



element

Tennant Company

ATWILC3000-MR110CA

**FCC 15.247:2021
802.11bgn**

Report: TENN0148, Issue Date: June 7, 2021



NVLAP LAB CODE: 200881-0



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CERTIFICATE OF TEST

Last Date of Test: March 19, 2021
Tennant Company
EUT: ATWILC3000-MR110CA

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2021	ANSI C63.10:2013, KDB 558074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a C2PC related to lower the output power
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.2.2.4	Output Power	Yes	Pass	
11.9.2.2.4	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Eric Brandon, Department Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

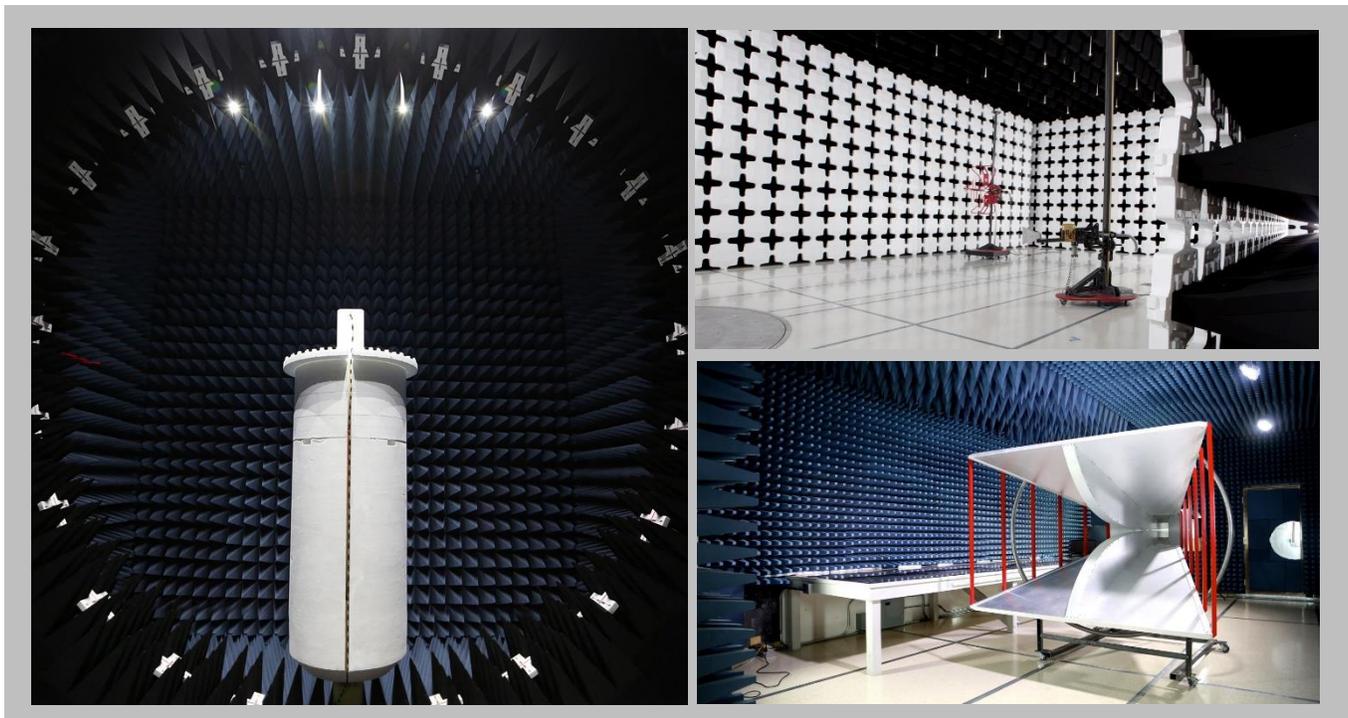
SCOPE

For details on the Scopes of our Accreditations, please visit:
<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

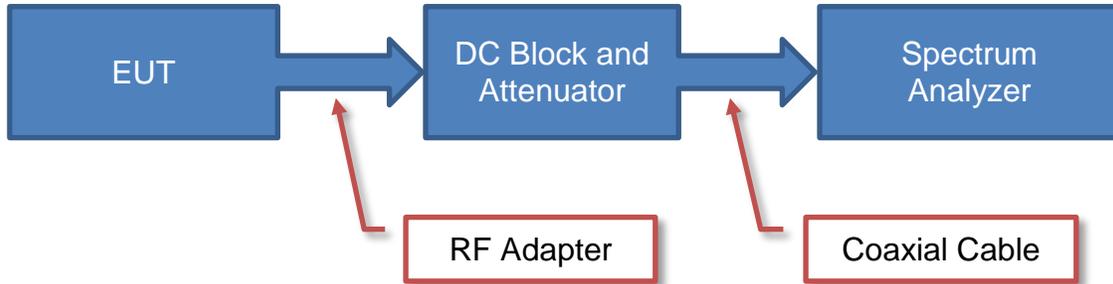
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

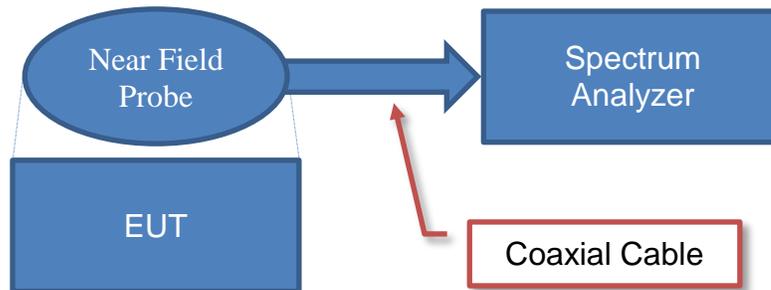
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.6 dB	-2.6 dB

Test Setup Block Diagrams

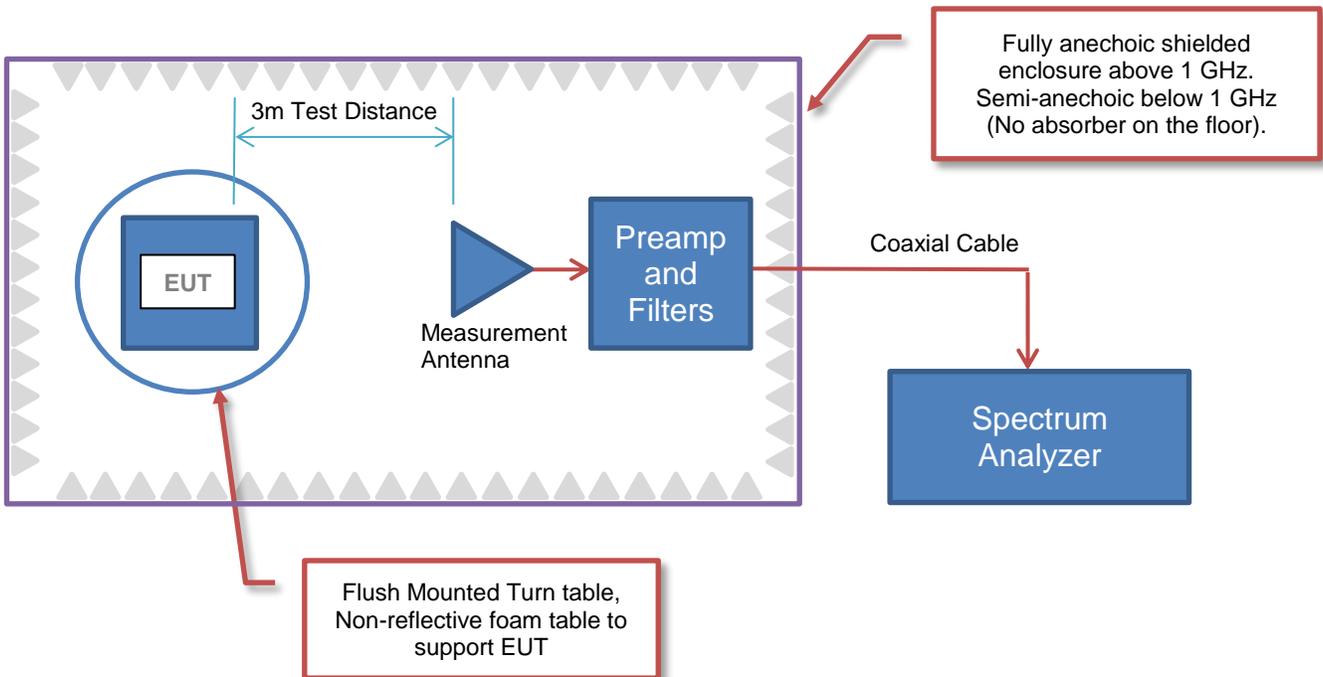
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



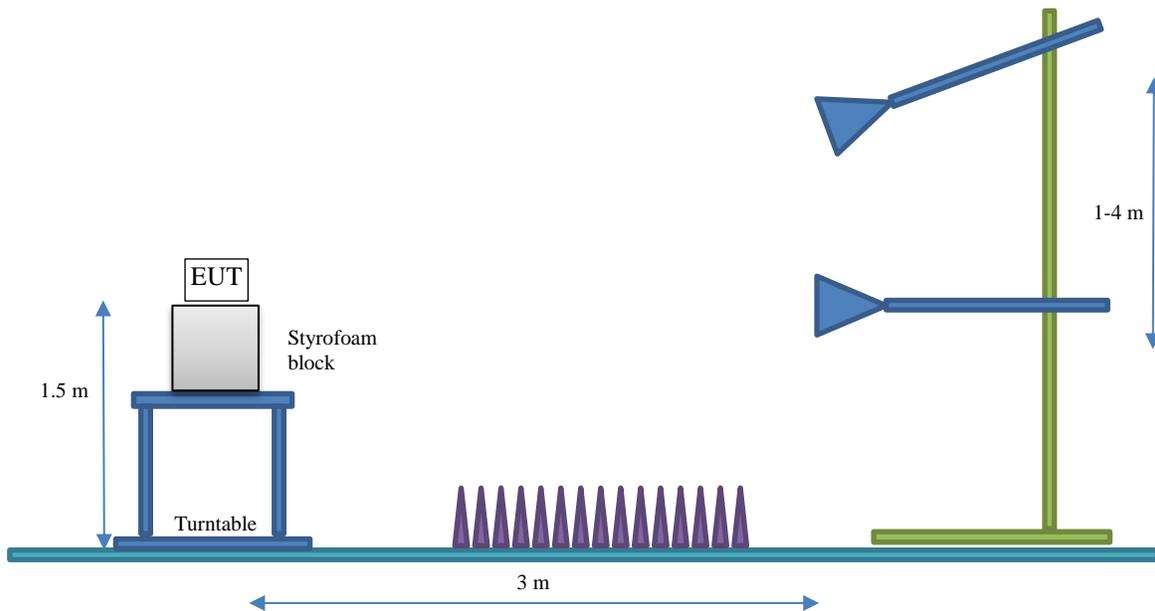
Spurious Radiated Emissions



Test Setup Block Diagrams

Bore Siting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	Tennant Company
Address:	701 N Lilac Drive
City, State, Zip:	Golden Valley, MN 55422
Test Requested By:	Curtis Bender
EUT:	ATWILC3000-MR110CA
First Date of Test:	March 18, 2021
Last Date of Test:	March 19, 2021
Receipt Date of Samples:	March 18, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

802.11bgn WiFi and Bluetooth module used as part of the telemetry system for Tennant devices.

Testing Objective:

To demonstrate compliance of the 802.11 radio under FCC 15.247 for operation in the 2.4 GHz band.

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
8T3216-B2R7HAA	ACX	2400-2500	0.5

POWER SETTINGS

Radio	Modulation	Channel	Power Setting (dBm)
802.11(b)	1 Mbps	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(b)	1 Mbps	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(b)	1 Mbps	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(b)	11 Mbps	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(b)	11 Mbps	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(b)	11 Mbps	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(g)	6 Mbps	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -10.5
802.11(g)	6 Mbps	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -10
802.11(g)	6 Mbps	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -10
802.11(g)	36 Mbps	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -10.5
802.11(g)	36 Mbps	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -10
802.11(g)	36 Mbps	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -10.5
802.11(g)	54 Mbps	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -10.5
802.11(g)	54 Mbps	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -10
802.11(g)	54 Mbps	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -10.5
802.11(n)	MCS0	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -11
802.11(n)	MCS0	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -10
802.11(n)	MCS0	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -12
802.11(n)	MCS7	Ch. 1 (2412 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(n)	MCS7	Ch. 6 (2437 MHz)	PPA = 15; PA = 18; Dig Gain = -13
802.11(n)	MCS7	Ch. 11 (2462 MHz)	PPA = 15; PA = 18; Dig Gain = -13

CONFIGURATIONS



Configuration TENN0148- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
WiFi Radio	Microchip	ATWILC3000-MR110CA	F8F005D93FFC

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Batteries	Trojan	T-125	N/A

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Lenovo	P52	PF1FLAYT
Power Supply (Laptop)	Lenovo	ADL170NDC2A	11S45N0371Z1ZMZB5444PU
USB to I2C Converter	Ardvark	2239-128952	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cables	No	>3.0 m	No	WiFi Radio	Batteries
AC Cable (Laptop)	No	1.0 m	No	Power Supply (Laptop)	AC Mains
DC Cable (Laptop)	No	1.8 m	Yes	Laptop	Power Supply (Laptop)
USB Cable	No	1.8 m	No	Laptop	USB to I2C Converter
USB Cable	Yes	1.8 m	No	Laptop	WiFi Radio

CONFIGURATIONS



Configuration TENN0148- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
WiFi Radio	Microchip	ATWILC3000-MR110CA	F8F005D92BD2

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Batteries	Trojan	T-125	N/A

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB to I2C Converter	Ardvark	2239-128952	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cables	No	>3.0 m	No	WiFi Radio	Batteries
USB Cable (unterminated)	Yes	1.8 m	No	WiFi Radio	Unterminated
USB Cable (unterminated)	No	1.8 m	No	USB I2C Converter	Unterminated
Serial Jumper	No	0.15 m	No	WiFi Radio	USB I2C Converter

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-03-18	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2021-03-18	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2021-03-18	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-03-18	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-03-18	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2021-03-18	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2021-03-18	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2021-03-19	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE



XMI 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE



TstTx 2019.08.30.0 XMI 2020.12.30.0

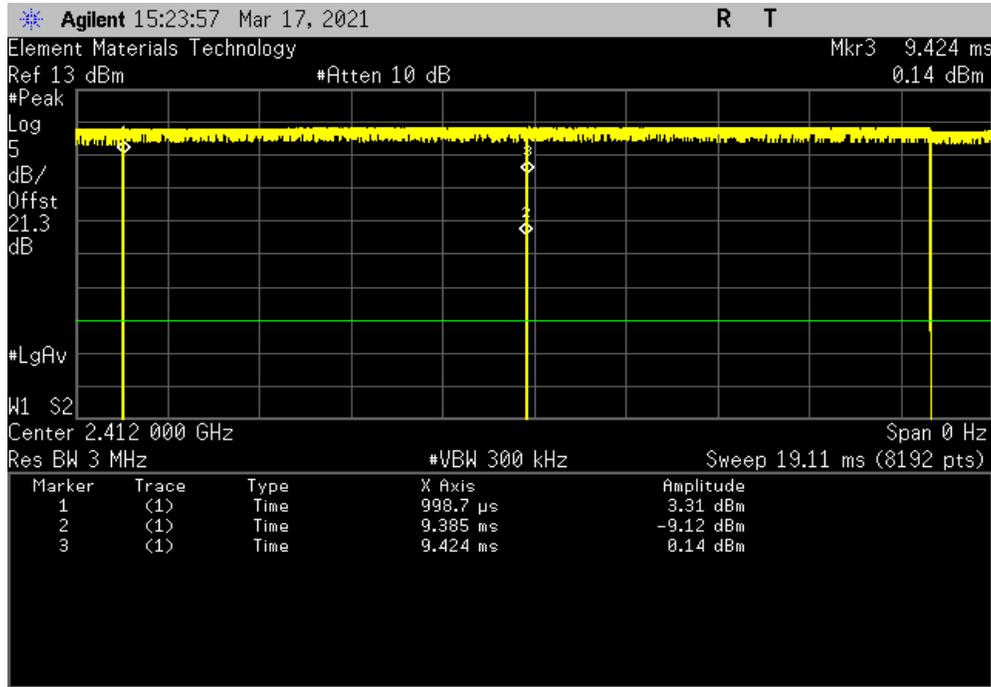
EUT: ATWILC3000-MR110CA		Work Order: TENN0148				
Serial Number: F8F005D93FFC		Date: 18-Mar-21				
Customer: Tennant Company		Temperature: 24.1 °C				
Attendees: Brett Paulsen		Humidity: 26% RH				
Project: None		Barometric Pres.: 1029 mbar				
Tested by: Andrew Rogstad		Power: Battery				
Job Site: MN08						
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2021		ANSI C63.10:2013				
COMMENTS						
Reference level offset includes measurement cable, attenuator, and DC block.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature <i>Andrew Rogstad</i>				
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2400 MHz - 2483.5 MHz Band						
802.11(b) 1 Mbps						
Low Channel 1, 2412 MHz	8.386 ms	8.426 ms	1	99.5	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	8.387 ms	8.418 ms	1	99.6	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	8.388 ms	8.426 ms	1	99.6	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(b) 11 Mbps						
Low Channel 1, 2412 MHz	937.4 us	978.9 us	1	95.8	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	937.4 us	969.6 us	1	96.7	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	937.2 us	978.9 us	1	95.7	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(g) 6 Mbps						
Low Channel 1, 2412 MHz	1.394 ms	1.43 ms	1	97.5	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	1.394 ms	1.439 ms	1	96.9	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	1.393 ms	1.43 ms	1	97.4	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(g) 36 Mbps						
Low Channel 1, 2412 MHz	252.9 us	289.1 us	1	87.5	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	253 us	289.8 us	1	87.3	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	254.1 us	289.2 us	1	87.9	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(g) 54 Mbps						
Low Channel 1, 2412 MHz	176.9 us	213.5 us	1	82.9	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	176.9 us	223.4 us	1	79.2	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	178.2 us	222.6 us	1	80.1	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(n) MCS0						
Low Channel 1, 2412 MHz	1.302 ms	1.346 ms	1	96.7	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	1.301 ms	1.347 ms	1	96.6	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	1.3 ms	1.338 ms	1	97.1	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(n) MCS7						
Low Channel 1, 2412 MHz	167.2 us	202 us	1	82.8	N/A	N/A
Low Channel 1, 2412 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 6, 2437 MHz	167 us	211 us	1	79.1	N/A	N/A
Mid Channel 6, 2437 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 11, 2462 MHz	166.4 us	210.4 us	1	79.1	N/A	N/A
High Channel 11, 2462 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

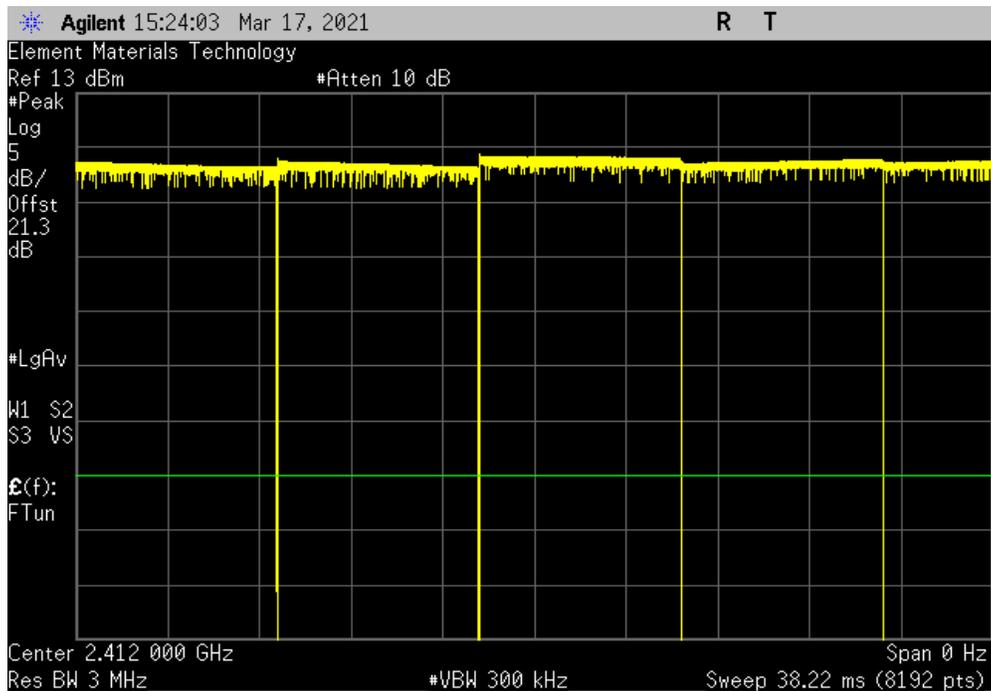


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
8.386 ms	8.426 ms	1	99.5	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

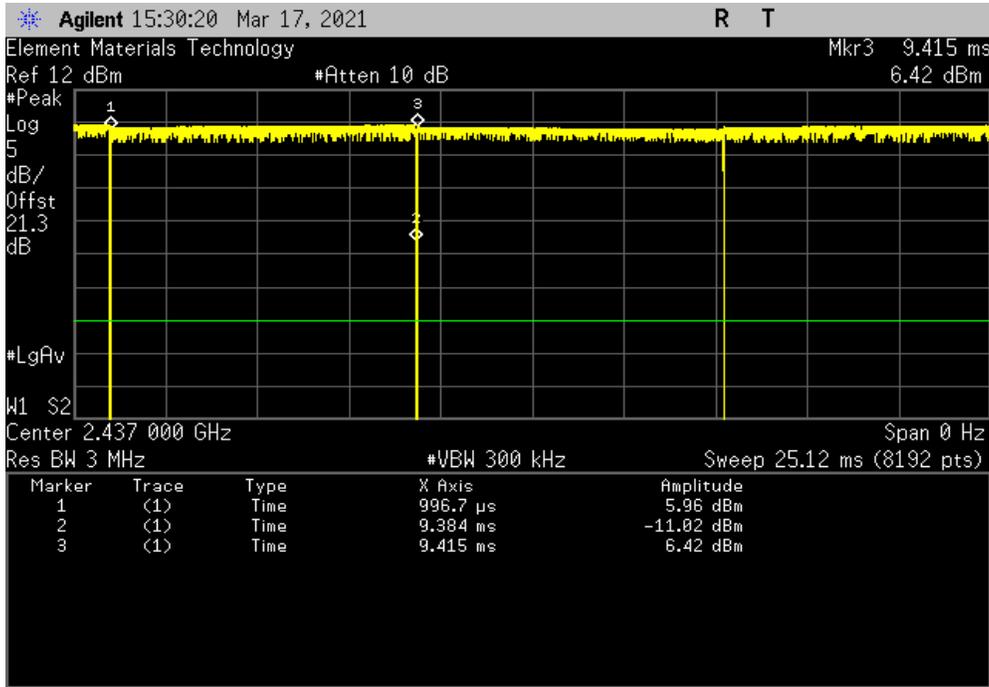


DUTY CYCLE

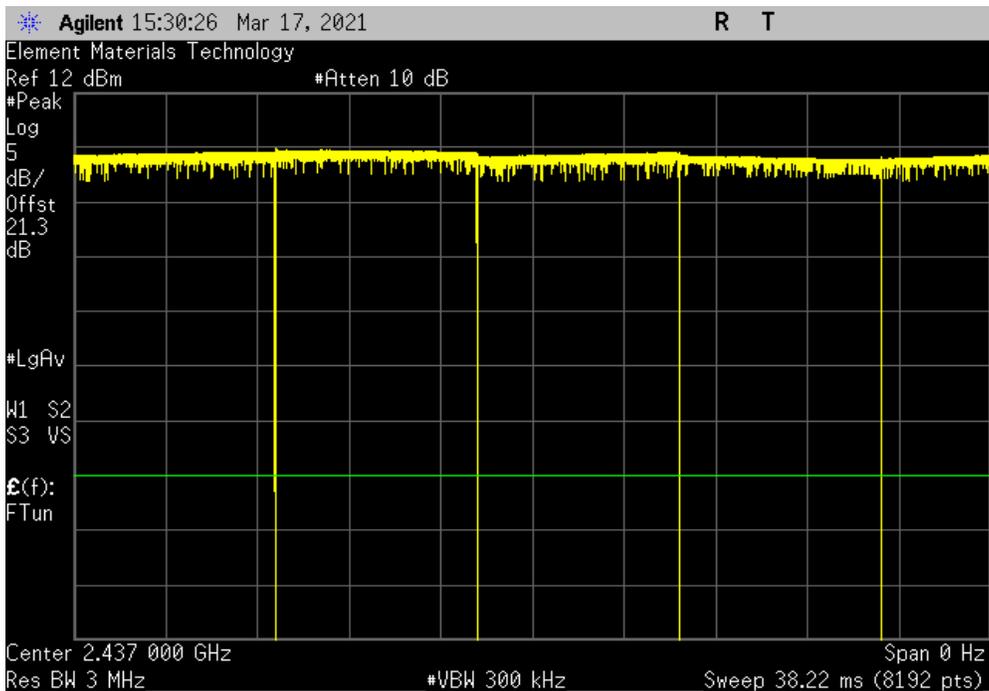


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
8.387 ms	8.418 ms	1	99.6	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

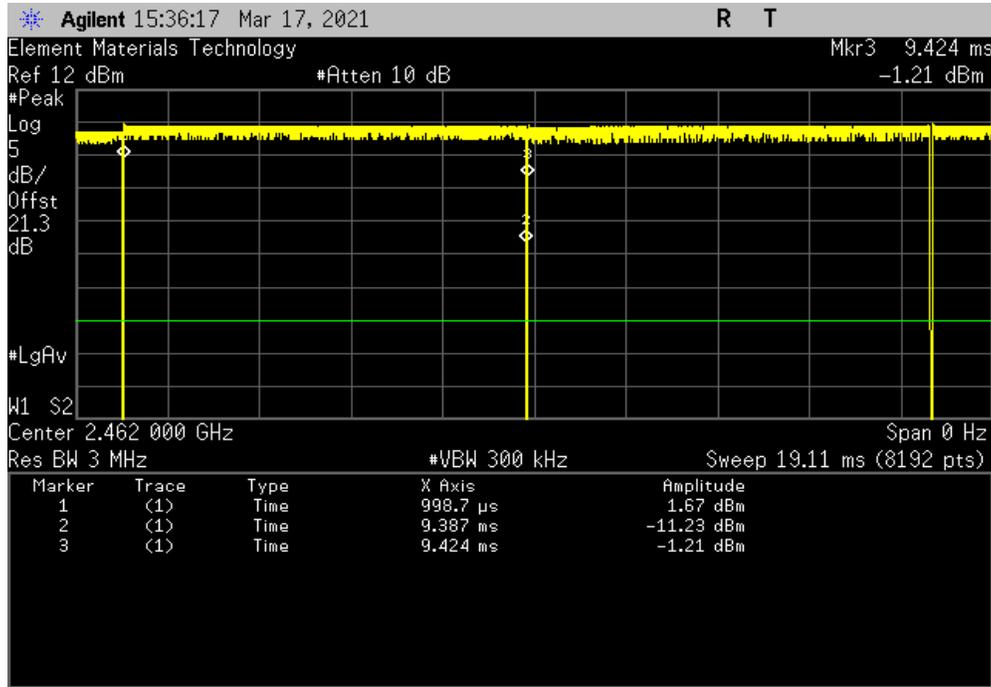


DUTY CYCLE

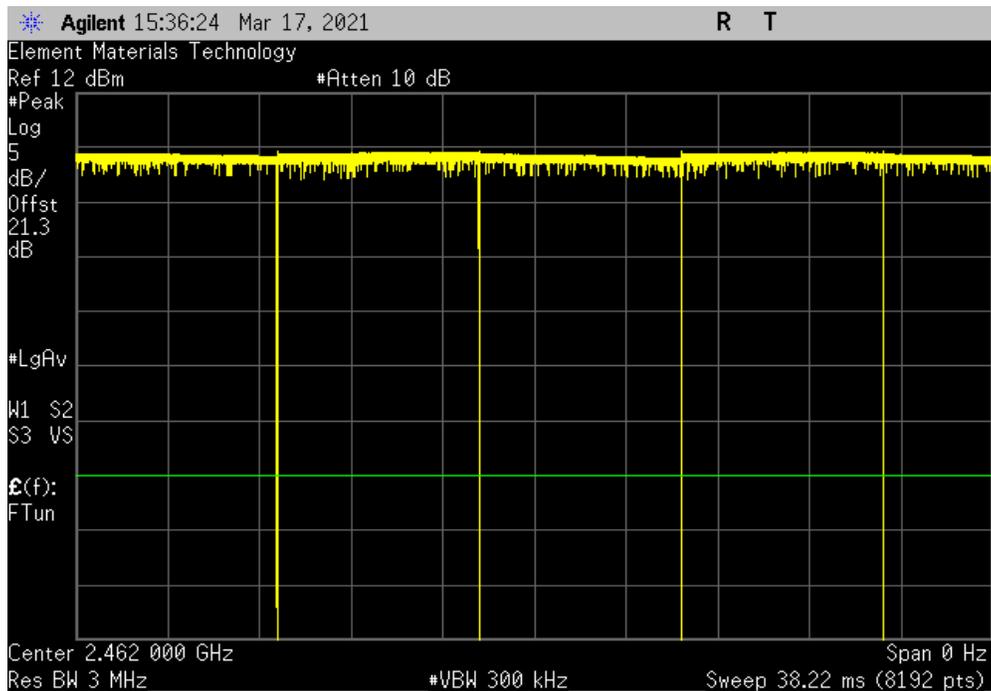


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
8.388 ms	8.426 ms	1	99.6	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

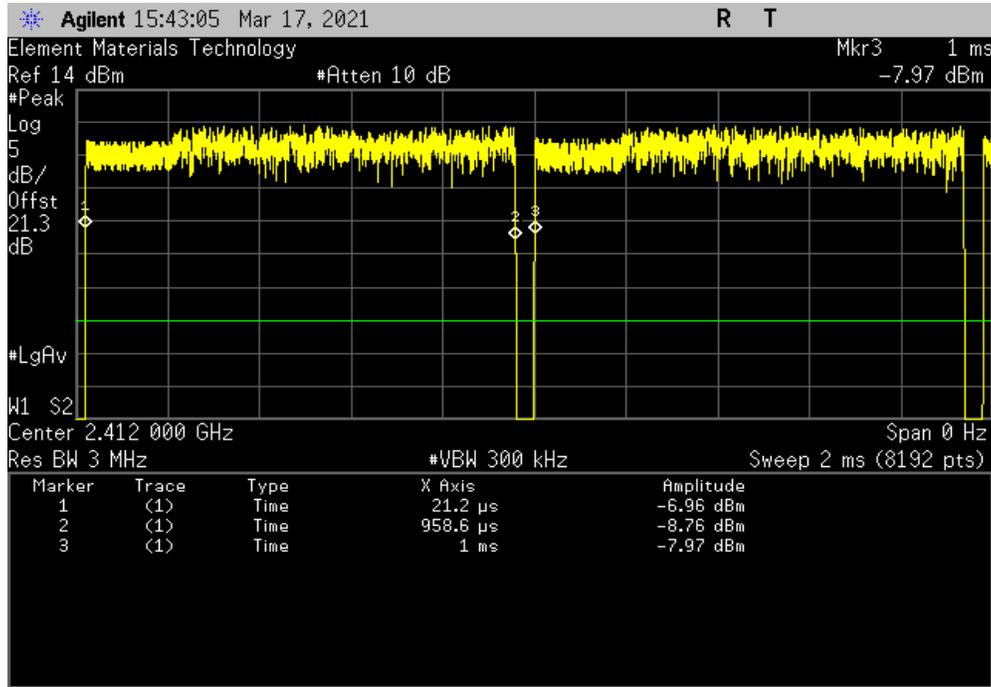


DUTY CYCLE

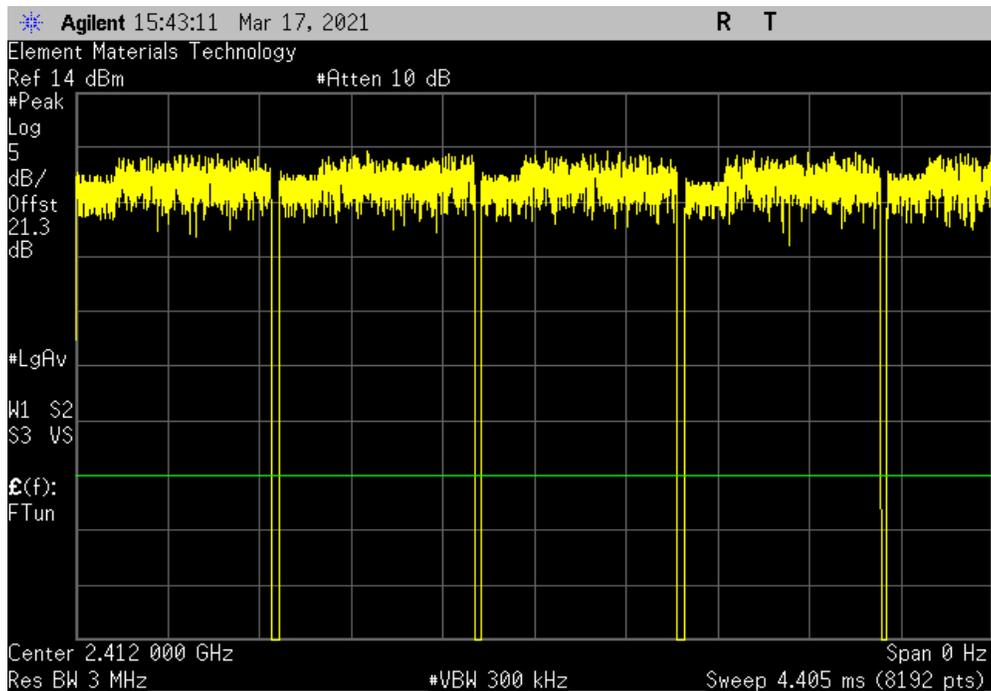


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
937.4 us	978.9 us	1	95.8	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

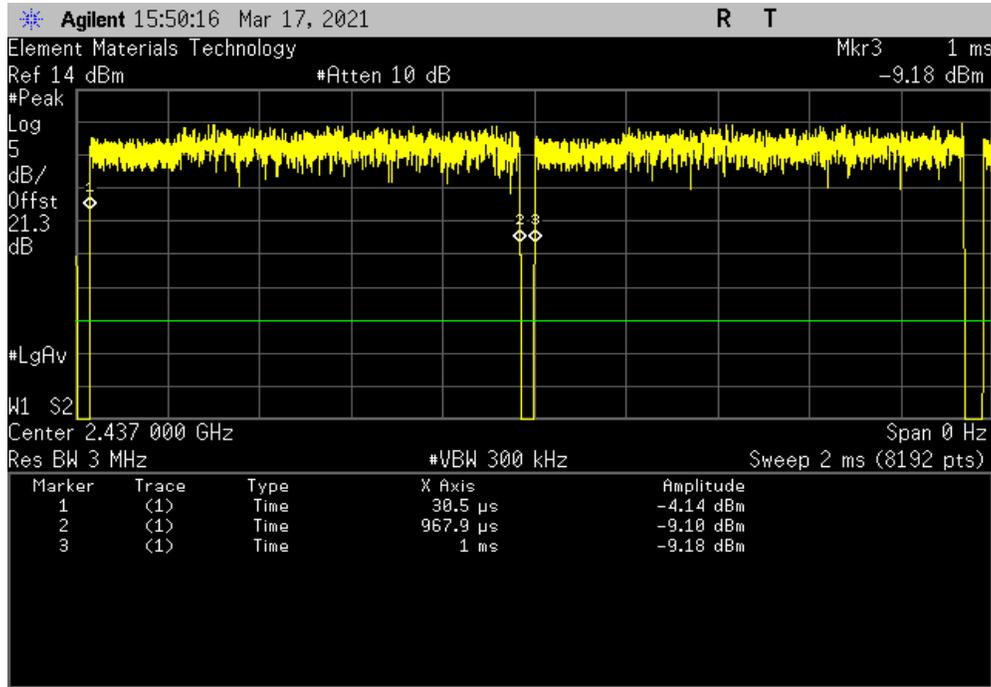


DUTY CYCLE

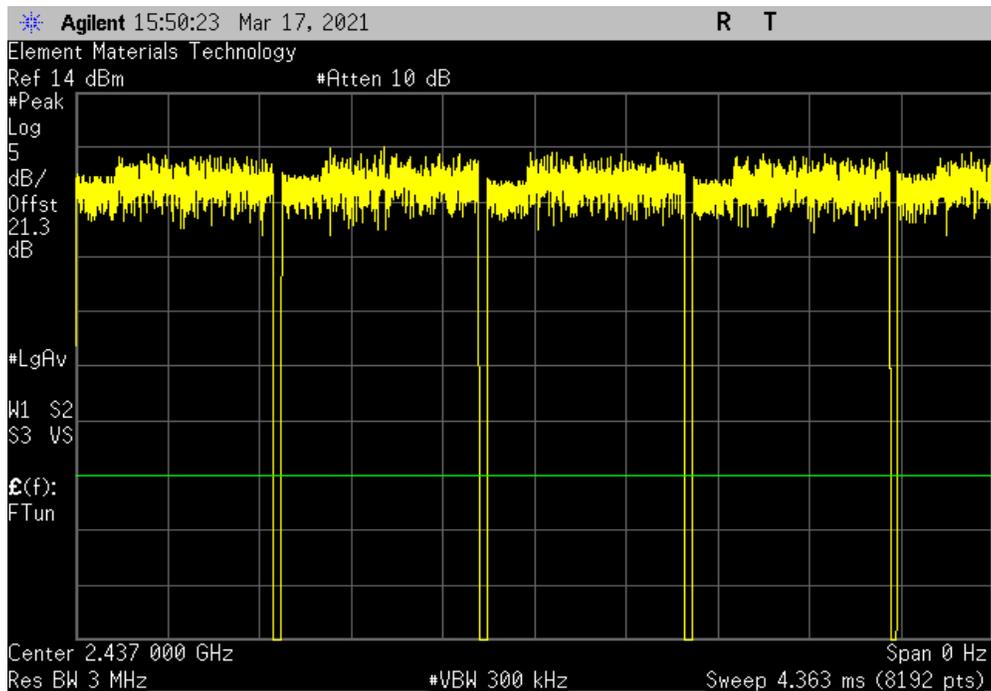


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
937.4 us	969.6 us	1	96.7	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

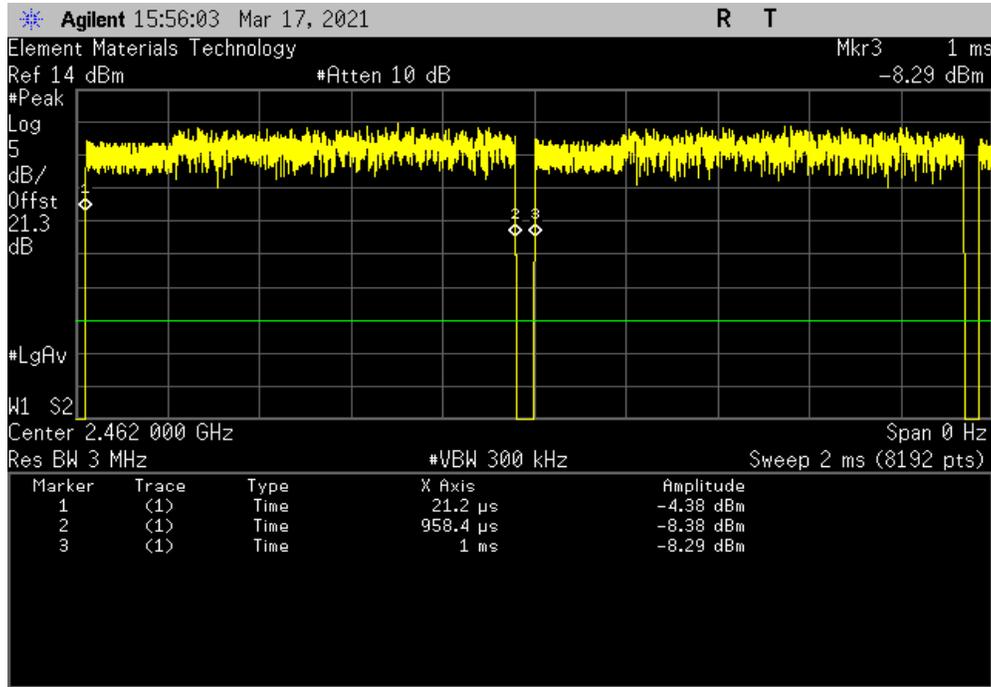


DUTY CYCLE

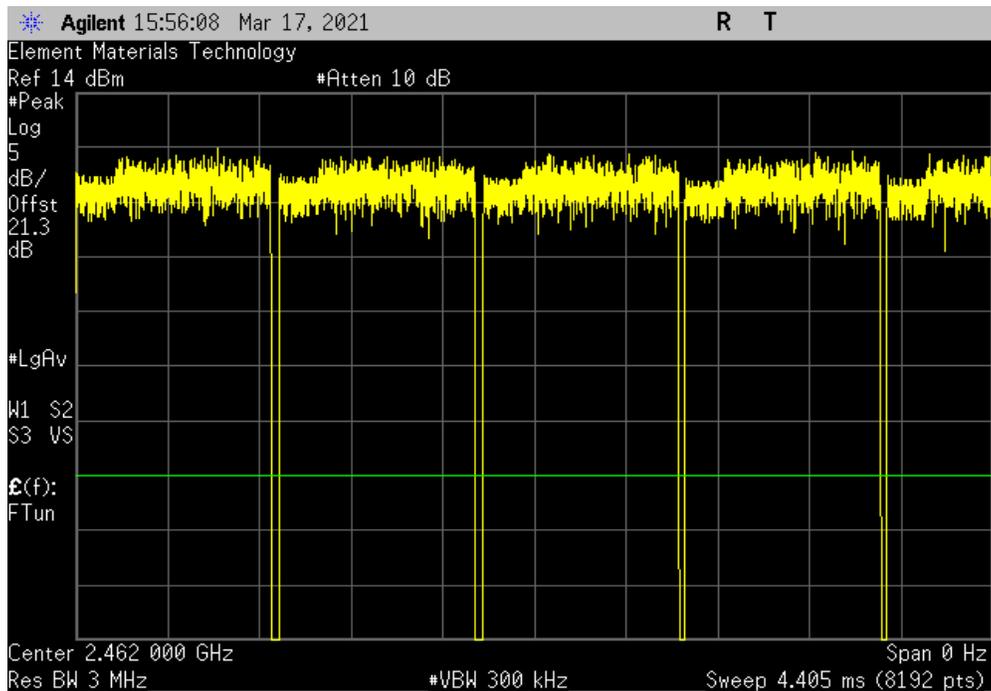


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
937.2 us	978.9 us	1	95.7	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

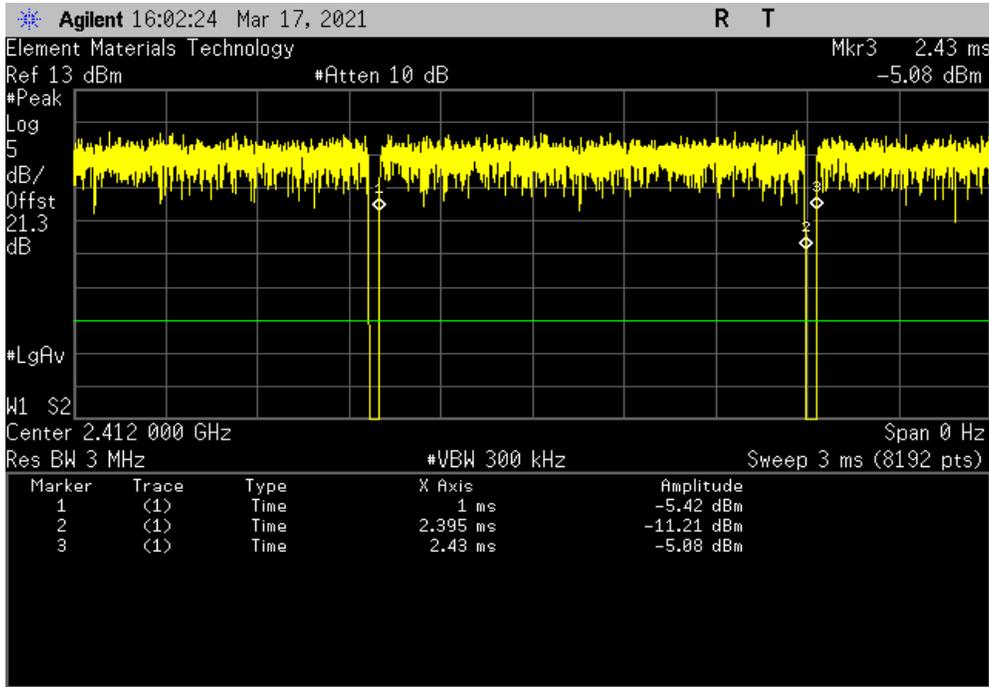


DUTY CYCLE

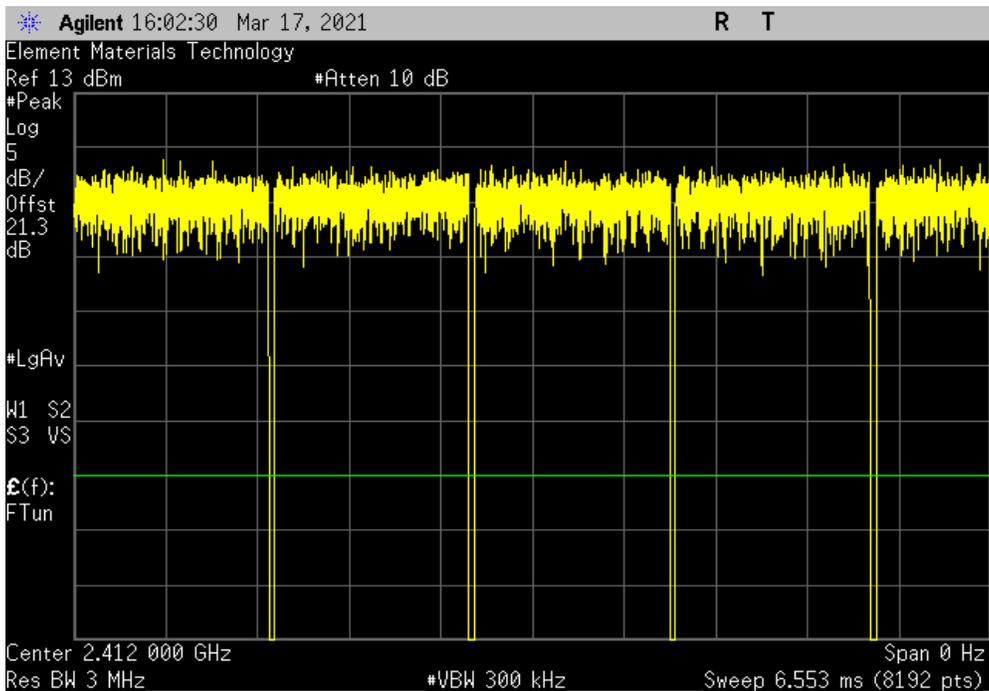


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.394 ms	1.43 ms	1	97.5	N/A	N/A



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

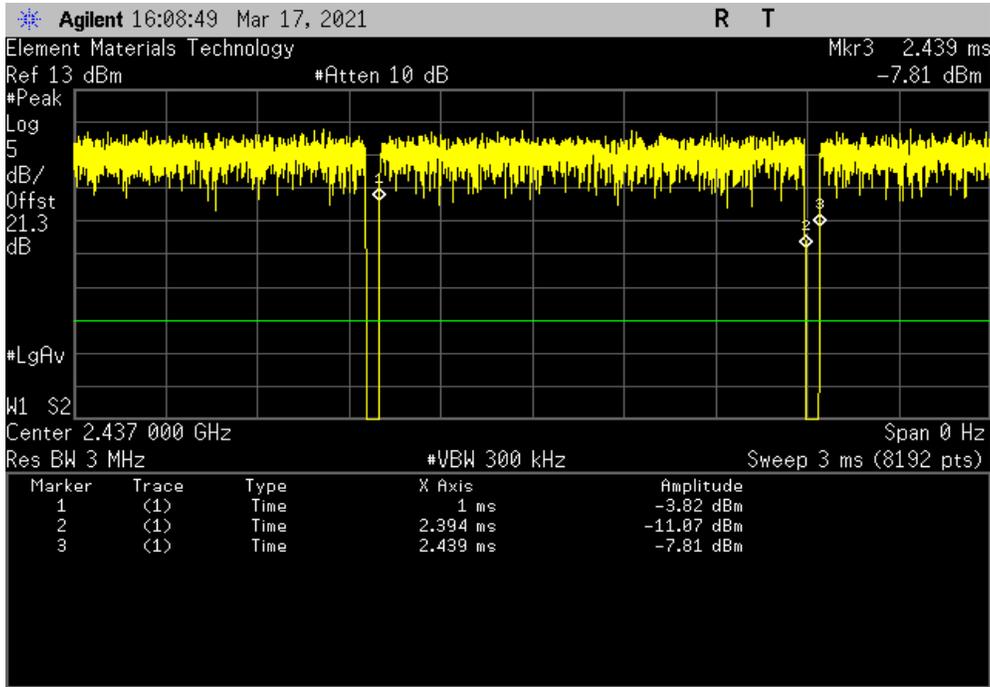


DUTY CYCLE

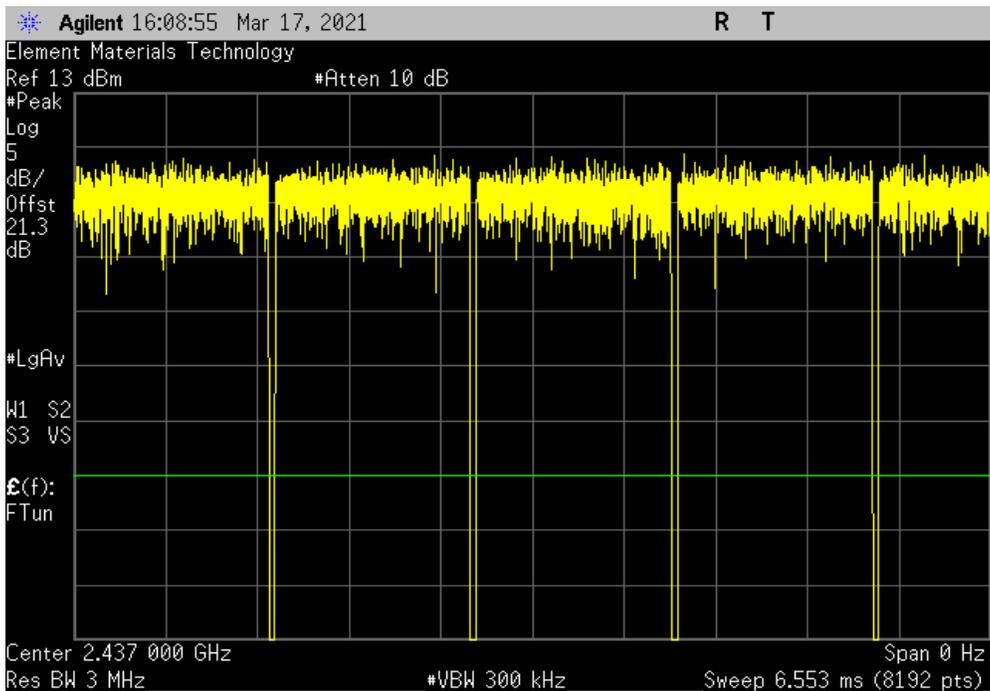


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.394 ms	1.439 ms	1	96.9	N/A	N/A



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

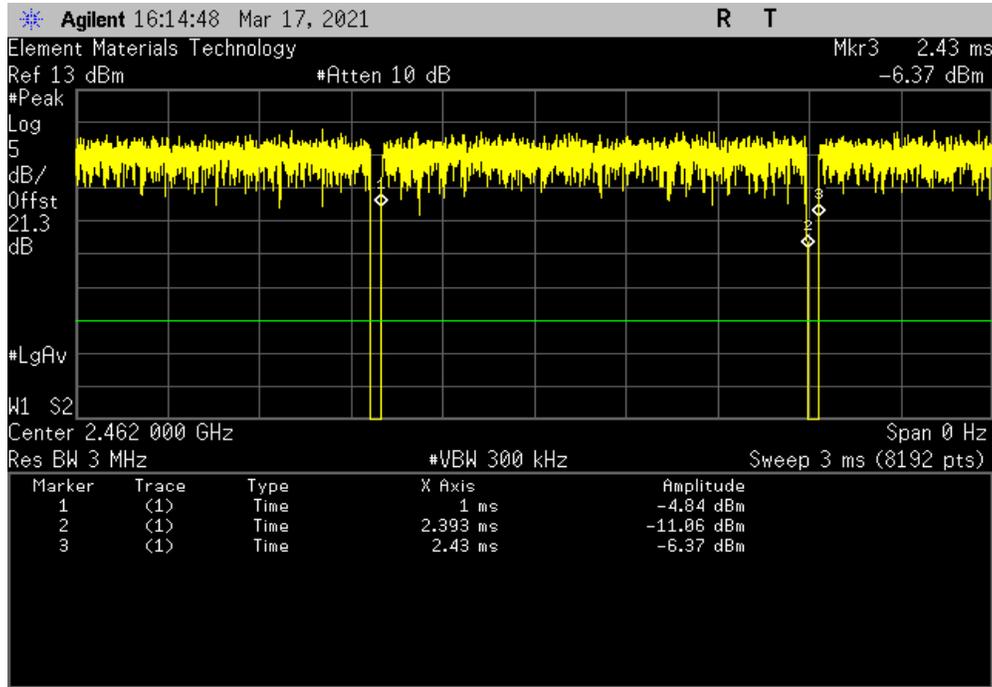


DUTY CYCLE

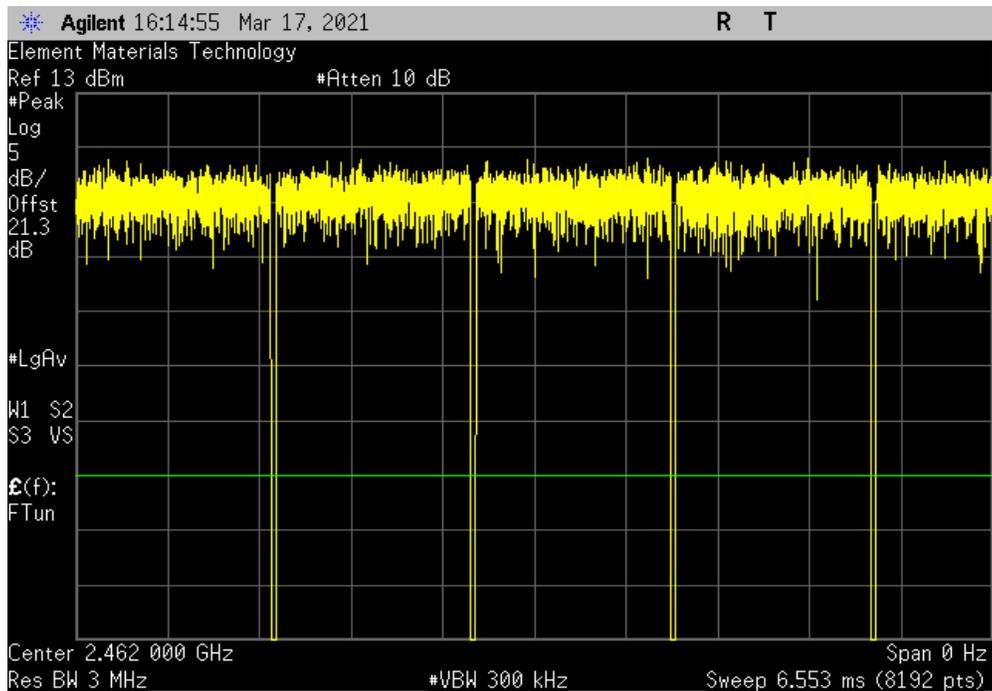


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.393 ms	1.43 ms	1	97.4	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

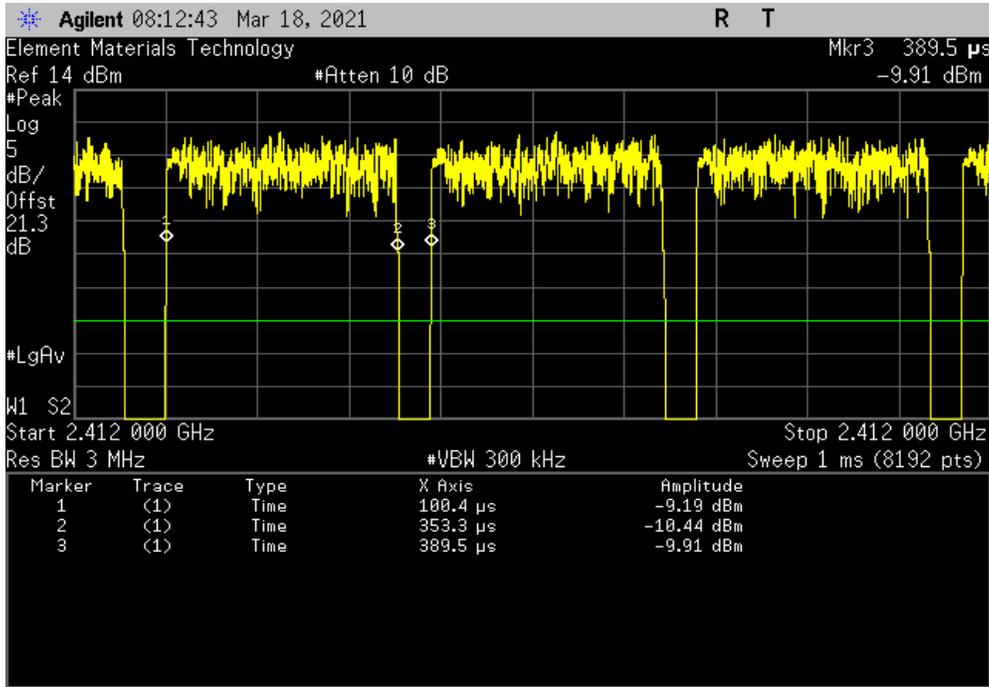


DUTY CYCLE



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
252.9 us	289.1 us	1	87.5	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

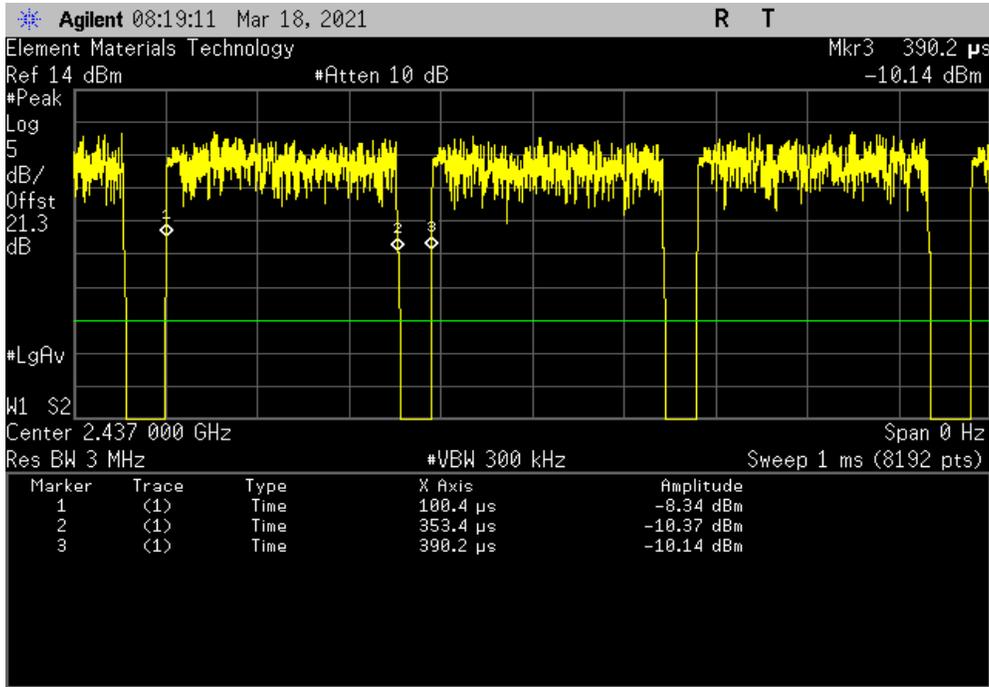


DUTY CYCLE



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
253 us	289.8 us	1	87.3	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

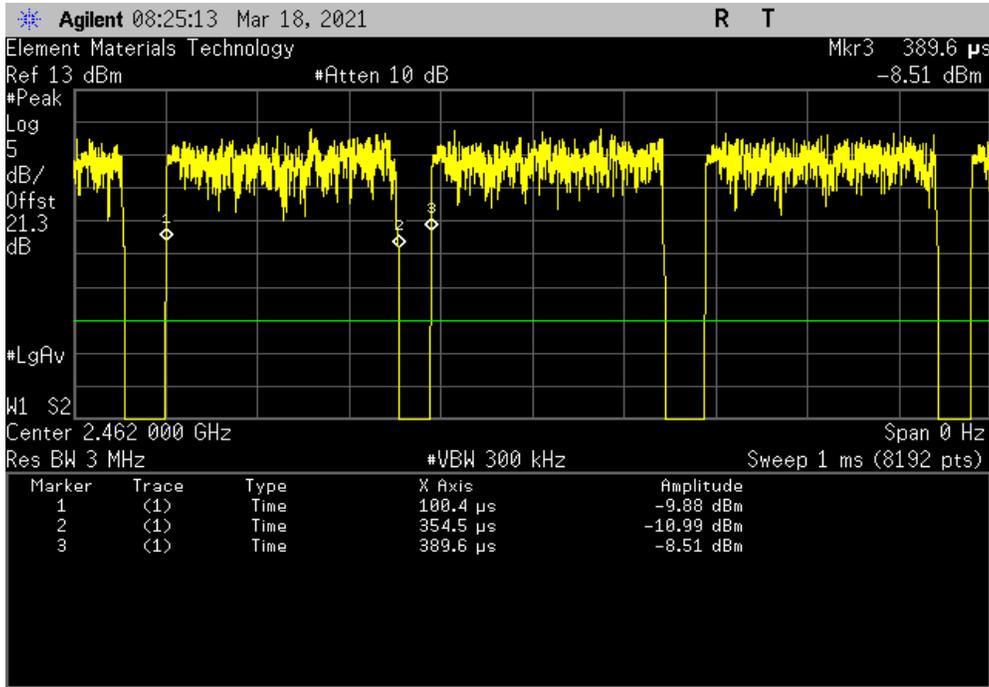


DUTY CYCLE

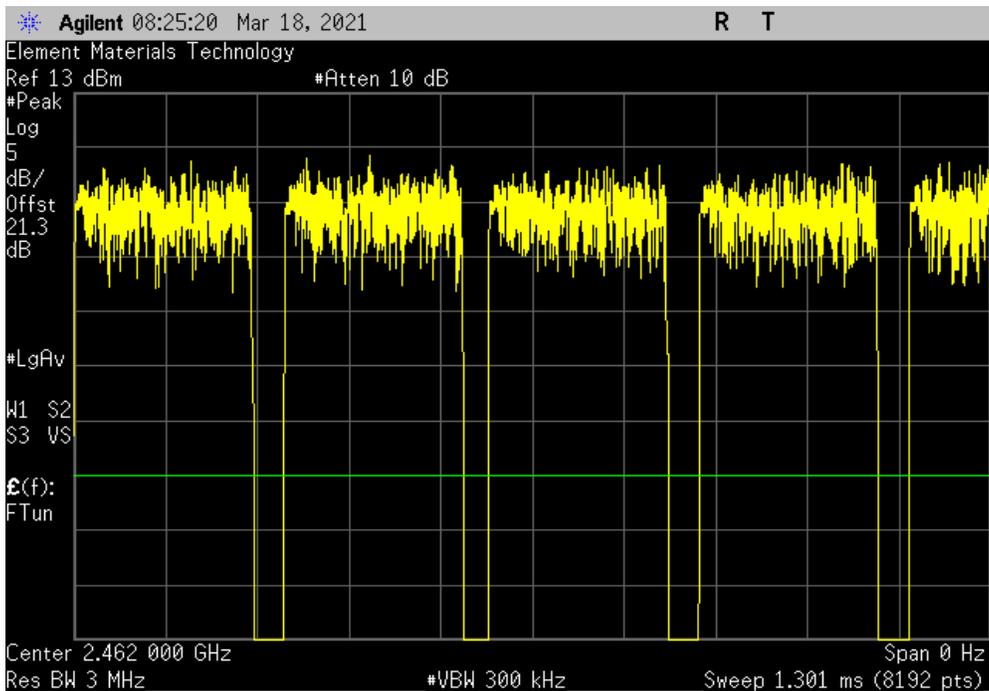


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
254.1 us	289.2 us	1	87.9	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

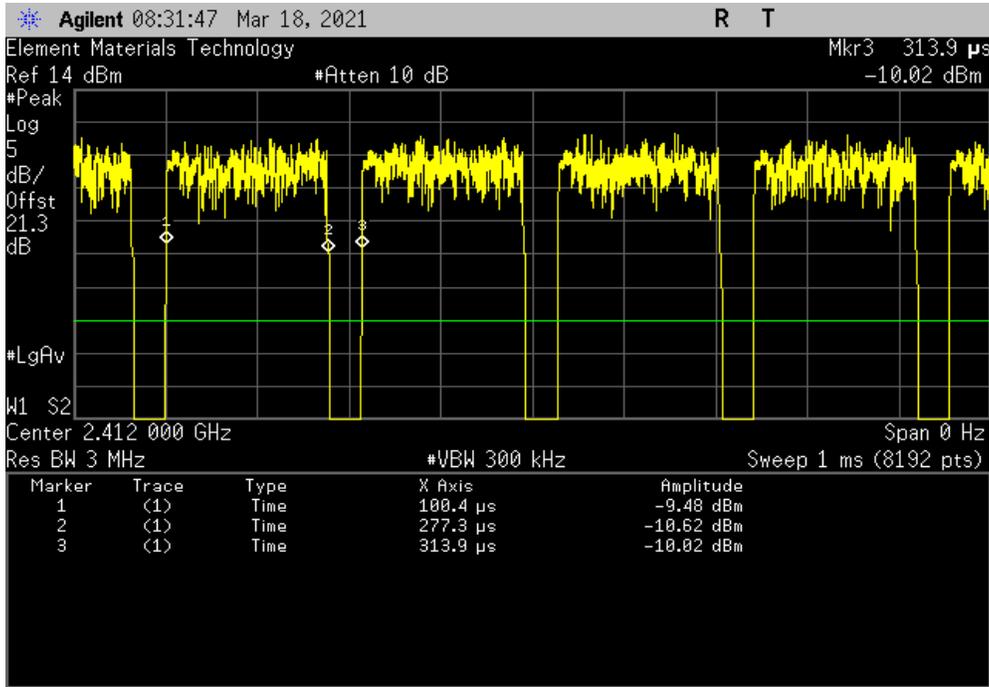


DUTY CYCLE

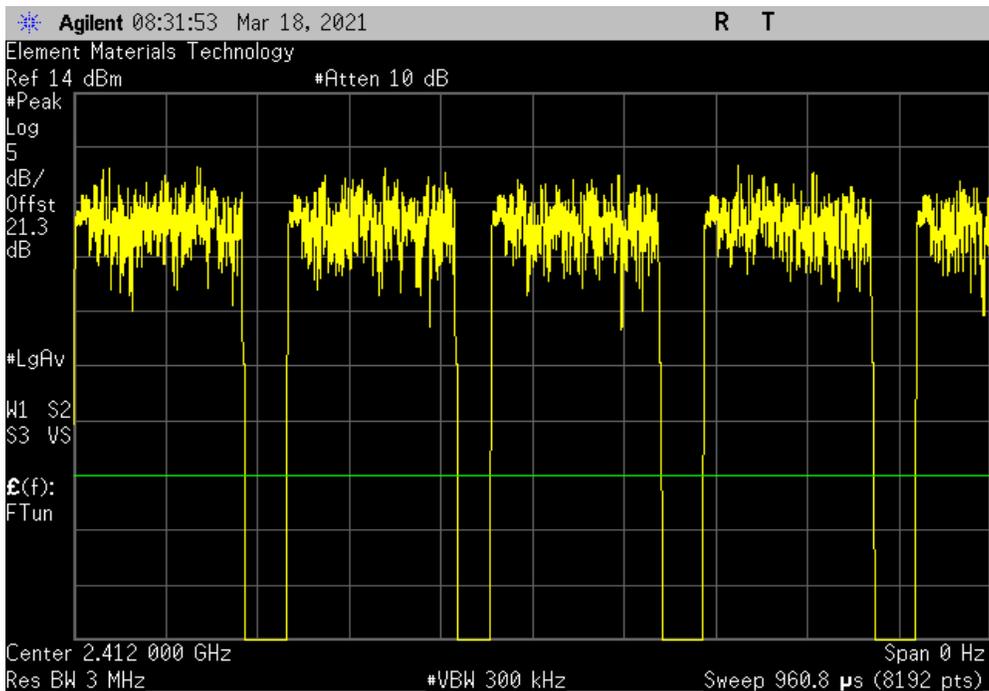


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
176.9 us	213.5 us	1	82.9	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

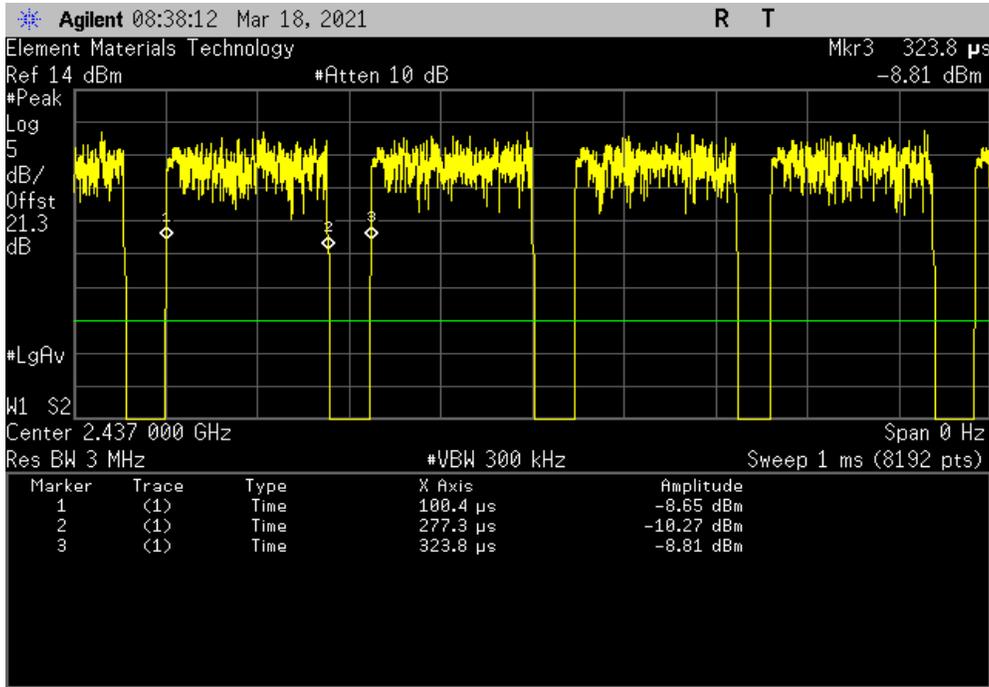


DUTY CYCLE

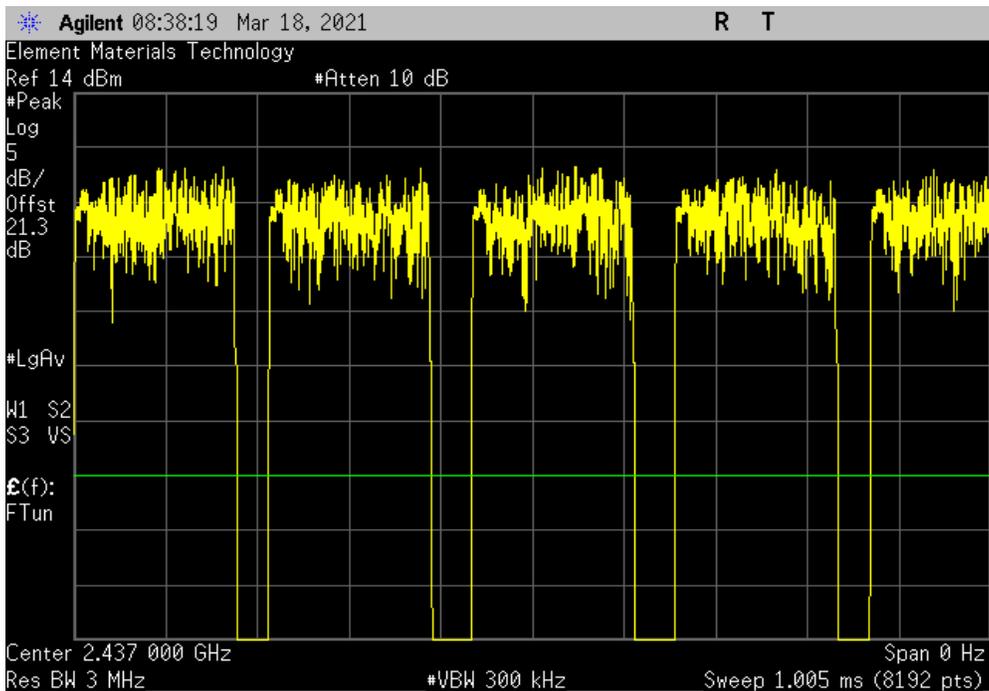


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
176.9 us	223.4 us	1	79.2	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

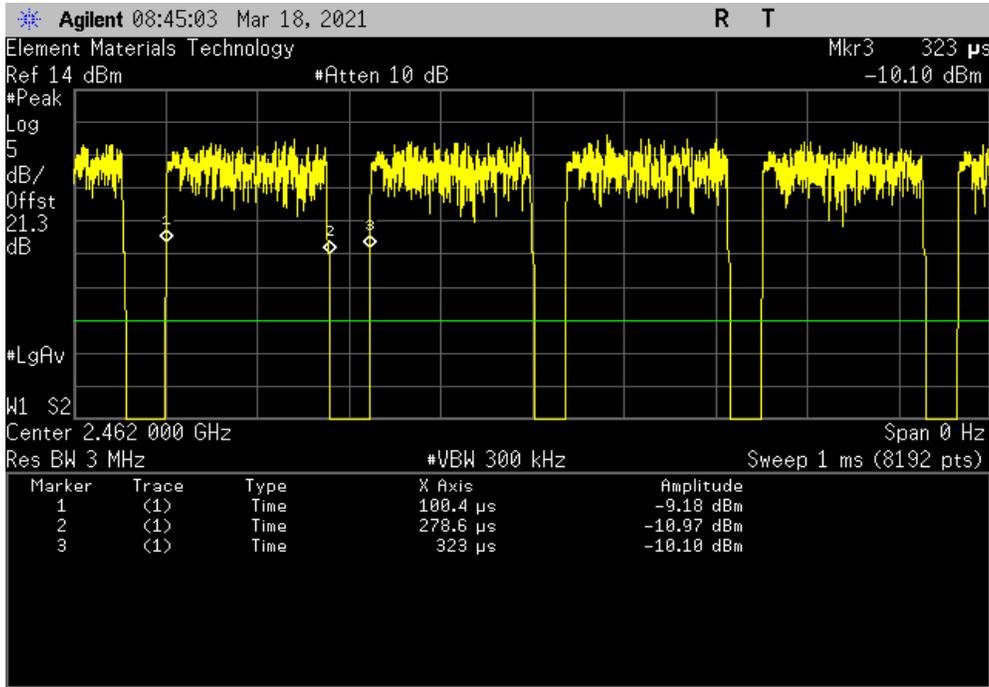


DUTY CYCLE

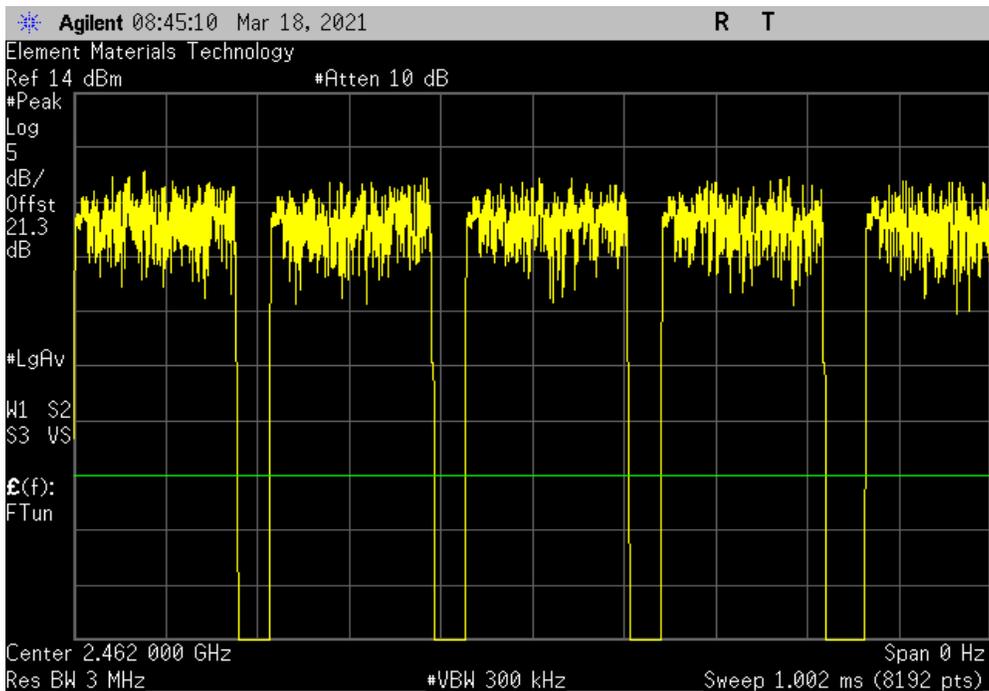


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
178.2 us	222.6 us	1	80.1	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

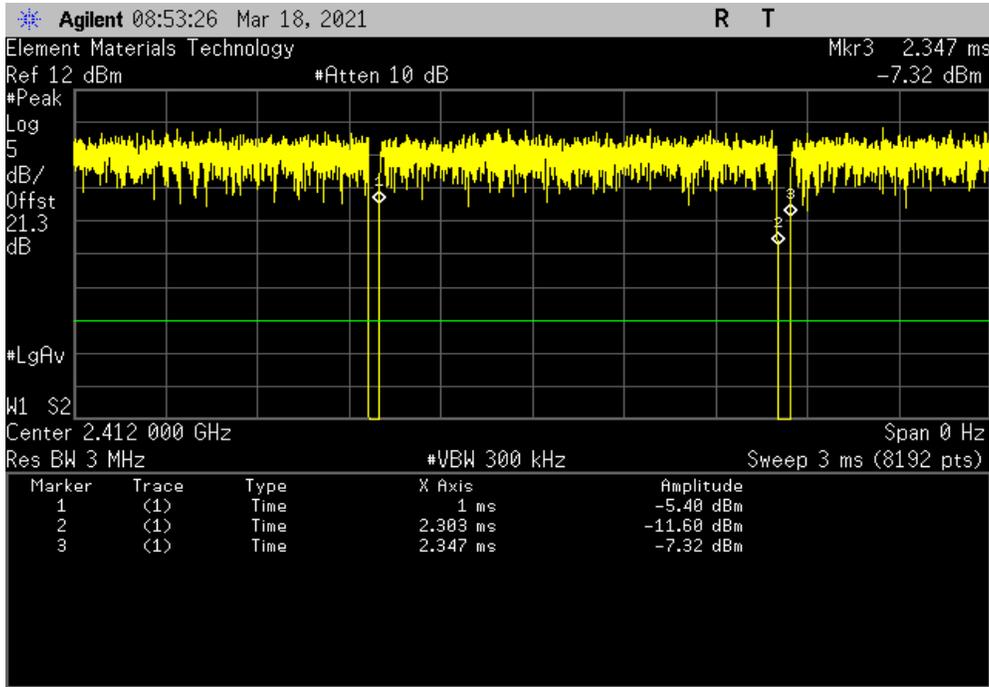


DUTY CYCLE



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.302 ms	1.346 ms	1	96.7	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

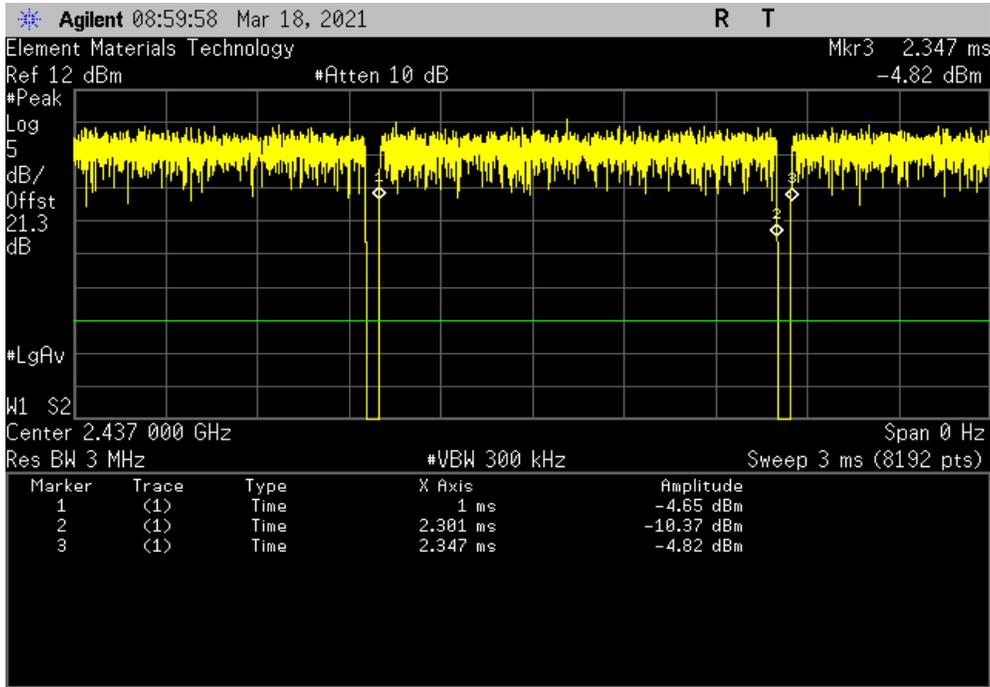


DUTY CYCLE

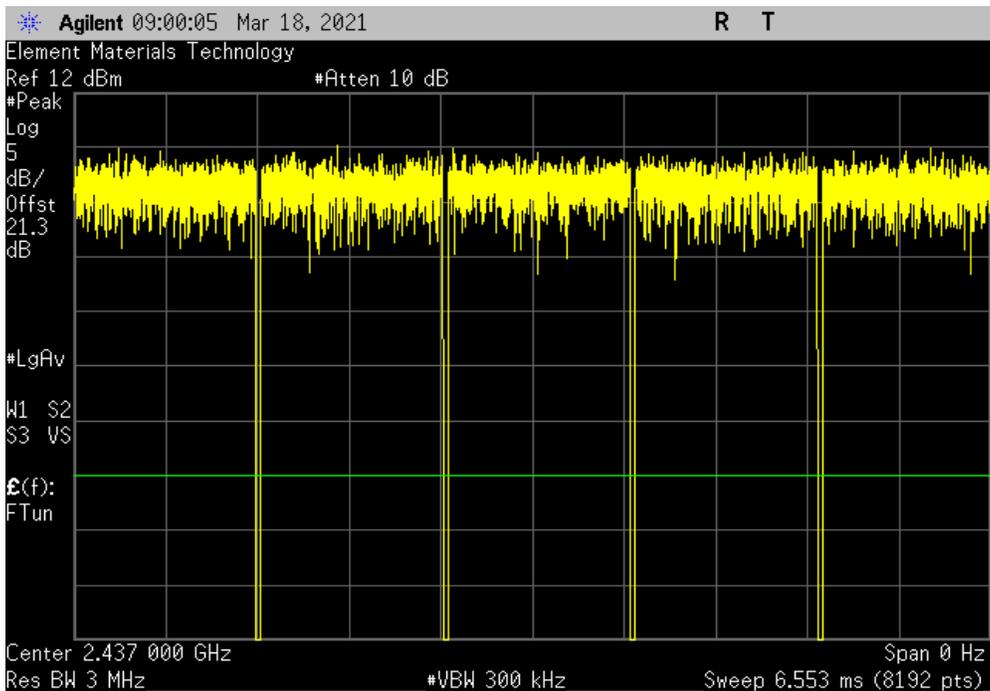


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.301 ms	1.347 ms	1	96.6	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

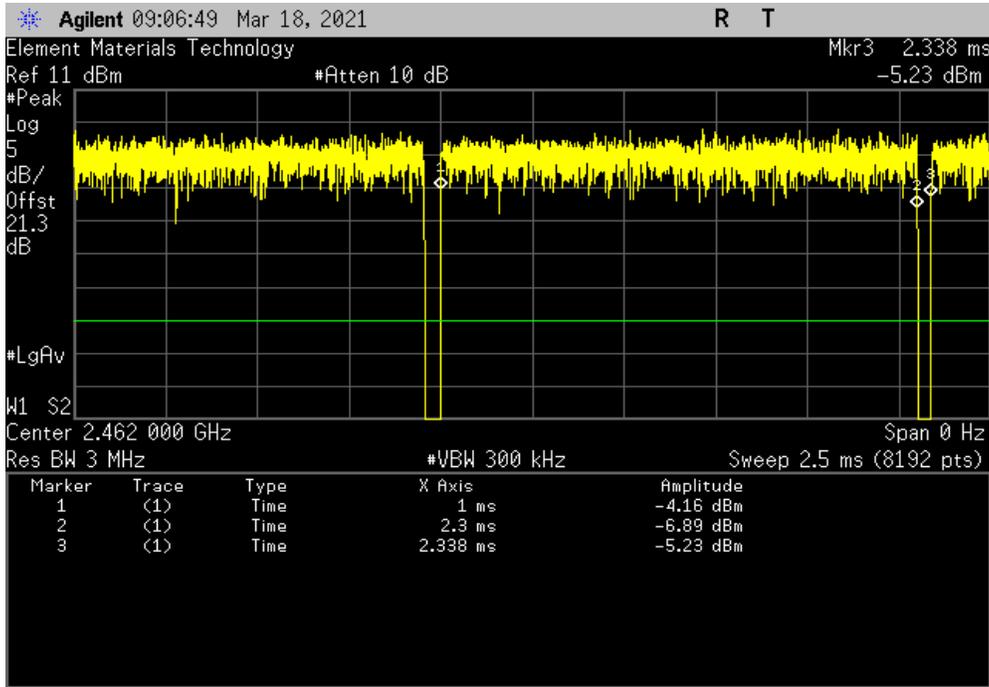


DUTY CYCLE

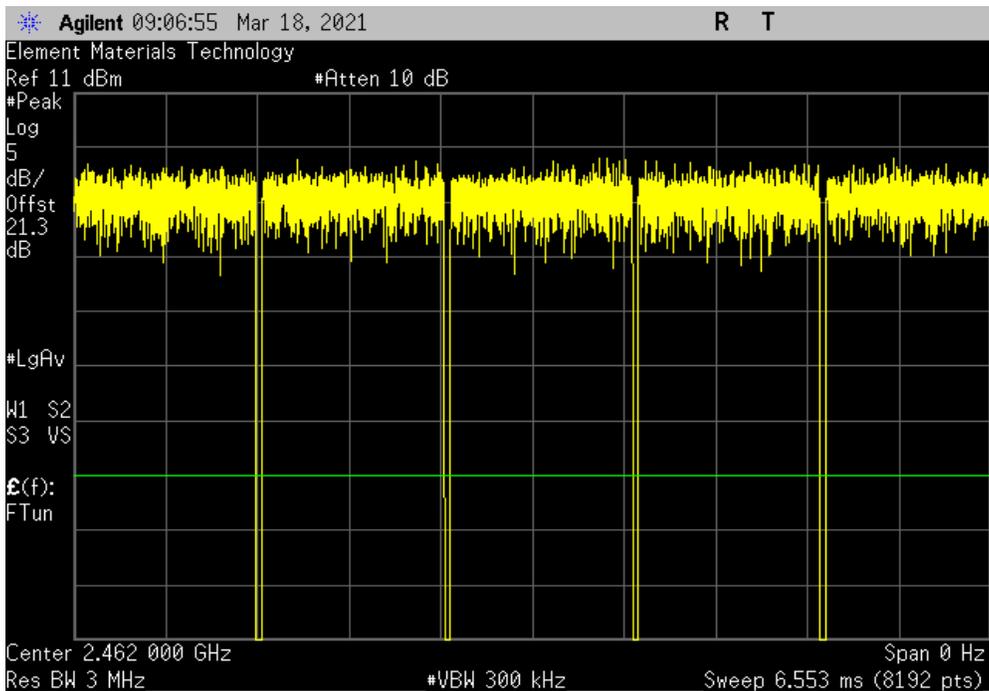


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.3 ms	1.338 ms	1	97.1	N/A	N/A



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

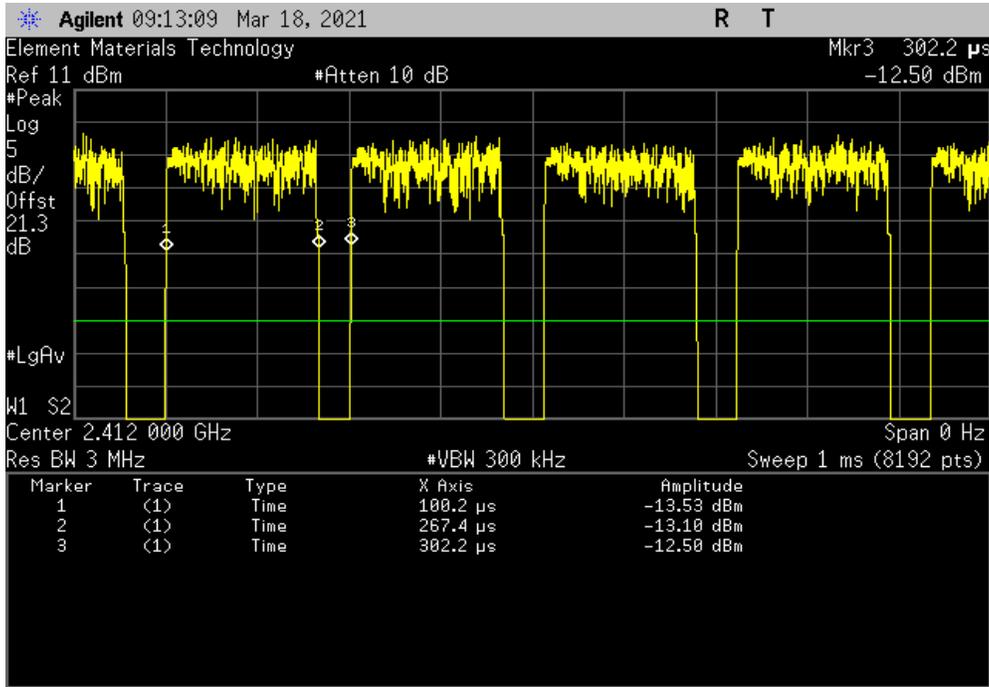


DUTY CYCLE

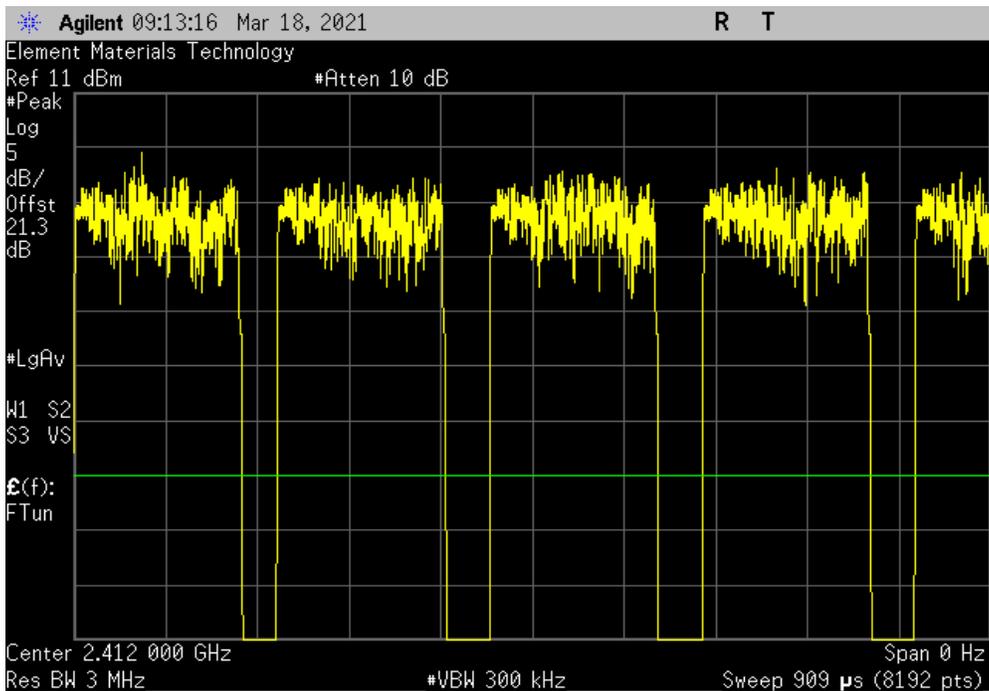


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
167.2 us	202 us	1	82.8	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

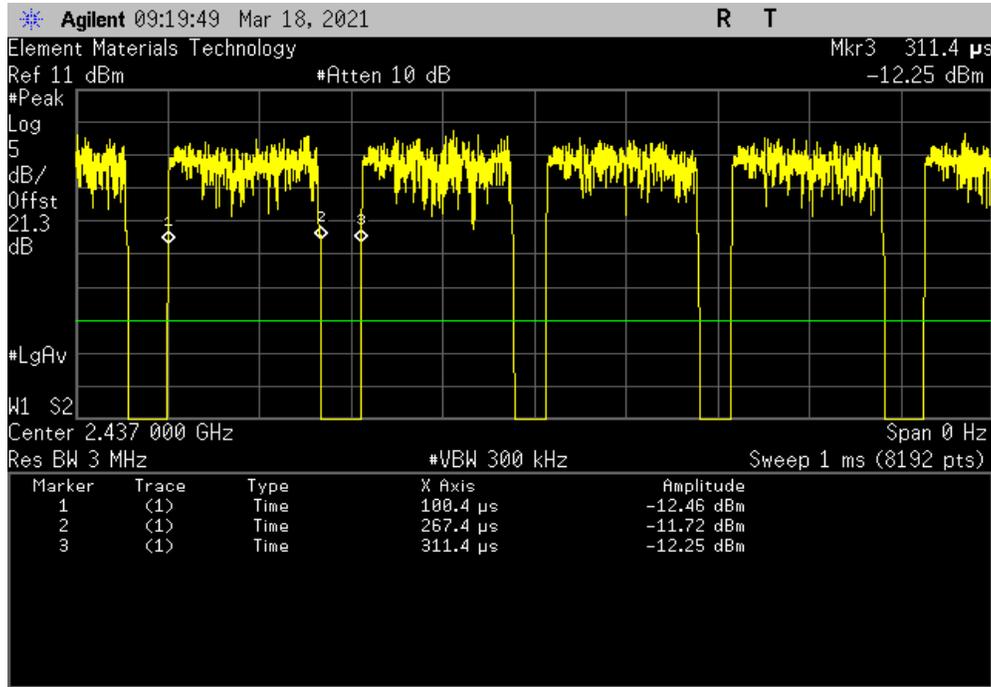


DUTY CYCLE

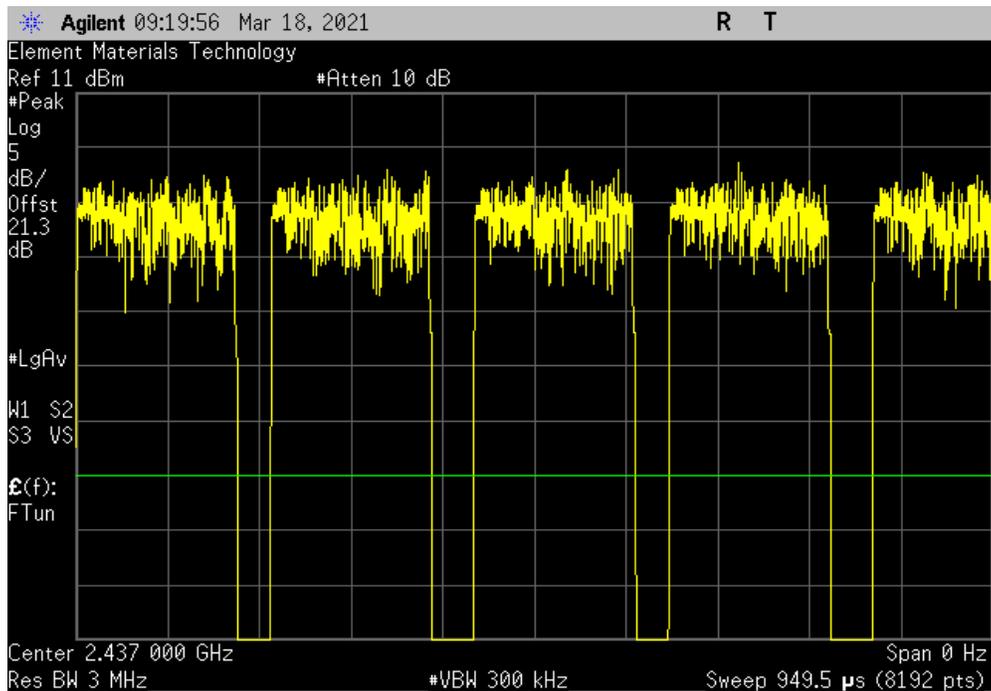


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
167 us	211 us	1	79.1	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

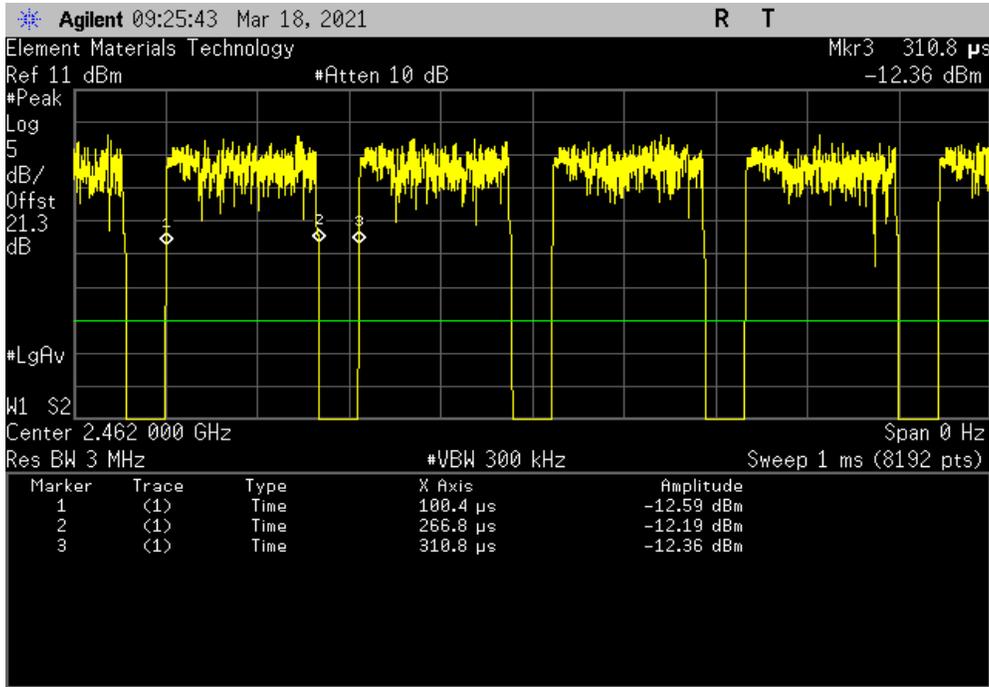


DUTY CYCLE

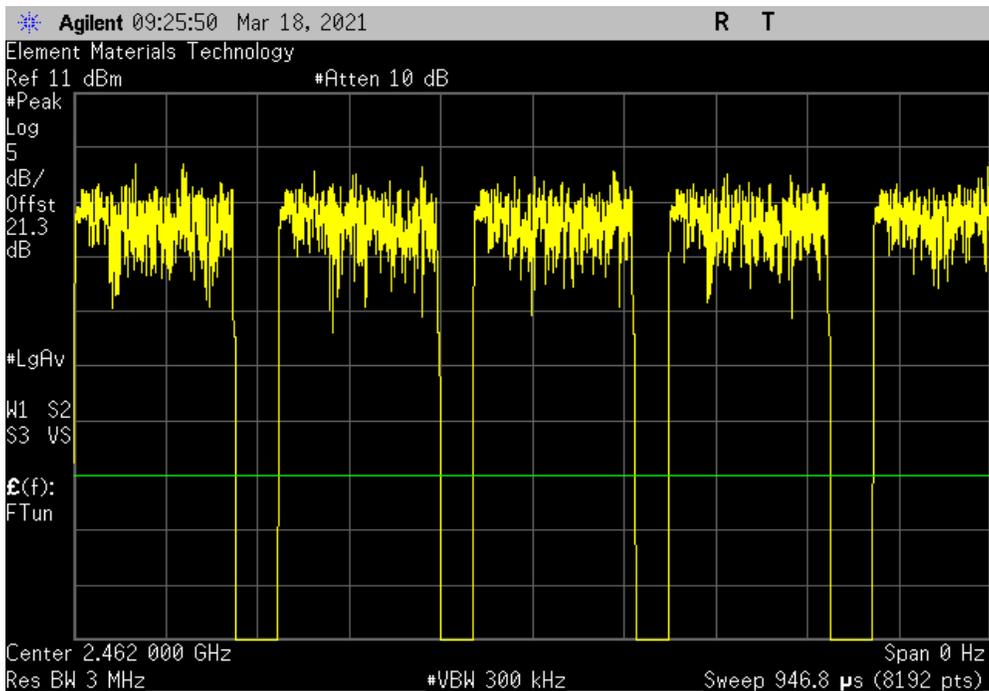


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
166.4 us	210.4 us	1	79.1	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	





OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The EUT was set to the channels and modes listed in the datasheet.

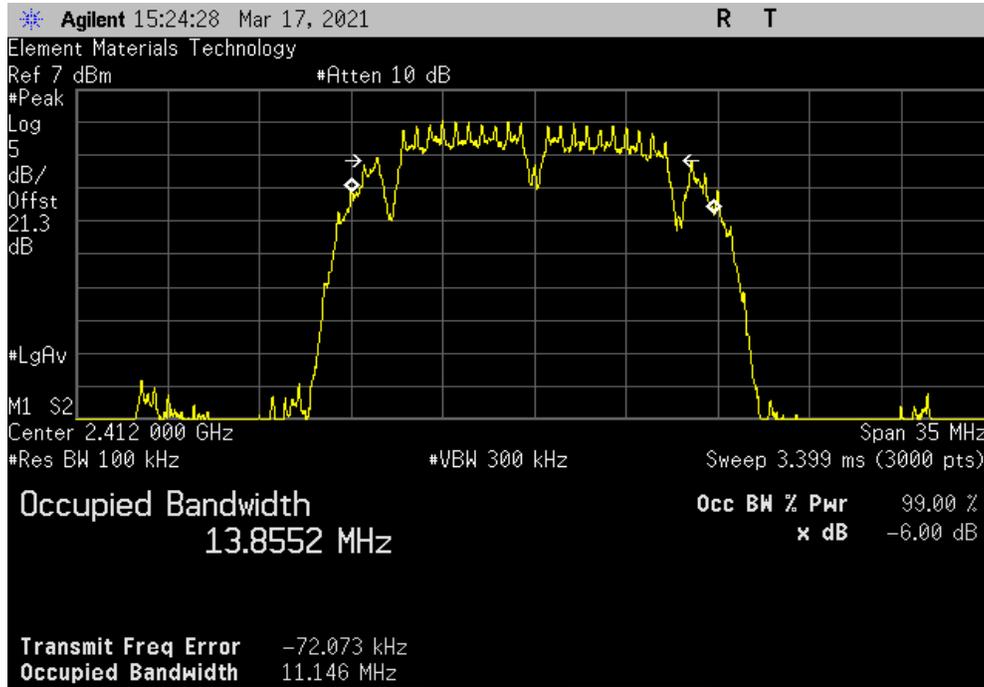
The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

OCCUPIED BANDWIDTH

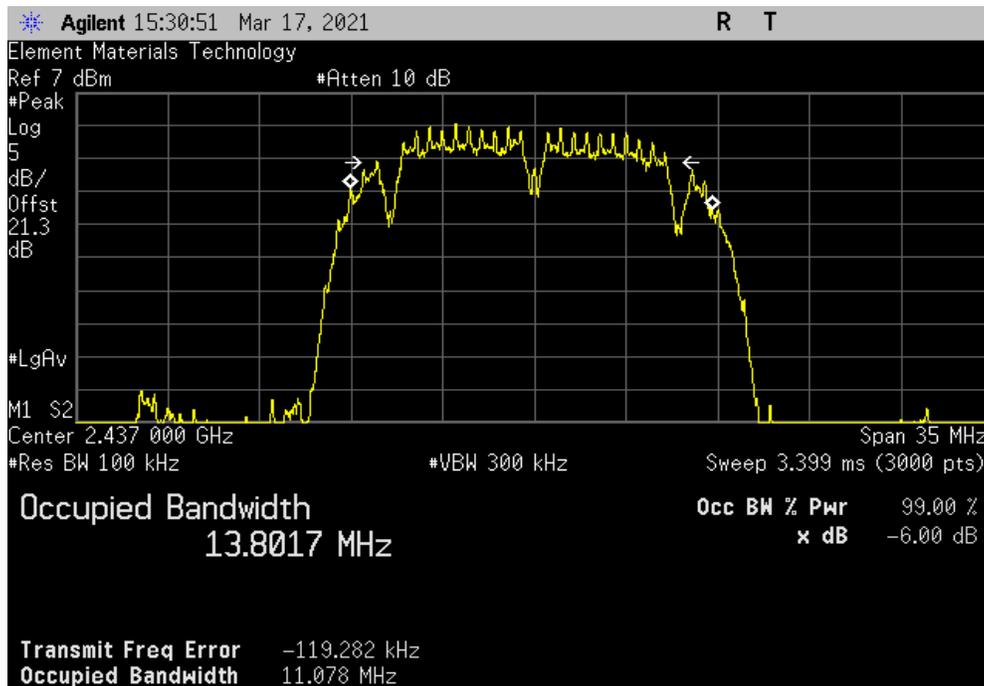


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit (>)	Result
	11.146 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit (>)	Result
	11.078 MHz	500 kHz	Pass

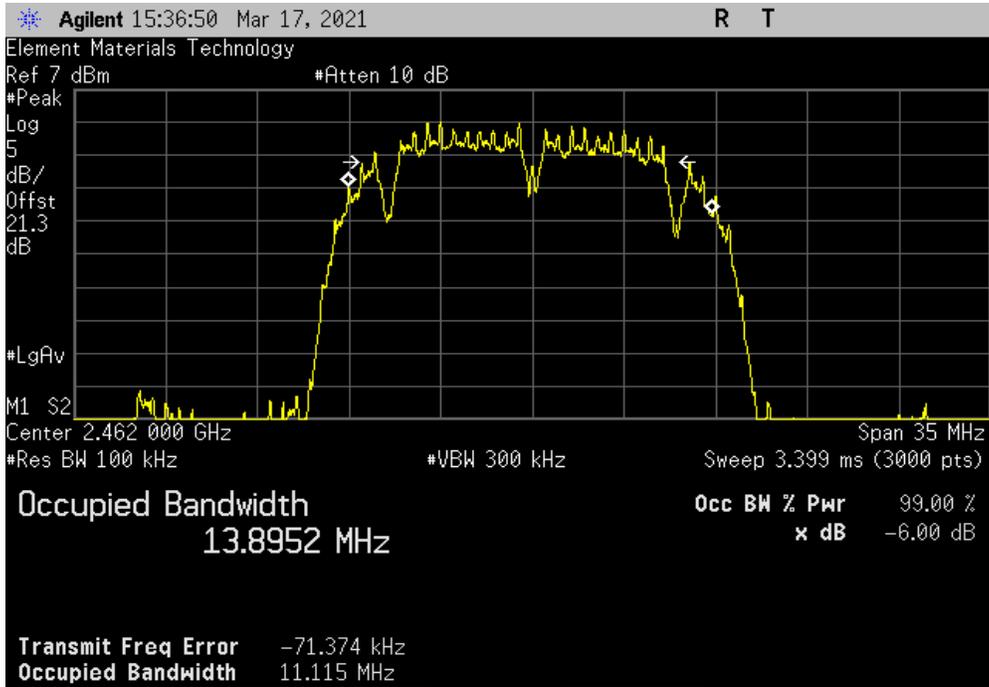


OCCUPIED BANDWIDTH

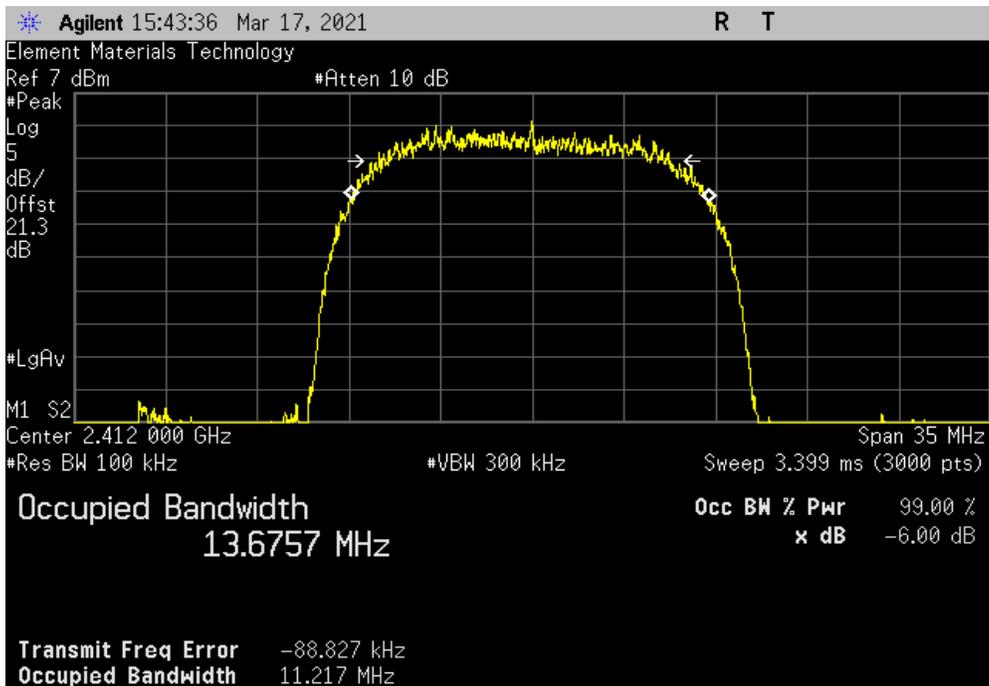


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz			
	Value	Limit (>)	Result
	11.115 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit (>)	Result
	11.217 MHz	500 kHz	Pass

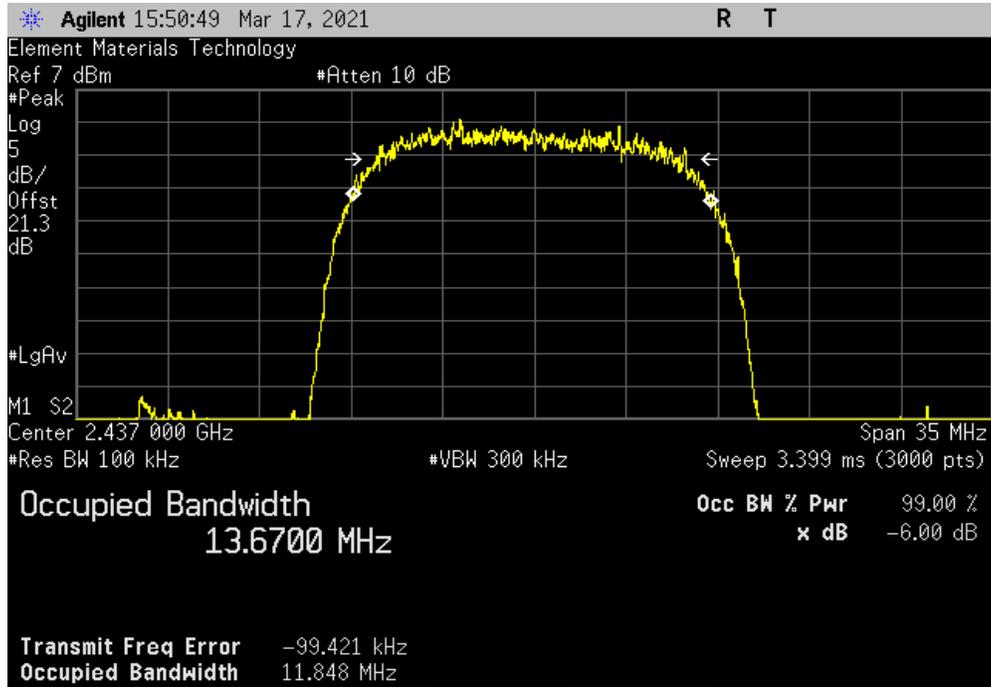


OCCUPIED BANDWIDTH

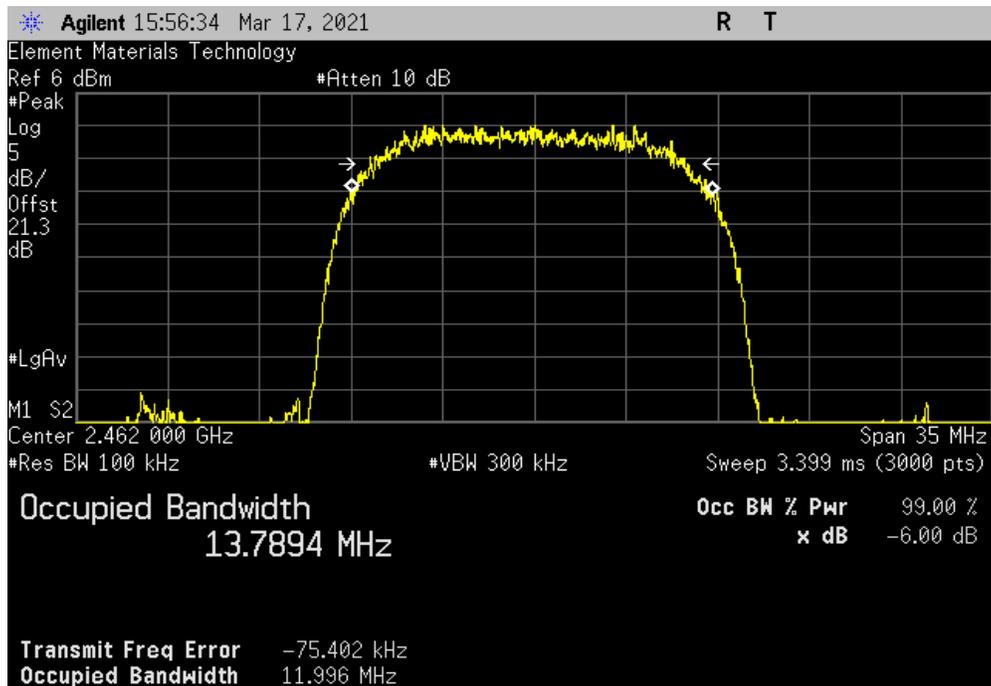


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit (>)	Result
	11.848 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz			
	Value	Limit (>)	Result
	11.996 MHz	500 kHz	Pass

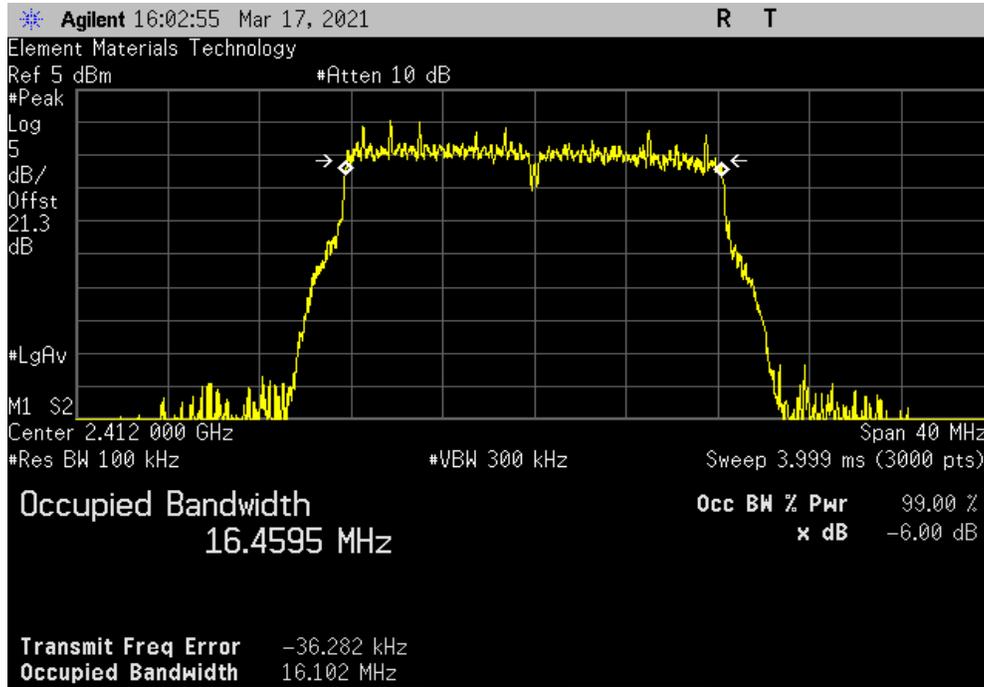


OCCUPIED BANDWIDTH

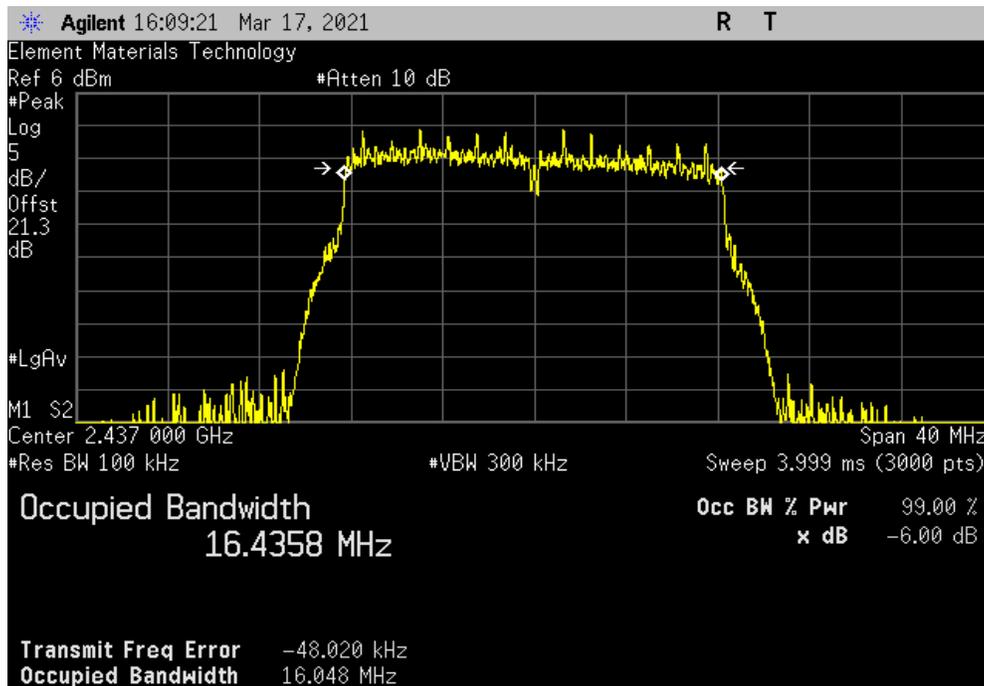


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Result
	16.102 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Result
	16.048 MHz	500 kHz	Pass

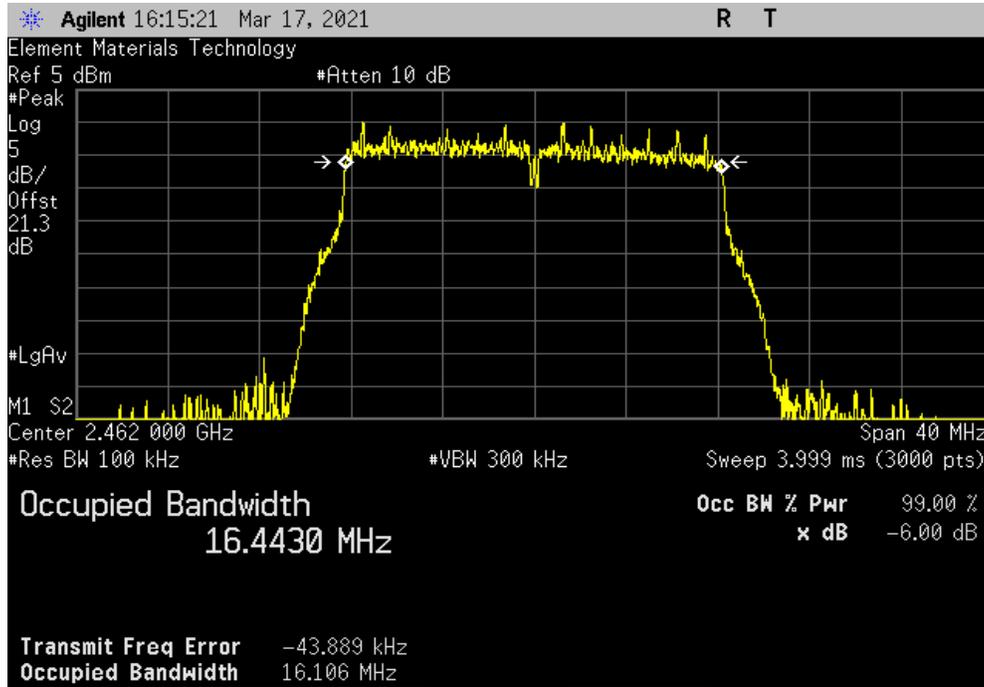


OCCUPIED BANDWIDTH

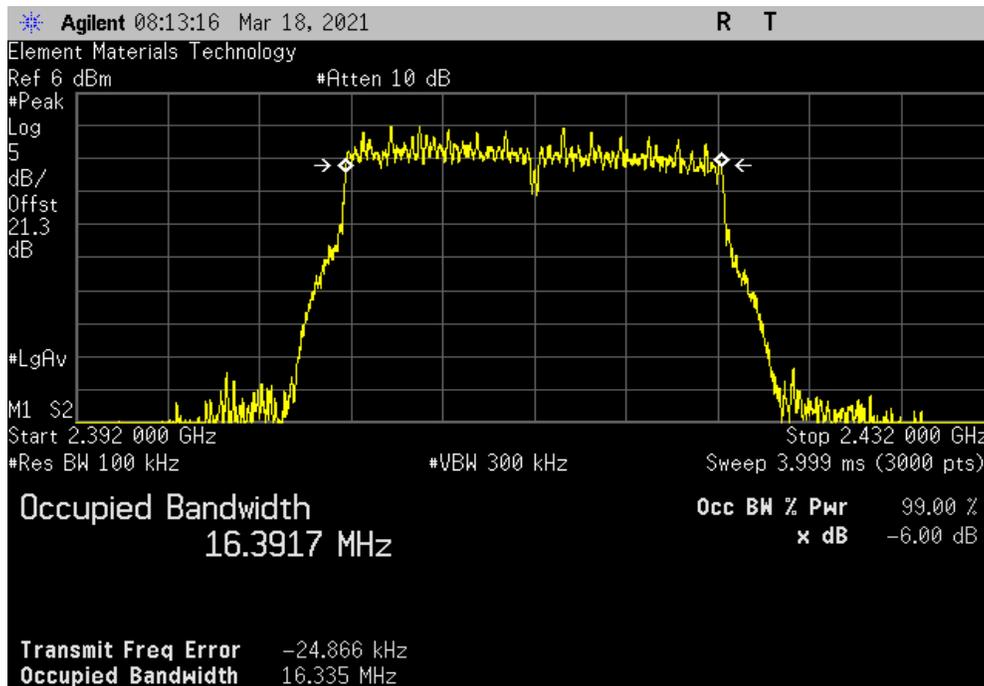


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
				16.106 MHz	(>) 500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				16.335 MHz	(>) 500 kHz	Pass

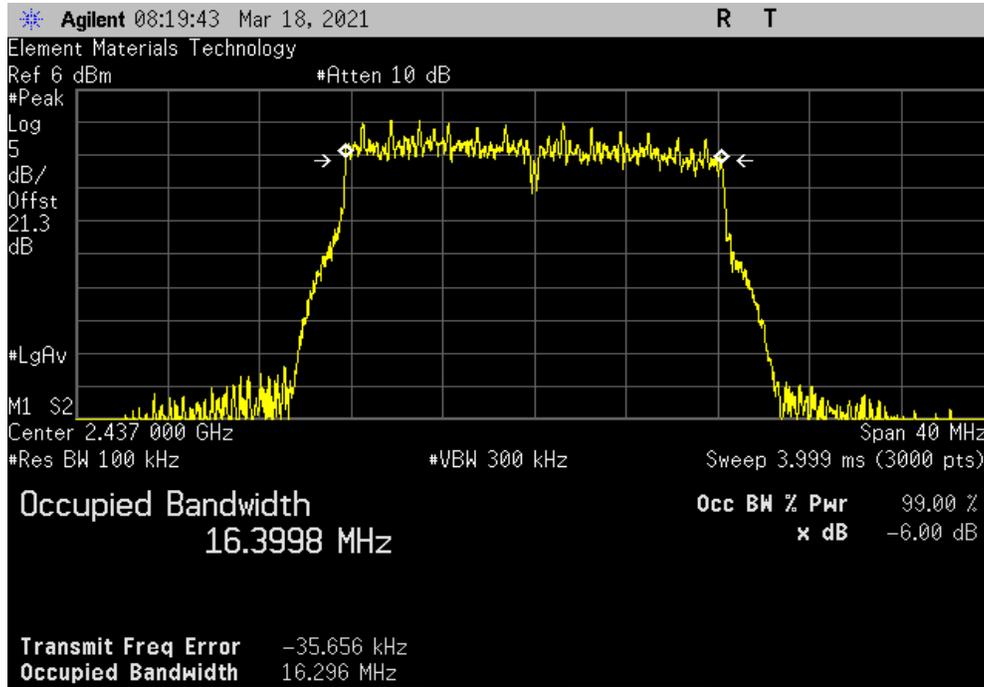


OCCUPIED BANDWIDTH

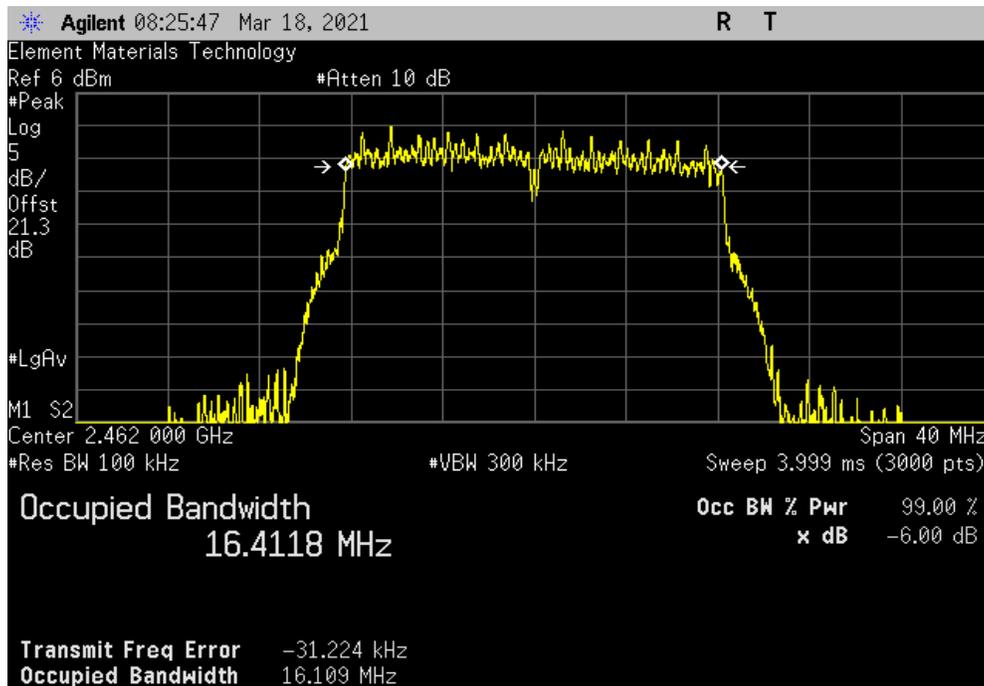


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				16.296 MHz	(>) 500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
				16.109 MHz	(>) 500 kHz	Pass

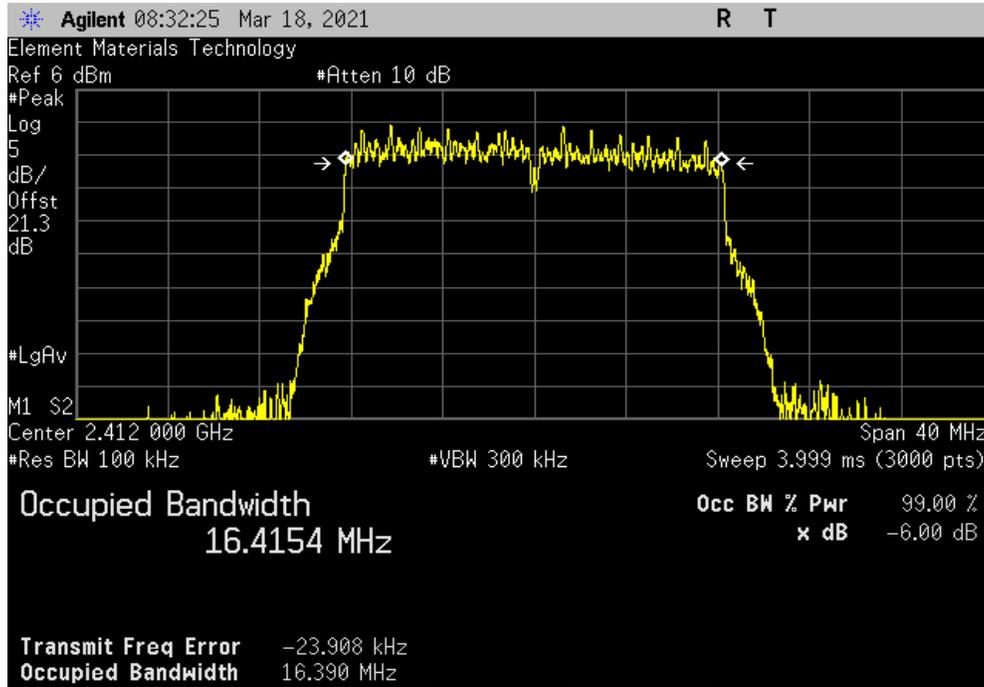


OCCUPIED BANDWIDTH

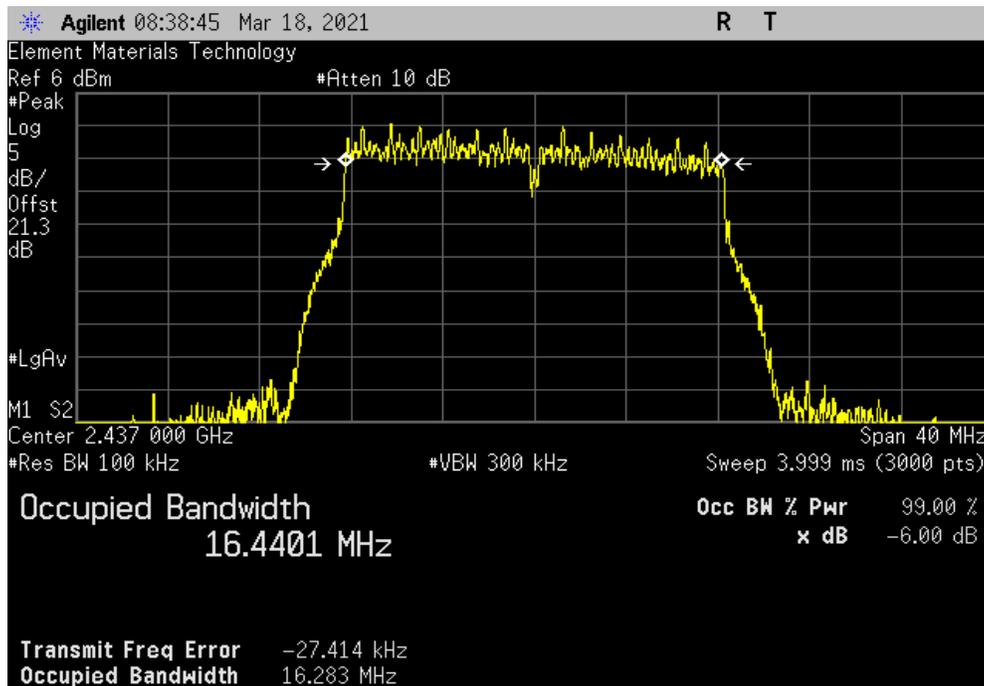


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
				Value	Limit (>)	Result
				16.39 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit (>)	Result
				16.283 MHz	500 kHz	Pass

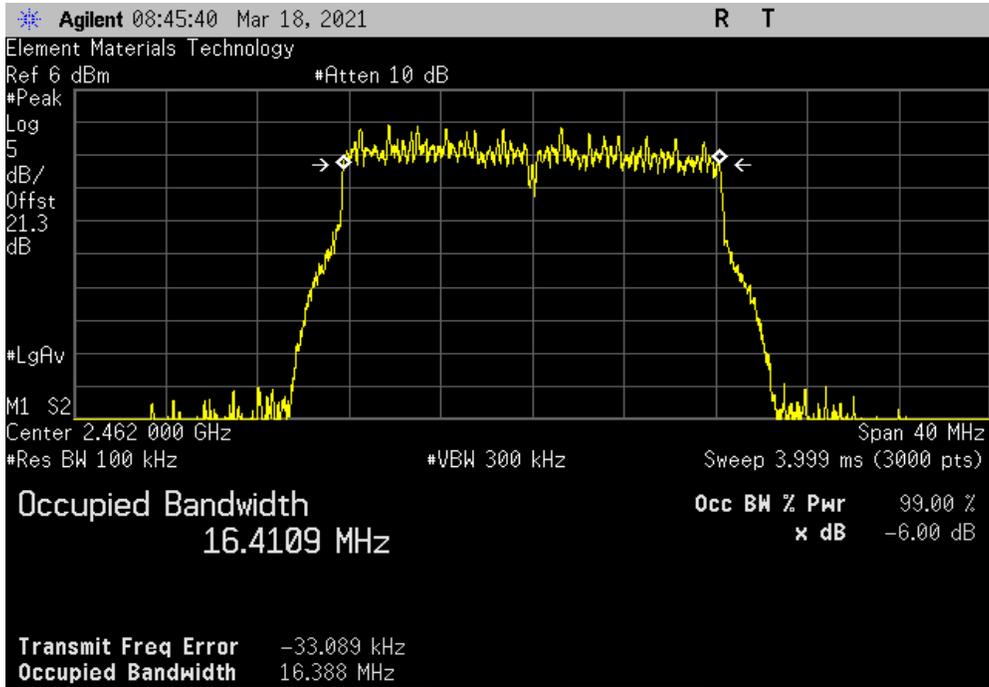


OCCUPIED BANDWIDTH

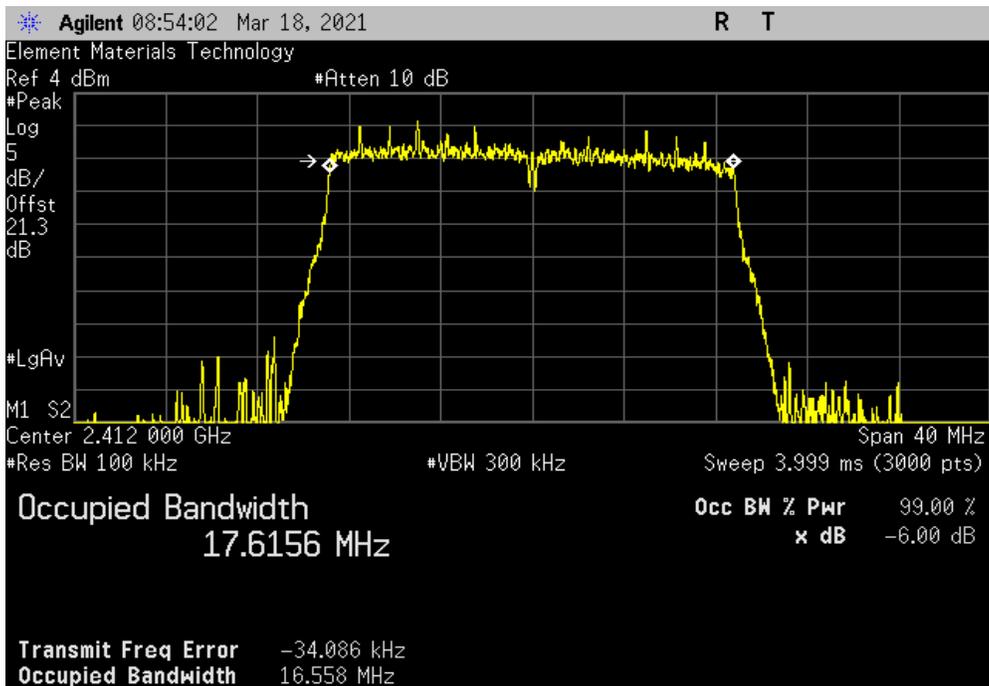


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz			
	Value	Limit (>)	Result
	16.388 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz			
	Value	Limit (>)	Result
	16.558 MHz	500 kHz	Pass

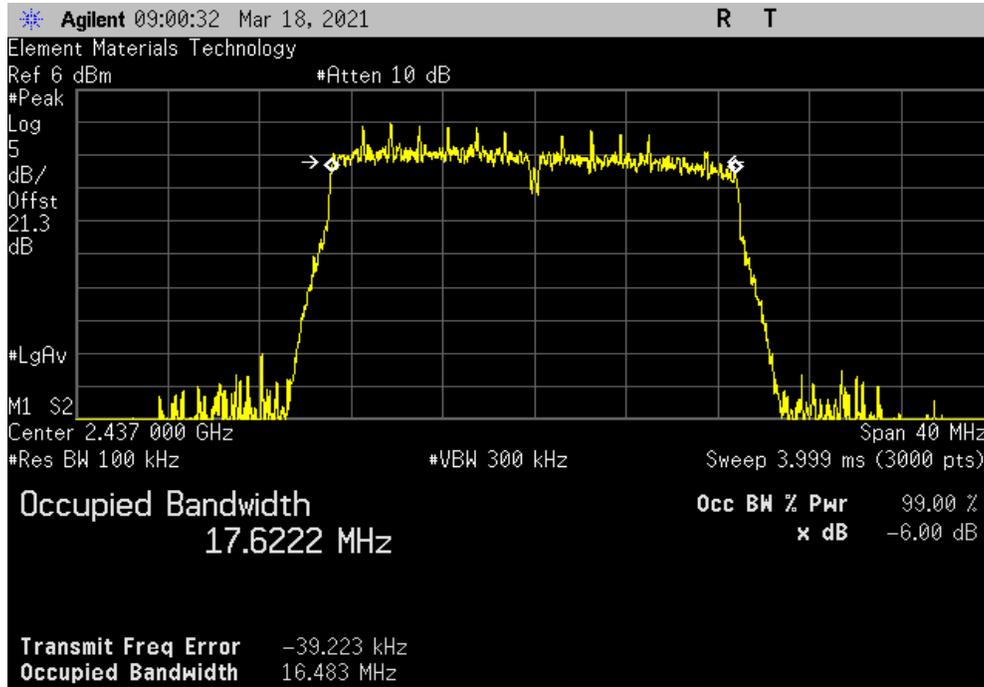


OCCUPIED BANDWIDTH

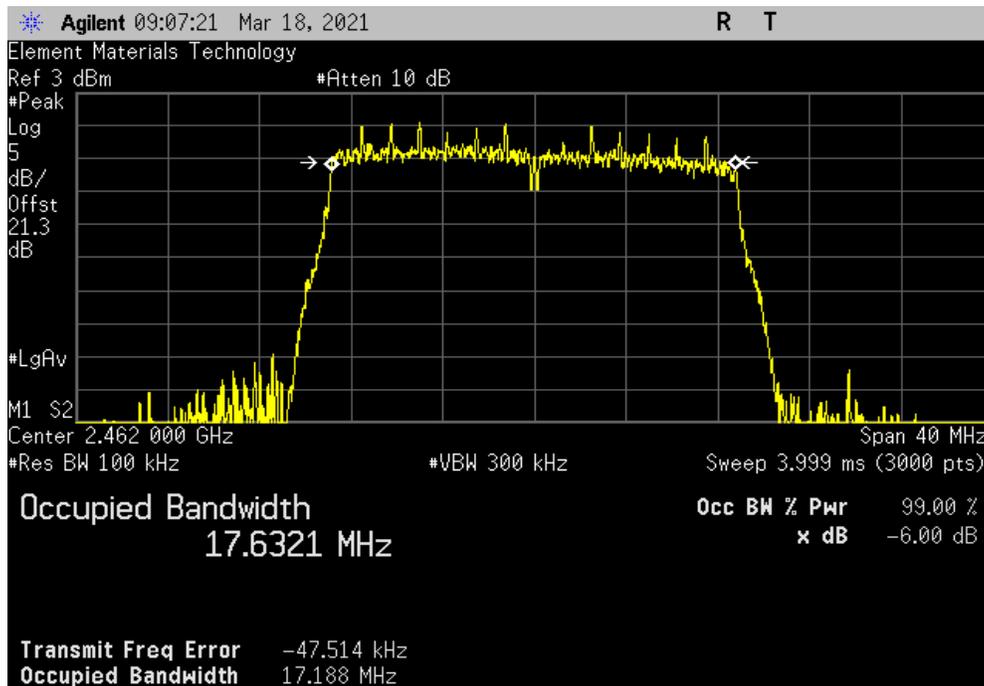


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
			Value	Limit	Result	
				(>)		
			16.483 MHz	500 kHz	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
			Value	Limit	Result	
				(>)		
			17.188 MHz	500 kHz	Pass	

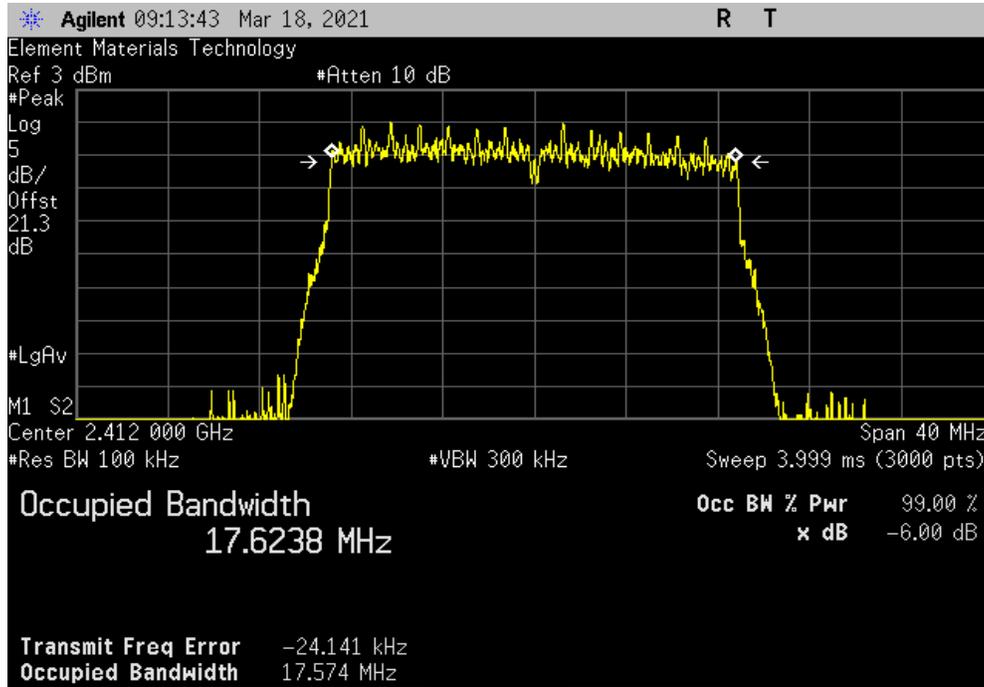


OCCUPIED BANDWIDTH

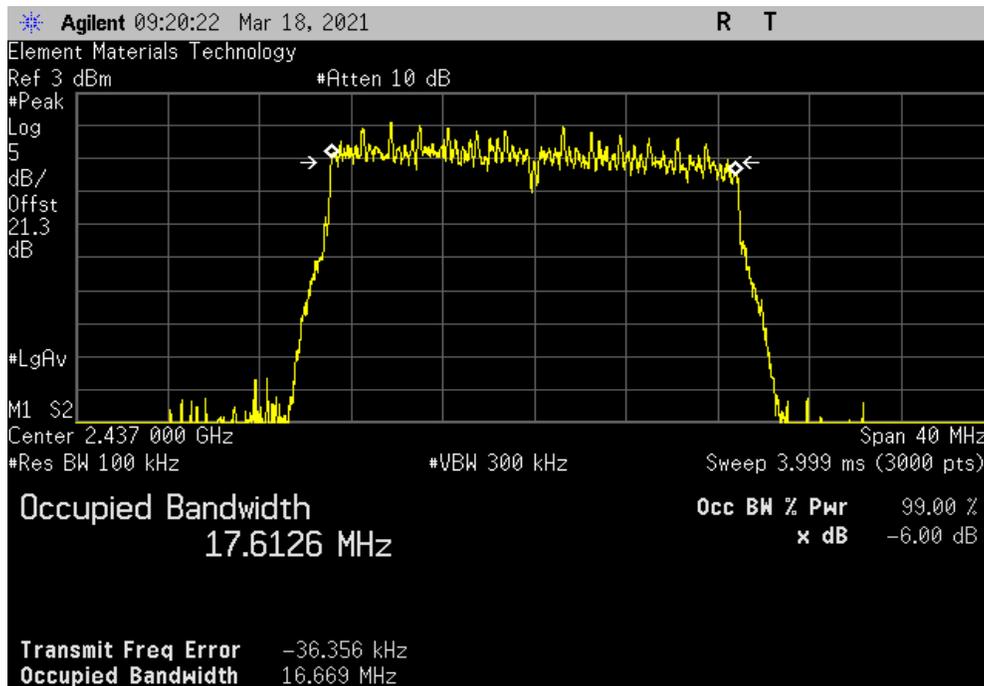


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz			
	Value	Limit	Result
	17.574 MHz	500 kHz	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz			
	Value	Limit	Result
	16.669 MHz	500 kHz	Pass

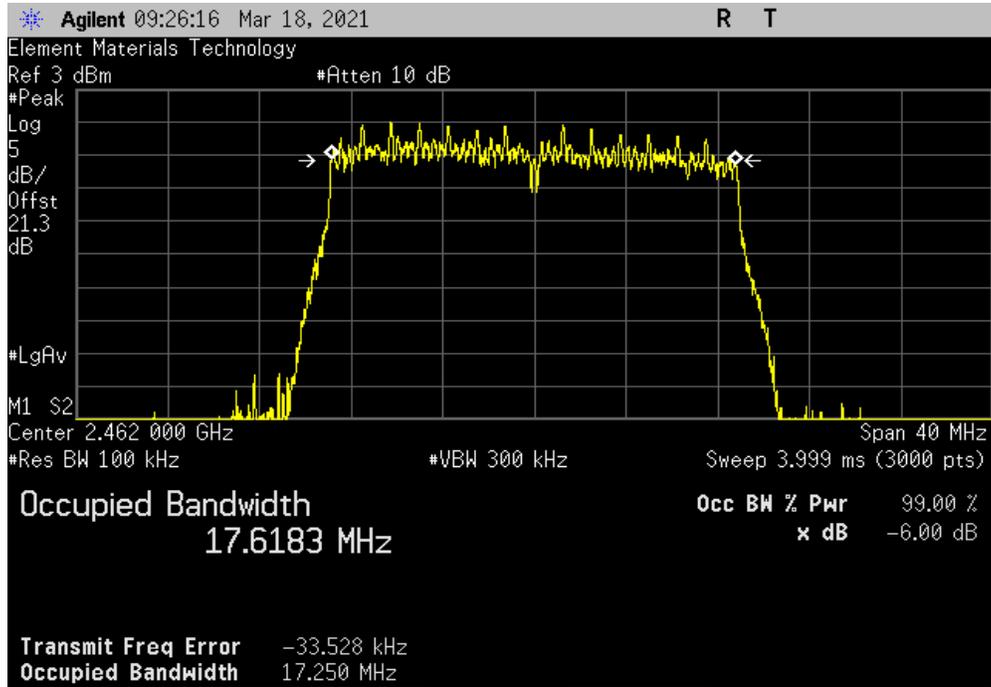


OCCUPIED BANDWIDTH



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz			
	Value	Limit	Result
	17.25 MHz	500 kHz	Pass



OUTPUT POWER



XMit 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

OUTPUT POWER



TelTx 2019.08.30.0 XMI 2020.12.30.0

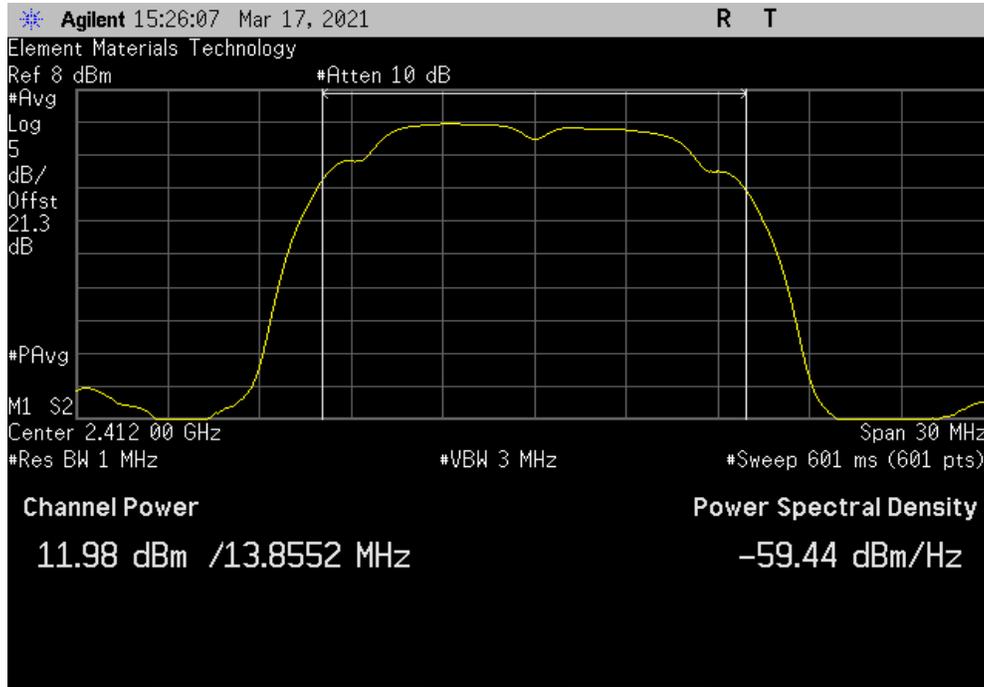
EUT: ATWILC3000-MR110CA		Work Order: TENN0148				
Serial Number: F8F005D93FFC		Date: 18-Mar-21				
Customer: Tennant Company		Temperature: 24.1 °C				
Attendees: Brett Paulsen		Humidity: 26.1% RH				
Project: None		Barometric Pres.: 1029 mbar				
Tested by: Andrew Rogstad		Power: Battery				
Job Site: MN08						
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2021		ANSI C63.10:2013				
COMMENTS						
Reference level offset includes measurement cable, attenuator, and DC block.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature <i>Andrew Rogstad</i>				
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
2400 MHz - 2483.5 MHz Band						
802.11(b) 1 Mbps						
	Low Channel 1, 2412 MHz	11.978	0	12	30	Pass
	Mid Channel 6, 2437 MHz	11.77	0	11.8	30	Pass
	High Channel 11, 2462 MHz	11.598	0	11.6	30	Pass
802.11(b) 11 Mbps						
	Low Channel 1, 2412 MHz	11.665	0.2	11.9	30	Pass
	Mid Channel 6, 2437 MHz	11.661	0.1	11.8	30	Pass
	High Channel 11, 2462 MHz	11.534	0.2	11.7	30	Pass
802.11(g) 6 Mbps						
	Low Channel 1, 2412 MHz	10.787	0.1	10.9	30	Pass
	Mid Channel 6, 2437 MHz	11.295	0.1	11.4	30	Pass
	High Channel 11, 2462 MHz	11.166	0.1	11.3	30	Pass
802.11(g) 36 Mbps						
	Low Channel 1, 2412 MHz	10.781	0.6	11.4	30	Pass
	Mid Channel 6, 2437 MHz	11.109	0.6	11.7	30	Pass
	High Channel 11, 2462 MHz	10.434	0.6	11	30	Pass
802.11(g) 54 Mbps						
	Low Channel 1, 2412 MHz	10.265	0.8	11.1	30	Pass
	Mid Channel 6, 2437 MHz	10.773	1	11.8	30	Pass
	High Channel 11, 2462 MHz	10.135	1	11.1	30	Pass
802.11(n) MCS0						
	Low Channel 1, 2412 MHz	10.331	0.1	10.5	30	Pass
	Mid Channel 6, 2437 MHz	11.314	0.2	11.5	30	Pass
	High Channel 11, 2462 MHz	9.213	0.1	9.3	30	Pass
802.11(n) MCS7						
	Low Channel 1, 2412 MHz	7.618	0.8	8.4	30	Pass
	Mid Channel 6, 2437 MHz	7.669	1	8.7	30	Pass
	High Channel 11, 2462 MHz	7.545	1	8.6	30	Pass

OUTPUT POWER

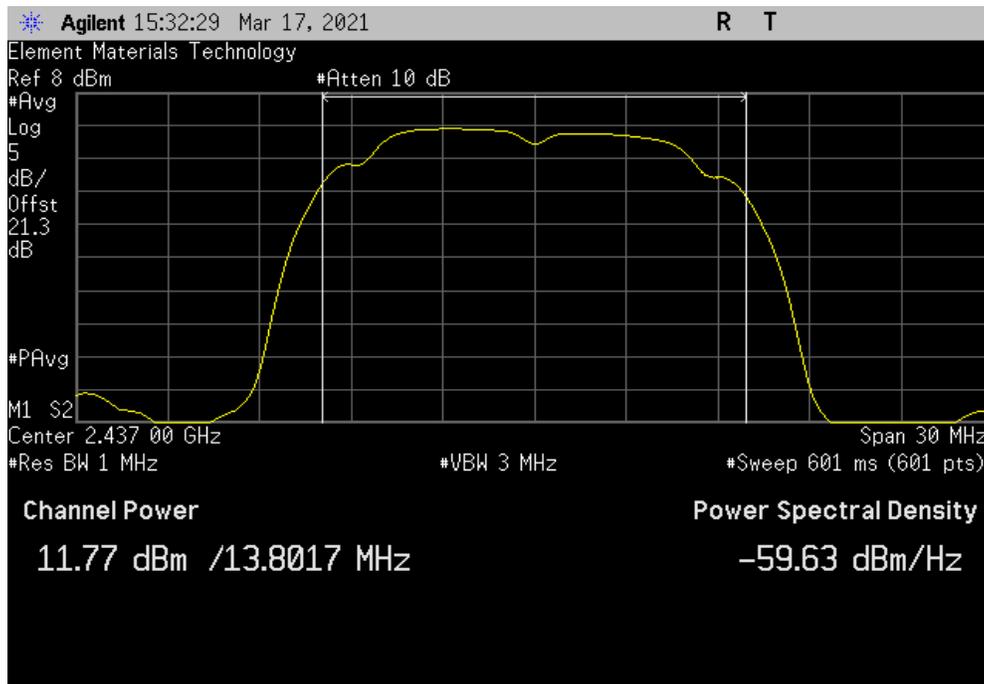


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.978	0	12	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.77	0	11.8	30	Pass	

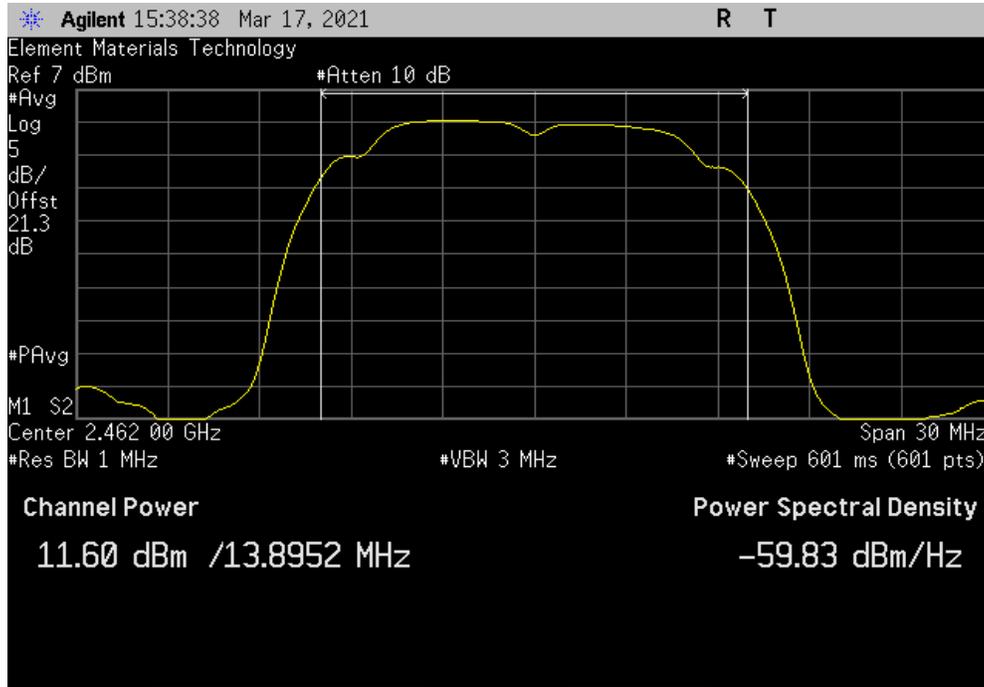


OUTPUT POWER

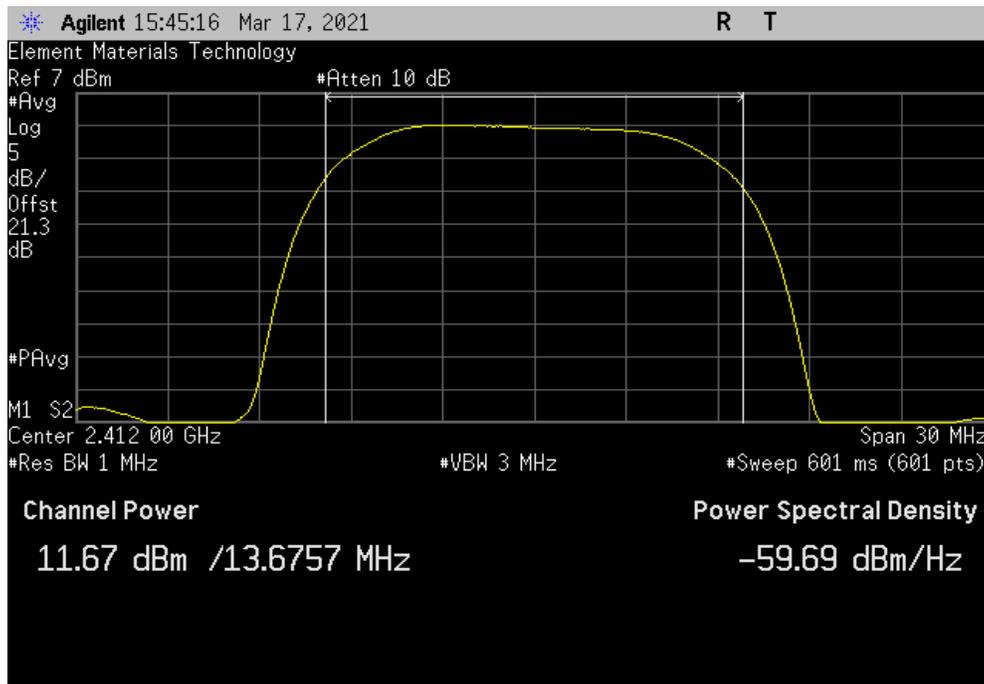


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.598	0	11.6	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.665	0.2	11.9	30	Pass	

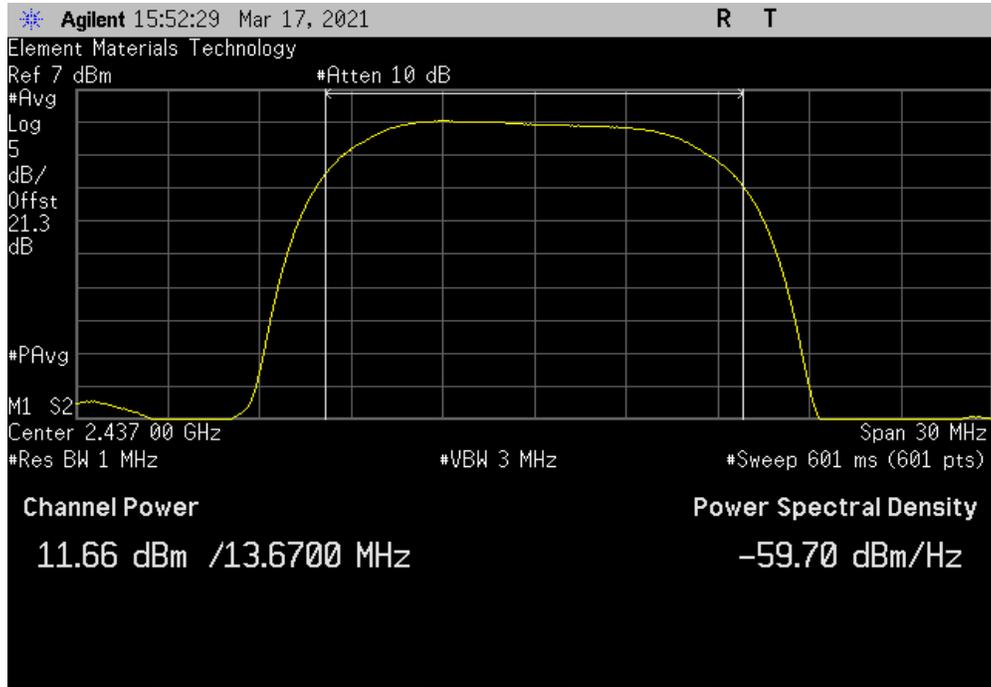


OUTPUT POWER

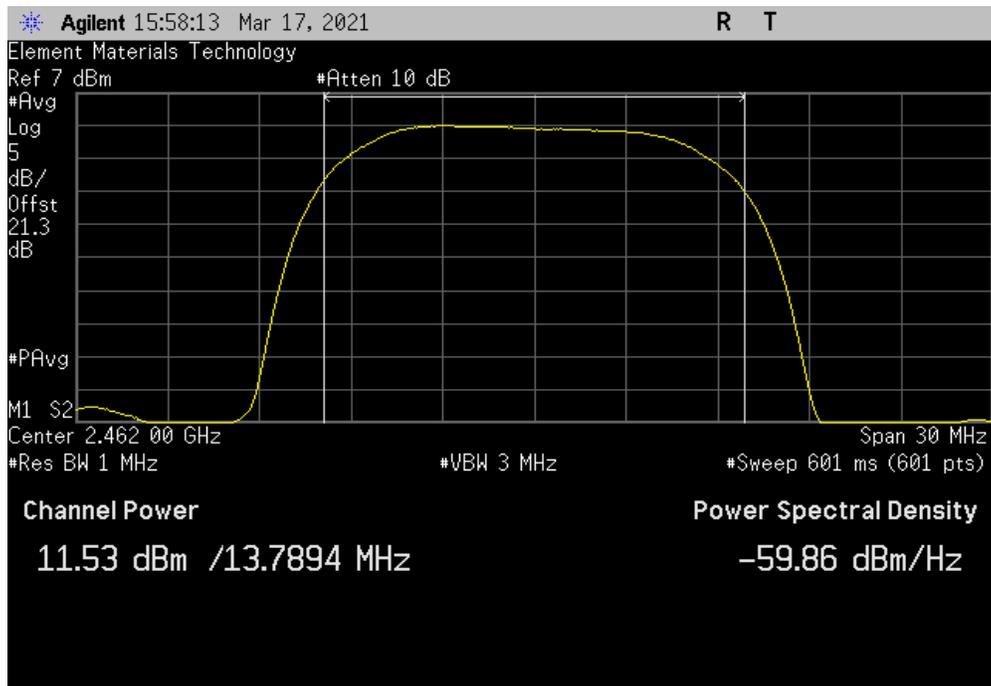


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.661	0.1	11.8	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.534	0.2	11.7	30	Pass	

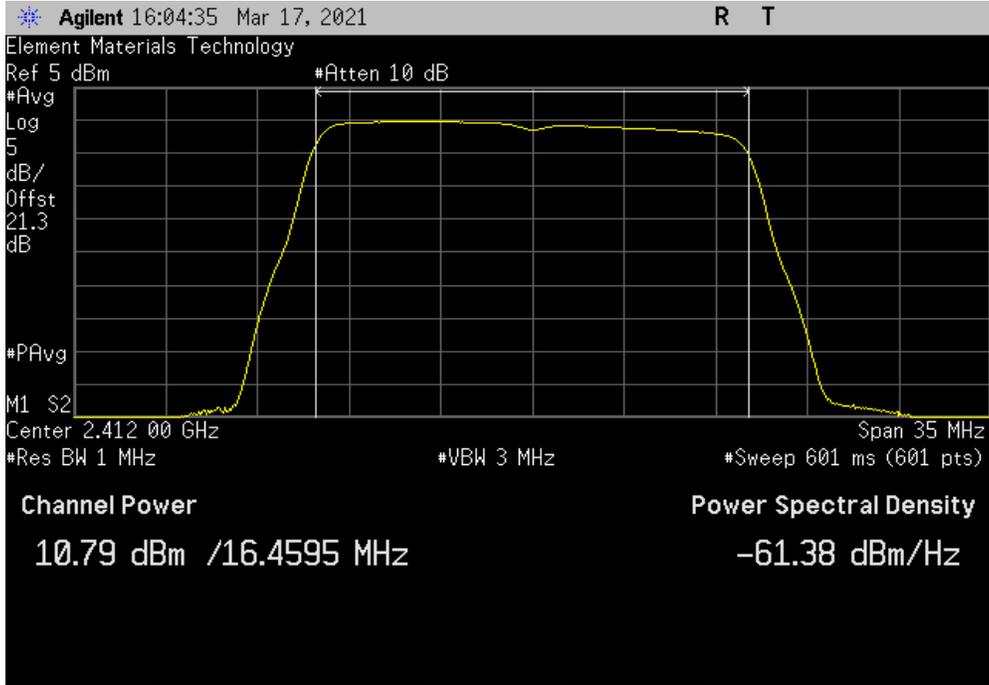


OUTPUT POWER

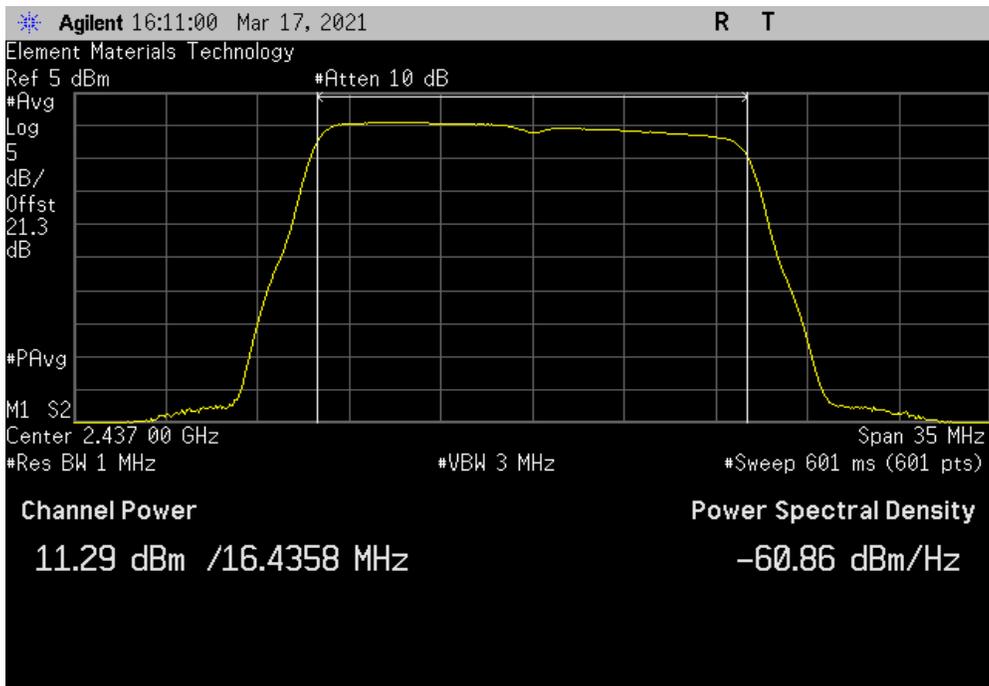


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.787	0.1	10.9	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.295	0.1	11.4	30	Pass	

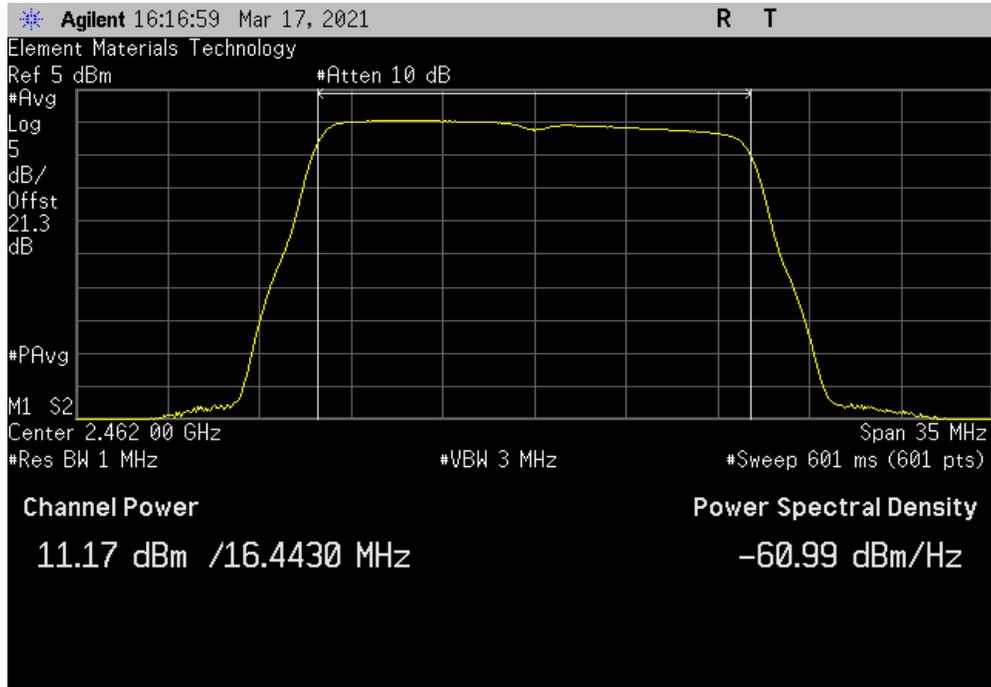


OUTPUT POWER

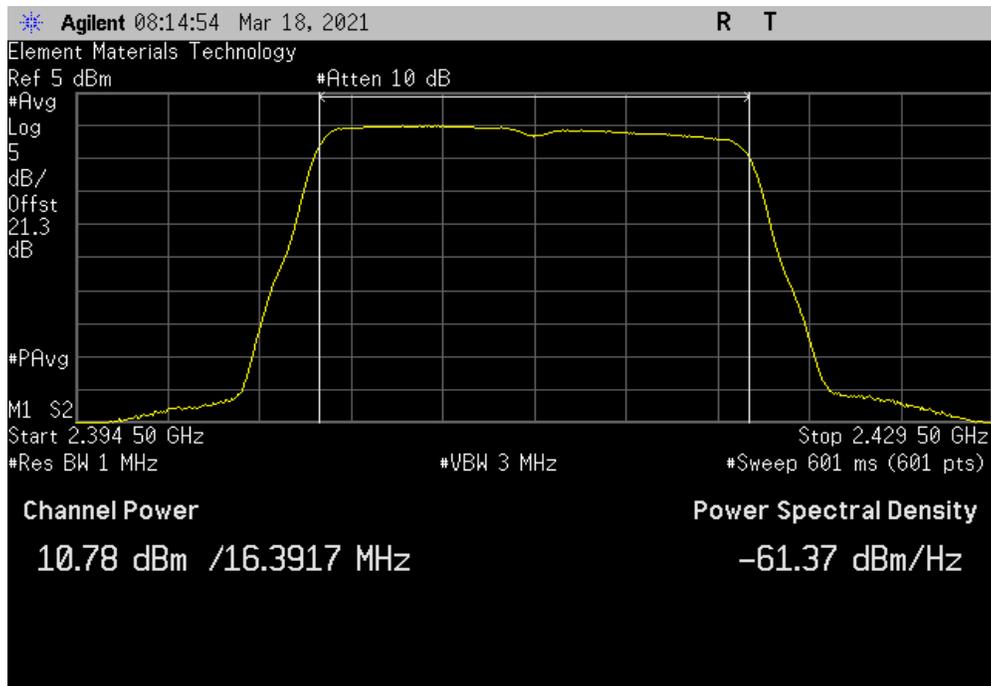


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.166	0.1	11.3	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.781	0.6	11.4	30	Pass	

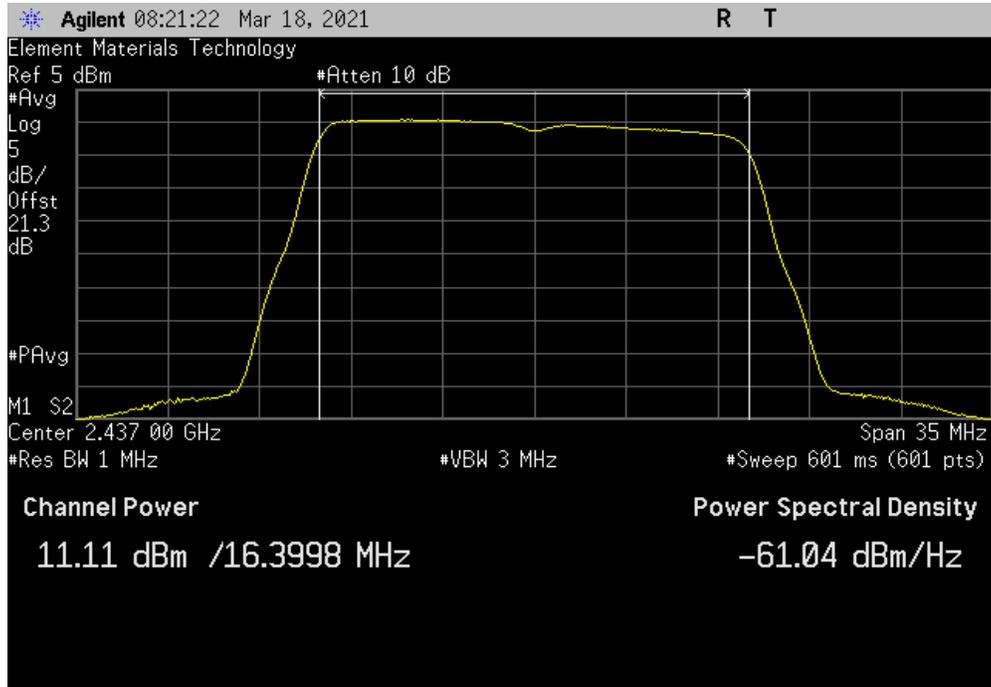


OUTPUT POWER

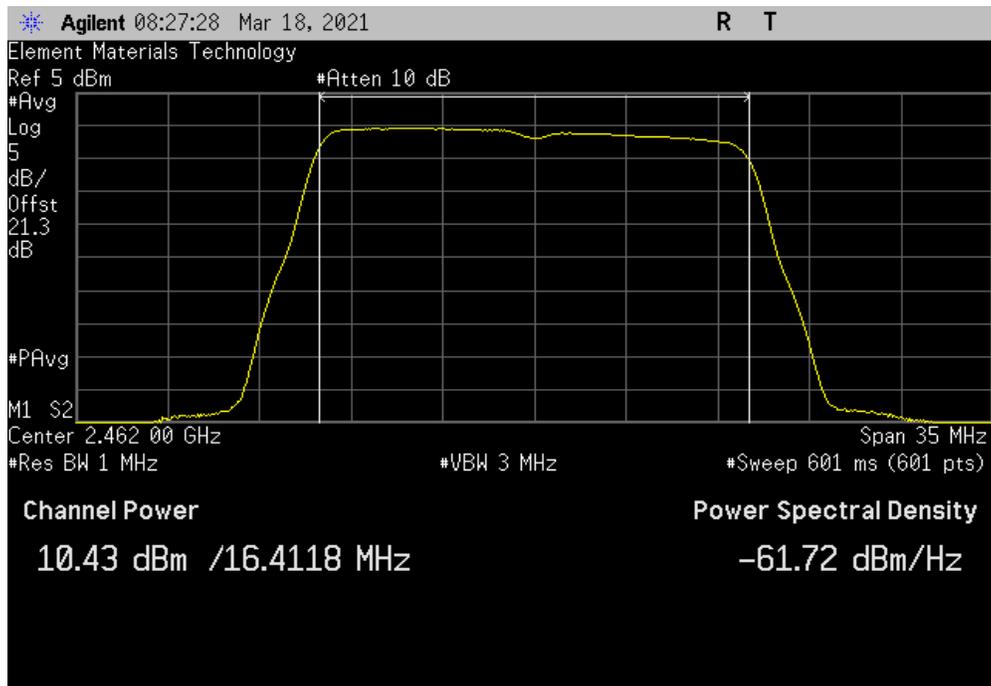


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.109	0.6	11.7	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.434	0.6	11	30	Pass	

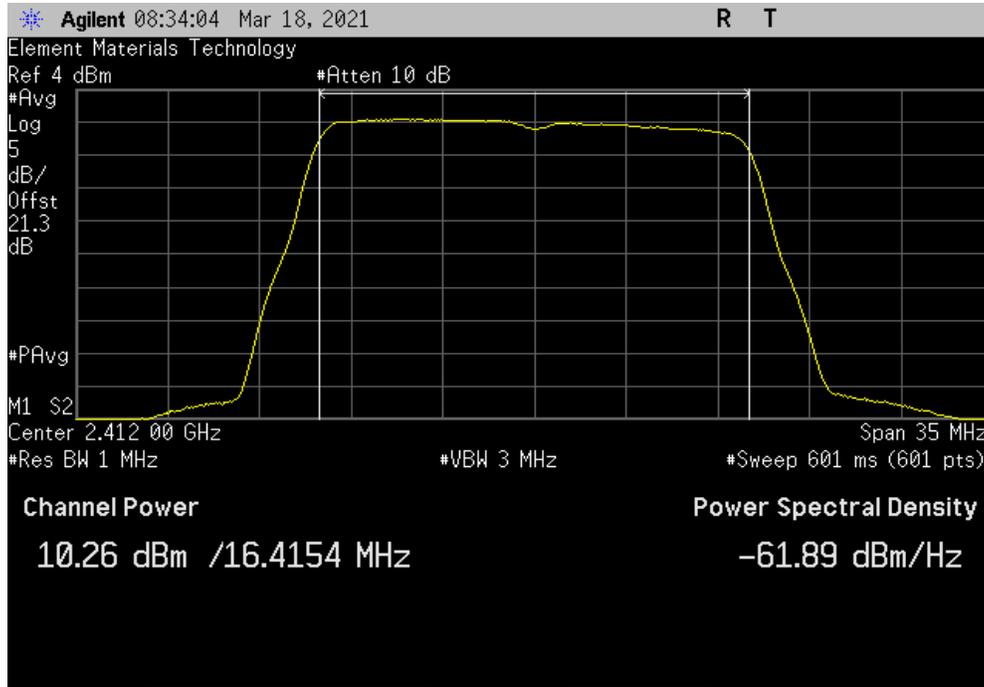


OUTPUT POWER

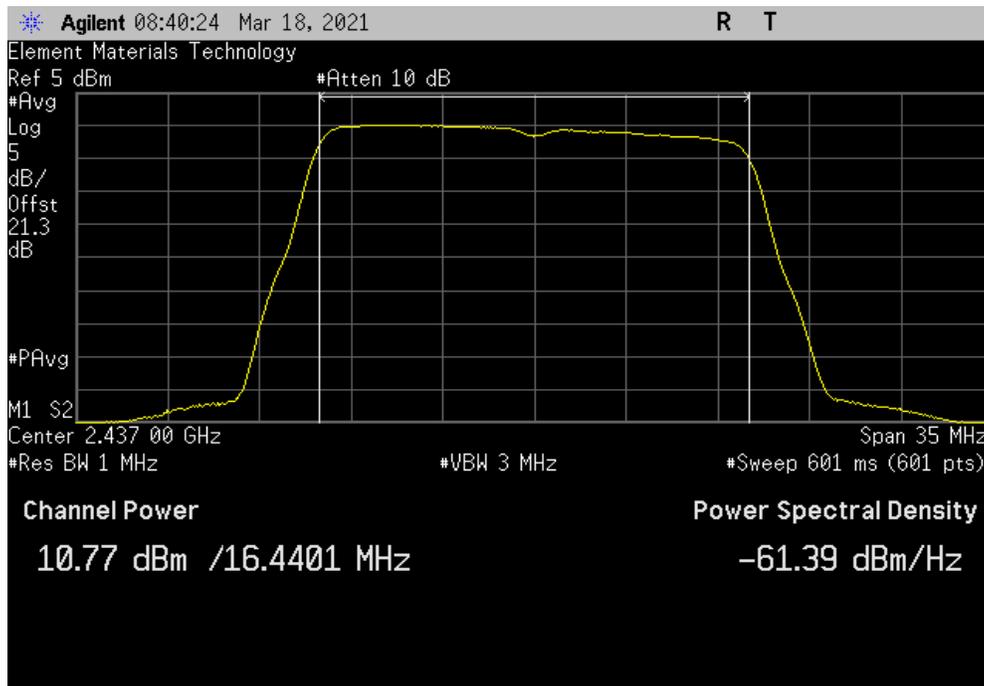


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.265	0.8	11.1	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.773	1	11.8	30	Pass	

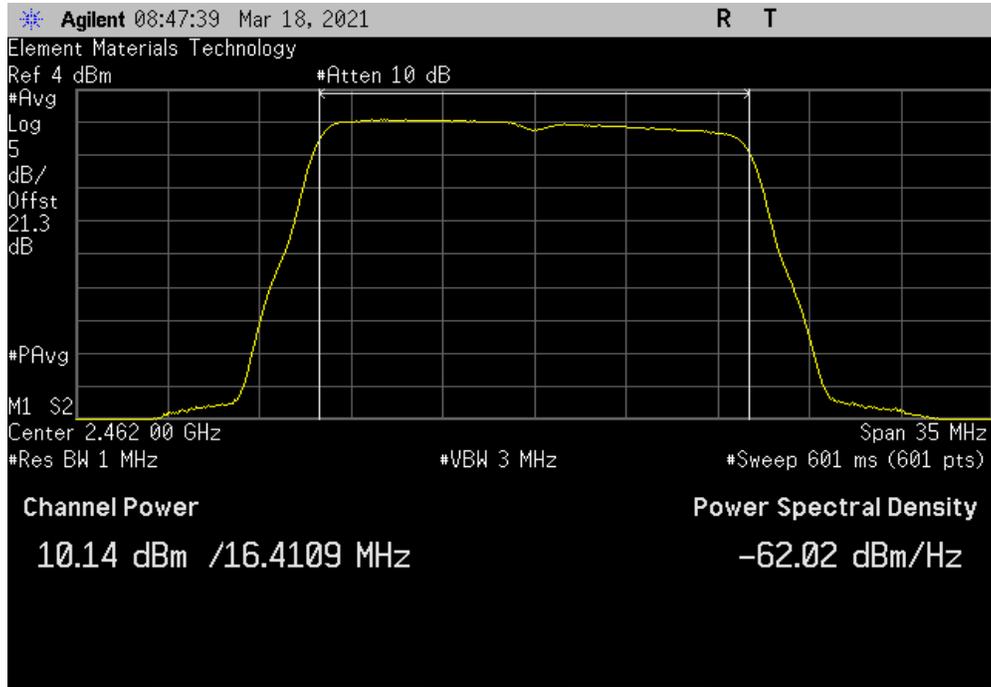


OUTPUT POWER

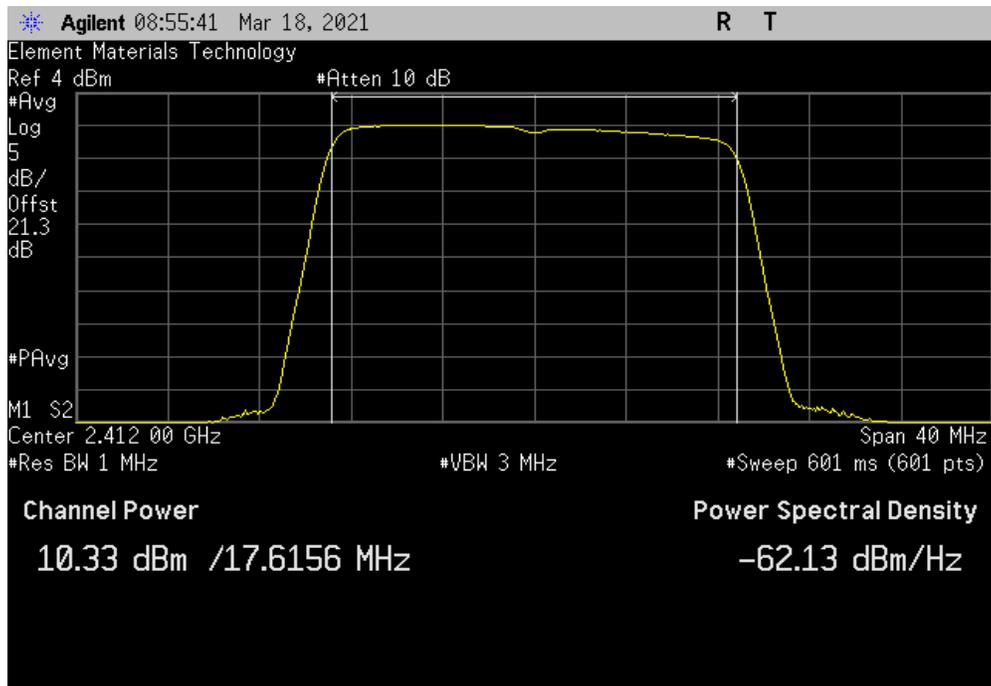


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.135	1	11.1	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	10.331	0.1	10.5	30	Pass	

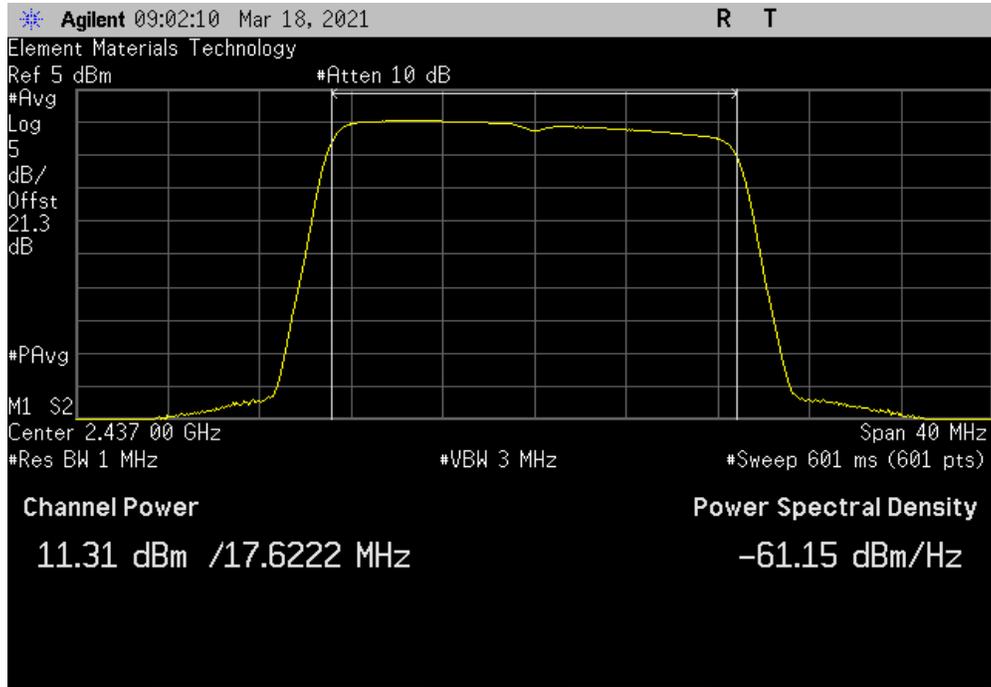


OUTPUT POWER

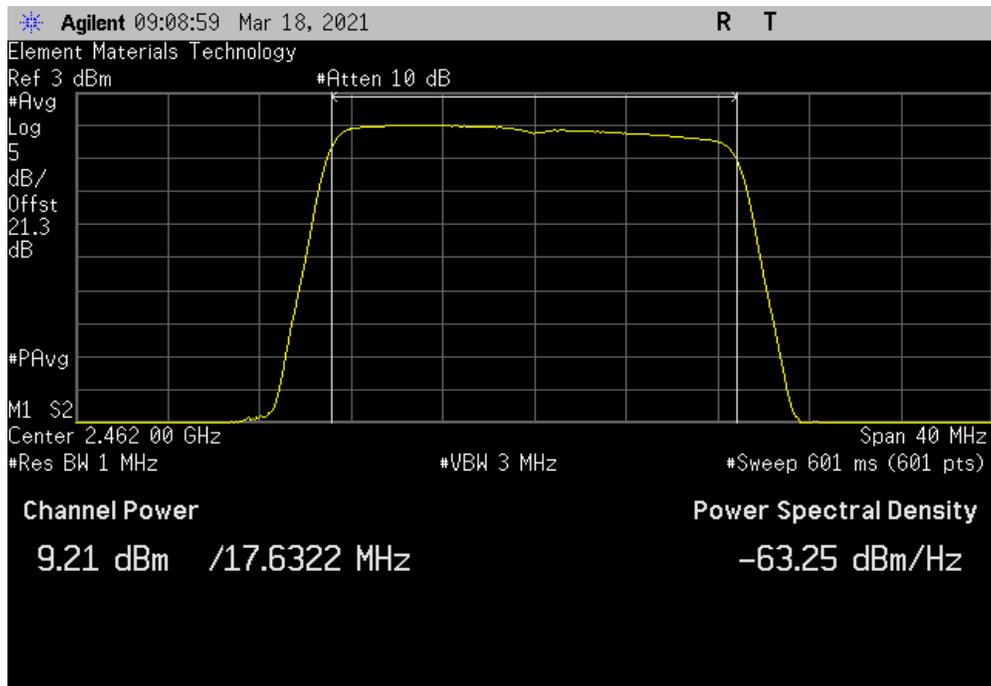


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	11.314	0.2	11.5	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	9.213	0.1	9.3	30	Pass	

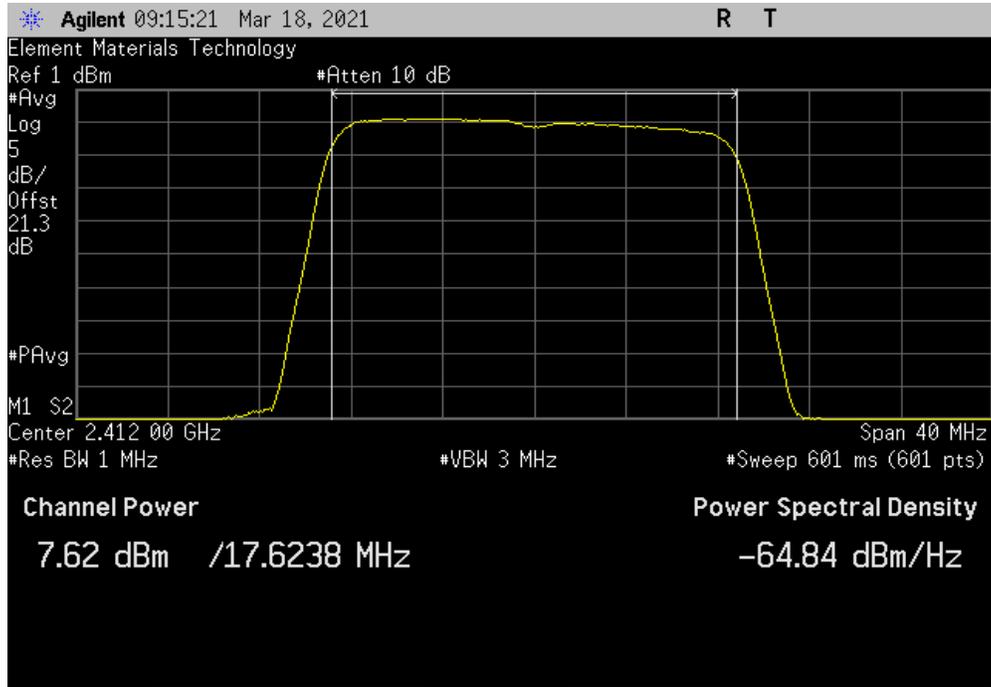


OUTPUT POWER

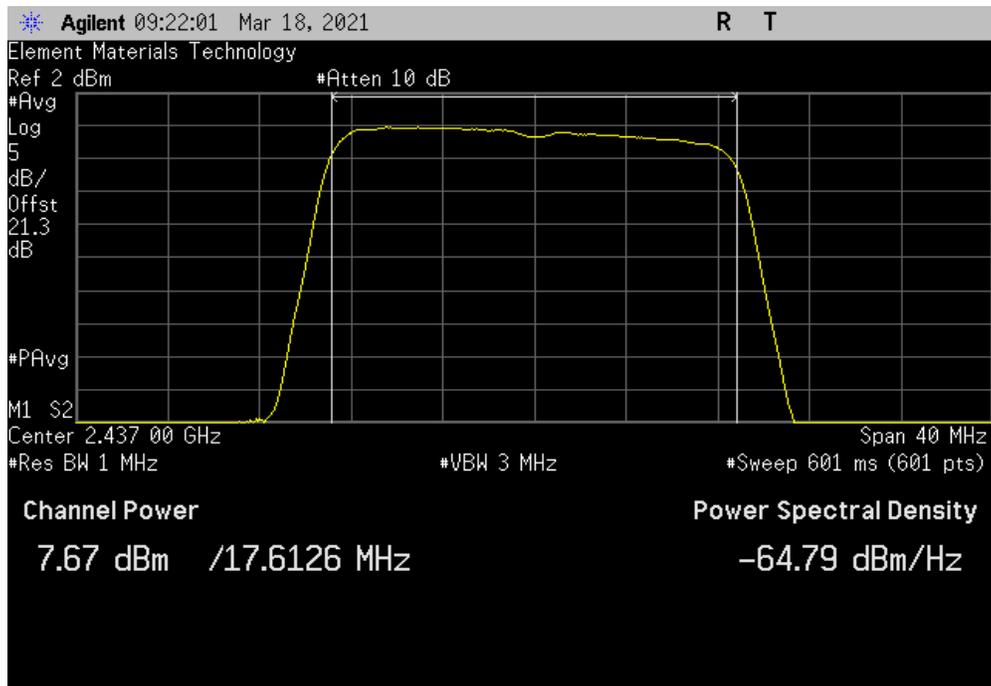


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	7.618	0.8	8.4	30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	7.669	1	8.7	30	Pass	

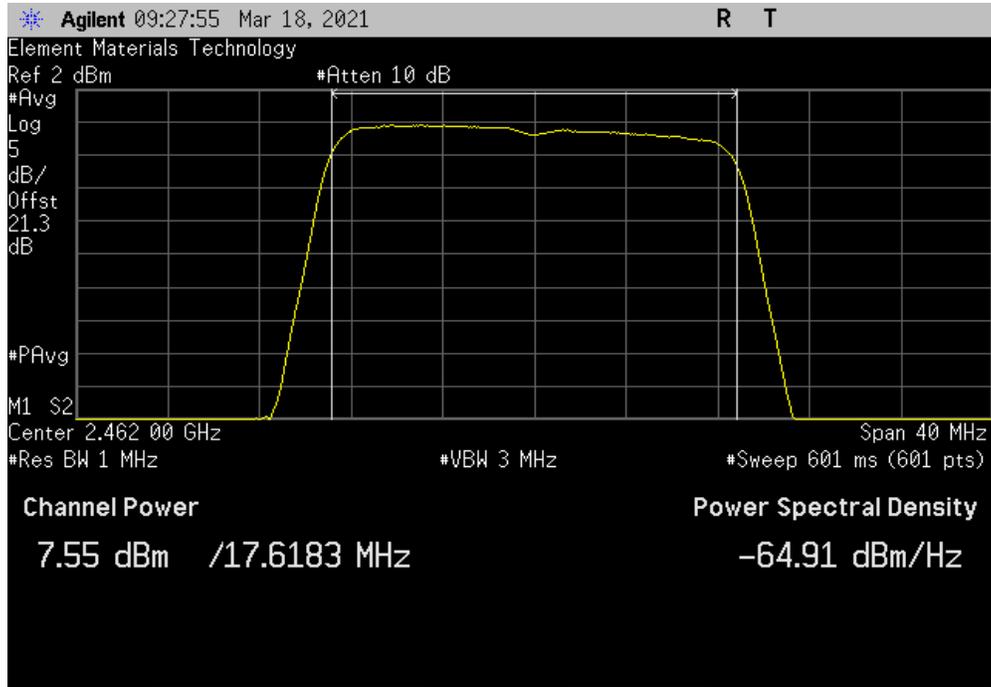


OUTPUT POWER



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result	
	7.545	1	8.6	30	Pass	



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



element

XMIT 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

Prior to measuring output power, the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



Tel: 2019.08.30.0 XMI: 2020.12.30.0

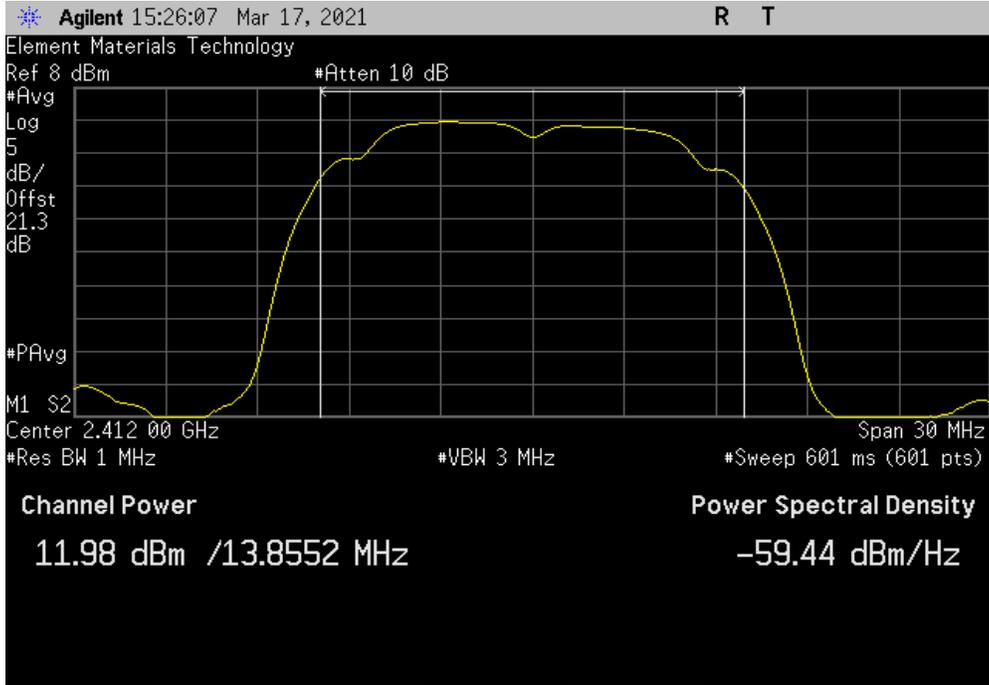
EUT: ATWILC3000-MR110CA		Work Order: TENN0148	
Serial Number: F8F005D93FFC		Date: 18-Mar-21	
Customer: Tennant Company		Temperature: 24 °C	
Attendees: Brett Paulsen		Humidity: 26.2% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Andrew Rogstad		Power: Battery	
Job Site: MN08			
TEST SPECIFICATIONS			
FCC 15.247:2021		ANSI C63.10:2013	
TEST METHOD			
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Andrew Rogstad</i>	
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	11.978	0
	Mid Channel 6, 2437 MHz	11.77	0
	High Channel 11, 2462 MHz	11.598	0
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	11.665	0.2
	Mid Channel 6, 2437 MHz	11.661	0.1
	High Channel 11, 2462 MHz	11.534	0.2
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	10.787	0.1
	Mid Channel 6, 2437 MHz	11.295	0.1
	High Channel 11, 2462 MHz	11.166	0.1
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	10.781	0.6
	Mid Channel 6, 2437 MHz	11.109	0.6
	High Channel 11, 2462 MHz	10.434	0.6
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	10.265	0.8
	Mid Channel 6, 2437 MHz	10.773	1
	High Channel 11, 2462 MHz	10.135	1
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	10.331	0.1
	Mid Channel 6, 2437 MHz	11.314	0.2
	High Channel 11, 2462 MHz	9.213	0.1
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	7.618	0.8
	Mid Channel 6, 2437 MHz	7.669	1
	High Channel 11, 2462 MHz	7.545	1

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

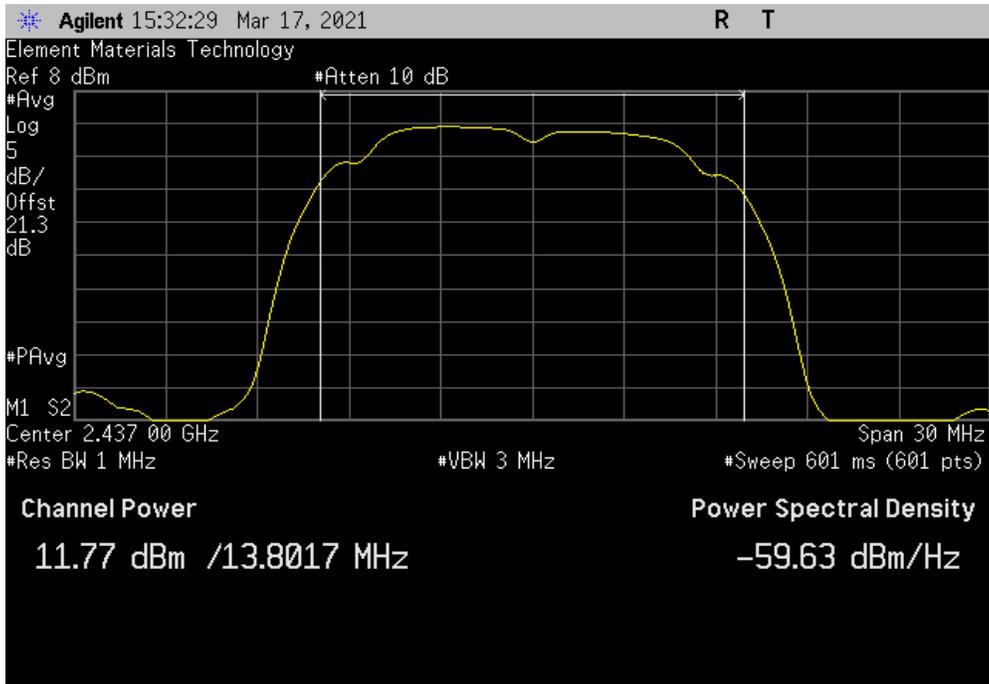


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.978	0	12	0.5	12.5	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.77	0	11.8	0.5	12.3	36	Pass

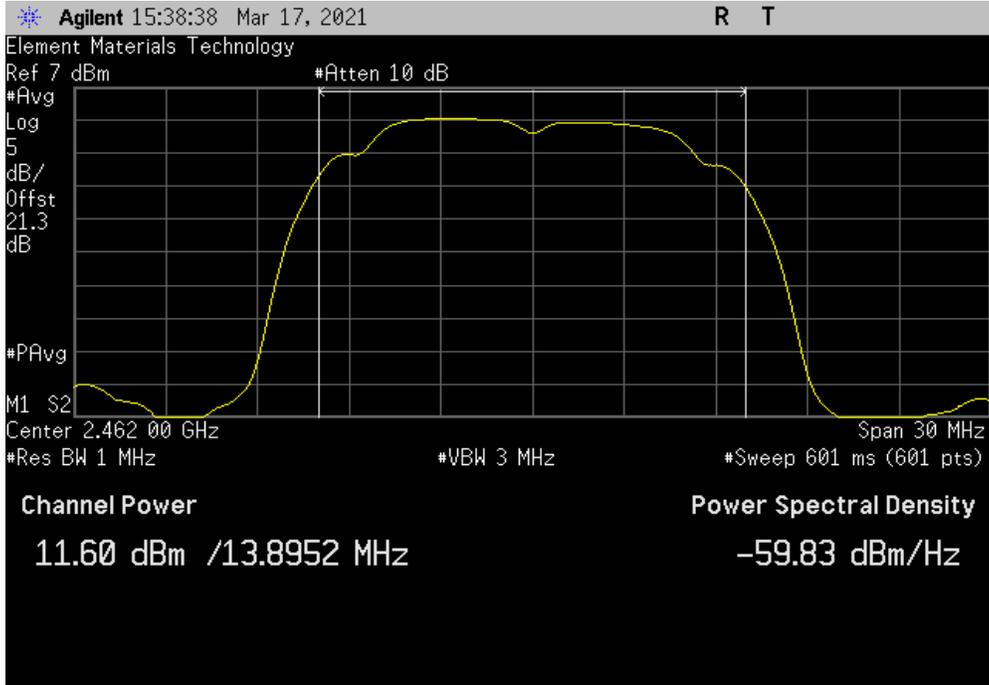


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

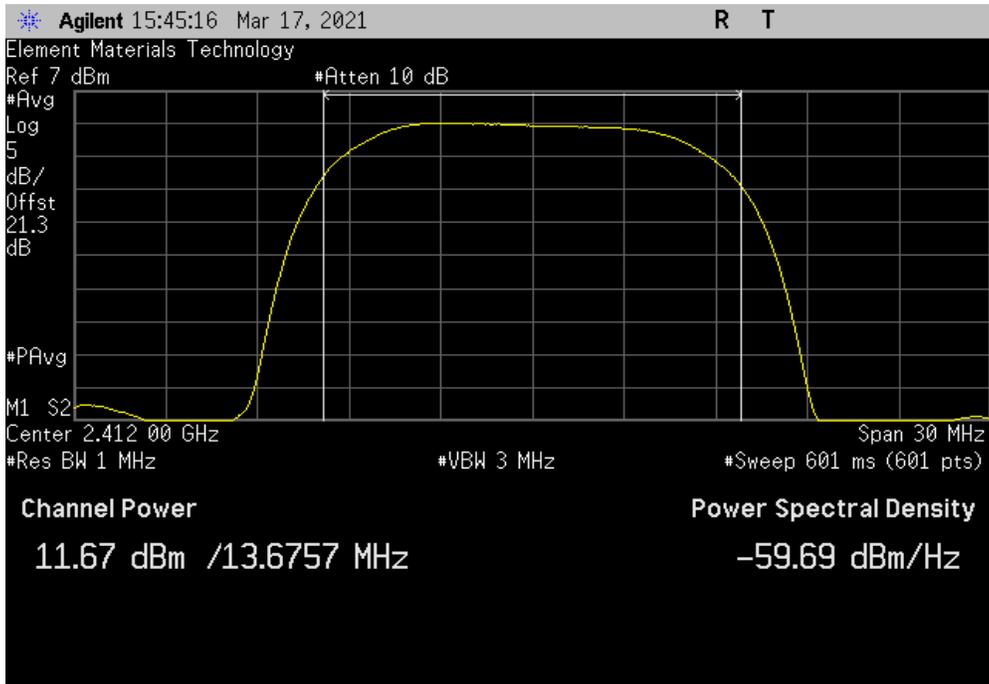


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.598	0	11.6	0.5	12.1	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.665	0.2	11.9	0.5	12.4	36	Pass

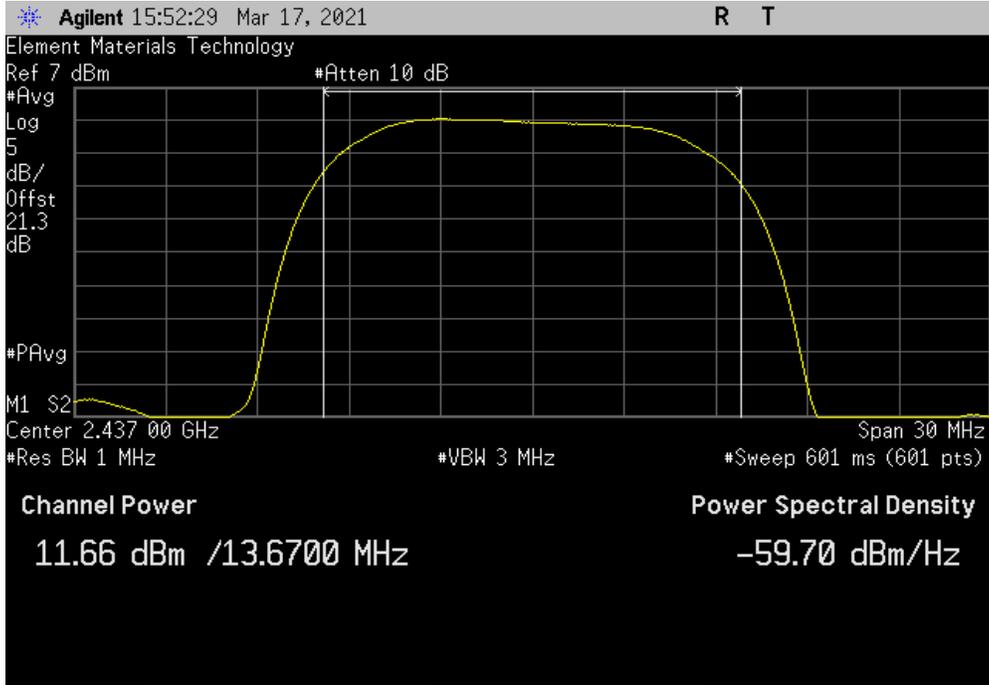


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

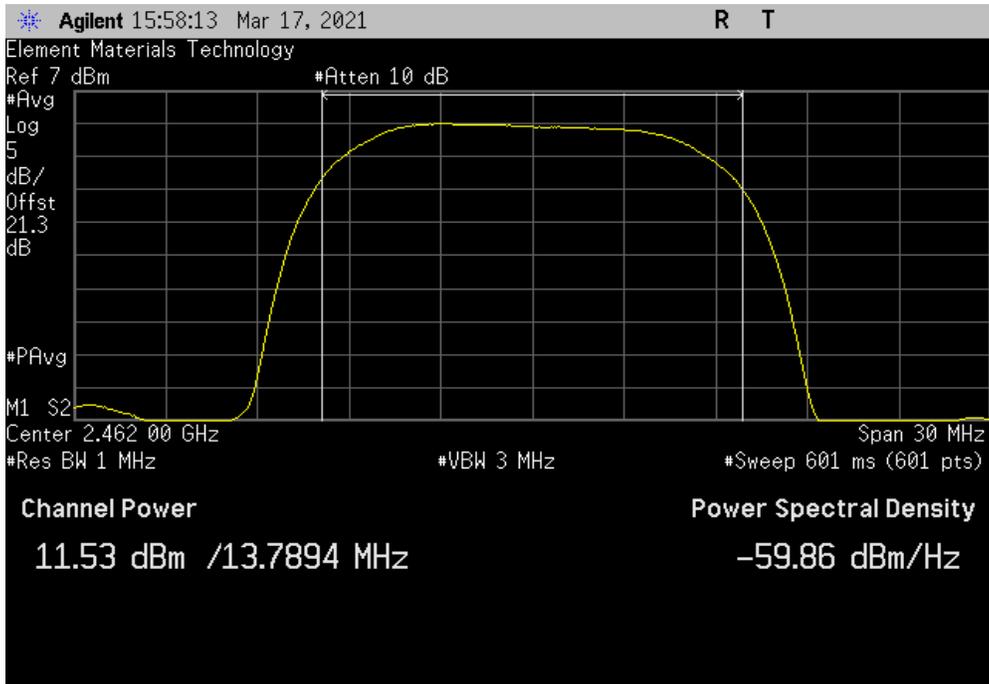


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.661	0.1	11.8	0.5	12.3	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.534	0.2	11.7	0.5	12.2	36	Pass

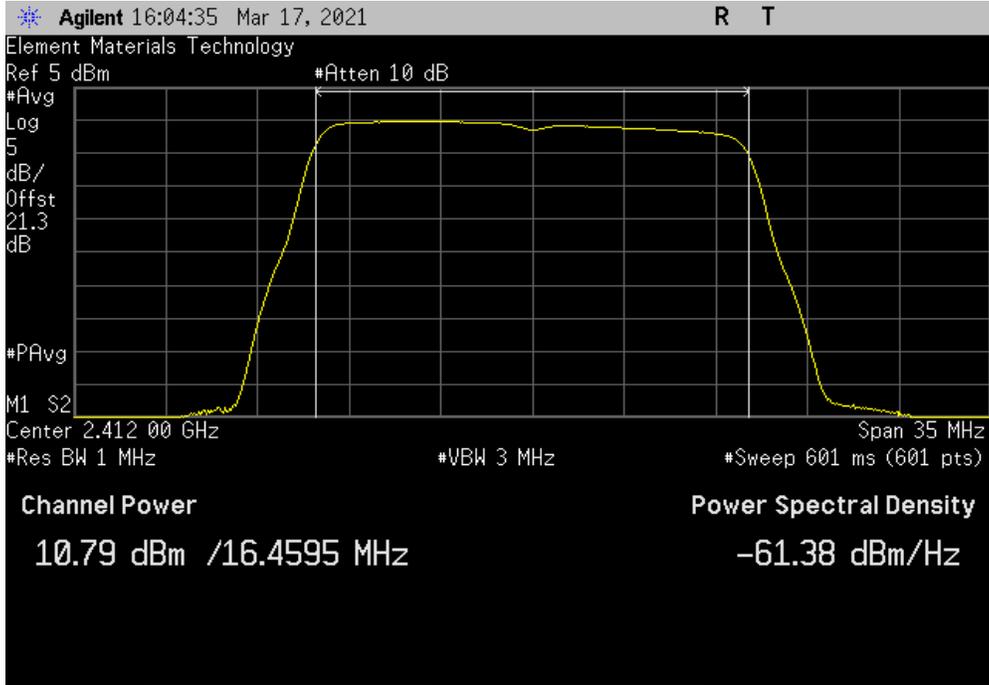


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

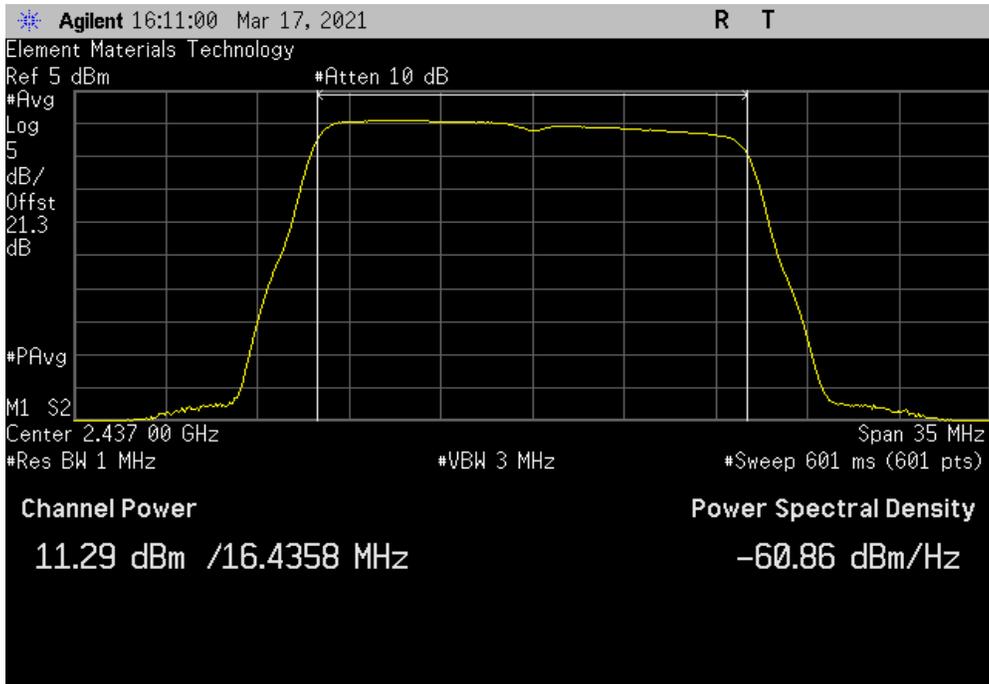


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.787	0.1	10.9	0.5	11.4	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.295	0.1	11.4	0.5	11.9	36	Pass

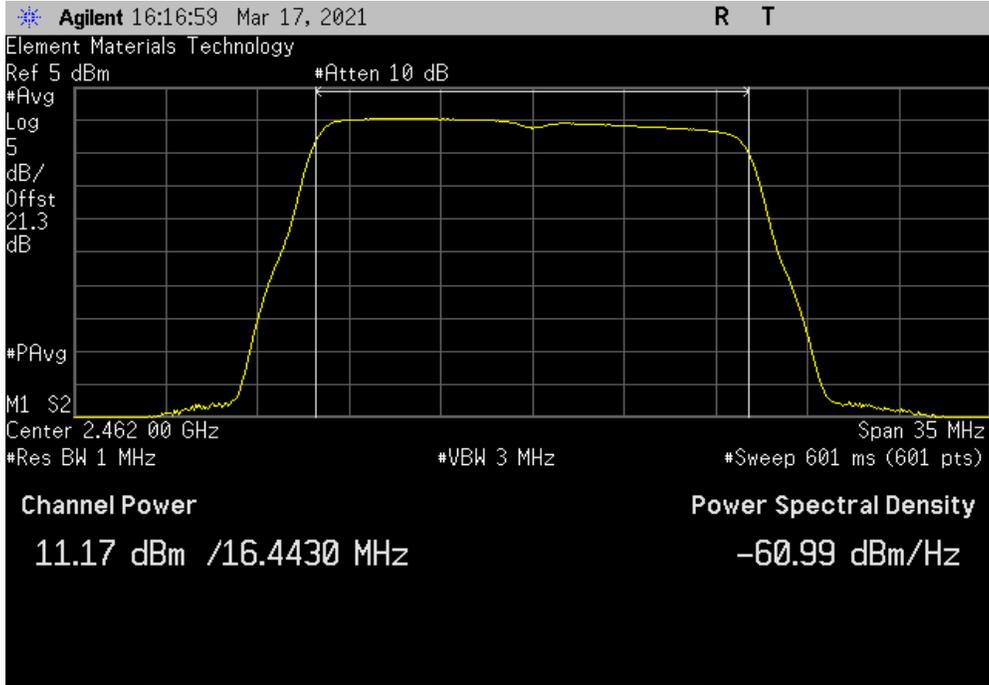


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

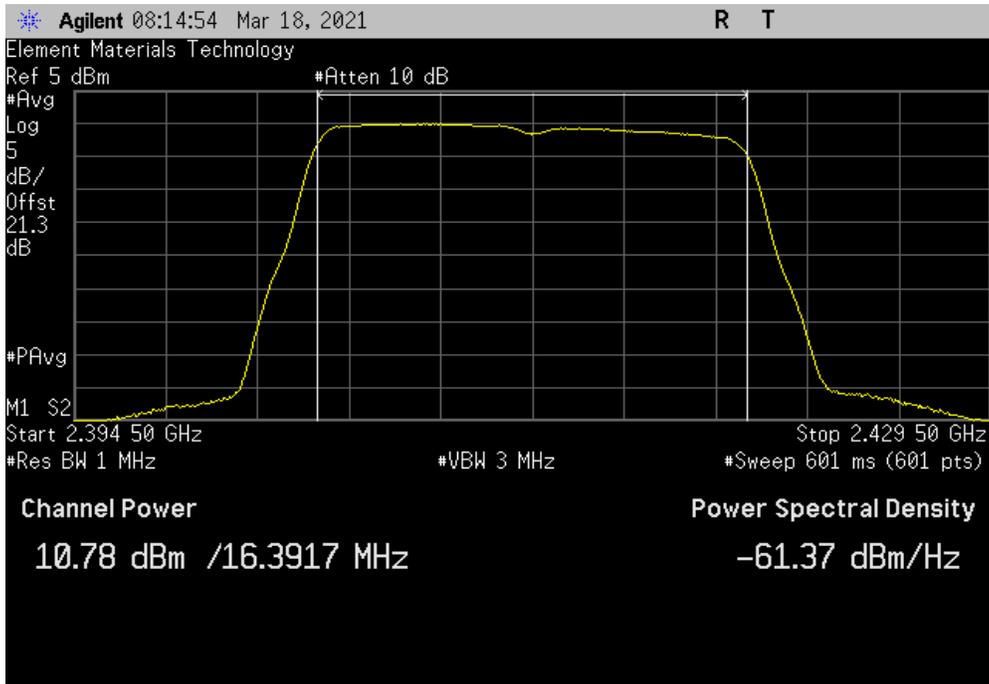


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.166	0.1	11.3	0.5	11.8	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.781	0.6	11.4	0.5	11.9	36	Pass

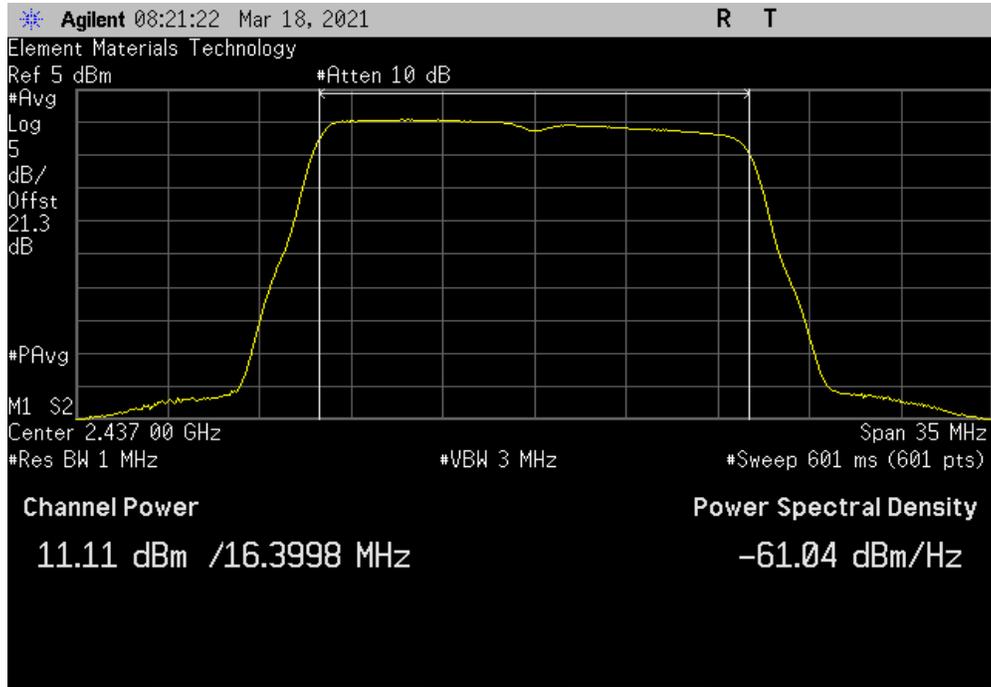


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

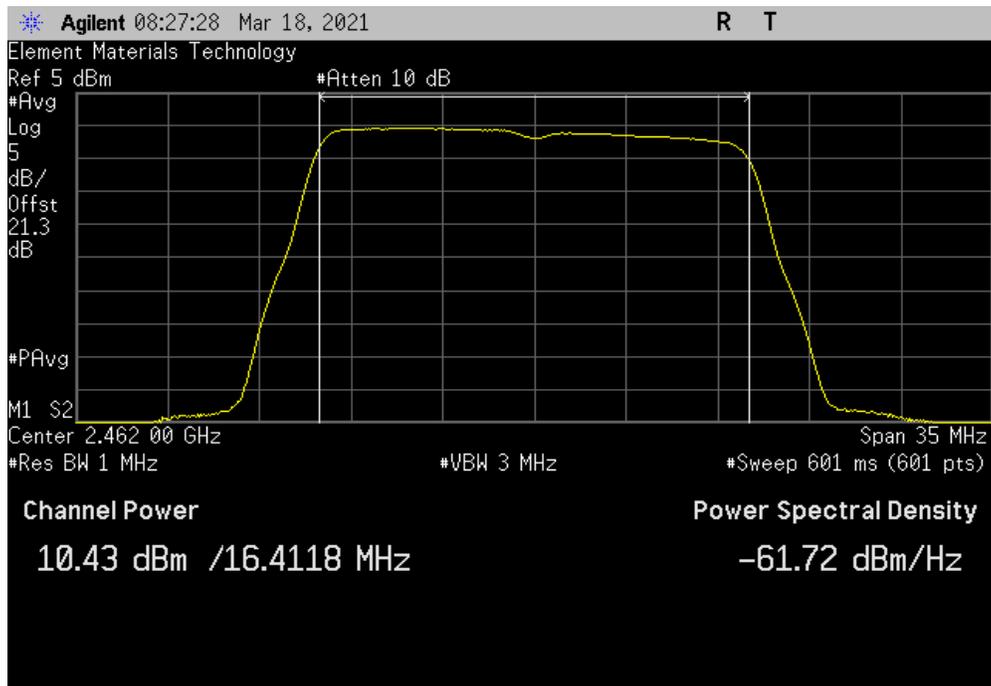


TuTx 2019.08.30.0 XMt 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.109	0.6	11.7	0.5	12.2	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.434	0.6	11	0.5	11.5	36	Pass

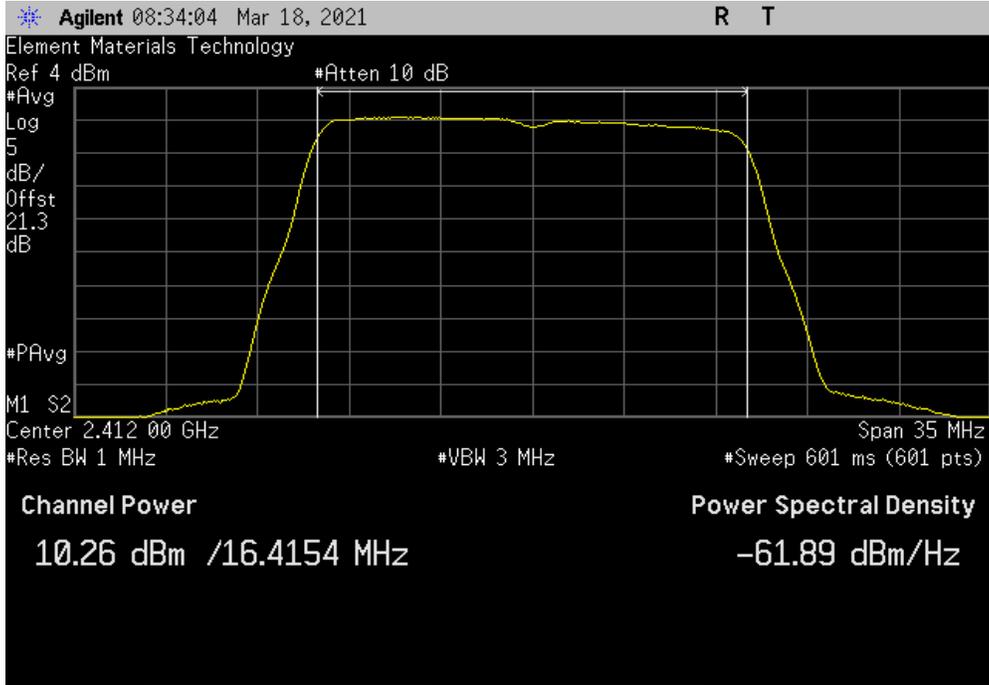


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

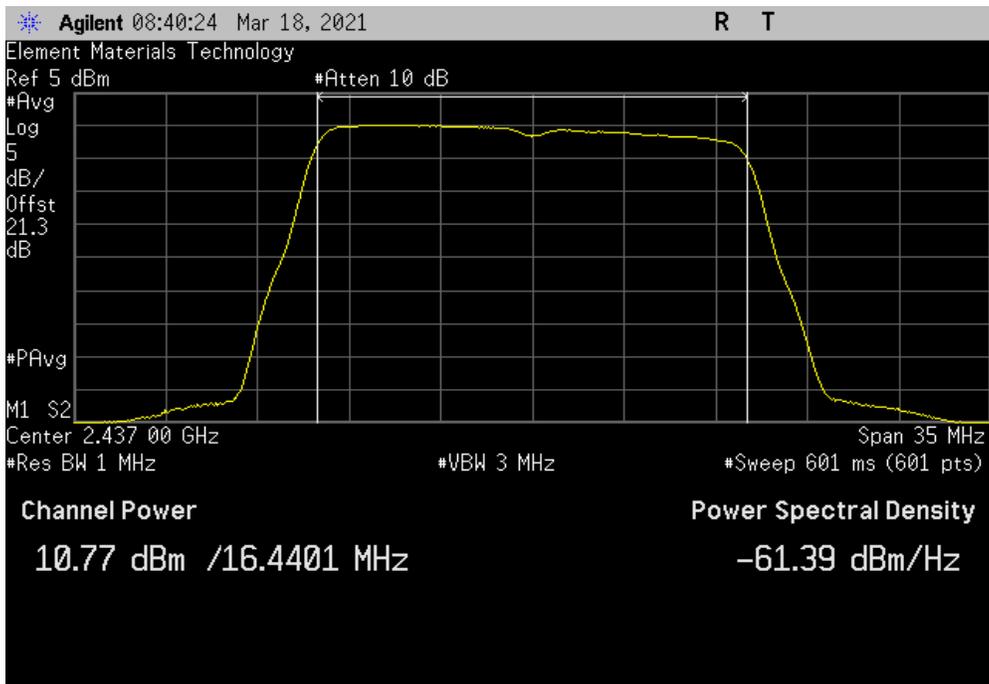


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.265	0.8	11.1	0.5	11.6	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.773	1	11.8	0.5	12.3	36	Pass

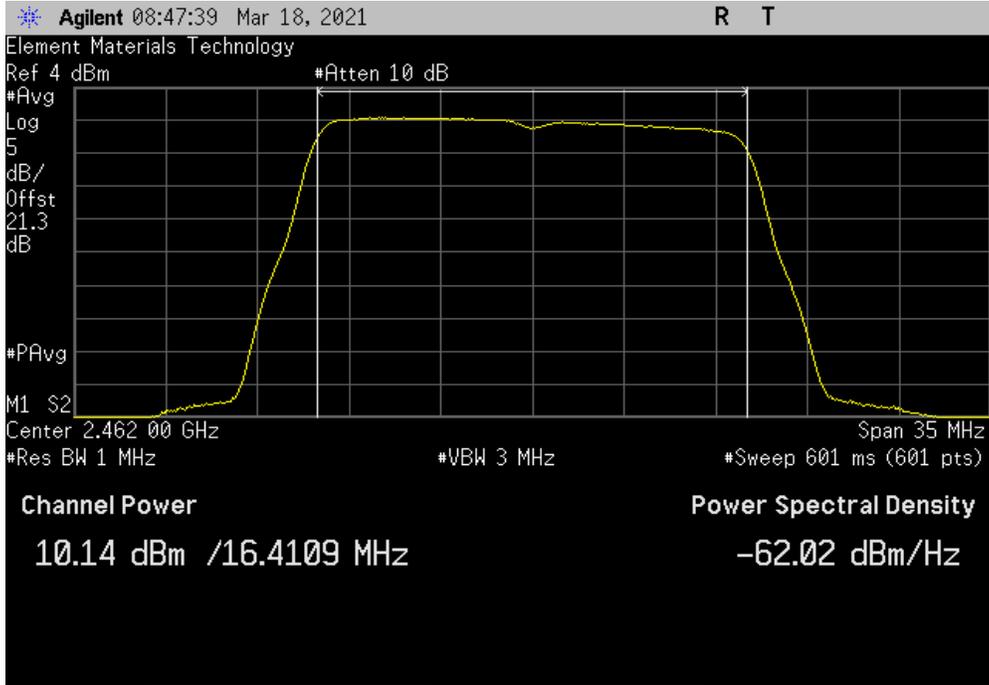


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

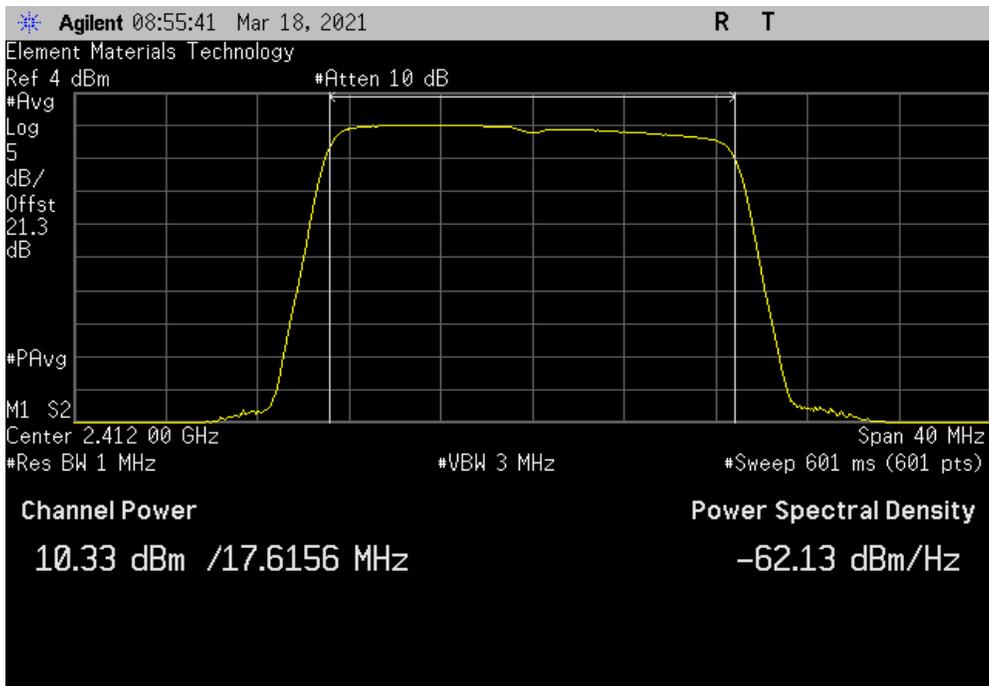


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.135	1	11.1	0.5	11.6	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.331	0.1	10.5	0.5	11	36	Pass

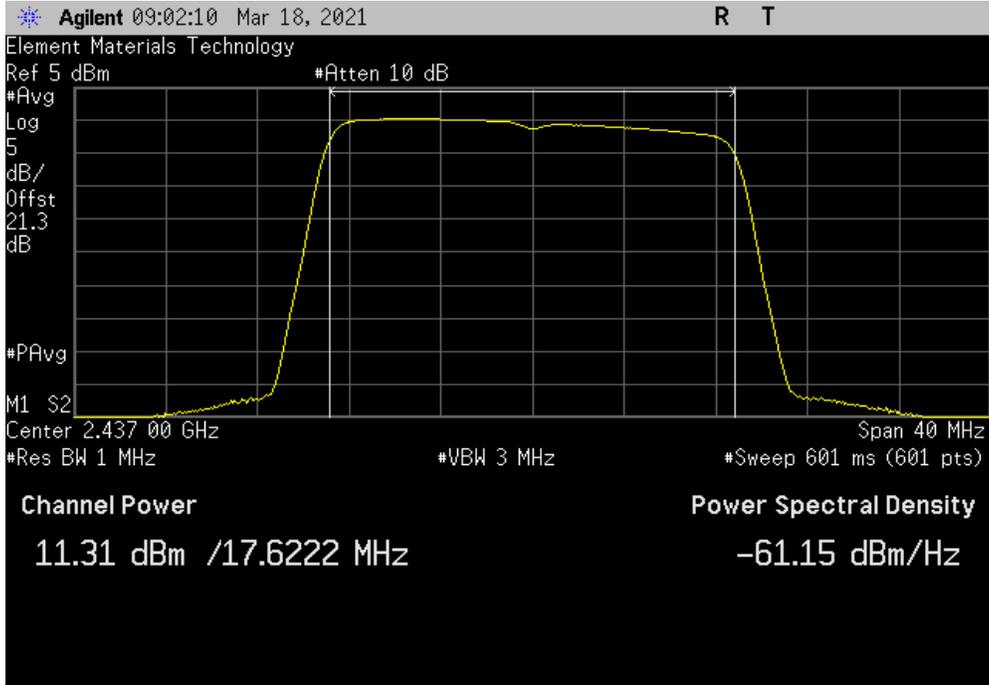


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

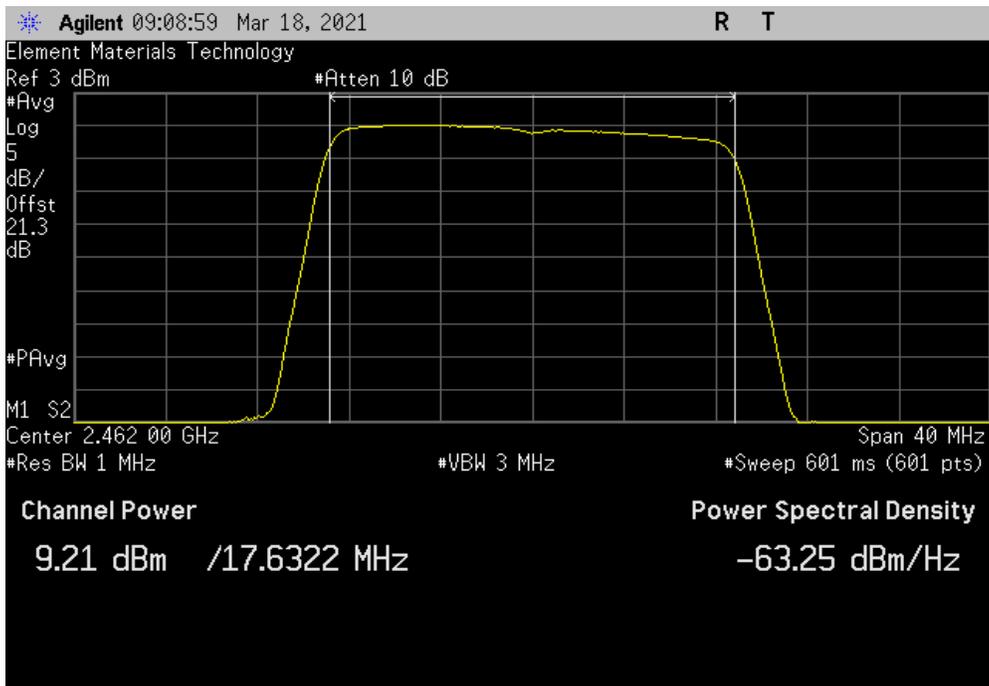


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.314	0.2	11.5	0.5	12	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
9.213	0.1	9.3	0.5	9.8	36	Pass

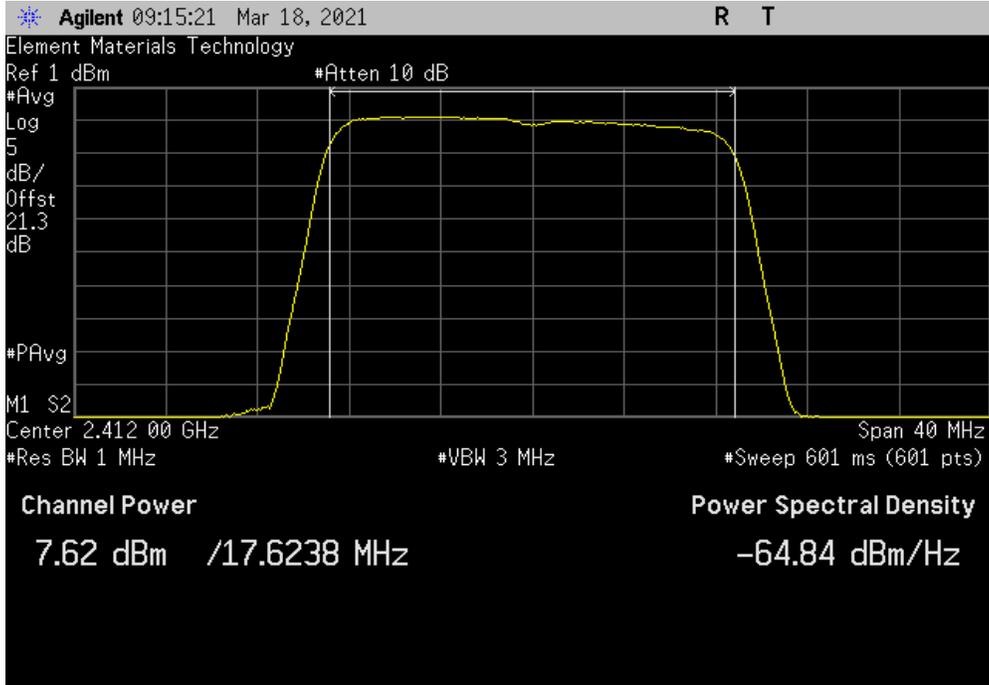


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

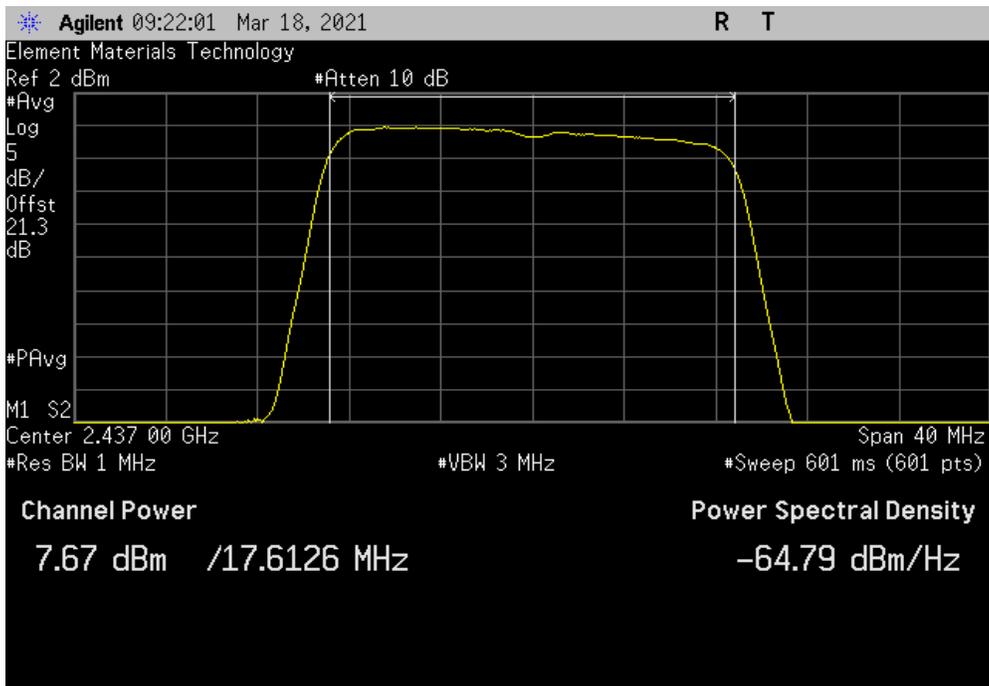


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
7.618	0.8	8.4	0.5	8.9	36	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
7.669	1	8.7	0.5	9.2	36	Pass

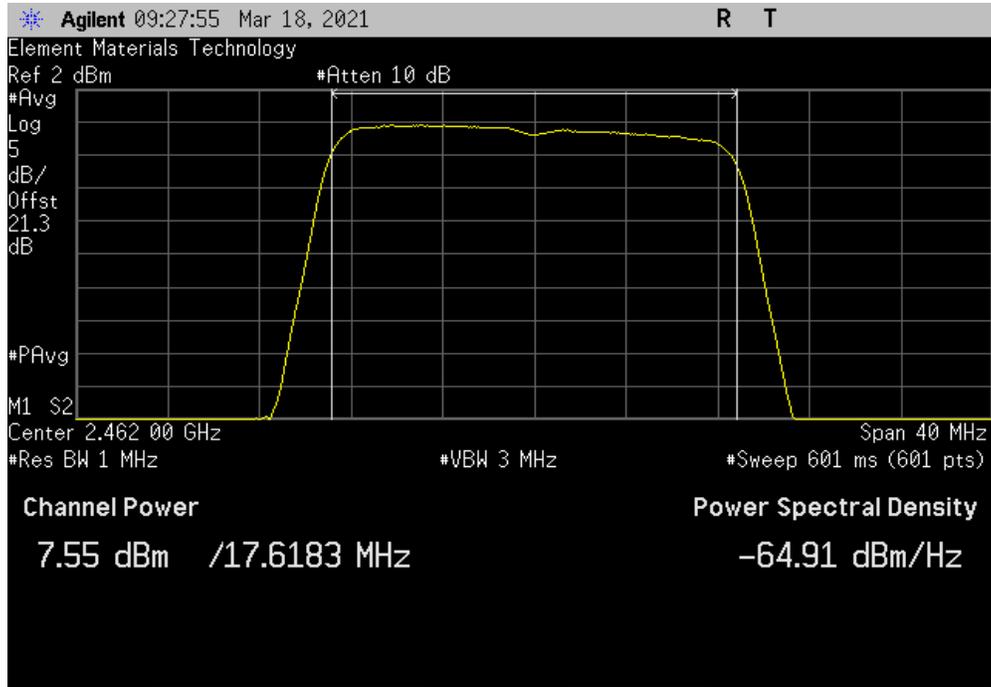


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
7.545	1	8.6	0.5	9.1	36	Pass



POWER SPECTRAL DENSITY



XMit 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY



TelTx 2019.08.30.0 XMI 2020.12.30.0

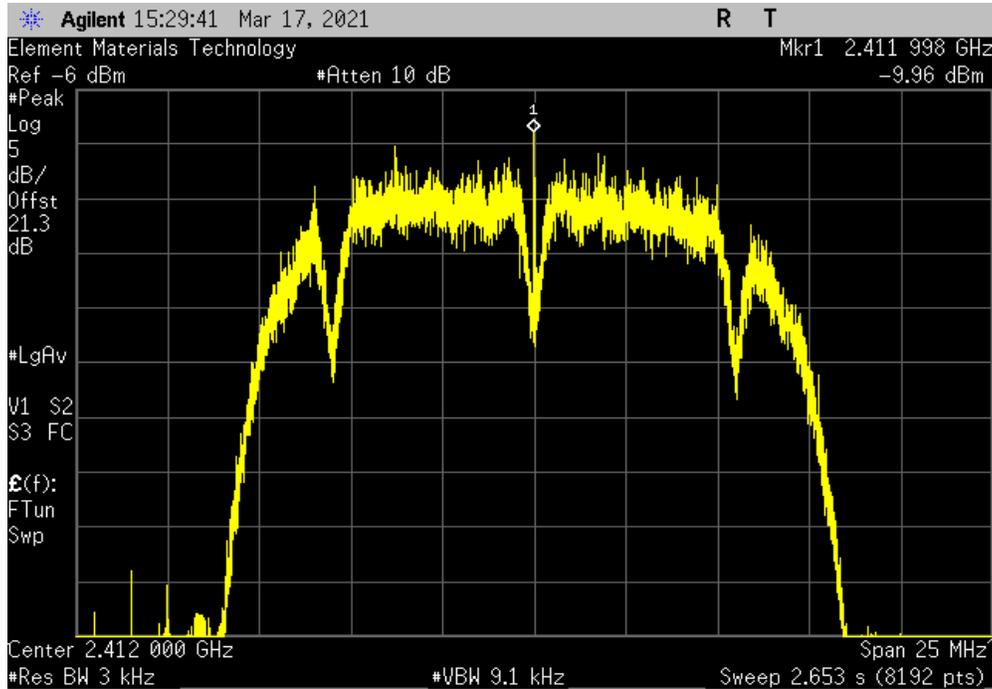
EUT: ATWILC3000-MR110CA		Work Order: TENN0148	
Serial Number: F8F005D93FFC		Date: 18-Mar-21	
Customer: Tennant Company		Temperature: 24.1 °C	
Attendees: Brett Paulsen		Humidity: 26.1% RH	
Project: None		Barometric Pres.: 1029 mbar	
Tested by: Andrew Rogstad		Power: Battery	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Andrew Rogstad</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	-9.957	8
	Mid Channel 6, 2437 MHz	-10.56	8
	High Channel 11, 2462 MHz	-10.492	8
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	-10.376	8
	Mid Channel 6, 2437 MHz	-7.817	8
	High Channel 11, 2462 MHz	-8.804	8
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	-10.252	8
	Mid Channel 6, 2437 MHz	-10.371	8
	High Channel 11, 2462 MHz	-10.531	8
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	-11.324	8
	Mid Channel 6, 2437 MHz	-11.547	8
	High Channel 11, 2462 MHz	-11.22	8
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	-12.432	8
	Mid Channel 6, 2437 MHz	-11.418	8
	High Channel 11, 2462 MHz	-12.175	8
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	-10.826	8
	Mid Channel 6, 2437 MHz	-10.262	8
	High Channel 11, 2462 MHz	-10.836	8
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	-12.337	8
	Mid Channel 6, 2437 MHz	-12.623	8
	High Channel 11, 2462 MHz	-12.781	8
			Results

POWER SPECTRAL DENSITY

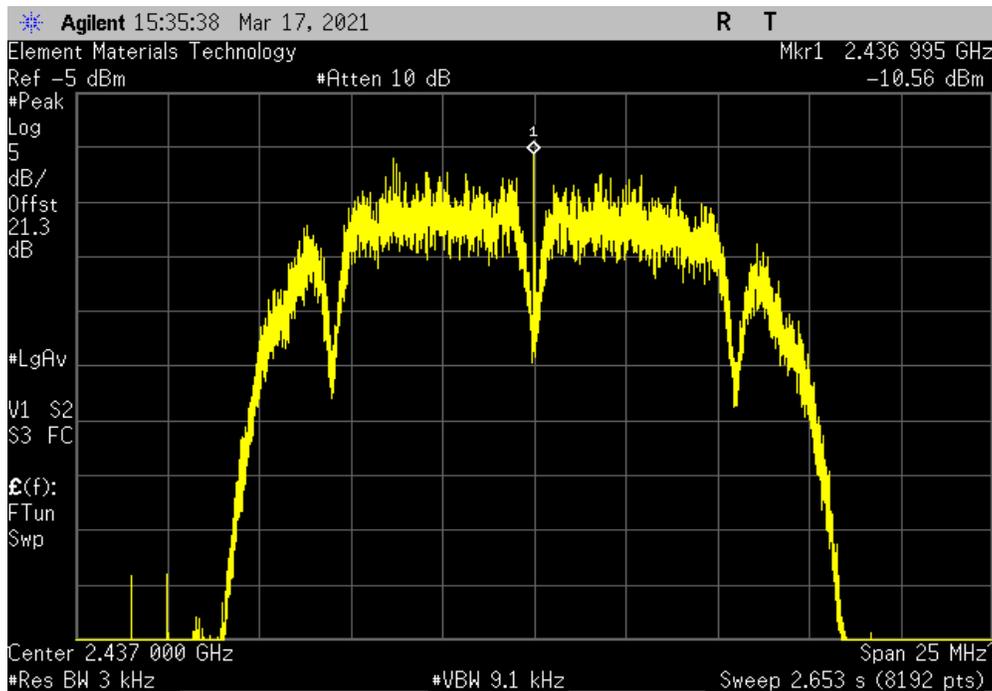


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-9.957	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.56	8	Pass

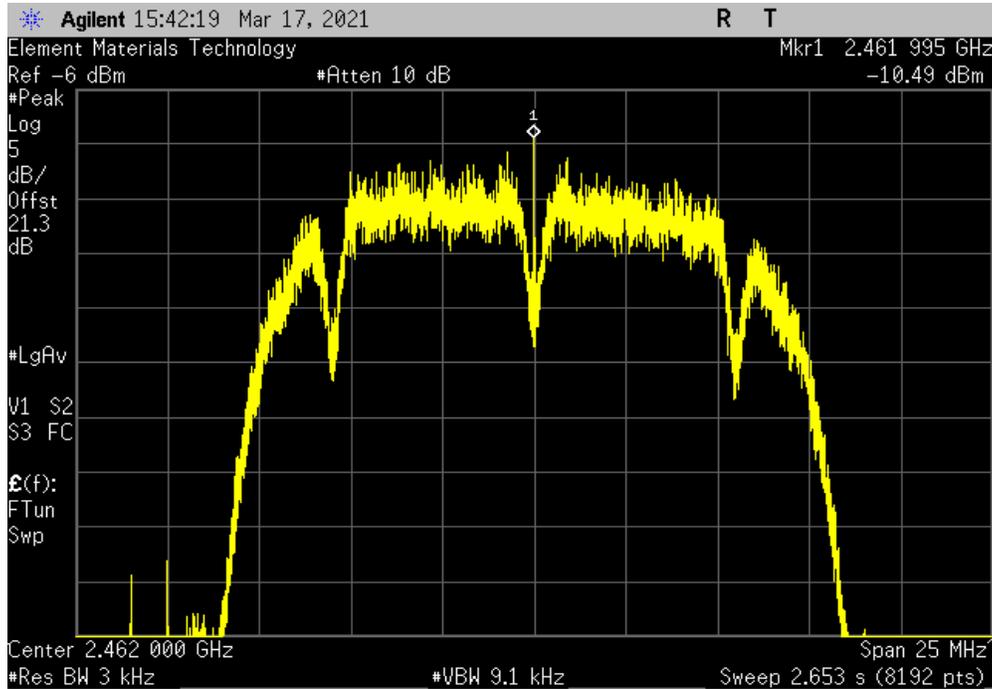


POWER SPECTRAL DENSITY

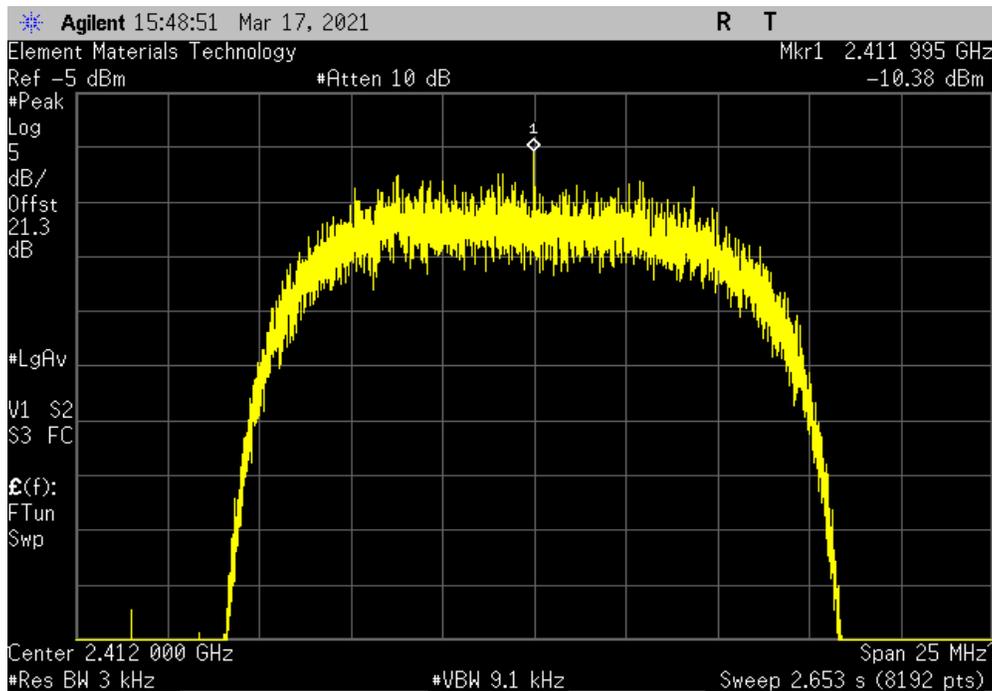


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.492	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.376	8	Pass

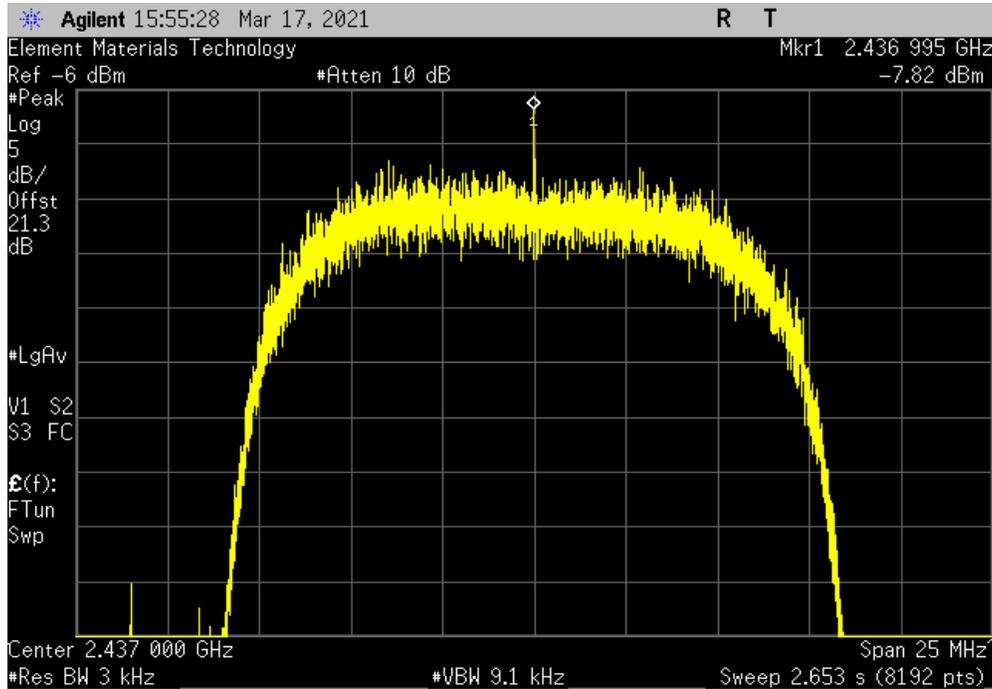


POWER SPECTRAL DENSITY

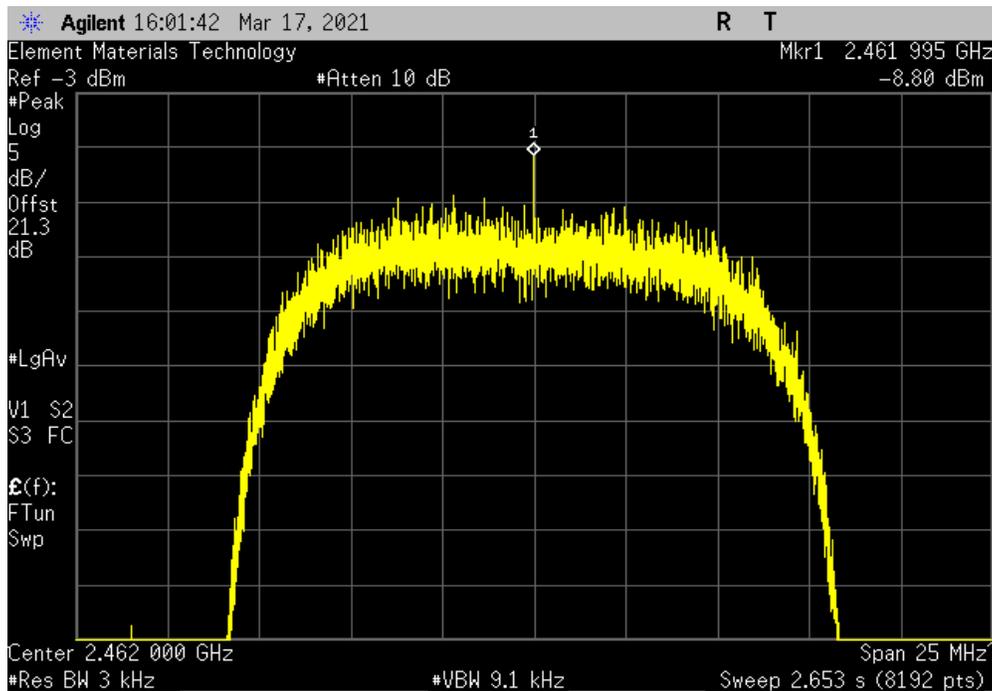


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-7.817	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-8.804	8	Pass

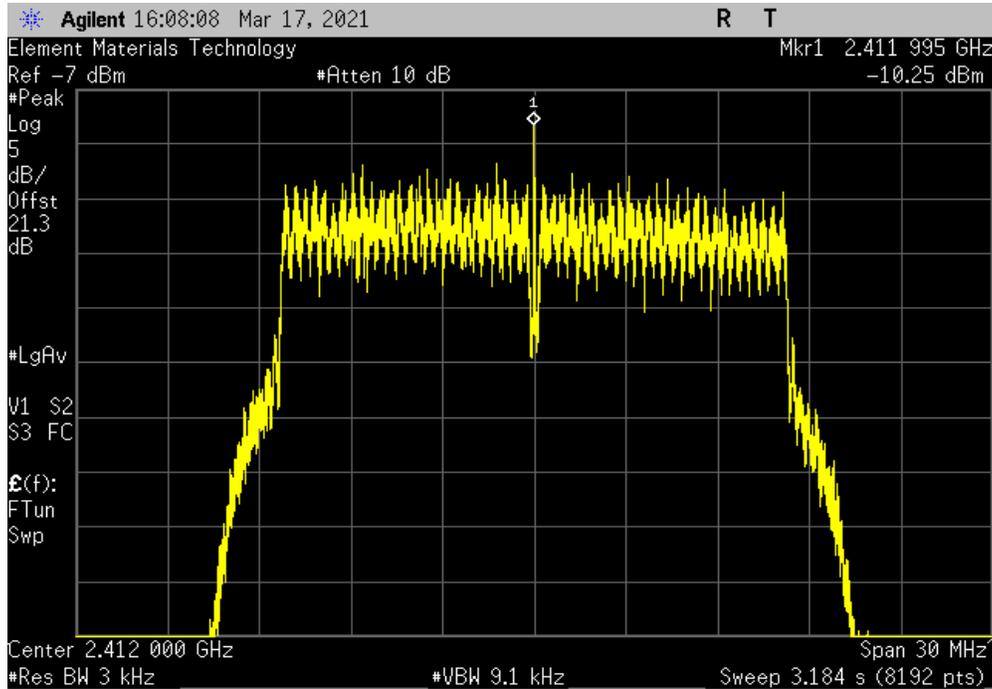


POWER SPECTRAL DENSITY

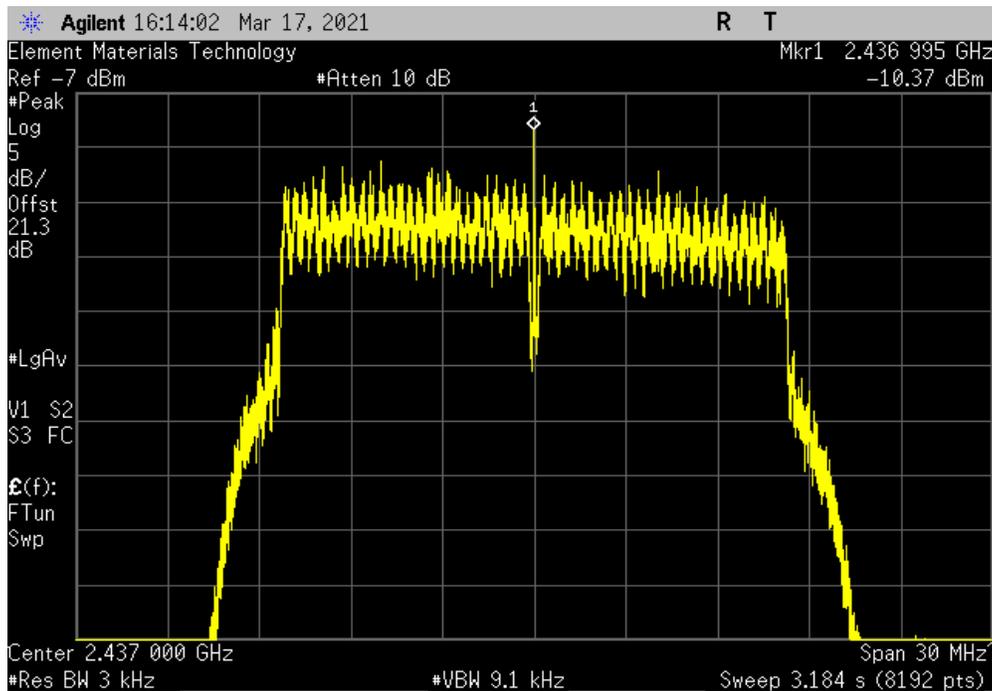


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.252	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.371	8	Pass

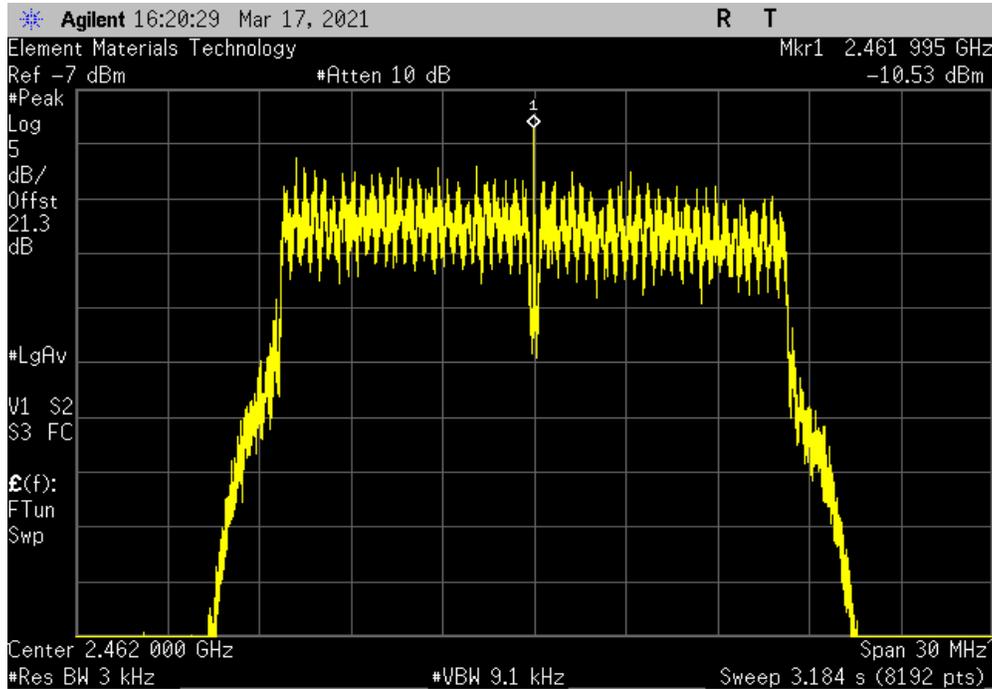


POWER SPECTRAL DENSITY

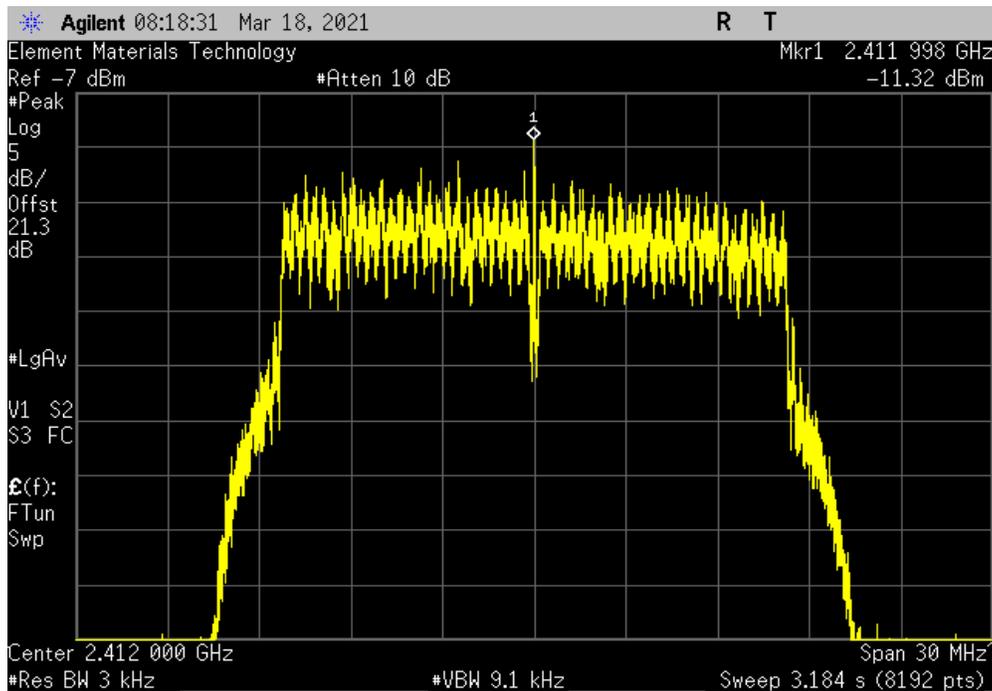


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.531	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.324	8	Pass

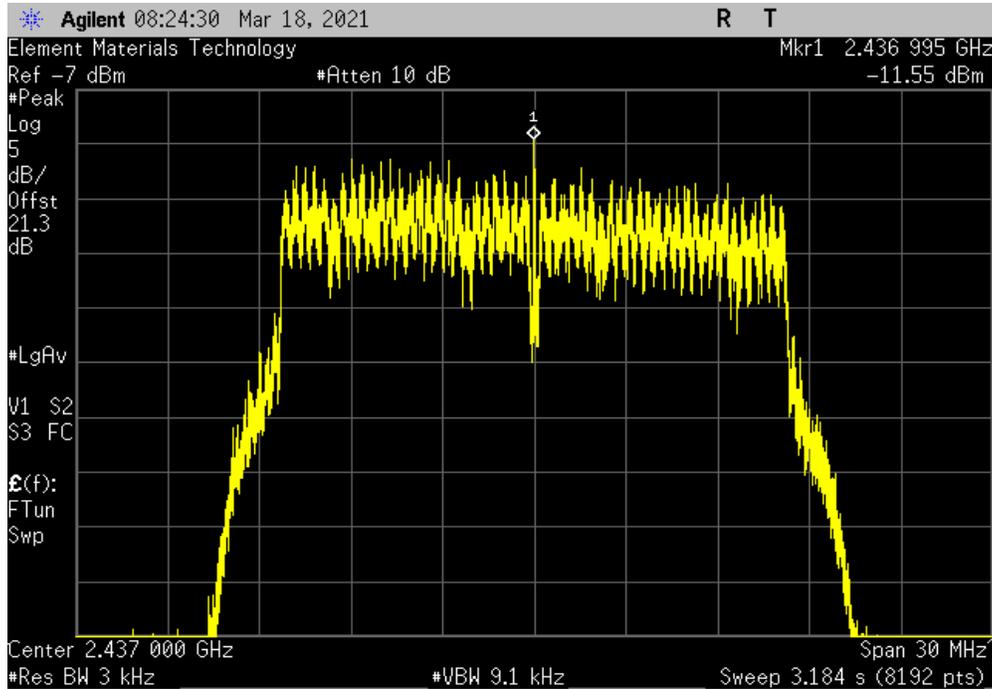


POWER SPECTRAL DENSITY

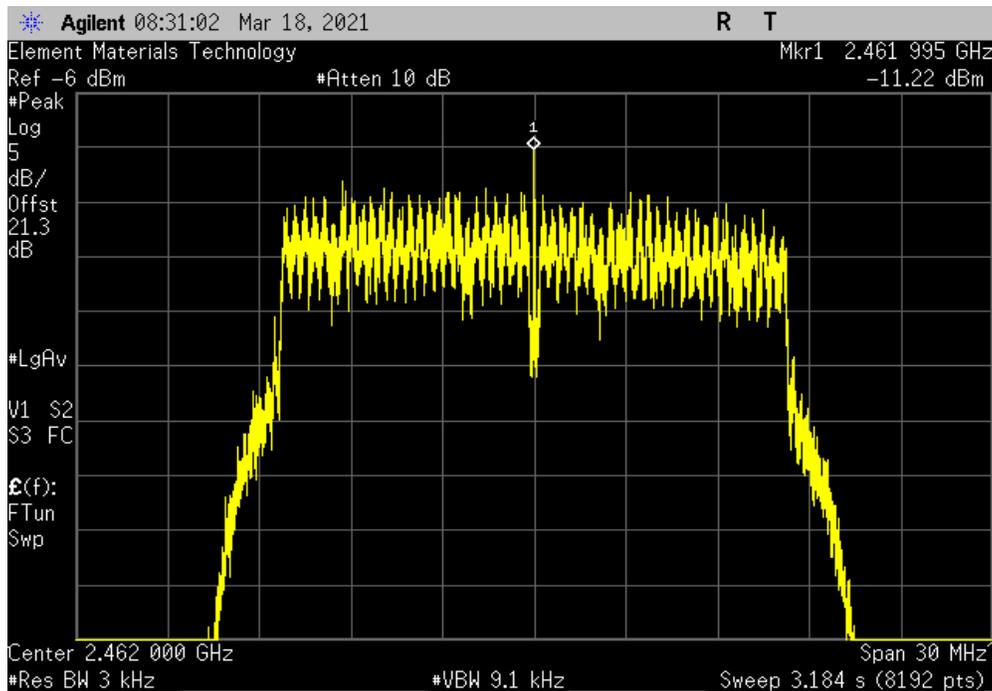


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.547	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.22	8	Pass

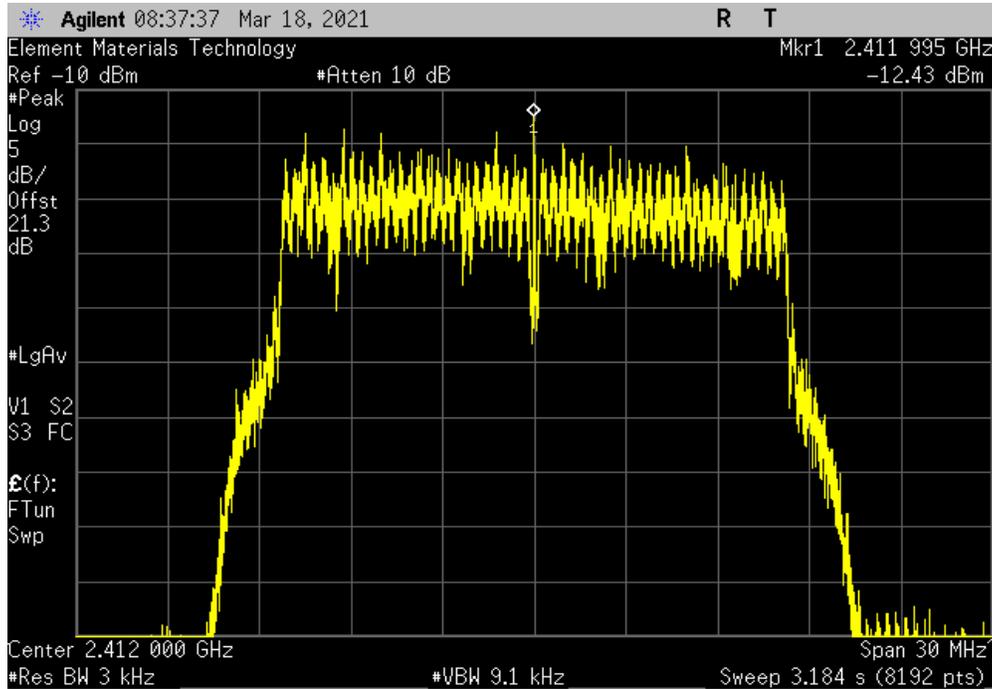


POWER SPECTRAL DENSITY

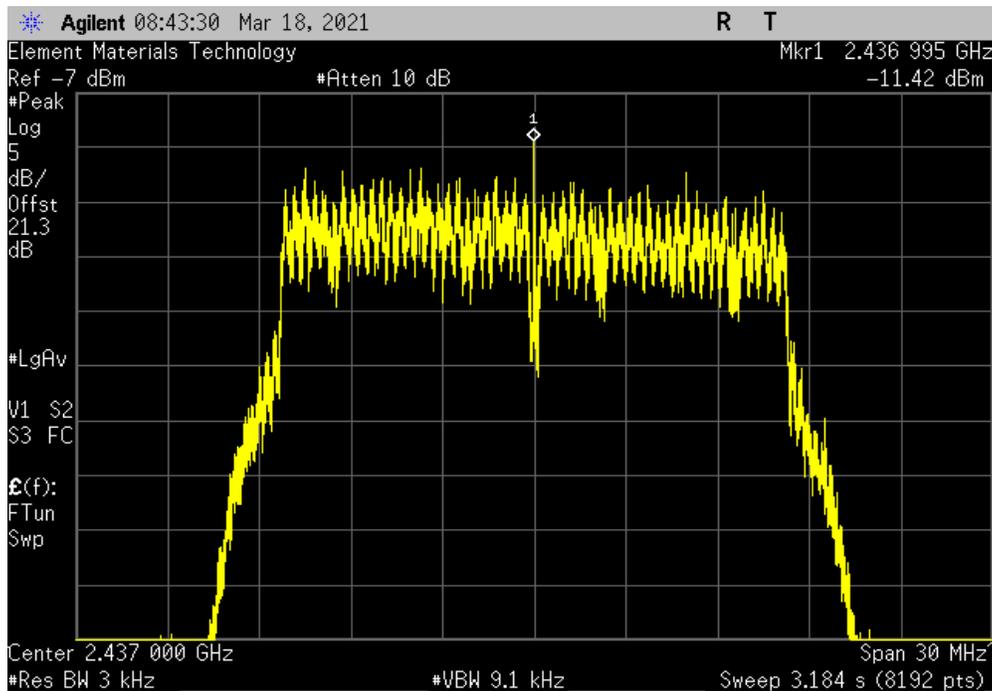


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.432	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.418	8	Pass

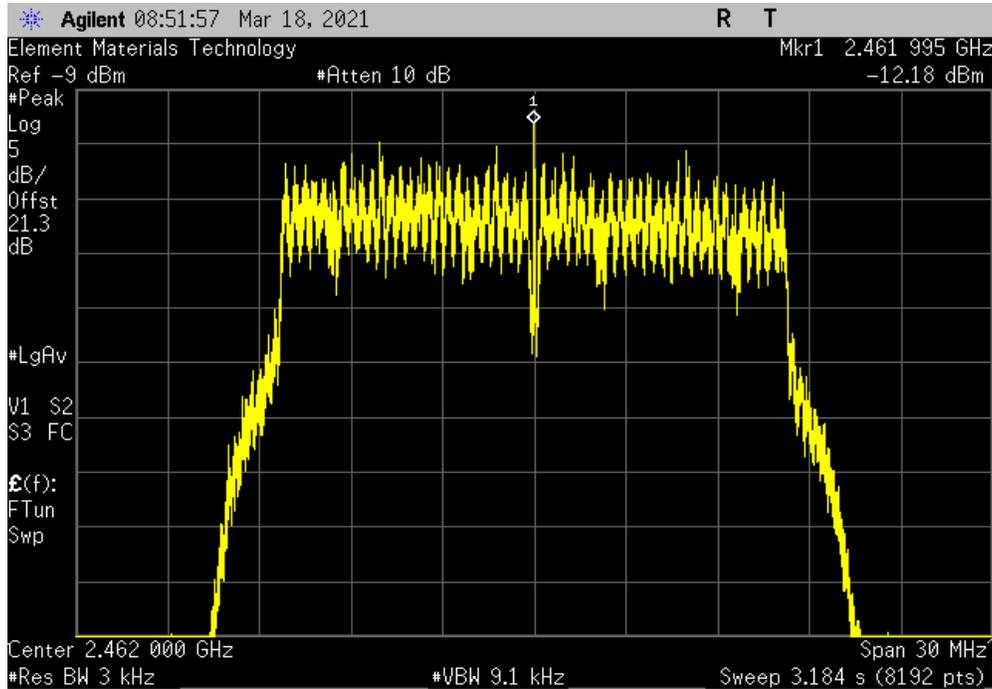


POWER SPECTRAL DENSITY

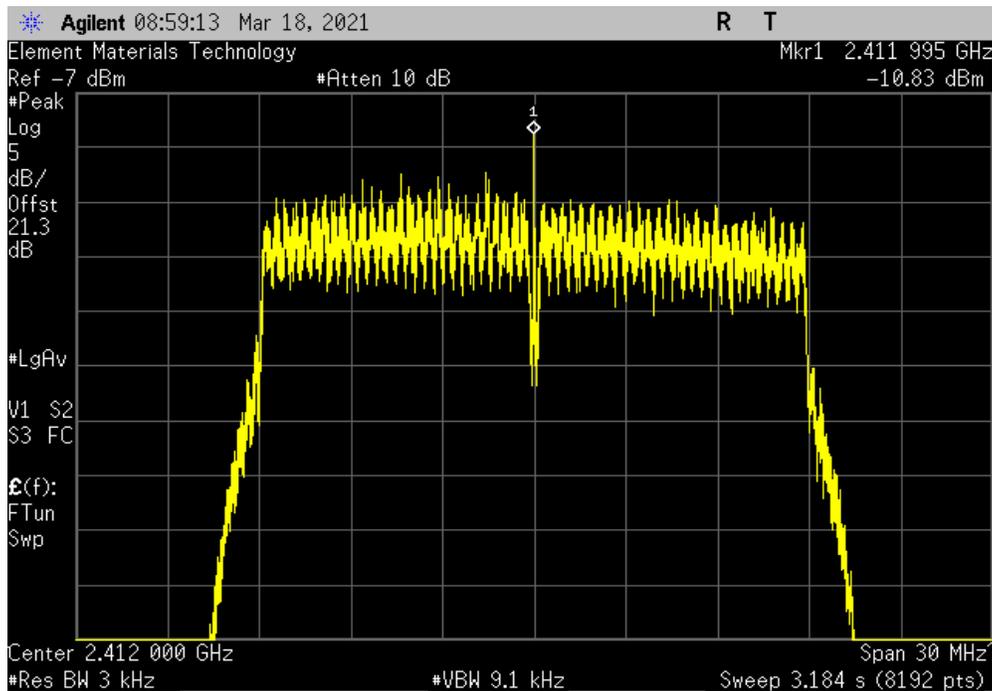


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.175	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.826	8	Pass

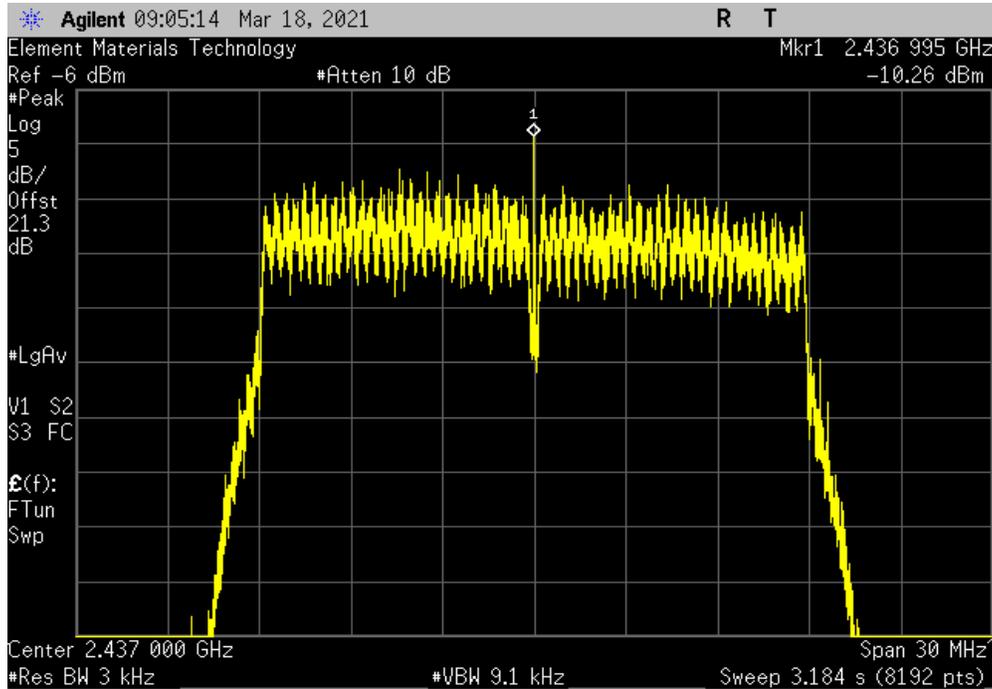


POWER SPECTRAL DENSITY

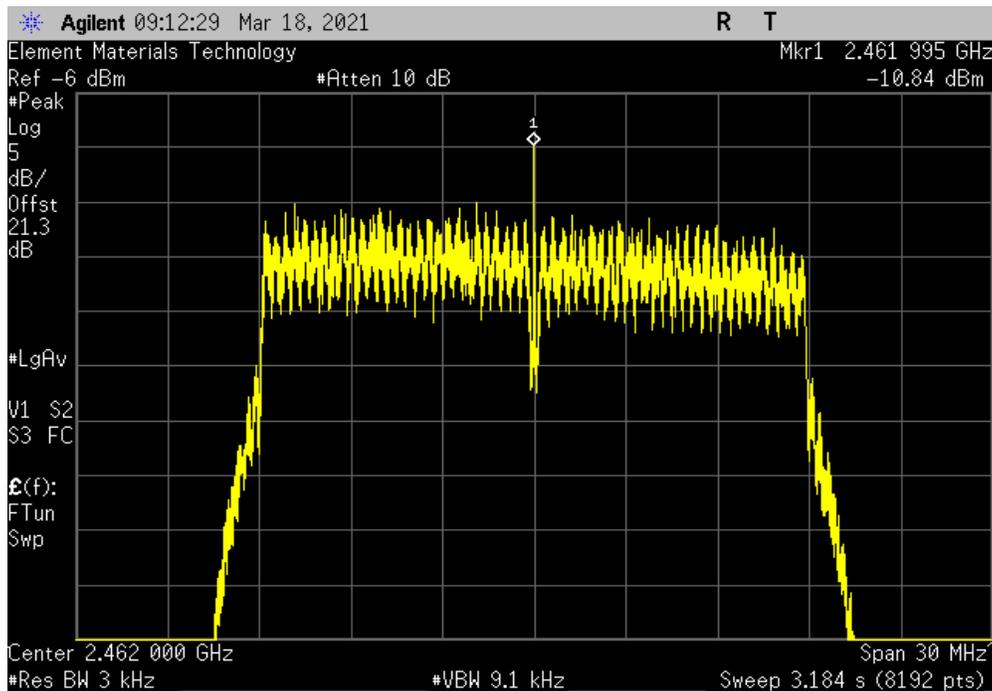


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.262	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.836	8	Pass

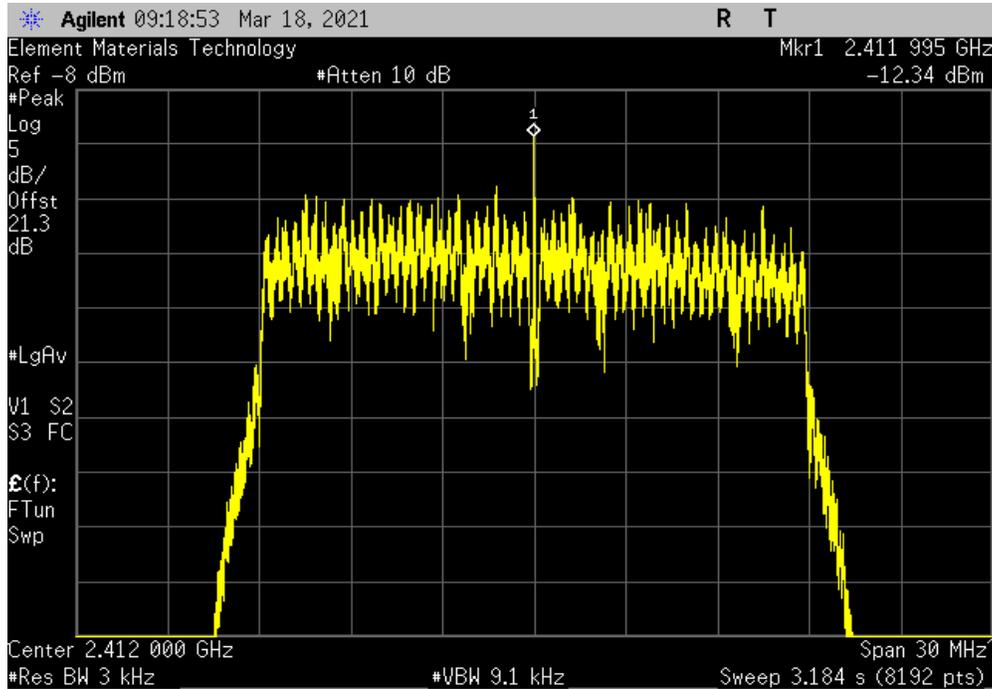


POWER SPECTRAL DENSITY

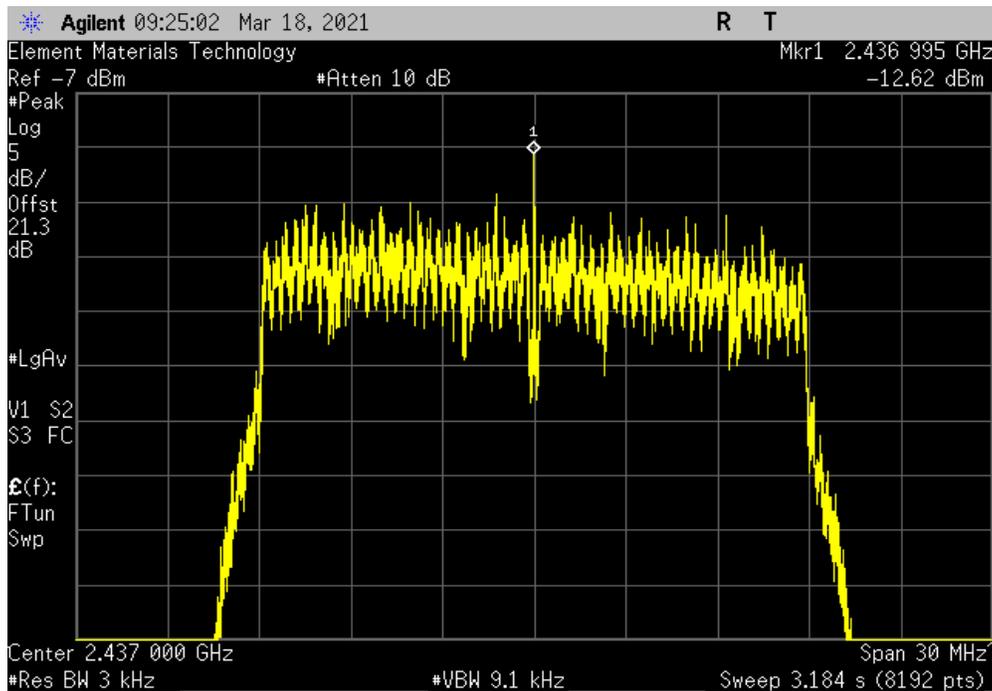


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.337	8	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.623	8	Pass

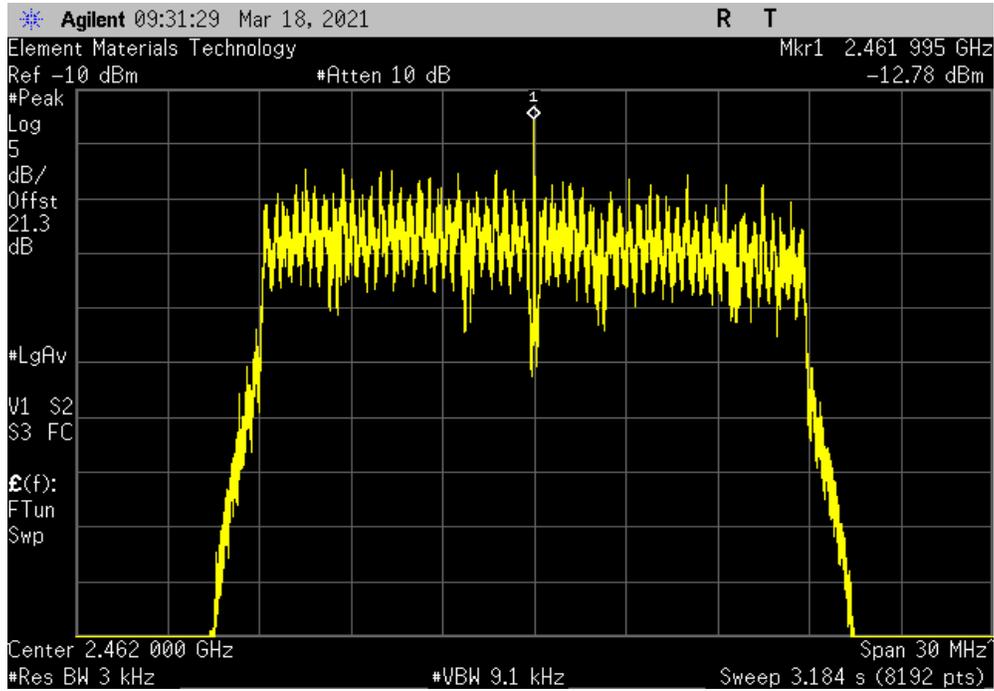


POWER SPECTRAL DENSITY



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.781	8	Pass



BAND EDGE COMPLIANCE



element

XMIT 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE



Tel: 2019.08.30.0 XM: 2020.12.30.0

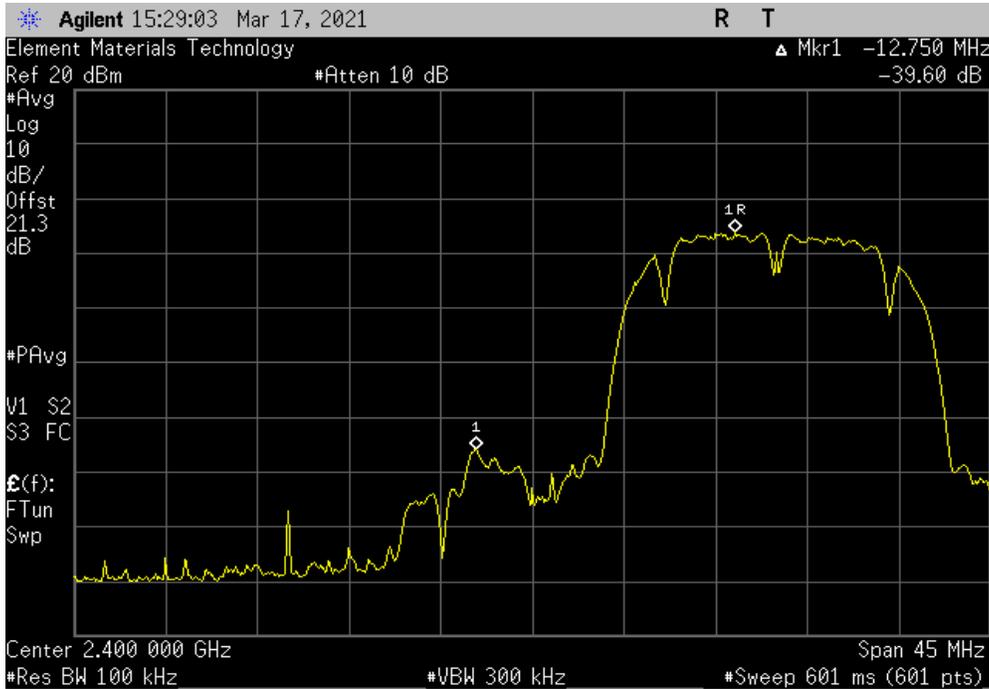
EUT: ATWILC3000-MR110CA		Work Order: TENN0148	
Serial Number: F8F005D93FFC		Date: 18-Mar-21	
Customer: Tennant Company		Temperature: 23.9 °C	
Attendees: Brett Paulsen		Humidity: 26.3% RH	
Project: None		Barometric Pres.: 1027.5 mbar	
Tested by: Andrew Rogstad		Power: Battery	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Andrew Rogstad</i>	
		Value (dBc)	Limit ≤ (dBc) Result
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	-39.61	-30 Pass
	High Channel 11, 2462 MHz	-59.62	-30 Pass
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	-42.63	-30 Pass
	High Channel 11, 2462 MHz	-60.94	-30 Pass
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	-44.55	-30 Pass
	High Channel 11, 2462 MHz	-52.81	-30 Pass
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	-43.66	-30 Pass
	High Channel 11, 2462 MHz	-54.31	-30 Pass
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	-43.83	-30 Pass
	High Channel 11, 2462 MHz	-53.96	-30 Pass
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	-44.03	-30 Pass
	High Channel 11, 2462 MHz	-53.74	-30 Pass
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	-46.3	-30 Pass
	High Channel 11, 2462 MHz	-55.23	-30 Pass

BAND EDGE COMPLIANCE

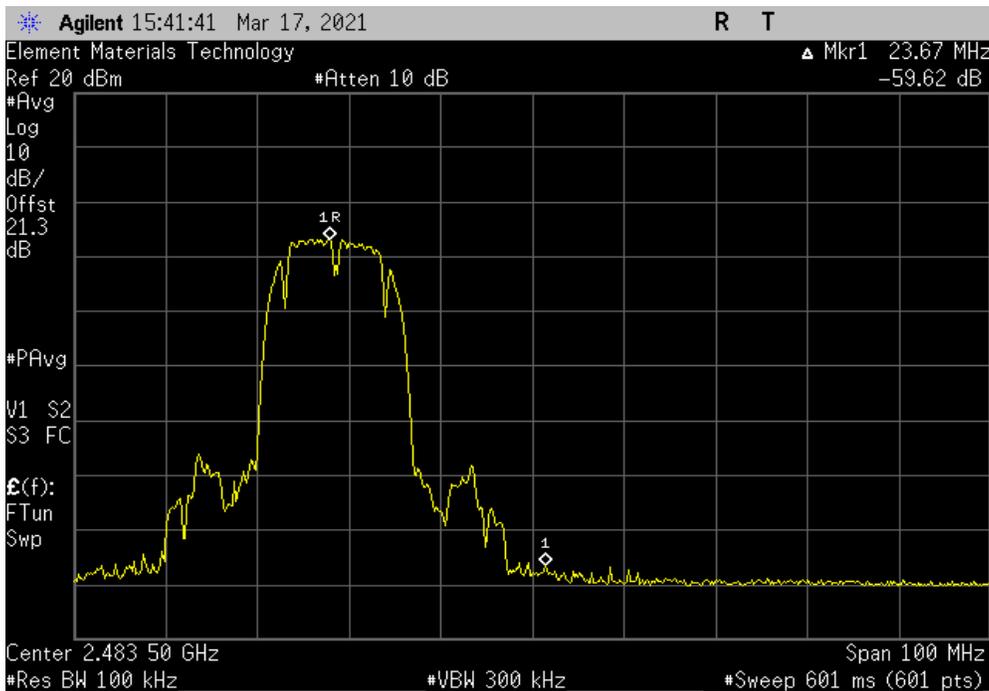


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-39.61	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59.62	-30	Pass

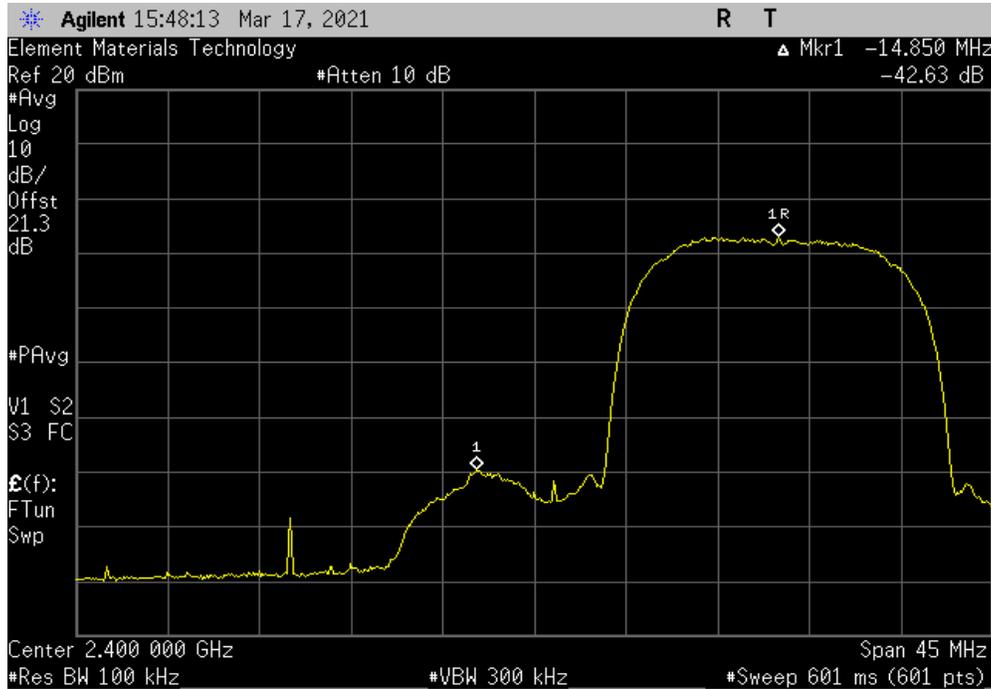


BAND EDGE COMPLIANCE

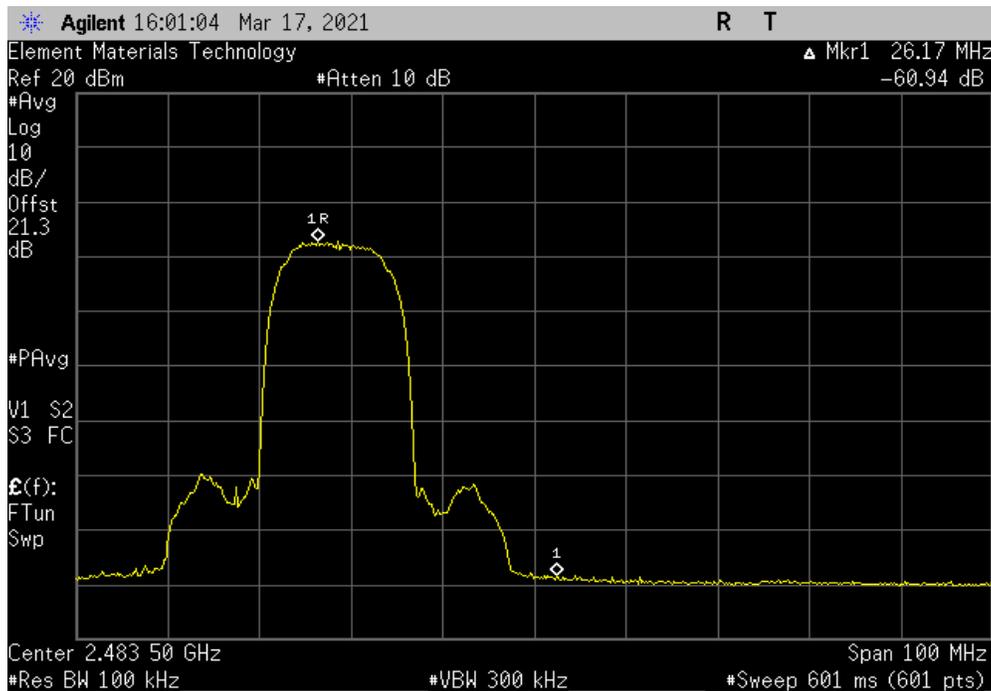


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-42.63	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-60.94	-30	Pass

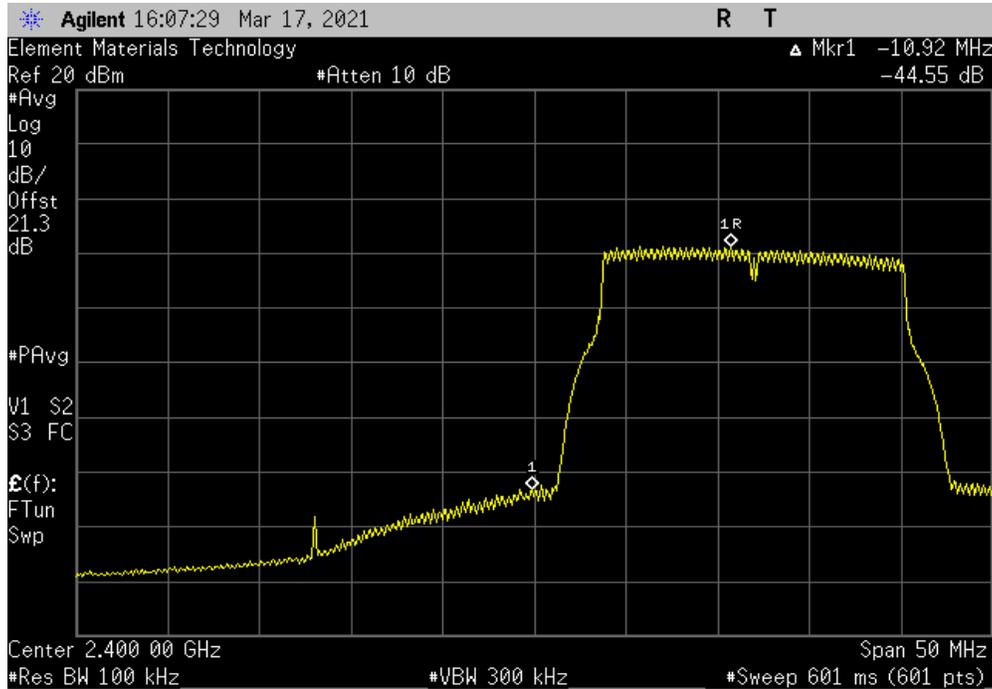


BAND EDGE COMPLIANCE

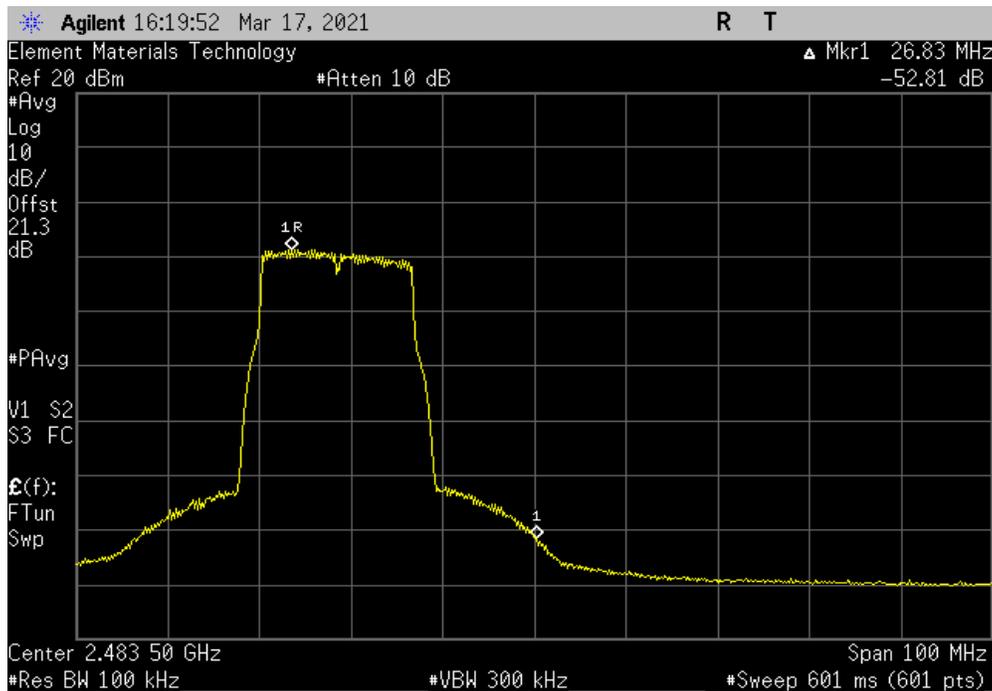


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.55	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.81	-30	Pass

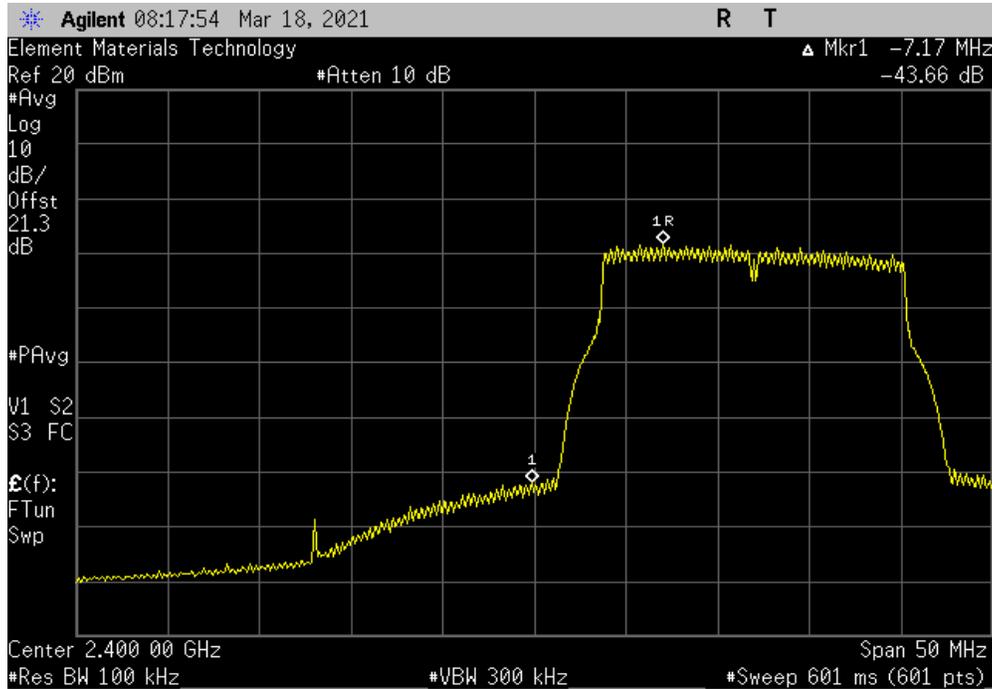


BAND EDGE COMPLIANCE

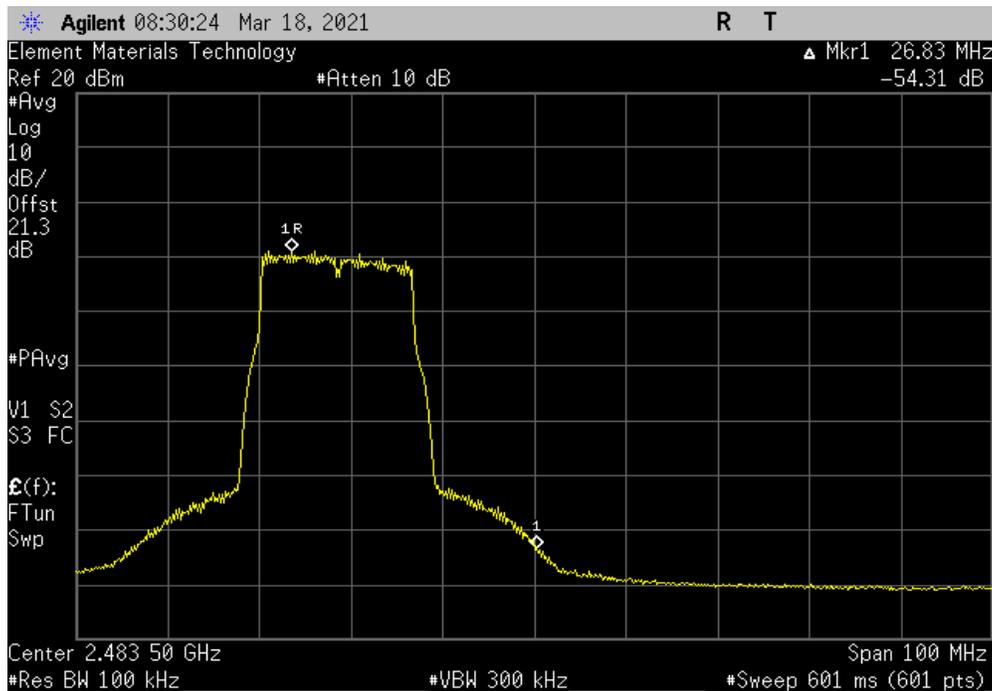


TuTx 2019.08.30.0 XMi 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.66	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.31	-30	Pass

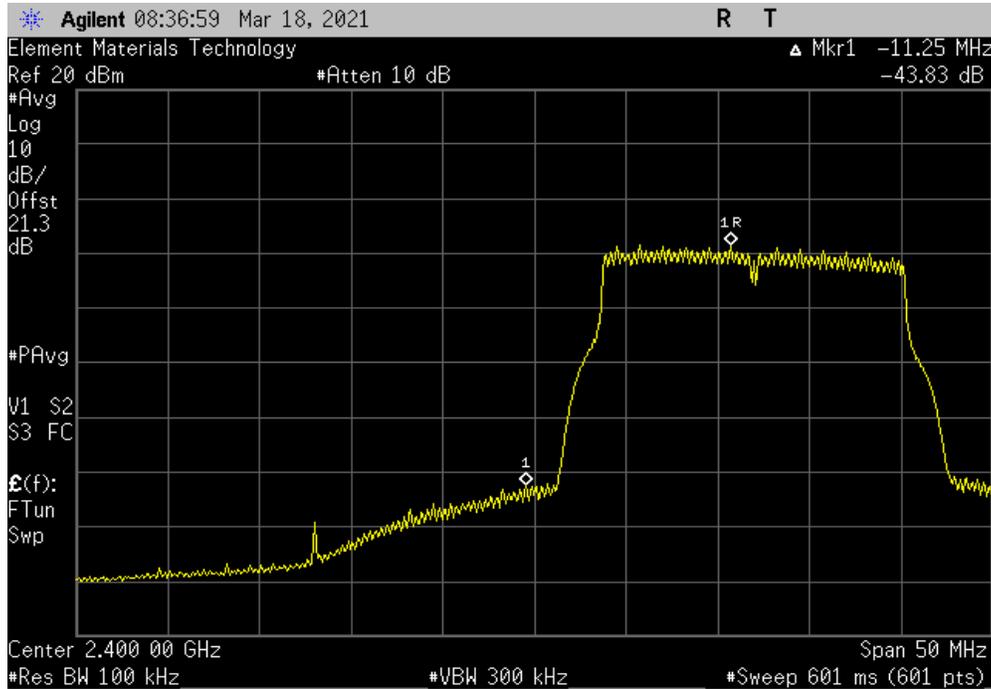


BAND EDGE COMPLIANCE

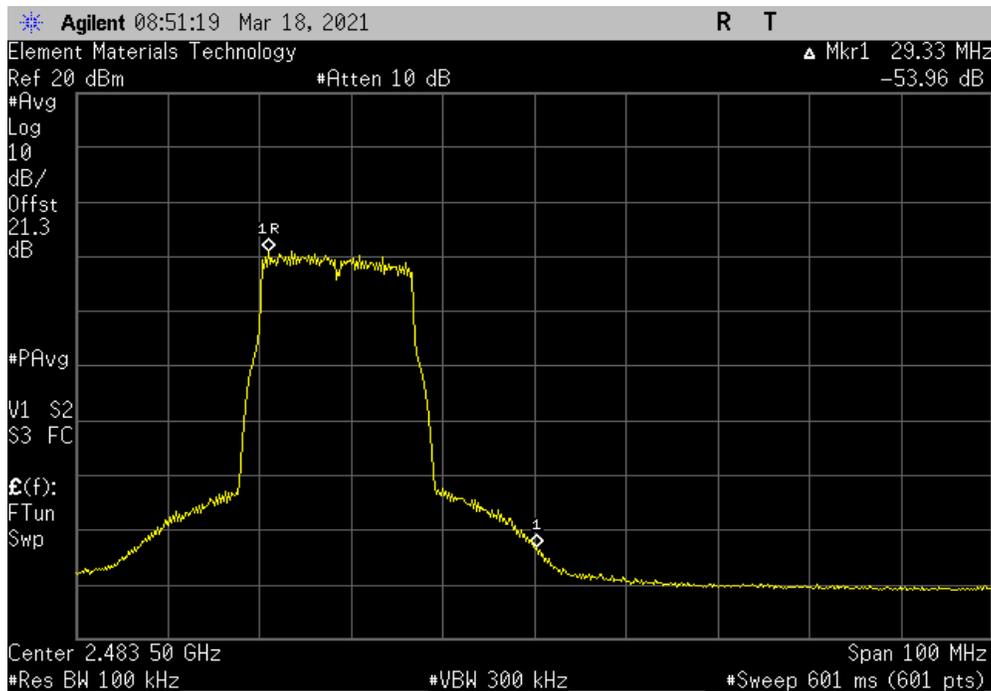


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.83	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.96	-30	Pass

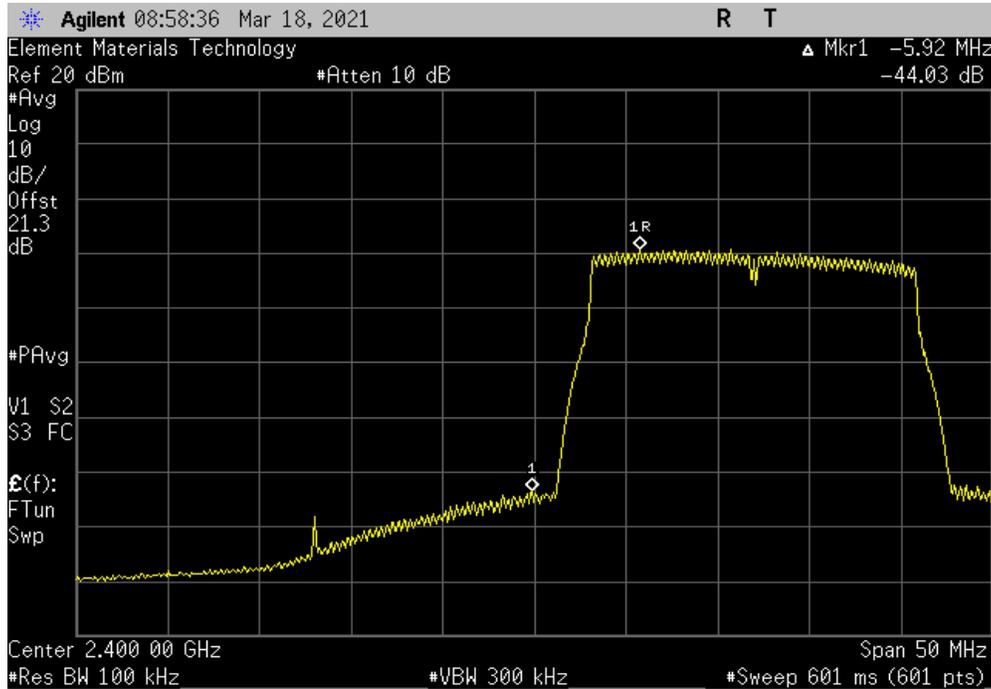


BAND EDGE COMPLIANCE

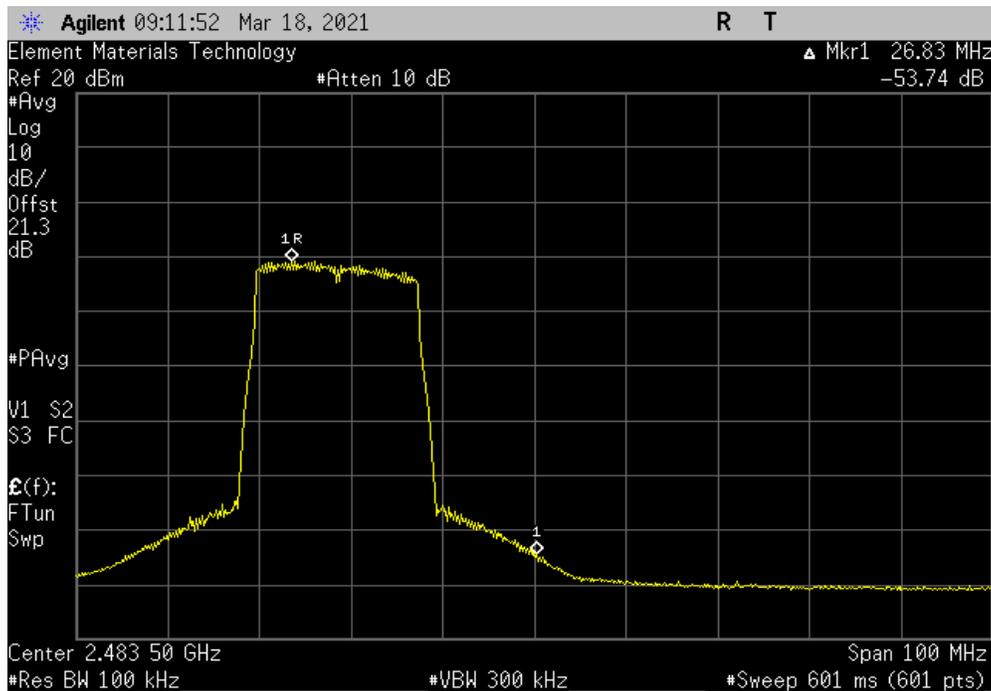


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.03	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.74	-30	Pass

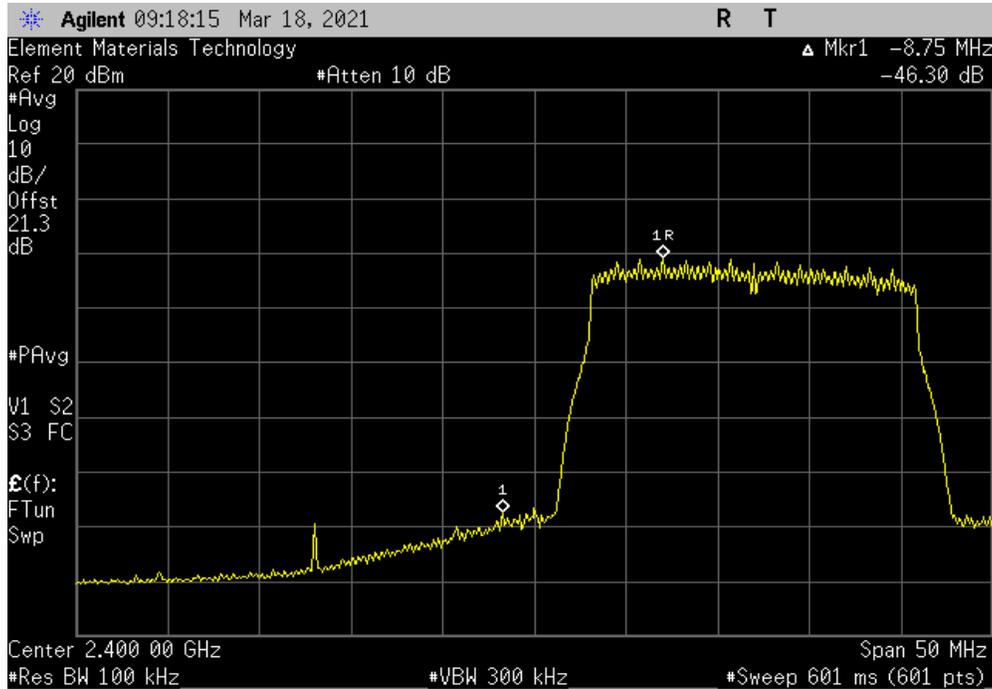


BAND EDGE COMPLIANCE

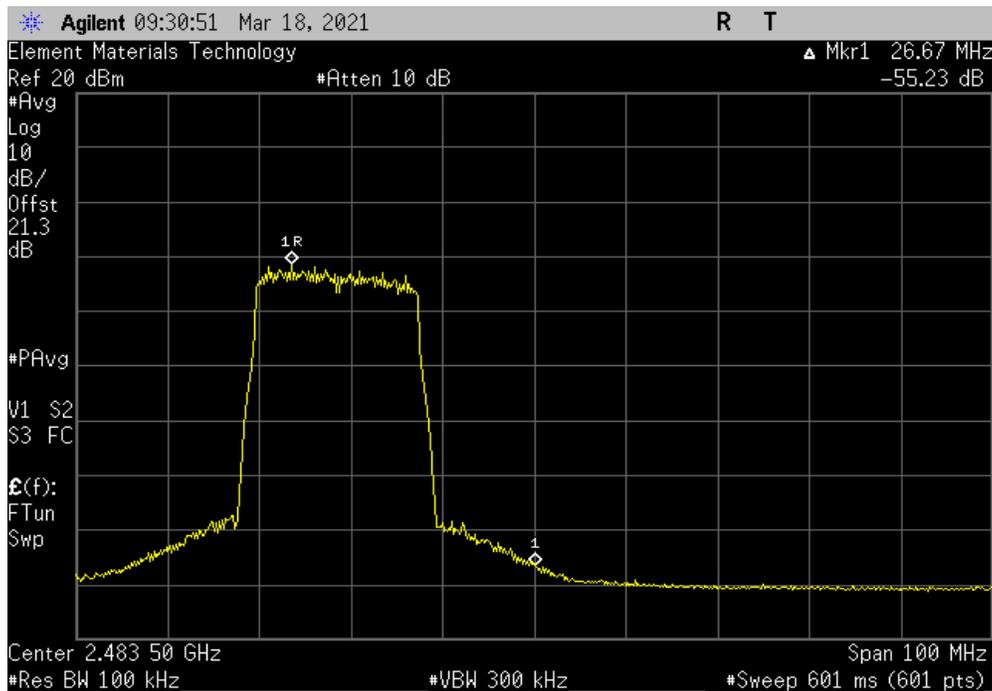


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-46.3	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.23	-30	Pass



SPURIOUS CONDUCTED EMISSIONS



XMit 2020.12.30.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	2021-05-07

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS



Tel: 2019.08.30.0 XM: 2020.12.30.0

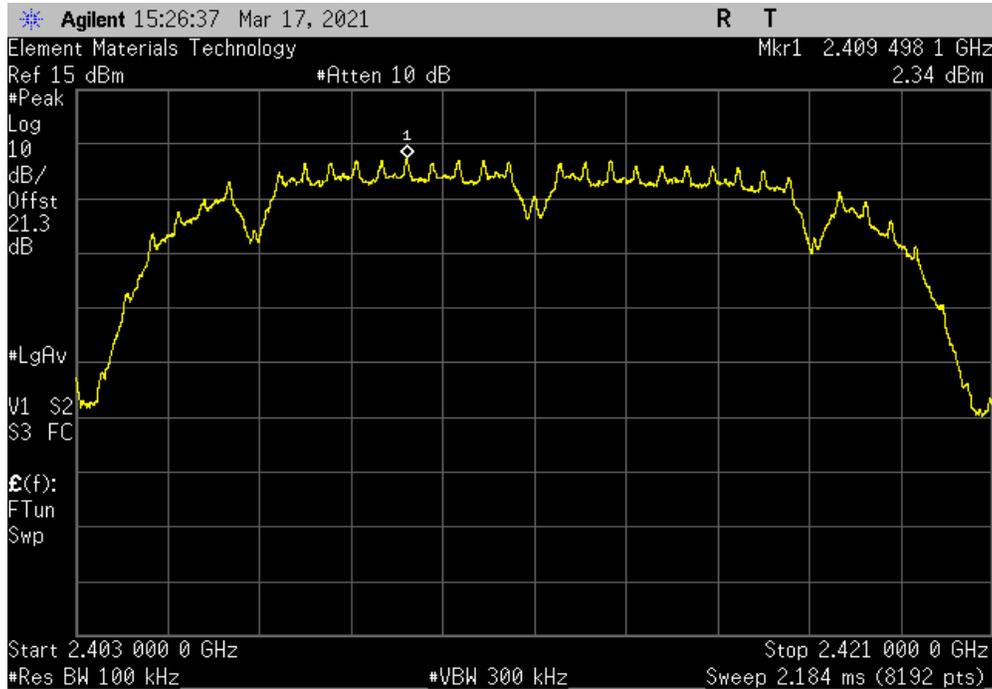
EUT: ATWILC3000-MR110CA		Work Order: TENN0148			
Serial Number: F8F005D93FFC		Date: 18-Mar-21			
Customer: Tennant Company		Temperature: 24.1 °C			
Attendees: Brett Paulsen		Humidity: 26.1% RH			
Project: None		Barometric Pres.: 1029 mbar			
Tested by: Andrew Rogstad		Power: Battery			
Job Site: MN08					
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2021		ANSI C63.10:2013			
COMMENTS					
Reference level offset includes measurement cable, attenuator, and DC block.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature <i>Andrew Rogstad</i>			
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
2400 MHz - 2483.5 MHz Band					
802.11(b) 1 Mbps					
Low Channel 1, 2412 MHz	Fundamental	2409.5	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-35.45	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24986.3	-51.17	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2434	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-35.17	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24841.3	-50.59	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2459.5	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-34.36	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24847.4	-50.2	-30	Pass
802.11(b) 11 Mbps					
Low Channel 1, 2412 MHz	Fundamental	2408.12	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-36.12	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24848.9	-50.53	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2437	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-35.17	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24934.4	-50.36	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2458.11	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-34.3	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24867.2	-50.79	-30	Pass
802.11(g) 6 Mbps					
Low Channel 1, 2412 MHz	Fundamental	2405.74	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-39.11	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24774.1	-48.43	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2430.72	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-38.98	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24836.7	-49.11	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2455.73	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-38.86	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24815.3	-48.92	-30	Pass
802.11(g) 36 Mbps					
Low Channel 1, 2412 MHz	Fundamental	2405.73	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-38.76	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24852	-49.68	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2430.74	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-39.25	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24801.6	-49.97	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2455.74	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-40.35	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24888.6	-49.63	-30	Pass
802.11(g) 54 Mbps					
Low Channel 1, 2412 MHz	Fundamental	2405.75	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-37.99	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24818.4	-49.83	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2430.75	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-38.53	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24987.8	-49.5	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2455.75	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-39	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24836.7	-49.29	-30	Pass
802.11(n) MCS0					
Low Channel 1, 2412 MHz	Fundamental	2405.75	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-39.36	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24810.8	-48.43	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2430.73	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	4874.3	-40.3	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24929.8	-49.56	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2455.74	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-40.07	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24856.5	-47.81	-30	Pass
802.11(n) MCS7					
Low Channel 1, 2412 MHz	Fundamental	2405.74	N/A	N/A	
Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	4824	-38.37	-30	Pass
Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	24810.8	-46.91	-30	Pass
Mid Channel 6, 2437 MHz	Fundamental	2430.73	N/A	N/A	
Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	9747.5	-40.69	-30	Pass
Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	24838.2	-46.6	-30	Pass
High Channel 11, 2462 MHz	Fundamental	2455.73	N/A	N/A	
High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	4924.5	-40.83	-30	Pass
High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	24948.1	-47.17	-30	Pass

SPURIOUS CONDUCTED EMISSIONS

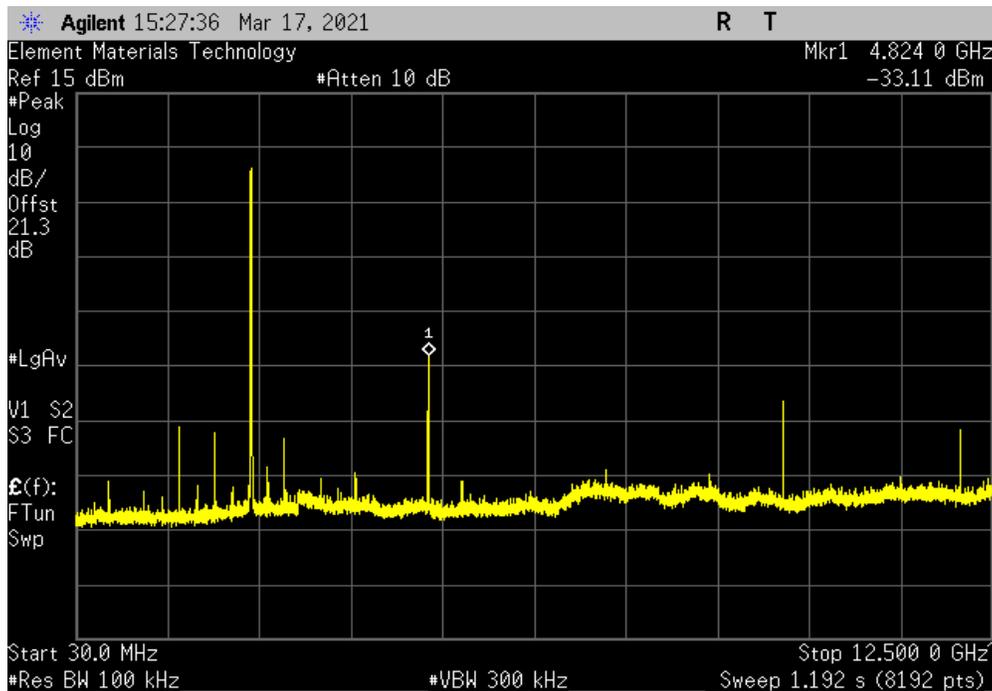


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2409.5	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4824	-35.45	-30	Pass	

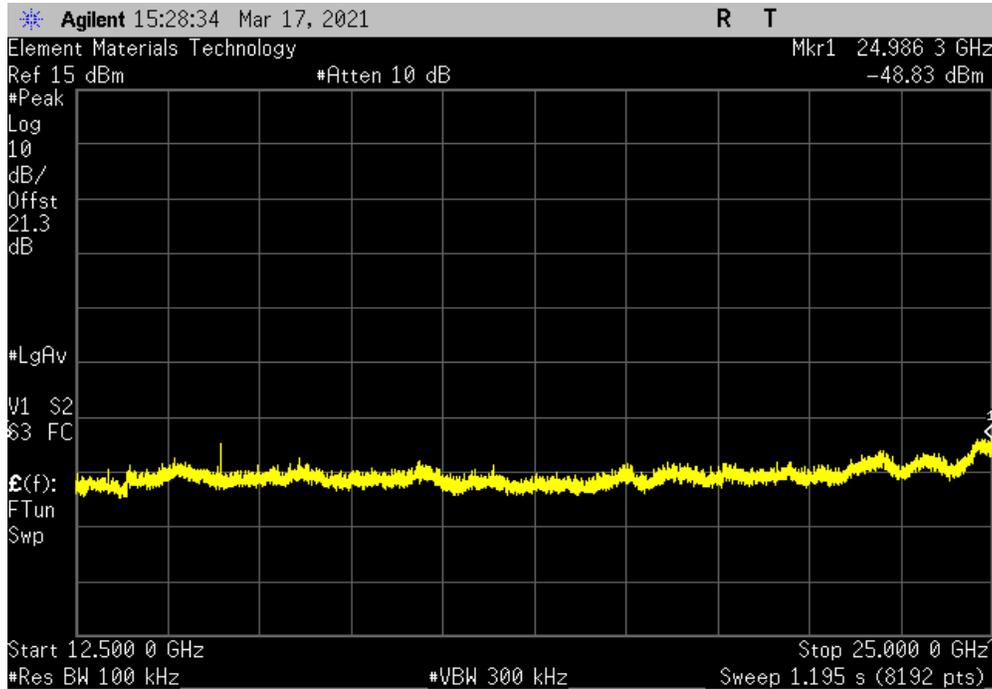


SPURIOUS CONDUCTED EMISSIONS

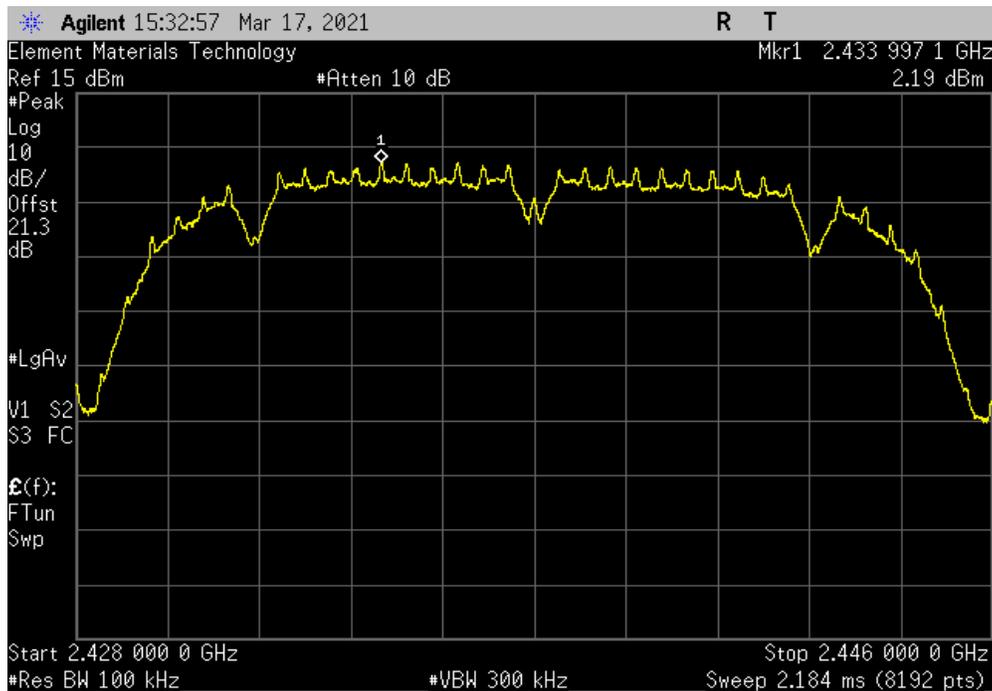


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24986.3	-51.17	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2434	N/A	N/A	N/A	

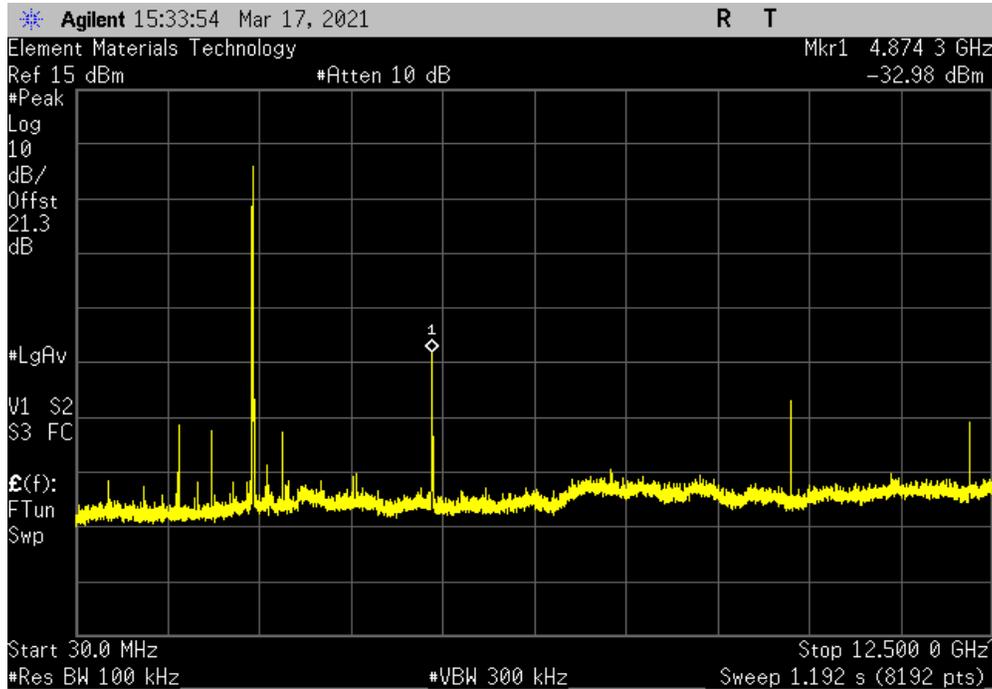


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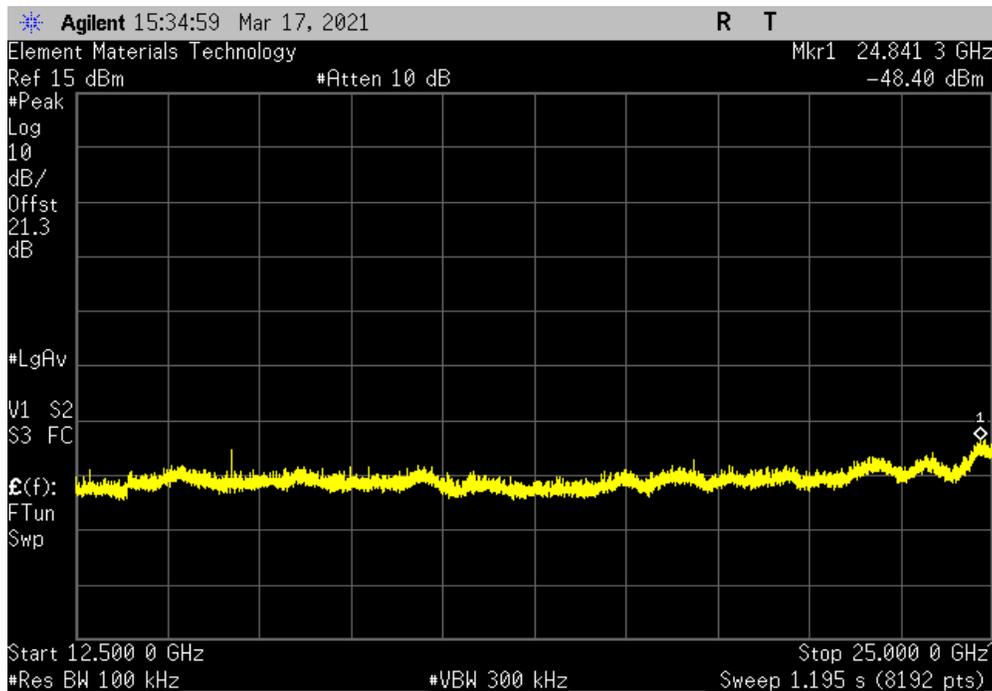


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4874.3	-35.17	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24841.3	-50.59	-30	Pass

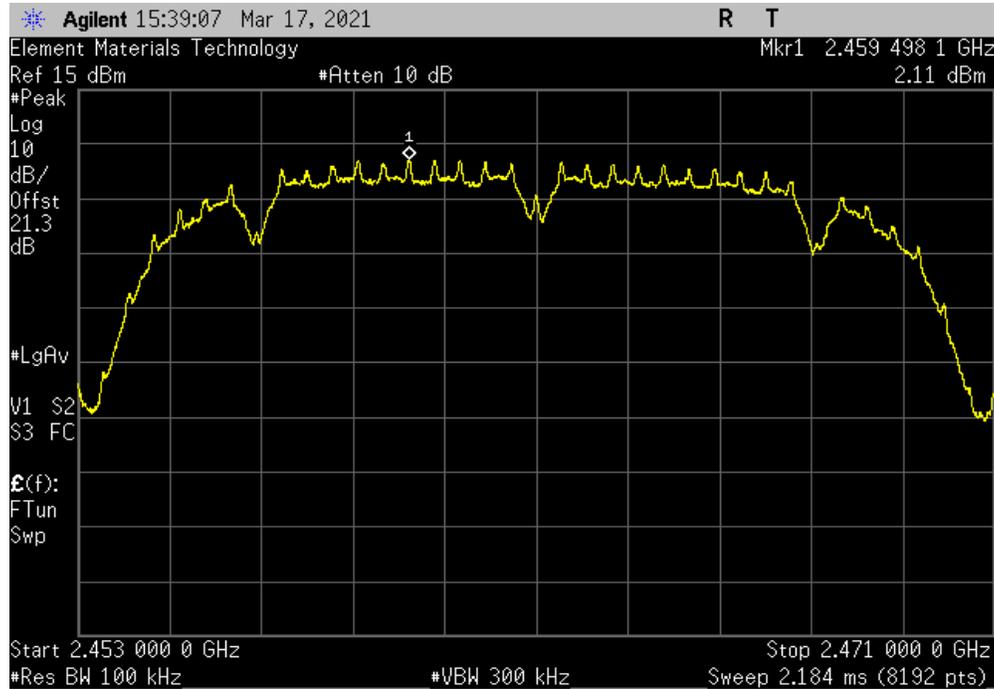


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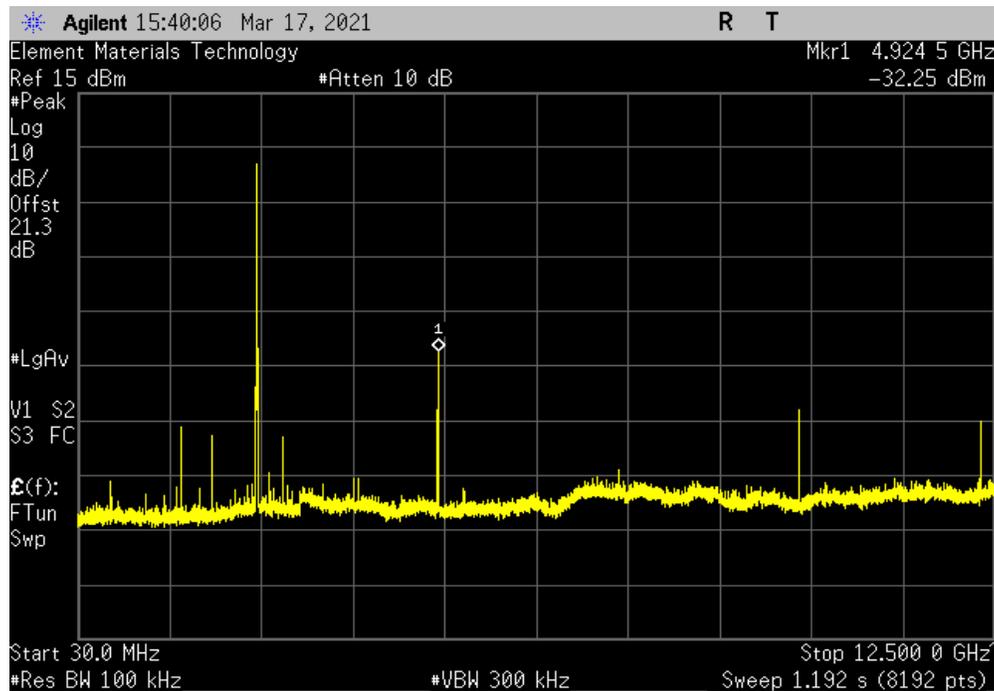


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2459.5	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4924.5	-34.36	-30	Pass	

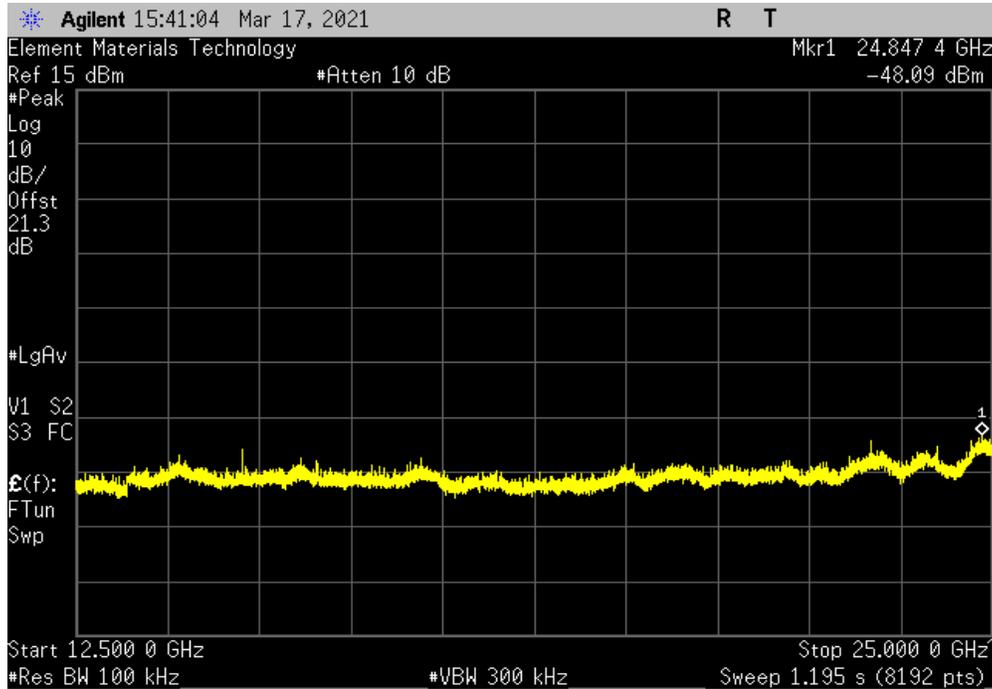


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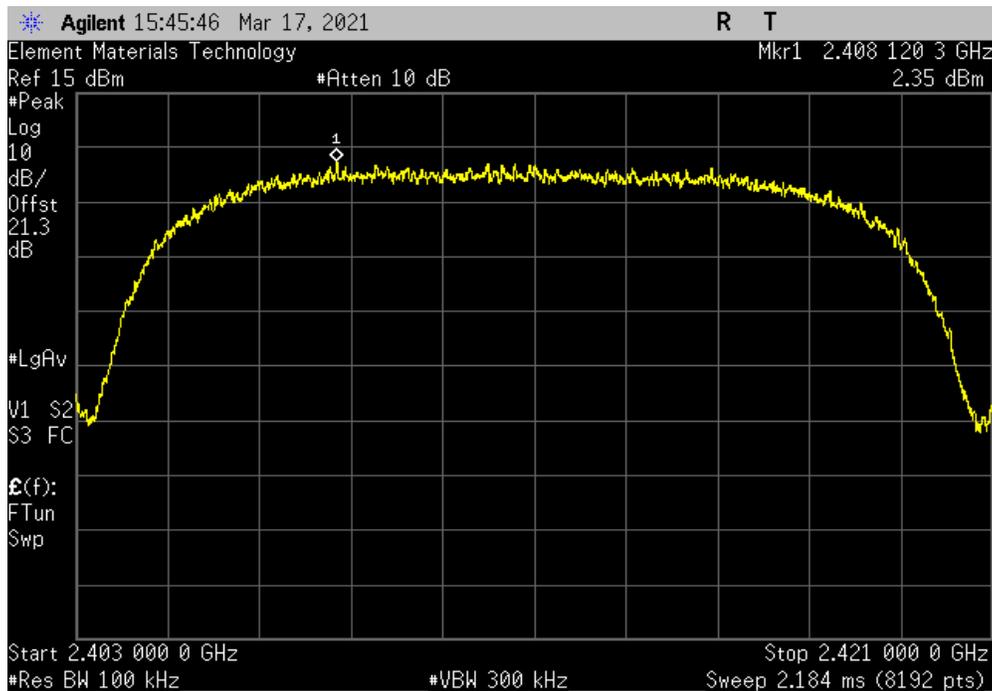


TuTx 2019.08.30.0 XMi 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24847.4	-50.2	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2408.12	N/A	N/A	N/A	

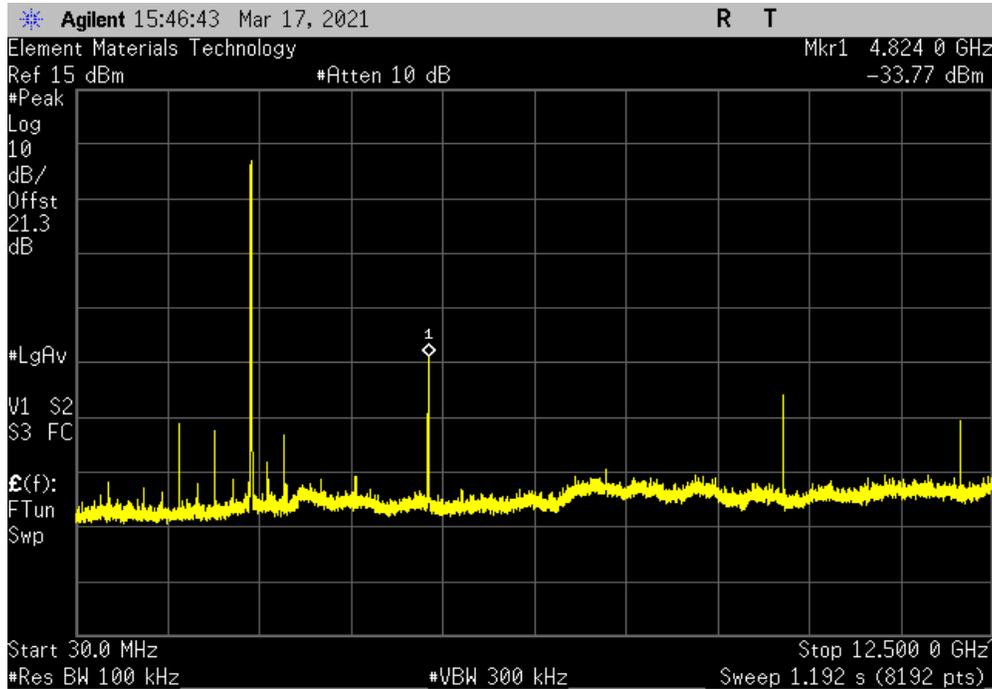


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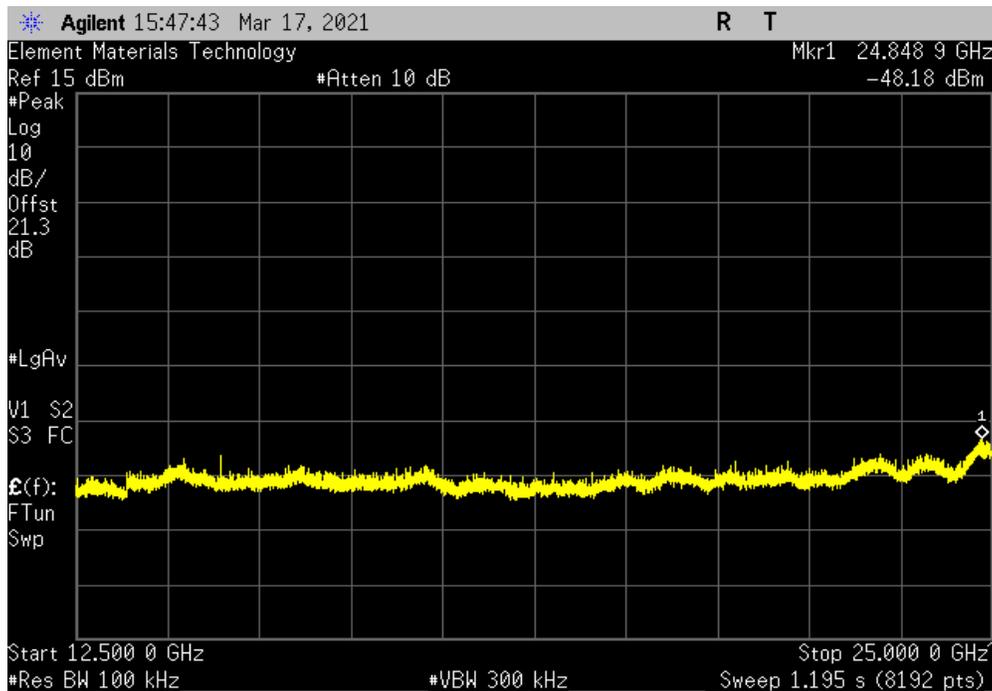


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4824	-36.12	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24848.9	-50.53	-30	Pass

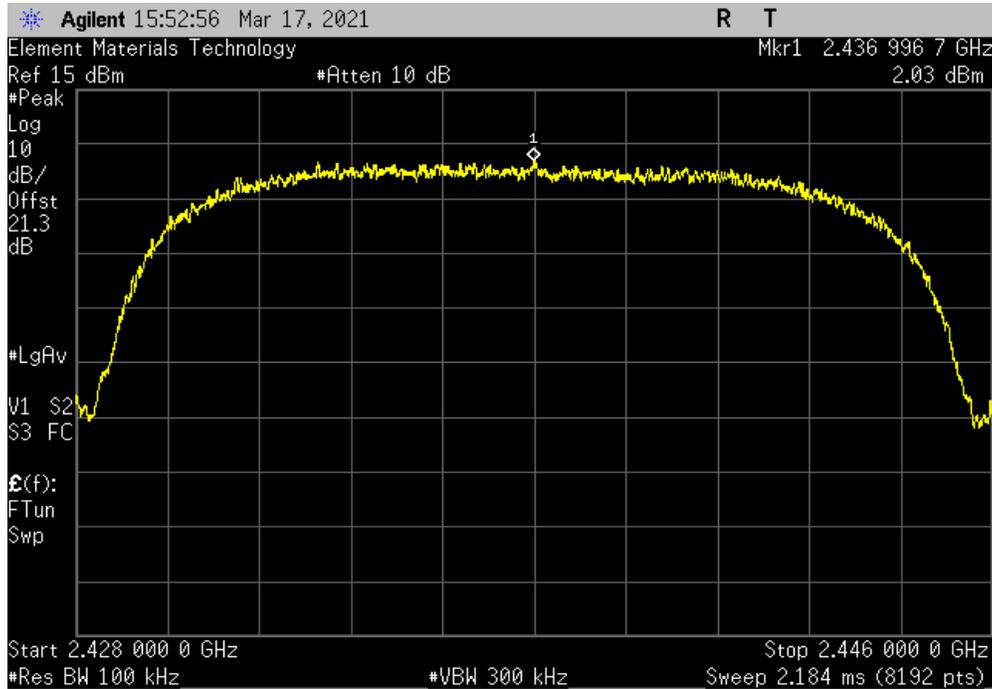


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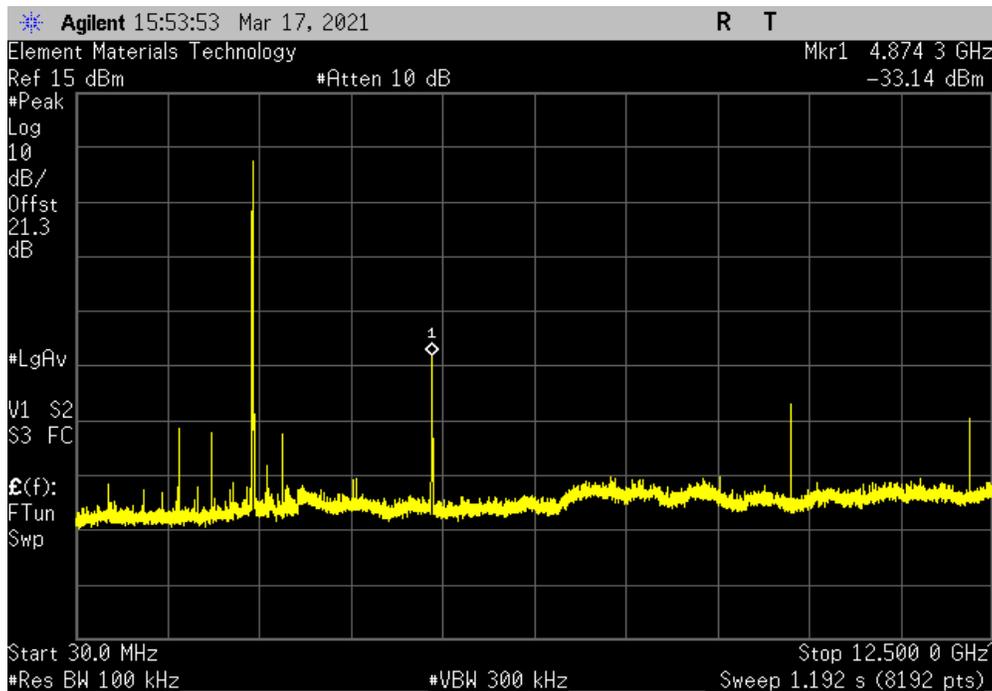


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2437	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4874.3	-35.17	-30	Pass	

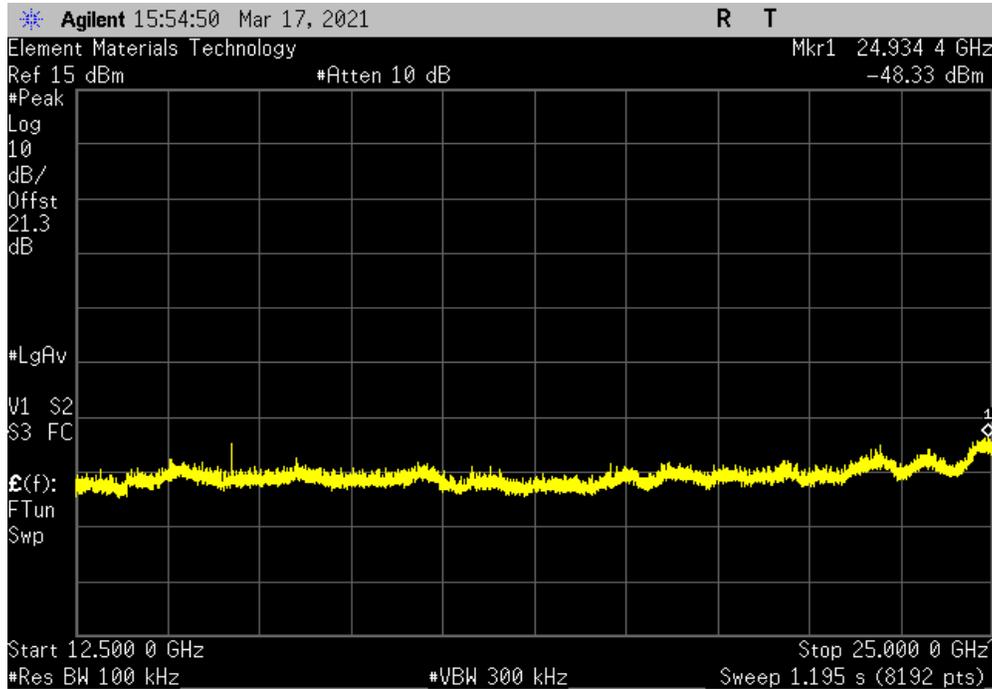


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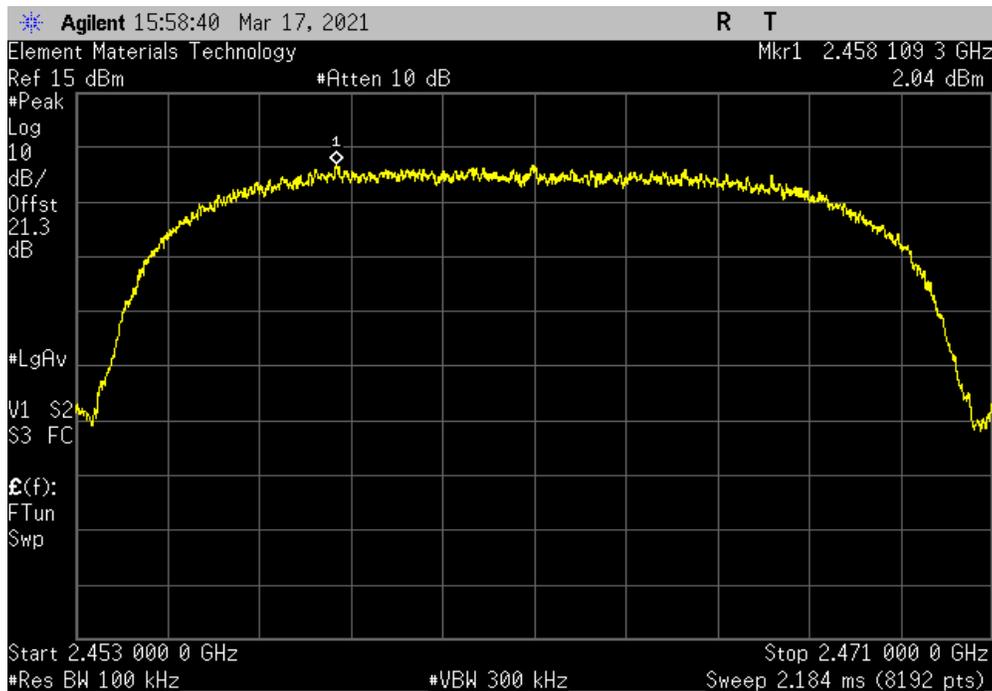


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24934.4	-50.36	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2458.11	N/A	N/A	N/A	

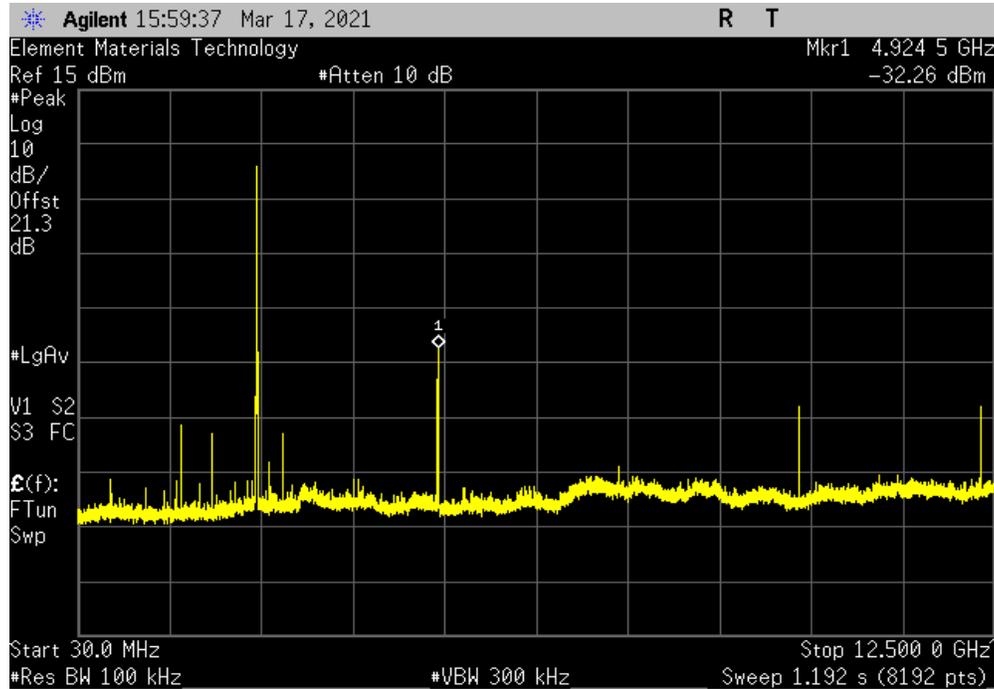


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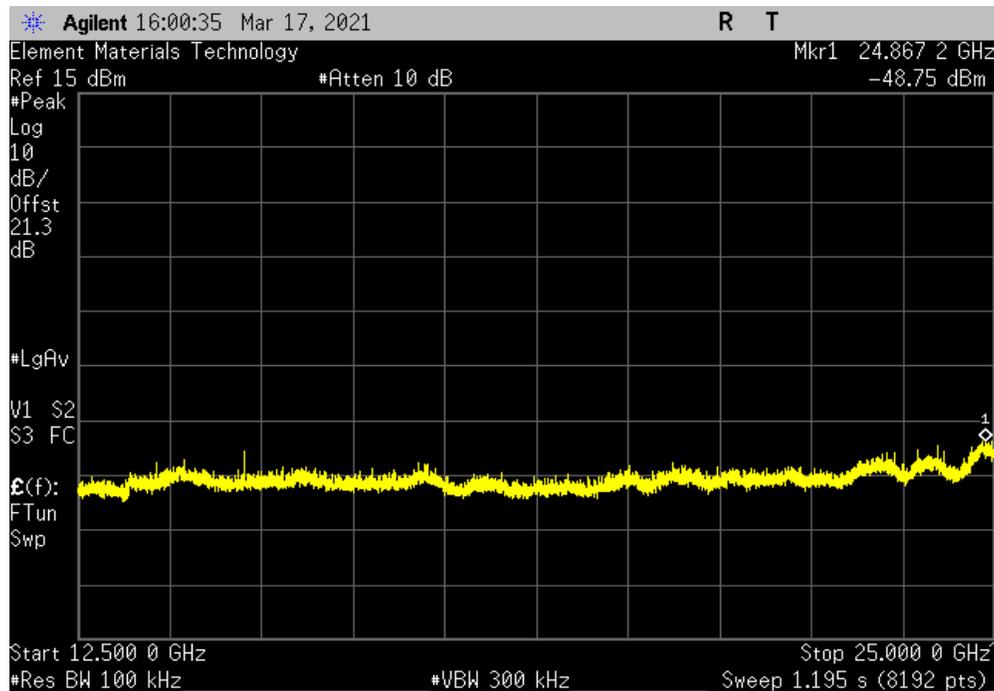


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4924.5	-34.3	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24867.2	-50.79	-30	Pass

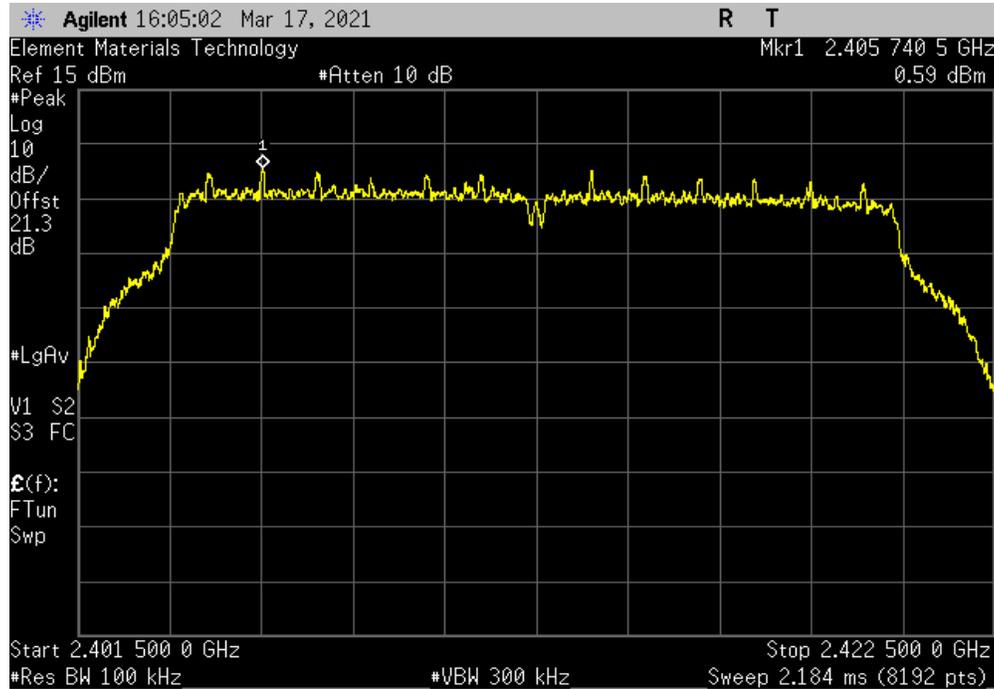


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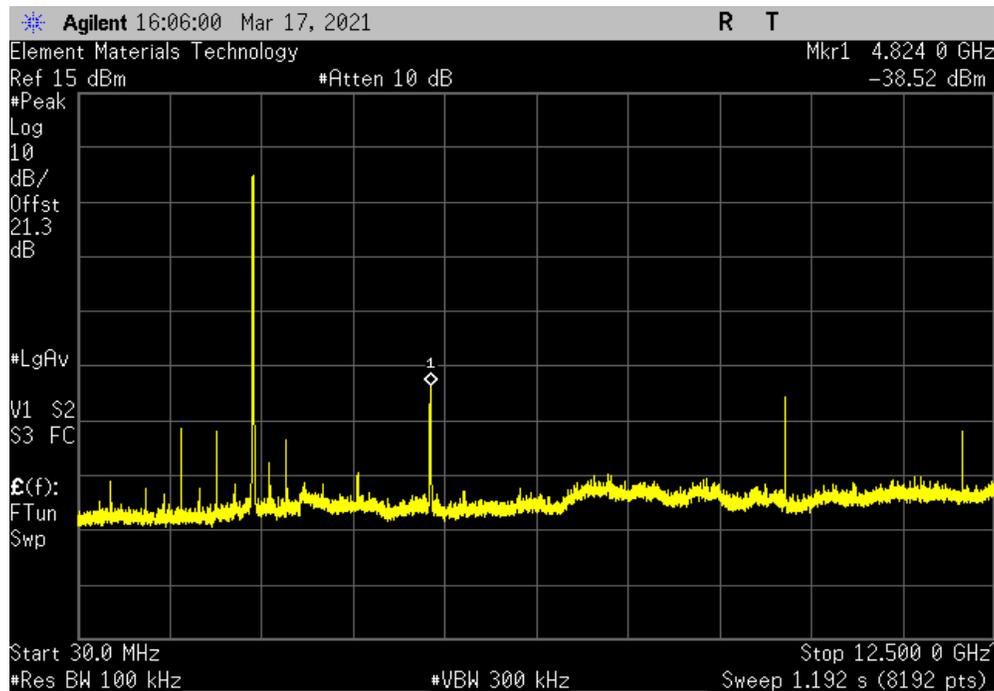


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2405.74	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4824	-39.11	-30	Pass	

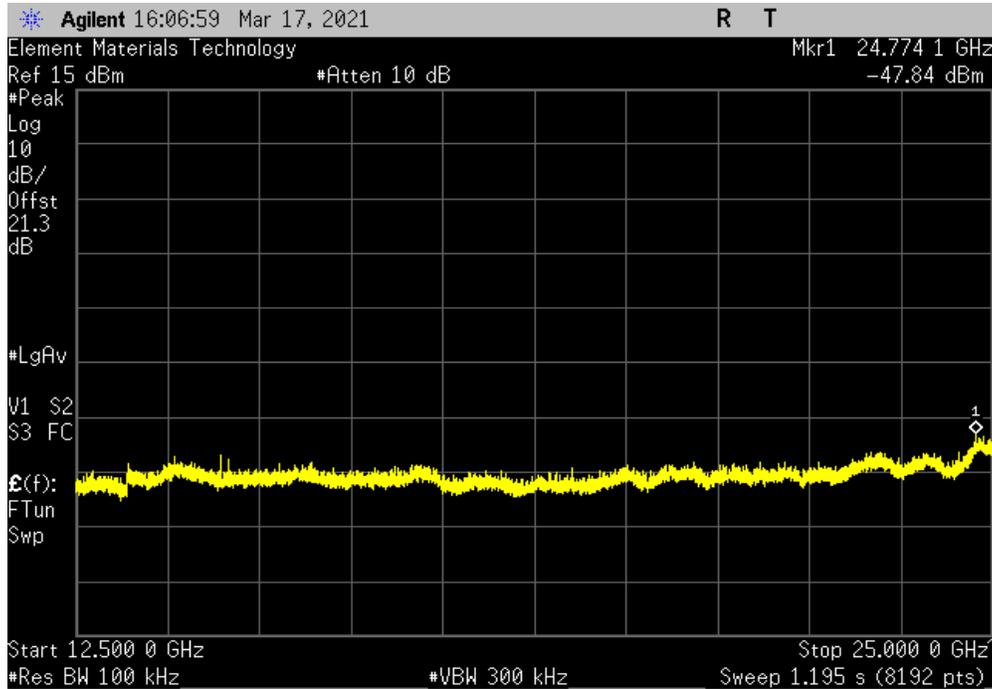


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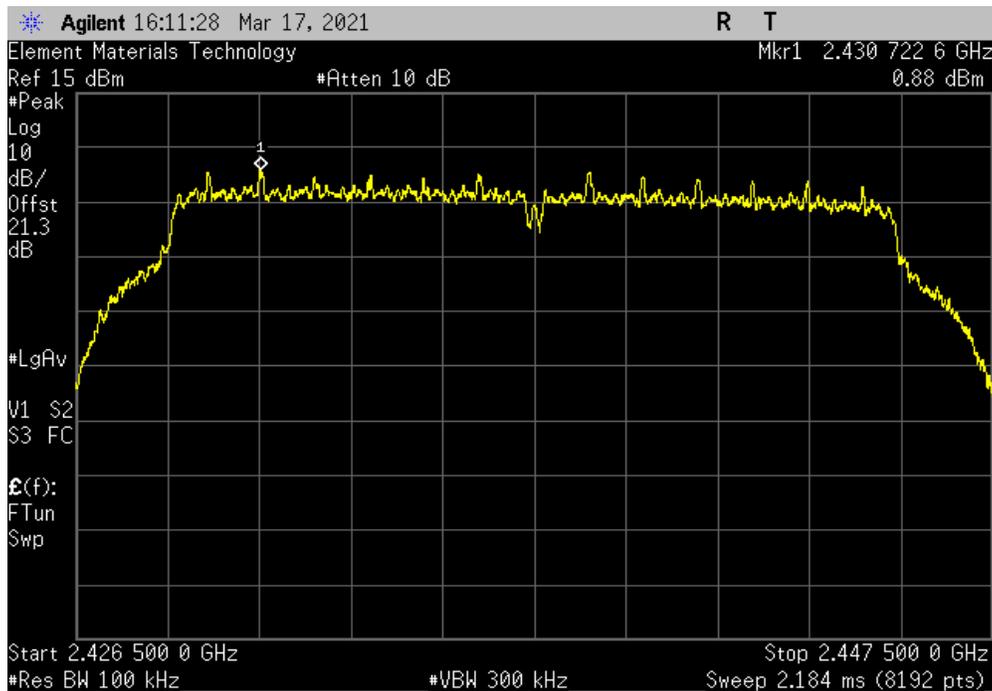


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24774.1	-48.43	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2430.72	N/A	N/A	N/A	

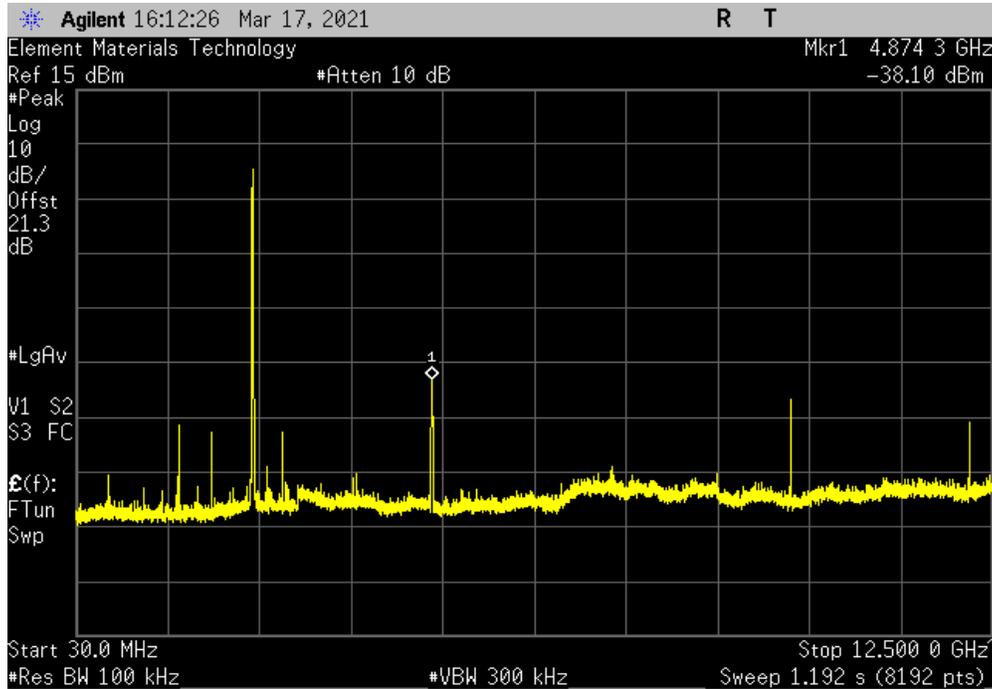


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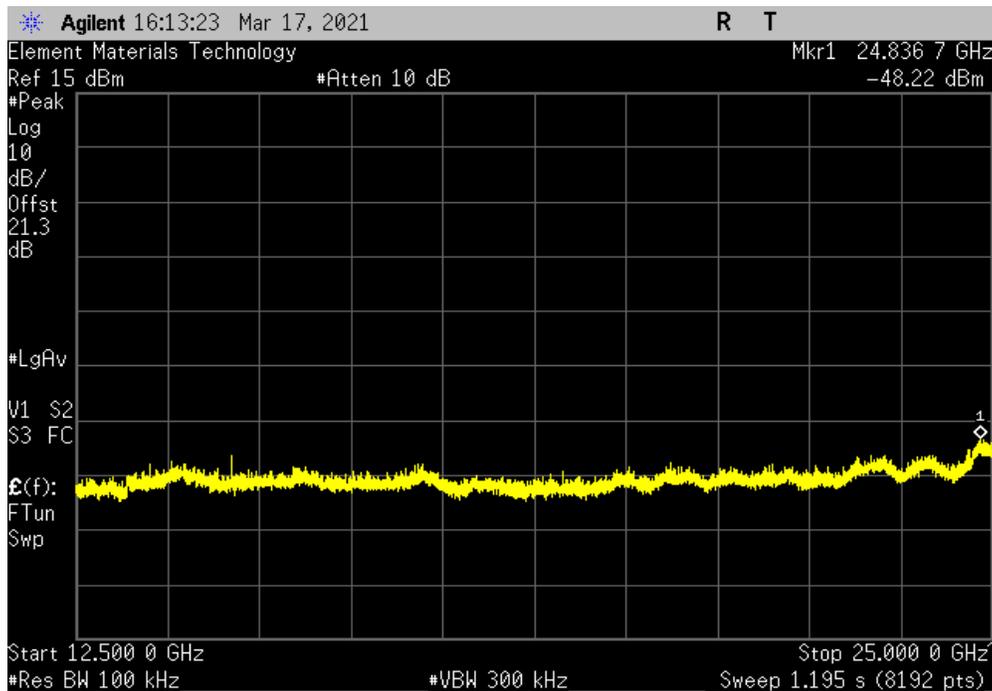


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4874.3	-38.98	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24836.7	-49.11	-30	Pass

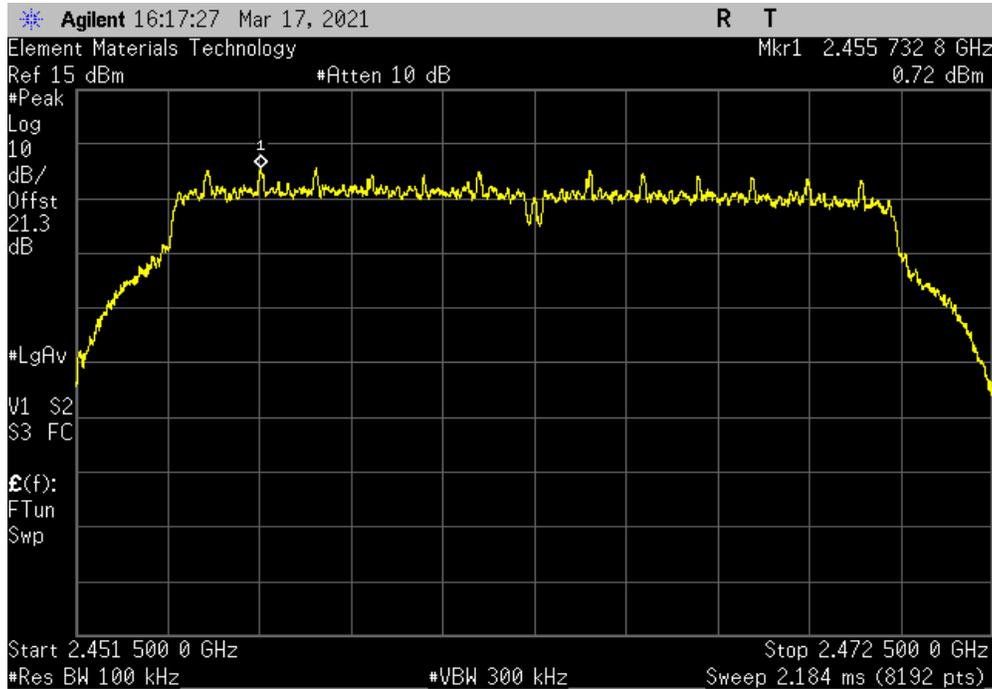


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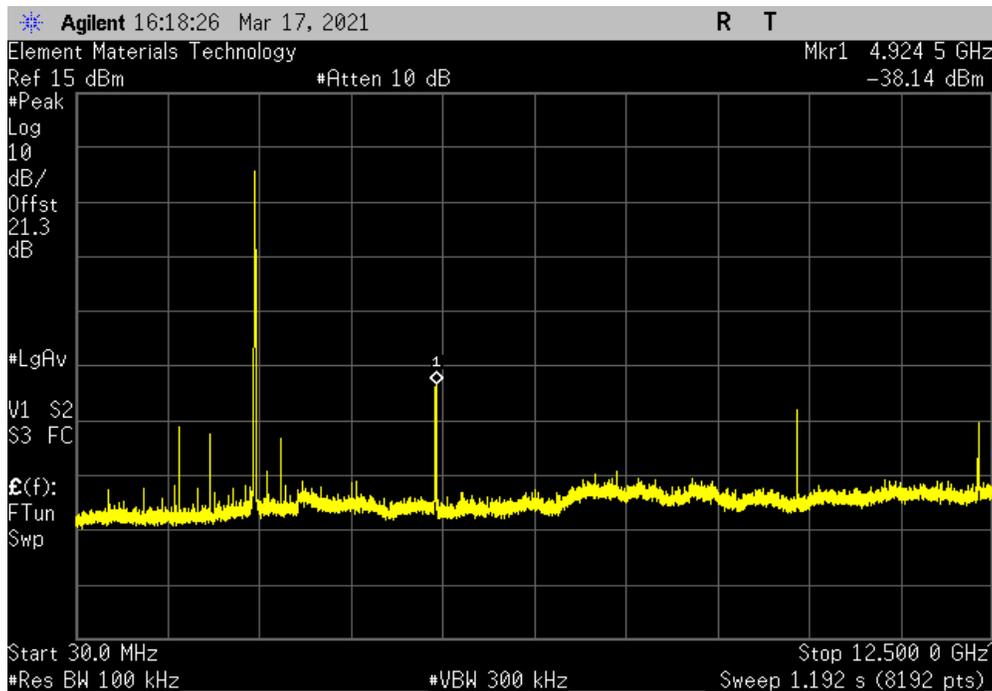


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2455.73	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4924.5	-38.86	-30	Pass	

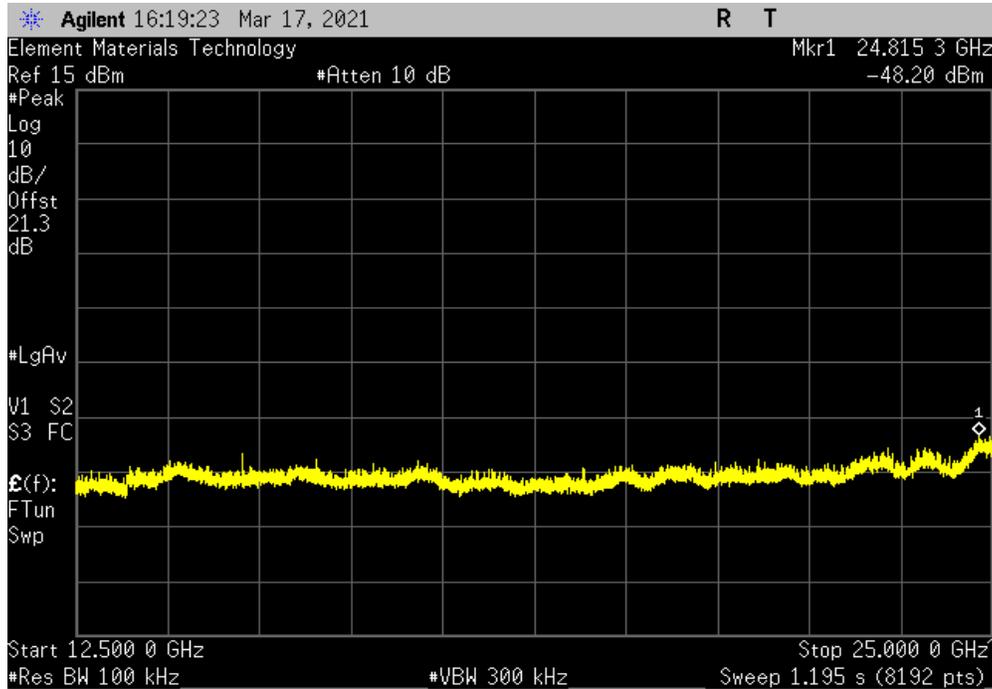


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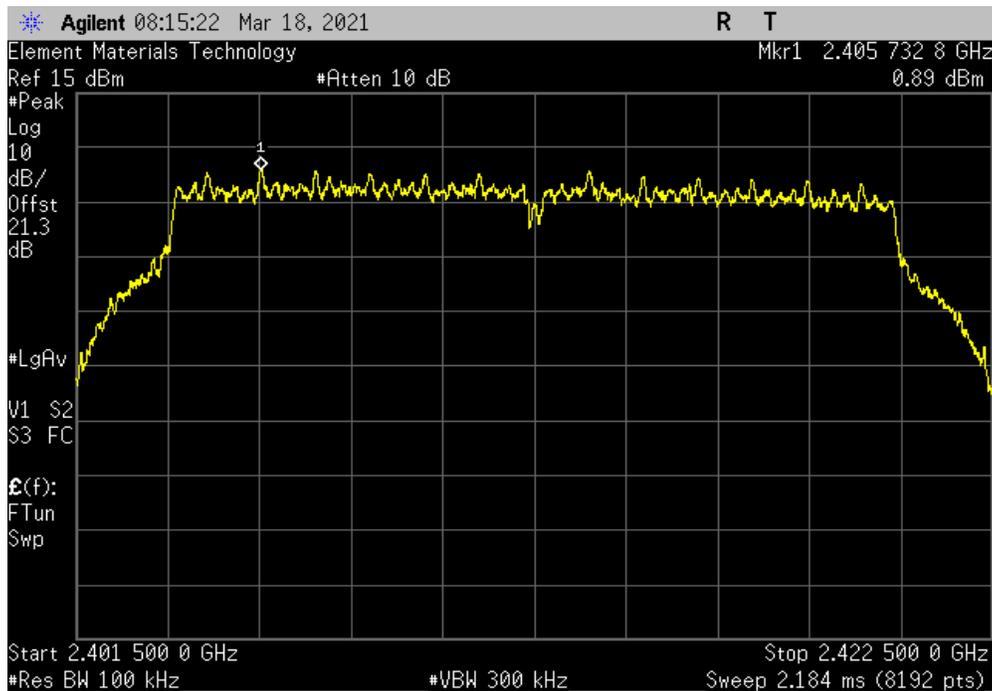


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24815.3	-48.92	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2405.73	N/A	N/A	N/A

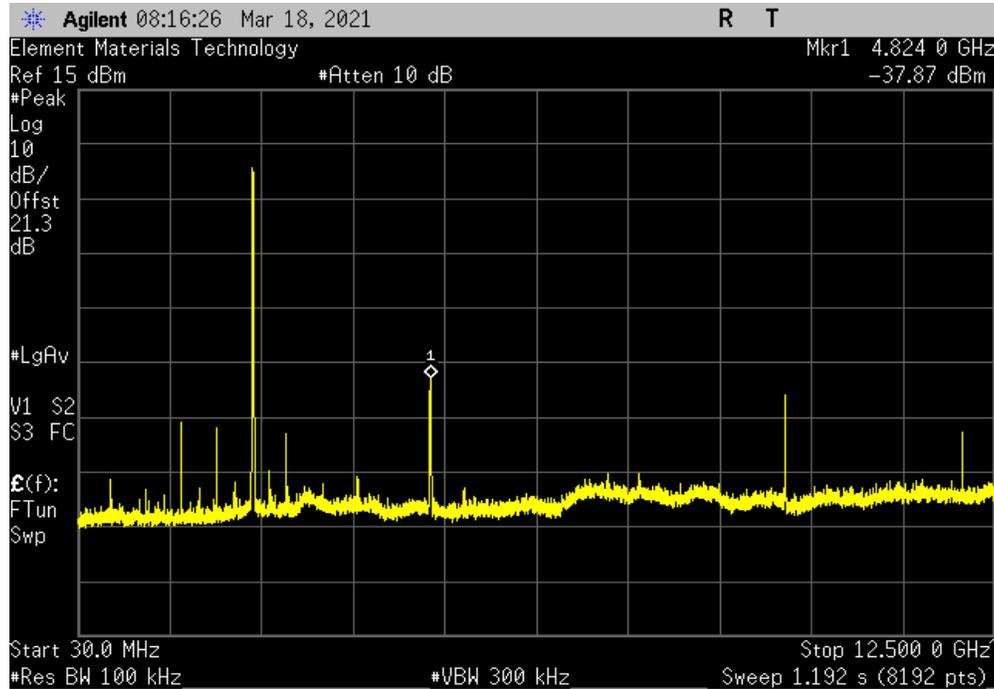


SPURIOUS CONDUCTED EMISSIONS

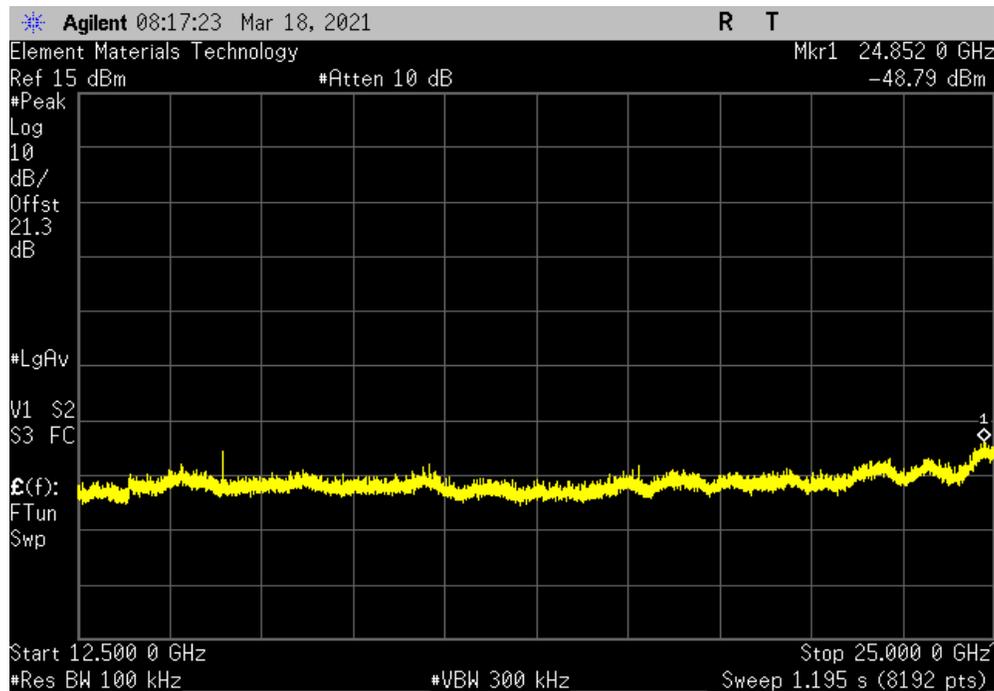


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4824	-38.76	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24852	-49.68	-30	Pass

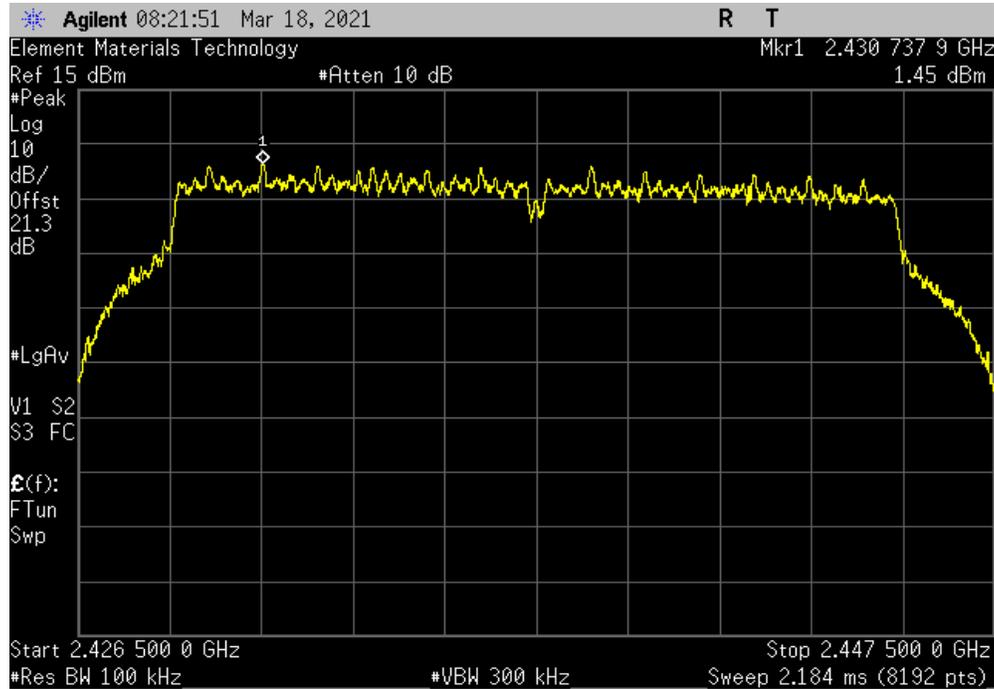


SPURIOUS CONDUCTED EMISSIONS

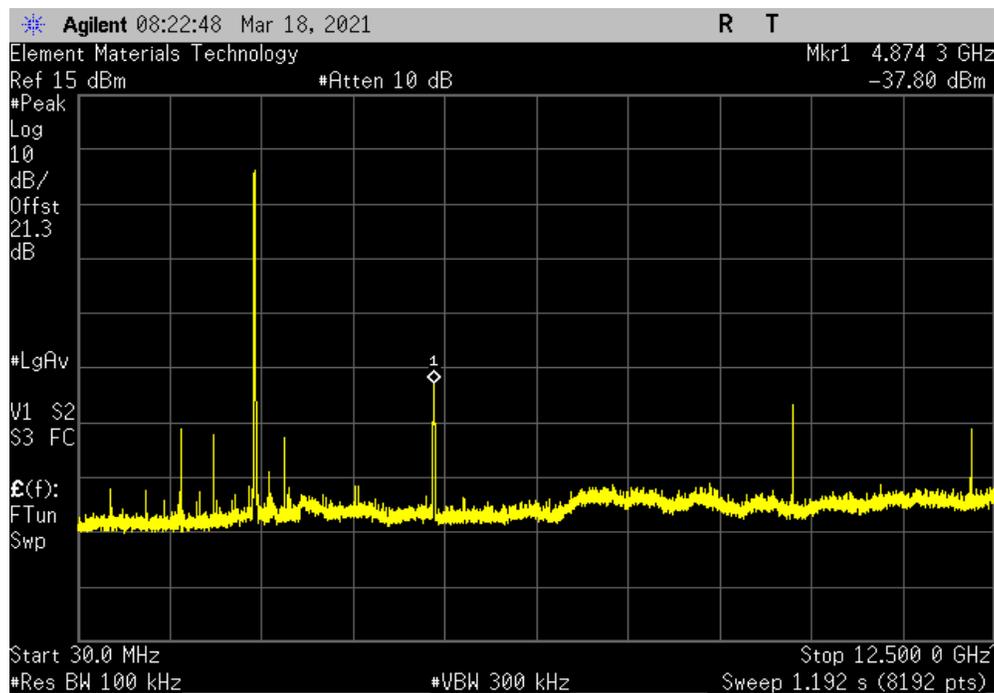


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2430.74	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4874.3	-39.25	-30	Pass	

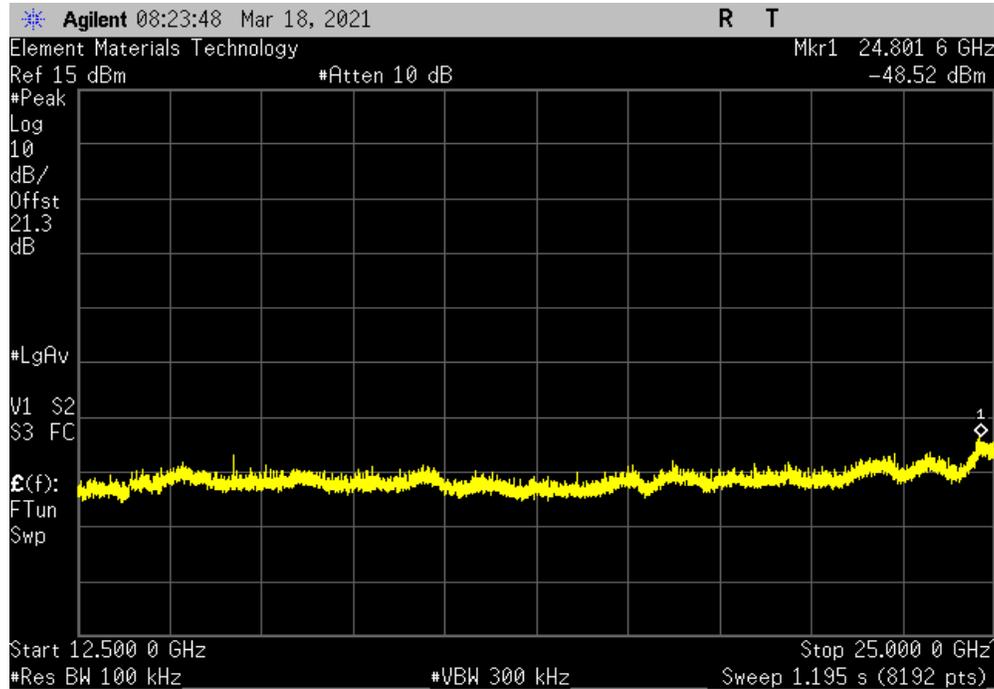


SPURIOUS CONDUCTED EMISSIONS

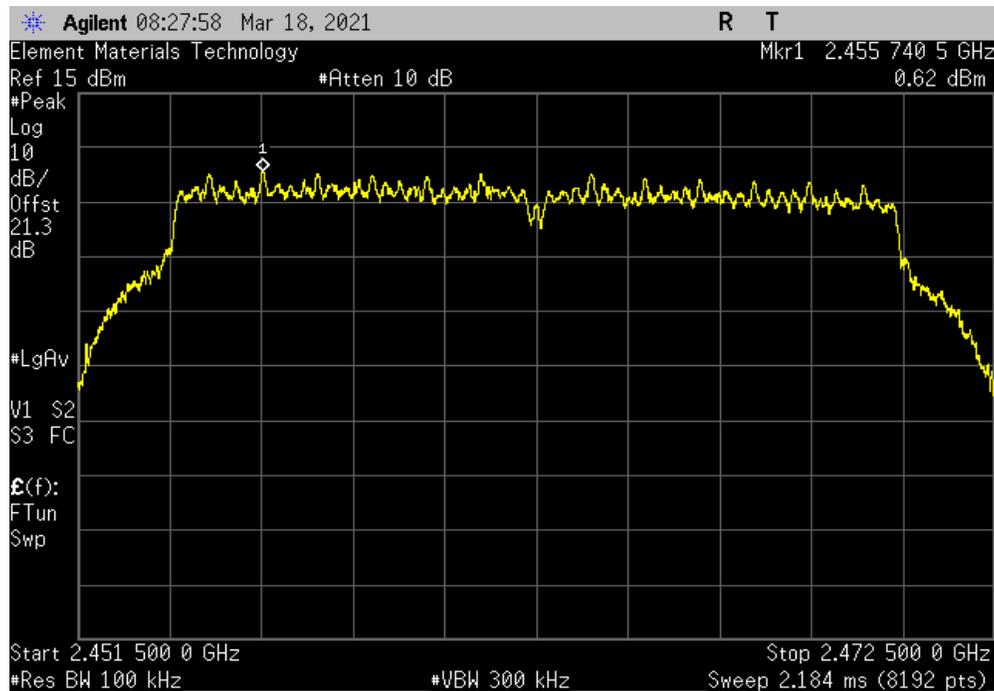


TuTx 2019.08.30.0 XMi 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24801.6	-49.97	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2455.74	N/A	N/A	N/A	

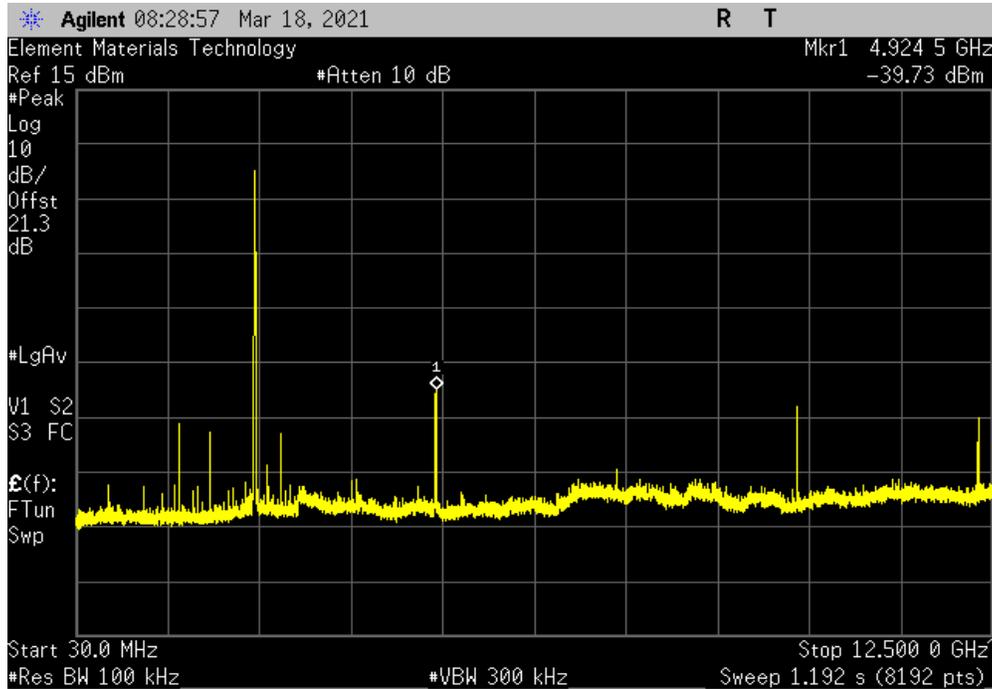


SPURIOUS CONDUCTED EMISSIONS

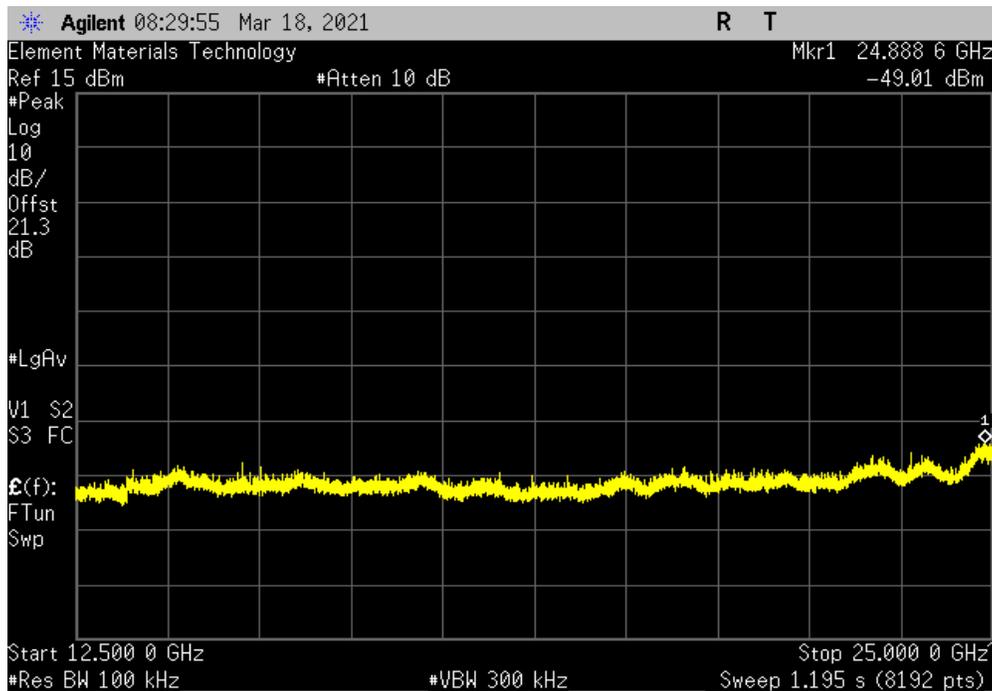


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4924.5	-40.35	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24888.6	-49.63	-30	Pass

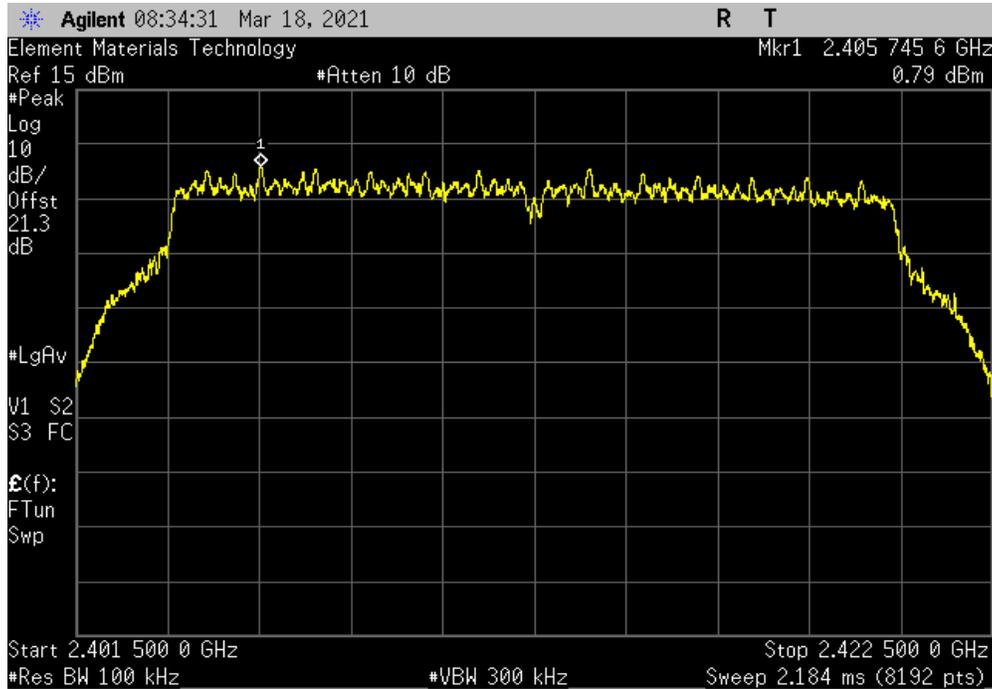


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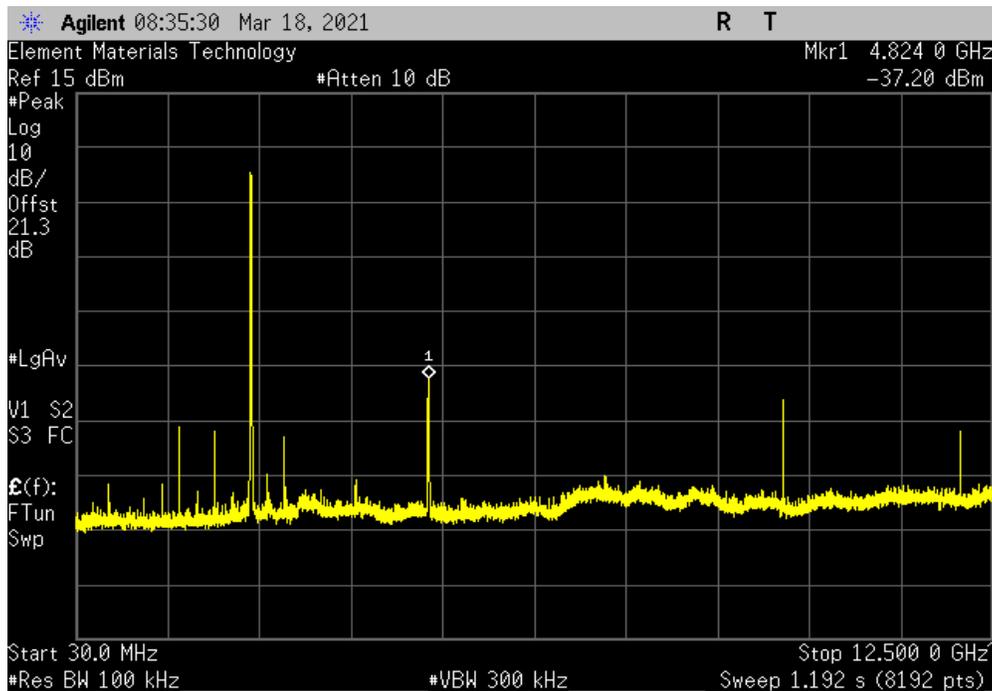


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2405.75	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4824	-37.99	-30	Pass	

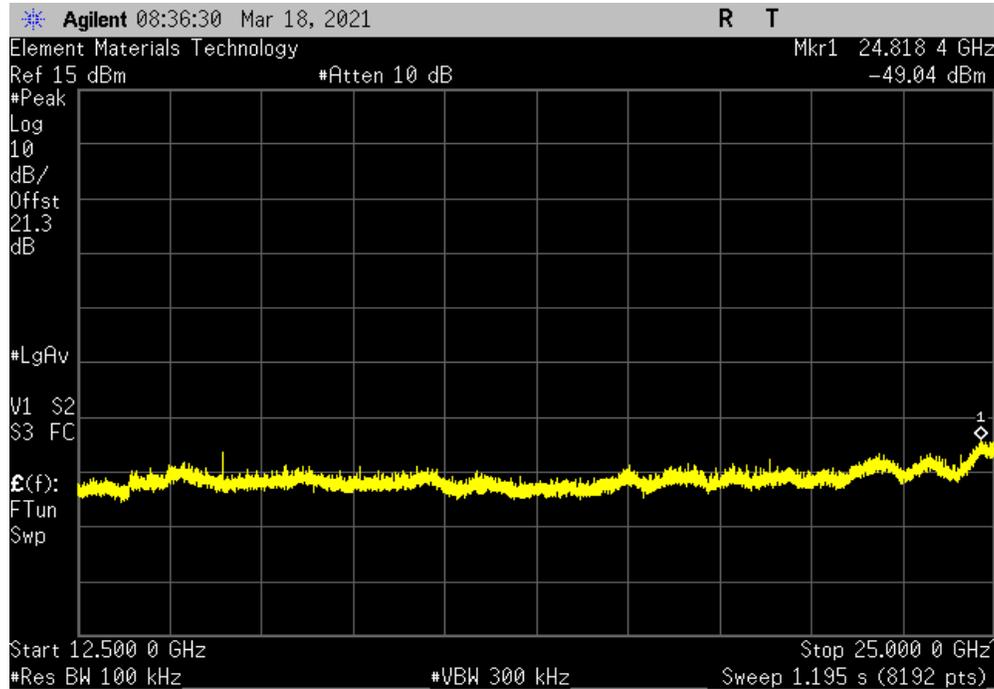


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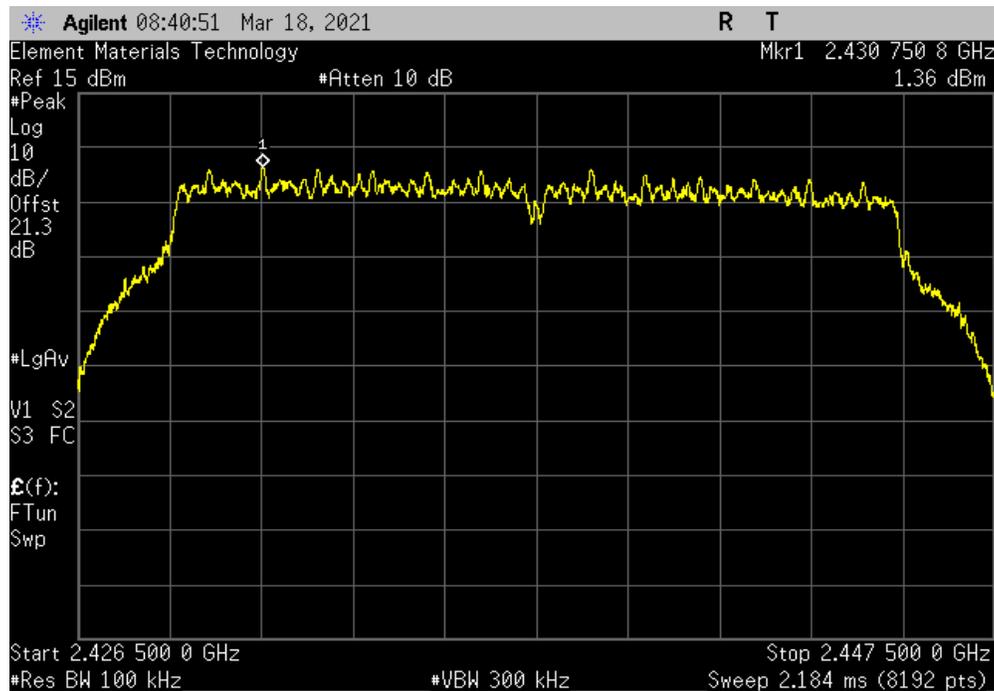


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24818.4	-49.83	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2430.75	N/A	N/A	N/A	

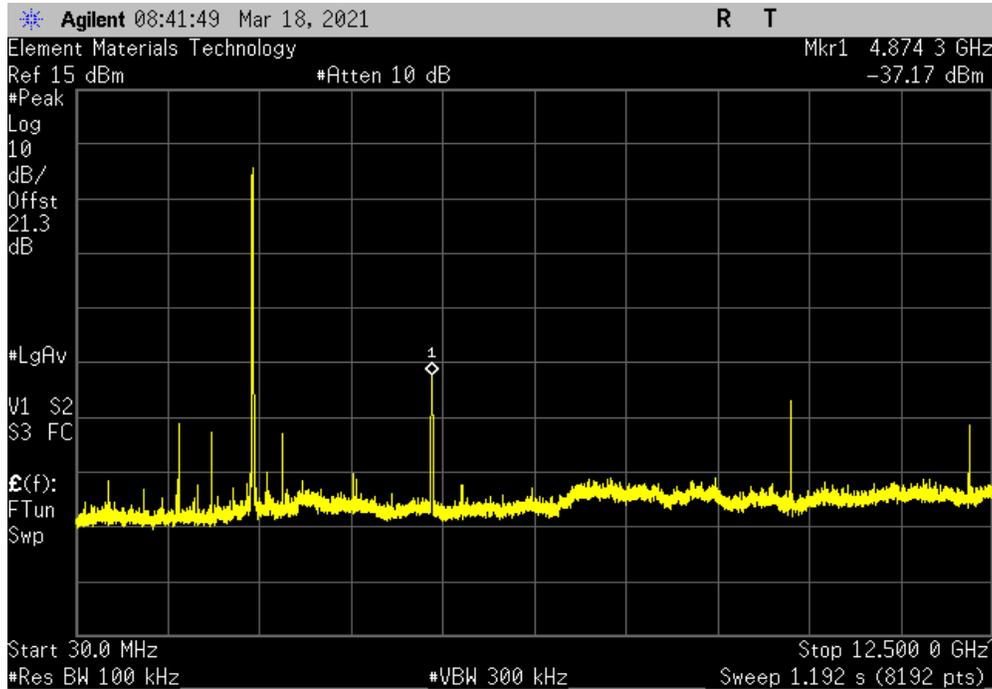


SPURIOUS CONDUCTED EMISSIONS

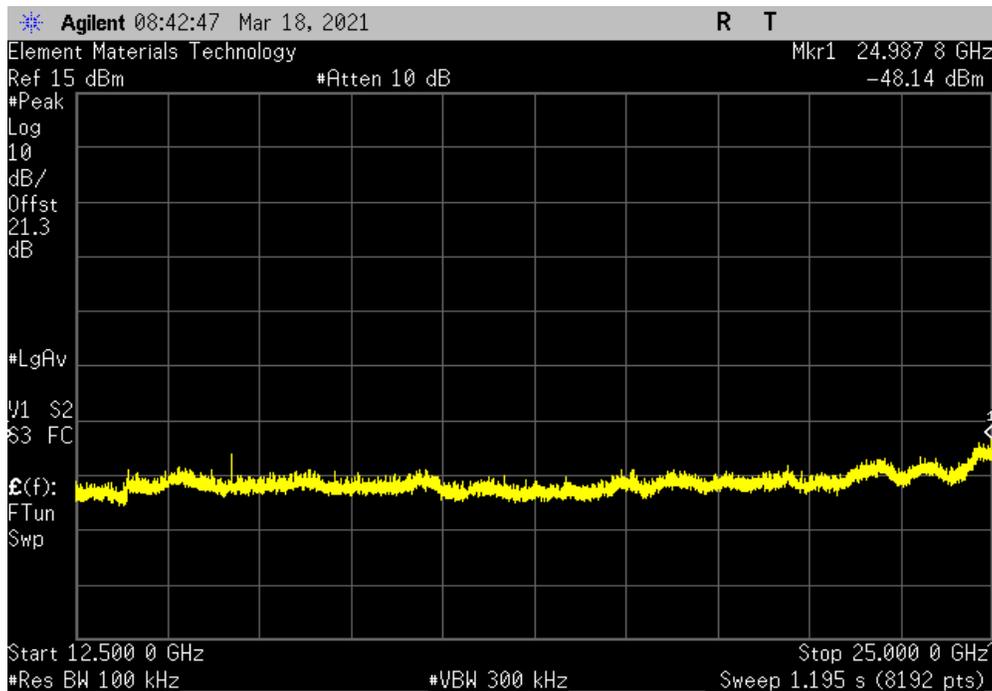


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4874.3	-38.53	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24987.8	-49.5	-30	Pass

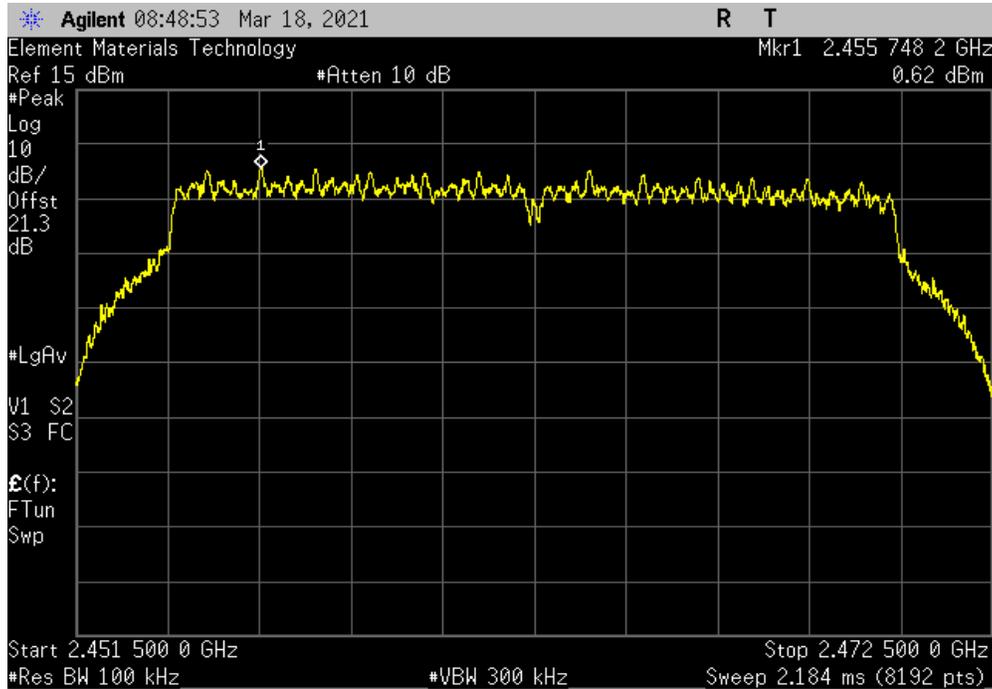


SPURIOUS CONDUCTED EMISSIONS

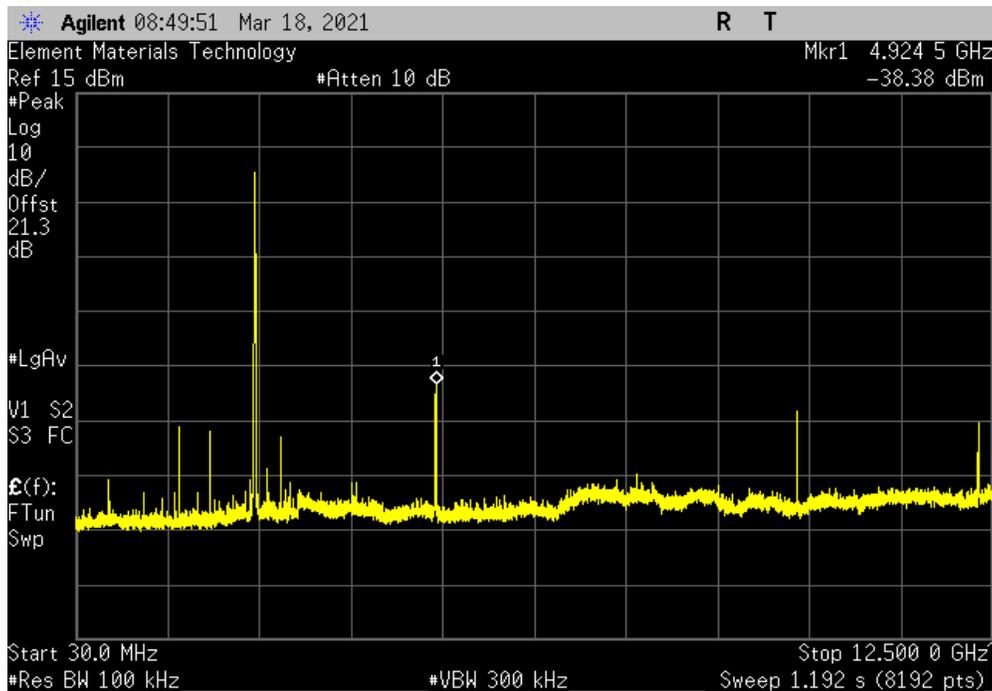


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2455.75	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4924.5	-39	-30	Pass	

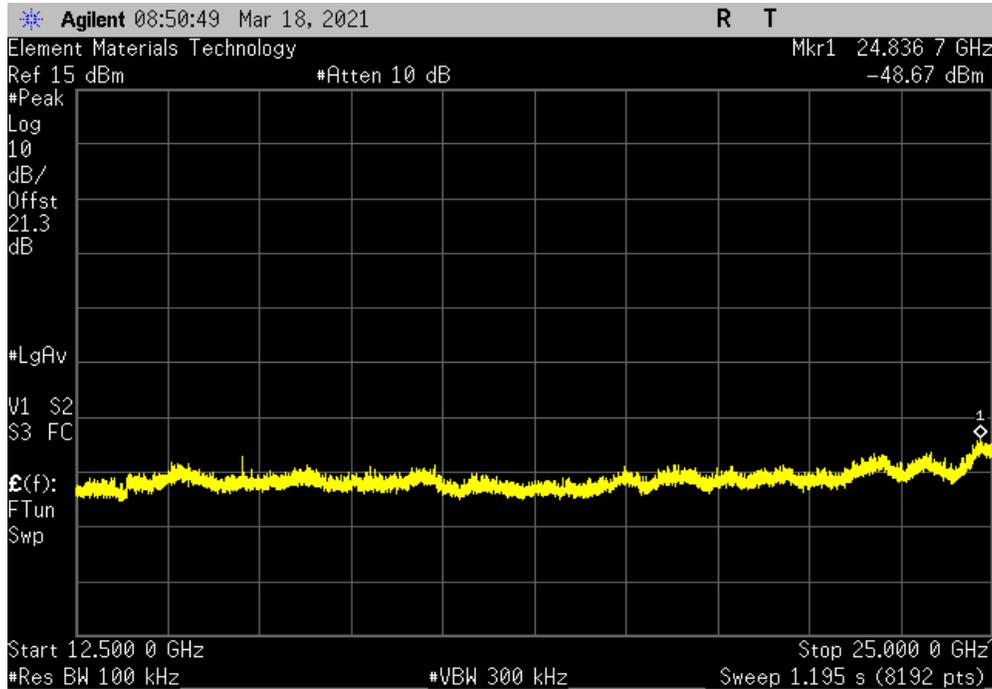


SPURIOUS CONDUCTED EMISSIONS

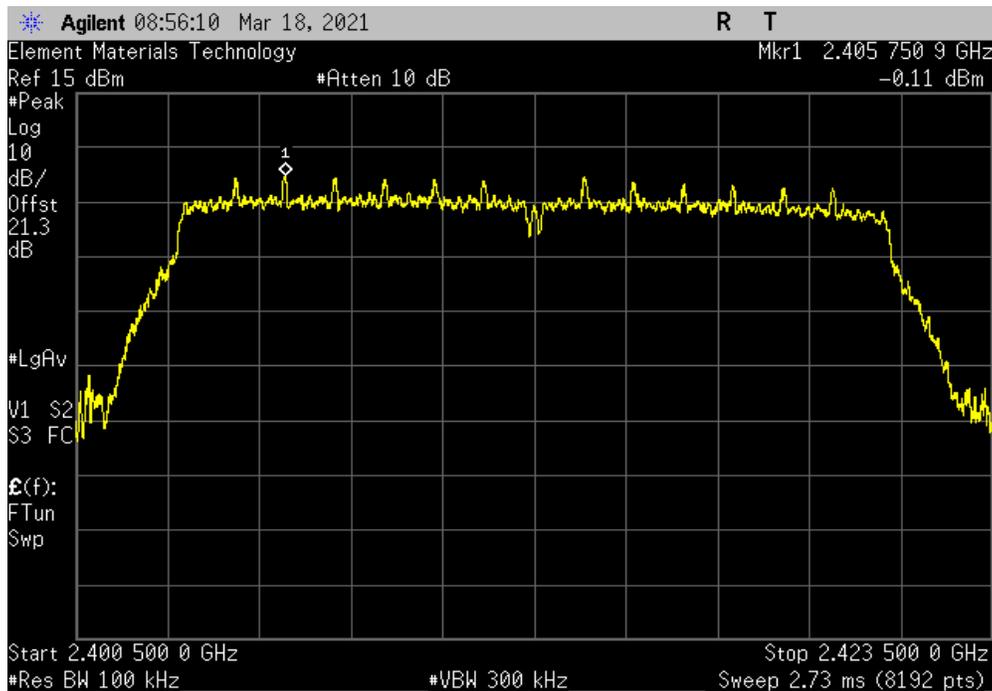


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24836.7	-49.29	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2405.75	N/A	N/A	N/A

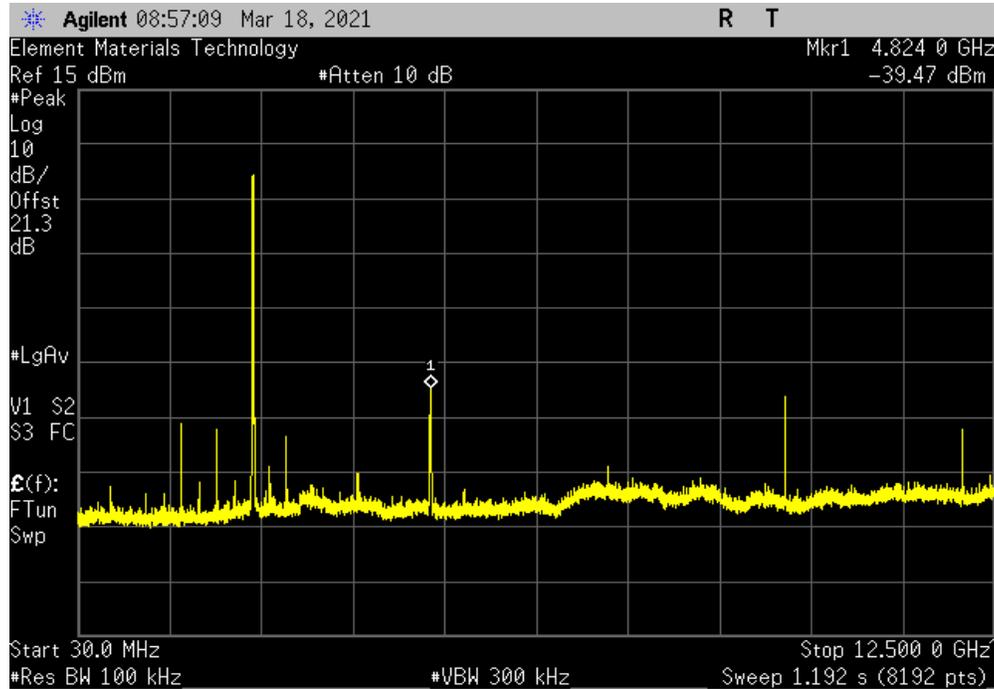


SPURIOUS CONDUCTED EMISSIONS

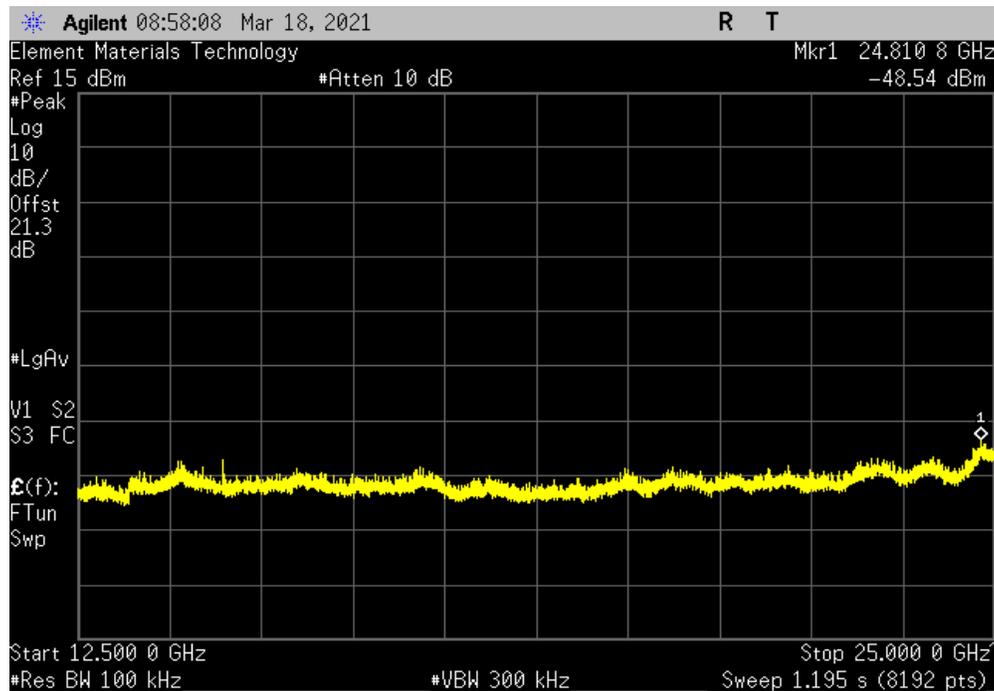


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4824	-39.36	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24810.8	-48.43	-30	Pass

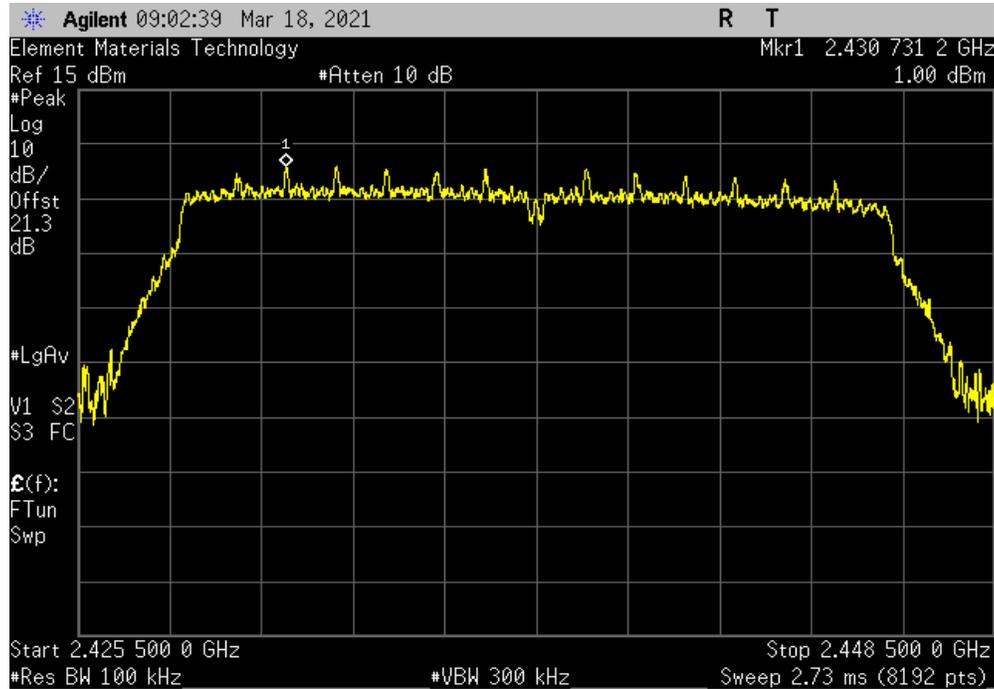


SPURIOUS CONDUCTED EMISSIONS

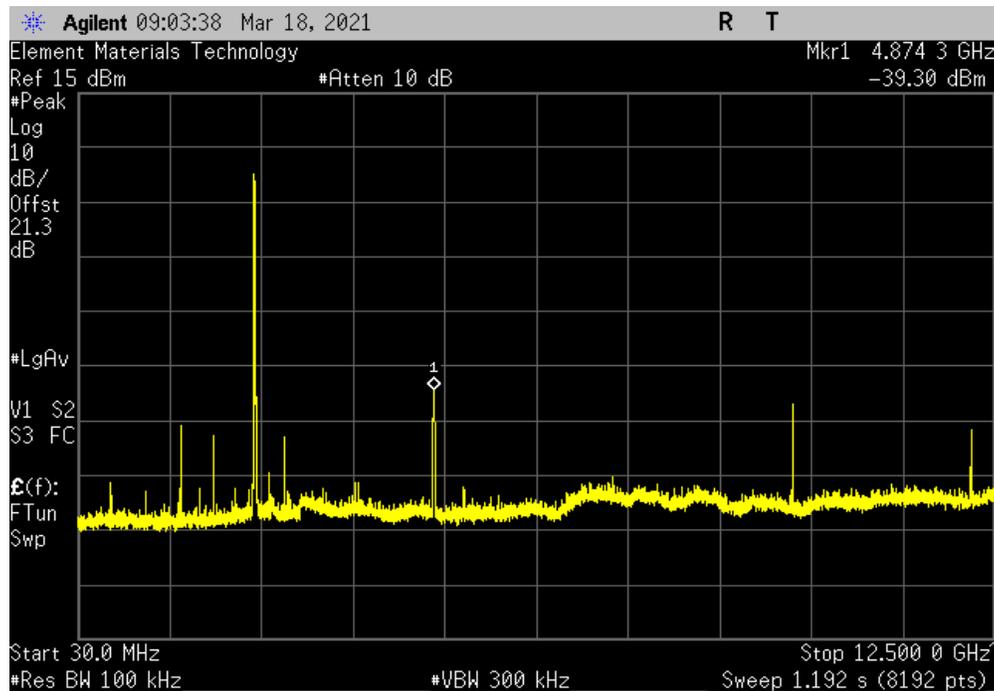


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2430.73	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4874.3	-40.3	-30	Pass	

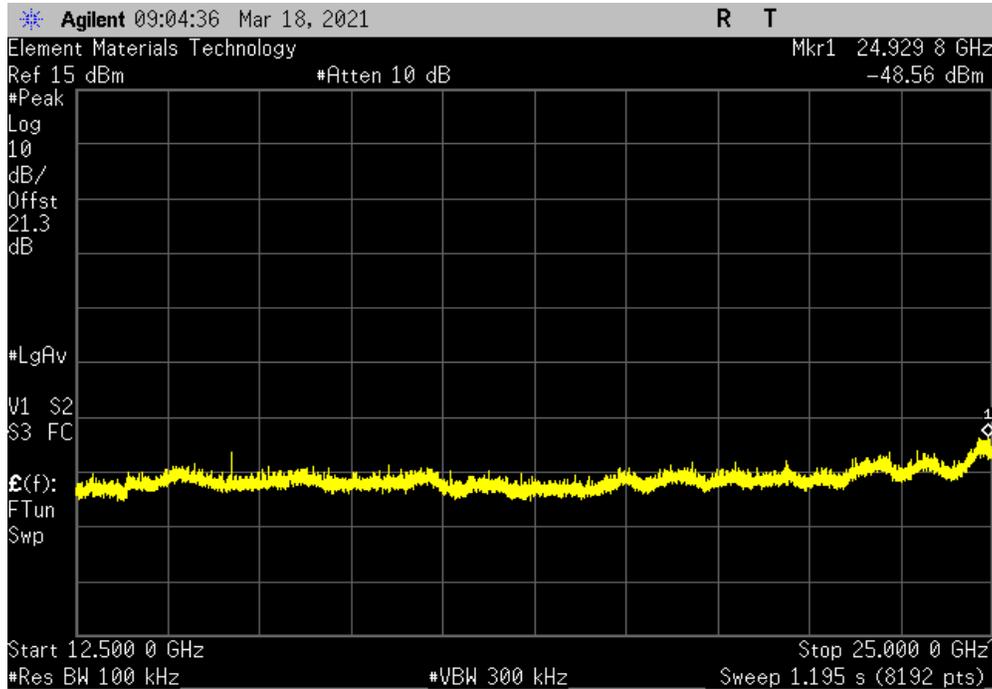


SPURIOUS CONDUCTED EMISSIONS

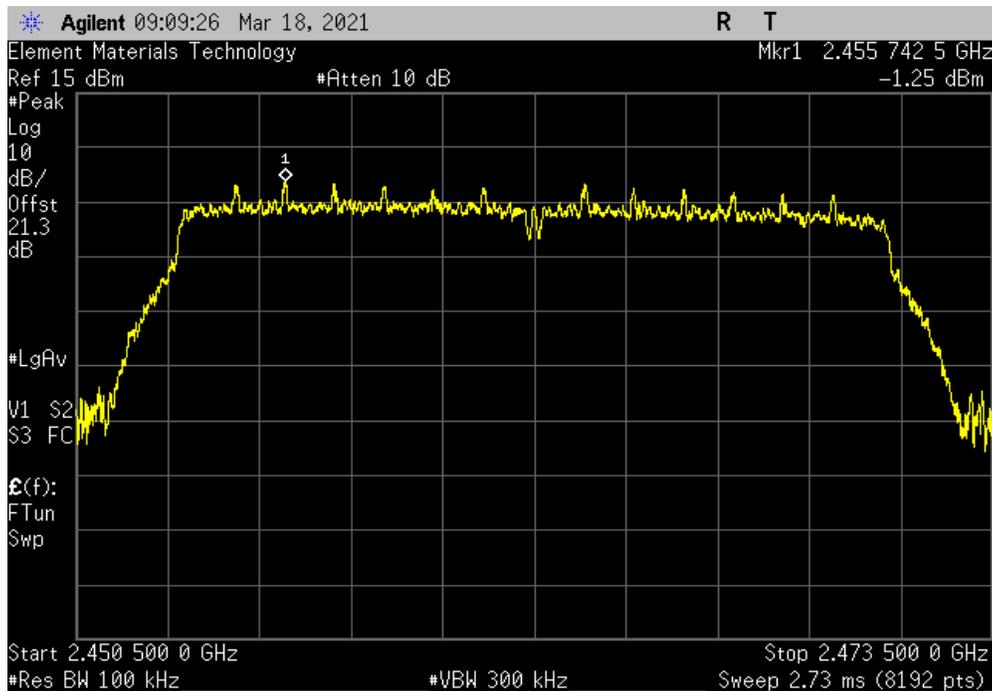


TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24929.8	-49.56	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2455.74	N/A	N/A	N/A	

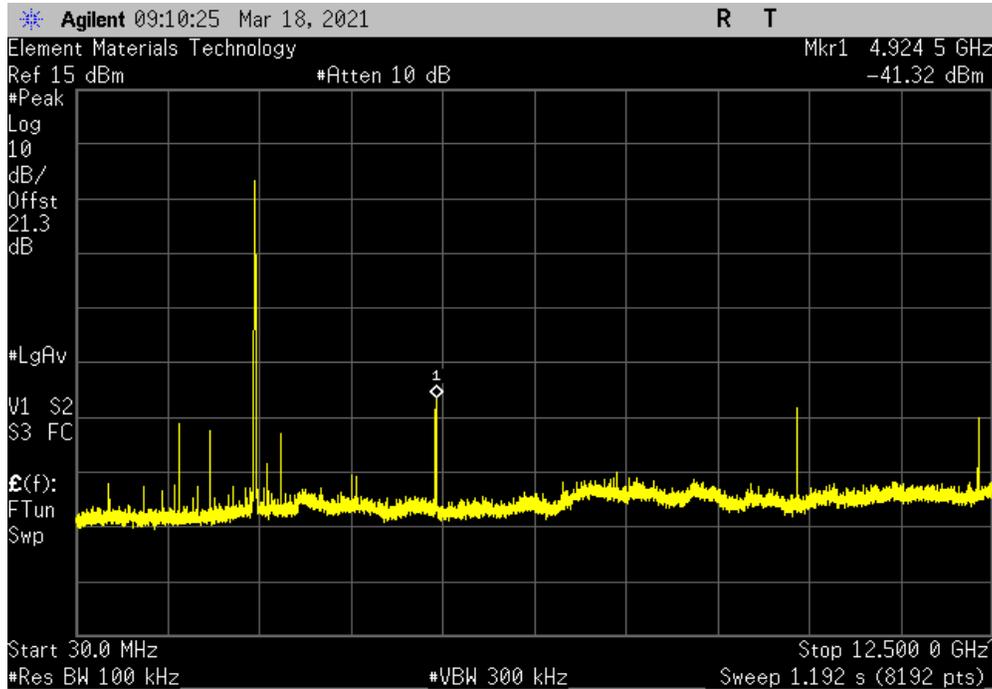


SPURIOUS CONDUCTED EMISSIONS

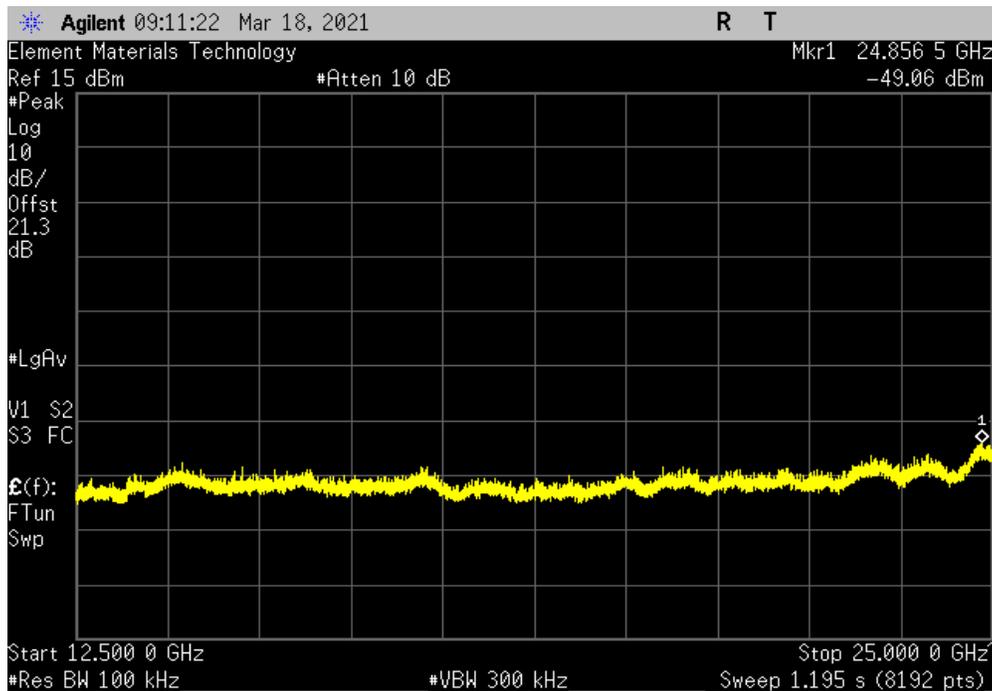


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	4924.5	-40.07	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24856.5	-47.81	-30	Pass

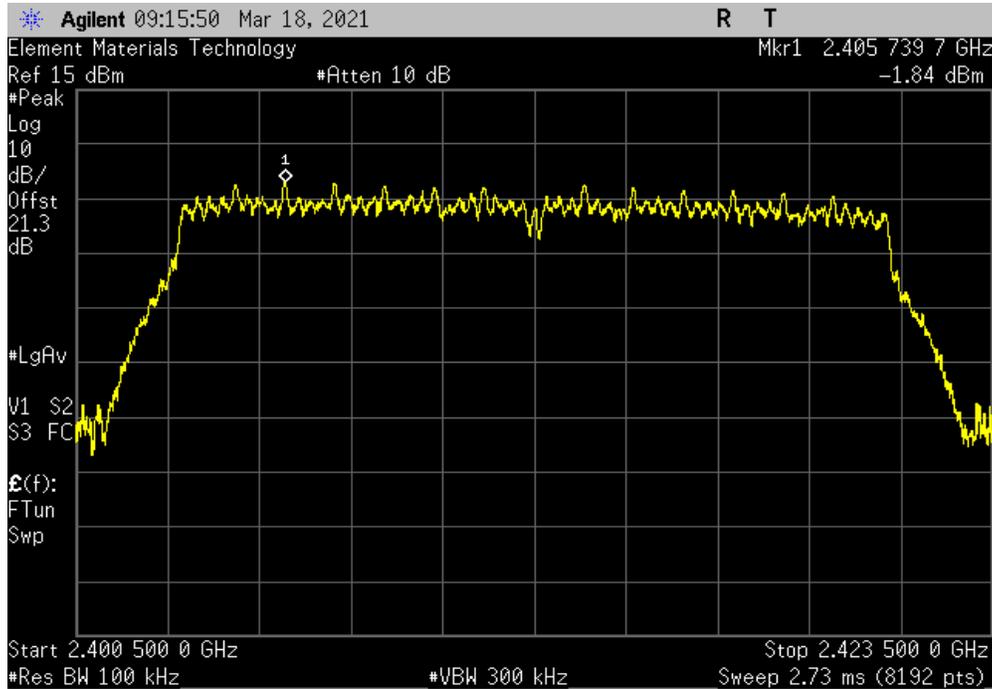


SPURIOUS CONDUCTED EMISSIONS

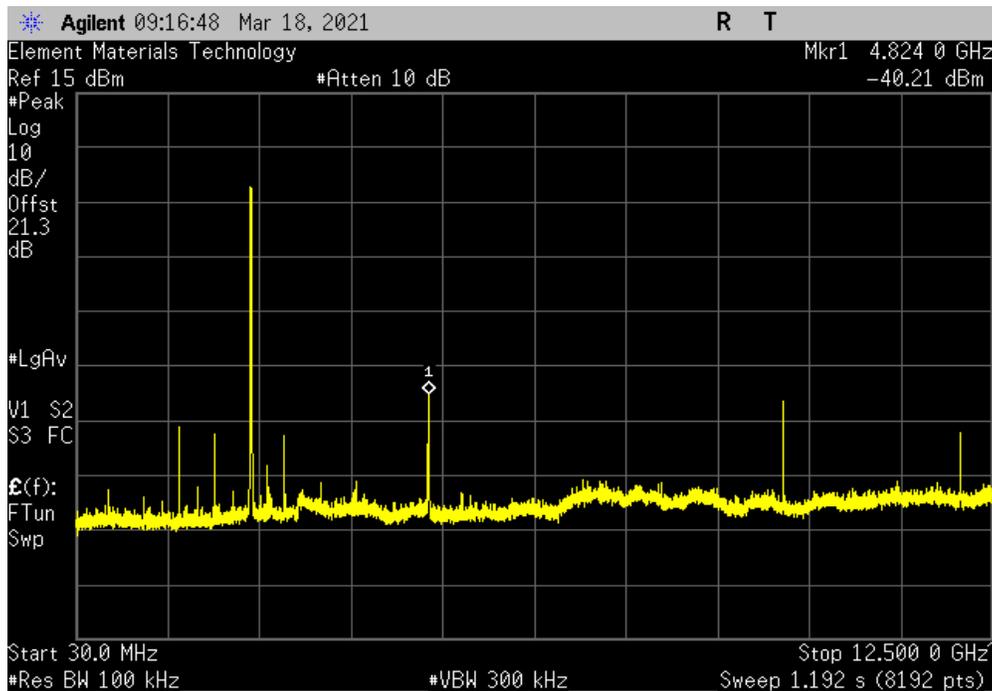


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2405.74	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4824	-38.37	-30	Pass	

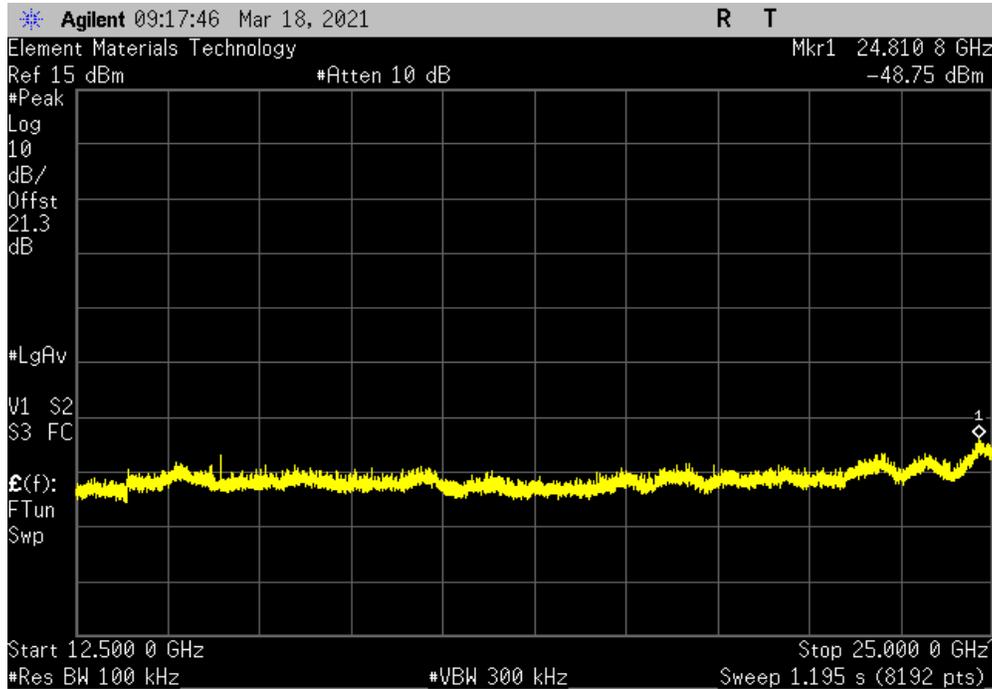


SPURIOUS CONDUCTED EMISSIONS

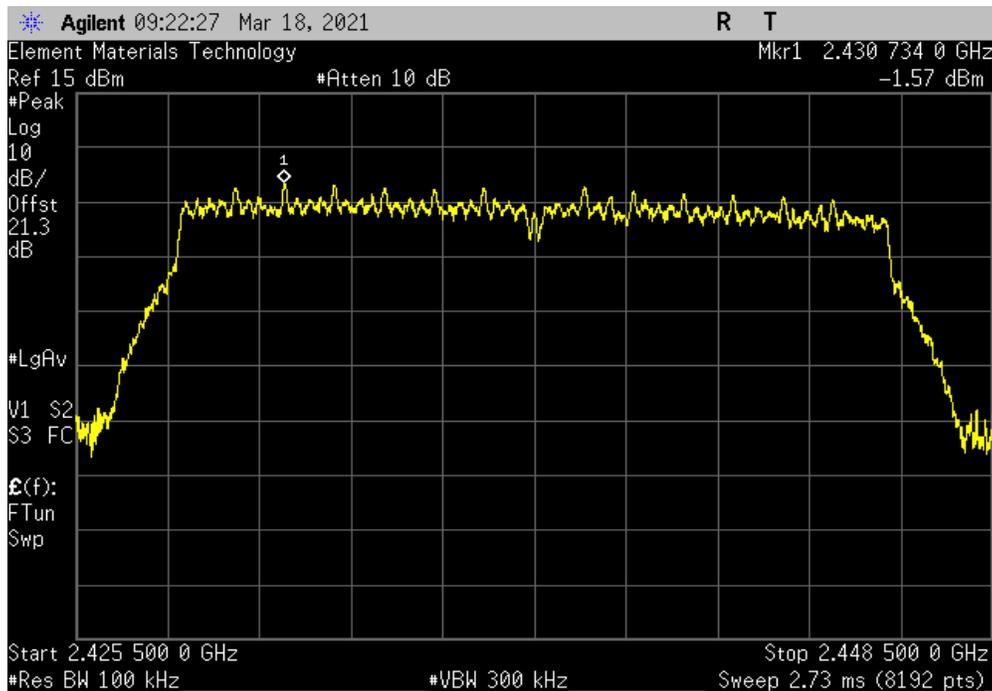


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24810.8	-46.91	-30	Pass	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2430.73	N/A	N/A	N/A	

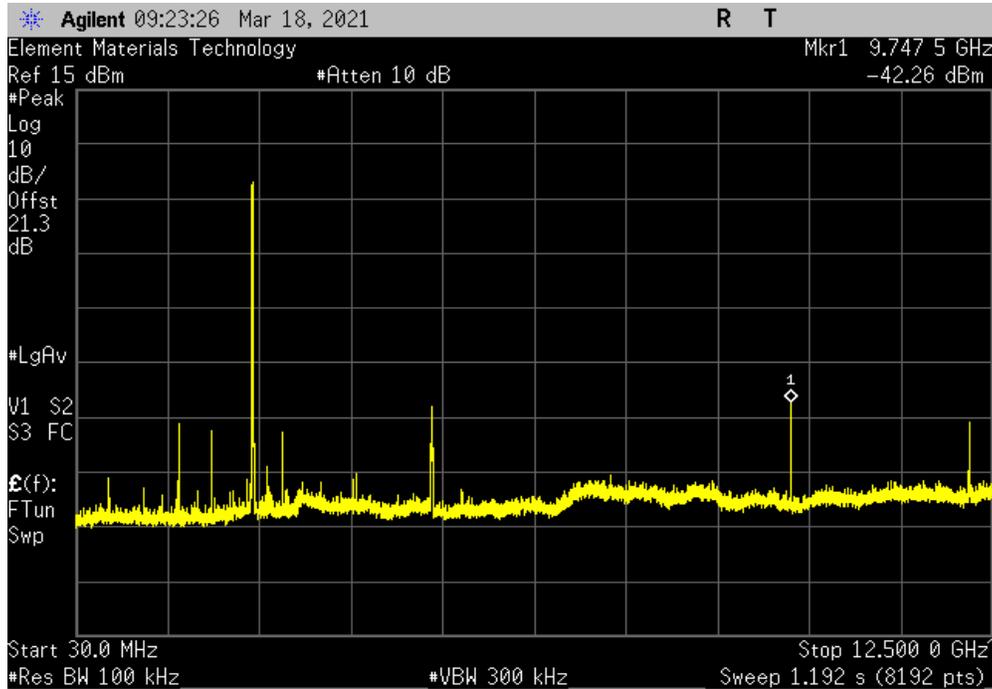


SPURIOUS CONDUCTED EMISSIONS

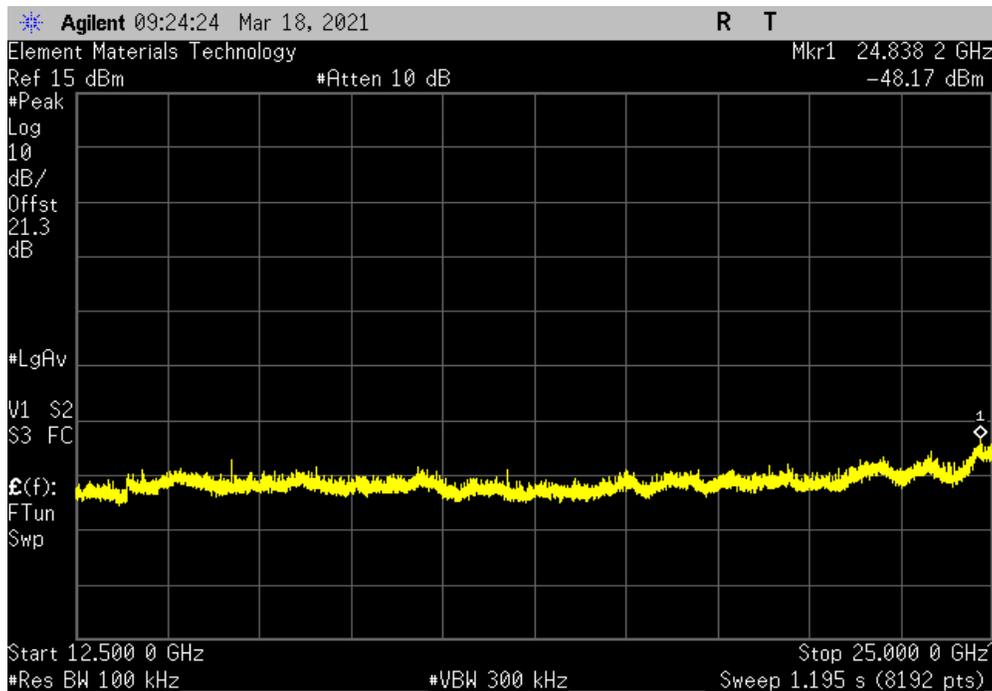


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	9747.5	-40.69	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24838.2	-46.6	-30	Pass

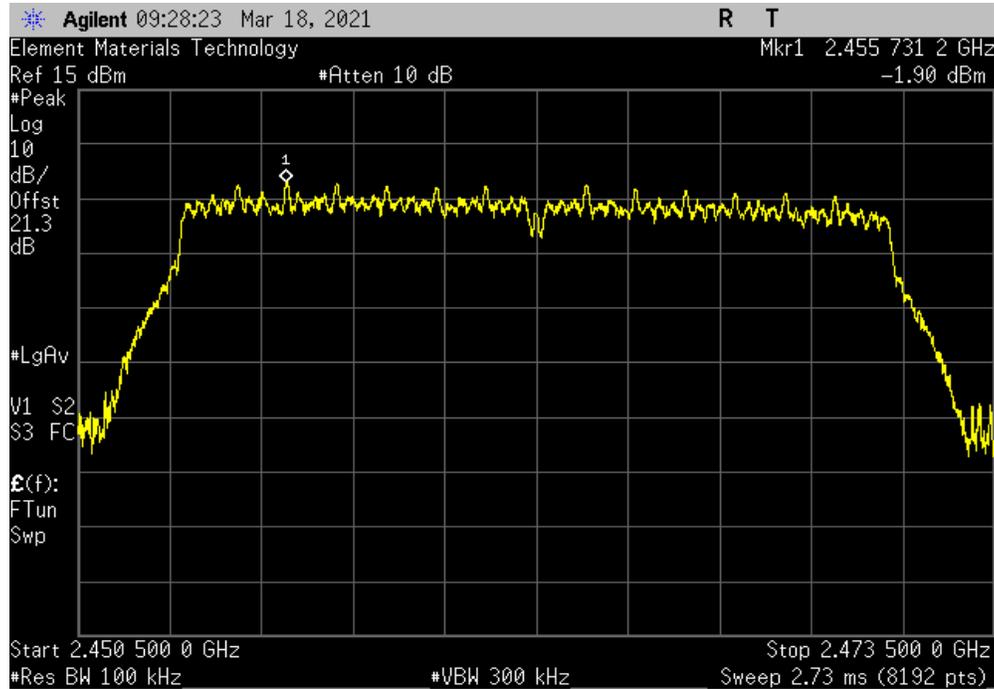


SPURIOUS CONDUCTED EMISSIONS

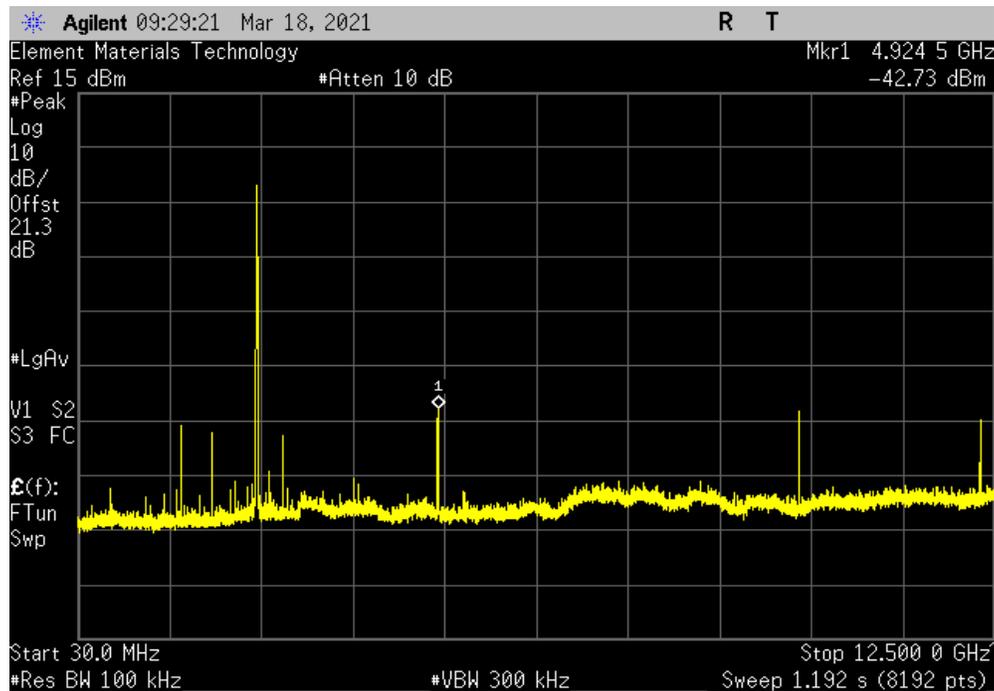


TuTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2455.73	N/A	N/A	N/A	



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	4924.5	-40.83	-30	Pass	

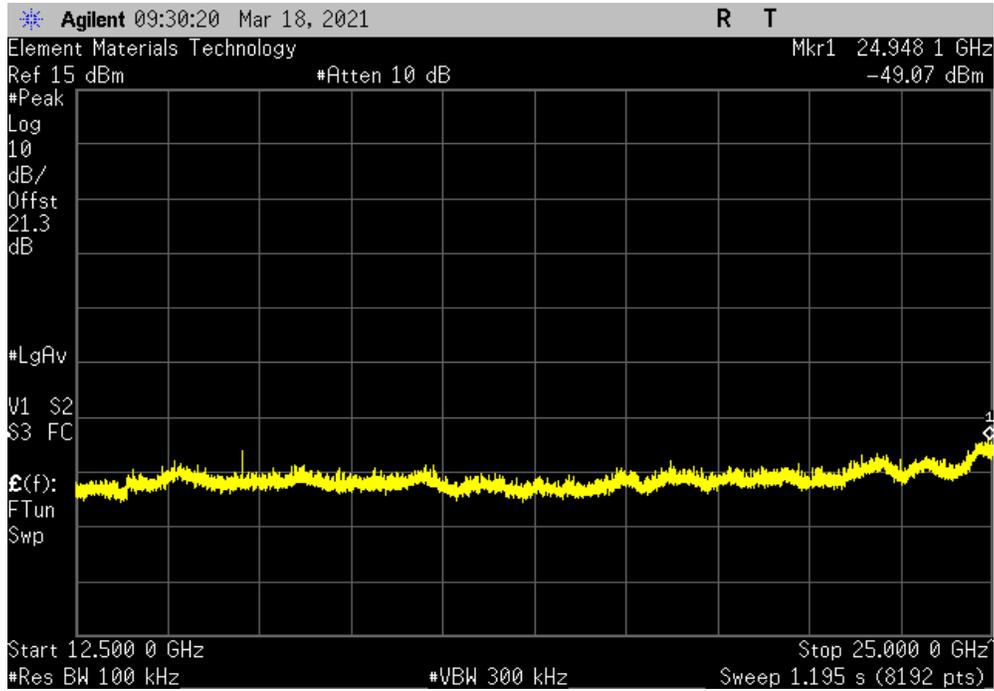


SPURIOUS CONDUCTED EMISSIONS



TbTx 2019.08.30.0 XMI 2020.12.30.0

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24948.1	-47.17	-30	Pass



SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2021.03.17.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting WiFi Ch 1 (2412 MHz), Ch 11 (2462 MHz), 20 MHz BW. See comments for data rates.

Transmitting WiFi Ch 1 (2421 MHz), Ch 6 (2437 MHz), Ch 11 (2462 MHz), 20 MHz BW. See comments for data rates.

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

TENN0148 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2020-09-11	2021-09-11
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2020-09-11	2021-09-11
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Attenuator	Fairview Microwave	SA18E-20	TWZ	2020-09-14	2021-09-14
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2021-01-15	2022-01-15
Cable	ESM Cable Corp.	Bilog Cables	MNH	2020-10-06	2021-10-06
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2020-09-24	2021-09-24
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2019-09-03	2021-09-03
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2020-10-06	2021-10-06
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2021-03-07	2022-03-07
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	2020-12-27	2021-12-27
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2020-09-14	2021-09-14
Filter - Band Pass/Notch	Micro-Tronics	BRC50703	LFG	2020-09-14	2021-09-14
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2021-01-15	2022-01-15
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2021-01-15	2022-01-15
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2021-01-15	2022-01-15
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2020-09-11	2021-09-11
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	2021-01-25	2023-01-25

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of $10 \cdot \log(1/dc)$.

SPURIOUS RADIATED EMISSIONS

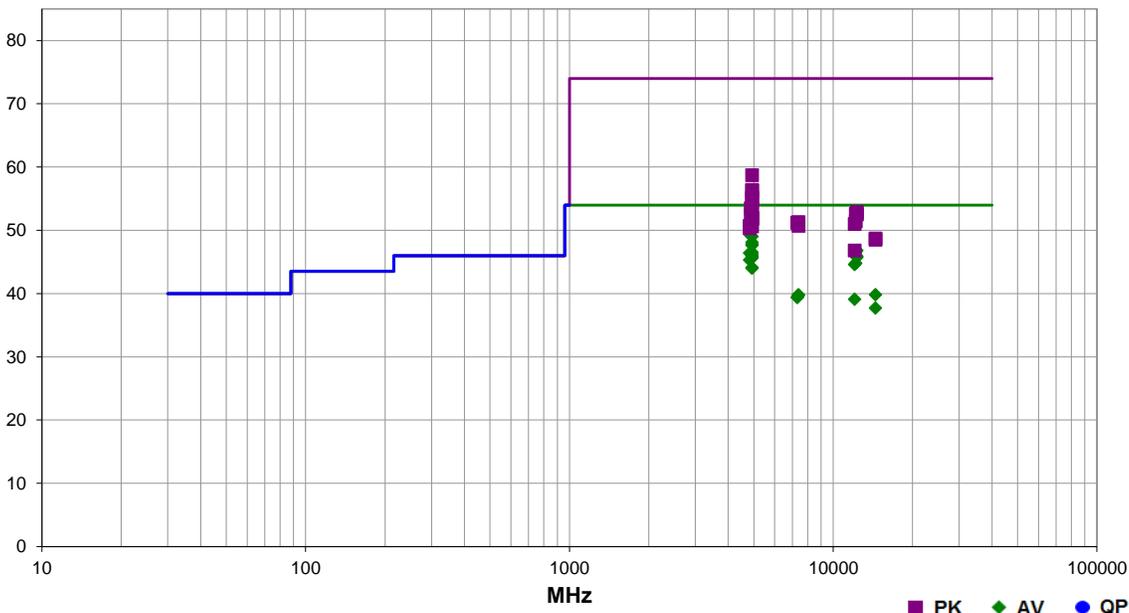


EmiRS 2021.01.08.0 PSA-ESCI 2021.03.17.0

Work Order:	TENN0148	Date:	2021-03-19	
Project:	None	Temperature:	23.3 °C	
Job Site:	MN05	Humidity:	24.3% RH	
Serial Number:	F8F005D92BD2	Barometric Pres.:	1035 mbar	
EUT:	ATWILC3000-MR110CA			
Configuration:	2			
Customer:	Tennant Company			
Attendees:	Brett Paulsen, Paul Letsche			
EUT Power:	Battery			
Operating Mode:	Transmitting WiFi Ch 1 (2421 MHz), Ch 6 (2437 MHz), Ch 11 (2462 MHz), 20 MHz BW. See comments for data rates.			
Deviations:	None			
Comments:	Table off center due to battery cart, EUT is centered on the turntable. Upward duty cycle correction factor (DCCF) applied from $10 \cdot \log(1/\text{duty cycle})$, 11 Mbps at 95.7% (0.2 dB DCCF), 6 Mbps at 96.9% (0.1 dB DCCF), 36 Mbps at 87.3% (0.6 dB DCCF), 54 Mbps at 79.2% (1.0 dB DCCF), MCS0 at 96.6% (0.1 dB DCCF), and MCS7 at 79.1% (1.0 dB DCCF). All other modes at >98% duty			

Test Specifications	Test Method
FCC 15.247:2021	ANSI C63.10:2013

Run #	12	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4924.008	50.6	2.4	2.7	218.9	0.0	0.0	Horz	AV	0.0	53.0	54.0	-1.0	EUT On Side, Ch 11, 1 Mbps
4923.967	48.0	2.4	1.0	19.9	0.0	0.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT Vert, Ch 11, 1 Mbps
4874.000	48.0	2.4	2.7	227.0	0.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	EUT On Side, Ch 6, 1 Mbps
4873.933	46.8	2.4	2.7	236.9	0.0	0.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT Vert, Ch 6, 1 Mbps
4924.008	46.6	2.4	2.0	268.0	0.0	0.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT Vert, Ch 11, 1 Mbps
4923.958	45.7	2.4	1.0	167.0	0.0	0.0	Vert	AV	0.0	48.1	54.0	-5.9	EUT Horz, Ch 11, 1 Mbps
4924.000	45.4	2.4	2.3	153.0	0.0	0.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT Horz, Ch 11, 1 Mbps
4923.992	45.0	2.4	2.7	218.9	0.2	0.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT On Side, Ch 11, 11 Mbps
12310.020	46.2	0.6	2.6	258.9	0.0	0.0	Horz	AV	0.0	46.8	54.0	-7.2	EUT On Side, Ch 11, 1 Mbps
4924.000	44.1	2.4	1.5	94.0	0.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT On Side, Ch 11, 1 Mbps
12184.970	46.4	0.1	1.5	242.0	0.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT Vert, Ch 6, 1 Mbps
4823.975	44.0	2.4	2.2	282.0	0.0	0.0	Horz	AV	0.0	46.4	54.0	-7.6	EUT Horz, Ch 11, 1 Mbps
4923.908	43.7	2.4	2.7	218.9	0.1	0.0	Horz	AV	0.0	46.2	54.0	-7.8	EUT On Side, Ch 11, 6 Mbps
12309.960	45.3	0.6	1.5	232.9	0.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT Vert, Ch 11, 1 Mbps
4924.133	42.5	2.4	2.7	218.9	1.0	0.0	Horz	AV	0.0	45.9	54.0	-8.1	EUT On Side, Ch 11, 54 Mbps
12309.910	45.1	0.6	1.5	232.9	0.0	0.0	Vert	AV	0.0	45.7	54.0	-8.3	EUT Vert, Ch 11, 1 Mbps
4923.958	42.6	2.4	2.7	218.9	0.6	0.0	Horz	AV	0.0	45.6	54.0	-8.4	EUT On Side, Ch 11, 36 Mbps
4823.967	42.9	2.4	1.0	13.9	0.0	0.0	Vert	AV	0.0	45.3	54.0	-8.7	EUT Vert, Ch 1, 1 Mbps
12184.960	44.7	0.1	1.6	258.9	0.0	0.0	Horz	AV	0.0	44.8	54.0	-9.2	EUT On Side, Ch 6, 1 Mbps
12059.890	44.5	0.1	1.5	247.9	0.0	0.0	Vert	AV	0.0	44.6	54.0	-9.4	EUT Vert, Ch 1, 1 Mbps

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4923.950	41.6	2.4	2.7	218.9	0.1	0.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT On Side, Ch 11, MCS0
4923.958	40.6	2.4	2.7	218.9	1.0	0.0	Horz	AV	0.0	44.0	54.0	-10.0	EUT On Side, Ch 11, MCS7
14471.890	31.6	8.2	1.6	240.9	0.0	0.0	Horz	AV	0.0	39.8	54.0	-14.2	EUT On Side, Ch 1, 1 Mbps
7388.050	30.5	9.3	1.5	191.0	0.0	0.0	Vert	AV	0.0	39.8	54.0	-14.2	EUT Vert, Ch 11, 1 Mbps
7386.950	30.4	9.3	1.5	171.9	0.0	0.0	Horz	AV	0.0	39.7	54.0	-14.3	EUT On Side, Ch 11, 1 Mbps
7313.083	30.2	9.2	1.5	271.9	0.0	0.0	Vert	AV	0.0	39.4	54.0	-14.6	EUT Vert, Ch 6, 1 Mbps
7313.308	30.2	9.2	1.5	351.9	0.0	0.0	Horz	AV	0.0	39.4	54.0	-14.6	EUT On Side, Ch 6, 1 Mbps
12059.890	39.0	0.1	1.7	199.9	0.0	0.0	Horz	AV	0.0	39.1	54.0	-14.9	EUT On Side, Ch 1, 1 Mbps
4924.133	56.3	2.4	2.7	218.9		0.0	Horz	PK	0.0	58.7	74.0	-15.3	EUT On Side, Ch 11, 6 Mbps
14472.050	29.5	8.2	1.5	303.0	0.0	0.0	Vert	AV	0.0	37.7	54.0	-16.3	EUT Vert, Ch 1, 1 Mbps
4924.367	54.0	2.4	2.7	218.9		0.0	Horz	PK	0.0	56.4	74.0	-17.6	EUT On Side, Ch 11, 54 Mbps
4924.408	53.9	2.4	2.7	218.9		0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT On Side, Ch 11, 36 Mbps
4924.008	52.8	2.4	2.7	218.9		0.0	Horz	PK	0.0	55.2	74.0	-18.8	EUT On Side, Ch 11, 1 Mbps
4924.117	52.6	2.4	2.7	218.9		0.0	Horz	PK	0.0	55.0	74.0	-19.0	EUT On Side, Ch 11, MCS0
4923.933	52.0	2.4	2.7	218.9		0.0	Horz	PK	0.0	54.4	74.0	-19.6	EUT On Side, Ch 11, 11 Mbps
4873.892	51.1	2.4	2.7	227.0		0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT On Side, Ch 6, 1 Mbps
4923.967	50.9	2.4	1.0	19.9		0.0	Vert	PK	0.0	53.3	74.0	-20.7	EUT Vert, Ch 11, 1 Mbps
12309.980	52.3	0.6	2.6	258.9		0.0	Horz	PK	0.0	52.9	74.0	-21.1	EUT On Side, Ch 11, 1 Mbps
12185.000	52.5	0.1	1.5	242.0		0.0	Vert	PK	0.0	52.6	74.0	-21.4	EUT Vert, Ch 6, 1 Mbps
12309.990	51.9	0.6	1.5	232.9		0.0	Vert	PK	0.0	52.5	74.0	-21.5	EUT Vert, Ch 11, 1 Mbps
4874.008	50.1	2.4	2.7	236.9		0.0	Vert	PK	0.0	52.5	74.0	-21.5	EUT Vert, Ch 6, 1 Mbps
4924.117	49.8	2.4	2.0	268.0		0.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT Vert, Ch 11, 1 Mbps
4923.967	49.5	2.4	2.3	153.0		0.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT Horz, Ch 11, 1 Mbps
4924.167	49.5	2.4	2.7	218.9		0.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT On Side, Ch 11, MCS7
4924.092	49.3	2.4	1.0	167.0		0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT Horz, Ch 11, 1 Mbps
12184.980	51.3	0.1	1.6	258.9		0.0	Horz	PK	0.0	51.4	74.0	-22.6	EUT On Side, Ch 6, 1 Mbps
7387.892	42.0	9.3	1.5	171.9		0.0	Horz	PK	0.0	51.3	74.0	-22.7	EUT On Side, Ch 11, 1 Mbps
7309.367	42.0	9.2	1.5	271.9		0.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT Vert, Ch 6, 1 Mbps
7312.783	42.0	9.2	1.5	351.9		0.0	Horz	PK	0.0	51.2	74.0	-22.8	EUT On Side, Ch 6, 1 Mbps
12059.900	50.9	0.1	1.5	247.9		0.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Vert, Ch 1, 1 Mbps
7387.417	41.4	9.3	1.5	191.0		0.0	Vert	PK	0.0	50.7	74.0	-23.3	EUT Vert, Ch 11, 1 Mbps
4824.042	48.3	2.4	2.2	282.0		0.0	Horz	PK	0.0	50.7	74.0	-23.3	EUT On Side, Ch 1, 1 Mbps
4923.958	48.2	2.4	1.5	94.0		0.0	Vert	PK	0.0	50.6	74.0	-23.4	EUT On Side, Ch 11, 1 Mbps
4824.025	47.9	2.4	1.0	13.9		0.0	Vert	PK	0.0	50.3	74.0	-23.7	EUT Vert, Ch 1, 1 Mbps
14471.790	40.5	8.2	1.6	240.9		0.0	Horz	PK	0.0	48.7	74.0	-25.3	EUT On Side, Ch 1, 1 Mbps
14472.270	40.3	8.2	1.5	303.0		0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT Vert, Ch 1, 1 Mbps
12060.090	46.7	0.1	1.7	199.9		0.0	Horz	PK	0.0	46.8	74.0	-27.2	EUT On Side, Ch 1, 1 Mbps

SPURIOUS RADIATED EMISSIONS

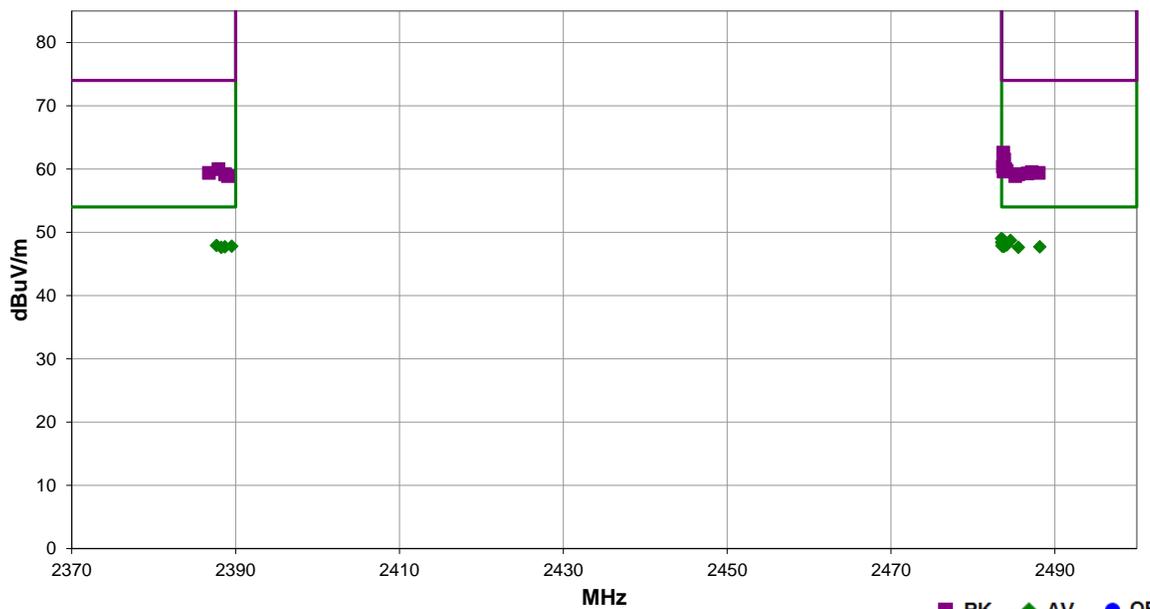


EmiR5 2021.01.08.0 PSA-ESCI 2021.03.17.0

Work Order:	TENN0148	Date:	2021-03-19	
Project:	None	Temperature:	23.3 °C	
Job Site:	MN05	Humidity:	24.3% RH	
Serial Number:	F8F005D92BD2	Barometric Pres.:	1035 mbar	
EUT:	ATWILC3000-MR110CA			
Configuration:	2			
Customer:	Tennant Company			
Attendees:	Brett Paulsen, Paul Letsche			
EUT Power:	Battery			
Operating Mode:	Transmitting WiFi Ch 1 (2412 MHz), Ch 11 (2462 MHz), 20 MHz BW. See comments for data rates.			
Deviations:	None			
Comments:	Table off center due to battery cart, EUT is centered on the turntable. Upward duty cycle correction factor (DCCF) applied from 10*log(1/duty cycle), 11 Mbps at 95.7% (0.2 dB DCCF), 6 Mbps at 96.9% (0.1 dB DCCF), 36 Mbps at 87.3% (0.6 dB DCCF), 54 Mbps at 79.2% (1.0 dB DCCF), MCS0 at 96.6% (0.1 dB DCCF), and MCS7 at 79.1% (1.0 dB DCCF). All other modes at >98% duty			

Test Specifications	Test Method
FCC 15.247:2021	ANSI C63.10:2013

Run #	20	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.500	32.8	-4.8	2.5	157.9	1.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT Vert, Ch 11, 54 Mbps
2483.700	33.0	-4.8	2.5	157.9	0.6	20.0	Vert	AV	0.0	48.8	54.0	-5.2	EUT Vert, Ch 11, 36 Mbps
2484.583	32.5	-4.8	2.5	157.9	1.0	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT Vert, Ch 11, MCS7
2483.517	33.1	-4.8	2.5	157.9	0.1	20.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT Vert, Ch 11, 6 Mbps
2483.650	32.9	-4.8	1.5	170.0	0.1	20.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT Horz, Ch 11, 6 Mbps
2483.850	32.7	-4.8	1.6	15.0	0.1	20.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT On Side, Ch 11, 6 Mbps
2484.125	32.7	-4.8	2.5	157.9	0.1	20.0	Vert	AV	0.0	48.0	54.0	-6.0	EUT Vert, Ch 11, MCS0
2483.567	32.6	-4.8	3.2	232.0	0.1	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT On Side, Ch 11, 6 Mbps
2387.675	32.5	-4.6	2.2	160.0	0.0	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT On Side, Ch 1, 1 Mbps
2483.608	32.5	-4.8	1.5	312.9	0.1	20.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT Vert, Ch 11, 6 Mbps
2483.842	32.5	-4.8	3.8	354.0	0.1	20.0	Vert	AV	0.0	47.8	54.0	-6.2	EUT Horz, Ch 11, 6 Mbps
2389.542	32.3	-4.6	1.5	303.0	0.1	20.0	Vert	AV	0.0	47.8	54.0	-6.2	EUT Vert, Ch 1, 6 Mbps
2388.708	32.2	-4.6	1.5	171.0	0.1	20.0	Horz	AV	0.0	47.7	54.0	-6.3	EUT Vert, Ch 1, 6 Mbps
2488.175	32.4	-4.9	2.5	157.9	0.2	20.0	Vert	AV	0.0	47.7	54.0	-6.3	EUT Vert, Ch 11, 11 Mbps
2485.558	32.4	-4.8	2.5	157.9	0.0	20.0	Vert	AV	0.0	47.6	54.0	-6.4	EUT Vert, Ch 11, 1 Mbps
2388.267	32.2	-4.6	1.5	290.9	0.0	20.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT On Side, Ch 1, 1 Mbps
2483.700	47.4	-4.8	2.5	157.9	20.0	20.0	Vert	PK	0.0	62.6	74.0	-11.4	EUT Vert, Ch 11, 6 Mbps
2483.808	46.3	-4.8	2.5	157.9	20.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	EUT Vert, Ch 11, 36 Mbps
2483.650	45.2	-4.8	1.5	170.0	20.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	EUT Horz, Ch 11, 6 Mbps
2483.958	44.8	-4.8	2.5	157.9	20.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT Vert, Ch 11, MCS0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2387.917	44.6	-4.6	2.2	160.0		20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT On Side, Ch 1, 1 Mbps
2483.758	44.5	-4.8	1.6	15.0		20.0	Horz	PK	0.0	59.7	74.0	-14.3	EUT On Side, Ch 11, 6 Mbps
2484.100	44.5	-4.8	2.5	157.9		20.0	Vert	PK	0.0	59.7	74.0	-14.3	EUT Vert, Ch 11, 11 Mbps
2483.767	44.4	-4.8	2.5	157.9		20.0	Vert	PK	0.0	59.6	74.0	-14.4	EUT Vert, Ch 11, 54 Mbps
2487.192	44.3	-4.8	3.2	232.0		20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT On Side, Ch 11, 6 Mbps
2488.033	44.3	-4.9	1.5	312.9		20.0	Horz	PK	0.0	59.4	74.0	-14.6	EUT Vert, Ch 11, 6 Mbps
2386.750	44.0	-4.6	1.5	303.0		20.0	Vert	PK	0.0	59.4	74.0	-14.6	EUT Vert, Ch 1, 6 Mbps
2486.650	44.1	-4.8	2.5	157.9		20.0	Vert	PK	0.0	59.3	74.0	-14.7	EUT Vert, Ch 11, 1 Mbps
2485.542	44.0	-4.8	2.5	157.9		20.0	Vert	PK	0.0	59.2	74.0	-14.8	EUT Vert, Ch 11, MCS7
2388.717	43.8	-4.6	1.5	290.9		20.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT On Side, Ch 1, 1 Mbps
2485.175	43.7	-4.8	3.8	354.0		20.0	Vert	PK	0.0	58.9	74.0	-15.1	EUT Horz, Ch 11, 6 Mbps
2389.067	43.5	-4.6	1.5	171.0		20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT Vert, Ch 1, 6 Mbps

End of Test Report