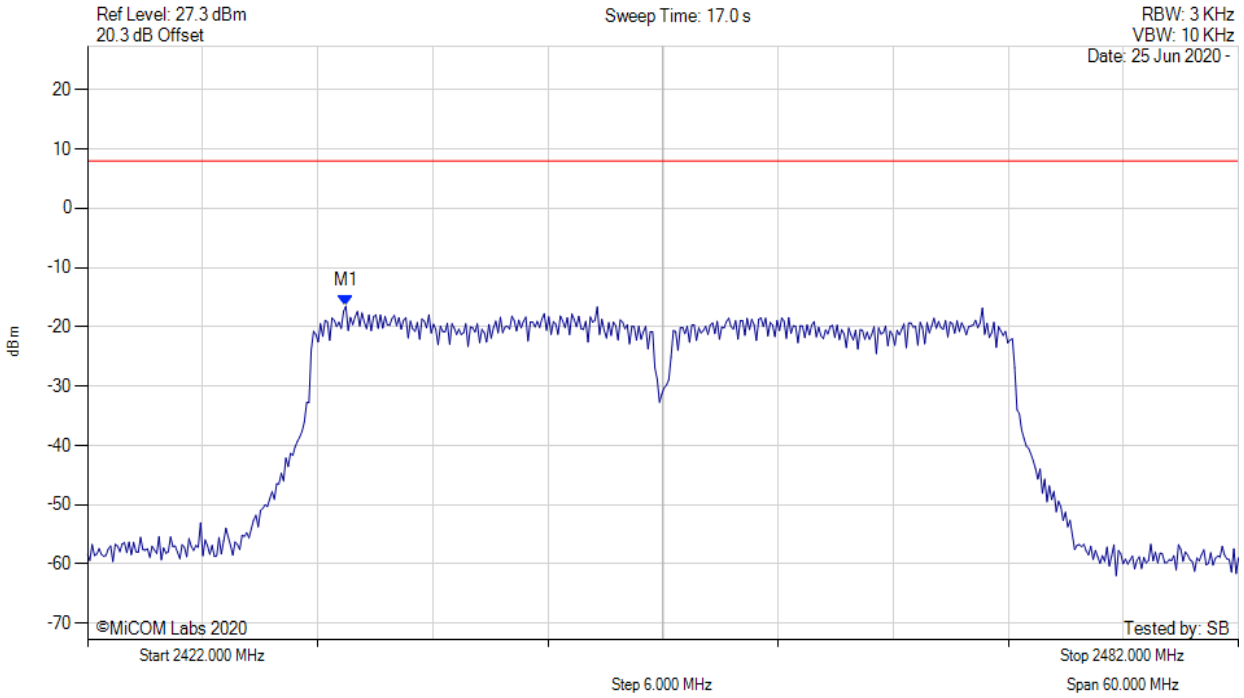


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2433.573 MHz : -13.213 dBm	Limit: ≤ 8.0 dBm Margin: -21.2 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2452.00 MHz, Chain a, Temp: 20, Voltage: Vdc

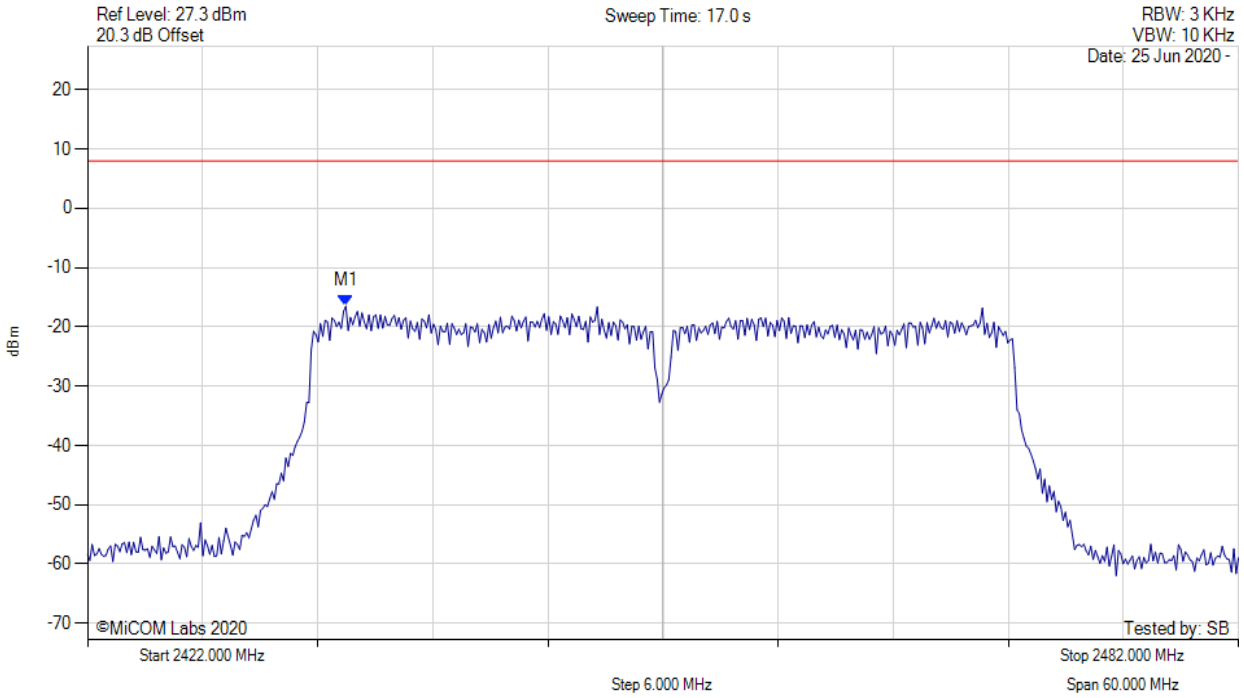


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2435.467 MHz : -16.509 dBm	Limit: ≤ 8.000 dBm Margin: 24.51 dB

back to matrix

POWER SPECTRAL DENSITY - PEAK

Variant: 802.11n HT-40, Channel: 2452.00 MHz, SUM, Temp: 20, Voltage: Vdc

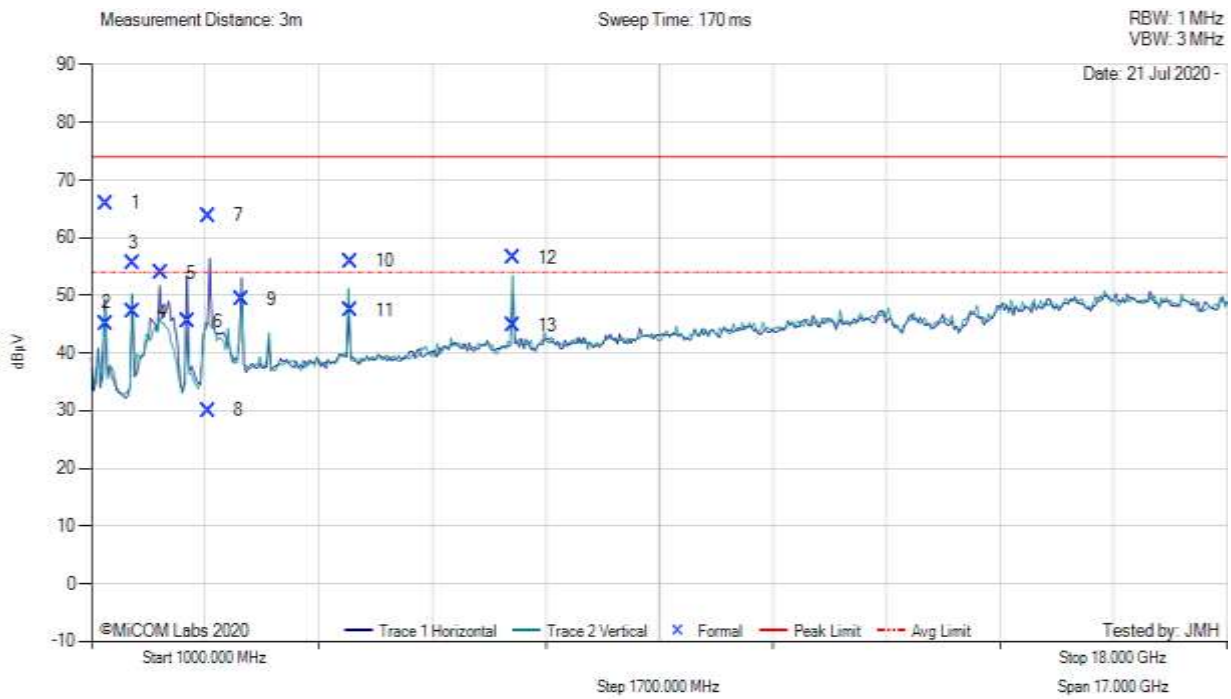


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2435.467 MHz : -16.509 dBm	Limit: ≤ 8.0 dBm Margin: -24.5 dB

back to matrix

A.2. TX Spurious & Restricted Band Emissions

Variant: 802.11b, Test Freq: 2437.00 MHz, Power Setting: 22



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	1218.42	81.20	1.44	-16.69	65.95	Max Peak	Horizontal	101	233	74.0	-8.1	Pass
2	1218.42	60.38	1.44	-16.69	45.13	Max Avg	Horizontal	101	233	54.0	-8.9	Pass
3	1624.69	70.48	1.65	-16.52	55.61	Max Peak	Horizontal	180	153	74.0	-18.4	Pass
4	1624.69	62.03	1.65	-16.52	47.16	Max Avg	Horizontal	180	153	54.0	-6.8	Pass
5	2037.64	65.37	1.91	-13.33	53.95	Peak (NRB)	Horizontal	100	360	--	--	Pass
6	2439.02	55.71	2.00	-12.22	45.49	Fundamental	Horizontal	150	0	--	--	
7	2755.73	73.67	2.13	-11.98	63.82	Max Peak	Horizontal	183	103	74.0	-10.2	Pass
8	2755.73	39.87	2.13	-11.98	30.02	Max Avg	Horizontal	183	103	54.0	-24.0	Pass
9	3249.26	58.79	2.37	-11.77	49.39	Peak (NRB)	Horizontal	100	360	--	--	Pass
10	4874.00	65.50	2.92	-12.52	55.90	Max Peak	Vertical	146	0	74.0	-18.1	Pass
11	4874.00	57.02	2.92	-12.52	47.42	Max Avg	Vertical	146	0	54.0	-6.6	Pass
12	7310.02	60.82	3.62	-7.87	56.57	Max Peak	Vertical	197	183	74.0	-17.4	Pass
13	7310.02	49.03	3.62	-7.87	44.78	Max Avg	Vertical	197	183	54.0	-9.2	Pass

Test Notes: EUT powered by Host. Connected to Laptop outside chamber. 2.4G notch in front of amp to prevent overload.

back to matrix

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