



# element

**A-dec, Inc.**

**A-dec Gateway**

**Bluetooth LE (DTS)  
FCC 15.247:2020**

**Report: A-DE0149.4, Issue Date: April 3, 2021**



**NVLAP**<sup>®</sup>  
TESTING

NVLAP LAB CODE: 200630-0



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# CERTIFICATE OF TEST



Last Date of Test: December 9, 2020  
A-dec, Inc.  
EUT: A-dec Gateway

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2020	ANSI C63.10:2013, KDB 558074

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:

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
00	None		

# ACCREDITATIONS AND AUTHORIZATIONS

## United States

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

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

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

## Canada

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

## European Union

**European Commission** – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

## Australia/New Zealand

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

## Korea

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

## Japan

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

## Taiwan

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

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

## Singapore

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

## Israel

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

## Hong Kong

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

## Vietnam

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

## SCOPE

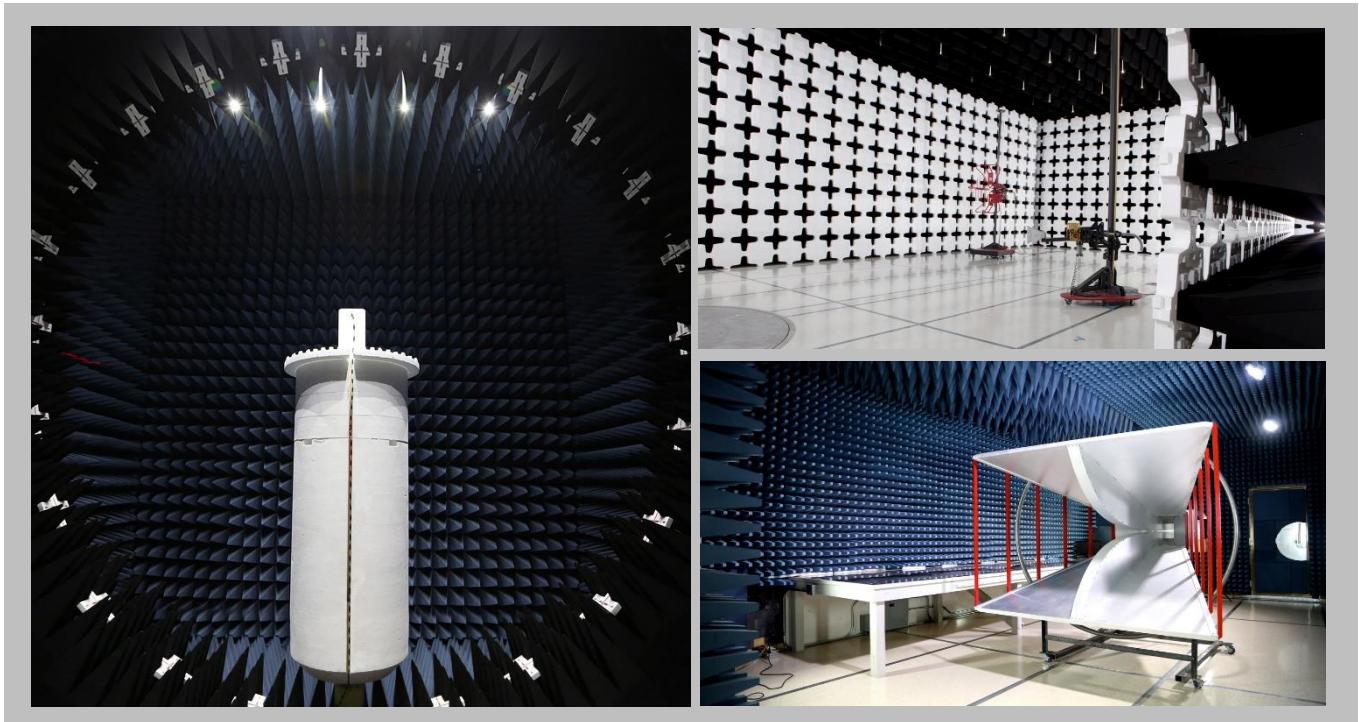
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

# FACILITIES



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



# MEASUREMENT UNCERTAINTY



## Measurement Uncertainty

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

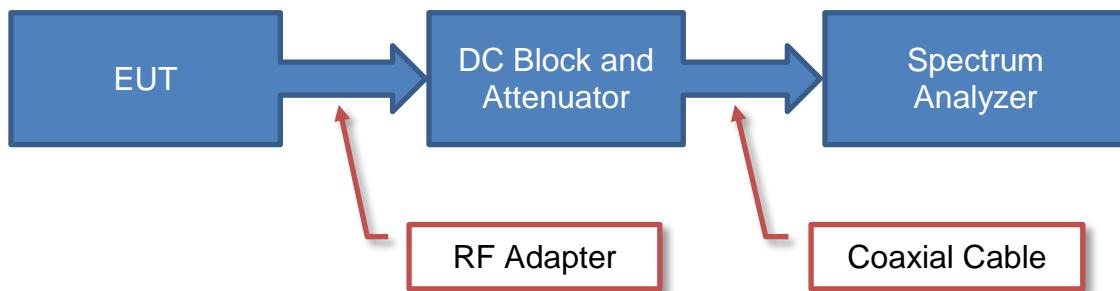
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

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

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

# Test Setup Block Diagrams

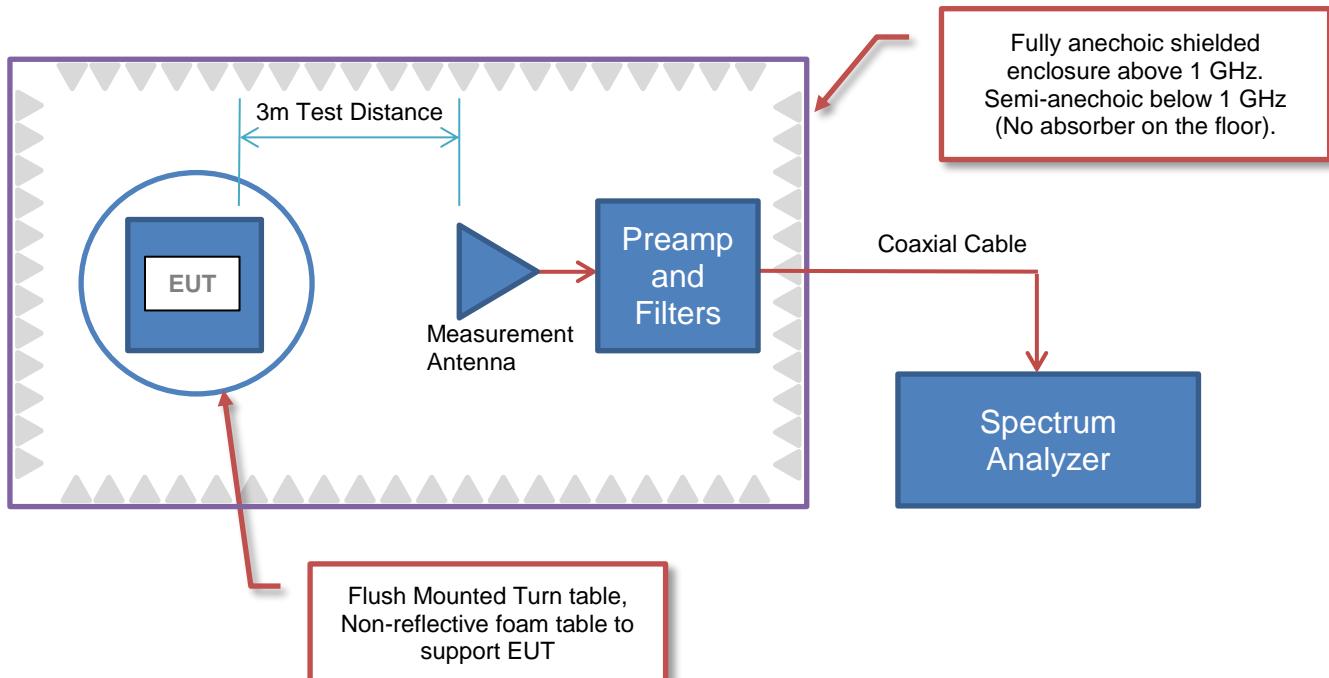
## Antenna Port Conducted Measurements



## Near Field Test Fixture Measurements



## Spurious Radiated Emissions



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	A-dec, Inc.
<b>Address:</b>	2601 Crestview Drive, Building 4
<b>City, State, Zip:</b>	Newberg, OR 97132-9528
<b>Test Requested By:</b>	Michael Yurkoski
<b>EUT:</b>	A-dec Gateway
<b>First Date of Test:</b>	December 8, 2020
<b>Last Date of Test:</b>	December 9, 2020
<b>Receipt Date of Samples:</b>	November 17, 2020
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

| **Functional Description of the EUT:** |
| Network Gateway |
| **Testing Objective:** |
| To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements. |

# 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)
2.2	Manufacturer	2400 - 2500	2.2

No adjustable power settings were provided. The EUT was tested using power settings pre-defined by the manufacturer.

# CONFIGURATIONS



## Configuration A-DE0149- 1

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

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless Access Point / IoT Device	A-dec, Inc.	43.0531.00	521O041984

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude E7470	BRXX1G2

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial to USB	Yes	2.0 m	No	Laptop	Wireless Access Point / IoT Device
DC Power	Yes	1.5 m	No	ITE Power Supply	Wireless Access Point / IoT Device

# CONFIGURATIONS



## Configuration A-DE0149- 2

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

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless Access Point / IoT Device	A-dec, Inc.	43.0531.00	521O041985

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude E7470	BRXX1G2

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial to USB	Yes	2.0 m	No	Laptop	Wireless Access Point / IoT Device
DC Power	Yes	1.5 m	No	ITE Power Supply	Wireless Access Point / IoT Device
Ethernet	No	5.5 m	No	Laptop	Wireless Access Point / IoT Device
CAN	No	7.6 m	No	Unterminated	Wireless Access Point / IoT Device
CAN FD	No	7.6 m	No	Unterminated	Wireless Access Point / IoT Device

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-12-08	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.
2	2020-12-09	Powerline 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.
3	2020-12-09	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2020-12-09	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.
5	2020-12-09	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	2020-12-09	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	2020-12-09	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2020-12-09	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	2020-12-09	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# 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	Rohde & Schwarz	ESCI	ARH	2020-05-13	2021-05-13
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT	EVGA	2020-01-06	2021-01-06
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	2020-08-31	2021-08-31

## MEASUREMENT UNCERTAINTY

Description	Expanded k=2	2.6 dB	-2.6 dB

## CONFIGURATIONS INVESTIGATED

A-DE0149-2

## MODES INVESTIGATED

Continuous Tx, Bluetooth LE 1M, Mid Channel = 2440 MHz

# POWERLINE CONDUCTED EMISSIONS



EUT:	A-dec Gateway	Work Order:	A-DE0149
Serial Number:	521O041985	Date:	2020-12-09
Customer:	A-dec, Inc.	Temperature:	22.4°C
Attendees:	Spencer Warneke	Relative Humidity:	37.7%
Customer Project:	None	Bar. Pressure:	1032 mb
Tested By:	Jeff Alcocke	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	A-DE0149-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2020	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	20	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

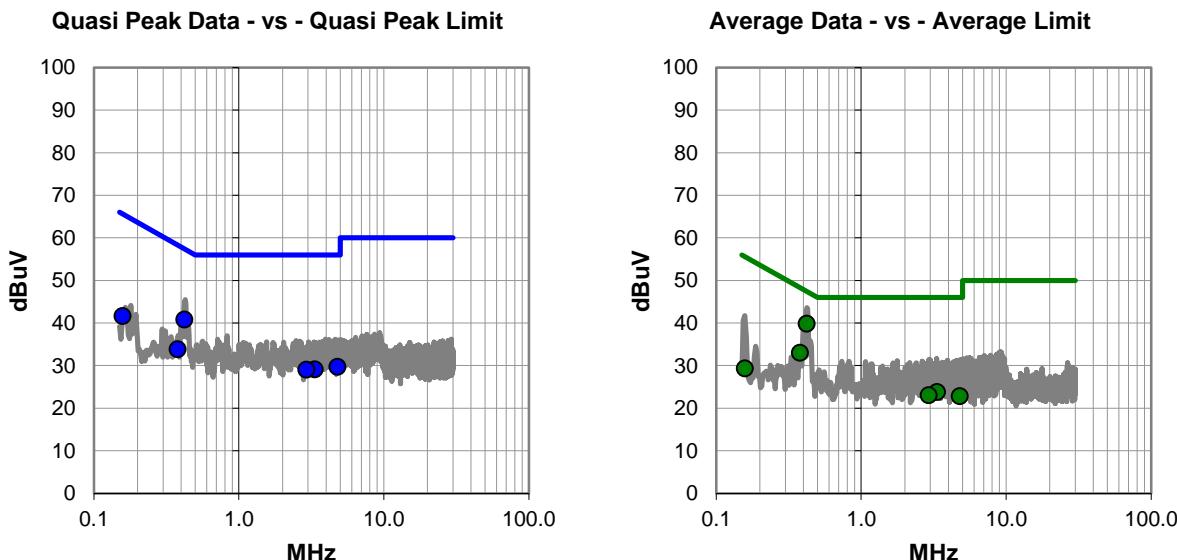
None

## EUT OPERATING MODES

Continuous Tx, Bluetooth LE 1M, Mid Channel = 2440 MHz,

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS



## RESULTS - Run #20

## Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.422	20.9	19.9	40.8	57.4	-16.6
0.158	21.6	20.0	41.6	65.6	-24.0
0.379	13.9	19.9	33.8	58.3	-24.5
4.802	9.6	20.1	29.7	56.0	-26.3
3.335	9.0	20.1	29.1	56.0	-26.9
2.928	9.0	20.0	29.0	56.0	-27.0

## Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.422	19.9	19.9	39.8	47.4	-7.6
0.379	13.1	19.9	33.0	48.3	-15.3
3.335	3.7	20.1	23.8	46.0	-22.2
2.928	3.0	20.0	23.0	46.0	-23.0
4.802	2.7	20.1	22.8	46.0	-23.2
0.158	9.3	20.0	29.3	55.6	-26.3

## CONCLUSION

Pass



# POWERLINE CONDUCTED EMISSIONS



EUT:	A-dec Gateway	Work Order:	A-DE0149
Serial Number:	521O041985	Date:	2020-12-09
Customer:	A-dec, Inc.	Temperature:	22.4°C
Attendees:	Spencer Warneke	Relative Humidity:	37.7%
Customer Project:	None	Bar. Pressure:	1032 mb
Tested By:	Jeff Alcocke	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	A-DE0149-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2020	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	21	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

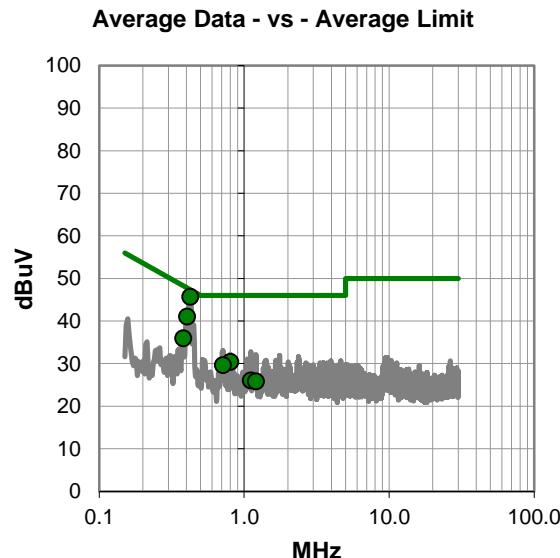
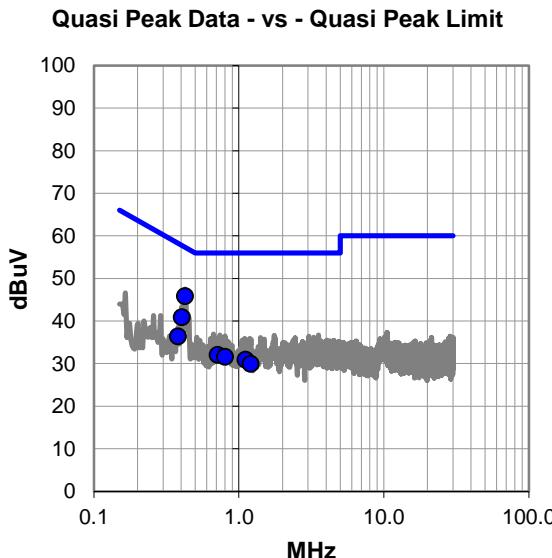
None

## EUT OPERATING MODES

Continuous Tx, Bluetooth LE 1M, Mid Channel = 2440 MHz

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS



## RESULTS - Run #21

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.426	25.9	19.9	45.8	57.3	-11.5
0.403	21.0	19.9	40.9	57.8	-16.9
0.380	16.5	19.9	36.4	58.3	-21.9
0.714	12.1	19.9	32.0	56.0	-24.0
0.803	11.7	19.9	31.6	56.0	-24.4
1.114	11.0	19.9	30.9	56.0	-25.1
1.210	10.0	19.9	29.9	56.0	-26.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.426	25.8	19.9	45.7	47.3	-1.6
0.403	21.1	19.9	41.0	47.8	-6.8
0.380	16.0	19.9	35.9	48.3	-12.4
0.803	10.5	19.9	30.4	46.0	-15.6
0.714	9.7	19.9	29.6	46.0	-16.4
1.114	6.1	19.9	26.0	46.0	-20.0
1.210	5.9	19.9	25.8	46.0	-20.2

## CONCLUSION

Pass

Tested By

# DUTY CYCLE



XMIT 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## 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



TbTx 2019.08.30.0 XMII 2020.03.25.0

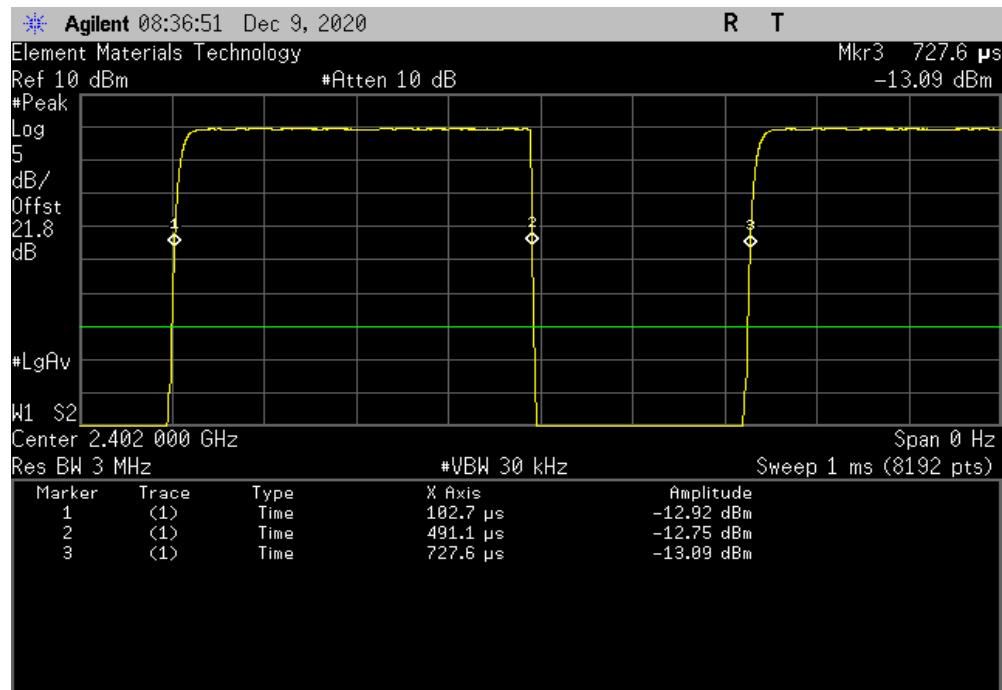
EUT:	A-dec Gateway		Work Order:	A-DE0149				
Serial Number:	5210041984		Date:	9-Dec-20				
Customer:	A-dec, Inc.		Temperature:	21.8 °C				
Attendees:	Spencer Warneke		Humidity:	38.3% RH				
Project:	None		Barometric Pres.:	1032 mbar				
Tested by:	Jeff Alcock	Power:	110VAC/60Hz		Job Site:	EV06		
TEST SPECIFICATIONS			Test Method					
FCC 15.247:2020			ANSI C63.10:2013					
COMMENTS								
Reference level offset includes: 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
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			388.4 us	624.9 us	1	62.2	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz			388.7 us	624.9 us	1	62.2	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz			N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz			388.7 us	624.9 us	1	62.2	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz			N/A	N/A	5	N/A	N/A	N/A

# DUTY CYCLE

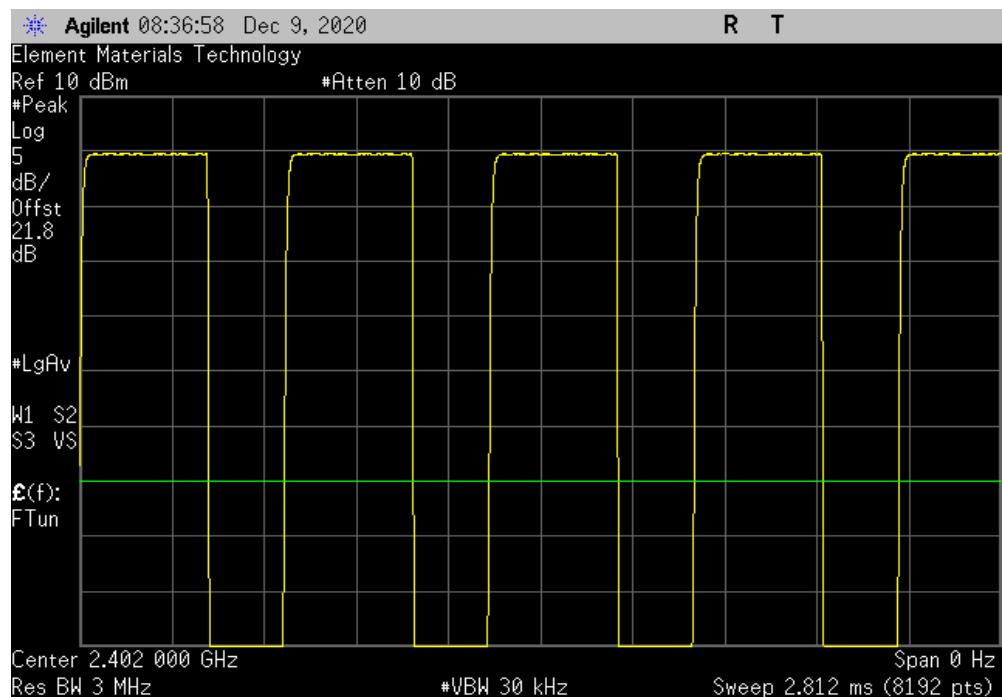


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
388.4 us	624.9 us	1	62.2	N/A	N/A



BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

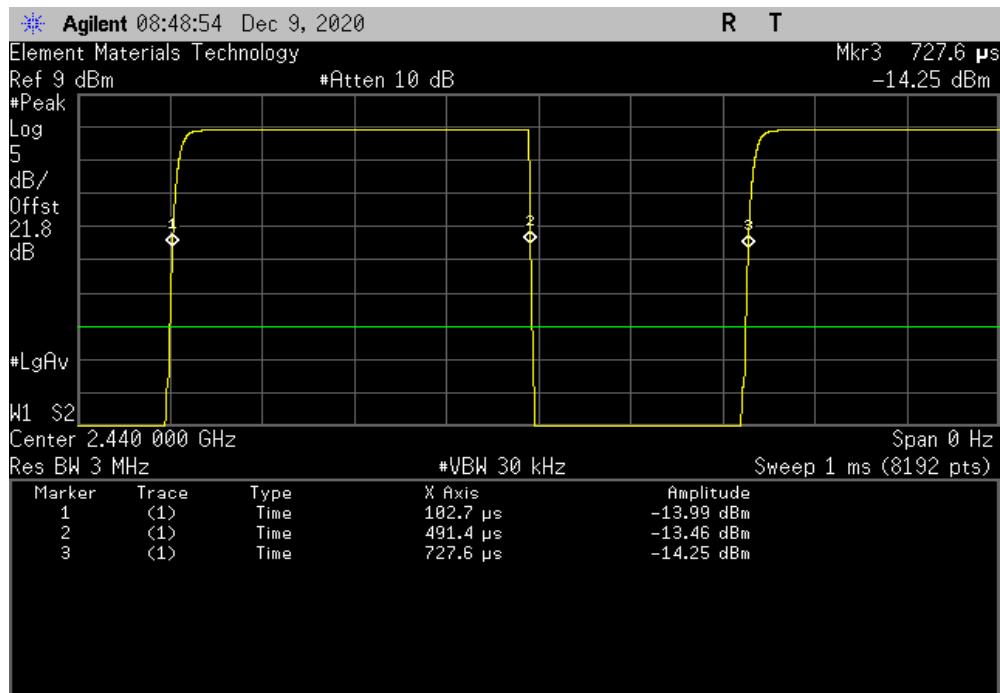


# DUTY CYCLE

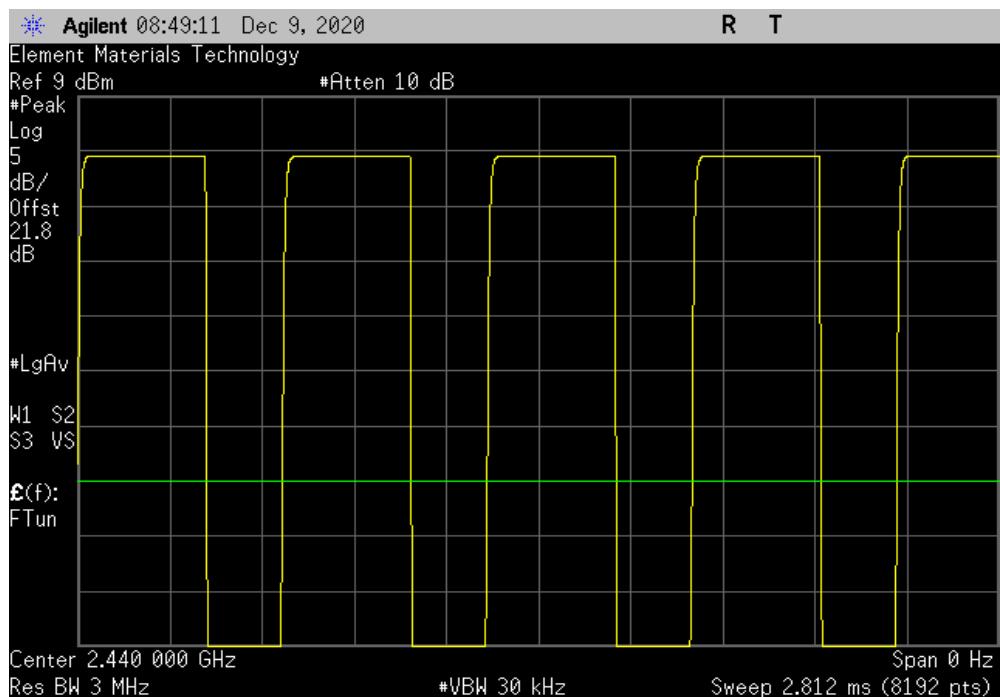


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
388.7 us	624.9 us	1	62.2	N/A	N/A



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

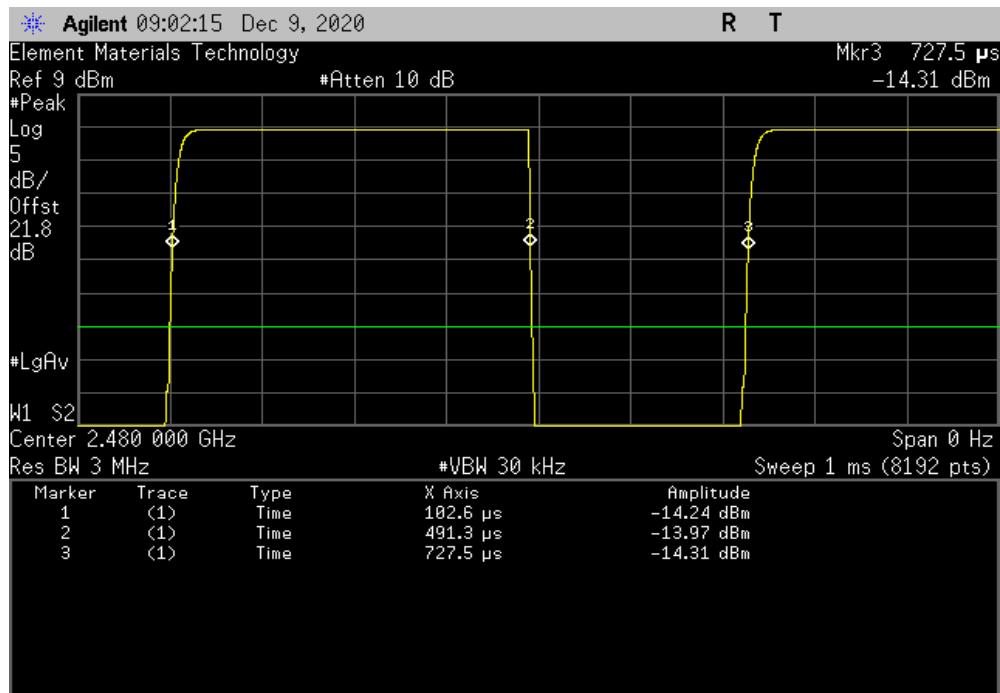


# DUTY CYCLE

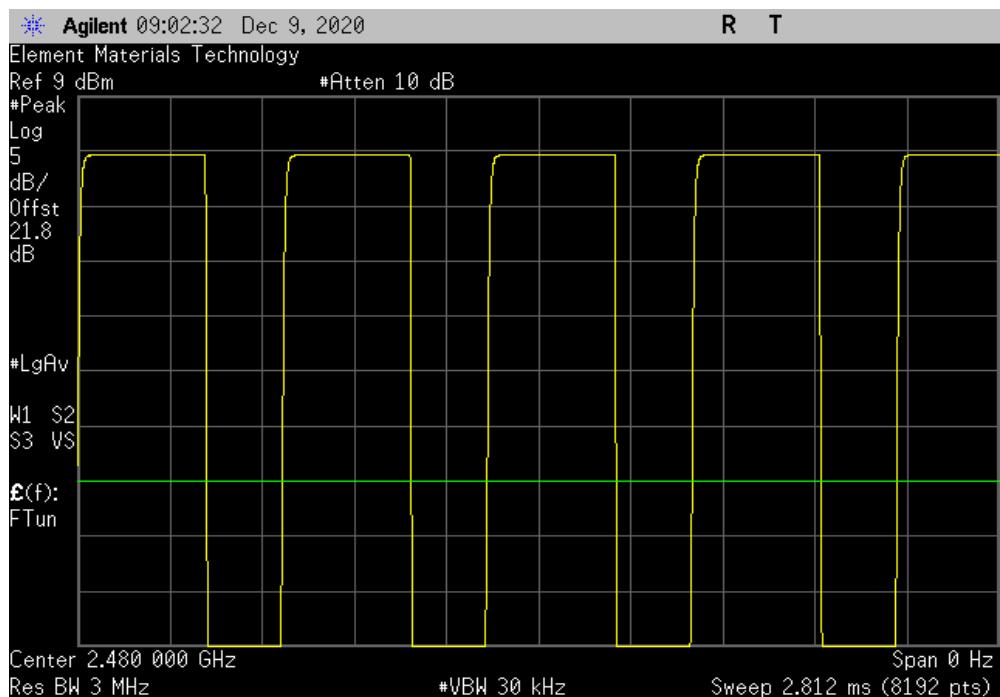


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
388.7 us	624.9 us	1	62.2	N/A	N/A



BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# OCCUPIED BANDWIDTH



XMit 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

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

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

# OCCUPIED BANDWIDTH



TbTx 2019.08.30.0 XMII 2020.03.25.0

EUT:	A-dec Gateway		Work Order:	A-DE0149		
Serial Number:	5210041984		Date:	9-Dec-20		
Customer:	A-dec, Inc.		Temperature:	21.7 °C		
Attendees:	Spencer Warneke		Humidity:	38.4% RH		
Project:	None		Barometric Pres.:	1032 mbar		
Tested by:	Jeff Alcock	Power:	110VAC/60Hz		Job Site:	EV06
TEST SPECIFICATIONS			Test Method			
FCC 15.247:2020			ANSI C63.10:2013			
COMMENTS						
Reference level offset includes: DC block, 20 dB attenuator and measurement cable.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
			Value	Limit (±)	Result	
			706.25 kHz	500 kHz	Pass	
			706.253 kHz	500 kHz	Pass	
			704.371 kHz	500 kHz	Pass	

BLE/GFSK 1 Mbps Low Channel, 2402 MHz  
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz  
BLE/GFSK 1 Mbps High Channel, 2480 MHz

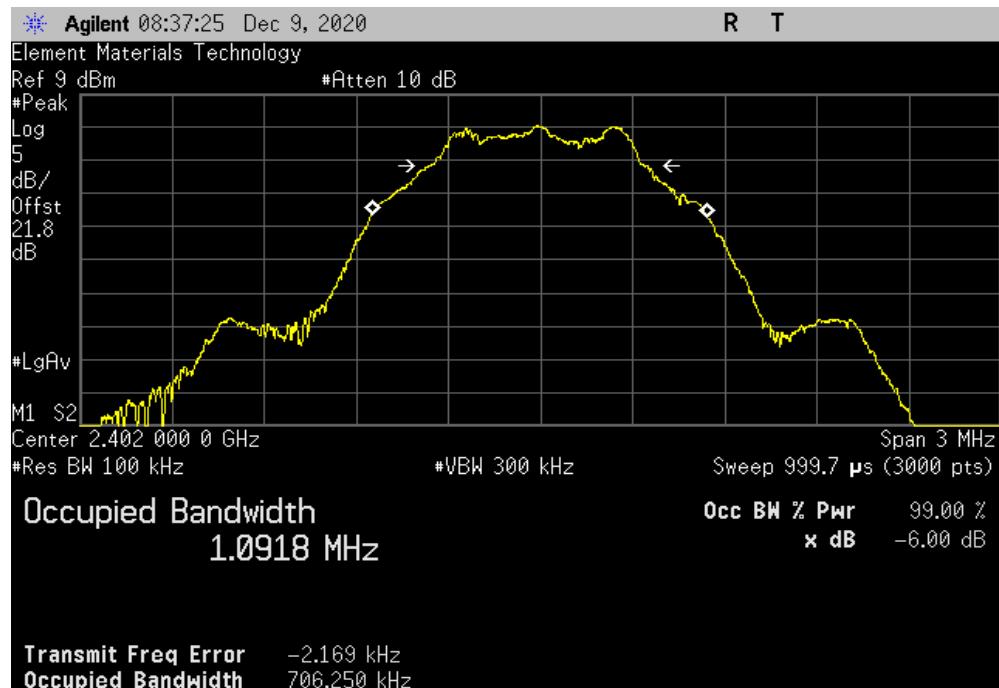
## OCCUPIED BANDWIDTH



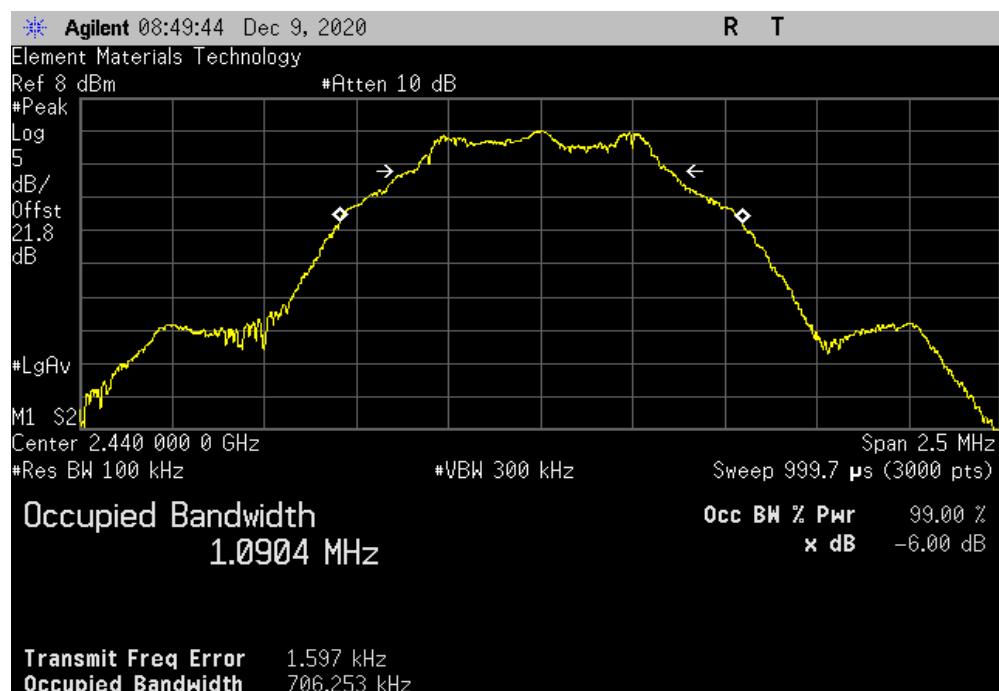
TbtTx 2019.08.30.0

XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value	Limit ( $\geq$ )	Result
				706.25 kHz	500 kHz	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
			Limit			
			Value	( $\geq$ )	Result	
			706.253 kHz	500 kHz	Pass	



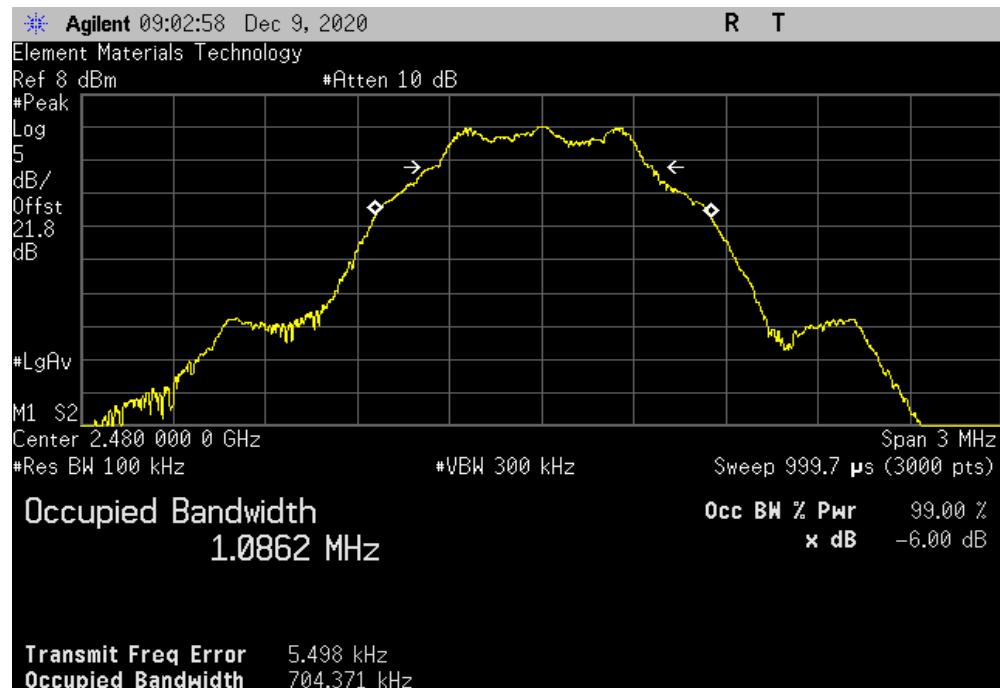
## OCCUPIED BANDWIDTH



TbtTx 2019.08.30.0

XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz				Limit		
				Value	( $\geq$ )	Result
				704.371 kHz	500 kHz	Pass



# OUTPUT POWER



XMit 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

# OUTPUT POWER

EUT: A-dec Gateway		Work Order: A-DE0149	
Serial Number:	5210041984	Date:	9-Dec-20
Customer:	A-dec, Inc.	Temperature:	21.7 °C
Attendees:	Spencer Warneke	Humidity:	38.3% RH
Project:	None	Barometric Pres.:	1032 mbar
Tested by:	Jeff Alcock	Power:	110VAC/60Hz
TEST SPECIFICATIONS		Job Site: EV06	
FCC 15.247:2020		Test Method: ANSI C63.10:2013	
COMMENTS			
Reference level offset includes: DC block, 20 dB attenuator and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
		Out Pwr (dBm)	Limit (dBm)
		4.933	30
		3.695	30
		3.769	30

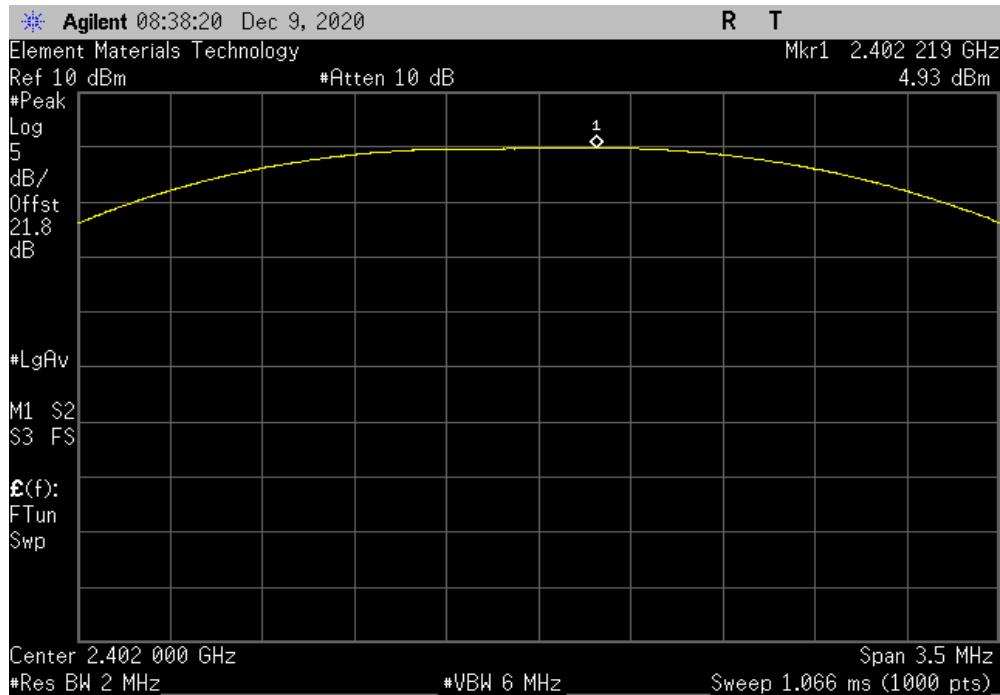
BLE/GFSK 1 Mbps Low Channel, 2402 MHz  
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz  
BLE/GFSK 1 Mbps High Channel, 2480 MHz

# OUTPUT POWER

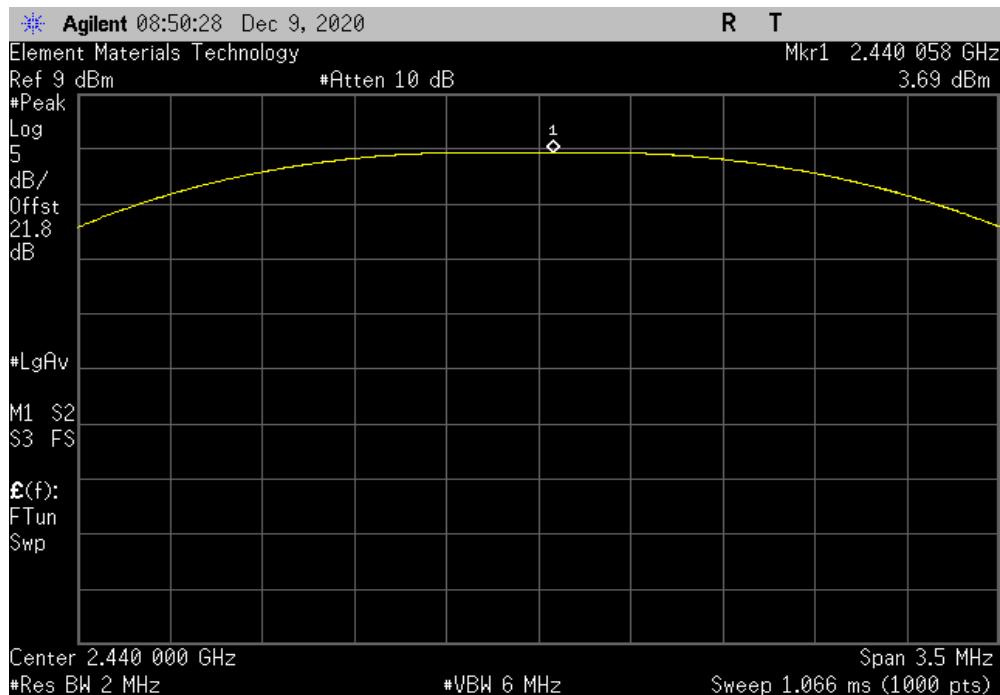


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz		
Out Pwr (dBm)	Limit (dBm)	Result
4.933	30	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz		
Out Pwr (dBm)	Limit (dBm)	Result
3.695	30	Pass

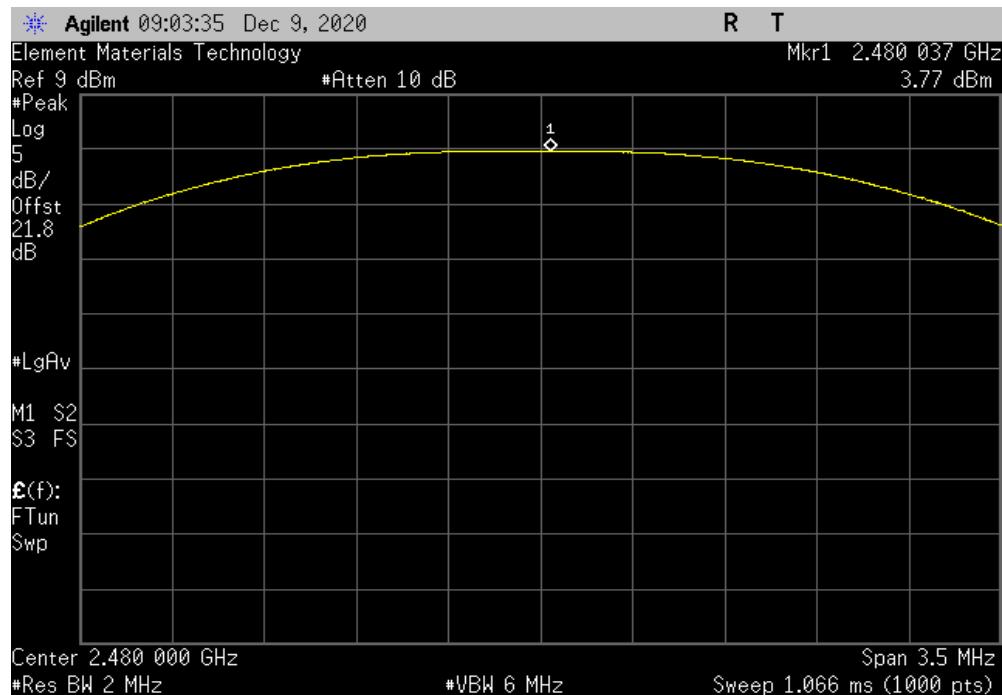


# OUTPUT POWER



TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz			Out Pwr (dBm)	Limit (dBm)	Result
			3.769	30	Pass



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMit 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

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

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbTx 2019.08.30.0 XMII 2020.03.25.0

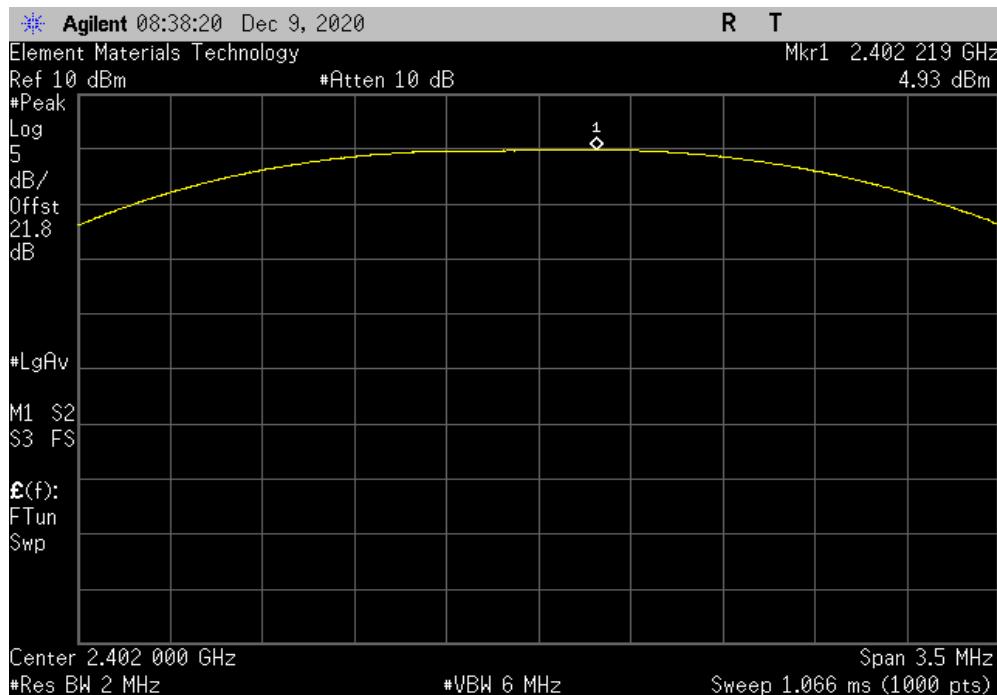
EUT:	A-dec Gateway		Work Order:	A-DE0149				
Serial Number:	5210041984		Date:	9-Dec-20				
Customer:	A-dec, Inc.		Temperature:	21.7 °C				
Attendees:	Spencer Warneke		Humidity:	38.4% RH				
Project:	None		Barometric Pres.:	1032 mbar				
Tested by:	Jeff Alcocke	Power:	110VAC/60Hz		Job Site:	EV06		
TEST SPECIFICATIONS			Test Method					
FCC 15.247:2020			ANSI C63.10:2013					
COMMENTS								
Reference level offset includes: 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
				4.933	2.2	7.133	36	Pass
				3.695	2.2	5.895	36	Pass
				3.769	2.2	5.969	36	Pass

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

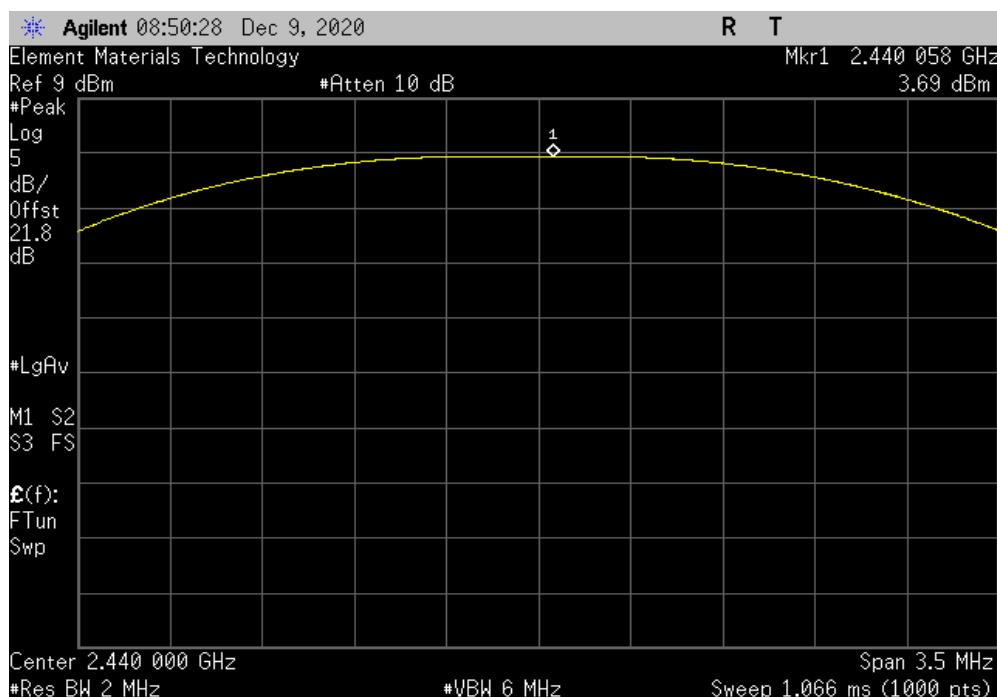


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
4.933	2.2	7.133	36	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
3.695	2.2	5.895	36	Pass	

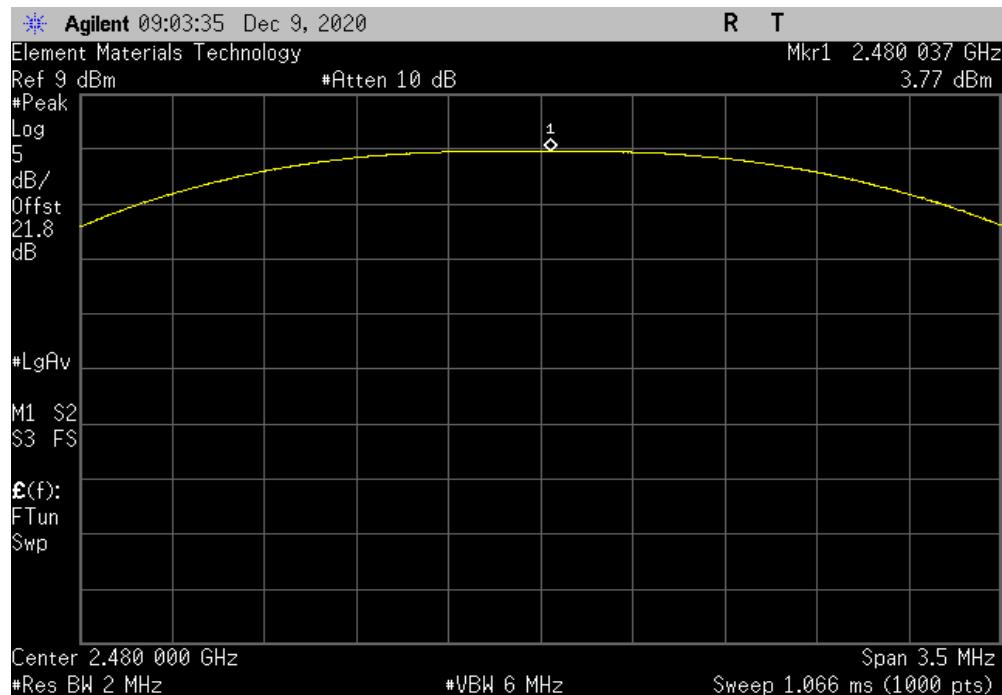


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
3.769	2.2	5.969	36	Pass	



# POWER SPECTRAL DENSITY



XMit 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

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

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

# POWER SPECTRAL DENSITY



TbTx 2019.08.30.0 XMII 2020.03.25.0

EUT:	A-dec Gateway		Work Order:	A-DE0149		
Serial Number:	5210041984		Date:	9-Dec-20		
Customer:	A-dec, Inc.		Temperature:	21.8 °C		
Attendees:	Spencer Warneke		Humidity:	38.4% RH		
Project:	None		Barometric Pres.:	1032 mbar		
Tested by:	Jeff Alcock	Power:	110VAC/60Hz		Job Site:	EV06
TEST SPECIFICATIONS			Test Method			
FCC 15.247:2020			ANSI C63.10:2013			
COMMENTS						
Reference level offset includes: DC block, 20 dB attenuator and measurement cable.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
			Value	Limit	Results	
			dBm/3kHz	< dBm/3kHz		
			-9.416	8	Pass	
			-10.656	8	Pass	
			-10.559	8	Pass	

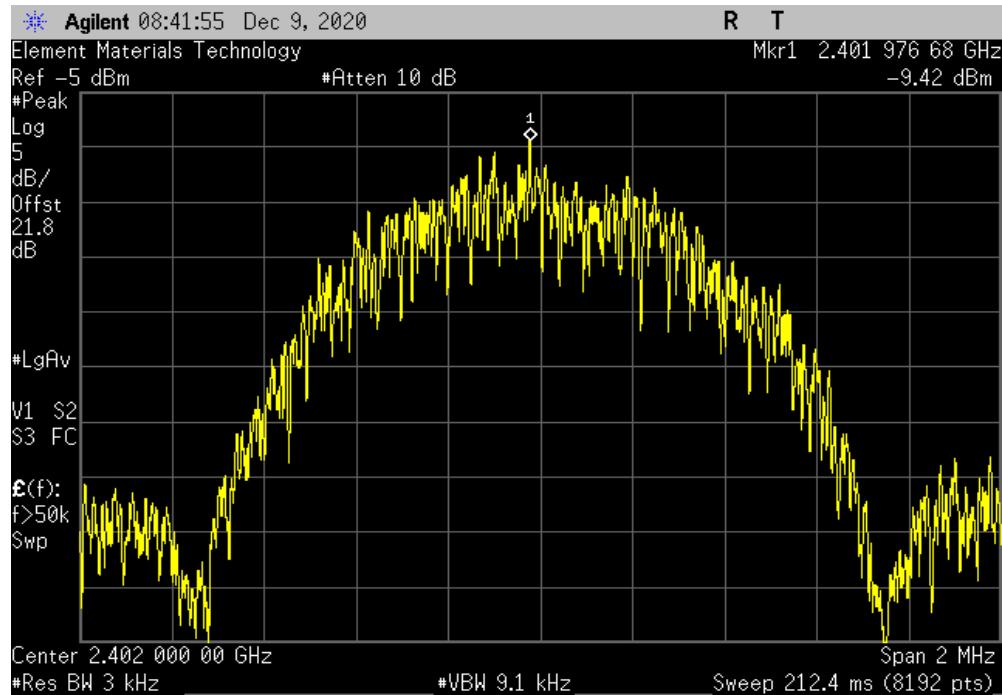
BLE/GFSK 1 Mbps Low Channel, 2402 MHz  
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz  
BLE/GFSK 1 Mbps High Channel, 2480 MHz

# POWER SPECTRAL DENSITY

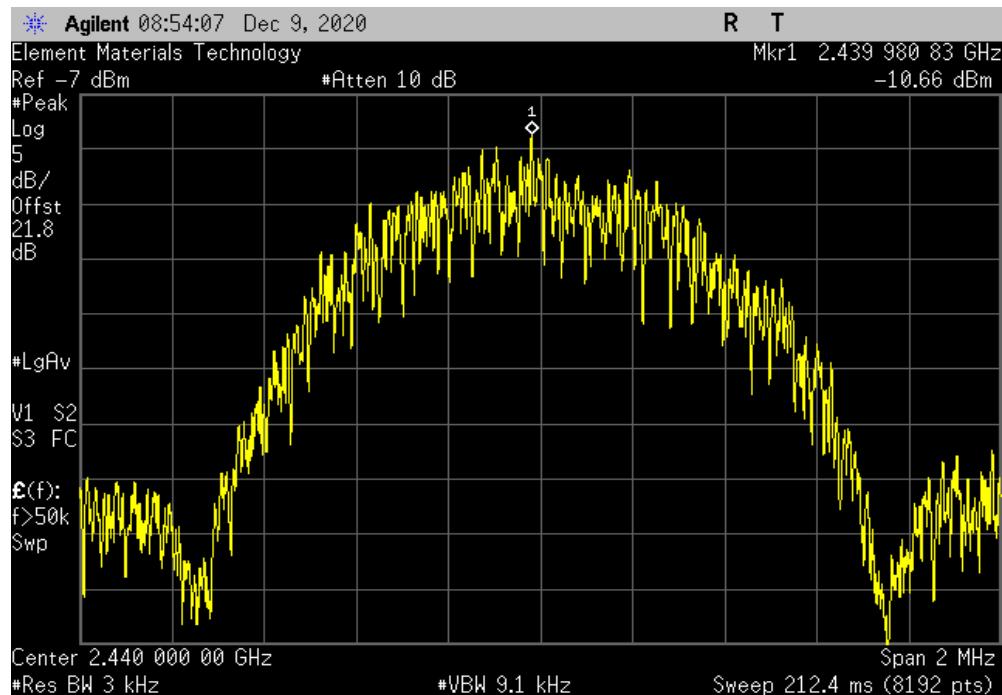


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz		
Value	Limit	Results
dBm/3kHz	< dBm/3kHz	
-9.416	8	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz		
Value	Limit	Results
dBm/3kHz	< dBm/3kHz	
-10.656	8	Pass

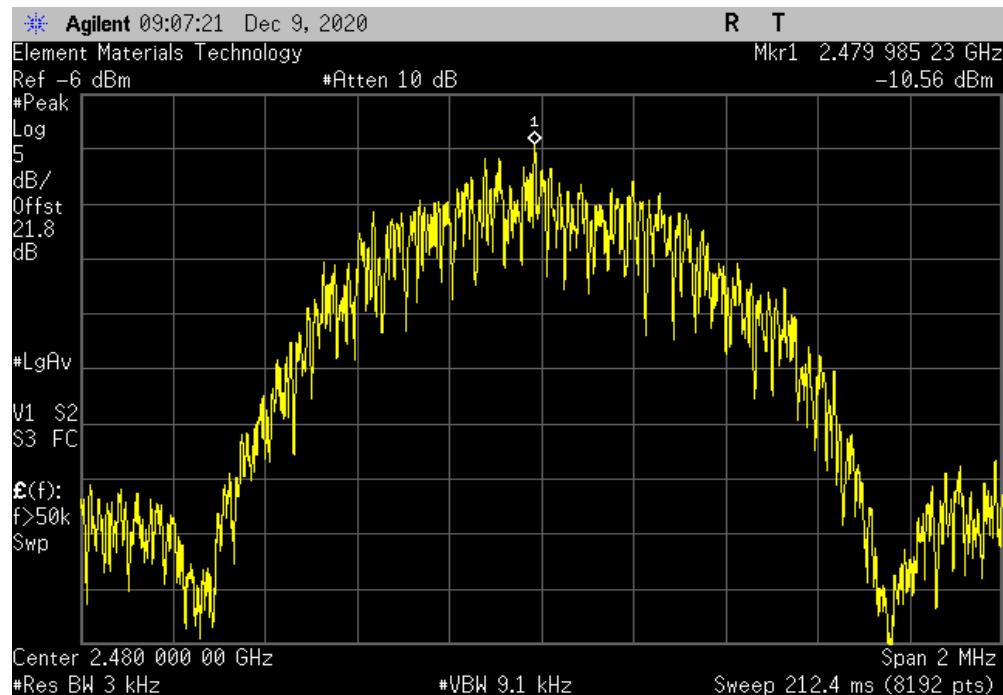


# POWER SPECTRAL DENSITY



TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz			
Value	Limit	Results	
dBm/3kHz	< dBm/3kHz	Pass	
-10.559	8		



# BAND EDGE COMPLIANCE



XMil 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

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

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

# BAND EDGE COMPLIANCE



TbTx 2019.08.30.0

XMI 2020.03.25.0

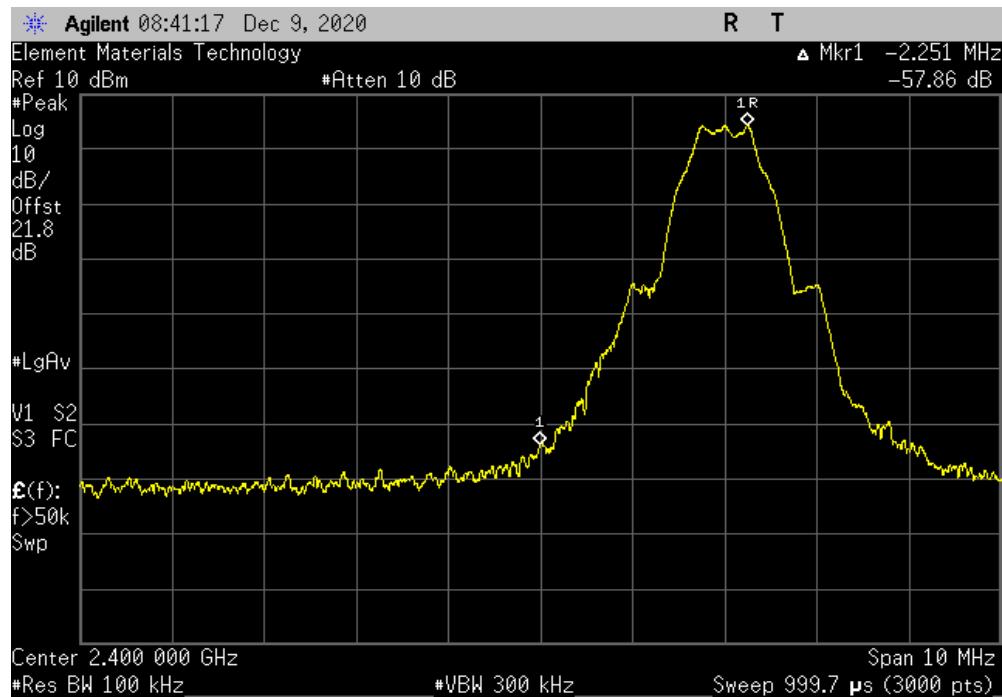
EUT:	A-dec Gateway		Work Order:	A-DE0149	
Serial Number:	5210041984		Date:	9-Dec-20	
Customer:	A-dec, Inc.		Temperature:	21.7 °C	
Attendees:	Spencer Warneke		Humidity:	38.3% RH	
Project:	None		Barometric Pres.:	1032 mbar	
Tested by:	Jeff Alcocke	Power:	110VAC/60Hz	Job Site:	EV06
TEST SPECIFICATIONS			Test Method		
FCC 15.247:2020			ANSI C63.10:2013		
COMMENTS					
Reference level offset includes: DC block, 20 dB attenuator and measurement cable.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			-57.86	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz			-60.73	-20	Pass

# BAND EDGE COMPLIANCE

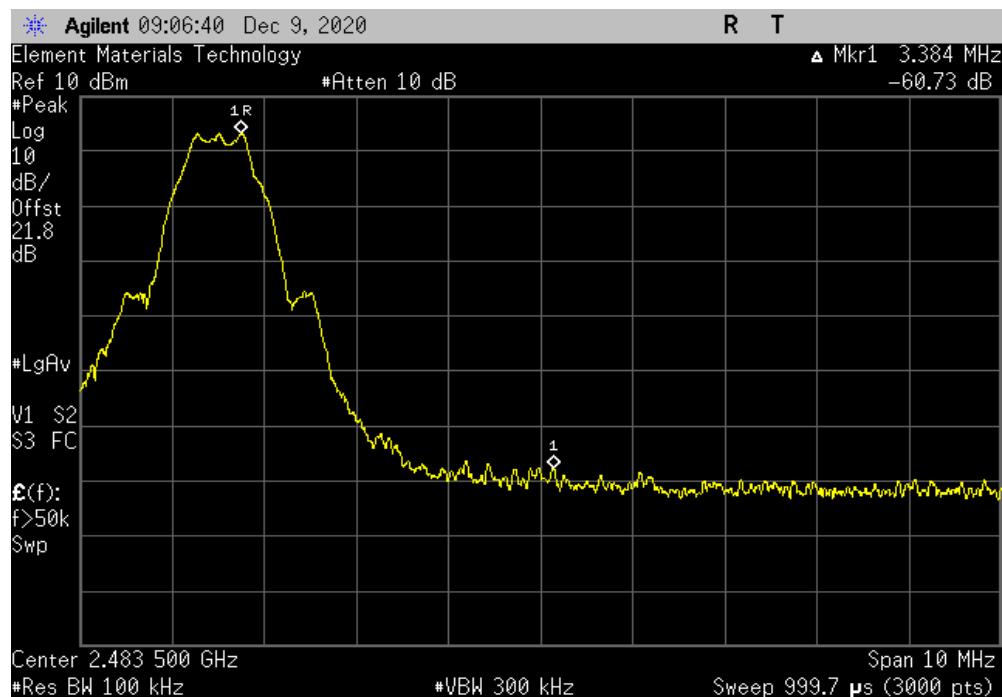


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-57.86	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-60.73	-20	Pass



# SPURIOUS CONDUCTED EMISSIONS



XMit 2020.03.25.0

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	Agilent	N5182A	TIF	29-Aug-20	29-Aug-23
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	13-Mar-20	13-Mar-21
Attenuator	S.M. Electronics	SA26B-20	AUY	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	28-Oct-20	28-Oct-21

## TEST DESCRIPTION

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

# SPURIOUS CONDUCTED EMISSIONS



TbTx 2019.08.30.0 XMII 2020.03.25.0

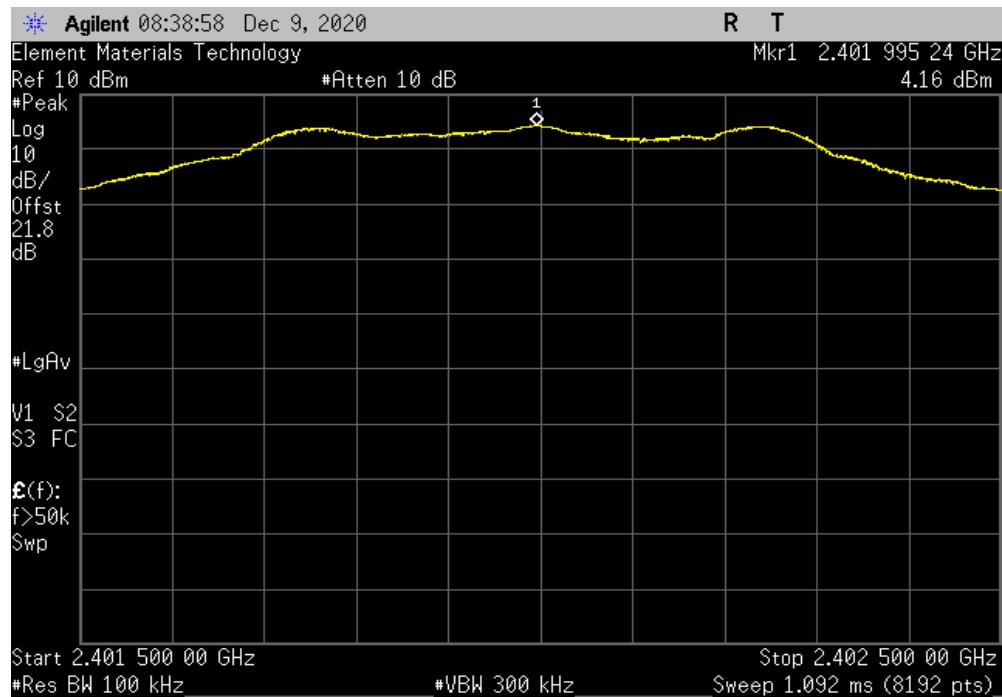
EUT:	A-dec Gateway		Work Order:	A-DE0149		
Serial Number:	5210041984		Date:	9-Dec-20		
Customer:	A-dec, Inc.		Temperature:	21.8 °C		
Attendees:	Spencer Warneke		Humidity:	38.3% RH		
Project:	None		Barometric Pres.:	1032 mbar		
Tested by:	Jeff Alcocke	Power:	110VAC/60Hz		Job Site:	EV06
TEST SPECIFICATIONS			Test Method			
FCC 15.247:2020			ANSI C63.10:2013			
COMMENTS						
Reference level offset includes: DC block, 20 dB attenuator and measurement cable.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
			Frequency Range	Measured Freq (MHz)	Max Value (dBc)	
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			Fundamental	2402	N/A	
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			30 MHz - 12.5 GHz	7031.5	-58.32	
BLE/GFSK 1 Mbps Low Channel, 2402 MHz			12.5 GHz - 25 GHz	13804.8	-54.83	
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz			Fundamental	2440	N/A	
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz			30 MHz - 12.5 GHz	6963	-56.2	
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz			12.5 GHz - 25 GHz	13878	-53.62	
BLE/GFSK 1 Mbps High Channel, 2480 MHz			Fundamental	2480.01	N/A	
BLE/GFSK 1 Mbps High Channel, 2480 MHz			30 MHz - 12.5 GHz	12489.3	-57.08	
BLE/GFSK 1 Mbps High Channel, 2480 MHz			12.5 GHz - 25 GHz	13885.7	-52.85	

# SPURIOUS CONDUCTED EMISSIONS

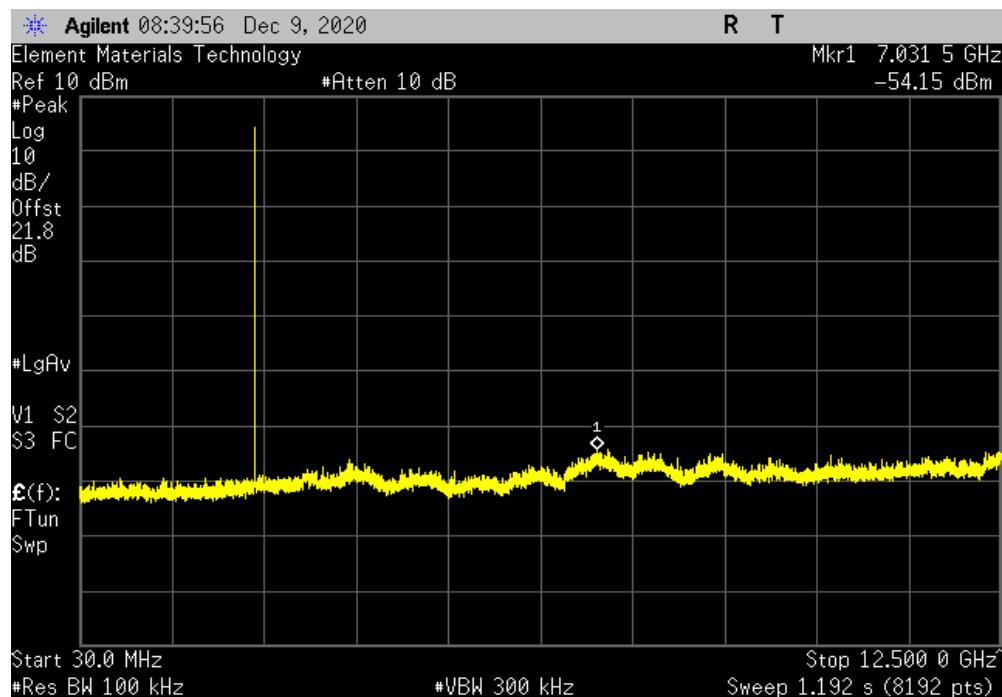


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2402	N/A	N/A	N/A	



BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	7031.5	-58.32	-20	Pass	

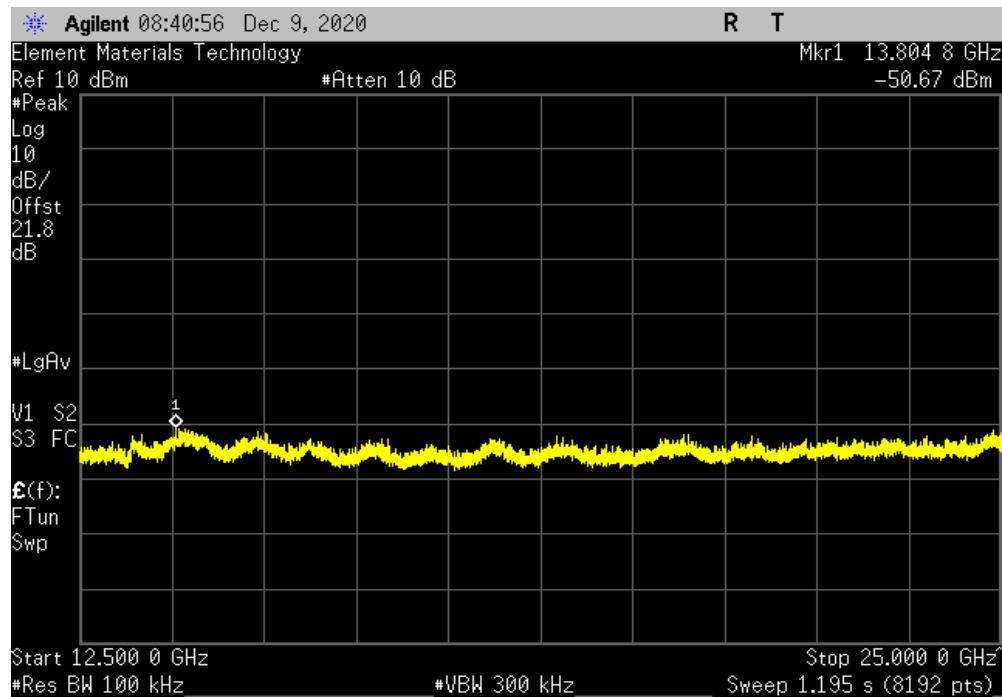


# SPURIOUS CONDUCTED EMISSIONS

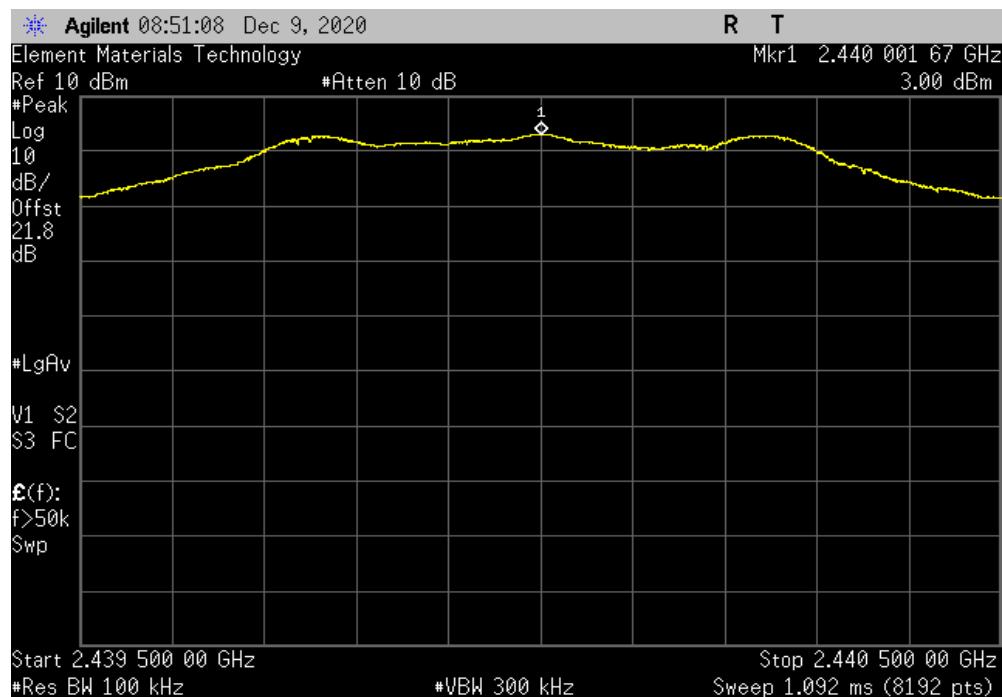


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	13804.8	-54.83	-20	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2440	N/A	N/A	N/A	N/A

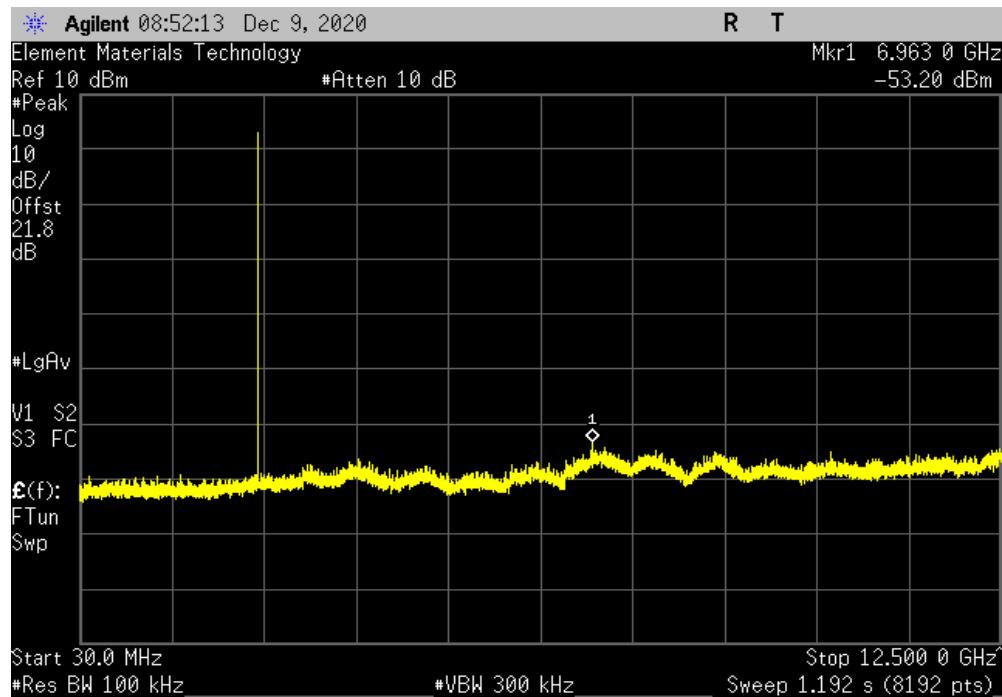


# SPURIOUS CONDUCTED EMISSIONS

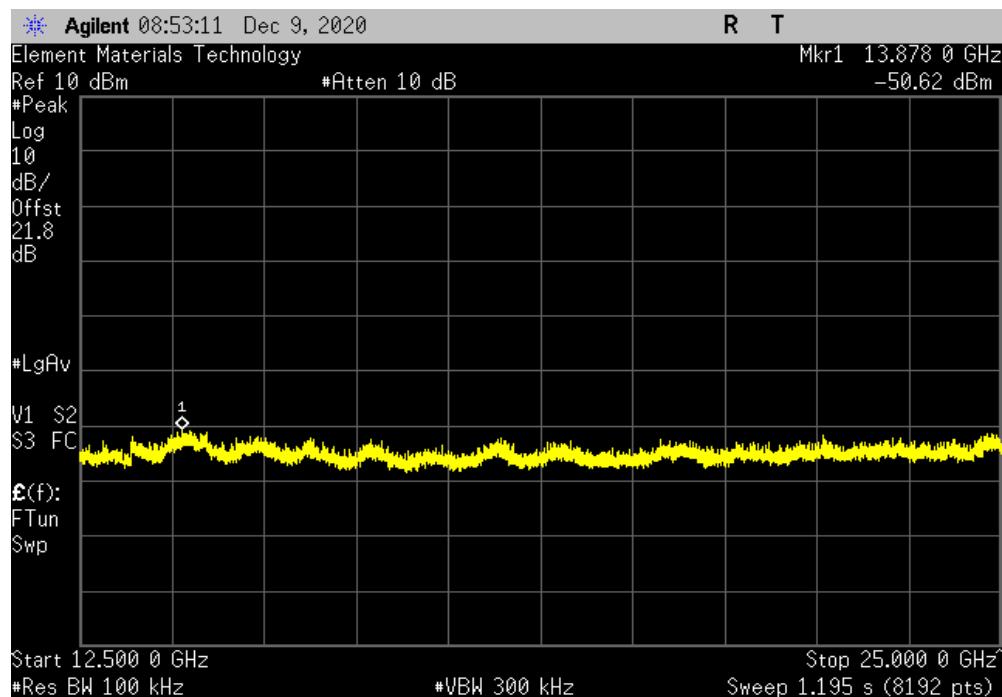


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps Mid Channel, 2440 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz	6963	-56.2	-20	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	13878	-53.62	-20	Pass

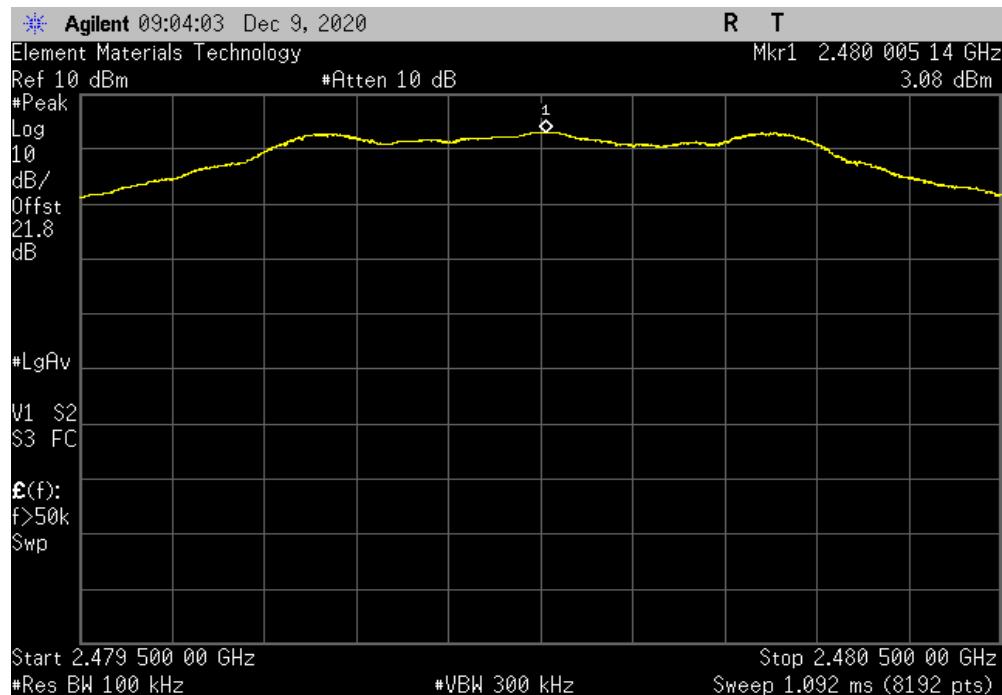


# SPURIOUS CONDUCTED EMISSIONS

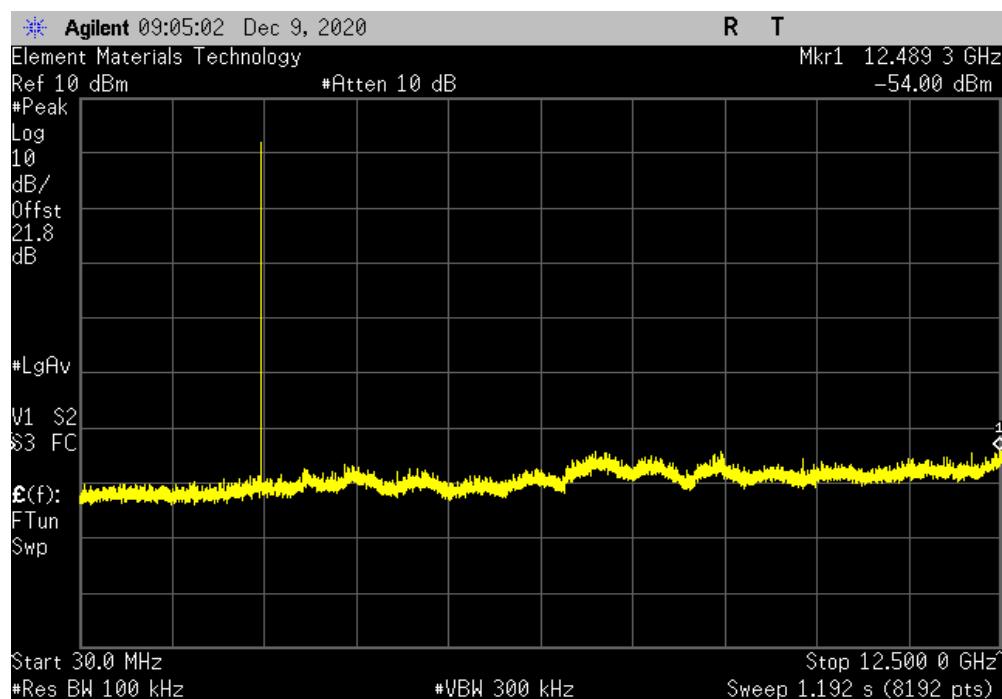


TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.01	N/A	N/A	N/A	



BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12489.3	-57.08	-20	Pass	

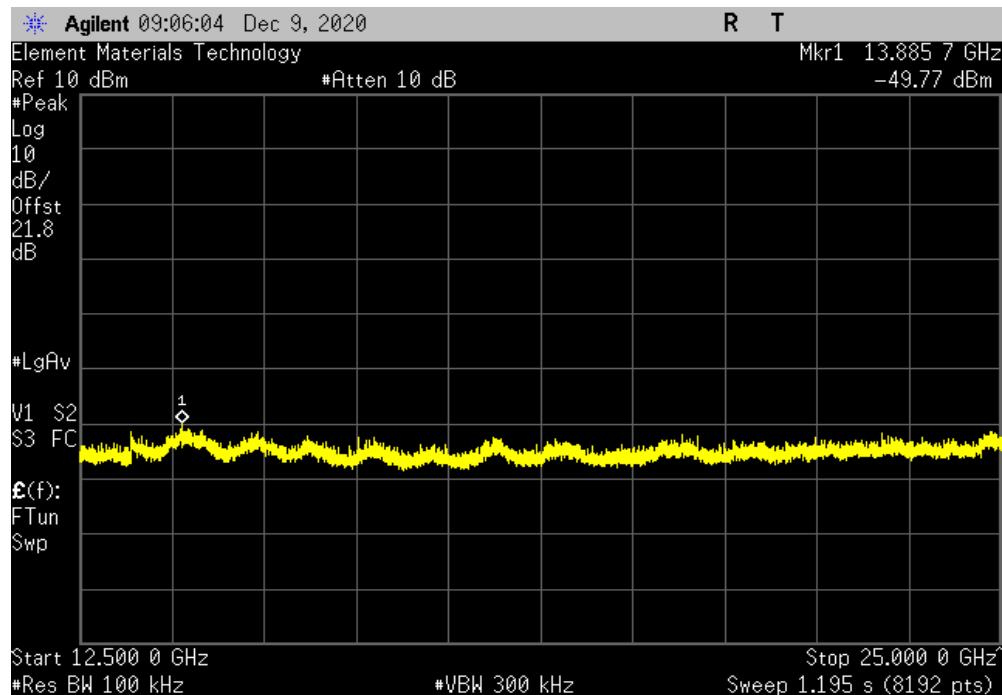


# SPURIOUS CONDUCTED EMISSIONS



TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	13885.7	-52.85	-20	Pass



# SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2020.06.24.2

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

## MODES OF OPERATION

Continuous Tx, Bluetooth LE 1M, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

A-DE0149 - 2

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26.5 GHz
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## SAMPLE CALCULATIONS

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	Micro-Tronics	HPM50111	HFO	2020-11-17	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	2020-02-15	12 mo
Attenuator	Coaxicom	3910-20	AXZ	2020-02-15	12 mo
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	EVY	2020-07-25	12 mo
Cable	None	Standard Gain Horns Cable	EVF	2020-11-18	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	2020-11-17	12 mo
Cable	N/A	Bilog Cables	EVA	2020-11-17	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	2020-07-25	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2020-11-18	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2020-11-18	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2020-11-17	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2020-11-17	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHC	2020-07-01	24 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	2020-10-13	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	2020-08-03	12 mo

# SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2020.06.24.2

## TEST DESCRIPTION

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

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

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

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

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

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

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

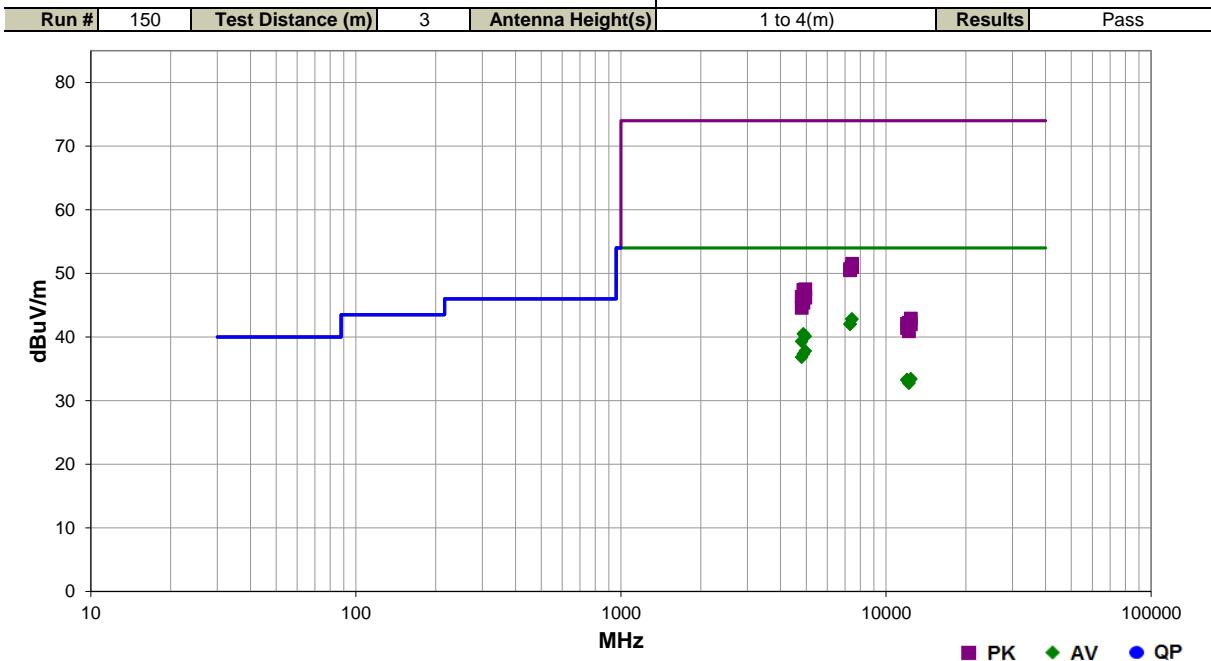
Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

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

# SPURIOUS RADIATED EMISSIONS



Work Order:	A-DE0149	Date:	2020-12-08		EmiR5 2020.06.24.4	PSA-ESCI 2020.06.24.2
Project:	None	Temperature:	22.8 °C			
Job Site:	EV01	Humidity:	33.8% RH			
Serial Number:	521O041985	Barometric Pres.:	1027 mbar		Tested by:	Jeff Alcock
EUT:	A-dec Gateway					
Configuration:	2					
Customer:	A-dec, Inc.					
Attendees:	Spencer Warneke					
EUT Power:	110VAC/60Hz					
Operating Mode:	Continuous Tx, Bluetooth LE 1M, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz					
Deviations:	None					
Comments:	The test mode operates at 62.2% duty cycle, an upward DCCF correction of $10^{\log(1/\text{Duty cycle})} = 10^{\log(1/0.622)} = 2.1$ dB was applied to the average measurements. See comments below for Channel and EUT orientation. Measurements performed using worst case orientations determined from previous testing.					
Test Specifications	FCC 15.247:2020		Test Method	ANSI C63.10:2013		



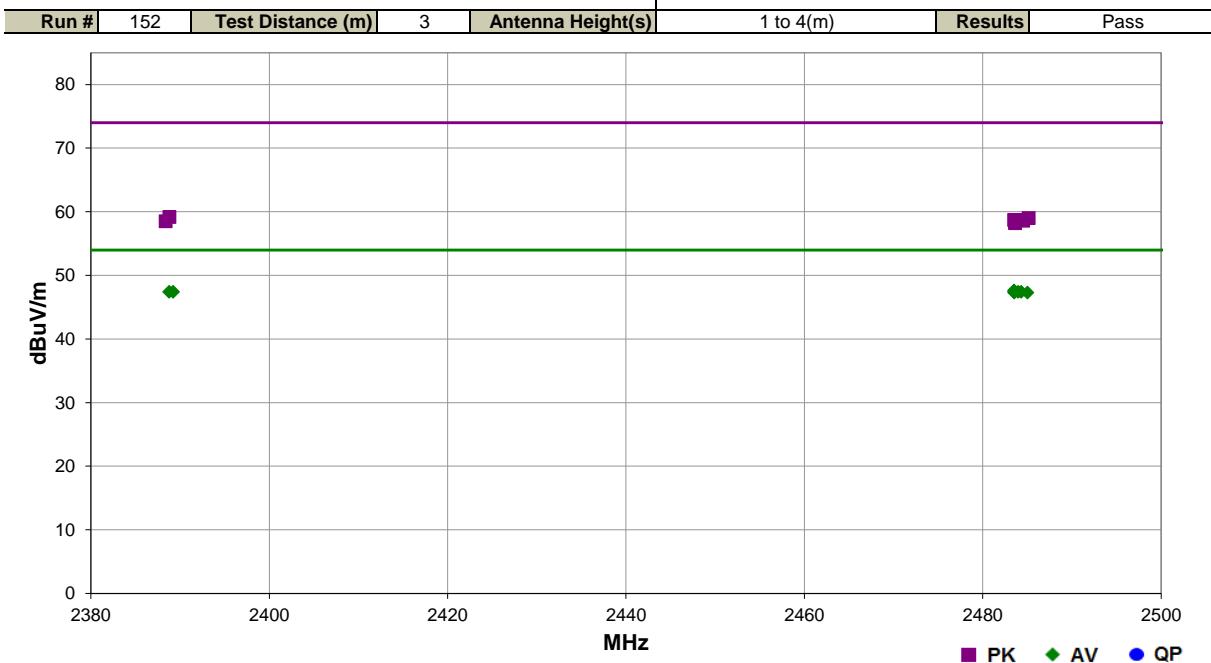
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.025	28.5	12.2	1.5	301.0	2.1	0.0	Vert	AV	0.0	42.8	54.0	-11.2	High Channel, EUT Horz
7439.950	28.5	12.2	1.5	170.0	2.1	0.0	Horz	AV	0.0	42.8	54.0	-11.2	High Channel, EUT on Side
7317.975	28.3	11.6	2.8	28.0	2.1	0.0	Vert	AV	0.0	42.0	54.0	-12.0	Mid Channel, EUT Horz
7321.883	28.2	11.7	1.5	93.0	2.1	0.0	Horz	AV	0.0	42.0	54.0	-12.0	Mid Channel, EUT on Side
4879.842	32.4	6.0	2.8	177.0	2.1	0.0	Vert	AV	0.0	40.5	54.0	-13.5	Mid Channel, EUT Horz
4959.917	32.1	5.9	1.5	201.0	2.1	0.0	Vert	AV	0.0	40.1	54.0	-13.9	High Channel, EUT Horz
4803.933	32.1	5.1	3.9	190.0	2.1	0.0	Vert	AV	0.0	39.3	54.0	-14.7	Low Channel, EUT Horz
4959.758	29.8	5.9	1.5	354.0	2.1	0.0	Horz	AV	0.0	37.8	54.0	-16.2	High Channel, EUT on Side
4879.967	29.2	6.0	1.5	354.0	2.1	0.0	Horz	AV	0.0	37.3	54.0	-16.7	Mid Channel, EUT on Side
4803.883	29.6	5.1	1.0	112.0	2.1	0.0	Horz	AV	0.0	36.8	54.0	-17.2	Low Channel, EUT on Side
12398.570	29.8	1.5	2.0	228.0	2.1	0.0	Horz	AV	0.0	33.4	54.0	-20.6	High Channel, EUT on Side
12397.550	29.8	1.5	1.5	23.0	2.1	0.0	Vert	AV	0.0	33.4	54.0	-20.6	High Channel, EUT Horz
12008.300	30.1	1.1	1.0	320.0	2.1	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Low Channel, EUT on Side
12009.010	30.0	1.1	1.0	32.0	2.1	0.0	Vert	AV	0.0	33.2	54.0	-20.8	Low Channel, EUT Horz
12200.480	29.9	0.9	1.5	28.0	2.1	0.0	Horz	AV	0.0	32.9	54.0	-21.1	Mid Channel, EUT on Side
12201.140	29.7	0.9	1.5	42.0	2.1	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Mid Channel, EUT Horz
7442.050	39.3	12.2	1.5	301.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	High Channel, EUT Horz
7442.350	38.8	12.2	1.5	170.0	0.0	0.0	Horz	PK	0.0	51.0	74.0	-23.0	High Channel, EUT on Side
7321.758	39.0	11.7	2.8	28.0	0.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	Mid Channel, EUT Horz
7319.717	38.8	11.7	1.5	93.0	0.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	Mid Channel, EUT on Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	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
4959.883	41.6	5.9	1.5	201.0	0.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	High Channel, EUT Horz
4880.367	41.4	6.0	2.8	177.0	0.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	Mid Channel, EUT Horz
4803.492	41.2	5.1	3.9	190.0	0.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	Low Channel, EUT Horz
4959.992	40.3	5.9	1.5	354.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	High Channel, EUT on Side
4879.350	39.4	6.0	1.5	354.0	0.0	0.0	Horz	PK	0.0	45.4	74.0	-28.6	Mid Channel, EUT on Side
4805.625	39.4	5.2	1.0	112.0	0.0	0.0	Horz	PK	0.0	44.6	74.0	-29.4	Low Channel, EUT on Side
12399.650	41.4	1.5	2.0	228.0	0.0	0.0	Horz	PK	0.0	42.9	74.0	-31.1	High Channel, EUT on Side
12199.010	41.3	0.9	1.5	28.0	0.0	0.0	Horz	PK	0.0	42.2	74.0	-31.8	Mid Channel, EUT on Side
12010.470	41.0	1.1	1.0	32.0	0.0	0.0	Vert	PK	0.0	42.1	74.0	-31.9	Low Channel, EUT Horz
12398.080	40.5	1.5	1.5	23.0	0.0	0.0	Vert	PK	0.0	42.0	74.0	-32.0	High Channel, EUT Horz
12011.430	40.3	1.1	1.0	320.0	0.0	0.0	Horz	PK	0.0	41.4	74.0	-32.6	Low Channel, EUT on Side
12198.650	40.0	0.9	1.5	42.0	0.0	0.0	Vert	PK	0.0	40.9	74.0	-33.1	Mid Channel, EUT Horz

# SPURIOUS RADIATED EMISSIONS



Work Order:	A-DE0149	Date:	2020-12-08		EmiR5 2020.06.24.4	PSA-ESCI 2020.06.24.2
Project:	None	Temperature:	22.8 °C			
Job Site:	EV01	Humidity:	33.8% RH			
Serial Number:	521O041985	Barometric Pres.:	1027 mbar		Tested by:	Jeff Alcock
EUT:	A-dec Gateway					
Configuration:	2					
Customer:	A-dec, Inc.					
Attendees:	Spencer Warneke					
EUT Power:	110VAC/60Hz					
Operating Mode:	Continuous Tx, Bluetooth LE 1M, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz					
Deviations:	None					
Comments:	All measurements are noisefloor, therefore no duty cycle correction factor was applied to the average measurements. See comments below for Channel and EUT orientation.					
Test Specifications		Test Method				
FCC 15.247:2020		ANSI C63.10:2013				



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	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
2483.517	31.2	-3.6	1.59	88.0	3.0	20.0	Horz	AV	0.0	47.6	54.0	-6.4	High Channel, EUT Horz
2483.983	31.0	-3.6	1.5	202.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High Channel, EUT Horz
2484.327	31.0	-3.6	1.5	47.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	High Channel, EUT on Side
2483.517	31.0	-3.6	1.5	320.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High Channel, EUT on Side
2388.783	30.9	-3.5	1.5	64.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	Low Channel, EUT Horz
2389.233	30.9	-3.5	1.5	0.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	Low Channel, EUT Horz
2483.527	30.9	-3.6	1.94	28.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High Channel, EUT Vert
2485.020	30.8	-3.5	2.22	97.0	3.0	20.0	Vert	AV	0.0	47.3	54.0	-6.7	High Channel, EUT Vert
2388.813	42.7	-3.5	1.5	0.0	3.0	20.0	Vert	PK	0.0	59.2	74.0	-14.8	Low Channel, EUT Horz
2485.133	42.5	-3.5	1.94	28.0	3.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	High Channel, EUT Vert
2484.380	42.3	-3.6	1.59	88.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High Channel, EUT Horz
2483.517	42.3	-3.6	1.5	202.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	High Channel, EUT Horz
2484.520	42.2	-3.6	2.22	97.0	3.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	High Channel, EUT Vert
2388.390	42.0	-3.5	1.5	64.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	Low Channel, EUT Horz
2483.620	42.0	-3.6	1.5	47.0	3.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	High Channel, EUT on Side
2483.623	41.8	-3.6	1.5	320.0	3.0	20.0	Vert	PK	0.0	58.2	74.0	-15.8	High Channel, EUT on Side