



A-dec, Inc.

43.0536.00

FCC 15.247:2021

Bluetooth

Report: A-DE0162.6 Rev. 1, Issue Date: October 21, 2021



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CERTIFICATE OF TEST



Last Date of Test: October 19, 2021

A-dec, Inc.

EUT: 43.0536.00

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2021	ANSI C63.10:2013, KDB 558074
FCC 15.247:2021	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.5	Equivalent Isotropic Radiated Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations 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
01	Added boresighting block diagram.	2021-10-21	8
	Added A-DE0162-7 configuration	2021-10-21	12
	Retested powerline conducted emissions measuring AC mains as opposed to DC power.	2021-10-21	15-19
	Power table updated to reflect appropriate modulations.	2021-10-21	14
	Updated last date of test to October 19, 2021.	2021-10-21	2, 9, 13
	Updated the Spurious Radiated Emissions test description.	2021-10-21	20

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 - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

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:

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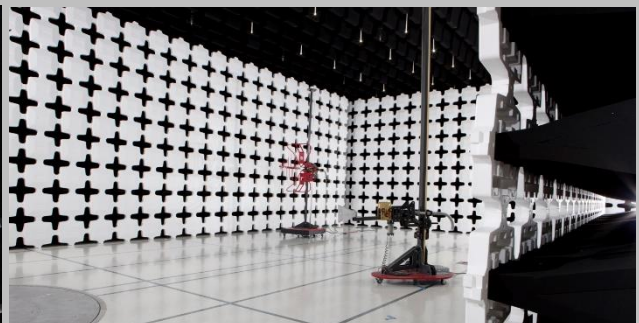
[Texas](#)

[Washington](#)

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
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
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.

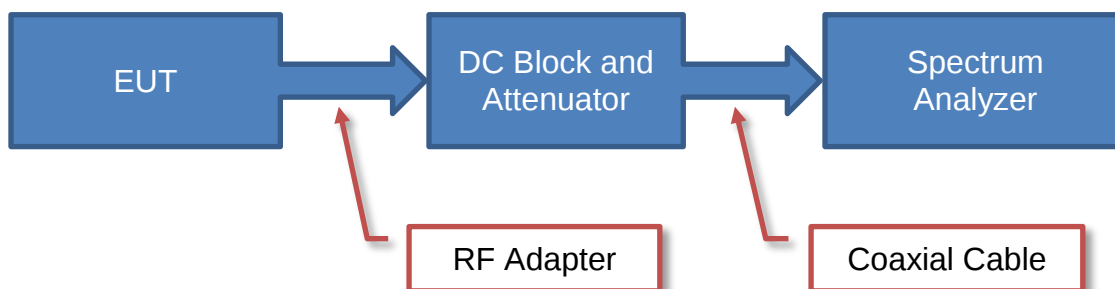
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. 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

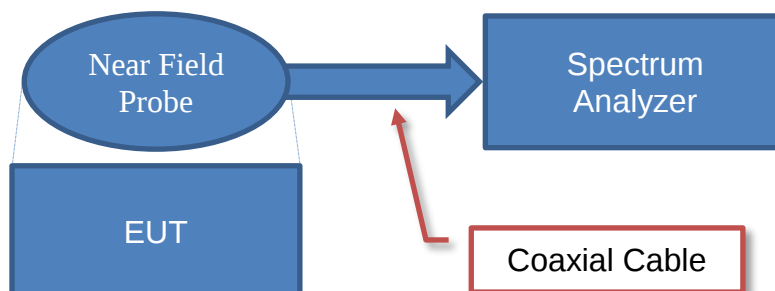
Antenna Port Conducted Measurements



Sample Calculation

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

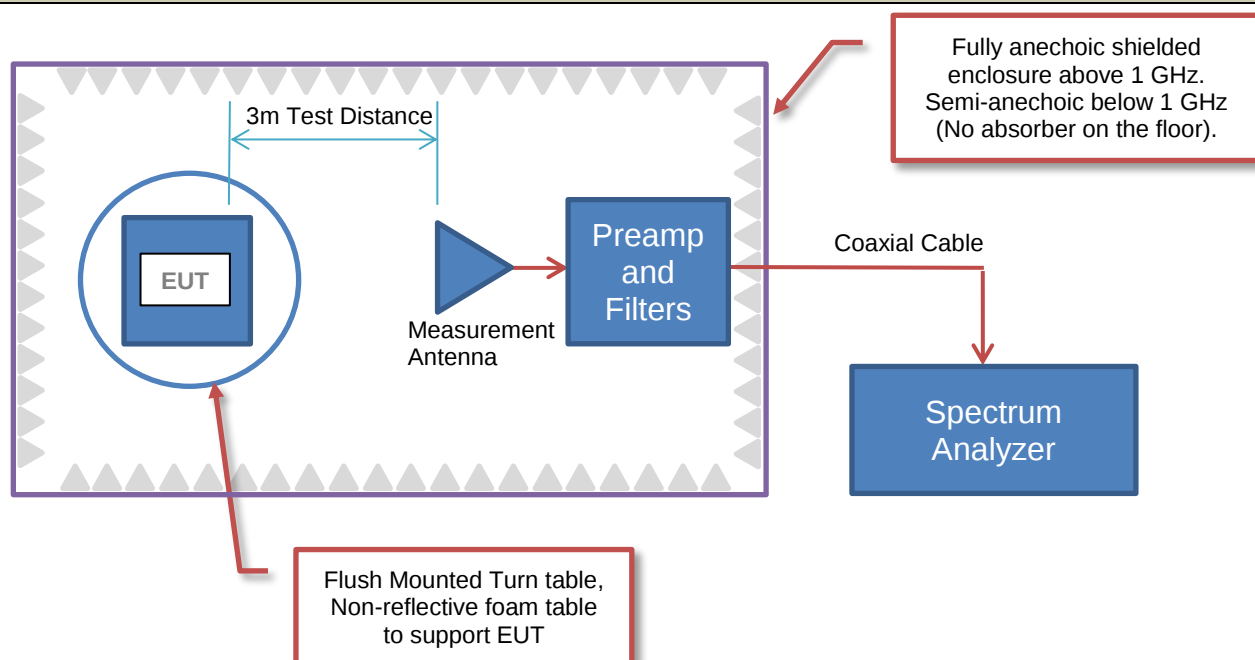


Sample Calculation

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

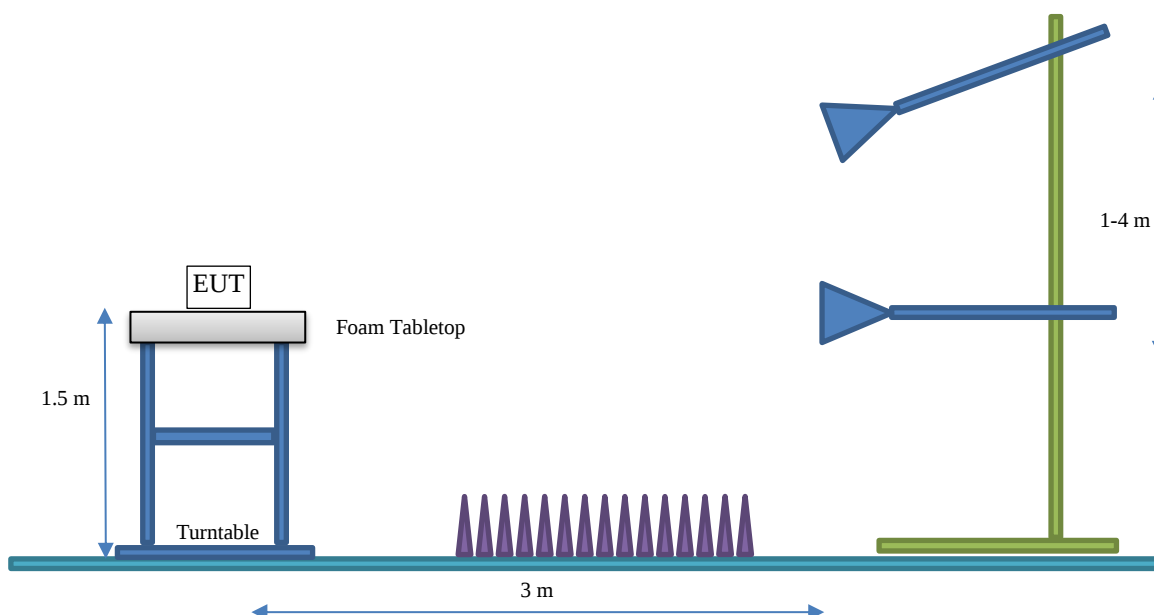
TEST SETUP BLOCK DIAGRAMS

Spurious Radiated Emissions



Bore Sighting (>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:	A-dec, Inc.
Address:	2601 Crestview Dr Building 4
City, State, Zip:	Newberg, OR 97132-9528
Test Requested By:	Russell Perkins
EUT:	43.0536.00
First Date of Test:	June 29, 2021
Last Date of Test:	October 19, 2021
Receipt Date of Samples:	June 25, 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:
Bluetooth, Bluetooth LE and 802.11 radio module
Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS



Configuration A-DE0162- 1

Software/Firmware Running during test	
Description	Version
Teraterm	4.105
Murata Test Firmware	None

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth and WiFi module	A-dec, Inc.	43.0536.00	SN001 00003

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Switching Power Supply	Total Power	TMPU130-108 (P00B)	2015017188
Laptop	Dell	Latitude 740	7437666170
Host PCB	A-dec, Inc.	43.0528.00 Rev 2	528P068188

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	0.2	No	Switching Power Supply	Host PCB
AC Power	No	2.0	No	AC Mains	Switching Power Supply
FTDI to USB	No	2.0	No	Laptop	Host PCB

CONFIGURATIONS



Configuration A-DE0162- 2

Software/Firmware Running during test	
Description	Version
Teraterm	4.105
Murata Test Firmware	None

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth and WiFi module	A-dec, Inc.	43.0536.00	SN001 00004

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Switching Power Supply	Total Power	TMPU130-108 (P00B)	2015017188
Host PCB	A-dec, Inc.	43.0528.00 Rev 2	528P068188

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude 740	7437666170

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	2.0	No	AC Mains	Switching Power Supply
FTDI to USB	No	2.0	No	Laptop	Host PCB
DC Power	No	2.7	No	Switching Power Supply	Host PCB

CONFIGURATIONS



Configuration A-DE0162- 7

Software/Firmware Running during test	
Description	Version
Teraterm	4.105
Murata Test Firmware	None

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth and WiFi module	A-dec, Inc.	43.0536.00	SN001 00004

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Host PCB	A-dec, Inc.	43.0528.00 Rev 2	528P068188

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude 740	7437666170

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	0.6	No	Lab DC Power Supply	Host PCB
DC Power	No	0.8	No	Lab DC Power Supply	Host PCB

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-06-29	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
2	2021-06-29	Carrier Frequency Separation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
3	2021-06-29	Number of Hopping Frequencies	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
4	2021-06-29	Dwell Time	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	2021-06-29	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.
6	2021-06-29	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.
7	2021-06-29	Band Edge Compliance – Hopping Mode	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	2021-06-29	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.
9	2021-06-29	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.
10	2021-06-29	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.
11	2021-06-30	Spurious Radiated 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.
12	2021-10-19	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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)
Ceramic Chip	Manufacturer	2400 - 2500	2.2

The EUT was tested using the power settings provided by the manufacturer:

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Type	Channel	Position	Frequency (MHz)	Power Setting
GFSK, pi/4 DQPSK, 8DPSK	FHSS	0	Low Channel	2402	7 dBm
		40	Mid Channel	2442	7 dBm
		78	High Channel	2480	7 dBm

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss Instruments	TDEMI 30M	ARN	2021-04-06	2022-04-06
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT	EVGA	2021-01-05	2022-01-05
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	2021-09-10	2022-09-10
LISN	Solar Electronics	9252-50-R-24-BNC	LIN	2021-01-08	2022-01-08
Power Supply - DC	Topward	TPS-2000	TPD	NCR	NCR
Power Supply - DC	MPJA	9950 PS	TQA	NCR	NCR

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.6 dB	-2.6 dB

CONFIGURATIONS INVESTIGATED

A-DE0162-7

MODES INVESTIGATED

Bluetooth, TX, Mid Channel 2442 MHz, DH5

POWERLINE CONDUCTED EMISSIONS

EUT:	43.0536.00	Work Order:	A-DE0162
Serial Number:	SN001 00004	Date:	2021-10-19
Customer:	A-dec, Inc.	Temperature:	22.8°C
Attendees:	None	Relative Humidity:	40%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Jeff Alcock	Job Site:	EV07
Power:	3.3 VDC via 110VAC/60Hz	Configuration:	A-DE0162-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	15	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

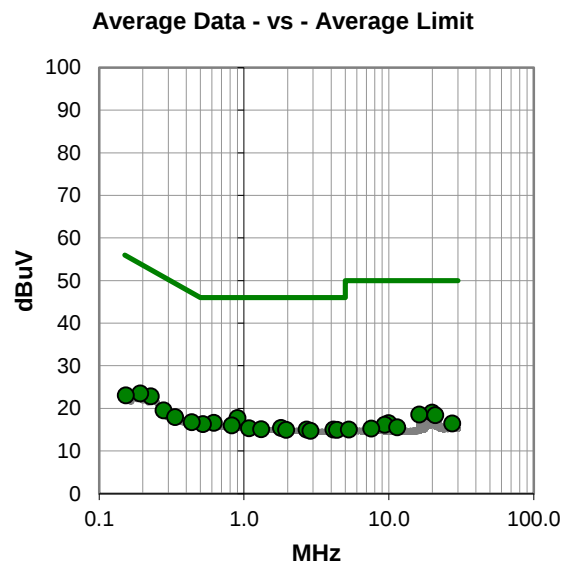
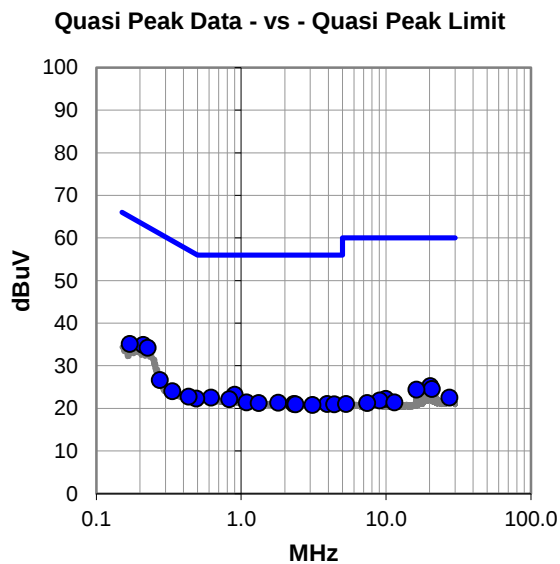
Measuring AC Mains of linear DC lab power supply. ARN, EVGA, LIR, LIN, TPD, TQA

EUT OPERATING MODES

Bluetooth, TX, Mid Channel 2442 MHz, DH5

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #15

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.211	14.8	20.1	34.9	63.2	-28.3
0.226	14.1	20.1	34.2	62.6	-28.4
0.170	15.0	20.1	35.1	65.0	-29.9
0.902	3.2	20.0	23.2	56.0	-32.8
0.620	2.5	20.0	22.5	56.0	-33.5
0.829	2.1	20.0	22.1	56.0	-33.9
0.490	2.3	20.0	22.3	56.2	-33.9
0.275	6.6	20.0	26.6	61.0	-34.4
0.434	2.7	20.0	22.7	57.2	-34.5
1.090	1.4	20.0	21.4	56.0	-34.6
1.801	1.3	20.0	21.3	56.0	-34.7
1.325	1.2	20.0	21.2	56.0	-34.8
20.205	4.5	20.7	25.2	60.0	-34.8
2.311	1.0	20.0	21.0	56.0	-35.0
3.928	1.0	20.0	21.0	56.0	-35.0
2.379	0.9	20.0	20.9	56.0	-35.1
4.390	0.9	20.0	20.9	56.0	-35.1
3.116	0.8	20.0	20.8	56.0	-35.2
0.335	4.0	20.0	24.0	59.3	-35.3
20.768	3.7	20.8	24.5	60.0	-35.5
16.227	3.8	20.6	24.4	60.0	-35.6
27.505	1.4	21.1	22.5	60.0	-37.5
9.970	2.0	20.2	22.2	60.0	-37.8
9.076	1.6	20.2	21.8	60.0	-38.2
11.456	1.0	20.4	21.4	60.0	-38.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.902	-2.3	20.0	17.7	46.0	-28.3
0.620	-3.4	20.0	16.6	46.0	-29.4
0.228	2.7	20.1	22.8	52.5	-29.7
0.521	-3.7	20.0	16.3	46.0	-29.7
0.826	-4.0	20.0	16.0	46.0	-30.0
0.193	3.4	20.1	23.5	53.9	-30.4
0.437	-3.3	20.0	16.7	47.1	-30.4
1.804	-4.6	20.0	15.4	46.0	-30.6
1.082	-4.7	20.0	15.3	46.0	-30.7
1.314	-4.9	20.0	15.1	46.0	-30.9
2.706	-5.0	20.0	15.0	46.0	-31.0
4.160	-5.0	20.0	15.0	46.0	-31.0
19.955	-1.7	20.7	19.0	50.0	-31.0
1.957	-5.1	20.0	14.9	46.0	-31.1
4.390	-5.1	20.0	14.9	46.0	-31.1
2.884	-5.3	20.0	14.7	46.0	-31.3
0.278	-0.5	20.0	19.5	50.9	-31.4
0.335	-2.1	20.0	17.9	49.3	-31.4
16.227	-2.1	20.6	18.5	50.0	-31.5
20.956	-2.4	20.8	18.4	50.0	-31.6
0.153	2.9	20.1	23.0	55.8	-32.8
9.970	-3.7	20.2	16.5	50.0	-33.5
27.491	-4.7	21.1	16.4	50.0	-33.6
9.375	-4.1	20.2	16.1	50.0	-33.9
11.456	-4.9	20.4	15.5	50.0	-34.5

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	43.0536.00	Work Order:	A-DE0162
Serial Number:	SN001 00004	Date:	2021-10-19
Customer:	A-dec, Inc.	Temperature:	22.8°C
Attendees:	None	Relative Humidity:	40%
Customer Project:	None	Bar. Pressure:	1013 mb
Tested By:	Jeff Alcock	Job Site:	EV07
Power:	3.3 VDC via 110VAC/60Hz	Configuration:	A-DE0162-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	16	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

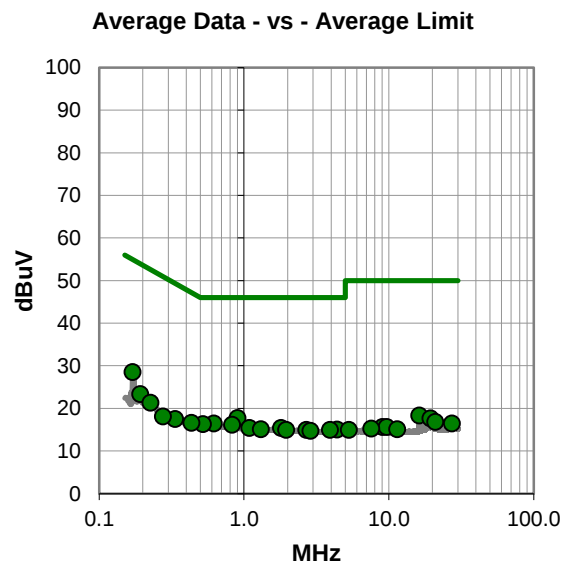
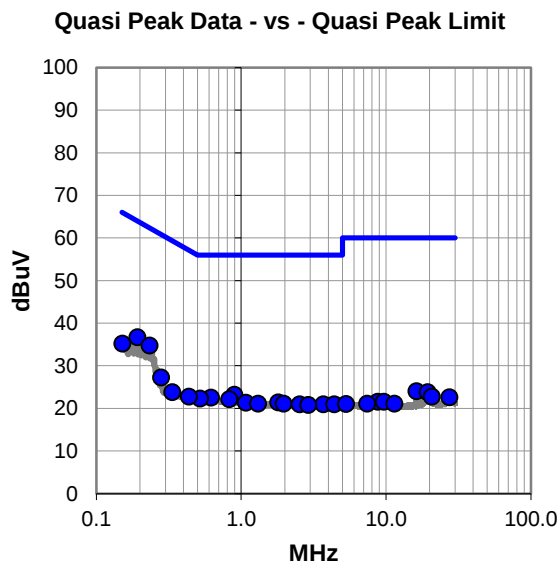
Measuring AC Mains of linear DC lab power supply. ARN, EVGA, LIR, LIN, TPD, TQA

EUT OPERATING MODES

Bluetooth, TX, Mid Channel 2442 MHz, DH5

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #16

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.193	16.6	20.1	36.7	63.9	-27.2
0.234	14.6	20.1	34.7	62.3	-27.6
0.152	15.1	20.1	35.2	65.9	-30.7
0.901	3.2	20.0	23.2	56.0	-32.8
0.620	2.5	20.0	22.5	56.0	-33.5
0.280	7.2	20.0	27.2	60.8	-33.6
0.521	2.3	20.0	22.3	56.0	-33.7
0.829	2.1	20.0	22.1	56.0	-33.9
0.437	2.7	20.0	22.7	57.1	-34.4
1.802	1.4	20.0	21.4	56.0	-34.6
1.081	1.3	20.0	21.3	56.0	-34.7
1.313	1.1	20.0	21.1	56.0	-34.9
1.970	1.1	20.0	21.1	56.0	-34.9
2.541	0.9	20.0	20.9	56.0	-35.1
3.697	0.9	20.0	20.9	56.0	-35.1
4.390	0.9	20.0	20.9	56.0	-35.1
2.916	0.8	20.0	20.8	56.0	-35.2
0.335	3.8	20.0	23.8	59.3	-35.5
16.227	3.4	20.6	24.0	60.0	-36.0
19.390	3.2	20.6	23.8	60.0	-36.2
20.768	1.9	20.8	22.7	60.0	-37.3
27.392	1.5	21.1	22.6	60.0	-37.4
8.775	1.3	20.2	21.5	60.0	-38.5
9.670	1.3	20.2	21.5	60.0	-38.5
7.417	0.9	20.2	21.1	60.0	-38.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.170	8.4	20.1	28.5	55.0	-26.5
0.902	-2.3	20.0	17.7	46.0	-28.3
0.618	-3.6	20.0	16.4	46.0	-29.6
0.522	-3.7	20.0	16.3	46.0	-29.7
0.827	-3.9	20.0	16.1	46.0	-29.9
0.193	3.2	20.1	23.3	53.9	-30.6
0.434	-3.4	20.0	16.6	47.2	-30.6
1.090	-4.6	20.0	15.4	46.0	-30.6
1.804	-4.6	20.0	15.4	46.0	-30.6
1.311	-4.9	20.0	15.1	46.0	-30.9
4.392	-5.0	20.0	15.0	46.0	-31.0
1.954	-5.1	20.0	14.9	46.0	-31.1
2.703	-5.1	20.0	14.9	46.0	-31.1
3.929	-5.1	20.0	14.9	46.0	-31.1
0.226	1.2	20.1	21.3	52.6	-31.3
2.884	-5.3	20.0	14.7	46.0	-31.3
16.227	-2.3	20.6	18.3	50.0	-31.7
0.335	-2.5	20.0	17.5	49.3	-31.8
19.422	-3.0	20.6	17.6	50.0	-32.4
0.277	-1.9	20.0	18.1	50.9	-32.8
20.956	-4.0	20.8	16.8	50.0	-33.2
27.369	-4.7	21.1	16.4	50.0	-33.6
9.074	-4.6	20.2	15.6	50.0	-34.4
9.668	-4.6	20.2	15.6	50.0	-34.4
7.587	-5.0	20.2	15.2	50.0	-34.8

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

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 (in no-hop, single channel mode) 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 $10 \cdot \log(1/dc)$.

RMS measurements taken for a FHSS radio also may have a duty cycle correction subtracted using the formula $10 \cdot \log(DC)$, where DC is the worst-case dwell time of the radio while in a hopping mode in a 100ms period.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2020-12-16	2021-12-16
Antenna - Biconilog	EMCO	3141	AXG	2019-07-23	2021-07-23
Antenna - Double Ridge	EMCO	3115	AHC	2020-07-01	2022-07-01
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2020-11-17	2021-11-17
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2020-11-17	2021-11-17
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2020-11-18	2021-11-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2020-11-18	2021-11-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	2020-07-25	2021-07-25
Cable	N/A	Bilog Cables	EVA	2020-11-17	2021-11-17
Cable	N/A	Double Ridge Horn Cables	EVB	2020-11-17	2021-11-17
Cable	None	Standard Gain Horns Cable	EVF	2020-11-18	2021-11-18
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	EVY	2020-07-25	2021-07-25
Attenuator	Coaxicom	3910-20	AXZ	2021-02-15	2022-02-15
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	2021-02-15	2022-02-15
Filter - High Pass	Micro-Tronics	HPM50111	HFO	2020-11-17	2021-11-17

SPURIOUS RADIATED EMISSIONS

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26.5 GHz

POWER INVESTIGATED

3.3 VDC via 110VAC/60Hz

CONFIGURATIONS INVESTIGATED

A-DE0162-2

MODES INVESTIGATED

Bluetooth - Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz

SPURIOUS RADIATED EMISSIONS

EUT:	43.0536.00	Work Order:	A-DE0162
Serial Number:	SN001 00004	Date:	2021-06-30
Customer:	A-dec, Inc.	Temperature:	23.1°C
Attendees:	Zack Lyda and Ben Meadows	Relative Humidity:	44.8%
Customer Project:	None	Bar. Pressure:	1015 mb
Tested By:	Jeff Alcock	Job Site:	EV01
Power:	3.3 VDC via 110VAC/60Hz	Configuration:	A-DE0162-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	19	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

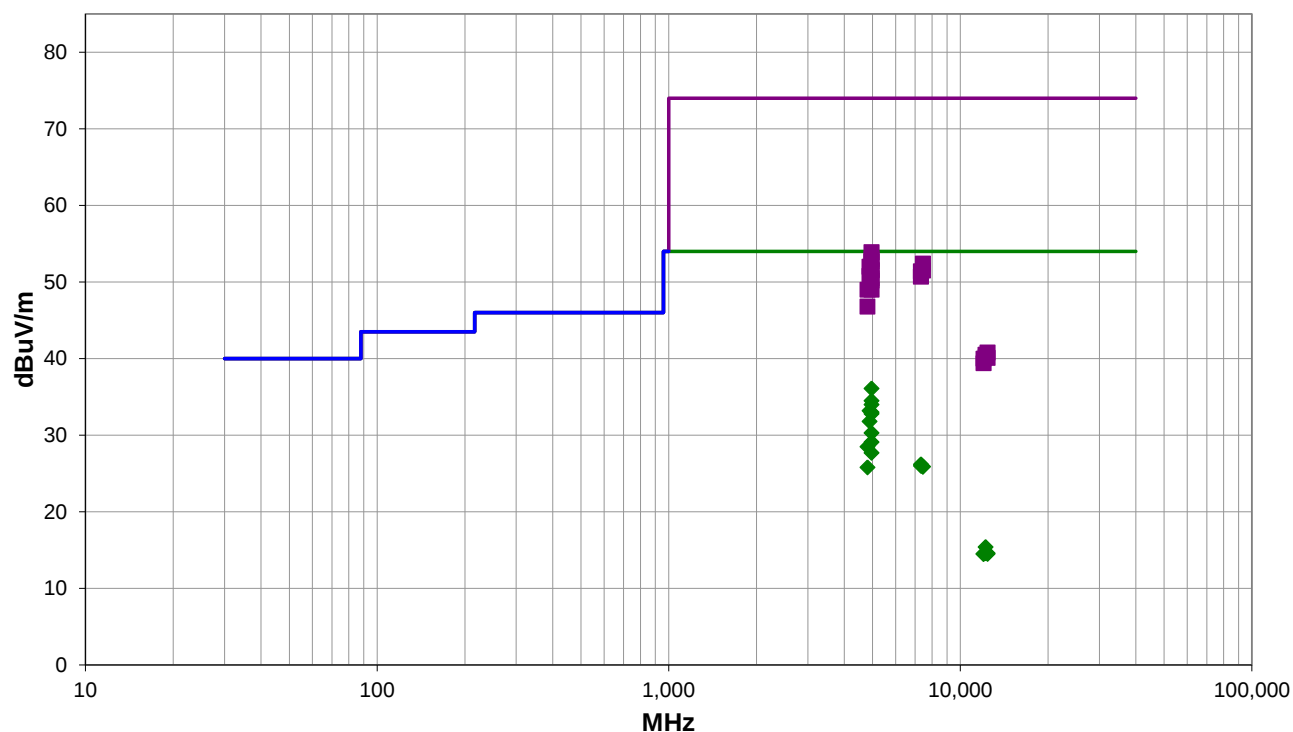
The test mode operates at 77.3% duty cycle (DC), an upward duty cycle correction factor (DCCF) of $10 \cdot \log(1/DC) = 10 \cdot \log(1/0.773) = 1.1$ dB was applied to the average measurements. When operating in FHSS mode, the worst-case transmission time over any 100 ms period is 2.9 ms. A downward DCCF correction applied based on $10 \cdot \log(\text{On Time}/100 \text{ ms}) = 10 \cdot \log(2.9/100) = -15.4$ dB was applied to the average measurements. Total correction applied = -14.3 dB. Please reference data comments below for channel, data rate, and EUT orientation.

EUT OPERATING MODES

Bluetooth - Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 19

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #19

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4960.017	44.5	5.9	1.1	105.0	-14.3	0.0	Vert	AV	0.0	36.1	54.0	-17.9	High Channel, DH5, EUT Horz
4960.025	42.9	5.9	1.2	91.0	-14.3	0.0	Vert	AV	0.0	34.5	54.0	-19.5	High Channel, 2DH5, EUT Horz
4960.075	42.4	5.9	2.2	238.0	-14.3	0.0	Horz	AV	0.0	34.0	54.0	-20.0	High Channel, DH5, EUT on Side
4959.983	48.0	5.9	1.1	105.0	0.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	High Channel, DH5, EUT Horz
4884.000	41.5	6.0	2.1	149.0	-14.3	0.0	Horz	AV	0.0	33.2	54.0	-20.8	Mid Channel, DH5, EUT on Side
4960.358	47.1	5.9	2.2	238.0	0.0	0.0	Horz	PK	0.0	53.0	74.0	-21.0	High Channel, DH5, EUT on Side
4960.042	41.4	5.9	3.3	185.0	-14.3	0.0	Vert	AV	0.0	33.0	54.0	-21.0	High Channel, DH5, EUT on Side
4960.042	41.2	5.9	2.0	155.0	-14.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	High Channel, DH5, EUT Vert
4960.533	46.8	5.9	1.2	91.0	0.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	High Channel, 2DH5, EUT Horz
7440.708	40.2	12.2	3.3	207.0	0.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	High Channel, DH5, EUT on Side
4883.658	46.0	6.0	2.1	149.0	0.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	Mid Channel, DH5, EUT on Side
4884.058	40.1	6.0	1.1	45.0	-14.3	0.0	Vert	AV	0.0	31.8	54.0	-22.2	Mid Channel, DH5, EUT Horz
4960.358	45.7	5.9	2.0	155.0	0.0	0.0	Horz	PK	0.0	51.6	74.0	-22.4	High Channel, DH5, EUT Vert
4960.150	45.6	5.9	3.3	185.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	High Channel, DH5, EUT on Side
7438.433	39.3	12.2	1.5	228.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	High Channel, DH5, EUT Horz
7328.033	39.7	11.7	1.5	138.0	0.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	Mid Channel, DH5, EUT Horz
4883.767	44.8	6.0	1.1	45.0	0.0	0.0	Vert	PK	0.0	50.8	74.0	-23.2	Mid Channel, DH5, EUT Horz
7326.250	39.0	11.7	1.5	309.0	0.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	Mid Channel, DH5, EUT on Side
4960.033	44.6	5.9	1.2	91.0	0.0	0.0	Vert	PK	0.0	50.5	74.0	-23.5	High Channel, 3DH5, EUT Horz
4960.017	38.7	5.9	1.2	149.0	-14.3	0.0	Vert	AV	0.0	30.3	54.0	-23.7	High Channel, DH5, EUT Vert
4960.308	44.3	5.9	1.2	149.0	0.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	High Channel, DH5, EUT Vert
4959.983	37.5	5.9	1.2	91.0	-14.3	0.0	Vert	AV	0.0	29.1	54.0	-24.9	High Channel, 3DH5, EUT Horz
4960.375	43.1	5.9	1.4	20.0	0.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	High Channel, DH5, EUT Horz
4804.425	43.8	5.2	2.1	158.0	0.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	Low Channel, DH5, EUT on Side
4803.958	37.7	5.1	2.1	158.0	-14.3	0.0	Horz	AV	0.0	28.5	54.0	-25.5	Low Channel, DH5, EUT on Side
4960.017	36.1	5.9	1.4	20.0	-14.3	0.0	Horz	AV	0.0	27.7	54.0	-26.3	High Channel, DH5, EUT Horz
4803.817	41.7	5.1	2.8	42.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	Low Channel, DH5, EUT Horz
7328.233	28.8	11.7	1.5	138.0	-14.3	0.0	Vert	AV	0.0	26.2	54.0	-27.8	Mid Channel, DH5, EUT Horz
7327.408	28.6	11.7	1.5	309.0	-14.3	0.0	Horz	AV	0.0	26.0	54.0	-28.0	Mid Channel, DH5, EUT on Side
7439.650	28.0	12.2	3.3	207.0	-14.3	0.0	Horz	AV	0.0	25.9	54.0	-28.1	High Channel, DH5, EUT on Side
7439.217	28.0	12.2	1.5	228.0	-14.3	0.0	Vert	AV	0.0	25.9	54.0	-28.1	High Channel, DH5, EUT Horz
4803.967	35.0	5.1	2.8	42.0	-14.3	0.0	Vert	AV	0.0	25.8	54.0	-28.2	Low Channel, DH5, EUT Horz
12399.920	39.3	1.5	1.5	241.0	0.0	0.0	Horz	PK	0.0	40.8	74.0	-33.2	High Channel, DH5, EUT on Side
12208.670	39.6	0.9	1.0	294.0	0.0	0.0	Horz	PK	0.0	40.5	74.0	-33.5	Mid Channel, DH5, EUT on Side
12211.630	39.2	1.0	1.5	231.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Mid Channel, DH5, EUT Horz
12398.540	38.6	1.5	1.5	141.0	0.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	High Channel, DH5, EUT Horz
12012.040	38.9	1.1	1.5	268.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	Low Channel, DH5, EUT on Side
12012.150	38.3	1.1	1.6	178.0	0.0	0.0	Vert	PK	0.0	39.4	74.0	-34.6	Low Channel, DH5, EUT Horz
12207.860	28.8	0.9	1.0	294.0	-14.3	0.0	Horz	AV	0.0	15.4	54.0	-38.6	Mid Channel, DH5, EUT on Side
12399.890	27.4	1.5	1.5	141.0	-14.3	0.0	Vert	AV	0.0	14.6	54.0	-39.4	High Channel, DH5, EUT Horz

SPURIOUS RADIATED EMISSIONS

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
12212.270	27.9	1.0	1.5	231.0	-14.3	0.0	Vert	AV	0.0	14.6	54.0	-39.4	Mid Channel, DH5, EUT Horz
12399.670	27.3	1.5	1.5	241.0	-14.3	0.0	Horz	AV	0.0	14.5	54.0	-39.5	High Channel, DH5, EUT on Side
12008.530	27.7	1.1	1.6	178.0	-14.3	0.0	Vert	AV	0.0	14.5	54.0	-39.5	Low Channel, DH5, EUT Horz
12008.000	27.7	1.1	1.5	268.0	-14.3	0.0	Horz	AV	0.0	14.5	54.0	-39.5	Low Channel, DH5, EUT on Side

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	43.0536.00	Work Order:	A-DE0162
Serial Number:	SN001 00004	Date:	2021-06-30
Customer:	A-dec, Inc.	Temperature:	23.1°C
Attendees:	Zack Lyda and Ben Meadows	Relative Humidity:	44.8%
Customer Project:	None	Bar. Pressure:	1015 mb
Tested By:	Jeff Alcock	Job Site:	EV01
Power:	3.3 VDC via 110VAC/60Hz	Configuration:	A-DE0162-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	21	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

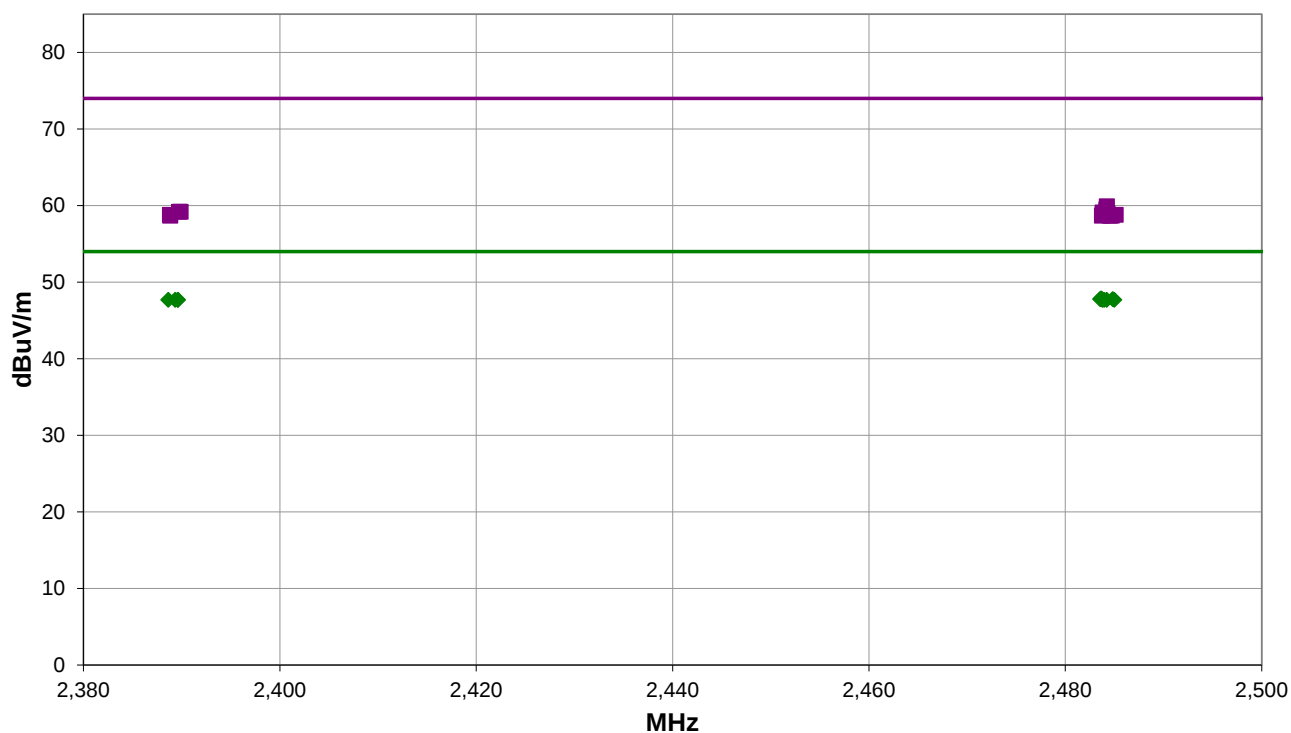
All measurements are noise floor; no duty cycle correction factor was applied to the average measurements. Please reference data comments below for channel, data rate, and EUT orientation.

EUT OPERATING MODES

Bluetooth - Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 21

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #21

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.670	31.5	-3.6	1.16	360.0	3.0	20.0	Horz	AV	0.0	47.9	54.0	-6.1	High Channel, DH5, EUT on Side
2483.593	31.4	-3.6	1.5	158.0	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	High Channel, DH5, EUT on Side
2484.830	31.4	-3.6	1.5	358.0	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	High Channel, DH5, EUT Vert
2483.547	31.4	-3.6	1.5	166.0	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	High Channel, DH5, EUT Horz
2484.983	31.3	-3.6	1.5	334.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	High Channel, DH5, EUT Vert
2483.953	31.3	-3.6	1.15	109.0	3.0	20.0	Vert	AV	0.0	47.7	54.0	-6.3	High Channel, DH5, EUT Horz
2484.213	31.3	-3.6	1.5	353.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	High Channel, 2DH5, EUT on Side
2483.777	31.3	-3.6	1.5	360.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	High Channel, 3DH5, EUT on Side
2389.333	31.2	-3.5	1.5	19.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	Low Channel, 3DH5, EUT on Side
2389.600	31.2	-3.5	1.5	19.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	Low Channel, 2DH5, EUT on Side
2389.617	31.2	-3.5	1.5	19.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	Low Channel, DH5, EUT on Side
2388.630	31.2	-3.5	1.38	57.0	3.0	20.0	Vert	AV	0.0	47.7	54.0	-6.3	Low Channel, DH5, EUT on Side
2484.227	43.5	-3.6	1.5	358.0	3.0	20.0	Vert	PK	0.0	59.9	74.0	-14.1	High Channel, DH5, EUT Vert
2484.177	43.1	-3.6	1.15	109.0	3.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	High Channel, DH5, EUT Horz
2389.893	42.7	-3.5	1.5	19.0	3.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	Low Channel, 3DH5, EUT on Side
2389.717	42.7	-3.5	1.5	19.0	3.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	Low Channel, DH5, EUT on Side
2483.800	42.7	-3.6	1.5	158.0	3.0	20.0	Vert	PK	0.0	59.1	74.0	-14.9	High Channel, DH5, EUT on Side
2484.297	42.6	-3.6	1.5	353.0	3.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	High Channel, 2DH5, EUT on Side
2485.127	42.3	-3.5	1.5	334.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High Channel, DH5, EUT Vert
2388.800	42.3	-3.5	1.5	19.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	Low Channel, 2DH5, EUT on Side
2483.730	42.3	-3.6	1.16	360.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High Channel, DH5, EUT on Side
2484.507	42.3	-3.6	1.5	166.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High Channel, DH5, EUT Horz
2484.717	42.3	-3.6	1.5	360.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High Channel, 3DH5, EUT on Side
2388.837	42.2	-3.5	1.38	57.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	Low Channel, DH5, EUT on Side

CONCLUSION

Pass



Tested By

DUTY CYCLE



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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

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



TMTx 2021.03.19.1 XMR 2020.12.30.0

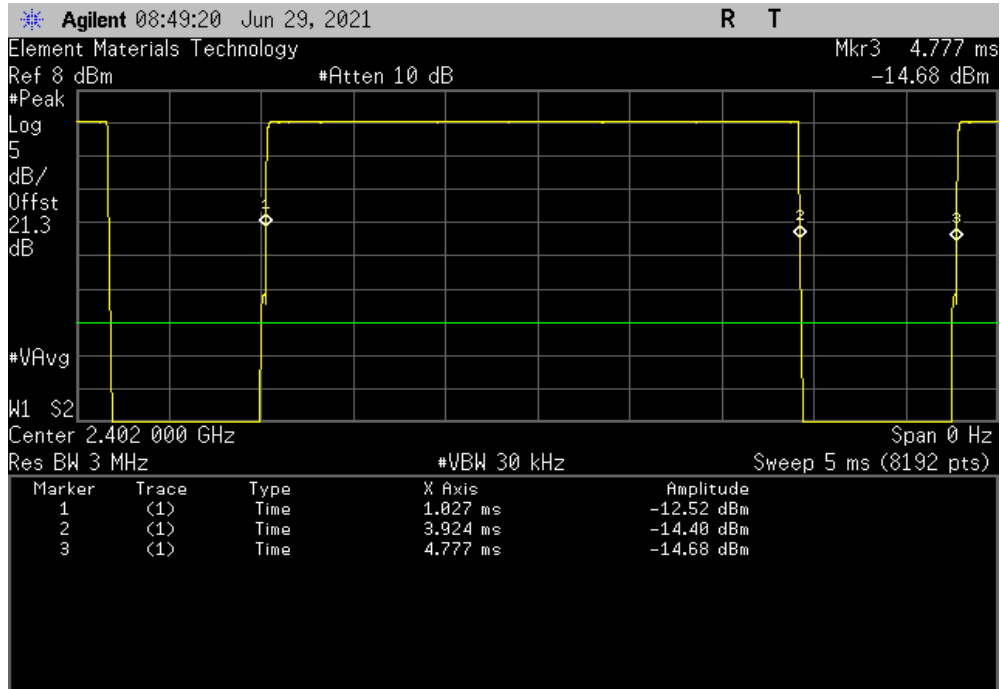
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.8 °C	
Attendees: Zack Lyda		Humidity: 47.1% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcoke		Power: 3.3 VDC via 110VAC/60Hz	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2021		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Pulse Width	Period
		Number of Pulses	Value (%)
		Limit (%)	Results
DH5, GFSK			
	Low Channel, 2402 MHz	2.898 ms	3.75 ms
	Low Channel, 2402 MHz	N/A	N/A
	Mid Channel, 2442 MHz	2.898 ms	3.75 ms
	Mid Channel, 2442 MHz	N/A	N/A
	High Channel, 2480 MHz	2.898 ms	3.75 ms
	High Channel, 2480 MHz	N/A	N/A
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	2.9 ms	3.751 ms
	Low Channel, 2402 MHz	N/A	N/A
	Mid Channel, 2442 MHz	2.9 ms	3.75 ms
	Mid Channel, 2442 MHz	N/A	N/A
	High Channel, 2480 MHz	2.9 ms	3.75 ms
	High Channel, 2480 MHz	N/A	N/A
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	2.901 ms	3.75 ms
	Low Channel, 2402 MHz	N/A	N/A
	Mid Channel, 2442 MHz	2.902 ms	3.751 ms
	Mid Channel, 2442 MHz	N/A	N/A
	High Channel, 2480 MHz	2.902 ms	3.75 ms
	High Channel, 2480 MHz	N/A	N/A

DUTY CYCLE

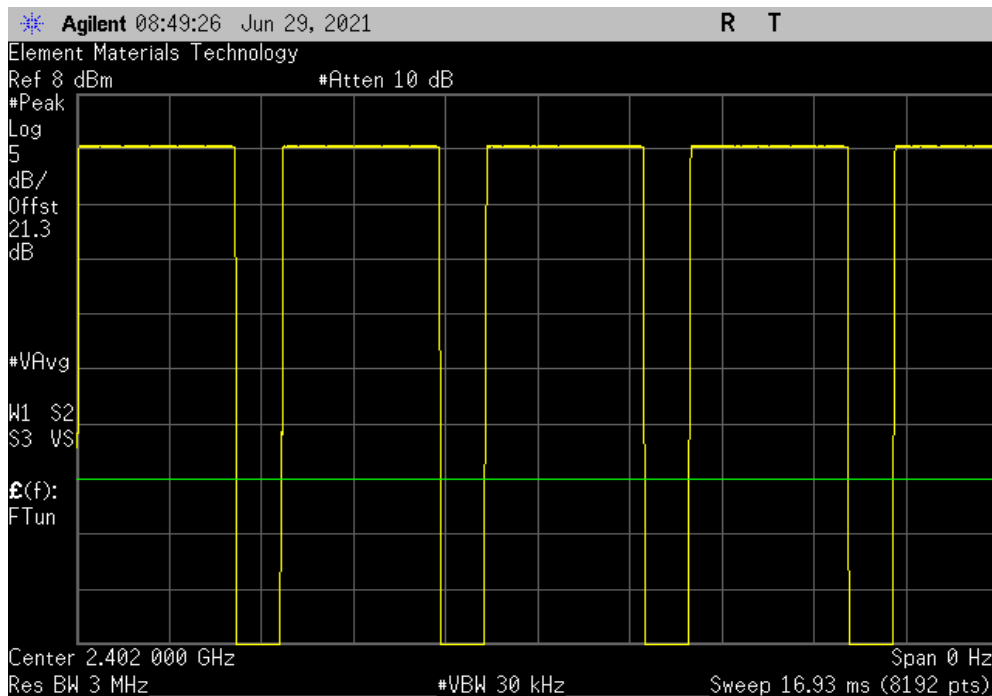


TbTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.898 ms	3.75 ms	1	77.3	N/A	N/A



DH5, GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

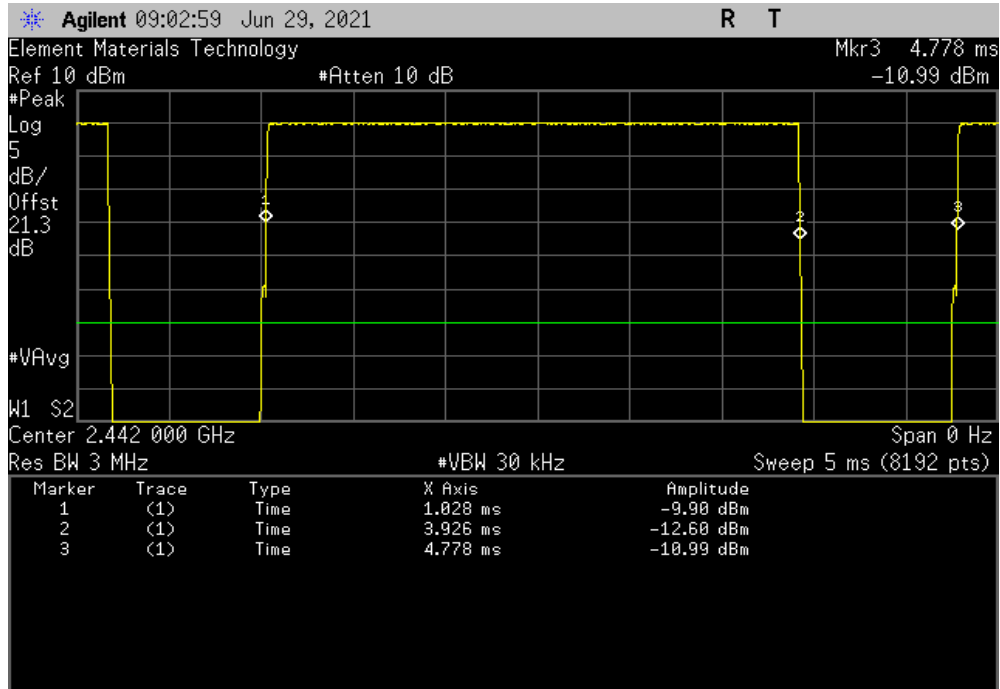


DUTY CYCLE

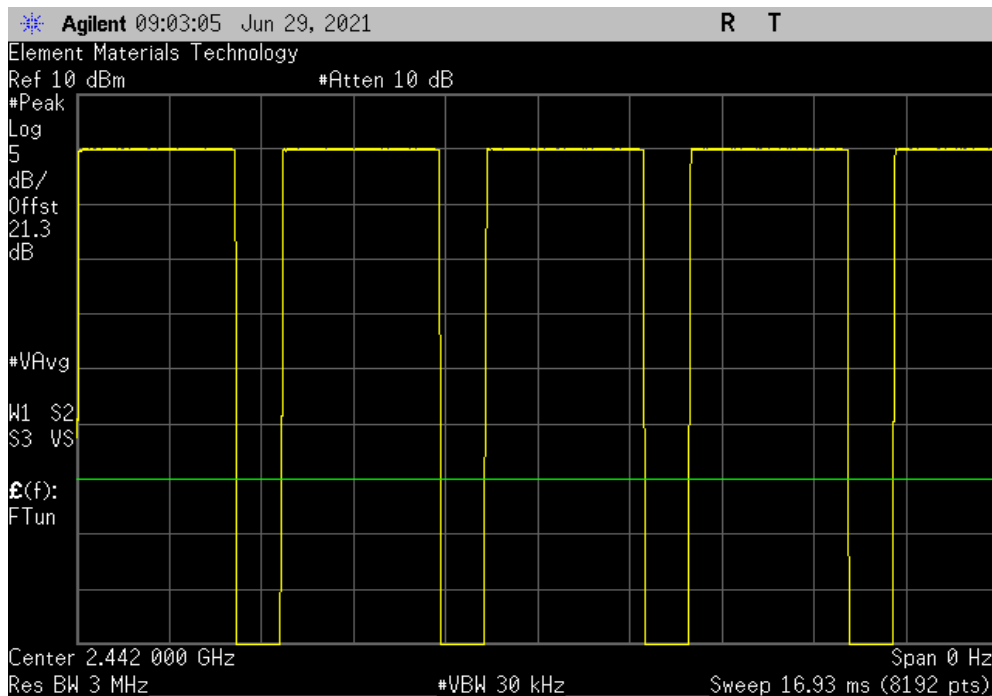


TUTx 2021.03.10.1 XMR 2020.12.30.0

DH5, GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.898 ms	3.75 ms	1	77.3	N/A	N/A



DH5, GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

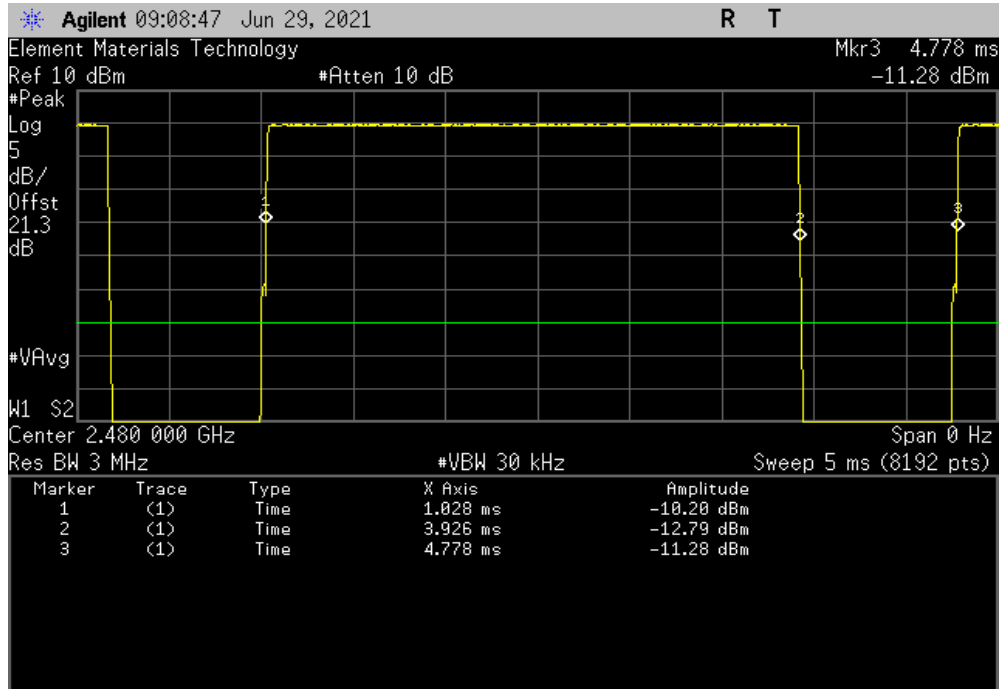


DUTY CYCLE

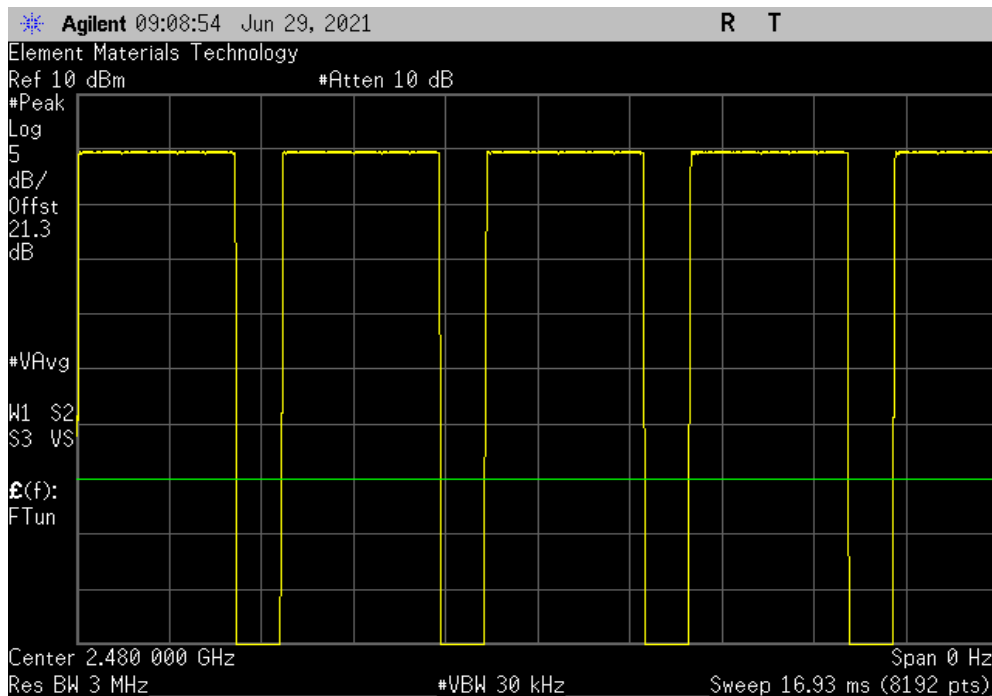


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.898 ms	3.75 ms	1	77.3	N/A	N/A



DH5, GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

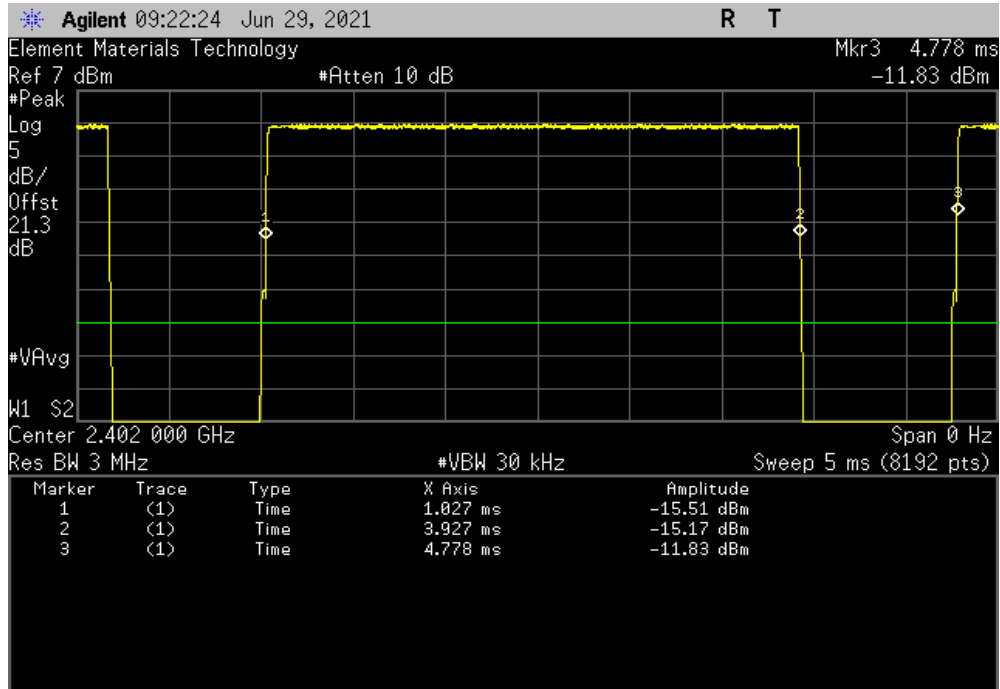


DUTY CYCLE

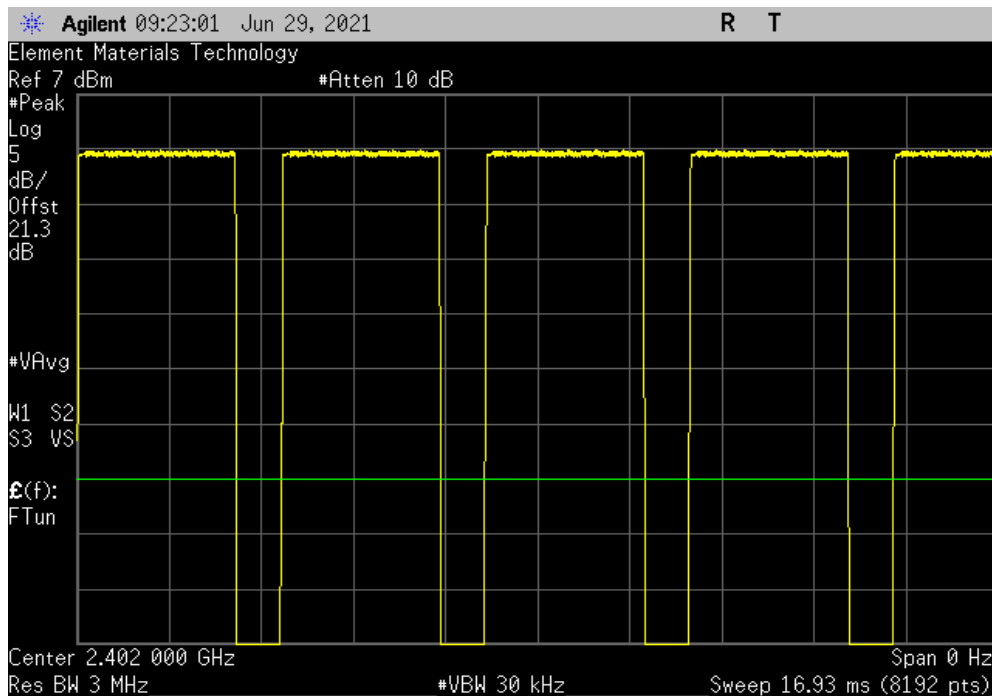


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.9 ms	3.751 ms	1	77.3	N/A	N/A



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

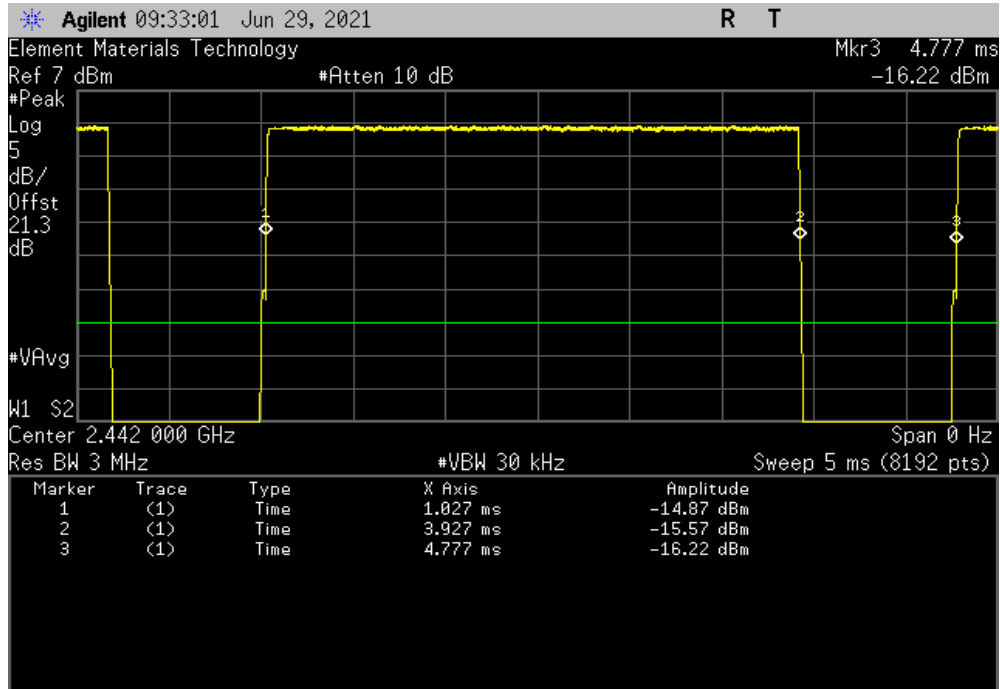


DUTY CYCLE

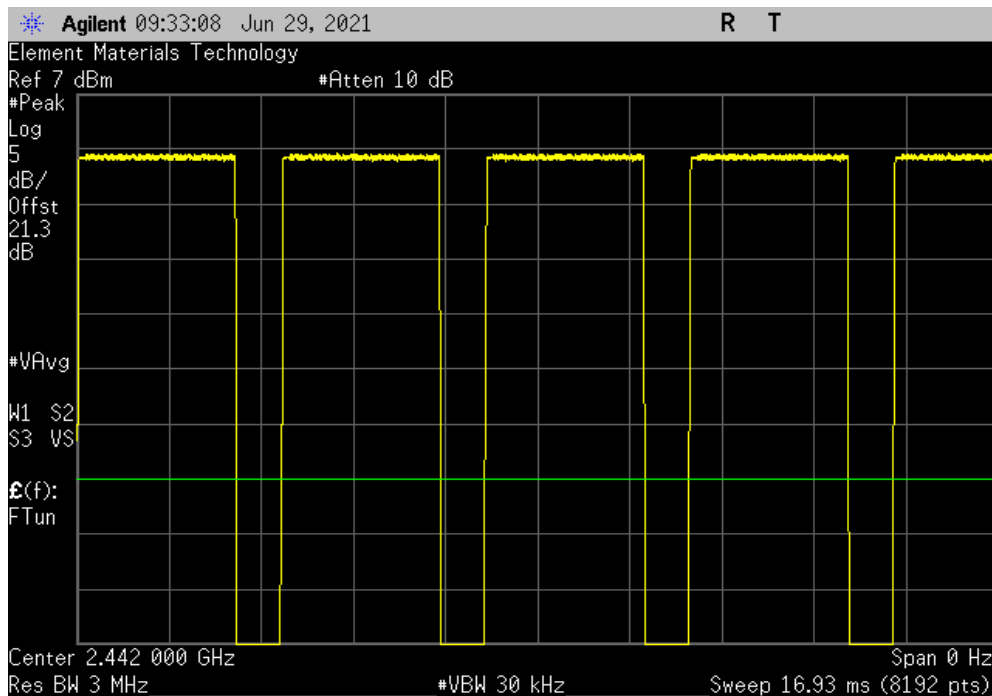


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.9 ms	3.75 ms	1	77.3	N/A	N/A



2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

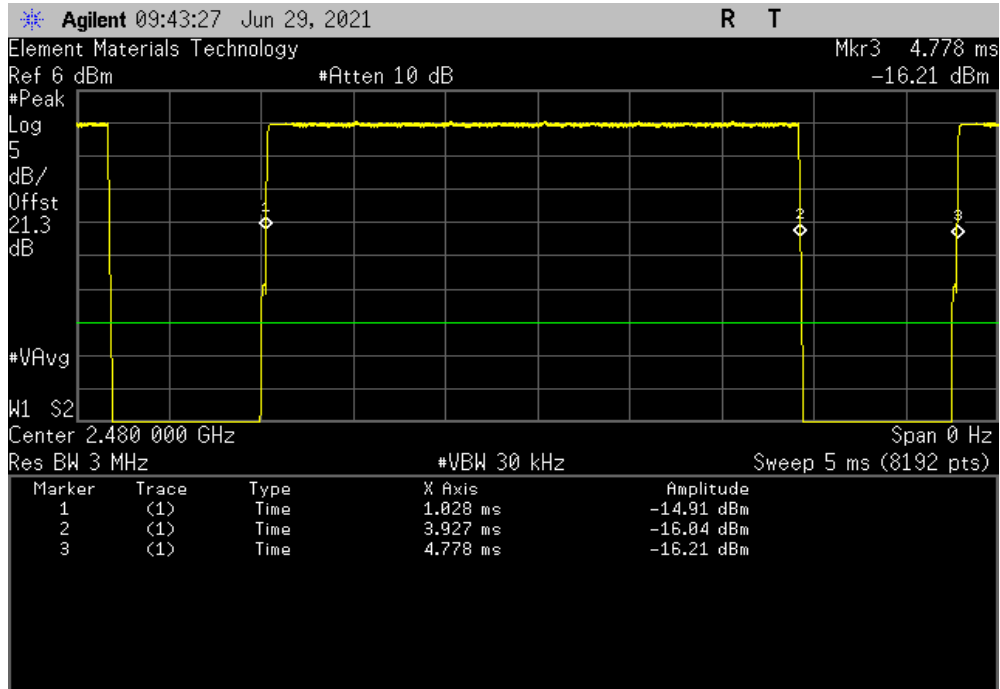


DUTY CYCLE

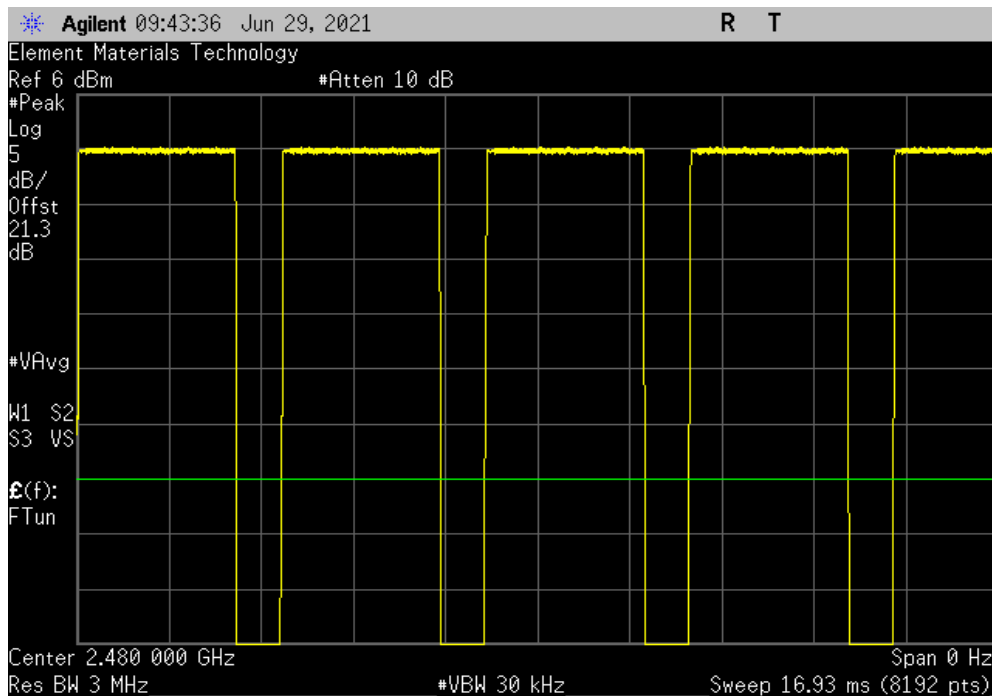


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.9 ms	3.75 ms	1	77.3	N/A	N/A



2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

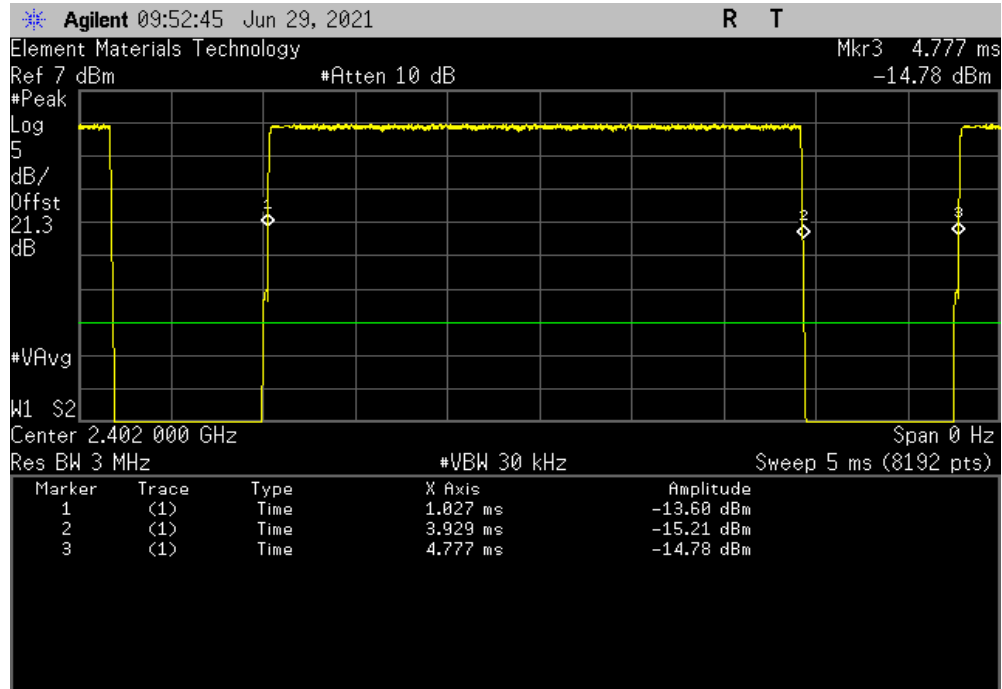


DUTY CYCLE

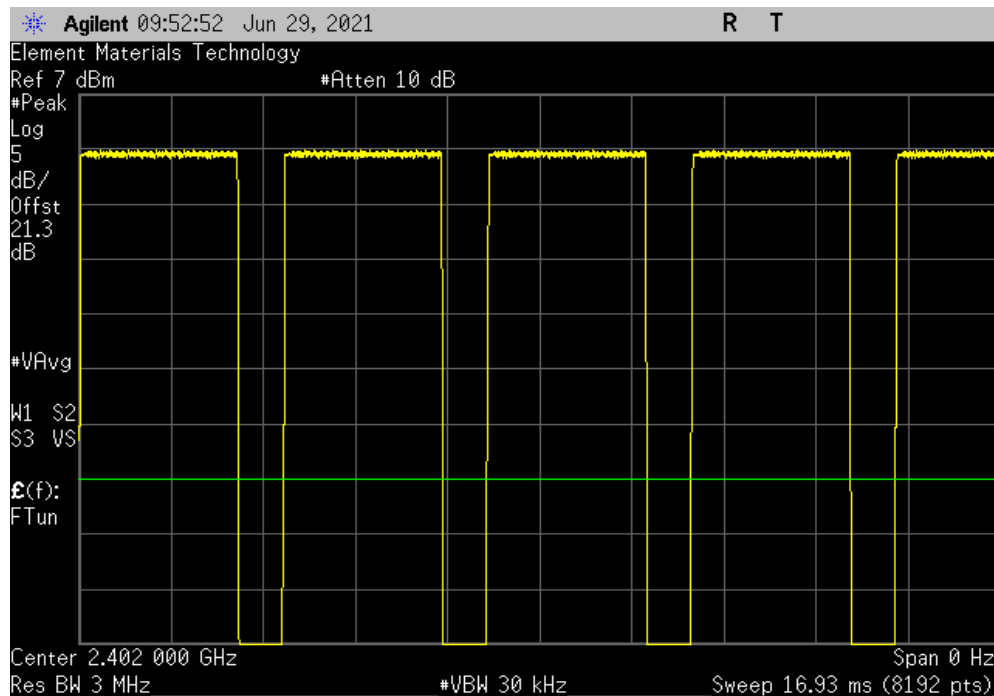


TbTx 2021.03.19.1 XM8 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.901 ms	3.75 ms	1	77.4	N/A	N/A



3DH5, 8-DPSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

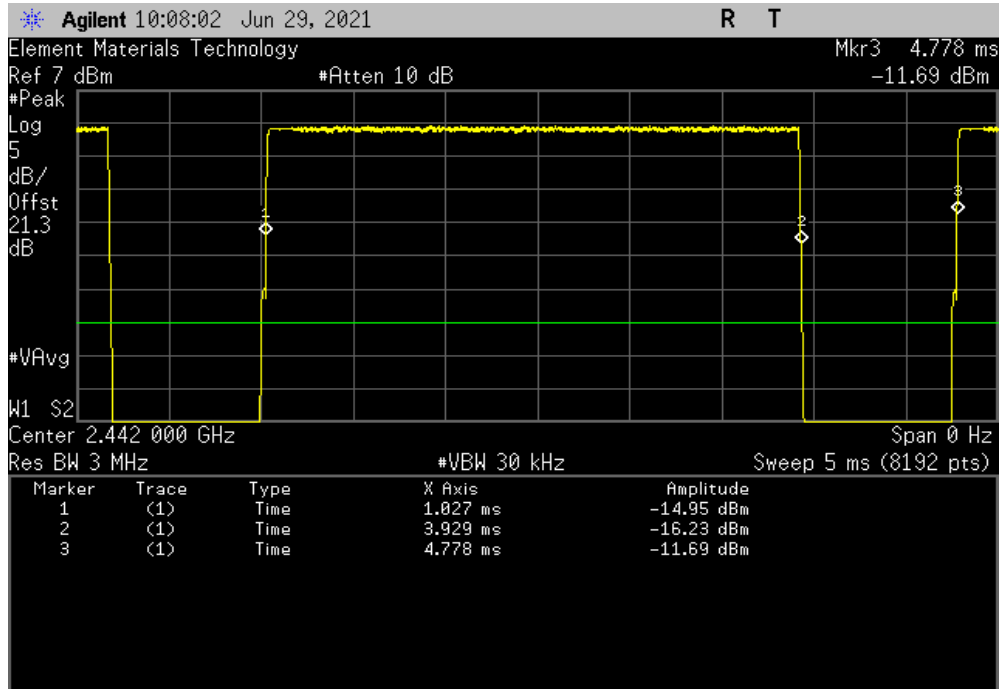


DUTY CYCLE

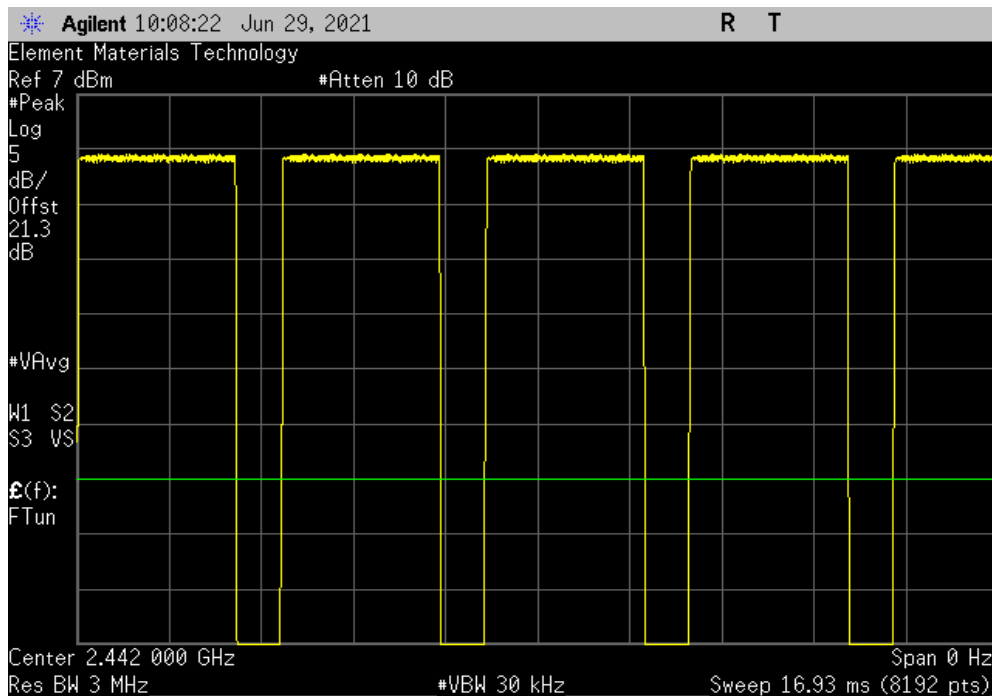


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.902 ms	3.751 ms	1	77.4	N/A	N/A	



3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

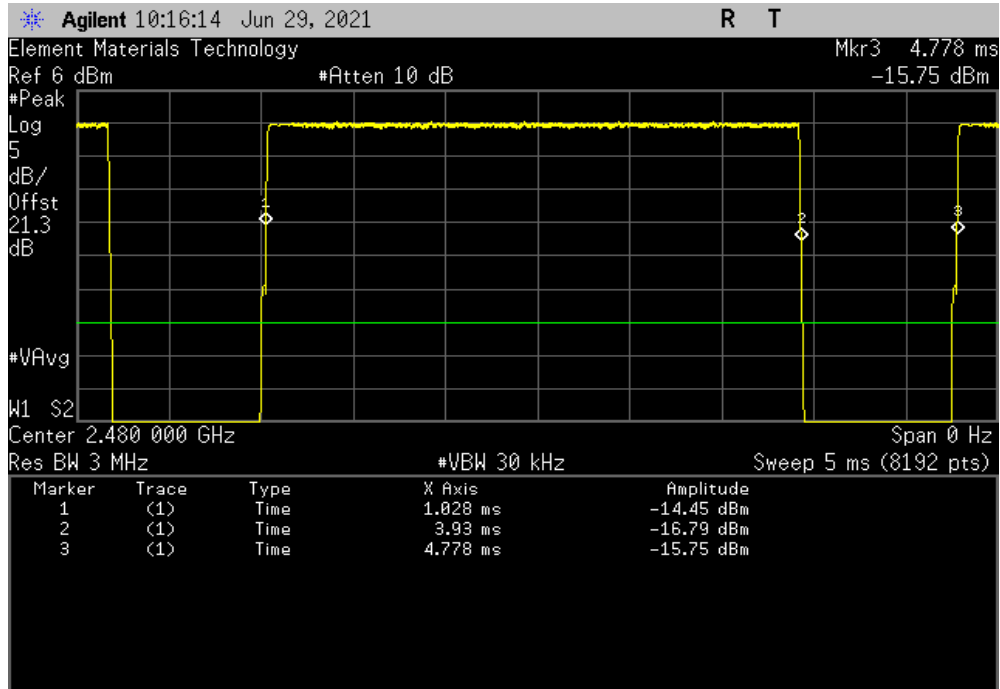


DUTY CYCLE

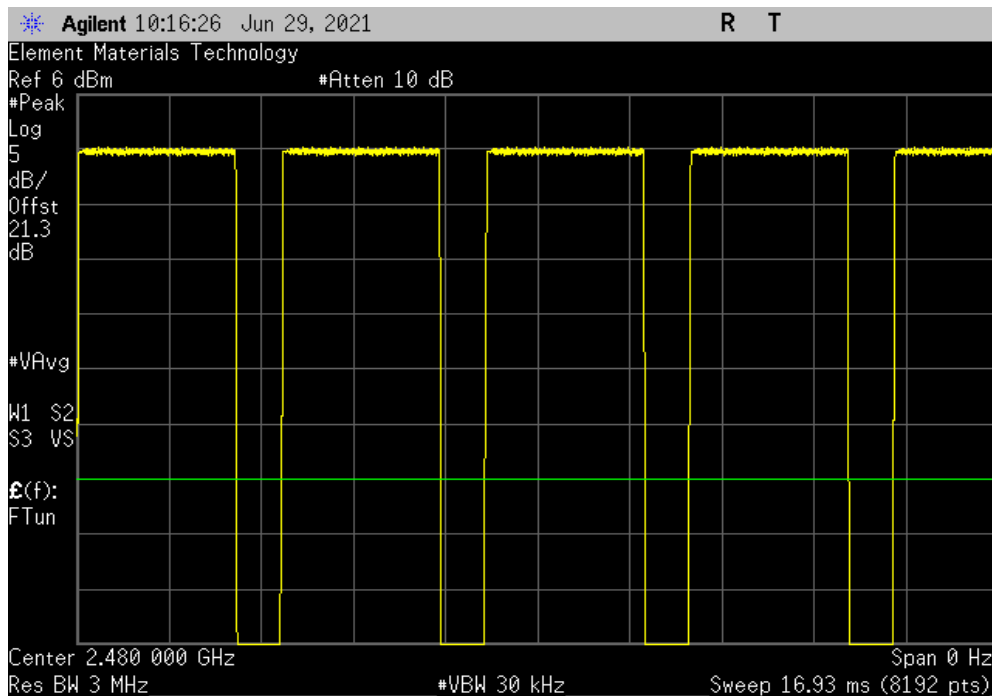


TbTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.902 ms	3.75 ms	1	77.4	N/A	N/A



3DH5, 8-DPSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



CARRIER FREQUENCY SEPARATION

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The channel carrier frequencies in the 2400-2483.5MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

CARRIER FREQUENCY SEPARATION



TSTx 2021.03.19.1 XMR 2020.12.30.0

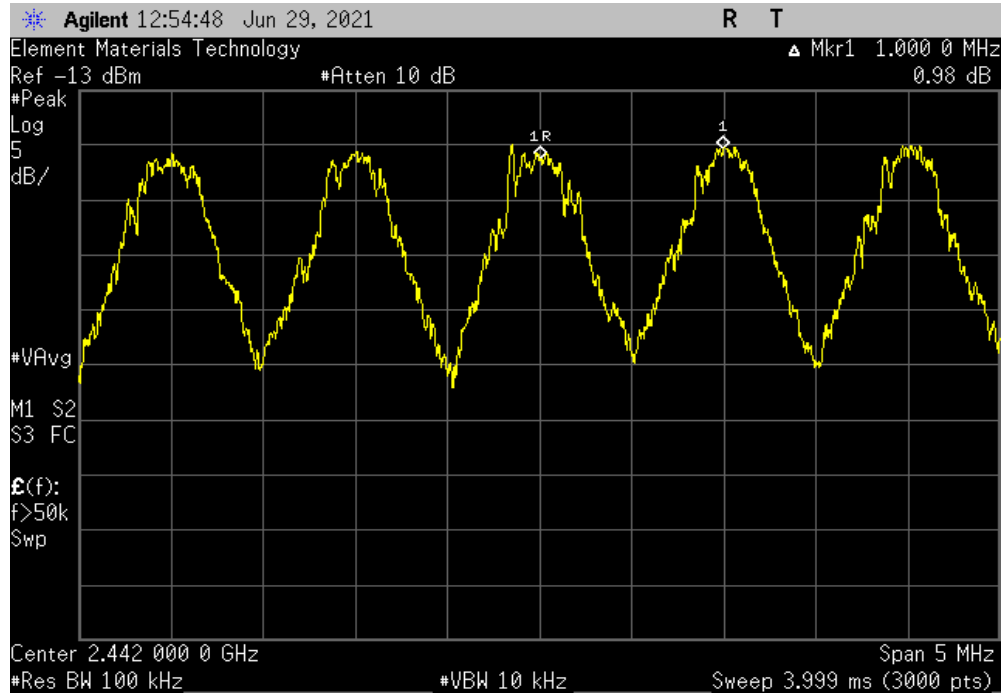
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.9 °C	
Attendees: Zack Lyda		Humidity: 47.7% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable. The largest measured 20 dB occupied bandwidth for the various data rates is as follows: DH5 = 933 kHz, 2/3*933 kHz = 622 kHz 2DH5 = 1344 kHz, 2/3*1344 kHz = 896 kHz 3DH5 = 1315 kHz, 2/3*1315 kHz = 877 kHz			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (≥) Results
Hopping Mode (All Channels)			
DH5, GFSK		1.0 MHz	622 kHz Pass
2DH5, π/4-DQPSK		1.0 MHz	896 kHz Pass
3DH5, 8-DPSK		1.0 MHz	877 kHz Pass

CARRIER FREQUENCY SEPARATION

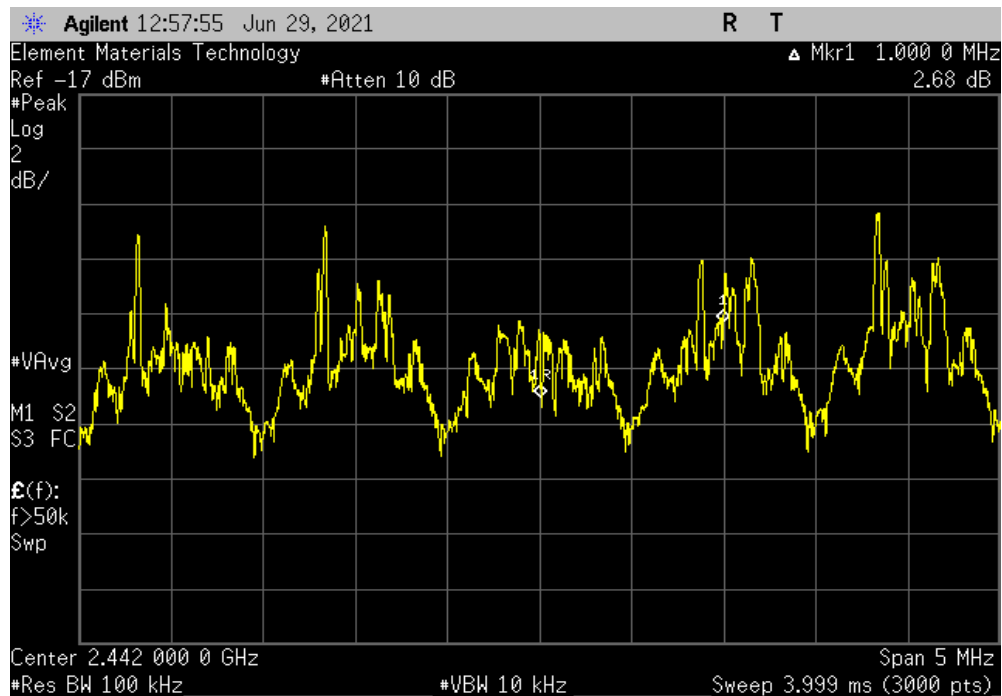


TUTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), DH5, GFSK						
				Value	Limit (≥)	Results
				1.0 MHz	622 kHz	Pass



Hopping Mode (All Channels), 2DH5, pi/4-DQPSK						
				Value	Limit (≥)	Results
				1.0 MHz	896 kHz	Pass

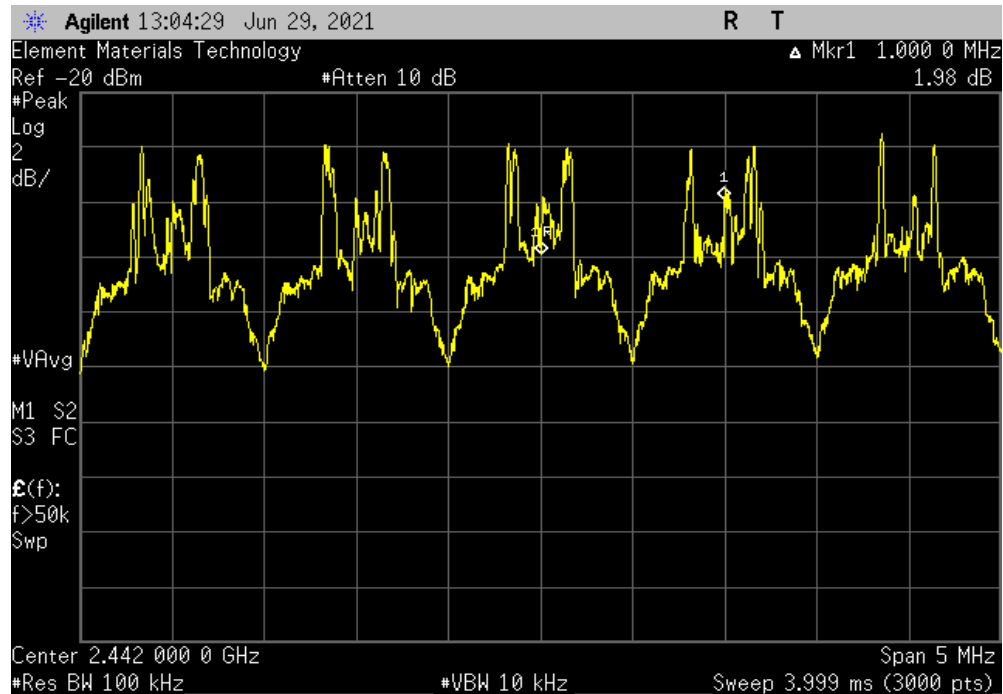


CARRIER FREQUENCY SEPARATION



TUTx 2021.03.19.1 XM8 2020.12.30.0

Hopping Mode (All Channels), 3DH5, 8-DPSK						
				Value	Limit (≥)	Results
				1.0 MHz	877 kHz	Pass



NUMBER OF HOPPING FREQUENCIES



XMit 2020.12.30.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

NUMBER OF HOPPING FREQUENCIES



TSTx 2021.03.19.1 XMR 2020.12.30.0

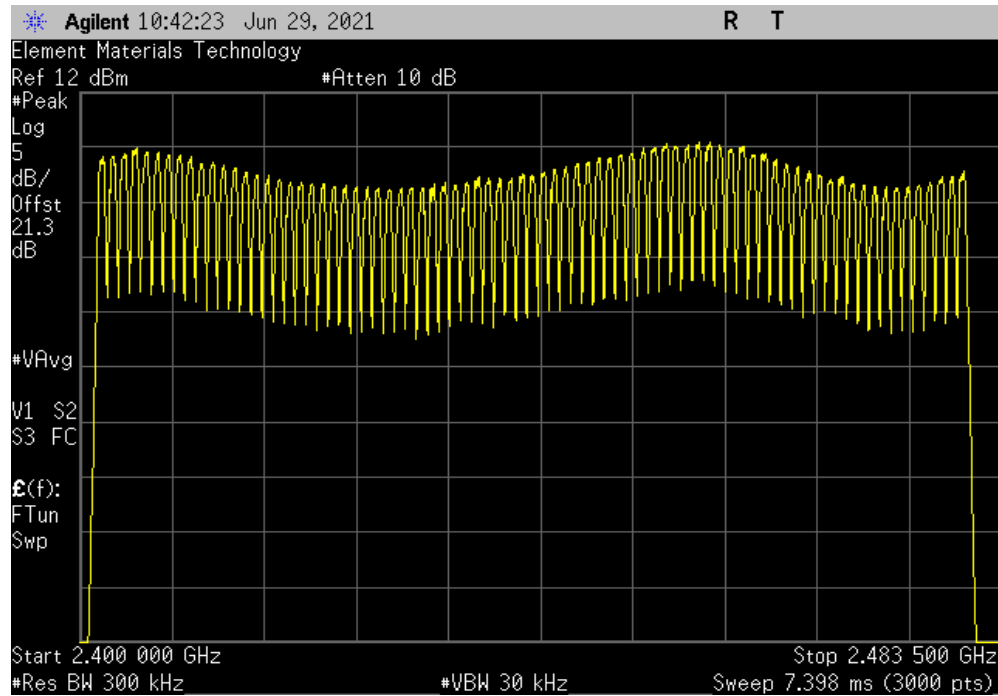
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.8 °C	
Attendees: Zack Lyda		Humidity: 47.3% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247:2021		Test Method: ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Number of Channels	Limit (≥)
Hopping Mode (All Channels)		79	15
		Results	
		Pass	

NUMBER OF HOPPING FREQUENCIES



TUTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels)						
				Number of Channels	Limit (≥)	Results
				79	15	Pass



DWELL TIME



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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels * 400 mS. For Bluetooth this would be 79 Channels * 400mS = 31.6 Sec.

On Time During 31.6 Sec = Pulse Width * Average Number of Pulses * Scale Factor

- Average Number of Pulses is based on 4 samples.
- Scale Factor = 31.6 Sec / Screen Capture Sweep Time = 31.6 Sec / 6.32 Sec = 5

DWELL TIME



TWtTx 2021.03.19.1 XMR 2020.12.30.0

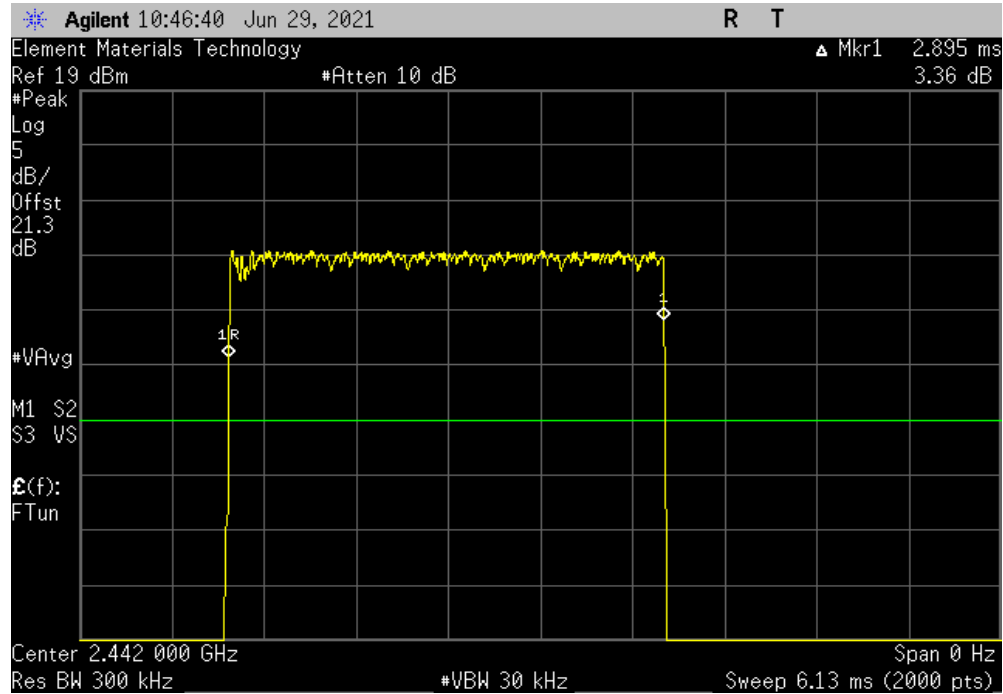
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.8 °C	
Attendees: Zack Lyda		Humidity: 46.5% RH	
Project: None		Barometric Pres.: 1011 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Pulse Width (ms)	Number of Pulses
Hopping Mode (All Channels)			
DH5, GFSK			
	Mid Channel, 2442 MHz	2.895	N/A
	Mid Channel, 2442 MHz	N/A	21
	Mid Channel, 2442 MHz	N/A	26
	Mid Channel, 2442 MHz	N/A	19
	Mid Channel, 2442 MHz	N/A	28
	Mid Channel, 2442 MHz	2.895	N/A
			23.5
2DH5, pi/4-DQPSK			
	Mid Channel, 2442 MHz	2.892	N/A
	Mid Channel, 2442 MHz	N/A	19
	Mid Channel, 2442 MHz	N/A	30
	Mid Channel, 2442 MHz	N/A	20
	Mid Channel, 2442 MHz	N/A	23
	Mid Channel, 2442 MHz	2.892	N/A
			23
3DH5, 8-DPSK			
	Mid Channel, 2442 MHz	2.898	N/A
	Mid Channel, 2442 MHz	N/A	21
	Mid Channel, 2442 MHz	N/A	28
	Mid Channel, 2442 MHz	N/A	20
	Mid Channel, 2442 MHz	N/A	20
	Mid Channel, 2442 MHz	2.898	N/A
			22.25

DWELL TIME

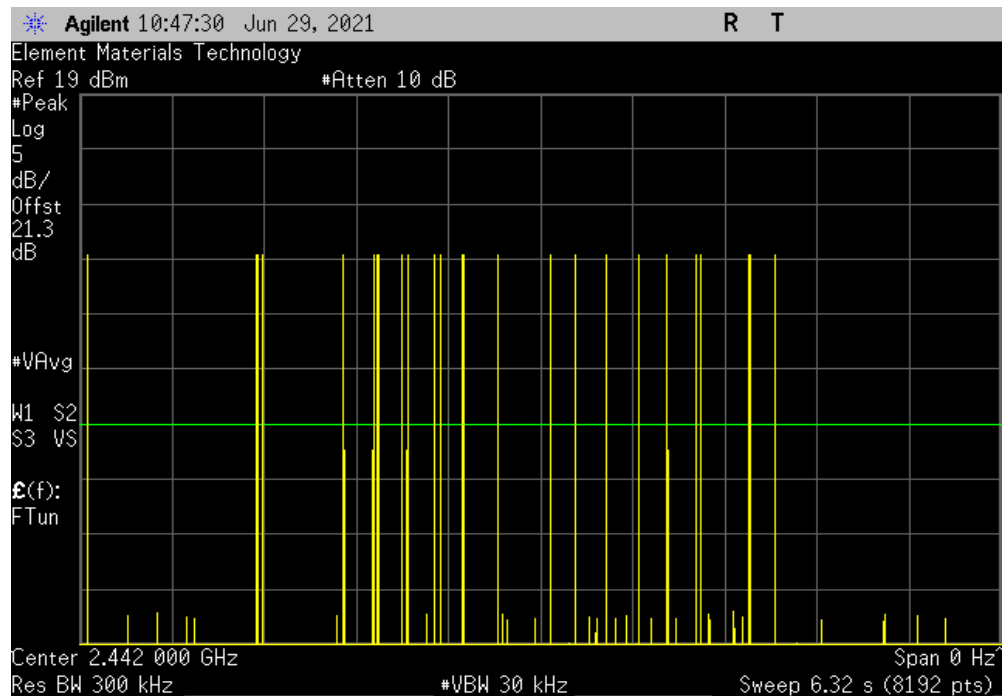


TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.895	N/A	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	21	N/A	N/A	N/A	N/A	N/A

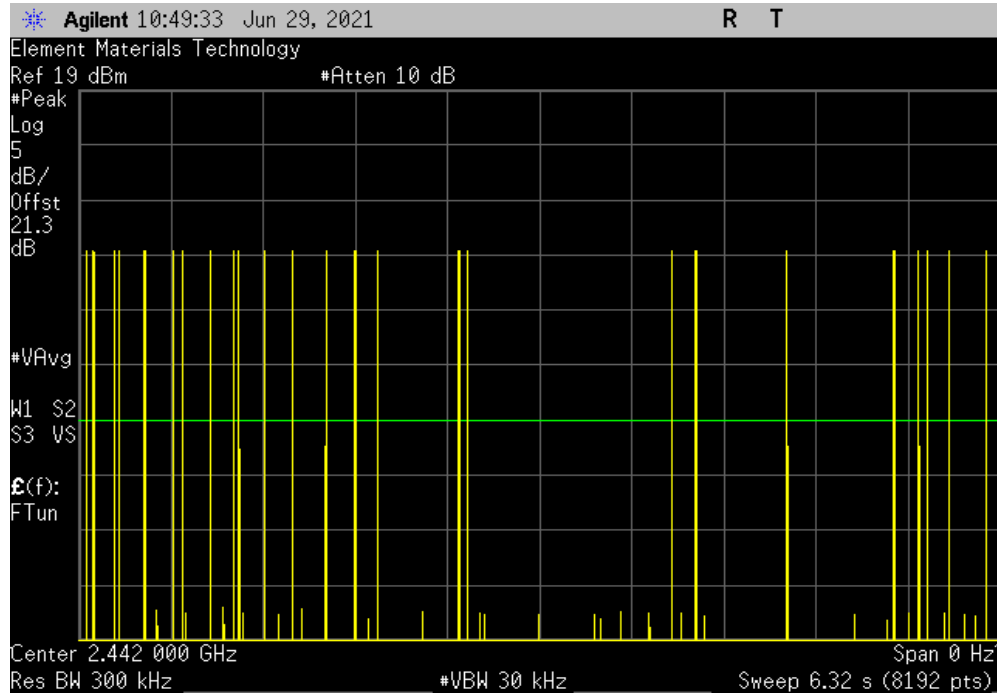


DWELL TIME

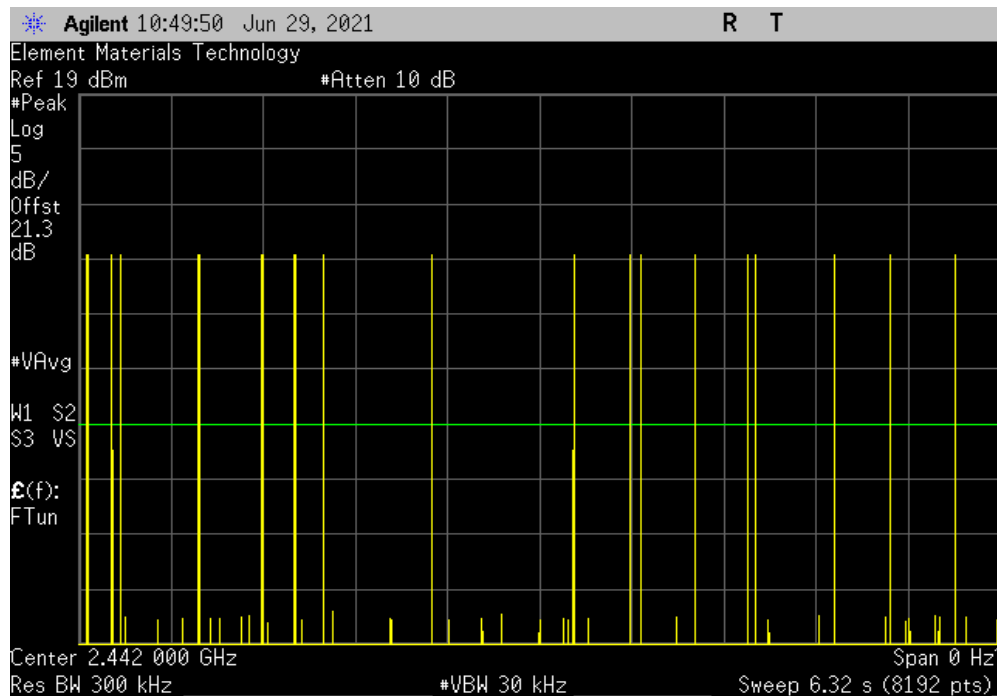


TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	26	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	19	N/A	N/A	N/A	N/A	N/A

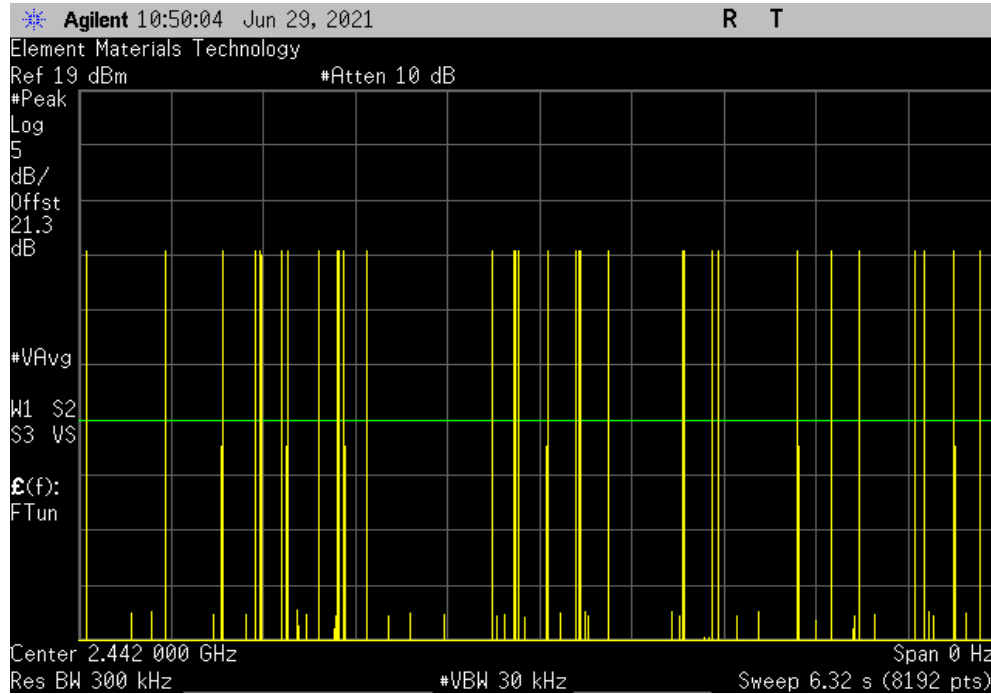


DWELL TIME



TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	28	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), DH5, GFSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.895	N/A	23.5	5	340.16	400	Pass

Calculation Only

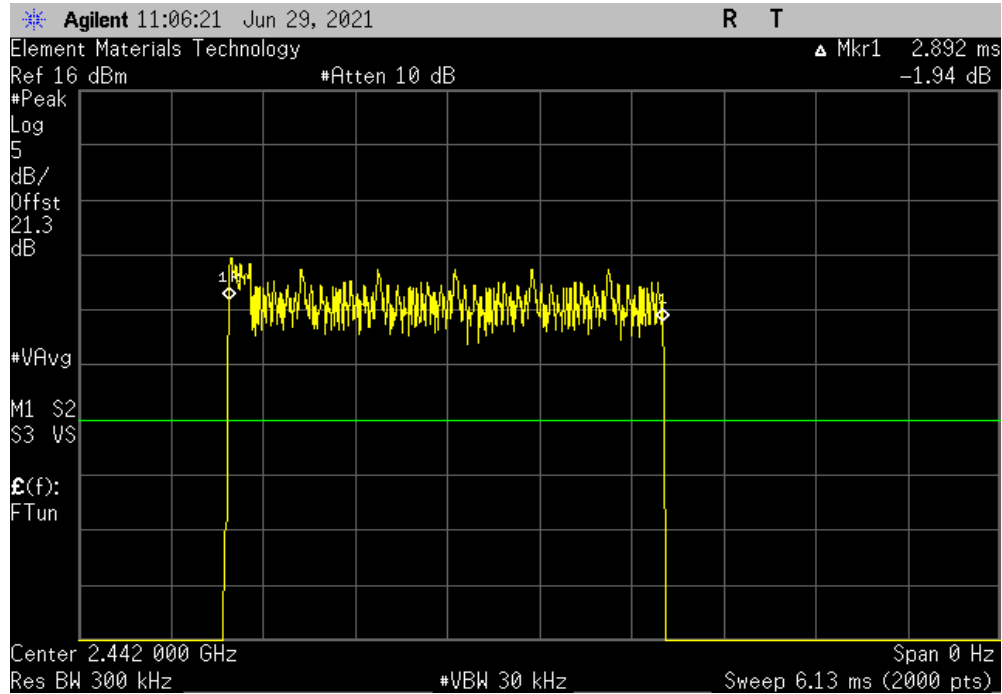
No Screen Capture Required

DWELL TIME

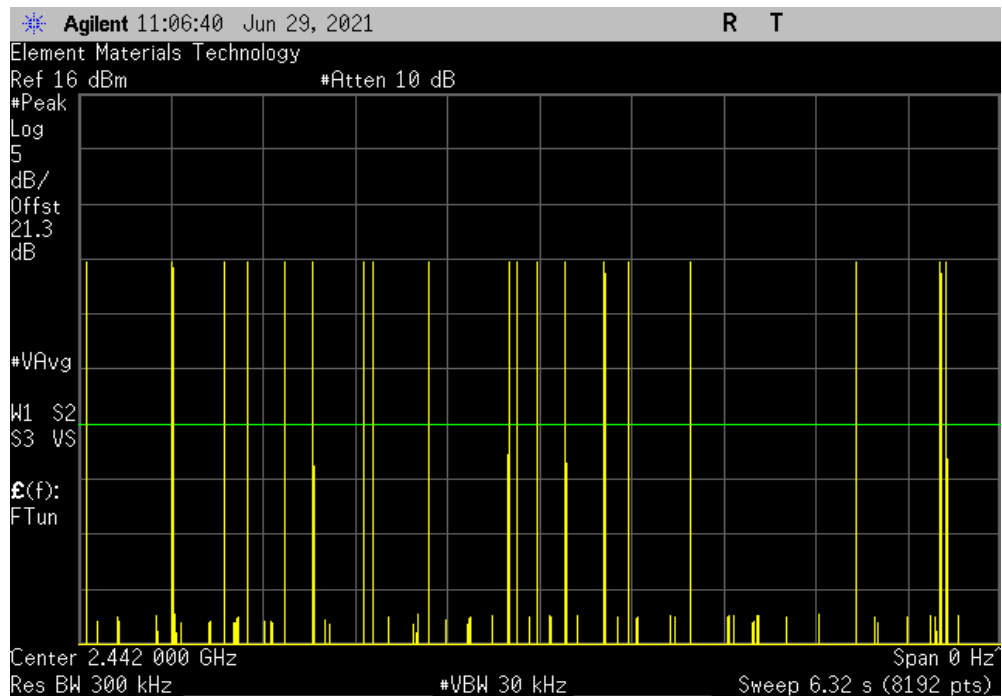


TMTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.892	N/A	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	19	N/A	N/A	N/A	N/A	N/A

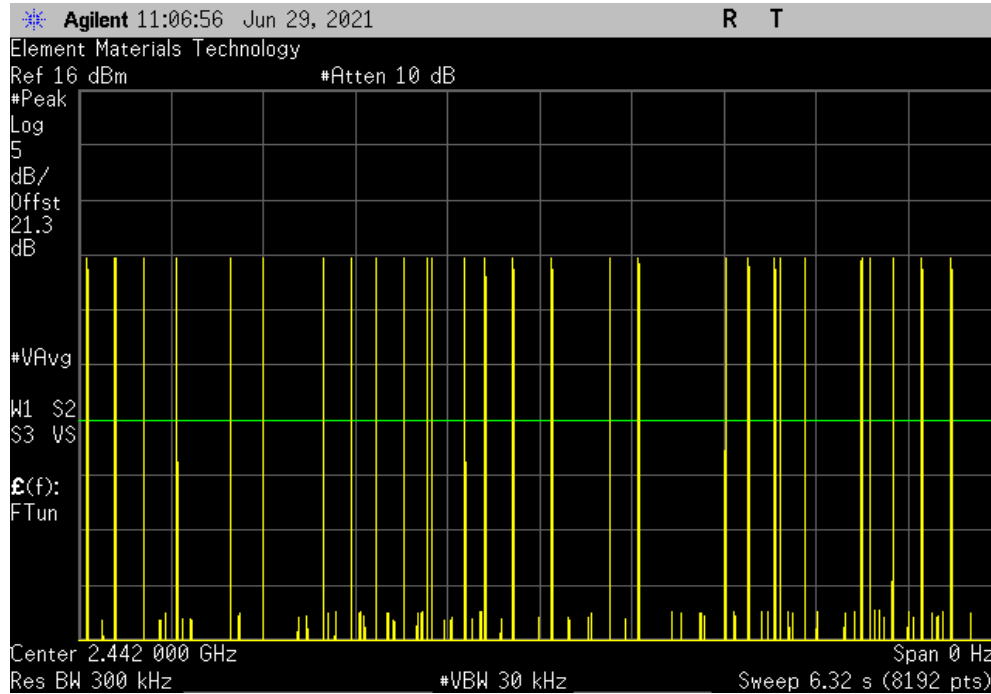


DWELL TIME

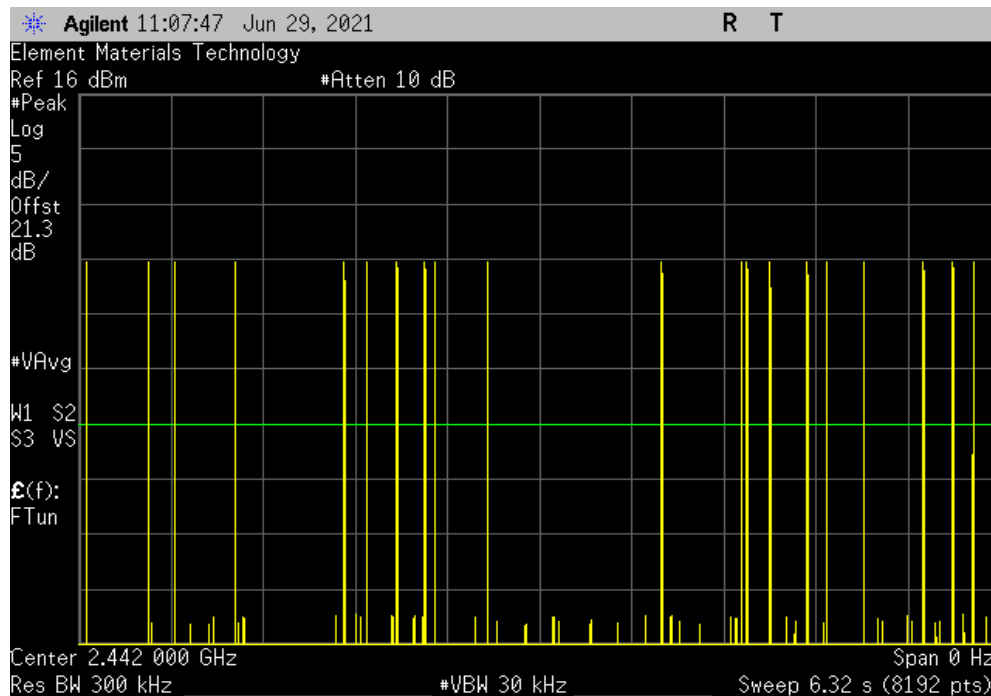


TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	30	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	20	N/A	N/A	N/A	N/A	N/A

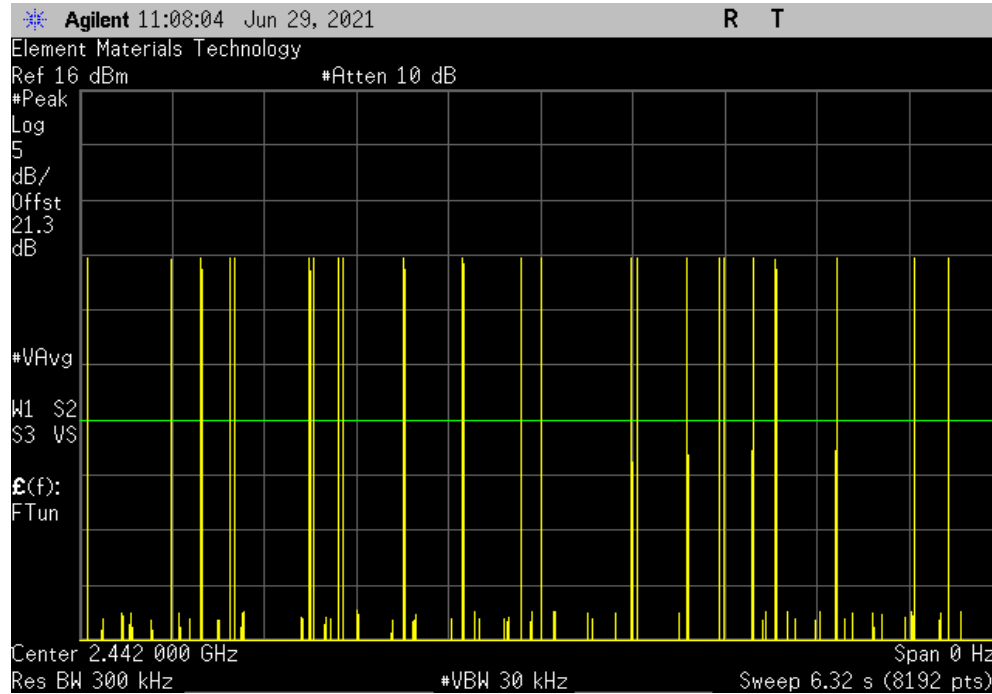


DWELL TIME



TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	23	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.892	N/A	23	5	332.58	400	Pass

Calculation Only

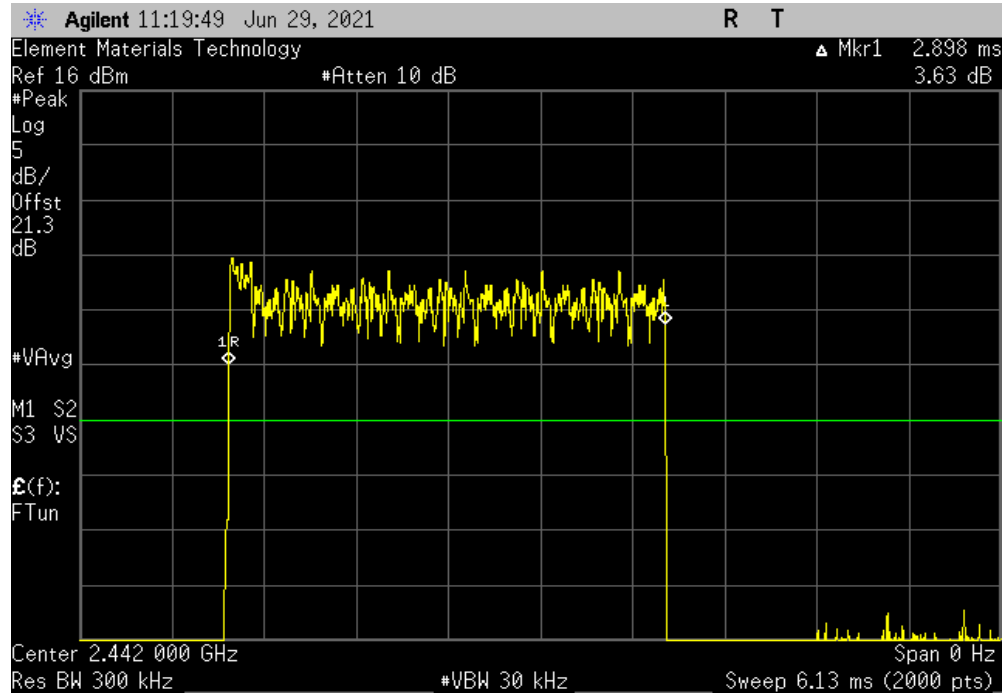
No Screen Capture Required

DWELL TIME

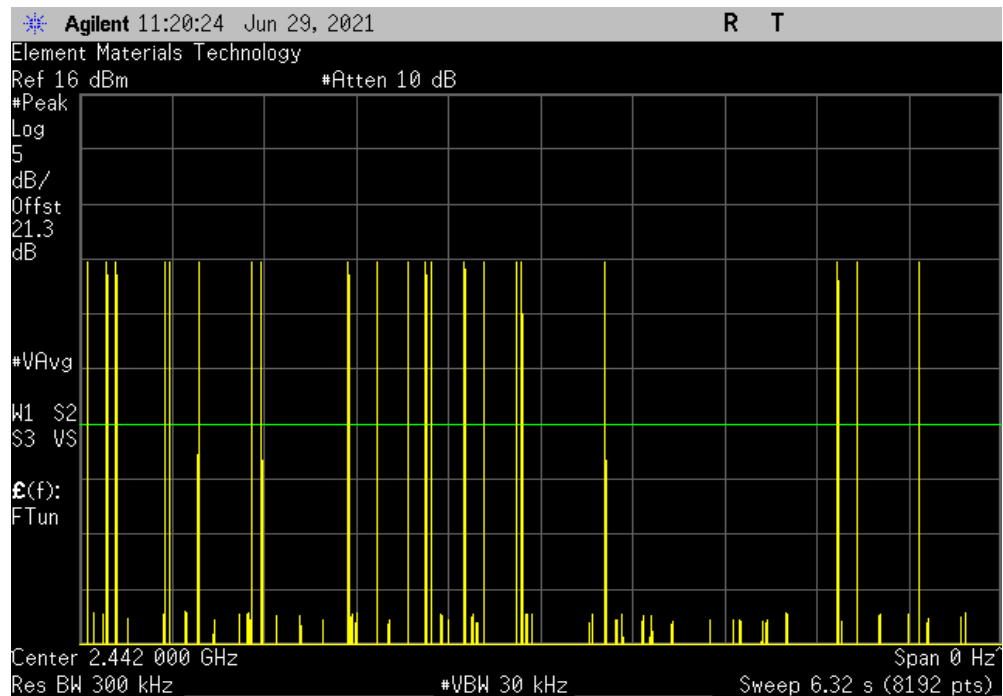


TbTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.898	N/A	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	21	N/A	N/A	N/A	N/A	N/A

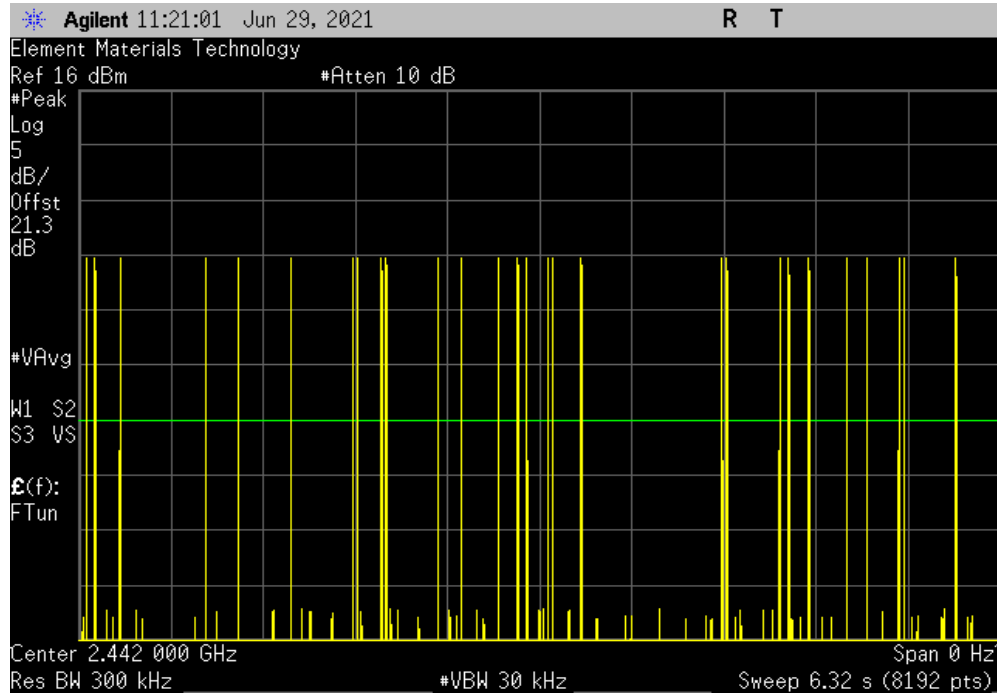


DWELL TIME

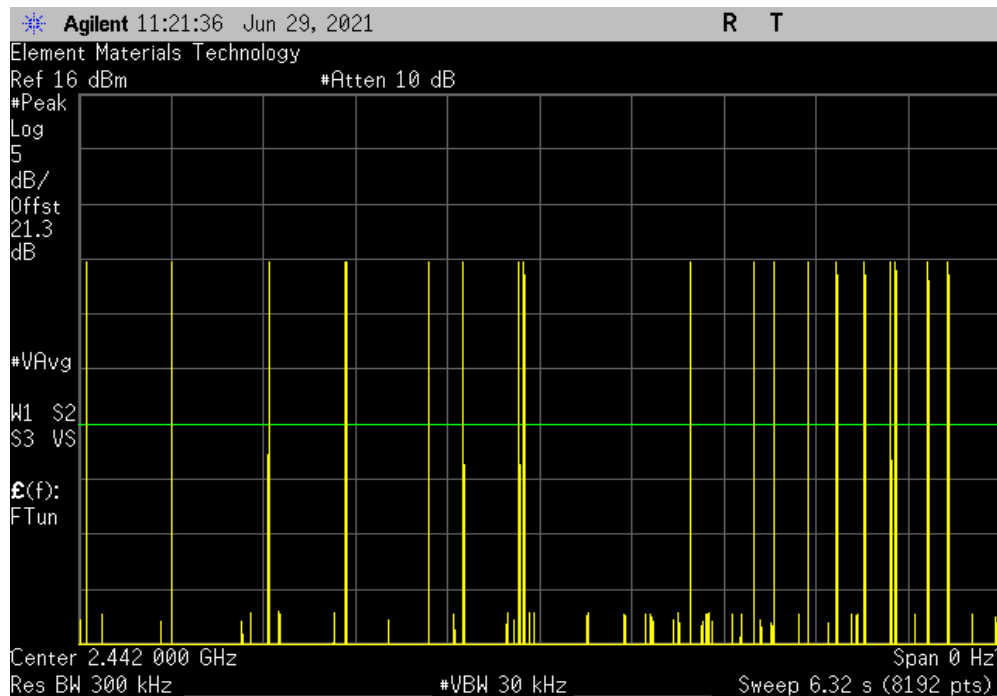


TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	28	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	20	N/A	N/A	N/A	N/A	N/A

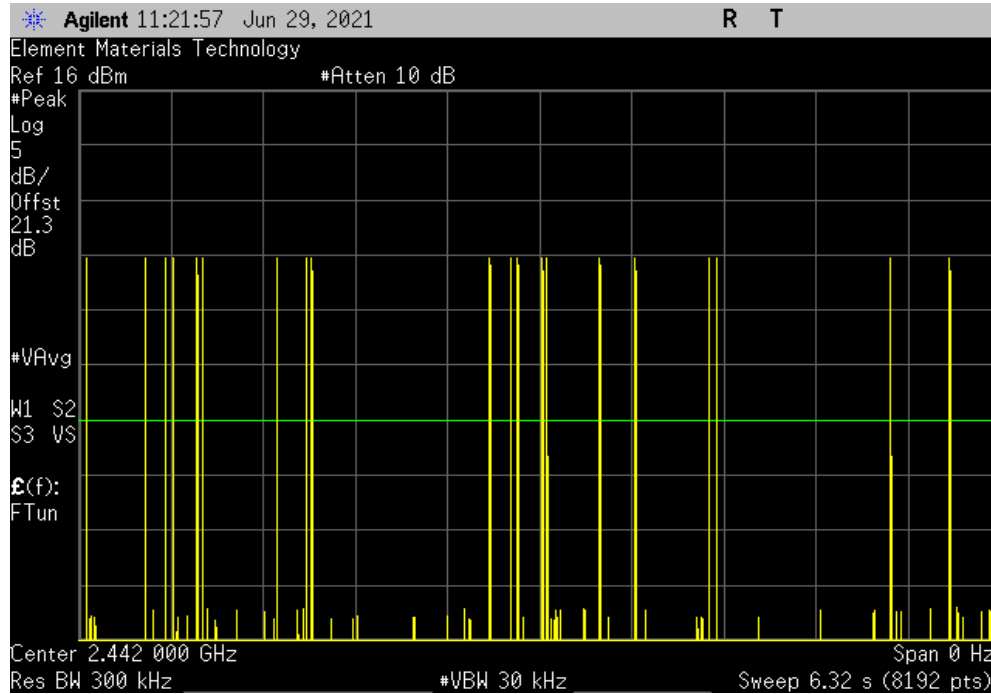


DWELL TIME



TbTx 2021.03.19.1 XMt 2020.12.30.0

Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	20	N/A	N/A	N/A	N/A	N/A



Hopping Mode (All Channels), 3DH5, 8-DPSK, Mid Channel, 2442 MHz						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.898	N/A	22.25	5	322.4	400	Pass

Calculation Only

No Screen Capture Required

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

OUTPUT POWER



TSTx 2021.03.19.1 XMR 2020.12.30.0

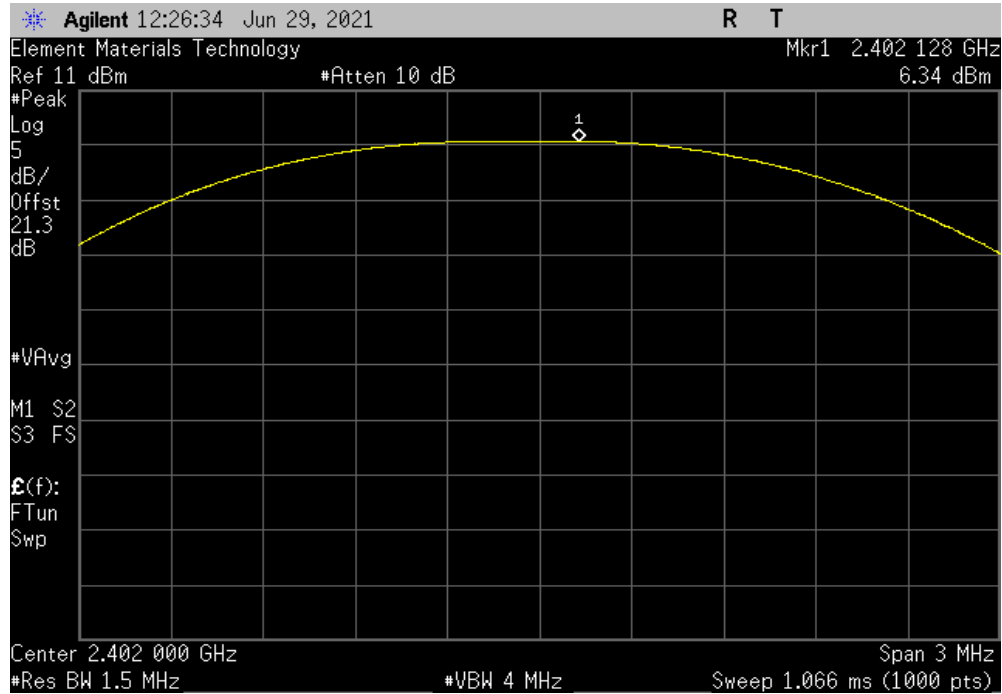
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.8 °C	
Attendees: Zack Lyda		Humidity: 47.2% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcock		Power: 3.3 VDC via 110VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Out Pwr (dBm)	Limit (dBm)
			Result
DH5, GFSK			
	Low Channel, 2402 MHz	6.343	21
	Mid Channel, 2442 MHz	5.068	21
	High Channel, 2480 MHz	4.83	21
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	3.904	21
	Mid Channel, 2442 MHz	3.493	21
	High Channel, 2480 MHz	3.1	21
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	4.306	21
	Mid Channel, 2442 MHz	3.822	21
	High Channel, 2480 MHz	3.455	21

OUTPUT POWER

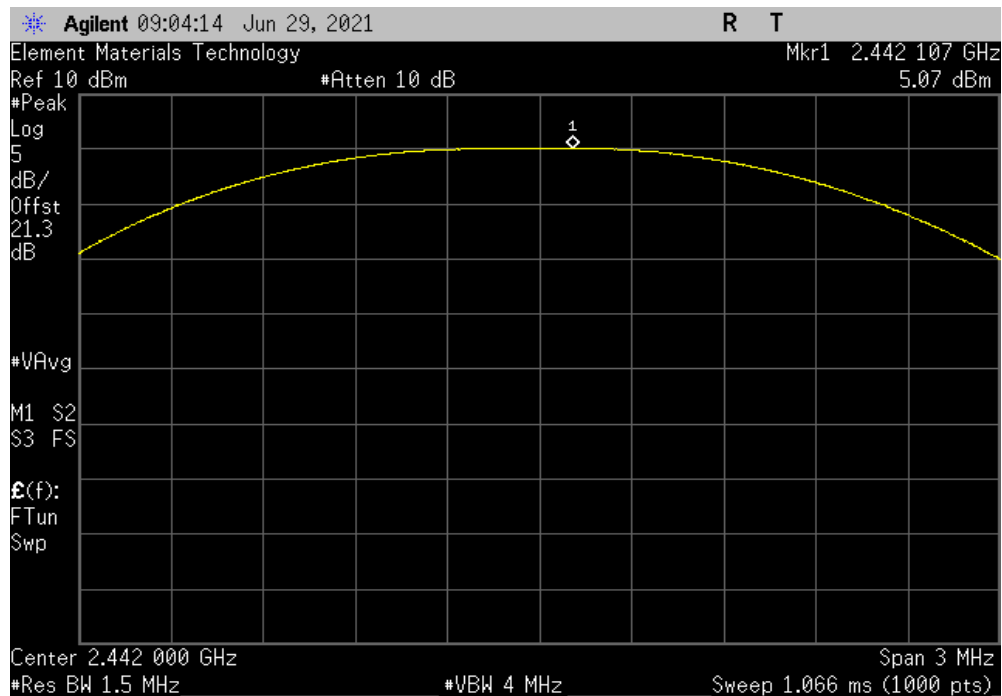


TbTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.343	21	Pass



DH5, GFSK, Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				5.068	21	Pass

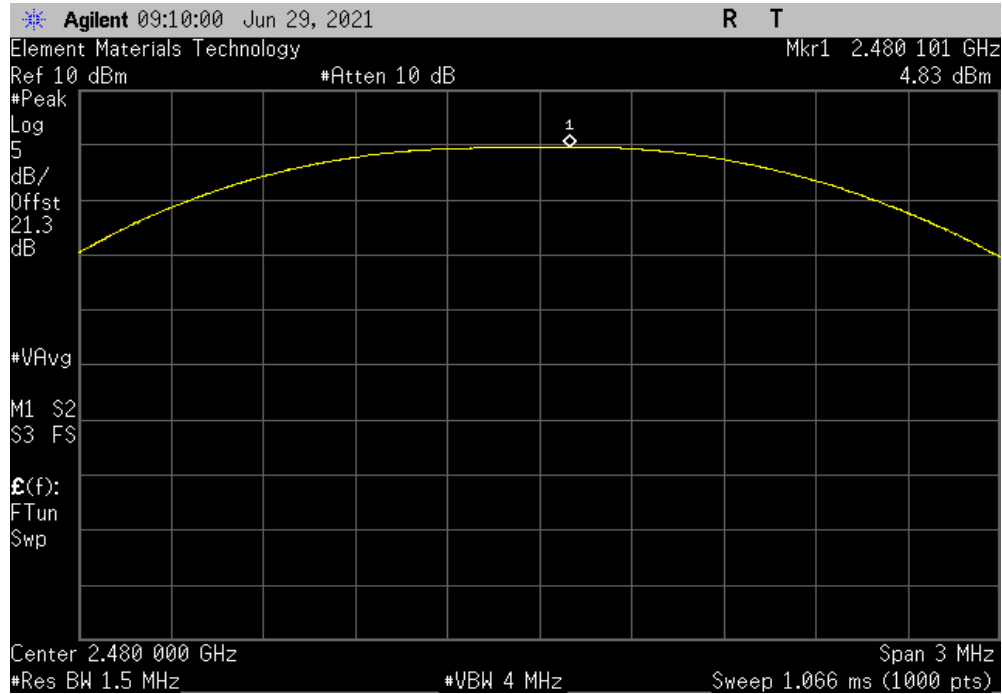


OUTPUT POWER

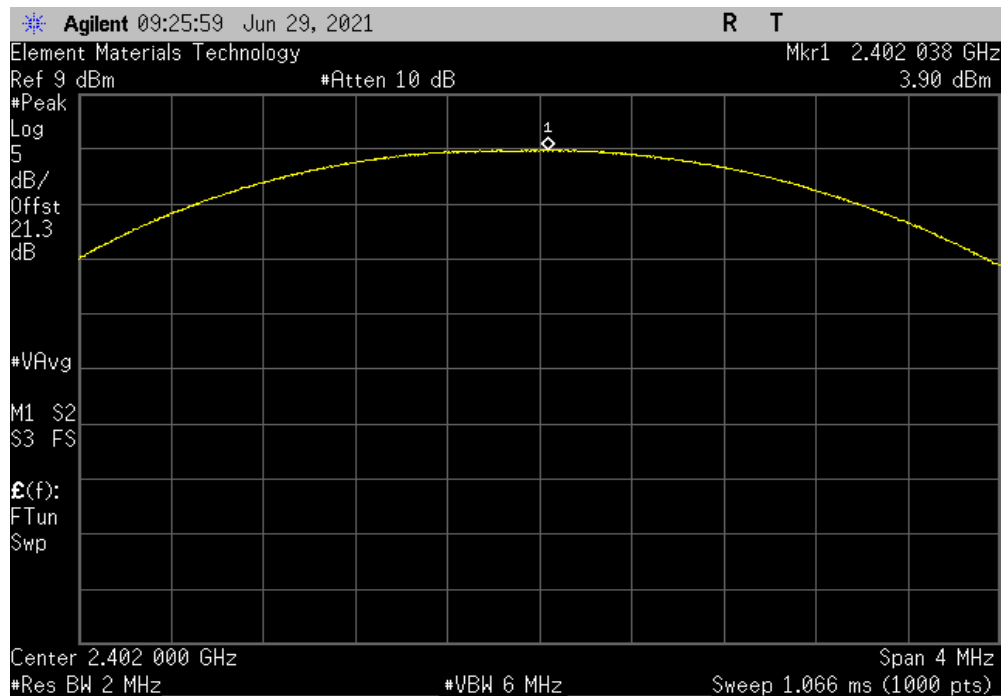


TbTx 2021.03.19.1 XM8 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				4.83	21	Pass



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				3.904	21	Pass

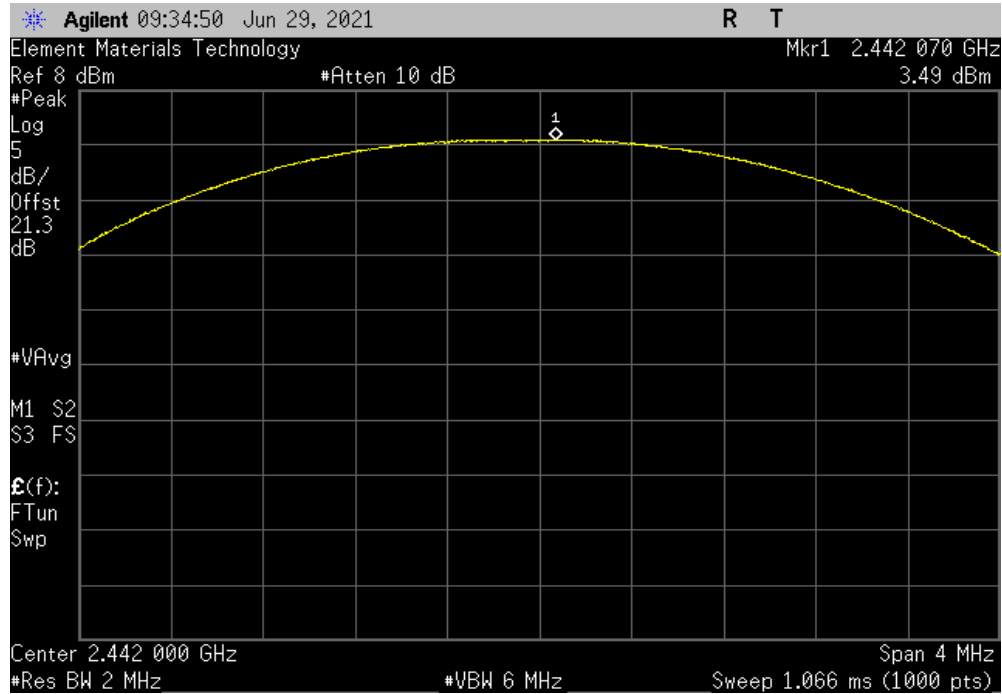


OUTPUT POWER

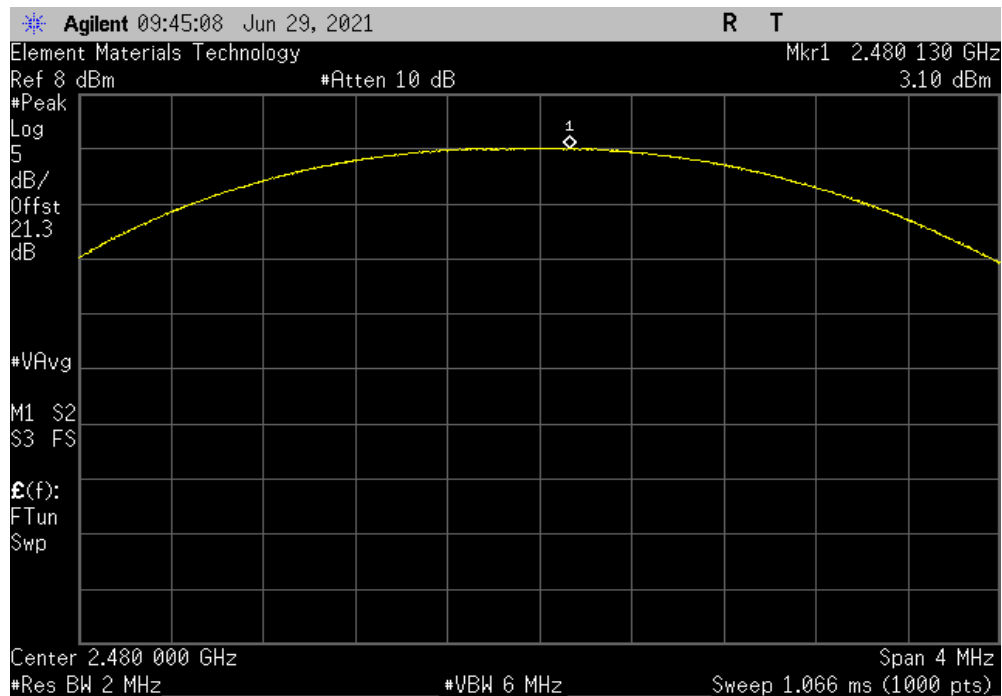


TUTx 2021.03.19.1 XM8 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Limit (dBm)	Result			
	3.493	21	Pass			



2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
	Out Pwr (dBm)	Limit (dBm)	Result			
	3.1	21	Pass			

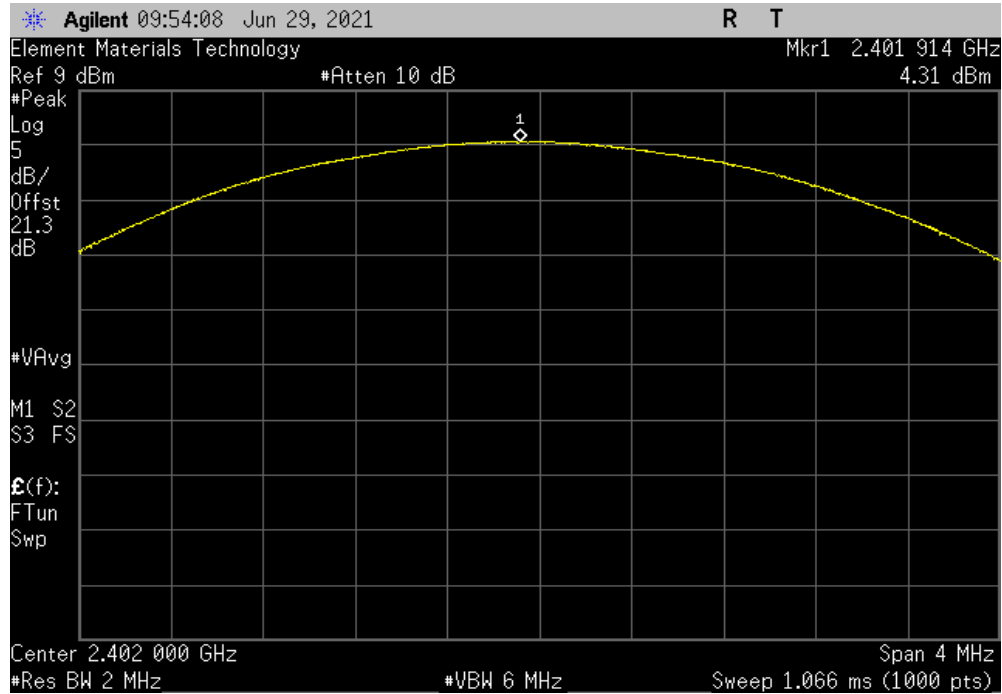


OUTPUT POWER

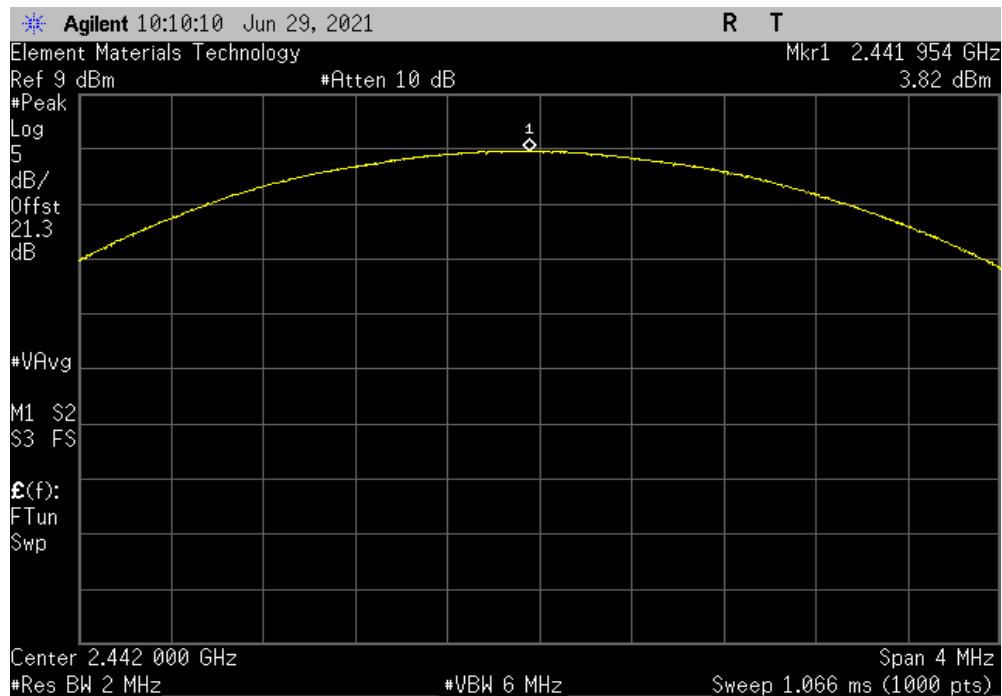


TbTx 2021.03.19.1 XMt 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				4.306	21	Pass



3DH5, 8-DPSK, Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				3.822	21	Pass

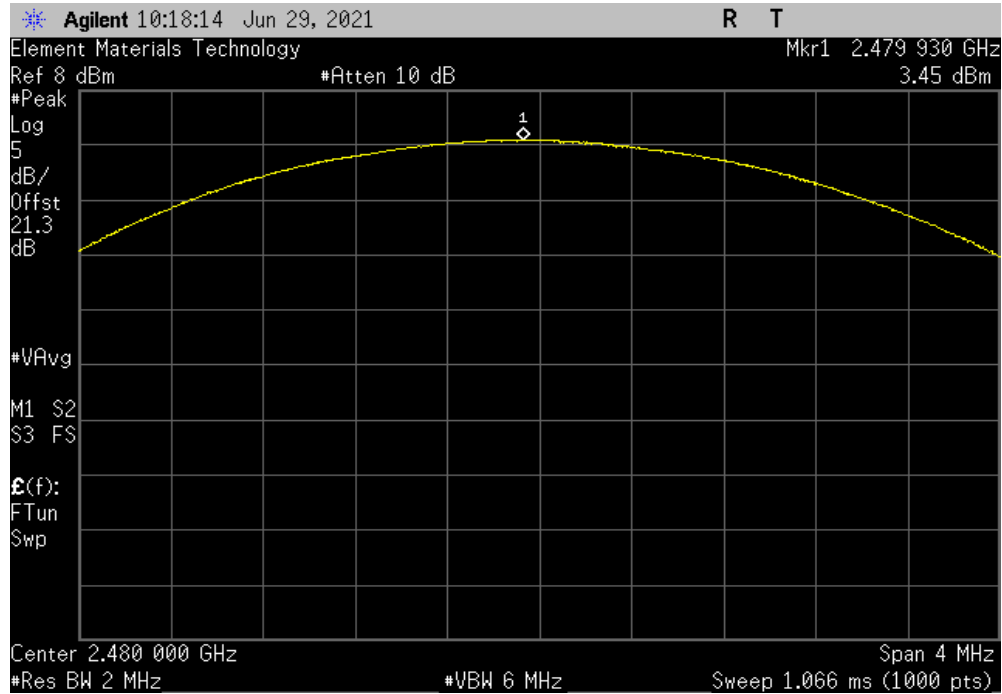


OUTPUT POWER



TbTx 2021.03.19.1 XMt 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				3.455	21	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

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

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TSTx 2021.03.19.1 XMR 2020.12.30.0

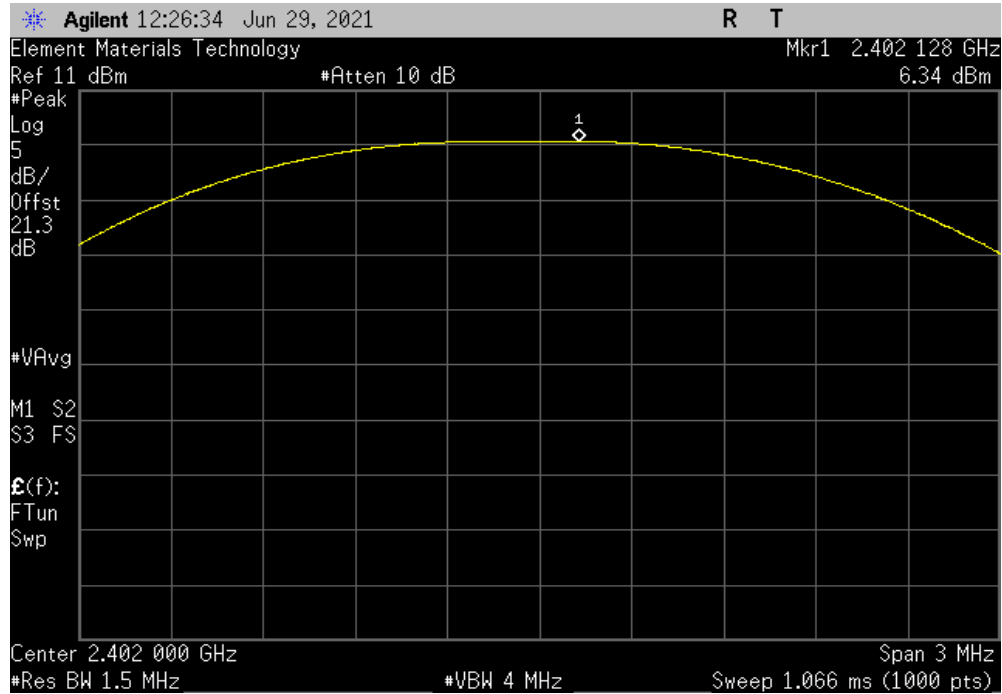
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.7 °C	
Attendees: Zack Lyda		Humidity: 47% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
DH5, GFSK			
	Low Channel, 2402 MHz	6.343	2.2
	Mid Channel, 2442 MHz	5.068	2.2
	High Channel, 2480 MHz	4.83	2.2
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	3.904	2.2
	Mid Channel, 2442 MHz	3.493	2.2
	High Channel, 2480 MHz	3.1	2.2
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	4.306	2.2
	Mid Channel, 2442 MHz	3.822	2.2
	High Channel, 2480 MHz	3.455	2.2

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

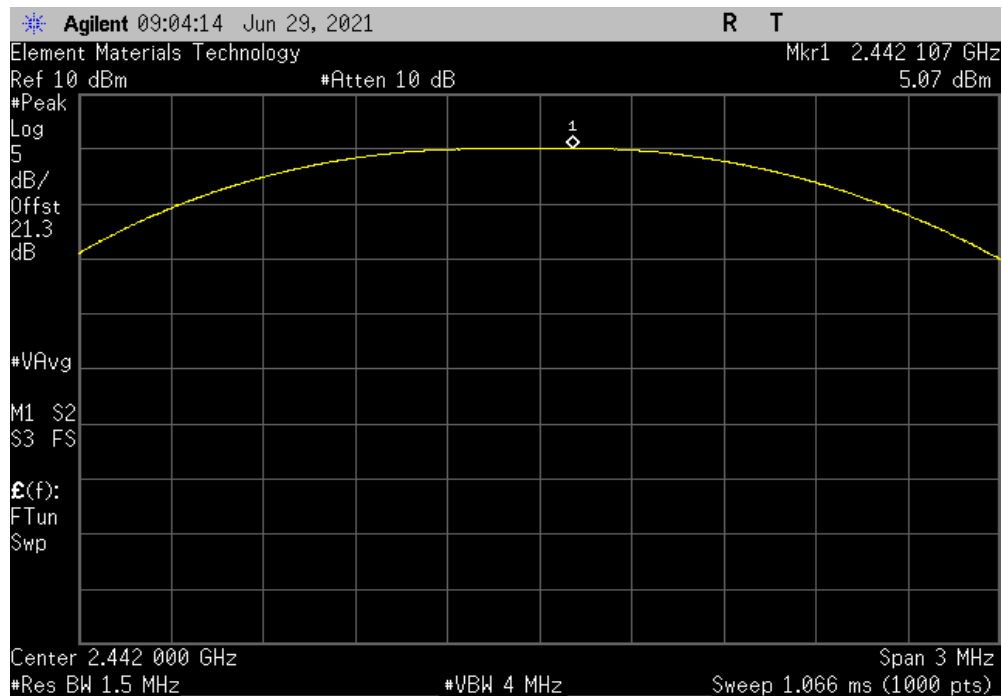


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	6.343	2.2	8.543	27	Pass	



DH5, GFSK, Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	5.068	2.2	7.268	27	Pass	

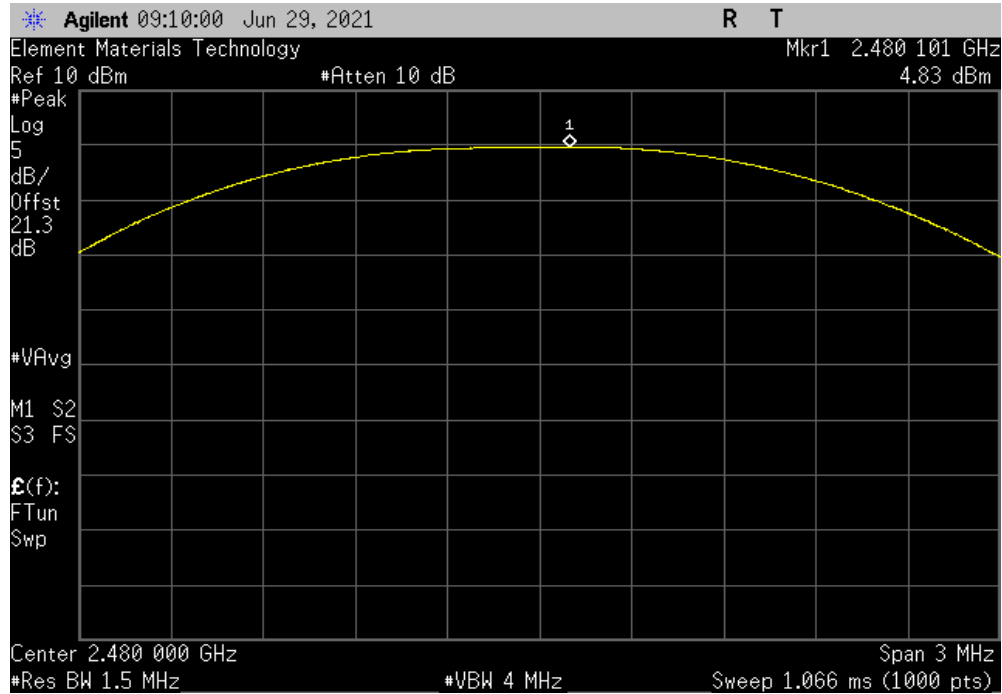


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

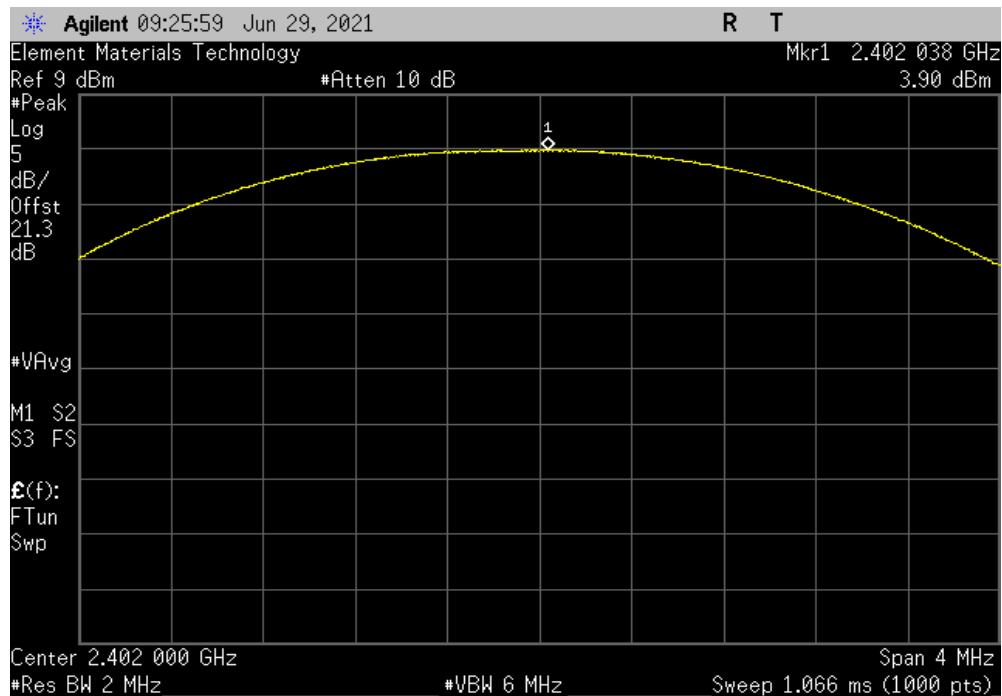


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	4.83	2.2	7.03	27	Pass	



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	3.904	2.2	6.104	27	Pass	

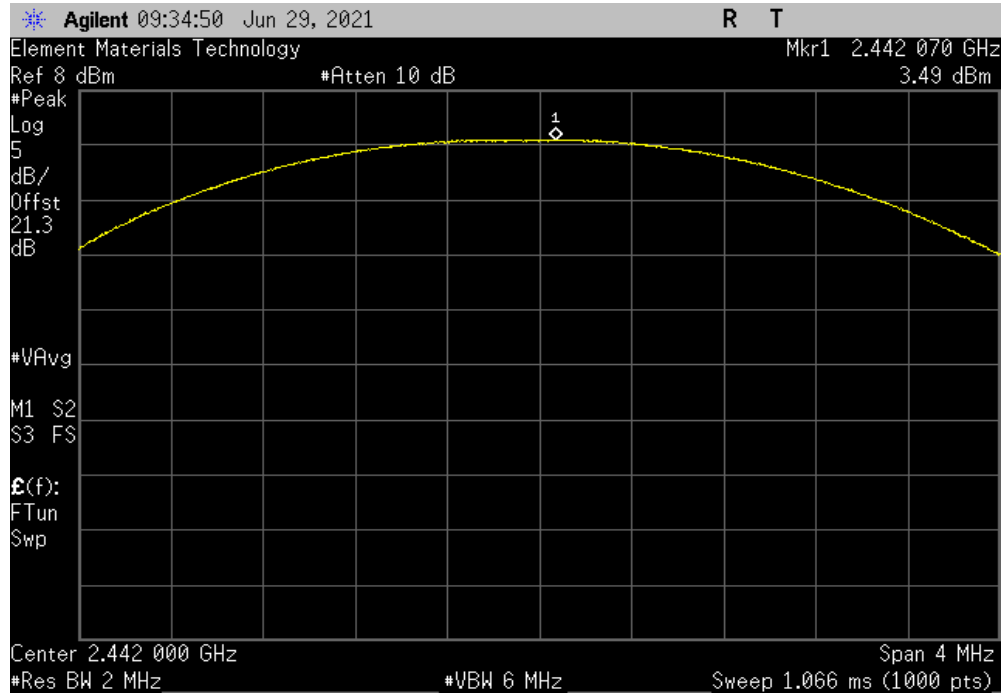


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

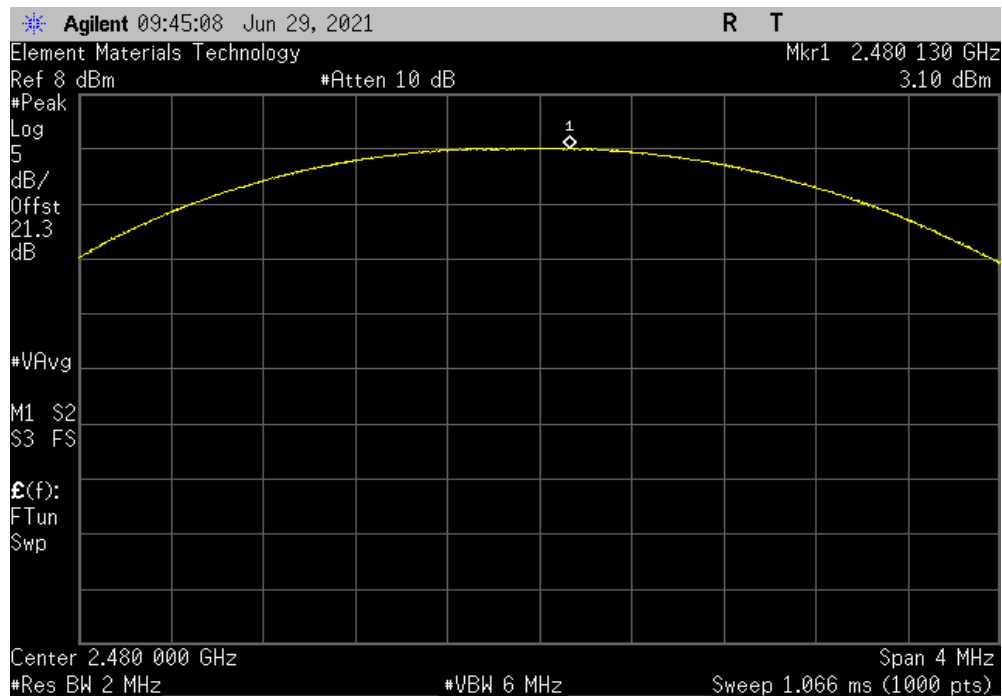


TUTx 2021.03.19.1 XM8 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	3.493	2.2	5.693	27	Pass	



2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	3.1	2.2	5.3	27	Pass	

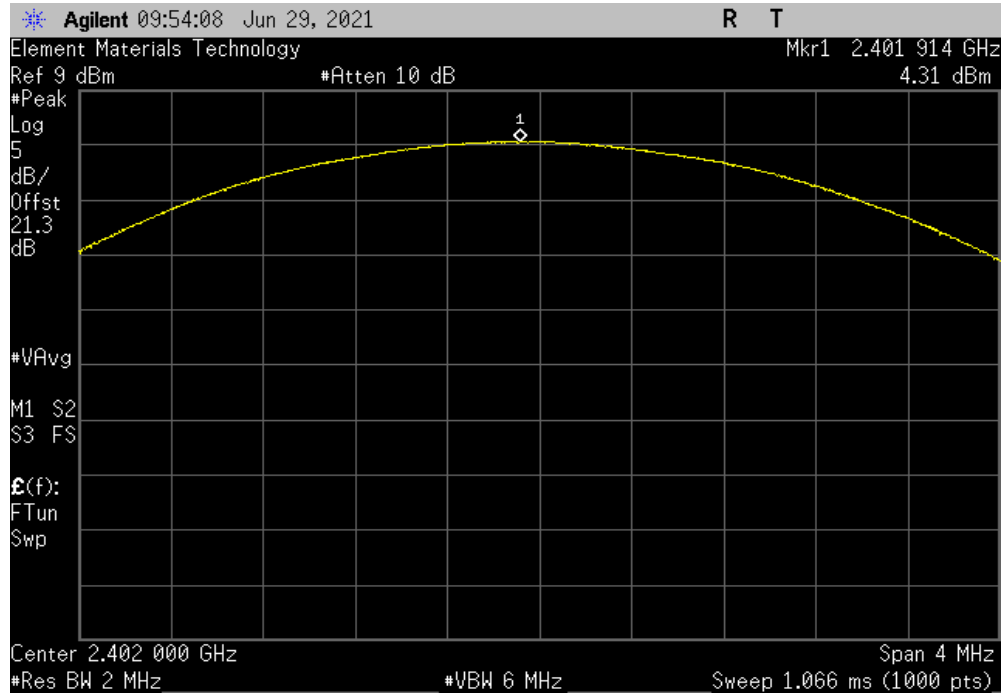


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

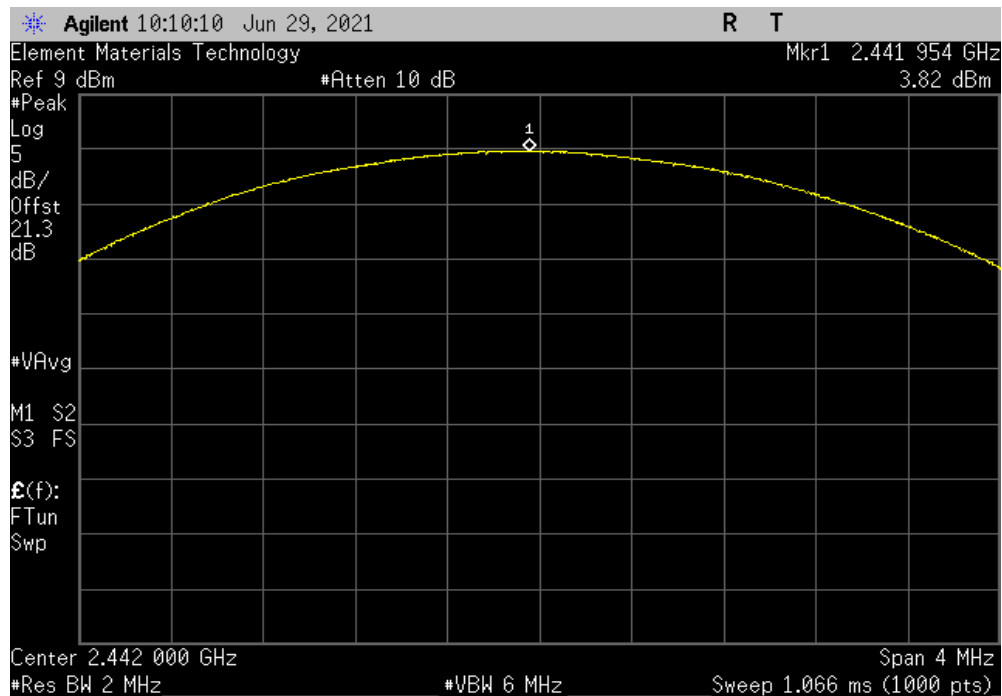


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	4.306	2.2	6.506	27	Pass	



3DH5, 8-DPSK, Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	3.822	2.2	6.022	27	Pass	

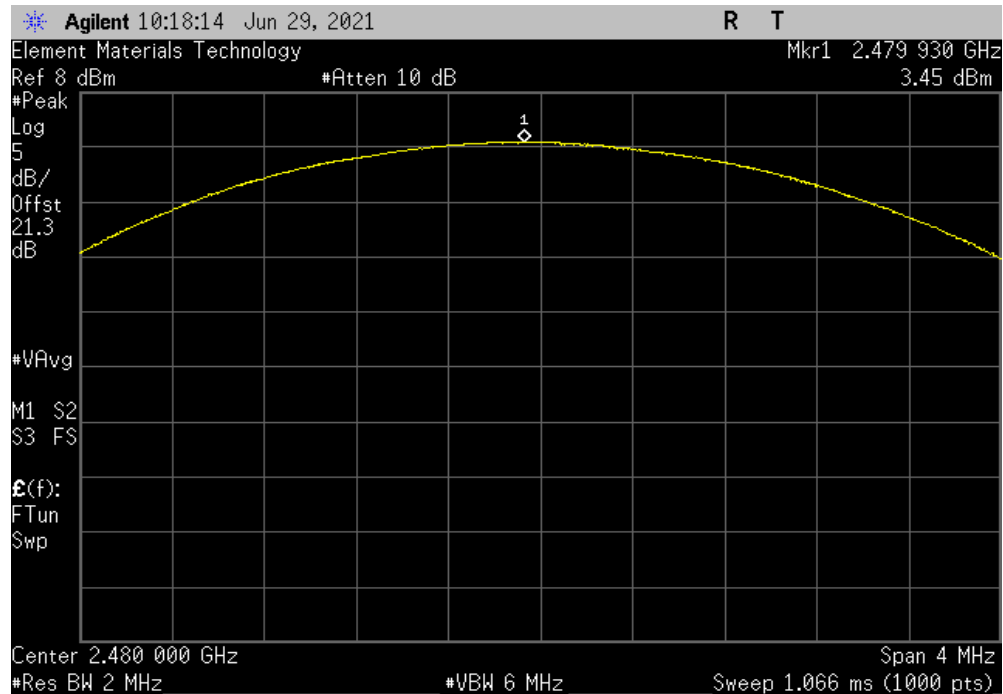


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2021.03.19.1 XMt 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	3.455	2.2	5.655	27	Pass	



BAND EDGE COMPLIANCE - HOPPING MODE

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. 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 - HOPPING MODE



TSTx 2021.03.19.1 XMR 2020.12.30.0

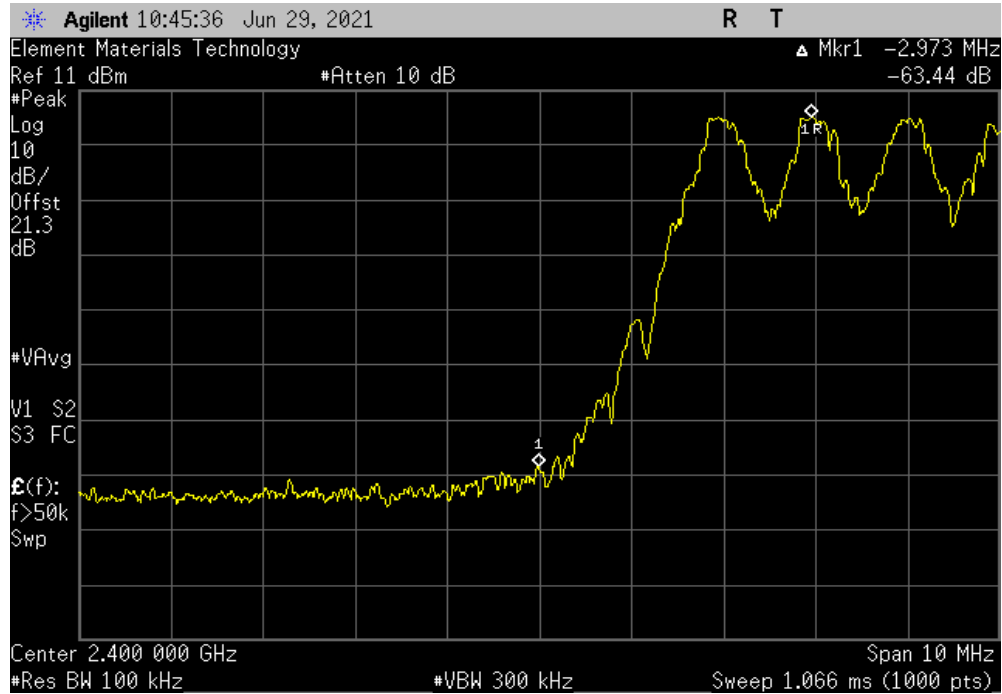
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.9 °C	
Attendees: Zack Lyda		Humidity: 46.4% RH	
Project: None		Barometric Pres.: 1011 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
Hopping Mode (All Channels)			
DH5, GFSK			
Low Channel, 2402 MHz		-63.44	-20 Pass
High Channel, 2480 MHz		-63.53	-20 Pass
2DH5, pi/4-DQPSK			
Low Channel, 2402 MHz		-57.6	-20 Pass
High Channel, 2480 MHz		-60.78	-20 Pass
3DH5, 8-DPSK			
Low Channel, 2402 MHz		-59.22	-20 Pass
High Channel, 2480 MHz		-59	-20 Pass

BAND EDGE COMPLIANCE - HOPPING MODE

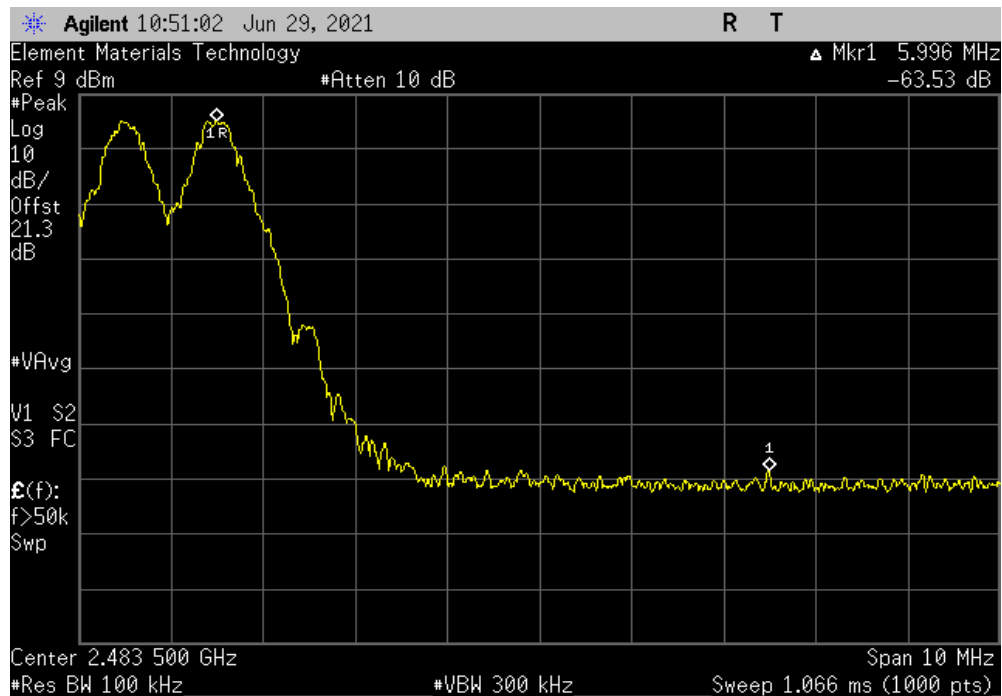


TUTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), DH5, GFSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-63.44	-20	Pass



Hopping Mode (All Channels), DH5, GFSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-63.53	-20	Pass

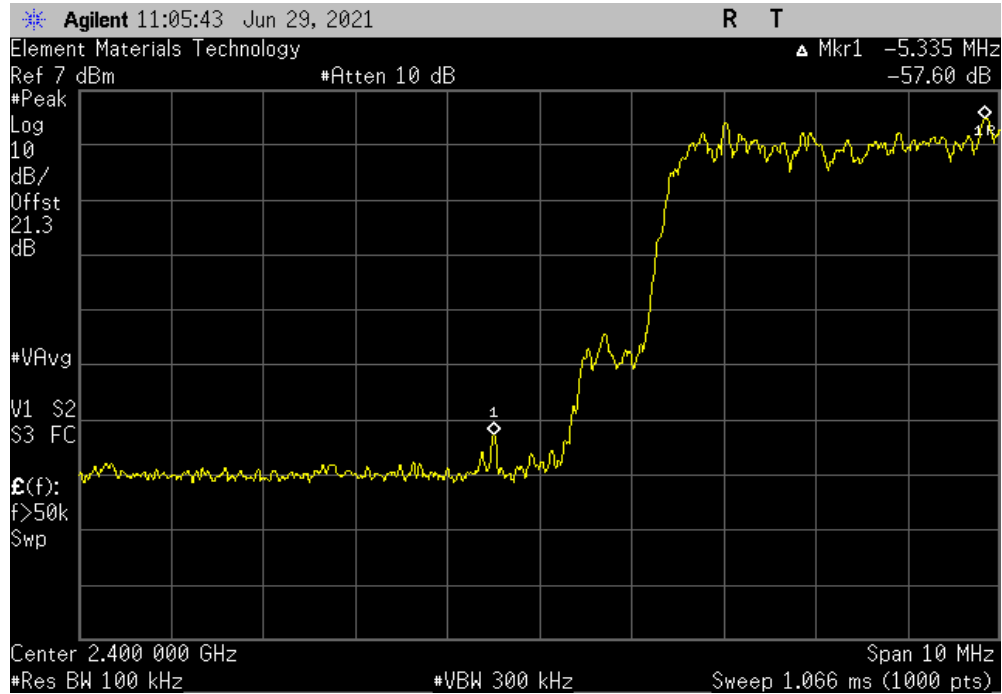


BAND EDGE COMPLIANCE - HOPPING MODE

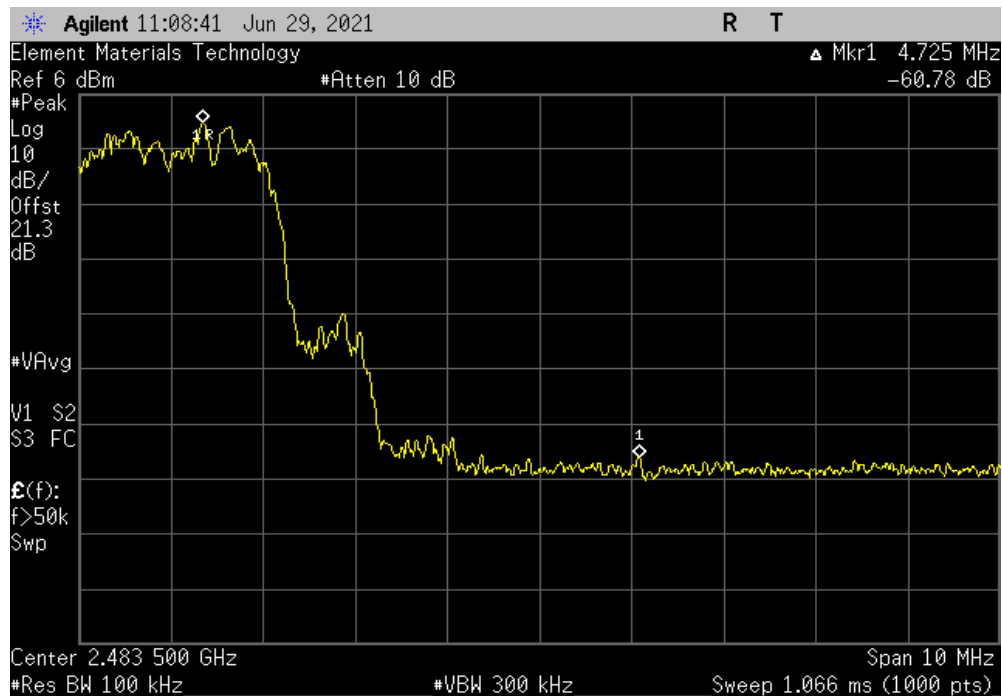


TbTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-57.6	-20	Pass



Hopping Mode (All Channels), 2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-60.78	-20	Pass

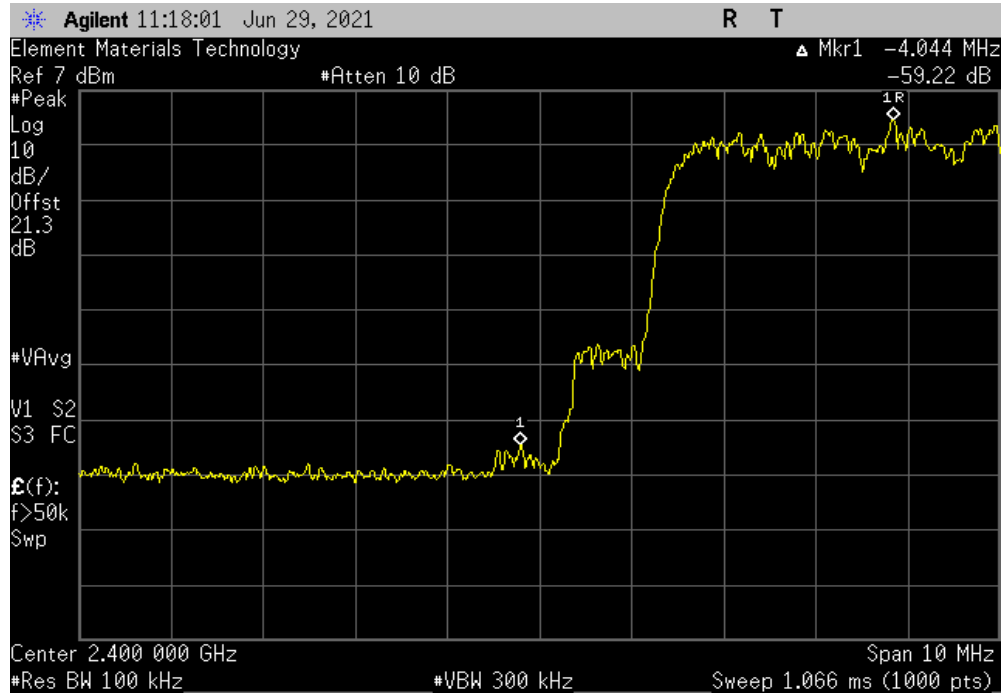


BAND EDGE COMPLIANCE - HOPPING MODE

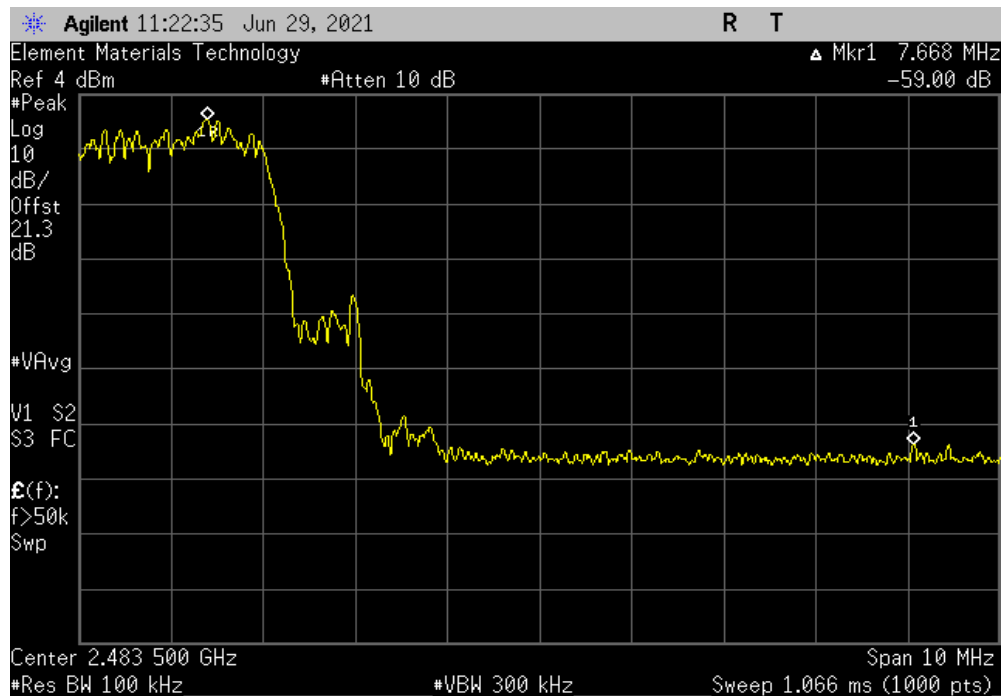


TUTx 2021.03.19.1 XMR 2020.12.30.0

Hopping Mode (All Channels), 3DH5, 8-DPSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59.22	-20	Pass



Hopping Mode (All Channels), 3DH5, 8-DPSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59	-20	Pass



BAND EDGE COMPLIANCE



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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

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

BAND EDGE COMPLIANCE



TSTx 2021.03.19.1 XMR 2020.12.30.0

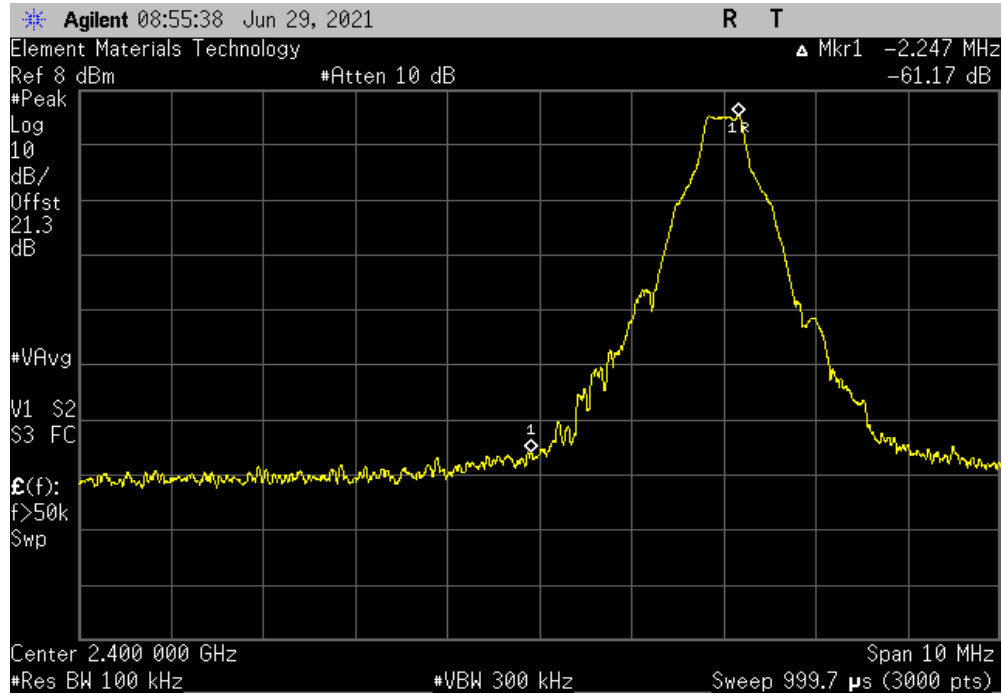
EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.7 °C	
Attendees: Zack Lyda		Humidity: 46.7% RH	
Project: None		Barometric Pres.: 1011 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS			
FCC 15.247:2021		Test Method: ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
DH5, GFSK			
	Low Channel, 2402 MHz	-61.17	-20 Pass
	High Channel, 2480 MHz	-61.44	-20 Pass
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	-57.01	-20 Pass
	High Channel, 2480 MHz	-59.82	-20 Pass
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	-56.85	-20 Pass
	High Channel, 2480 MHz	-60.61	-20 Pass

BAND EDGE COMPLIANCE

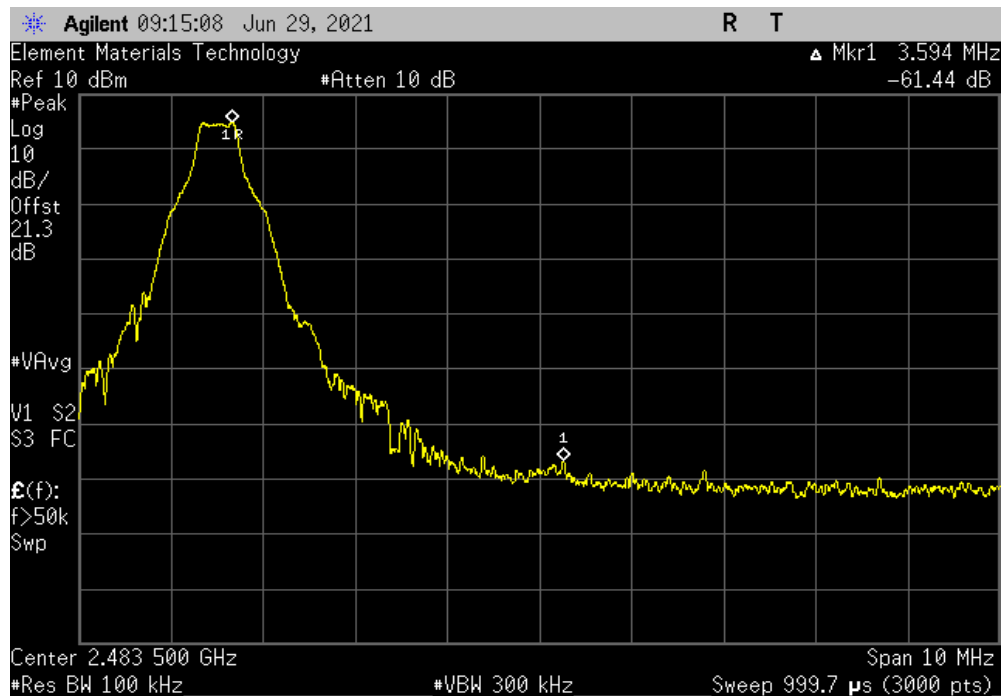


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-61.17	-20	Pass



DH5, GFSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-61.44	-20	Pass

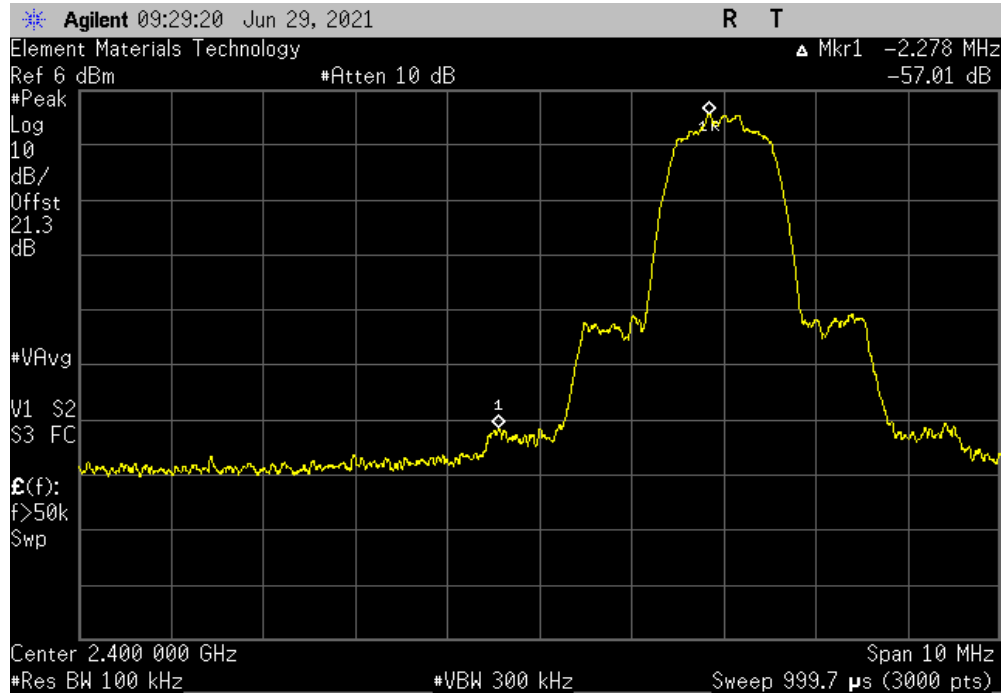


BAND EDGE COMPLIANCE

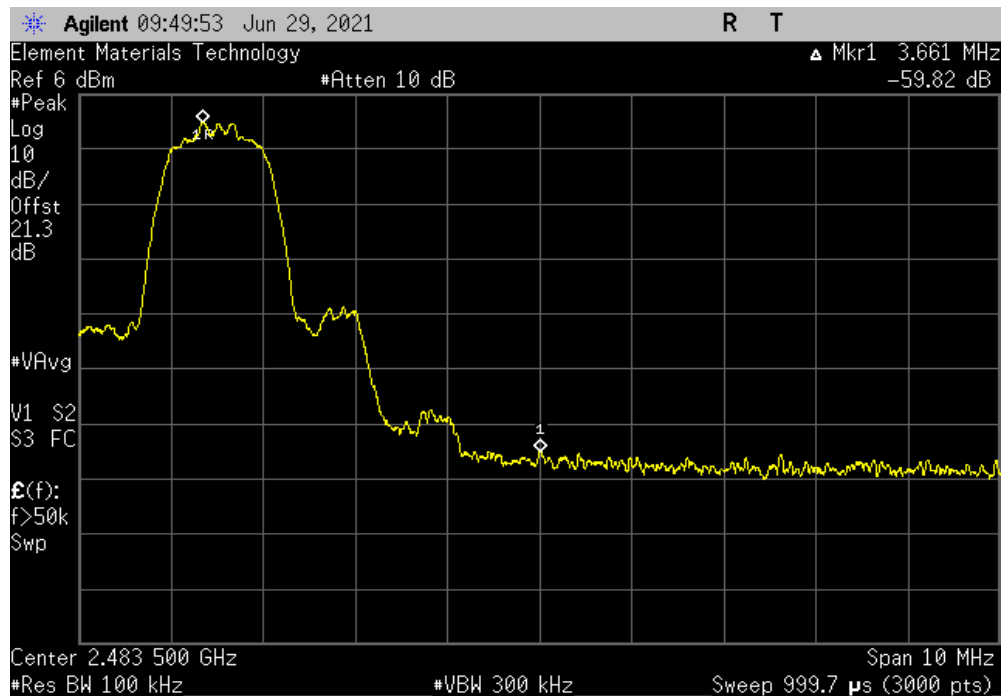


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-57.01	-20	Pass



2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59.82	-20	Pass

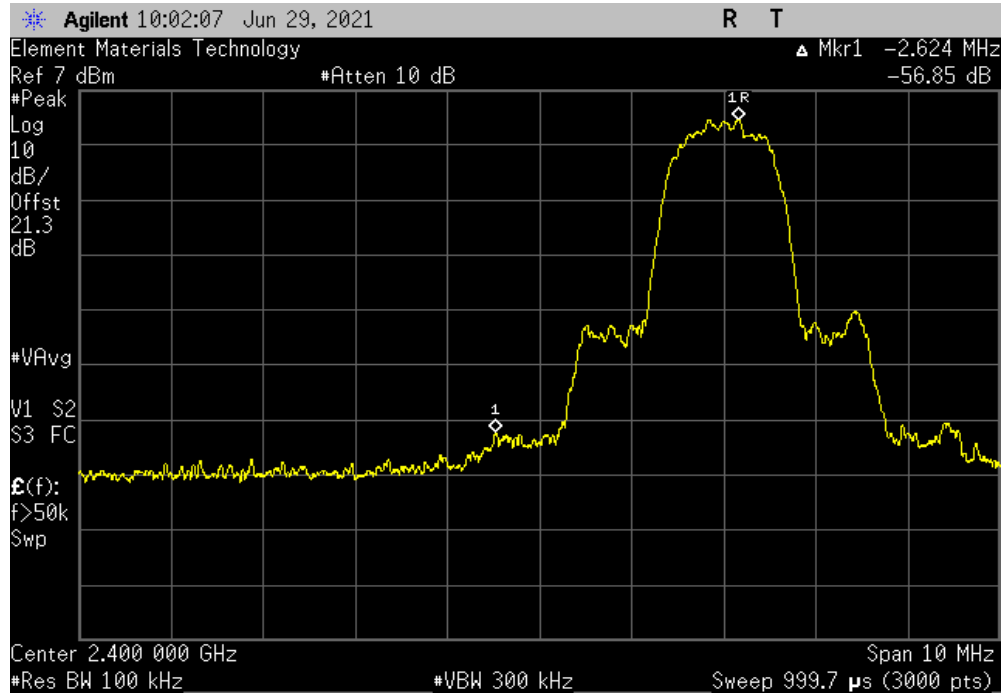


BAND EDGE COMPLIANCE

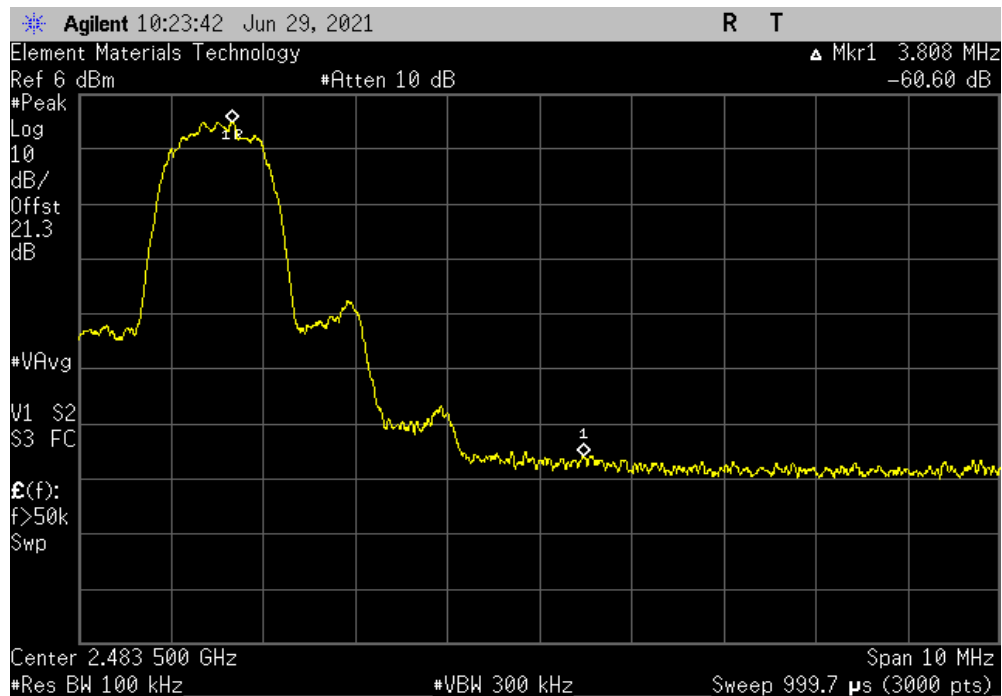


TUTx 2021.03.10.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-56.85	-20	Pass



3DH5, 8-DPSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-60.61	-20	Pass



OCCUPIED BANDWIDTH



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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

TEST DESCRIPTION

The 20 dB occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

OCCUPIED BANDWIDTH



TSTx 2021.03.19.1 XMR 2020.12.30.0

EUT: 43.0536.00		Work Order: A-DE0162	
Serial Number: SN001 00003		Date: 29-Jun-21	
Customer: A-dec, Inc.		Temperature: 23.7 °C	
Attendees: Zack Lyda		Humidity: 47% RH	
Project: None		Barometric Pres.: 1010 mbar	
Tested by: Jeff Alcock	Power: 3.3 VDC via 110VAC/60Hz	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2021		ANSI C63.10:2013	
COMMENTS			
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (<) Result
DH5, GFSK			
	Low Channel, 2402 MHz	933.083 kHz	1.5 MHz Pass
	Mid Channel, 2442 MHz	931.998 kHz	1.5 MHz Pass
	High Channel, 2480 MHz	932.991 kHz	1.5 MHz Pass
2DH5, pi/4-DQPSK			
	Low Channel, 2402 MHz	1.344 MHz	1.5 MHz Pass
	Mid Channel, 2442 MHz	1.337 MHz	1.5 MHz Pass
	High Channel, 2480 MHz	1.337 MHz	1.5 MHz Pass
3DH5, 8-DPSK			
	Low Channel, 2402 MHz	1.312 MHz	1.5 MHz Pass
	Mid Channel, 2442 MHz	1.314 MHz	1.5 MHz Pass
	High Channel, 2480 MHz	1.315 MHz	1.5 MHz Pass

OCCUPIED BANDWIDTH

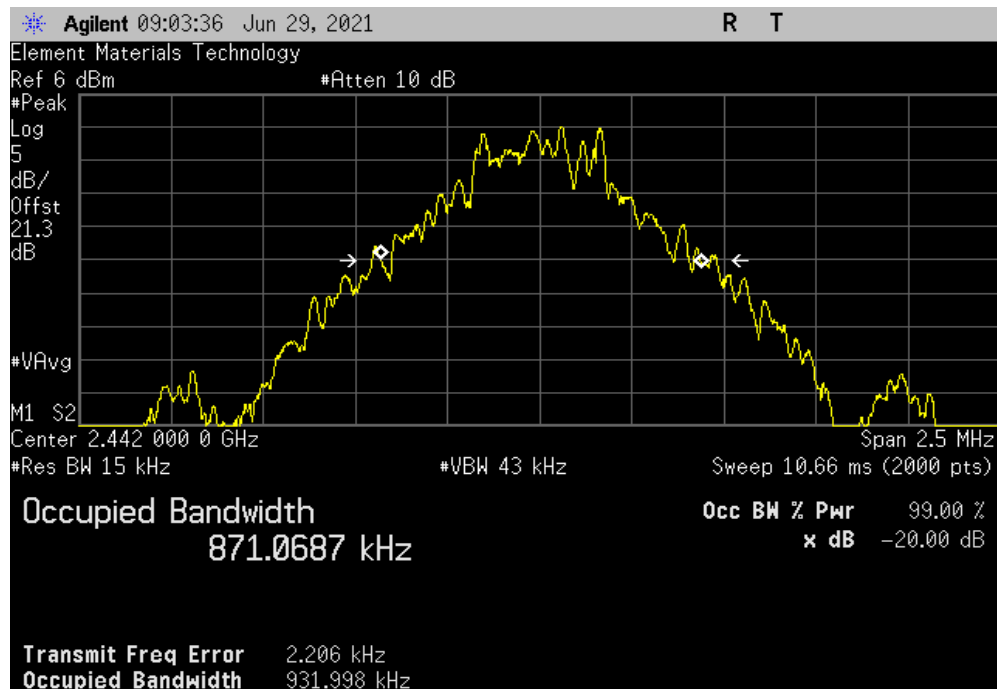


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				933.083 kHz	1.5 MHz	Pass



DH5, GFSK, Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				931.998 kHz	1.5 MHz	Pass

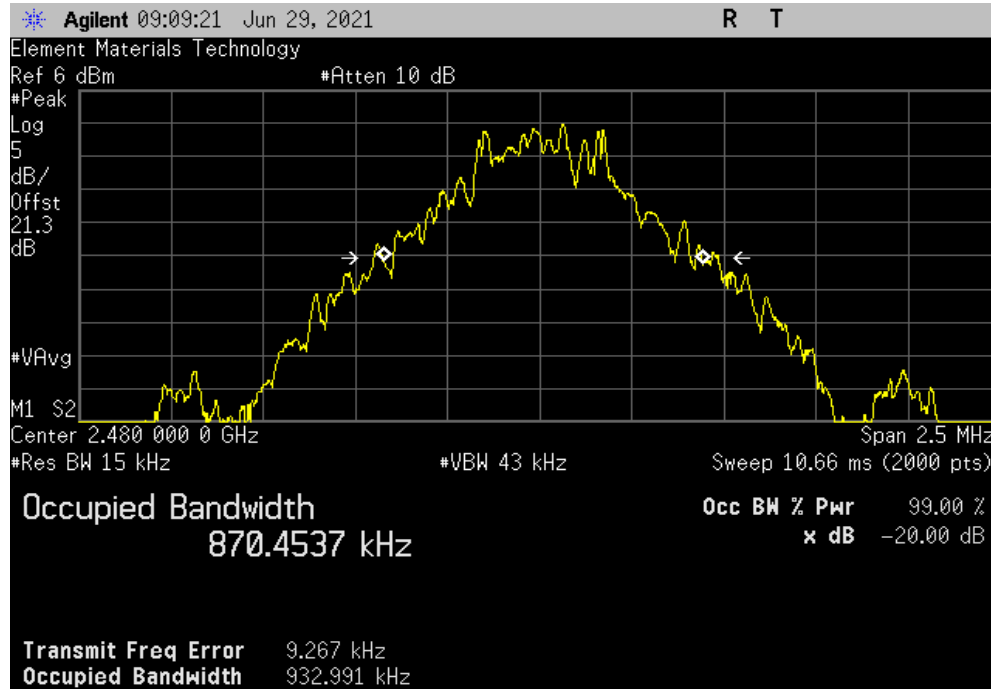


OCCUPIED BANDWIDTH

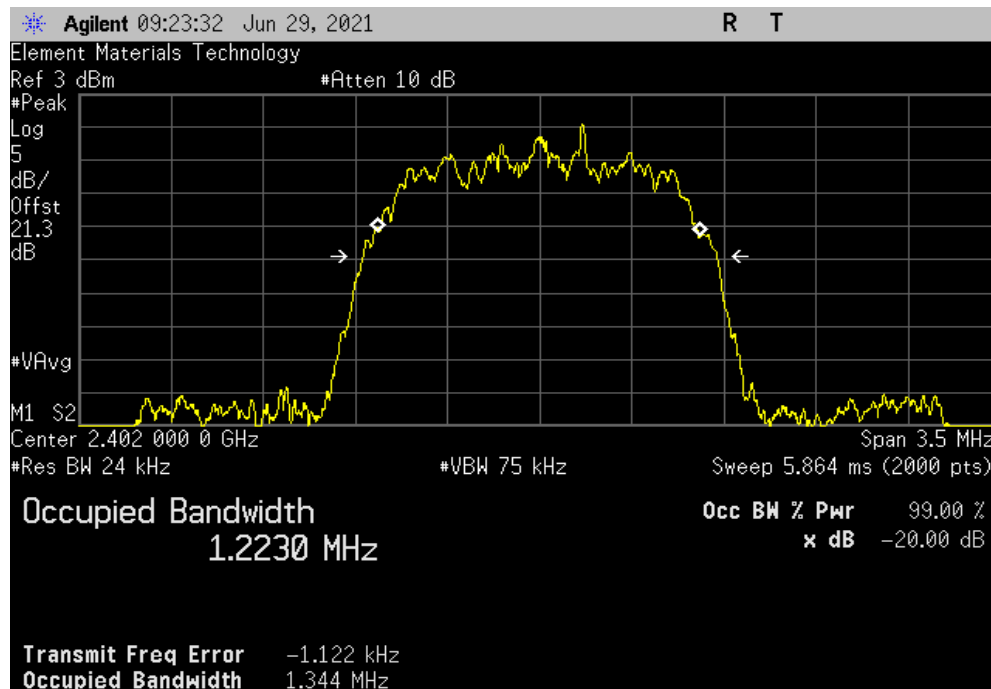


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz						
				Value	Limit ($\leq$)	Result
				932.991 kHz	1.5 MHz	Pass



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
				Value	Limit ($\leq$)	Result
				1.344 MHz	1.5 MHz	Pass

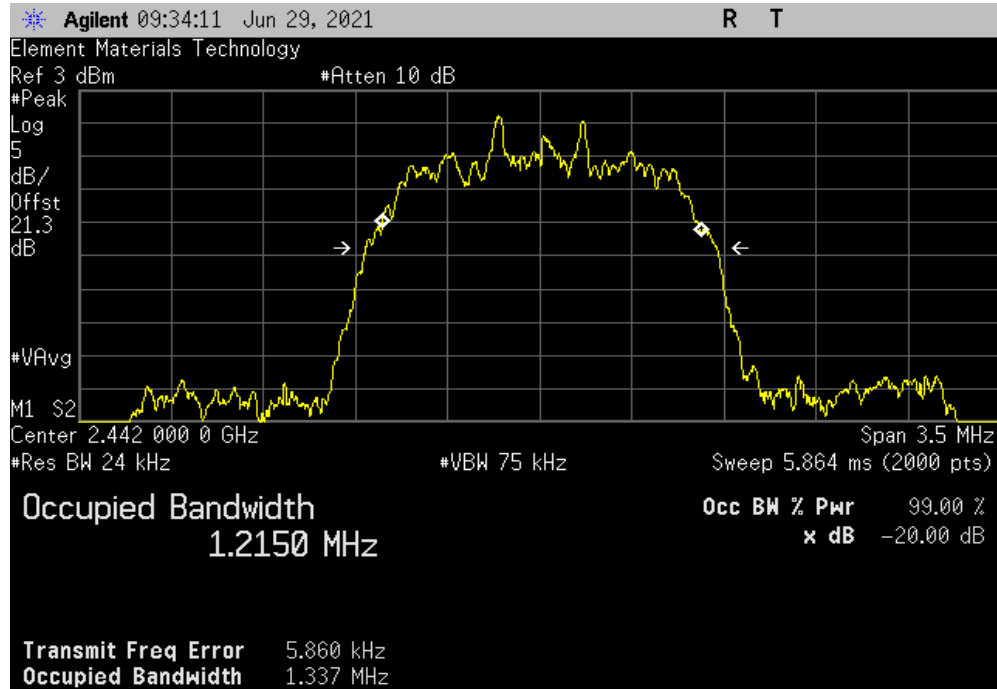


OCCUPIED BANDWIDTH

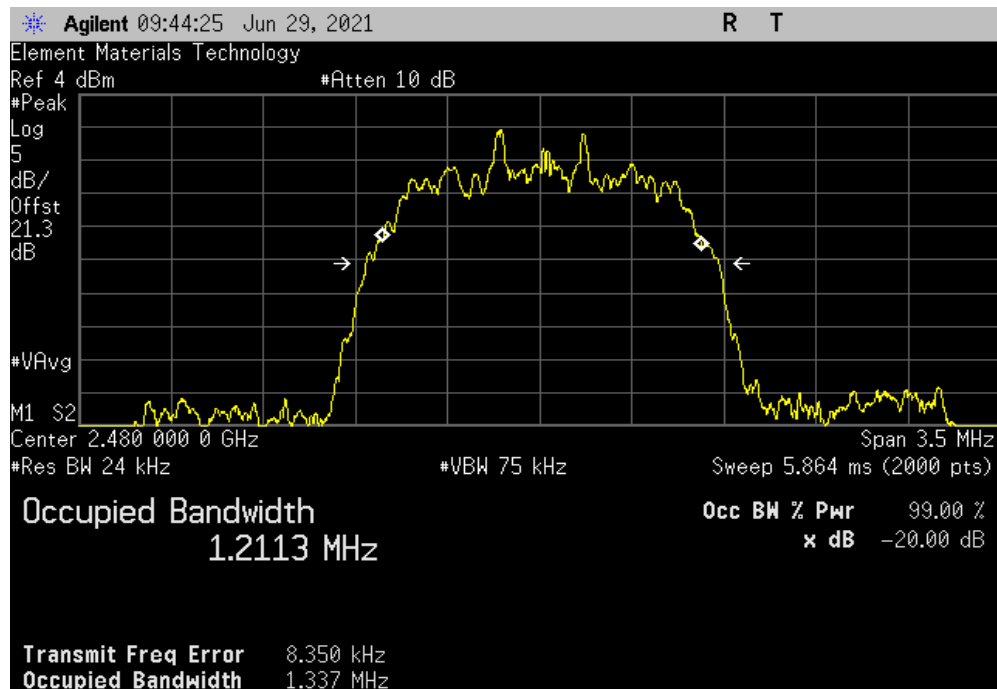


TMTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				1.337 MHz	1.5 MHz	Pass



2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
				Value	Limit (<)	Result
				1.337 MHz	1.5 MHz	Pass

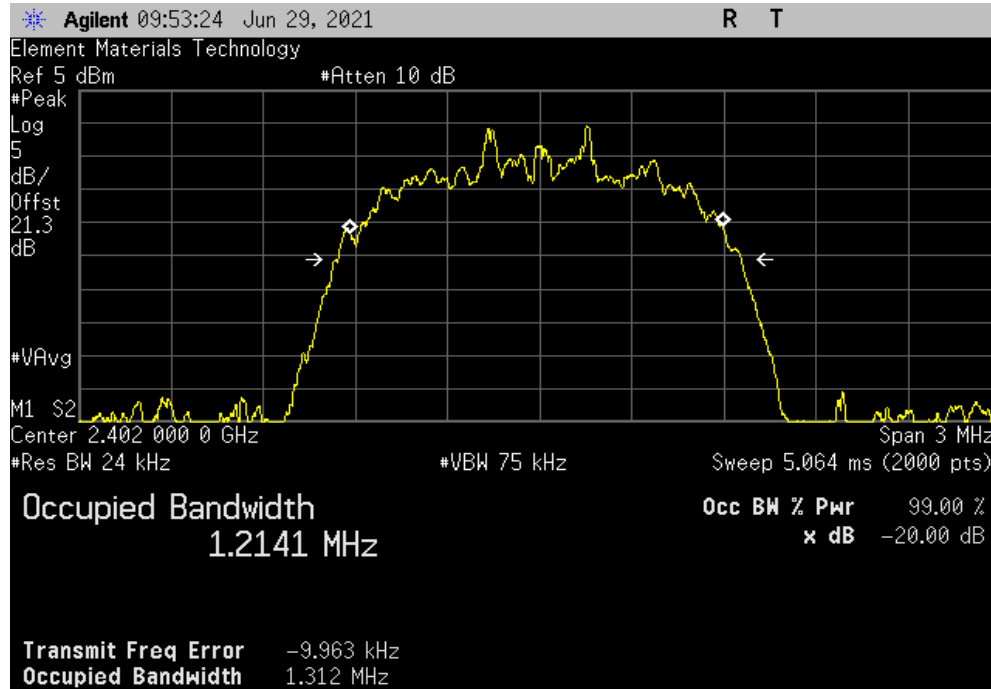


OCCUPIED BANDWIDTH

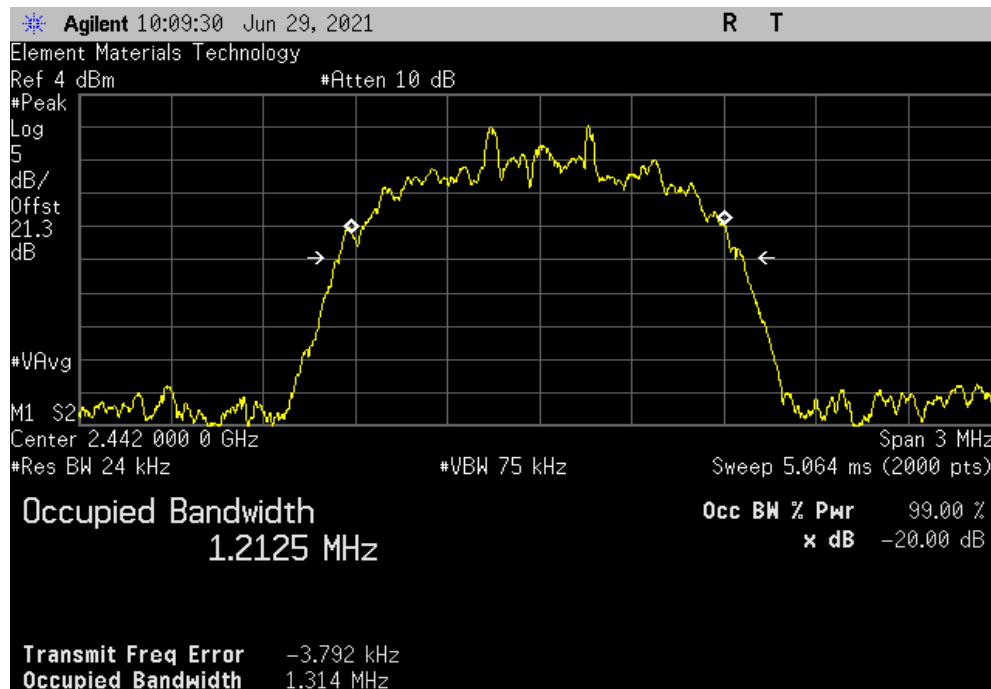


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				1.312 MHz	1.5 MHz	Pass



3DH5, 8-DPSK, Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				1.314 MHz	1.5 MHz	Pass

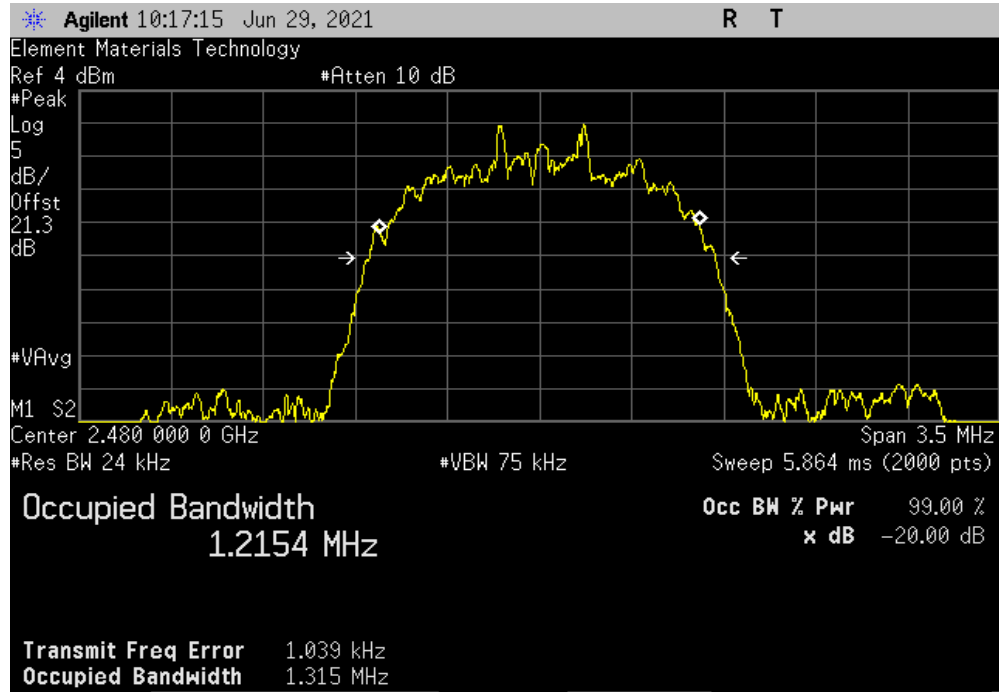


OCCUPIED BANDWIDTH



TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz						
				Value	Limit (≤)	Result
				1.315 MHz	1.5 MHz	Pass



SPURIOUS CONDUCTED EMISSIONS

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
Generator - Signal	Keysight	N5182B	TFU	2020-11-20	2022-11-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2021-04-08	2022-04-08

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 in a no-hop mode. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

SPURIOUS CONDUCTED EMISSIONS



TSTx 2021.03.19.1 XMR 2020.12.30.0

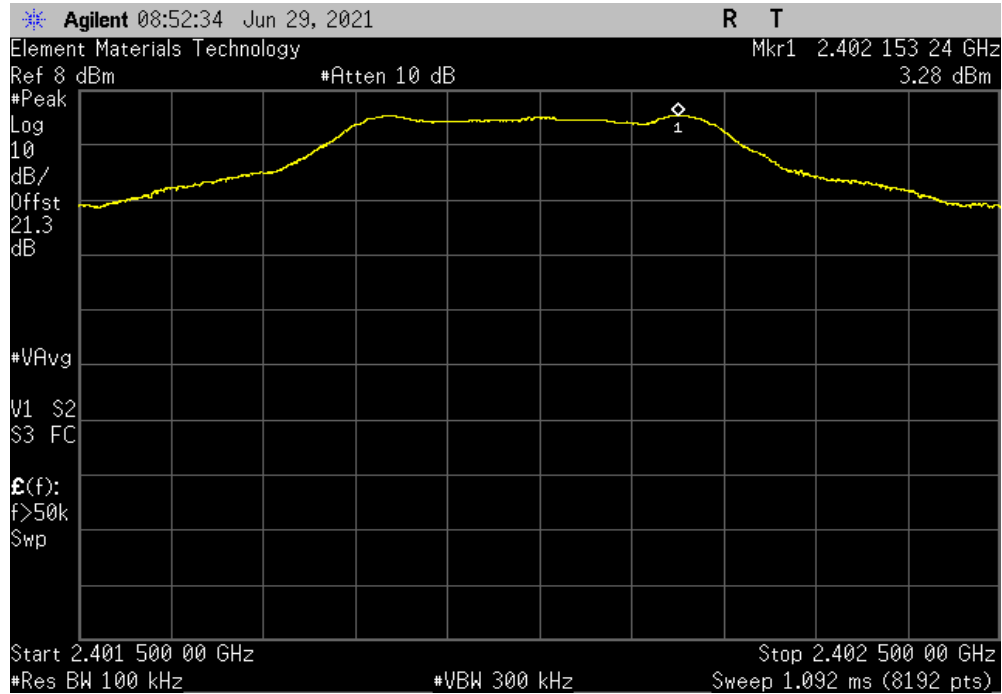
EUT: 43.0536.00		Work Order: A-DE0162			
Serial Number: SN001 00003		Date: 29-Jun-21			
Customer: A-dec, Inc.		Temperature: 23.8 °C			
Attendees: Zack Lyda		Humidity: 47.1% RH			
Project: None		Barometric Pres.: 1010 mbar			
Tested by: Jeff Alcoke		Power: 3.3 VDC via 110VAC/60Hz			
Job Site: EV06					
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2021		ANSI C63.10:2013			
COMMENTS					
Reference level offset: DC Block, 20 dB attenuator, and measurement cable.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
DH5, GFSK					
Low Channel, 2402 MHz	Fundamental	2402.15	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	7744	-59.71	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24429.3	-56.92	-20	Pass
Mid Channel, 2442 MHz	Fundamental	2442.16	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	12452.8	-61.02	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24894.7	-58.48	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.16	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	12398	-61.33	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	24928.3	-58.54	-20	Pass
2DH5, pi/4-DQPSK					
Low Channel, 2402 MHz	Fundamental	2401.83	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	7722.7	-58.33	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24069.1	-55.02	-20	Pass
Mid Channel, 2442 MHz	Fundamental	2441.84	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	702.9	-56.44	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24797	-53.9	-20	Pass
High Channel, 2480 MHz	Fundamental	2479.84	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	12382.8	-57.66	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	24836.7	-54.49	-20	Pass
3DH5, 8-DPSK					
Low Channel, 2402 MHz	Fundamental	2402.15	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	8034.8	-58.71	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24893.2	-53.94	-20	Pass
Mid Channel, 2442 MHz	Fundamental	2442.16	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	9508.5	-57.89	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	23527.3	-54.86	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.16	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	9426.3	-57.47	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	23501.4	-54.24	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

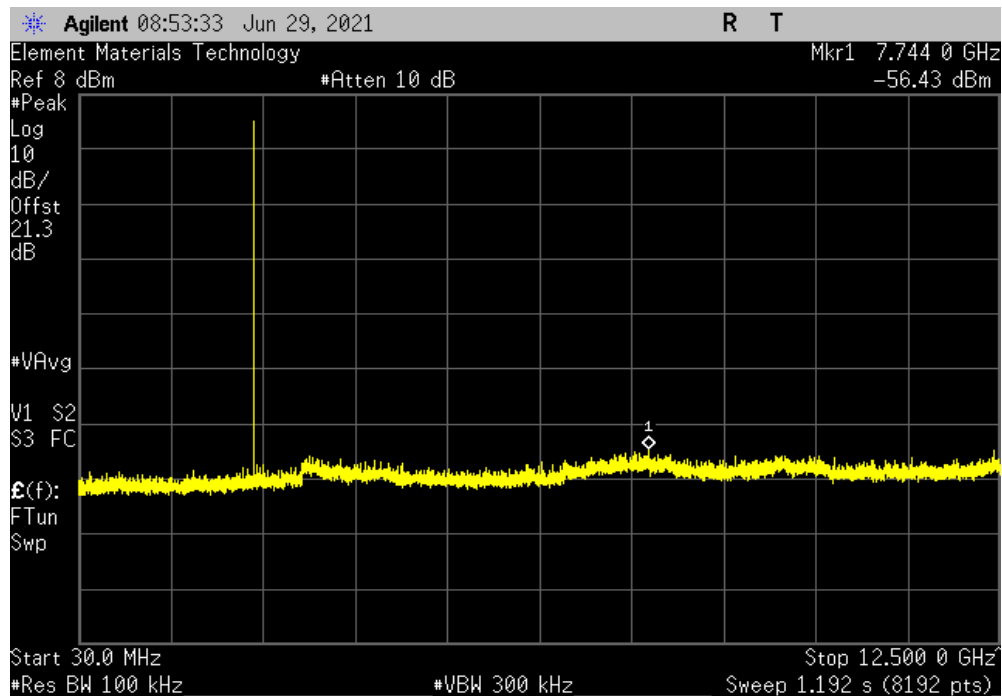


TbTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		2402.15	N/A	N/A	N/A	



DH5, GFSK, Low Channel, 2402 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		7744	-59.71	-20	Pass	

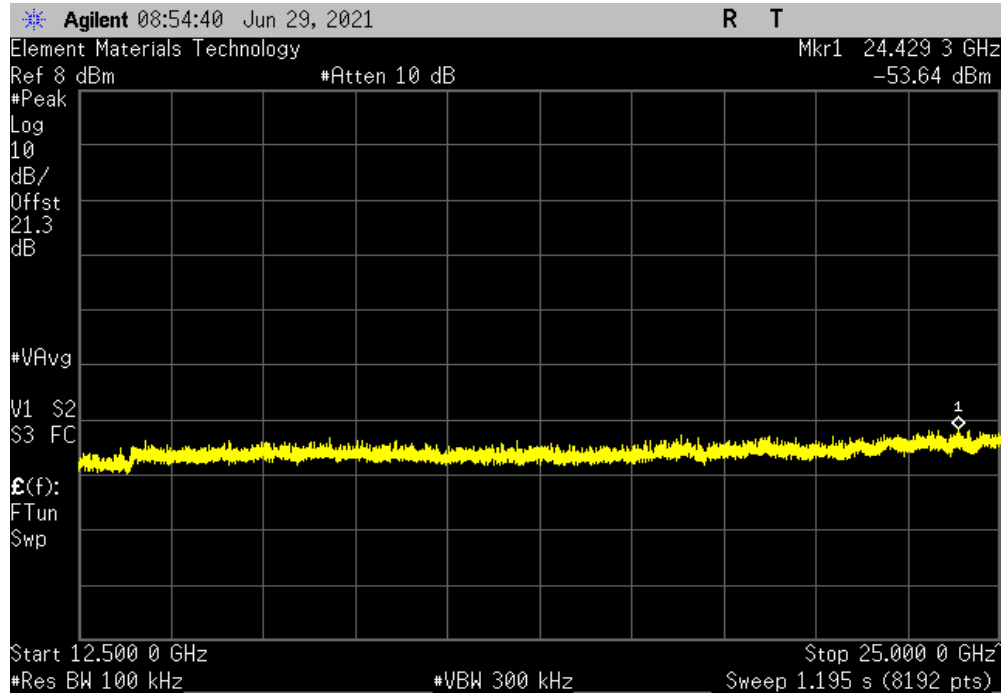


SPURIOUS CONDUCTED EMISSIONS

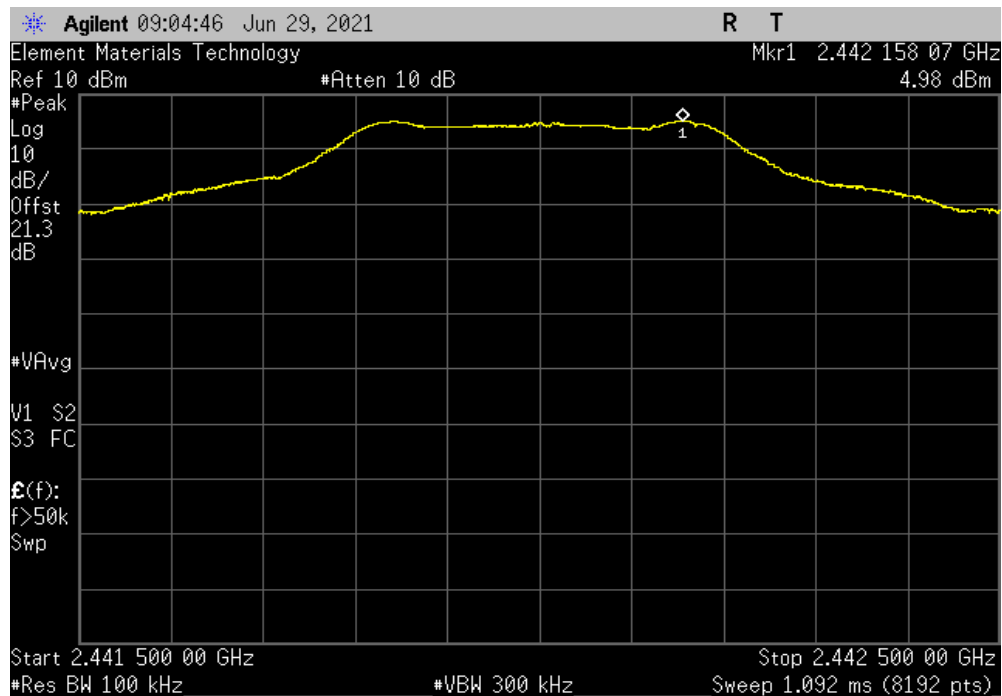


TbTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24429.3	-56.92	-20	Pass	



DH5, GFSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.16	N/A	N/A	N/A	

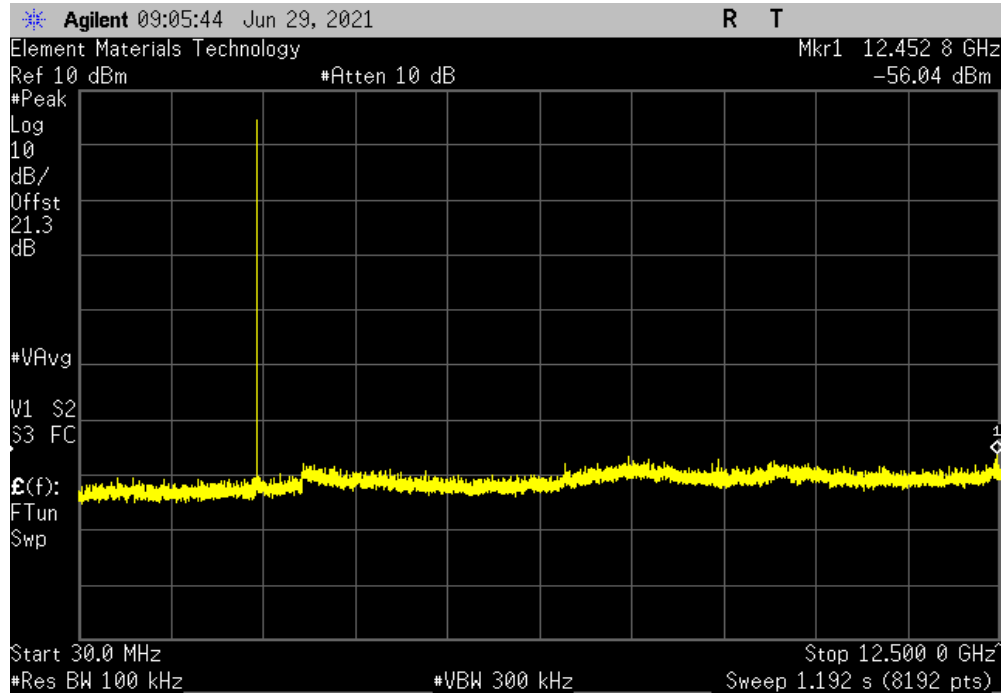


SPURIOUS CONDUCTED EMISSIONS

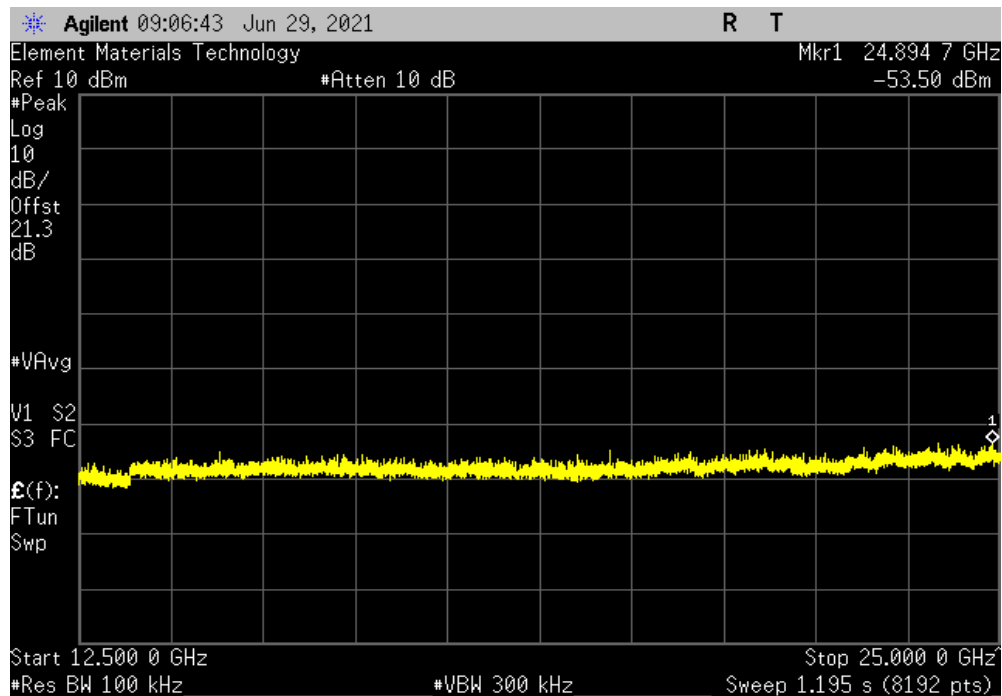


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12452.8	-61.02	-20	Pass	



DH5, GFSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24894.7	-58.48	-20	Pass	

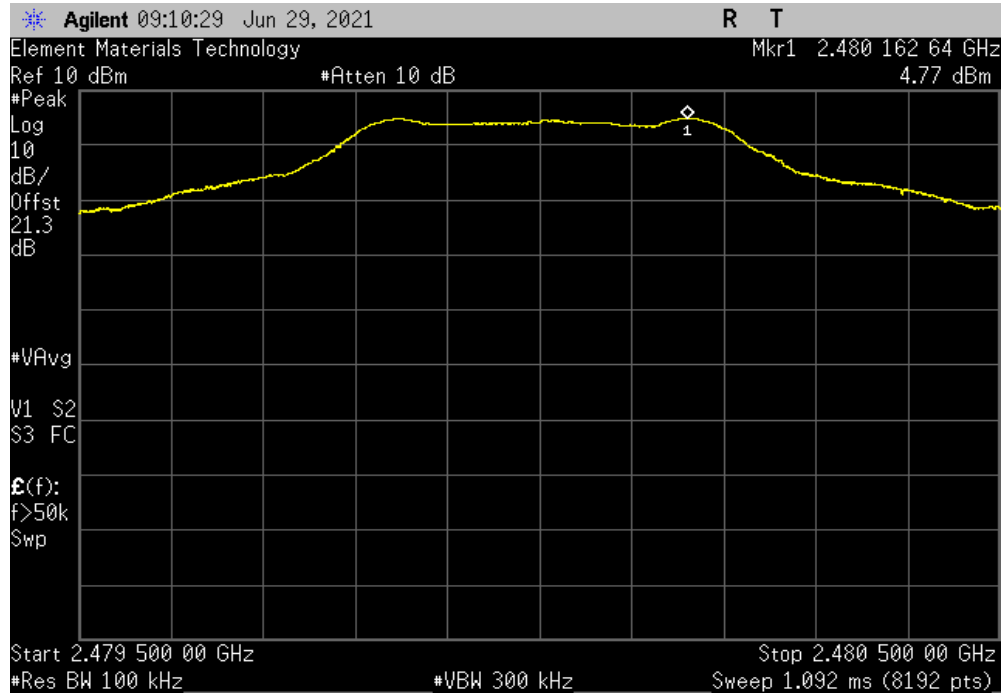


SPURIOUS CONDUCTED EMISSIONS

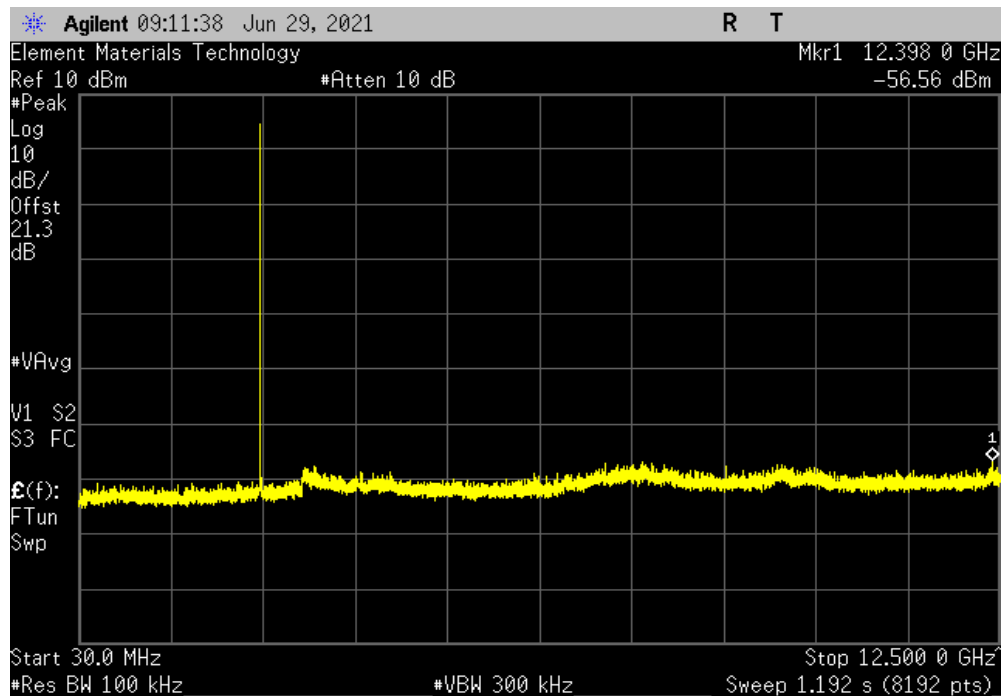


TbTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		2480.16	N/A	N/A	N/A	



DH5, GFSK, High Channel, 2480 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		12398	-61.33	-20	Pass	

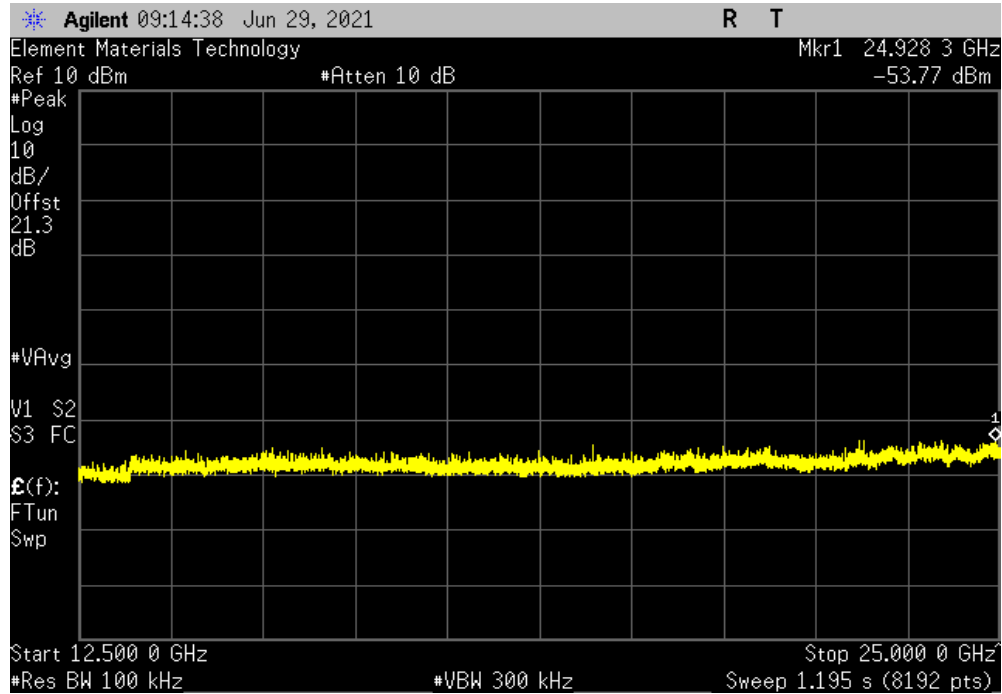


SPURIOUS CONDUCTED EMISSIONS

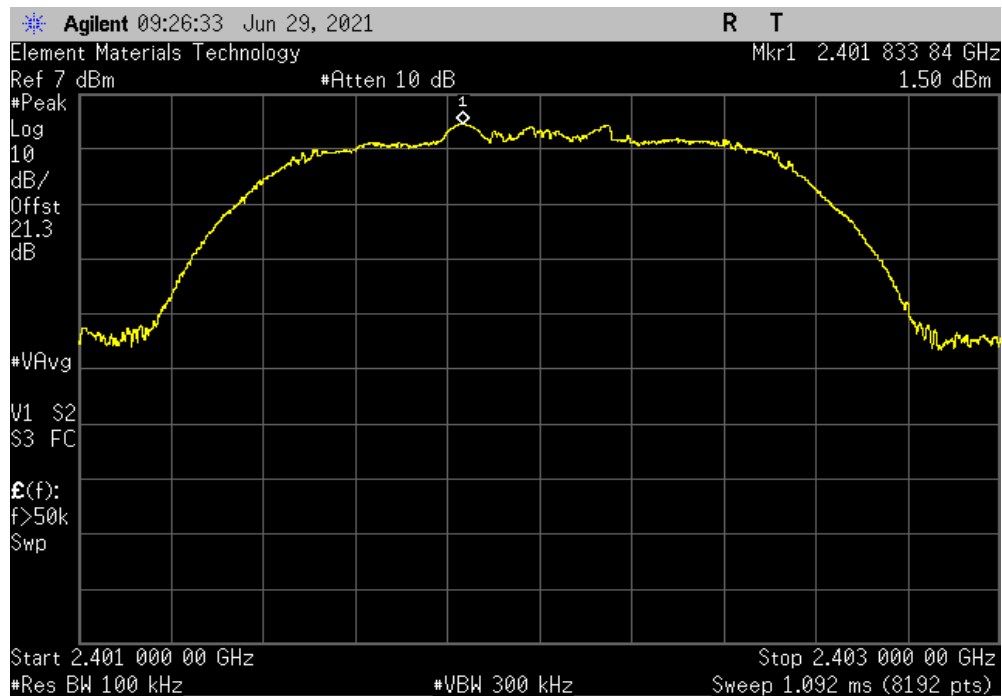


TUTx 2021.03.19.1 XMR 2020.12.30.0

DH5, GFSK, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24928.3	-58.54	-20	Pass	



2DH5, pi/4-QPSK, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2401.83	N/A	N/A	N/A	

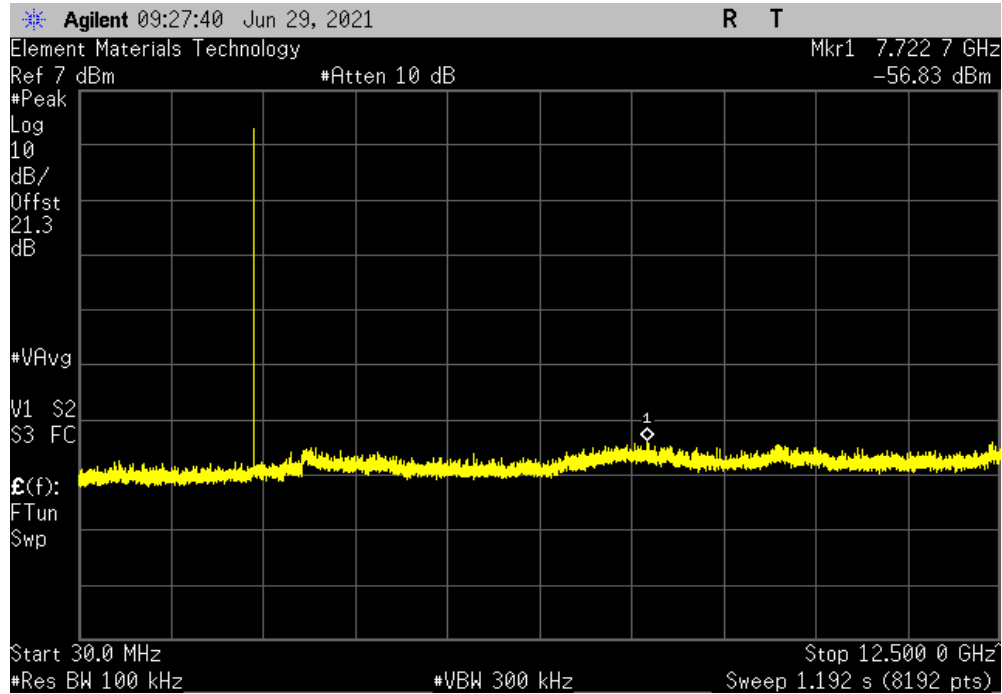


SPURIOUS CONDUCTED EMISSIONS

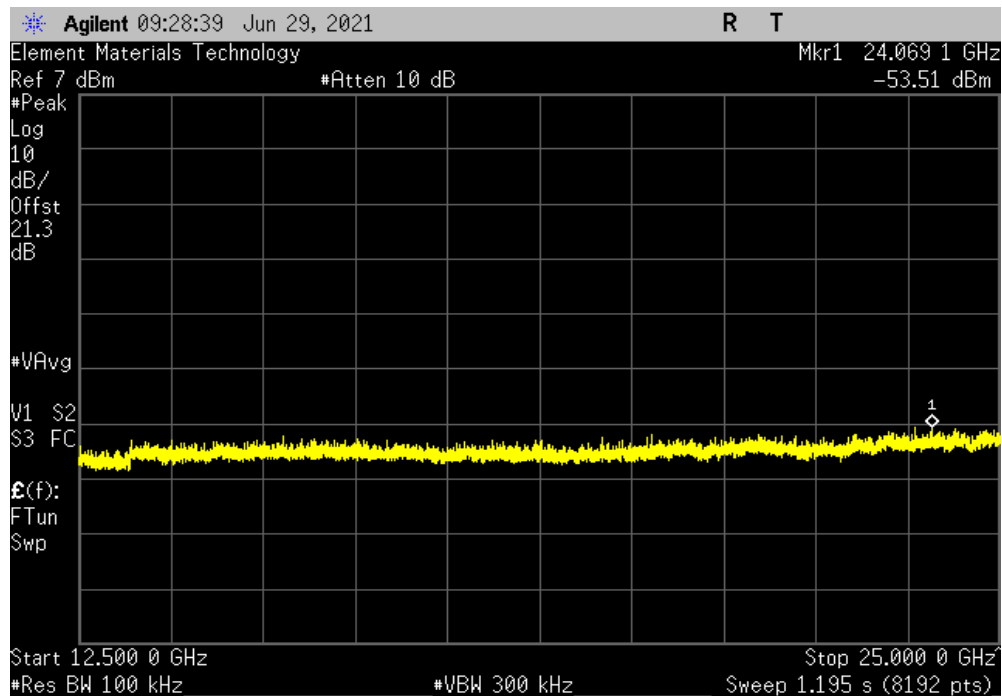


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	7722.7	-58.33	-20	Pass	



2DH5, pi/4-DQPSK, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24069.1	-55.02	-20	Pass	

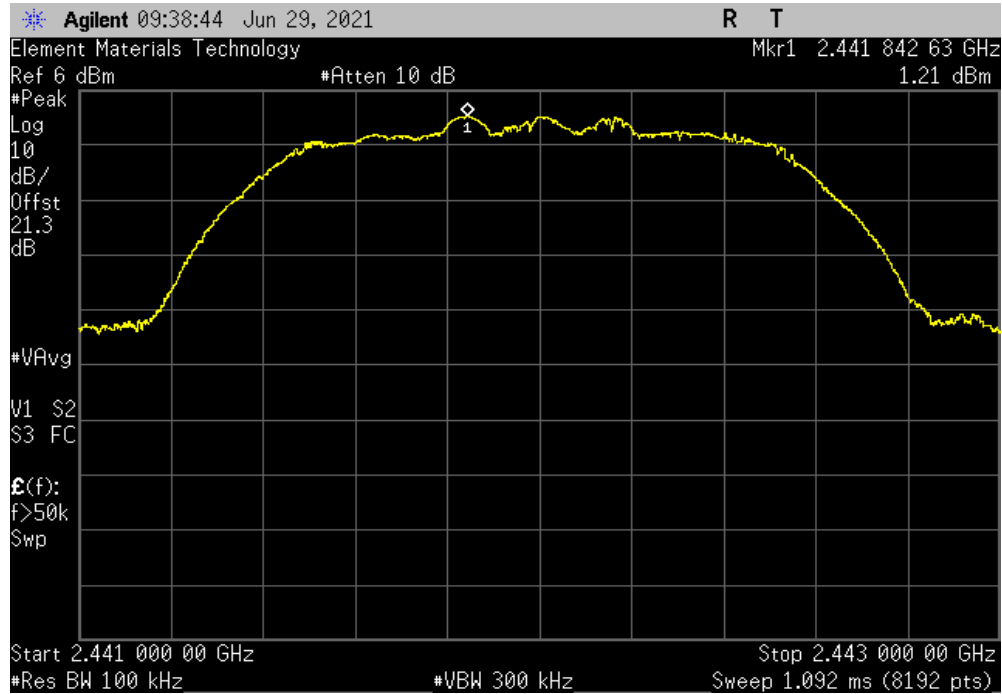


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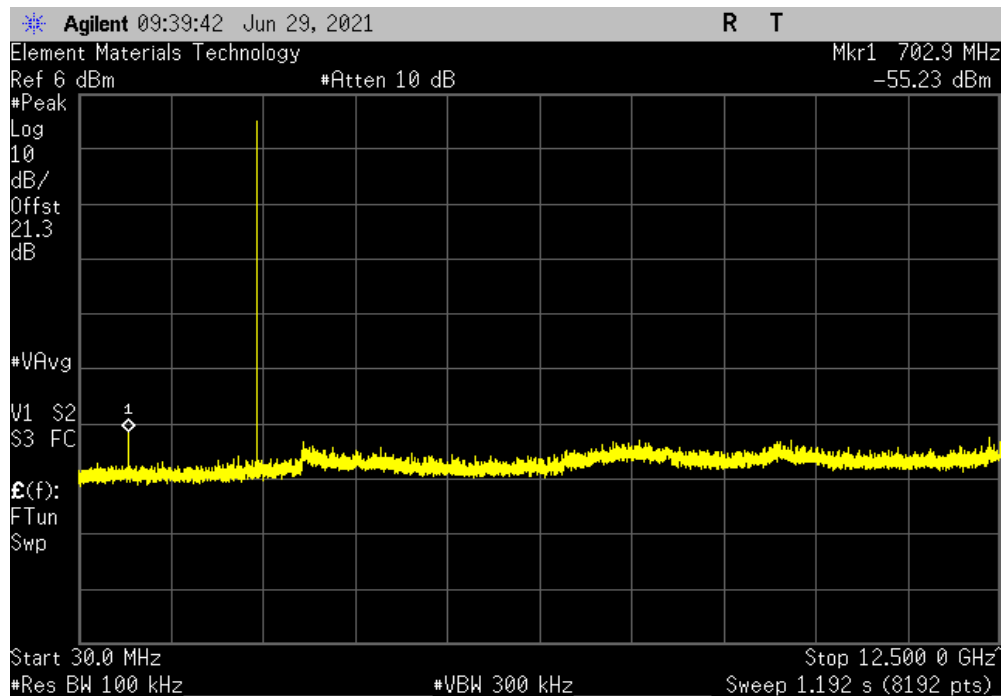


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2441.84	N/A	N/A	N/A	



2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	702.9	-56.44	-20	Pass	

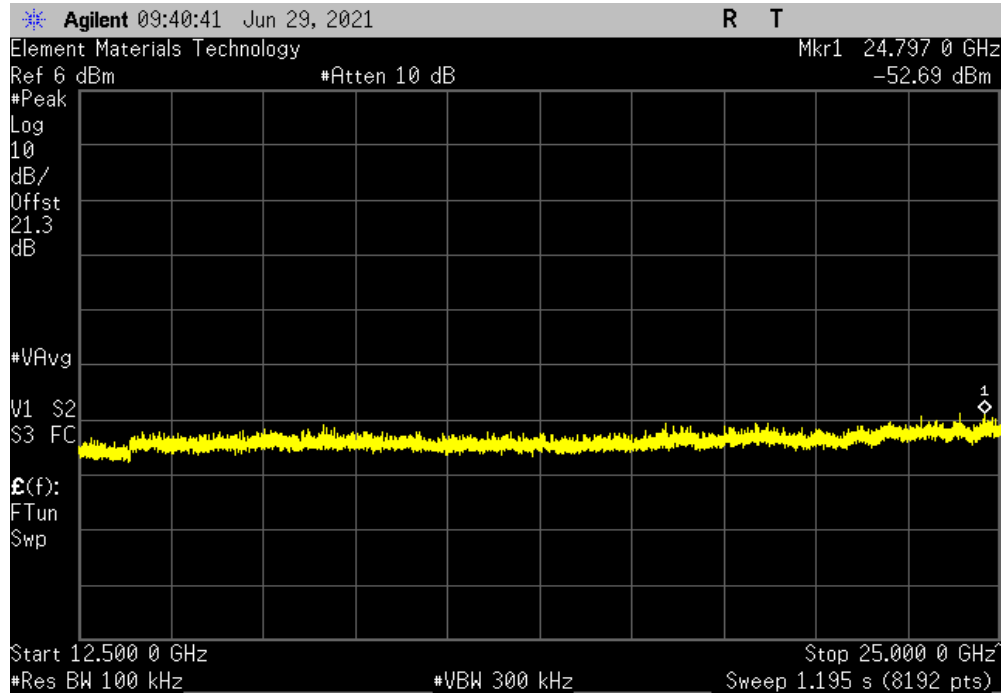


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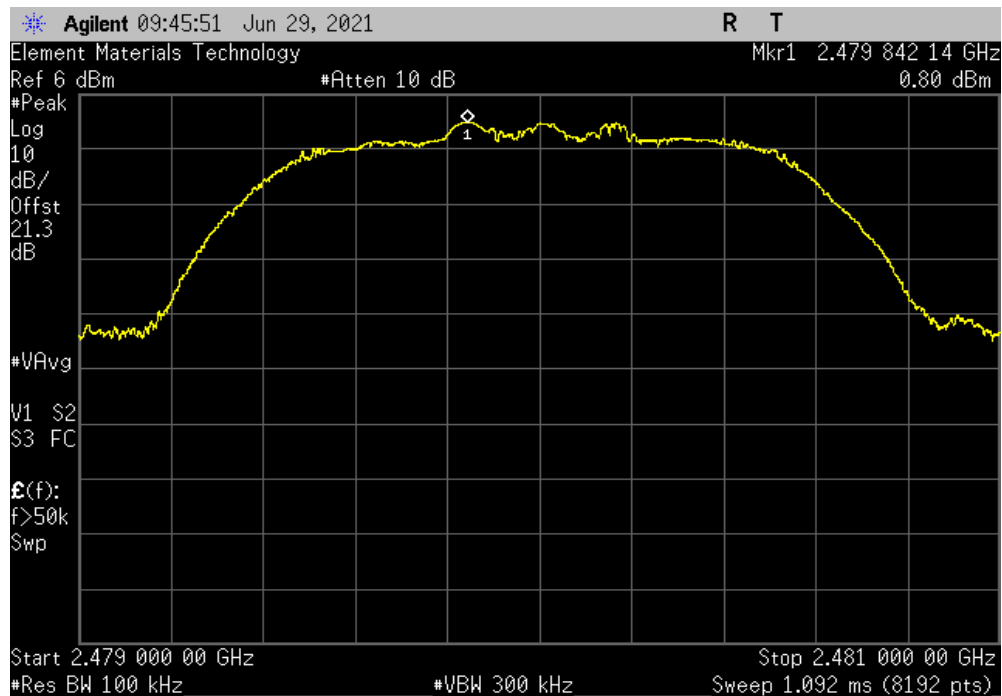


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24797	-53.9	-20	Pass	



2DH5, pi/4-DQPSK, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2479.84	N/A	N/A	N/A	

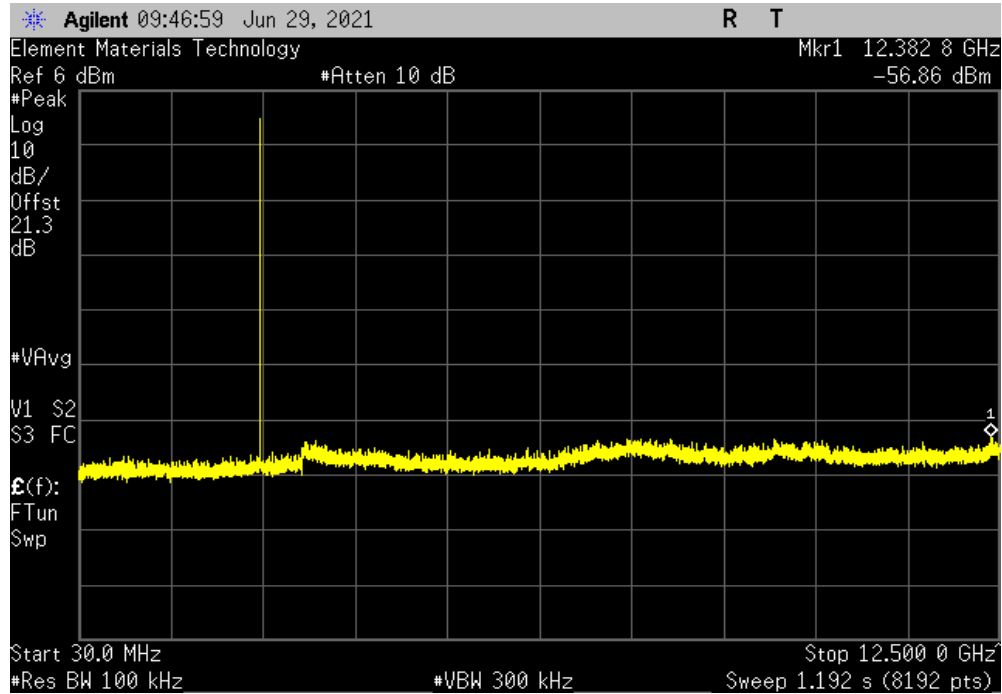


SPURIOUS CONDUCTED EMISSIONS

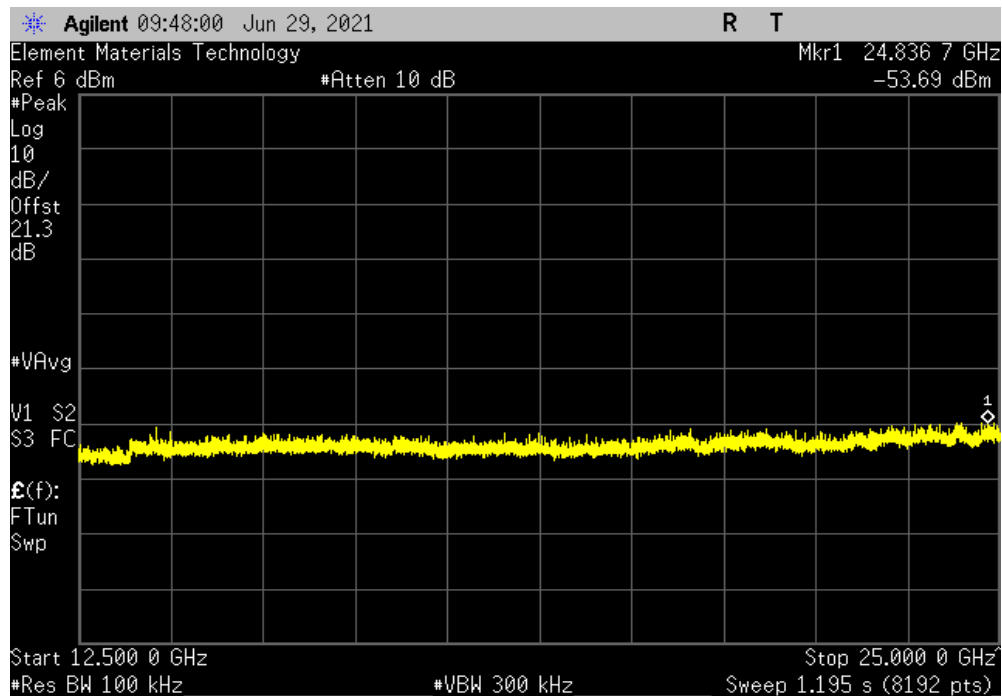


TUTx 2021.03.19.1 XMR 2020.12.30.0

2DH5, pi/4-DQPSK, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12382.8	-57.66	-20	Pass	



2DH5, pi/4-DQPSK, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24836.7	-54.49	-20	Pass	

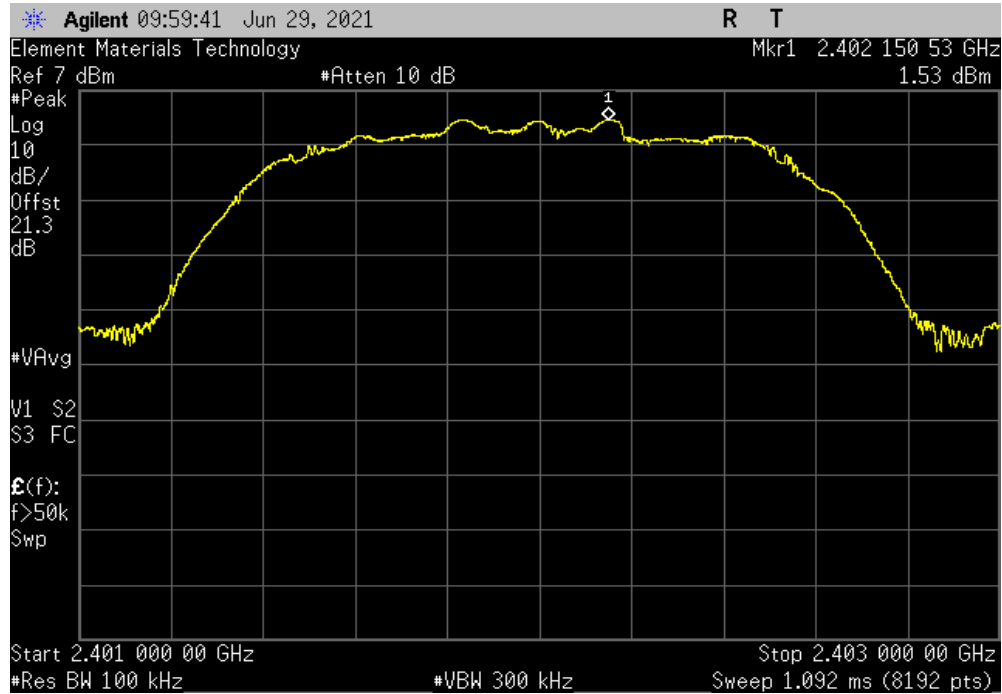


SPURIOUS CONDUCTED EMISSIONS

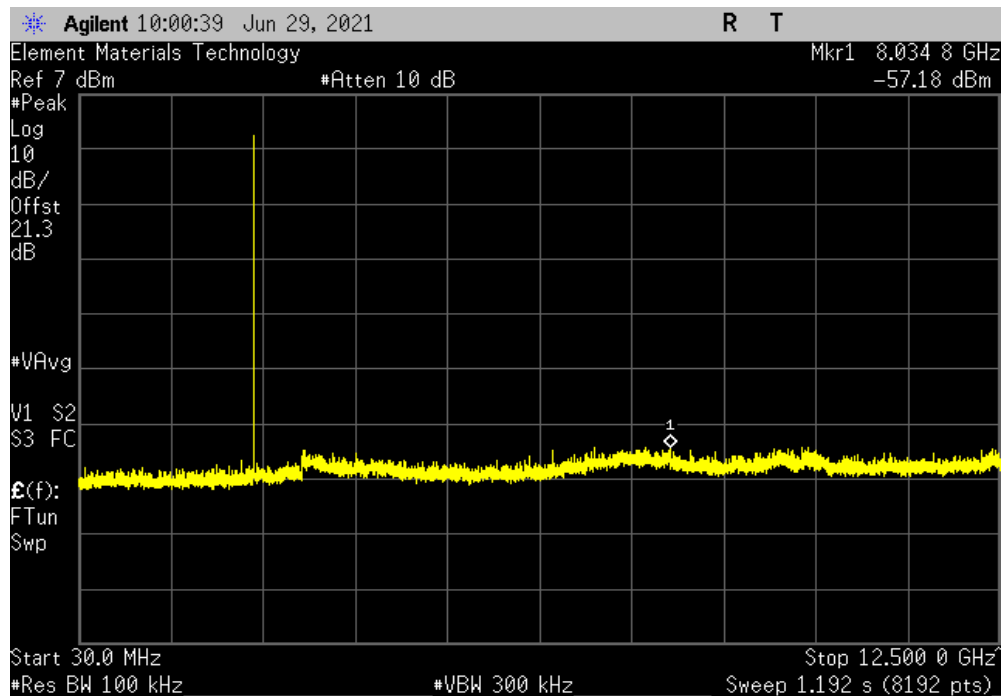


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		2402.15	N/A	N/A	N/A	



3DH5, 8-DPSK, Low Channel, 2402 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		8034.8	-58.71	-20	Pass	

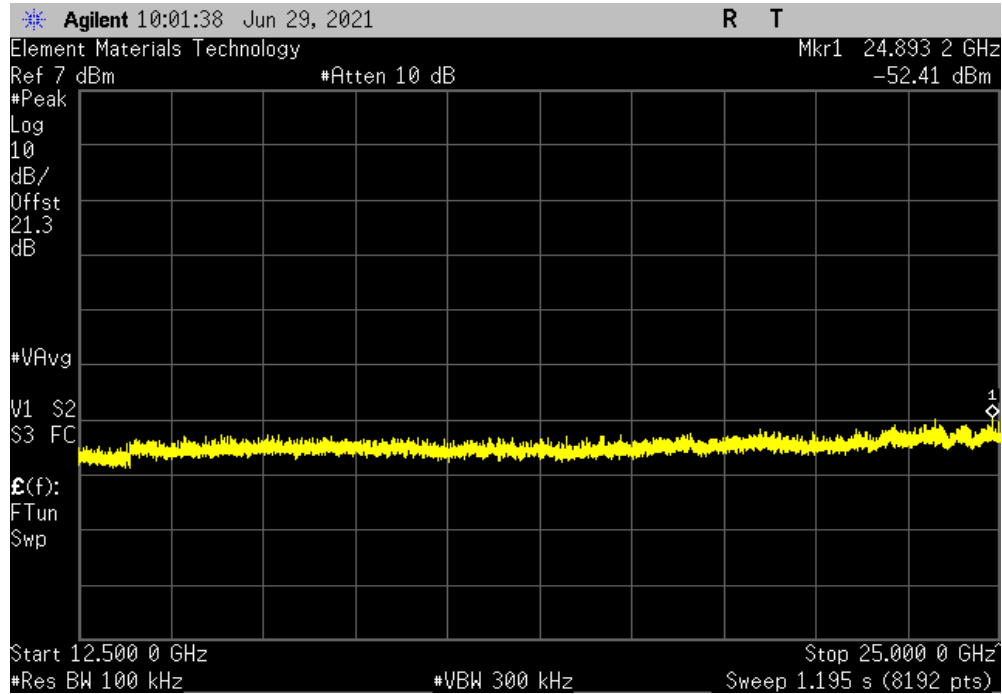


SPURIOUS CONDUCTED EMISSIONS

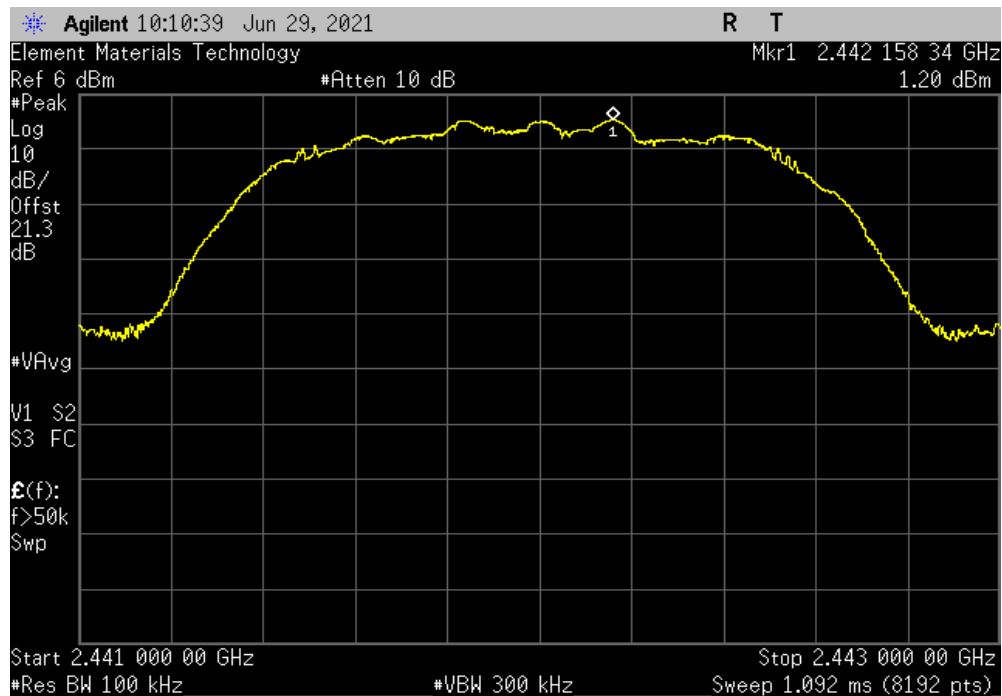


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24893.2	-53.94	-20	Pass	



3DH5, 8-DPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.16	N/A	N/A	N/A	

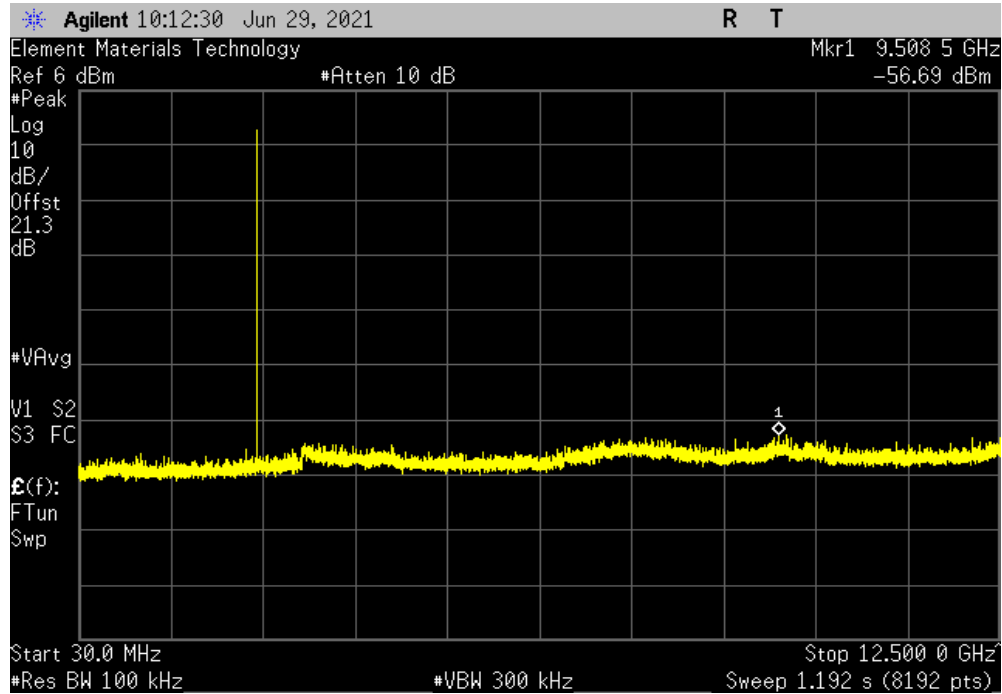


SPURIOUS CONDUCTED EMISSIONS

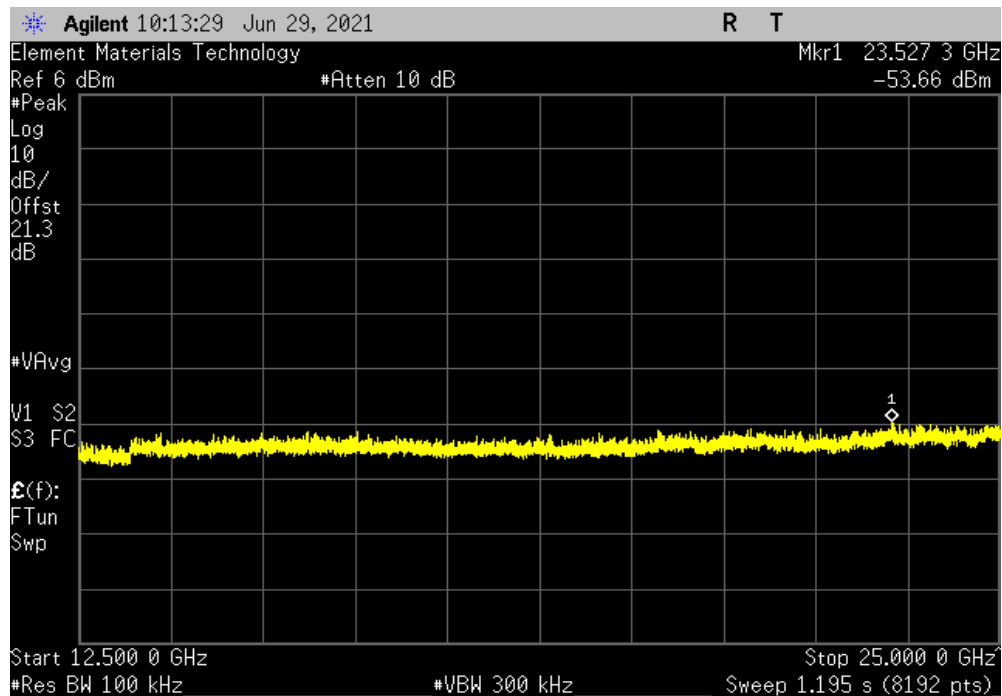


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	9508.5	-57.89	-20	Pass	



3DH5, 8-DPSK, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23527.3	-54.86	-20	Pass	

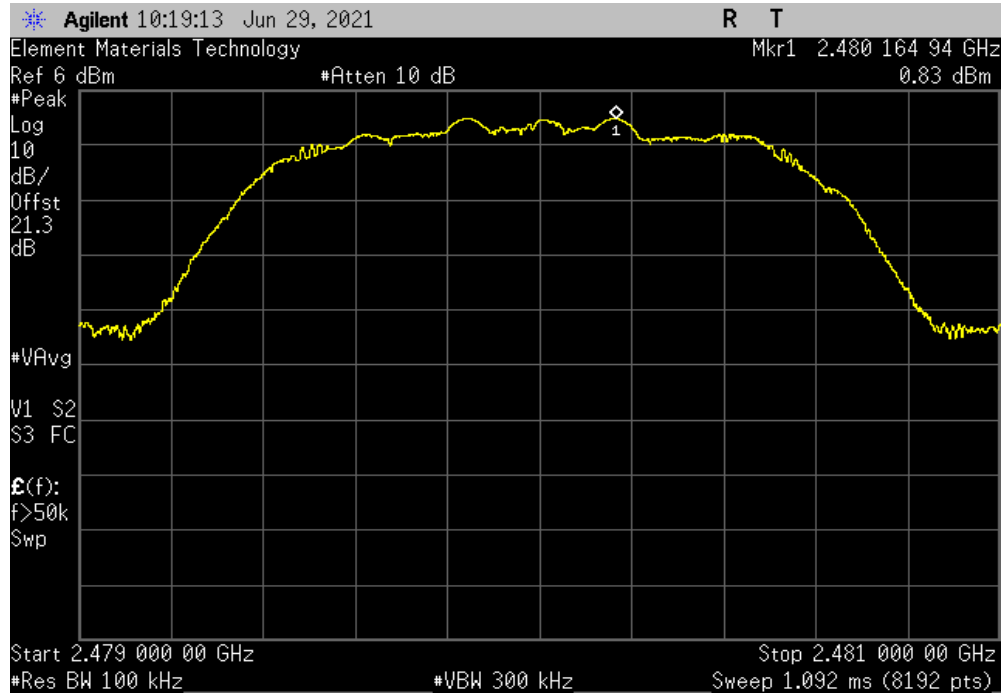


SPURIOUS CONDUCTED EMISSIONS

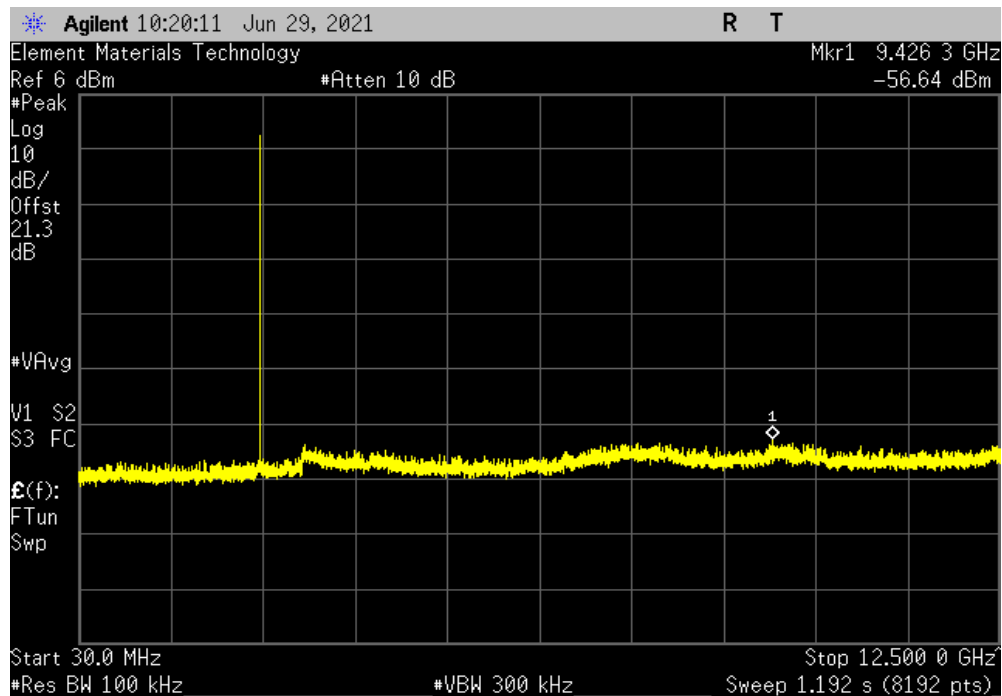


TUTx 2021.03.19.1 XMR 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		2480.16	N/A	N/A	N/A	



3DH5, 8-DPSK, High Channel, 2480 MHz						
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		9426.3	-57.47	-20	Pass	

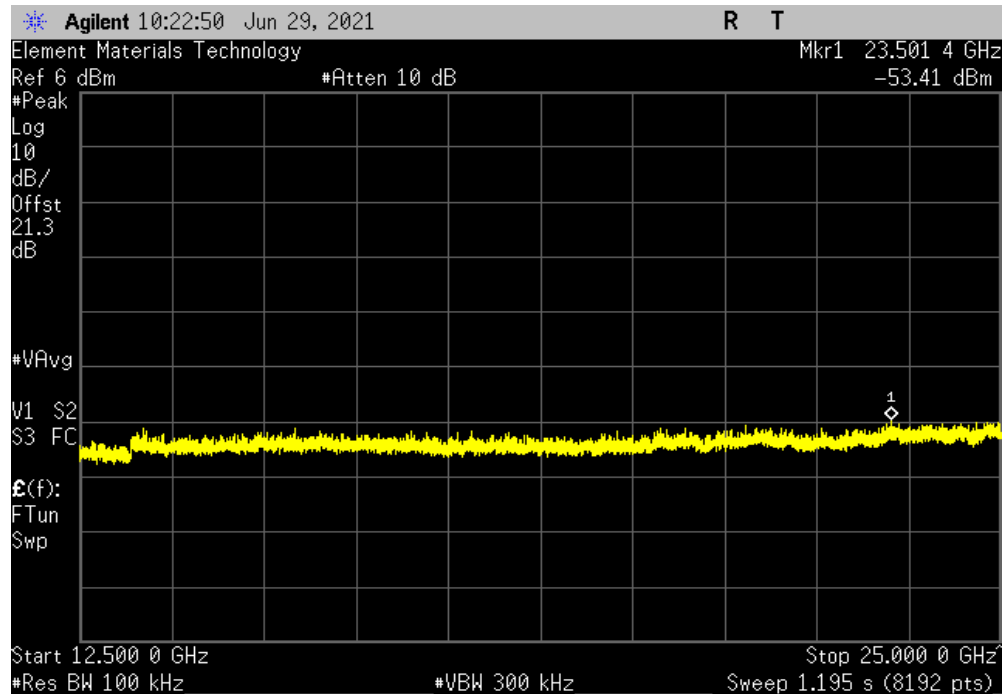


SPURIOUS CONDUCTED EMISSIONS



TUTx 2021.03.19.1 XMt 2020.12.30.0

3DH5, 8-DPSK, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23501.4	-54.24	-20	Pass	



End of Test Report