



element

Apptricity

Ultra Long-Range Bluetooth Tag with GPS

FCC 15.247:2021
Bluetooth Low Energy

Report: APTY0011.1, Issue Date: August 25, 2021



NVLAP LAB CODE: 200881-0



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CERTIFICATE OF TEST

Last Date of Test: June 16, 2021
Apptricity
EUT: Ultra Long Range Bluetooth Tag with GPS

Radio Equipment Testing

Standards

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

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
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:



Adam Bruno, 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 – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

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

FACILITIES



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



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

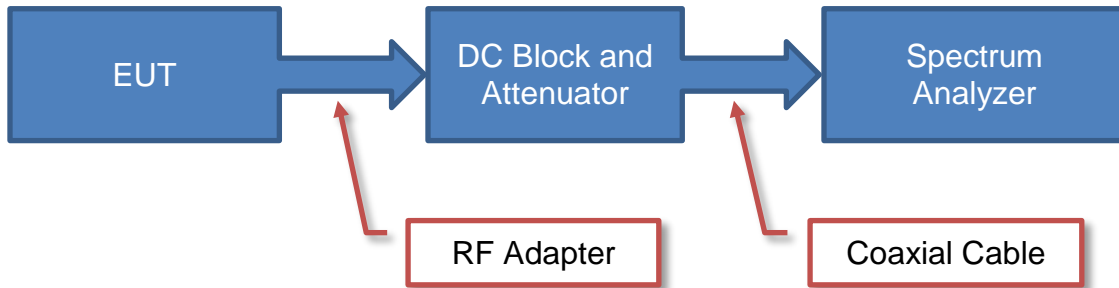
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific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

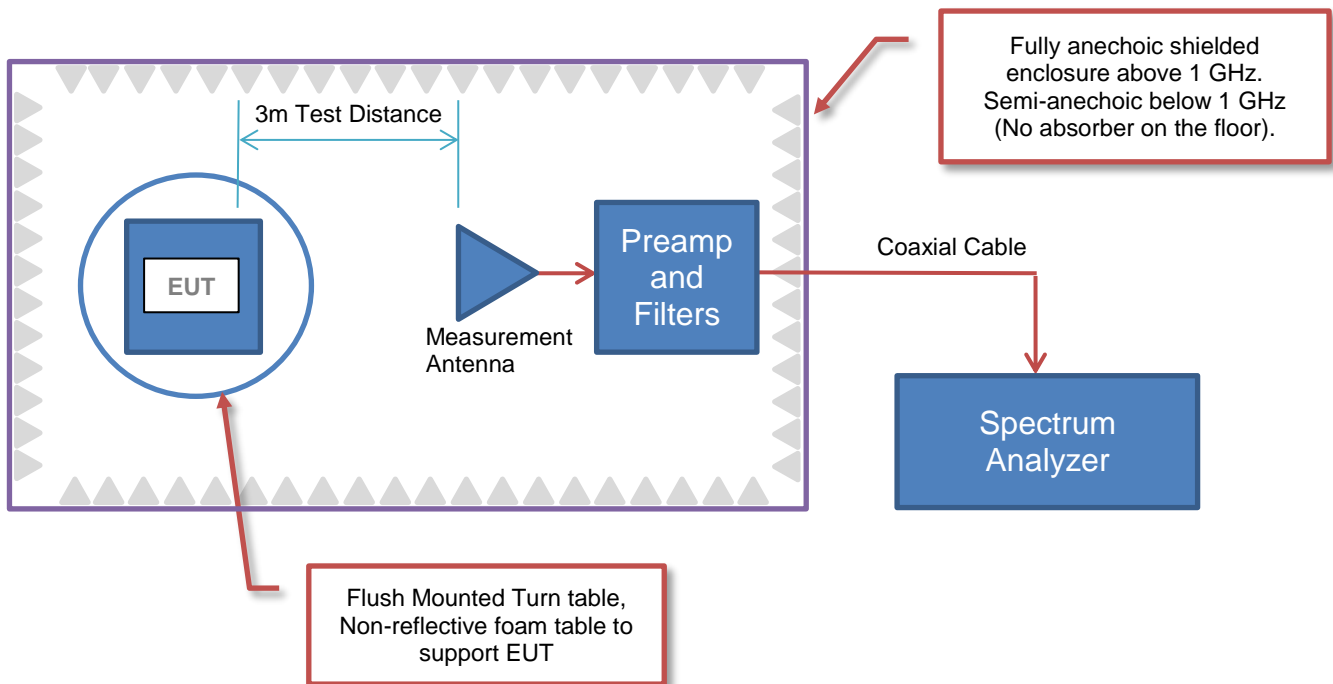
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



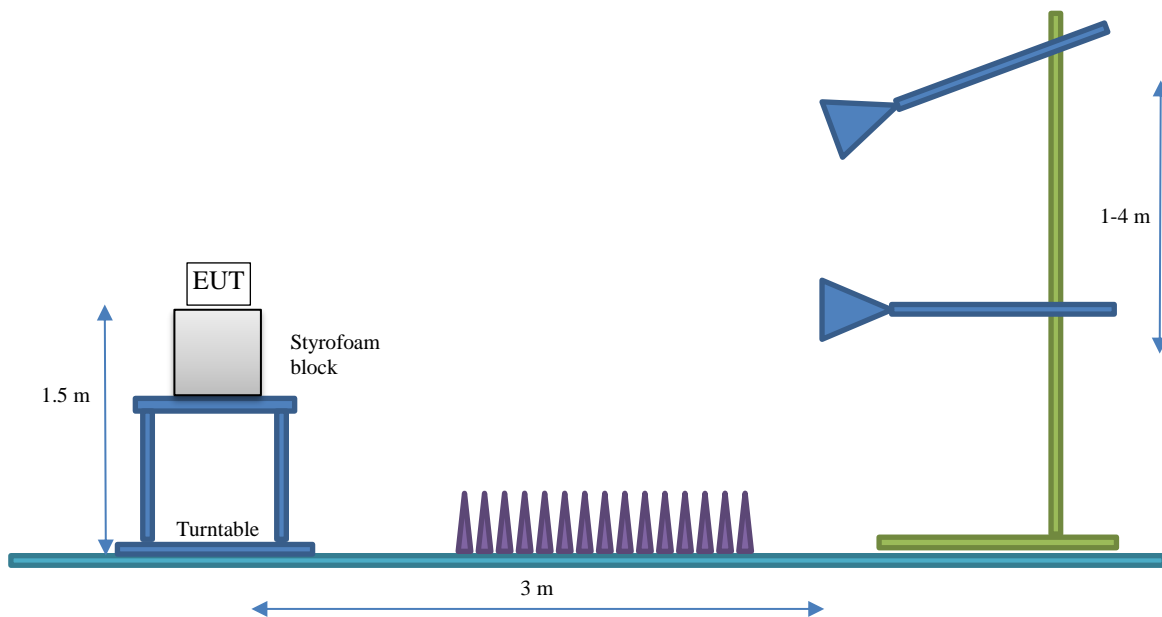
Spurious Radiated Emissions



Test Setup Block Diagrams

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:	Apptricity
Address:	220 E Las Colinas Blvd Suite 400
City, State, Zip:	Irving, TX 75039
Test Requested By:	Marci Haslam
EUT:	Ultra Long Range Bluetooth Tag with GPS
First Date of Test:	May 19, 2021
Last Date of Test:	June 16, 2021
Receipt Date of Samples:	May 18, 2021
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Ultra long range bluetooth low energy tag with GPS.
Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS



Configuration APTY0011- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Tag	Appticity Corporation	550-145-100	DC:7F:9D:19:7C:60

Configuration APTY0011- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Tag	Appticity Corporation	550-145-100	F4:45:E4:3A:D8:AC

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-06-16	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2021-06-16	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2021-06-16	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-06-16	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-06-16	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2021-06-16	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2021-06-16	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2021-05-19	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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)
PCB	Appticity	2400-2483.5	3.5

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



XMI 2020.12.30.0

DUTY CYCLE

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-506	TEV	2021-04-27	2024-04-27
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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



TelTx 2021.03.19.1 XMI 2020.12.30.0

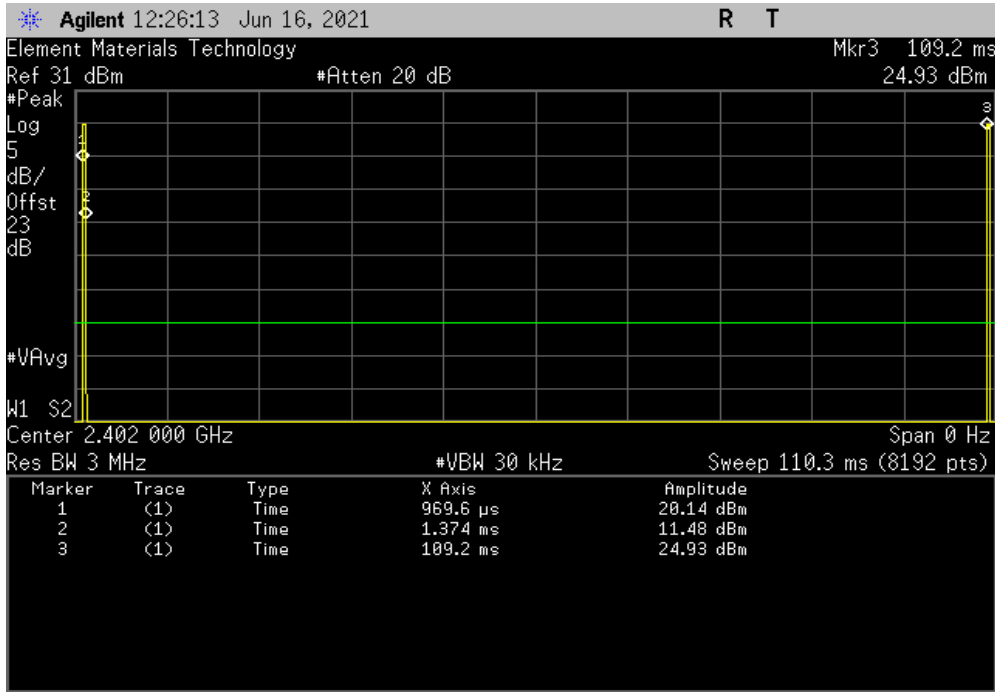
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011					
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21					
Customer: Appticity		Temperature: 21.7 °C					
Attendees: Welmin Peng		Humidity: 50.9% RH					
Project: None		Barometric Pres.: 1019 mbar					
Tested by: Mark Baytan	Power: Battery	Job Site: TX03					
TEST SPECIFICATIONS							
FCC 15.247:2021		Test Method					
		ANSI C63.10:2013					
COMMENTS							
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	1	<i>Signature</i>					
		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		404.146 us	108.205 ms	1	0.4	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, 2426 MHz		390.68 us	108.474 ms	1	0.4	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz		404 us	107.652 ms	1	0.4	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

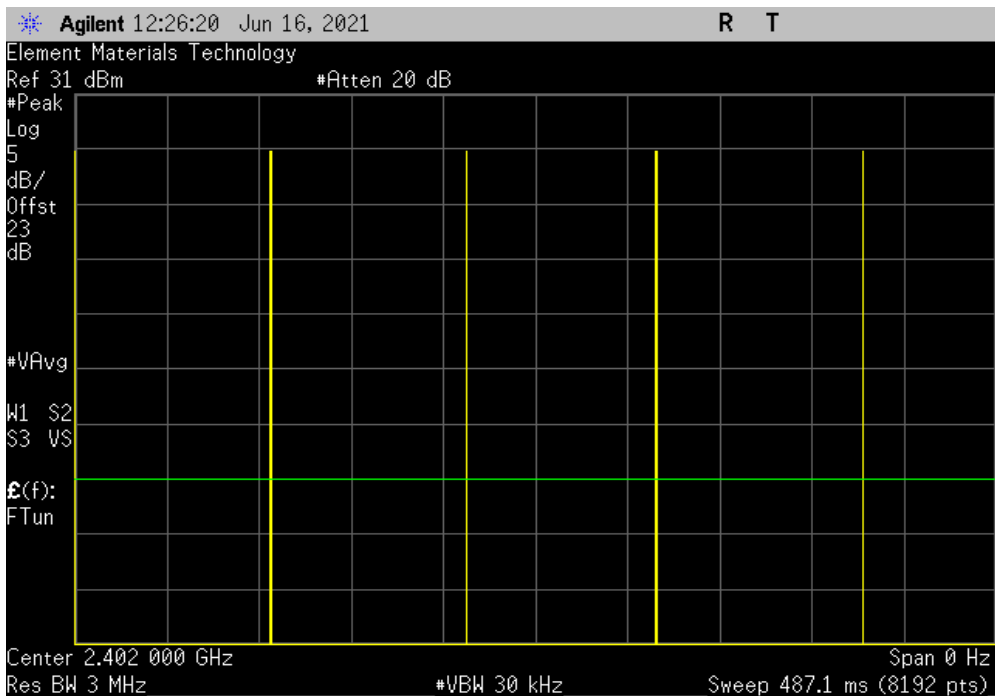


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
404.146 us	108.205 ms	1	0.4	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	

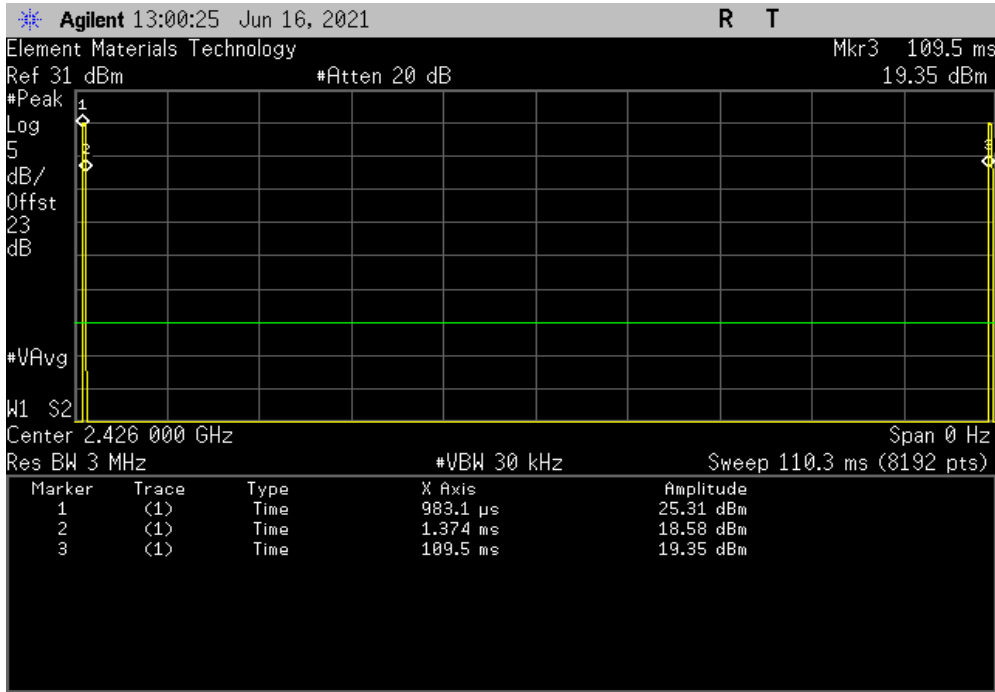


DUTY CYCLE

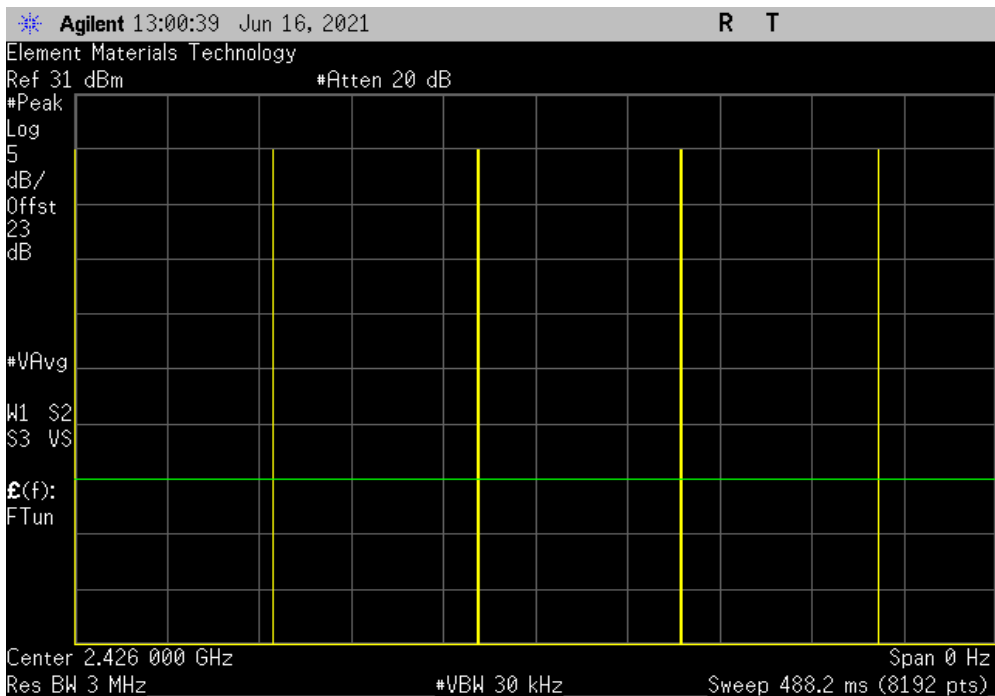


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Mid Channel, 2426 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
390.68 us	108.474 ms	1	0.4	N/A	N/A	



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

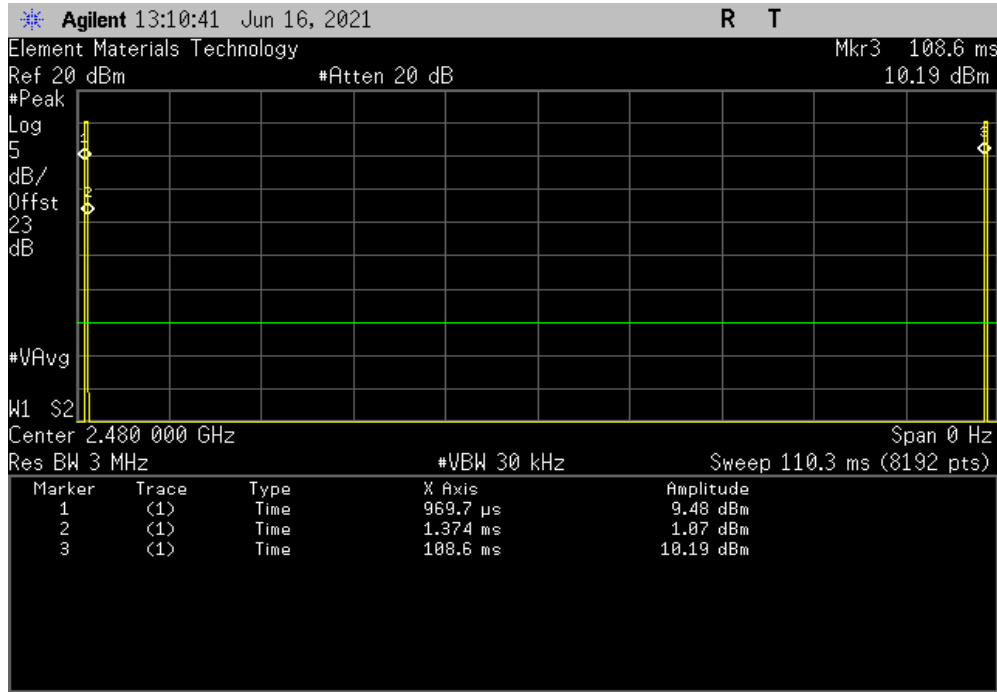


DUTY CYCLE

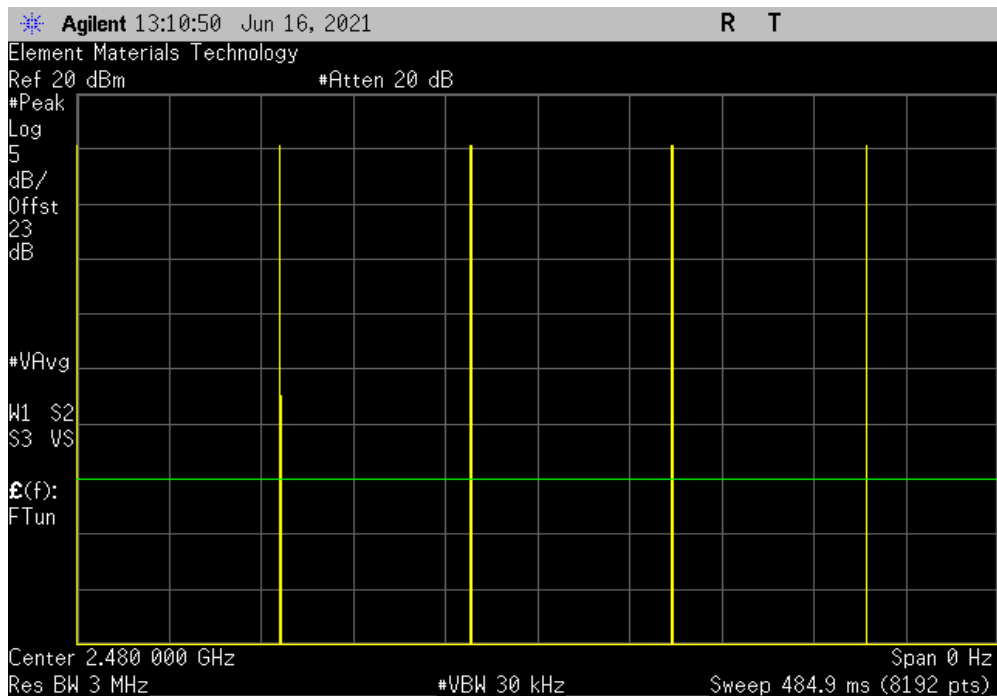


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	404 us	107.652 ms	1	0.4	N/A	N/A



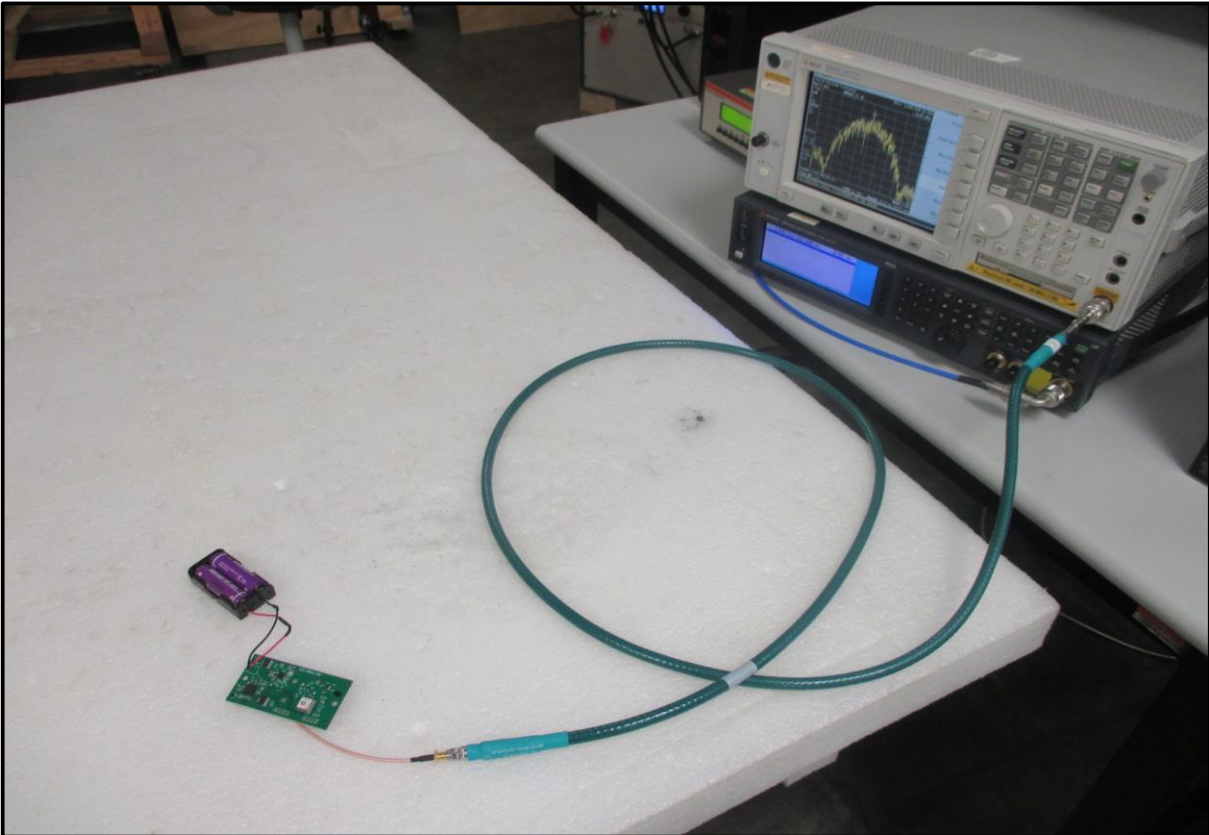
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



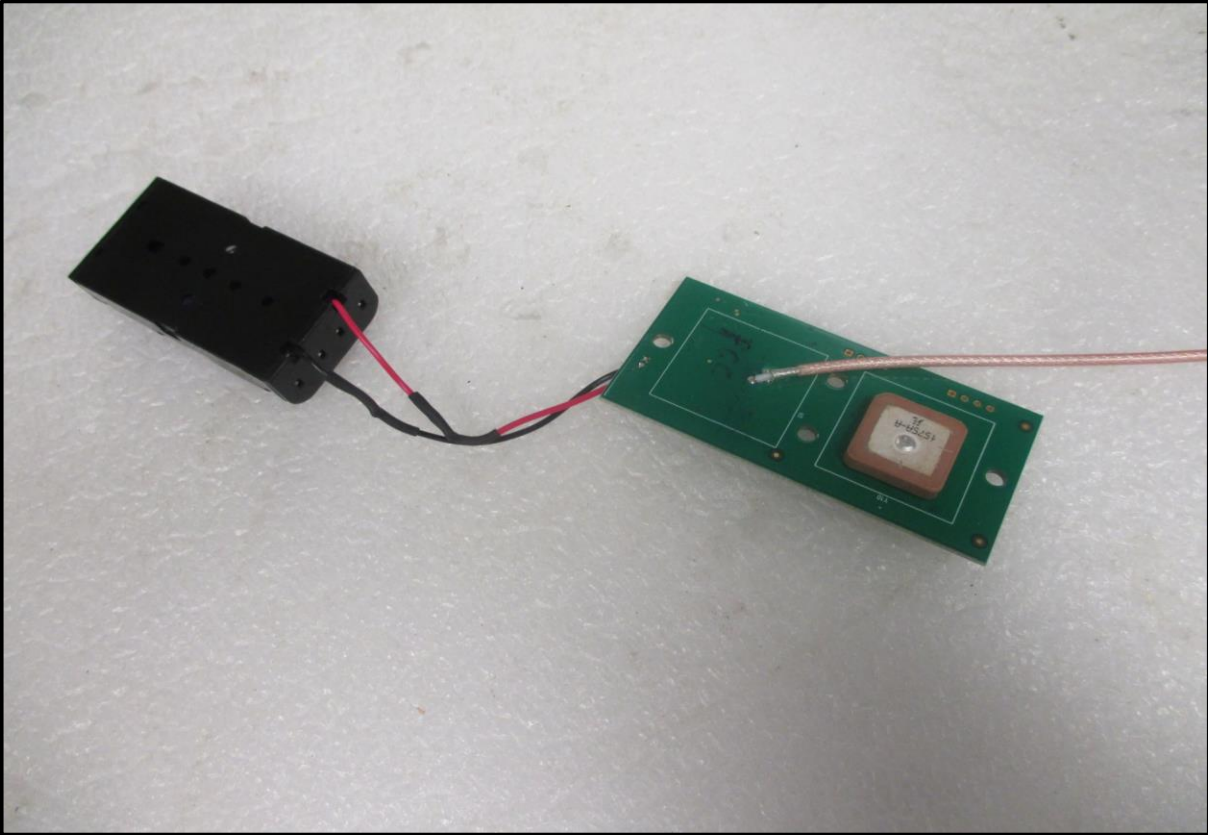
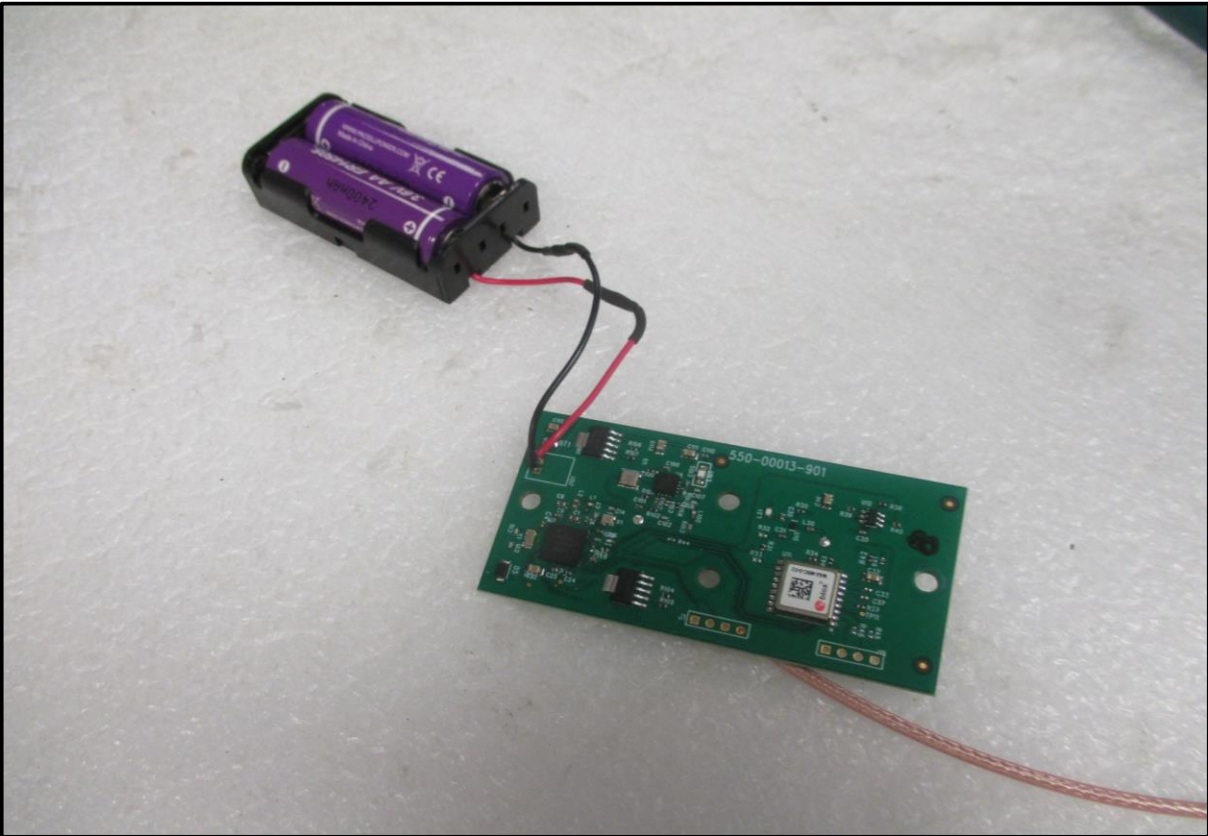
DUTY CYCLE



XMit 2020.12.30.0



DUTY CYCLE





XMH 2020.12.30.0

OCCUPIED BANDWIDTH

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B-506	TEV	2021-04-27	2024-04-27
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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



TelTx 2021.03.19.1 XMI 2020.12.30.0

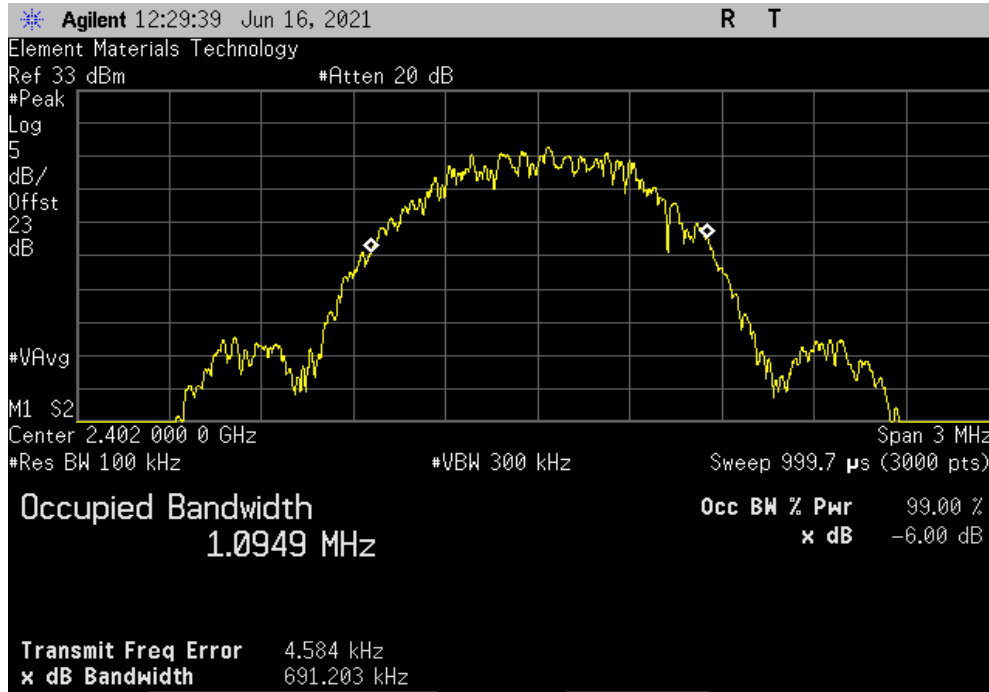
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21
Customer: Appticity		Temperature: 21.7 °C
Attendees: Welmin Peng		Humidity: 50.9% RH
Project: None		Barometric Pres.: 1019 mbar
Tested by: Mark Baytan	Power: Battery	Job Site: TX03
TEST SPECIFICATIONS		
FCC 15.247:2021		Test Method: ANSI C63.10:2013
COMMENTS		
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	1	Signature 
		Value Limit (±) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		691.203 kHz 500 kHz Pass
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		719.622 kHz 500 kHz Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		616.622 kHz 500 kHz Pass

OCCUPIED BANDWIDTH

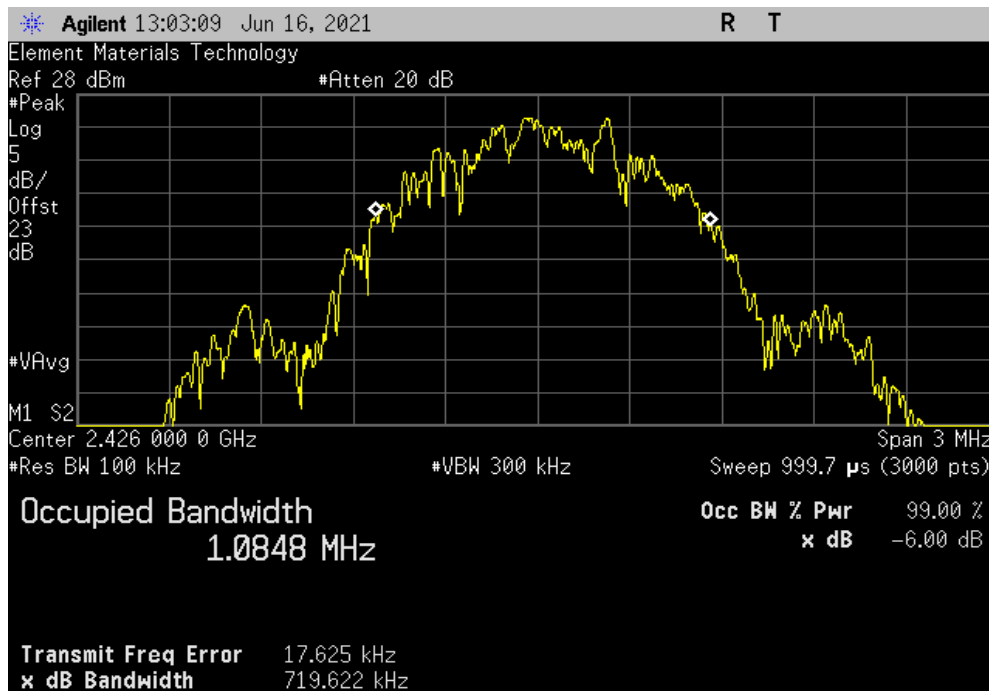


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz			
	Value	Limit (≥)	Result
	691.203 kHz	500 kHz	Pass



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz			
	Value	Limit (≥)	Result
	719.622 kHz	500 kHz	Pass

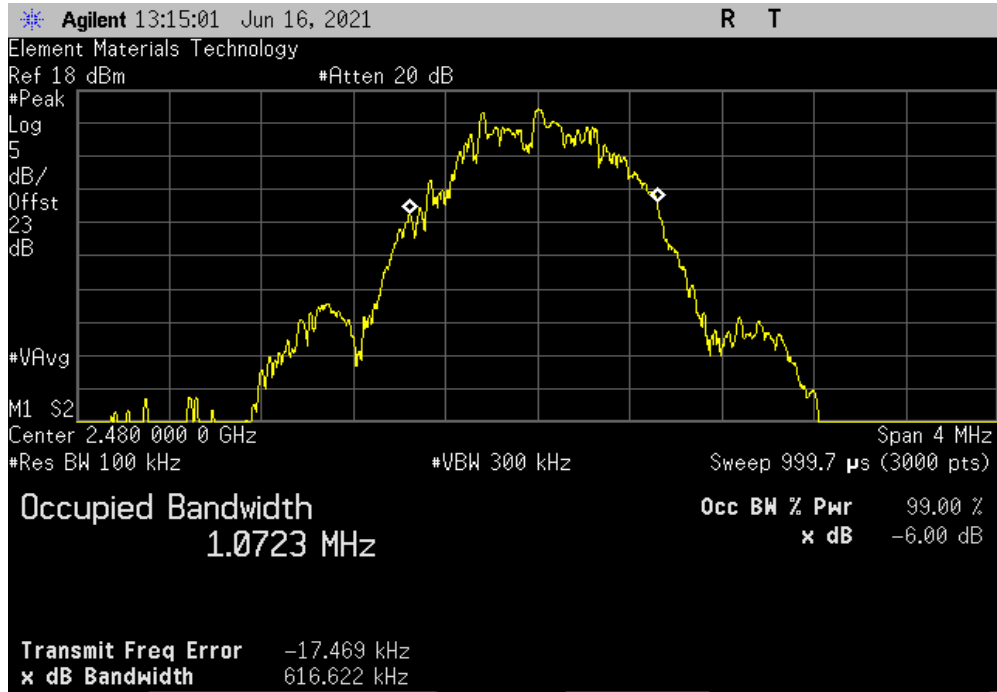


OCCUPIED BANDWIDTH

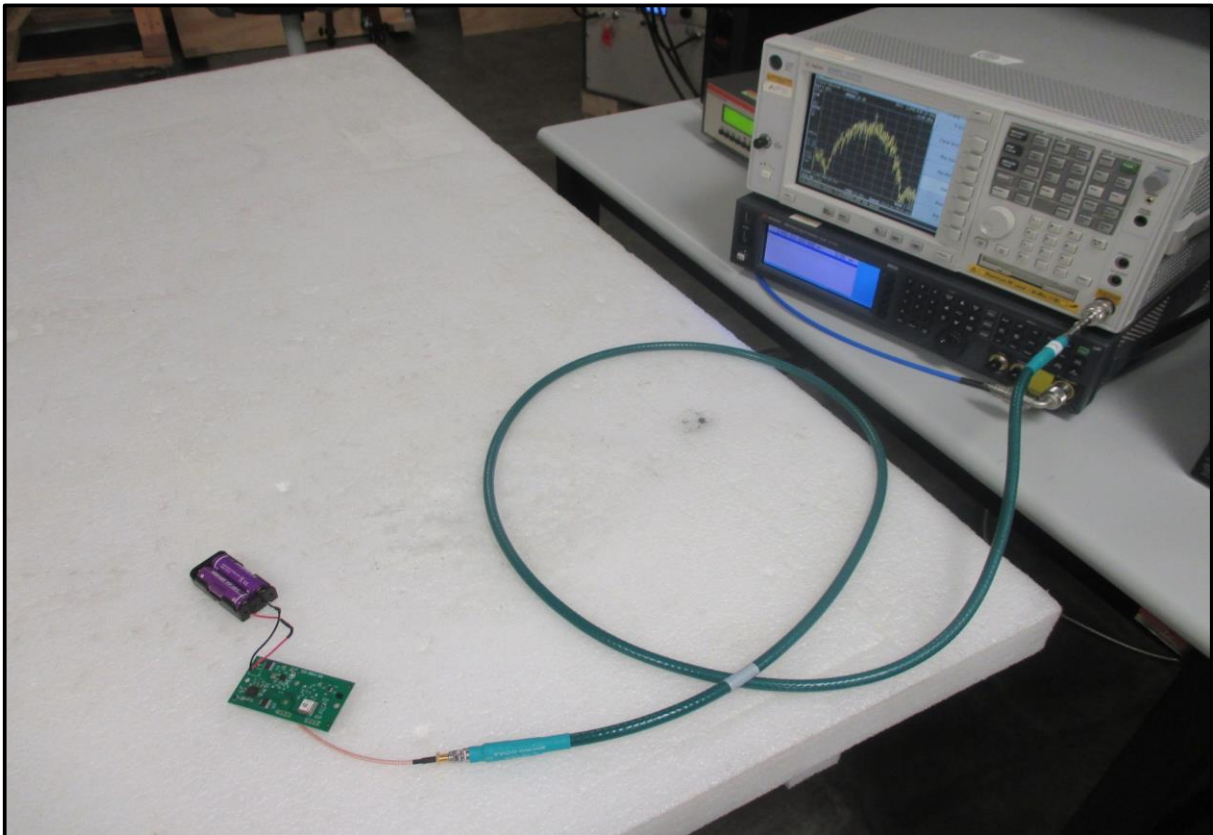


TbTx 2021.03.19.1 XMI 2020.12.30.0

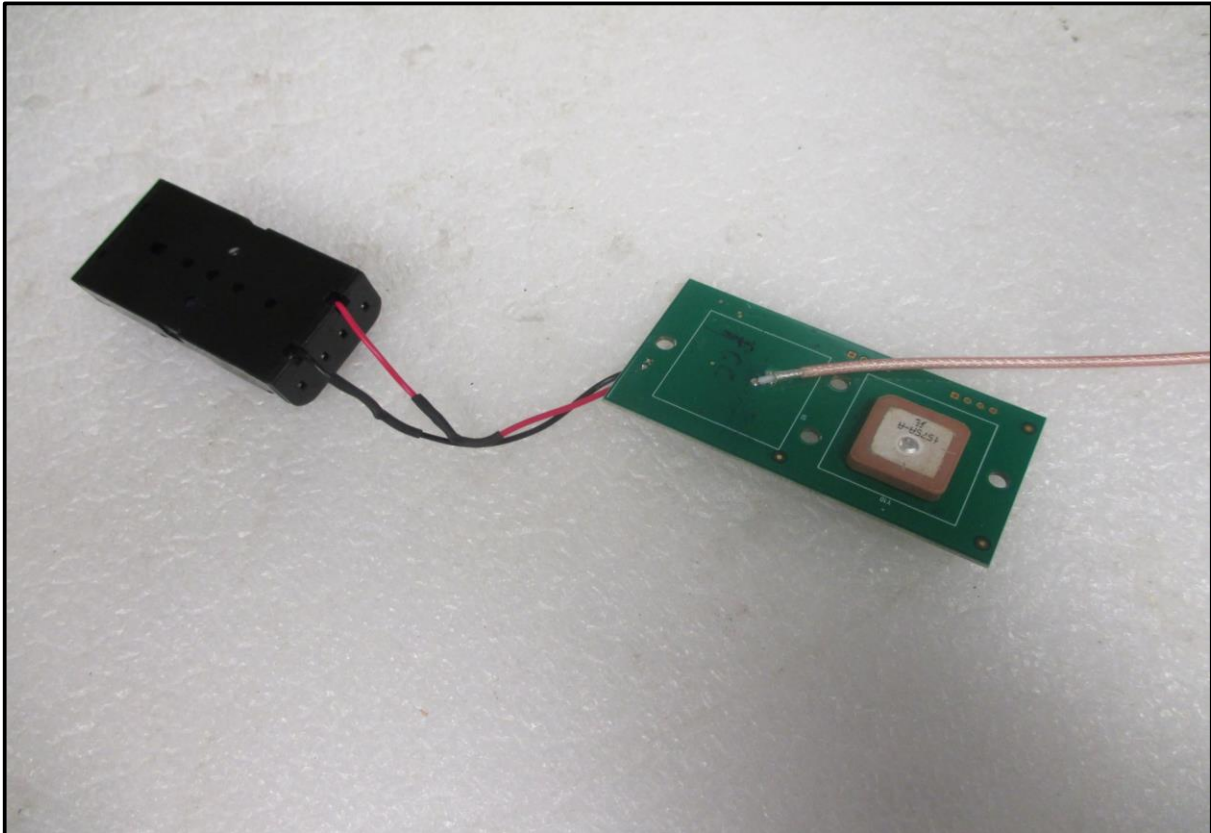
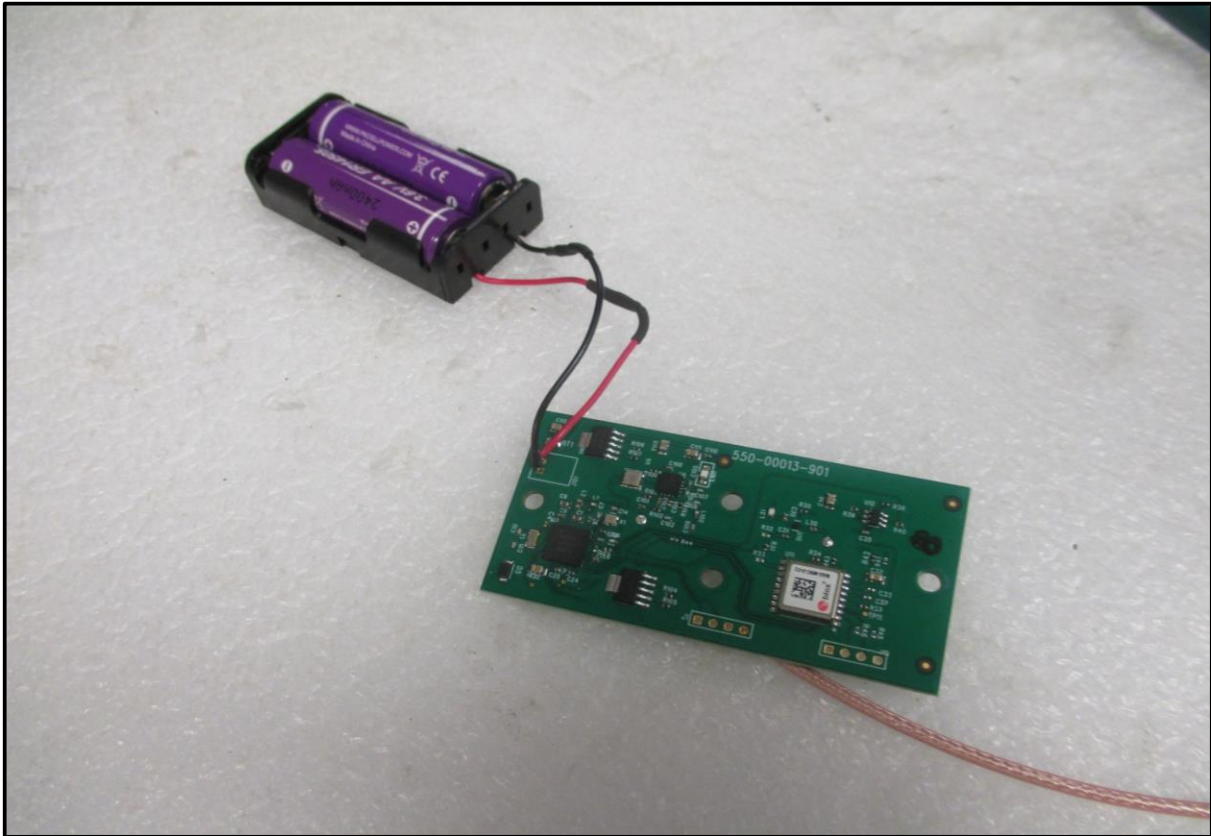
BLE/GFSK 1 Mbps High Channel, 2480 MHz		
Value	Limit	Result
616.622 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH



OCCUPIED BANDWIDTH



OUTPUT POWER



XMH 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

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Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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



TelTx 2021.03.19.1 XMI 2020.12.30.0

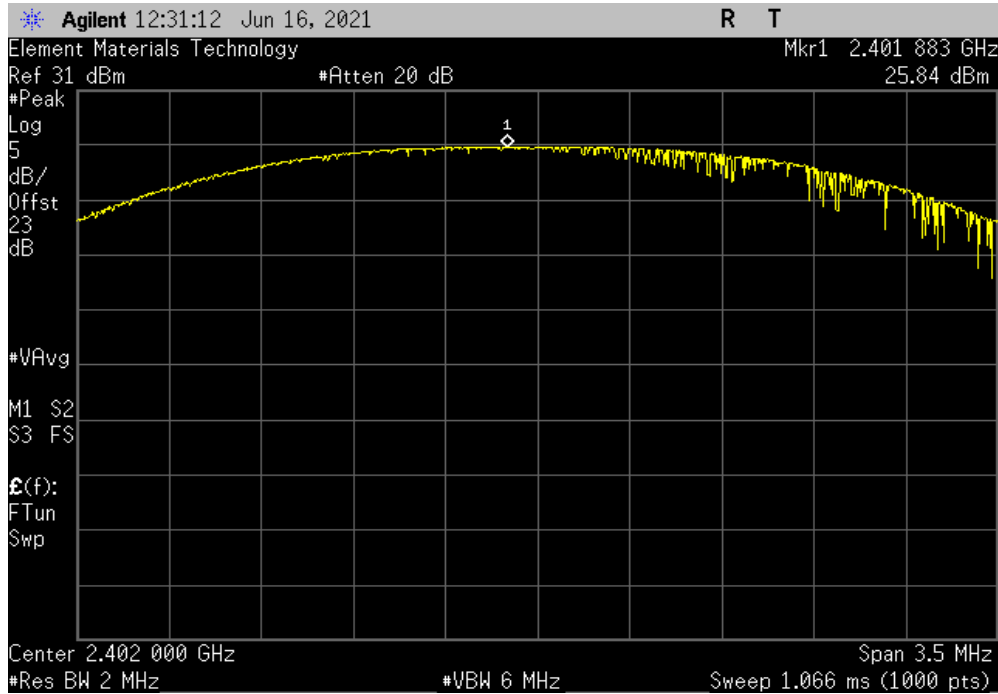
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21
Customer: Appticity		Temperature: 21.7 °C
Attendees: Welmin Peng		Humidity: 50.9% RH
Project: None		Barometric Pres.: 1019 mbar
Tested by: Mark Baytan	Power: Battery	Job Site: TX03
TEST SPECIFICATIONS		
FCC 15.247:2021		Test Method: ANSI C63.10:2013
COMMENTS		
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	1	Signature 
		Out Pwr (dBm) Limit (dBm) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		25.839 30 Pass
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		26.047 30 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		15.564 30 Pass

OUTPUT POWER

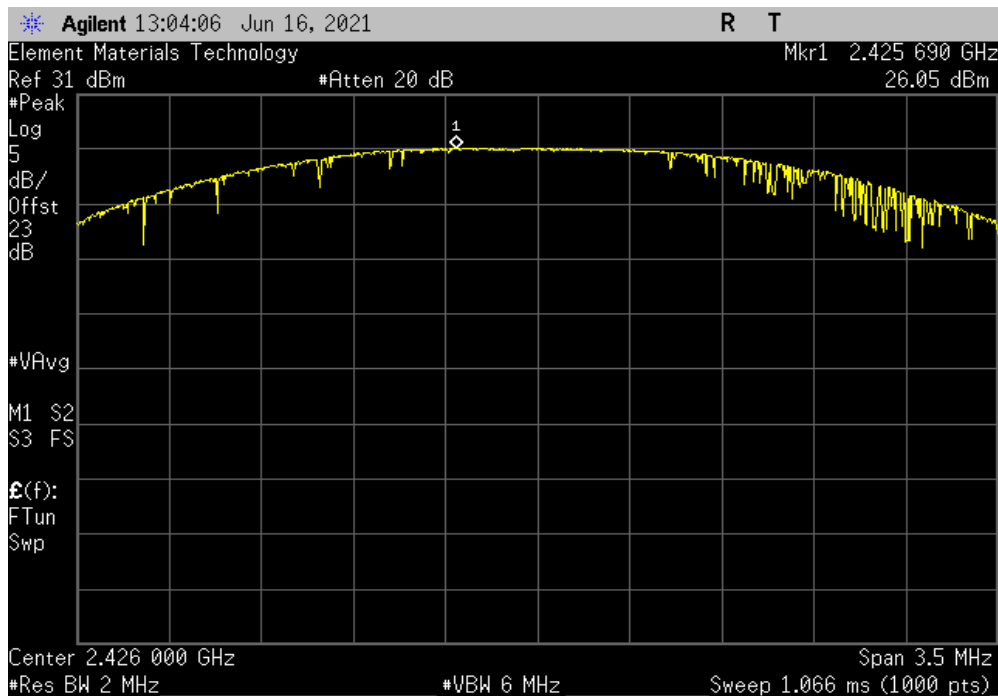


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				25.839	30	Pass



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				26.047	30	Pass

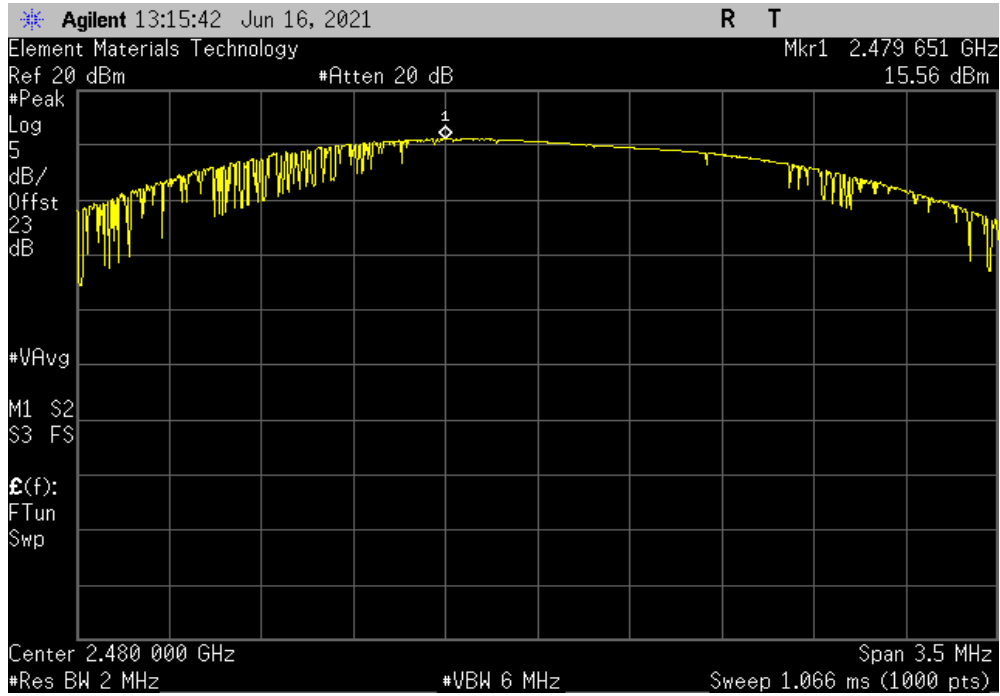


OUTPUT POWER

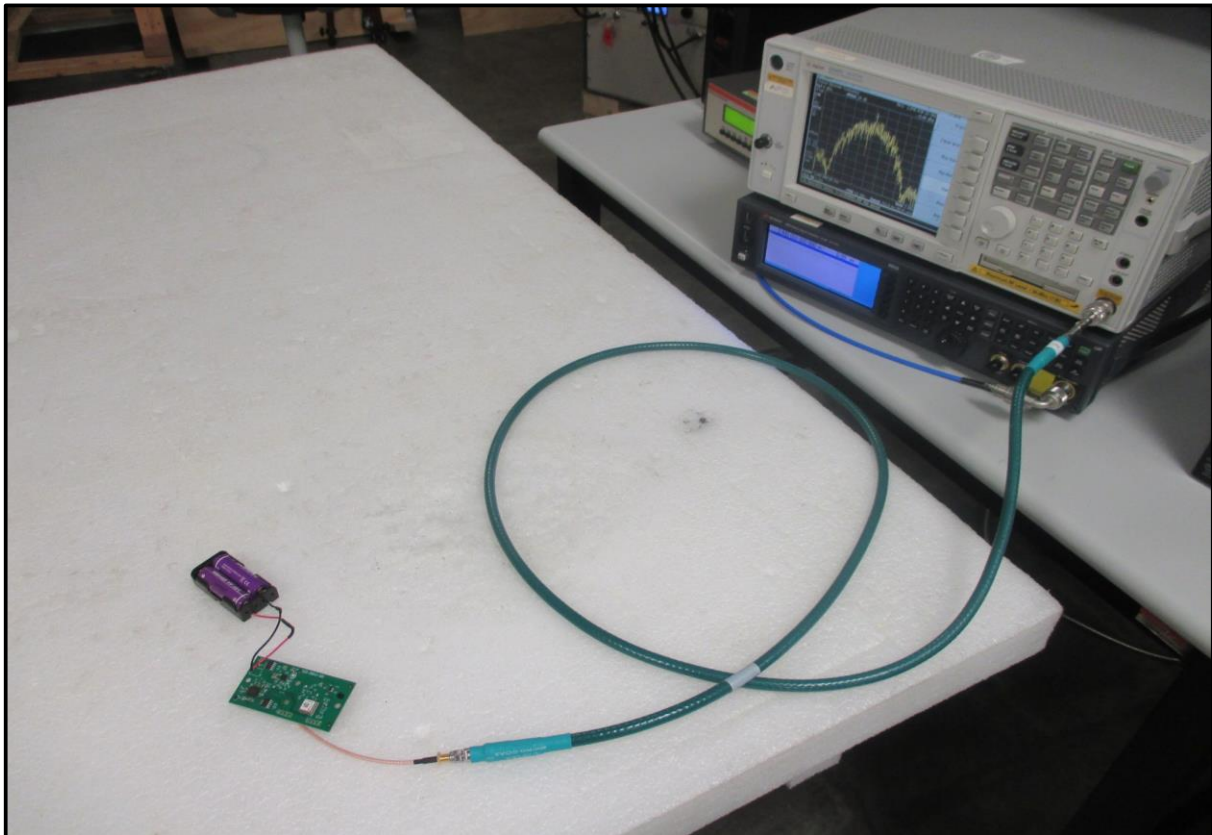


TuTx 2021.03.19.1 XMt 2020.12.30.0

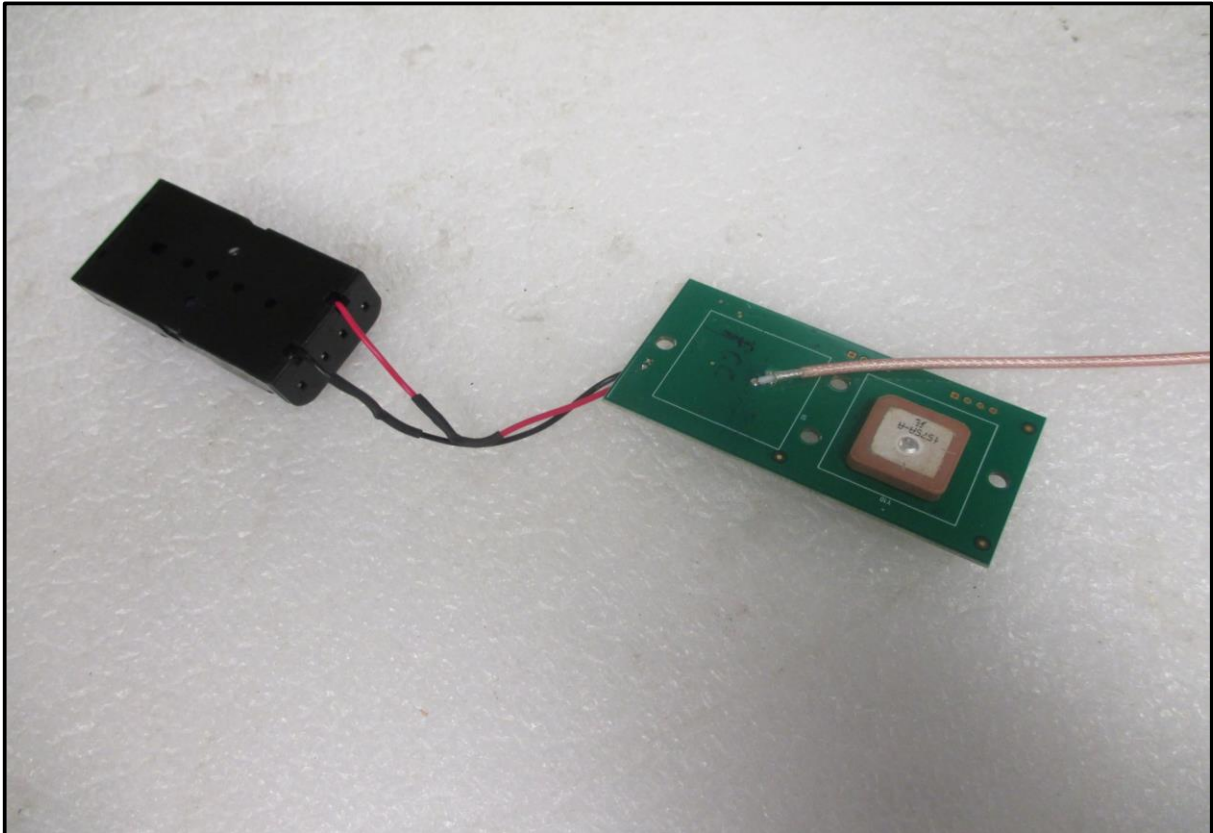
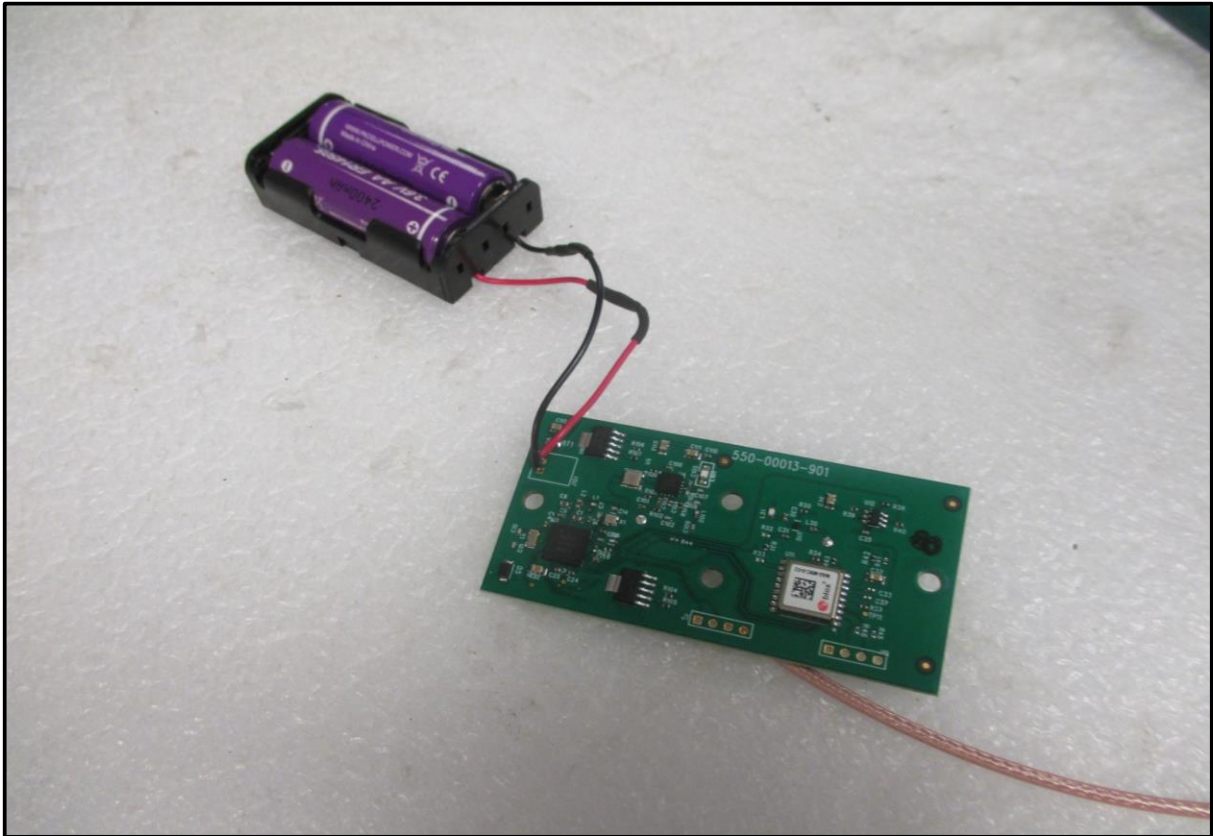
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				15.564	30	Pass



OUTPUT POWER



OUTPUT POWER



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMH 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-506	TEV	2021-04-27	2024-04-27
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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)



TelTx 2021.03.19.1 XMI 2020.12.30.0

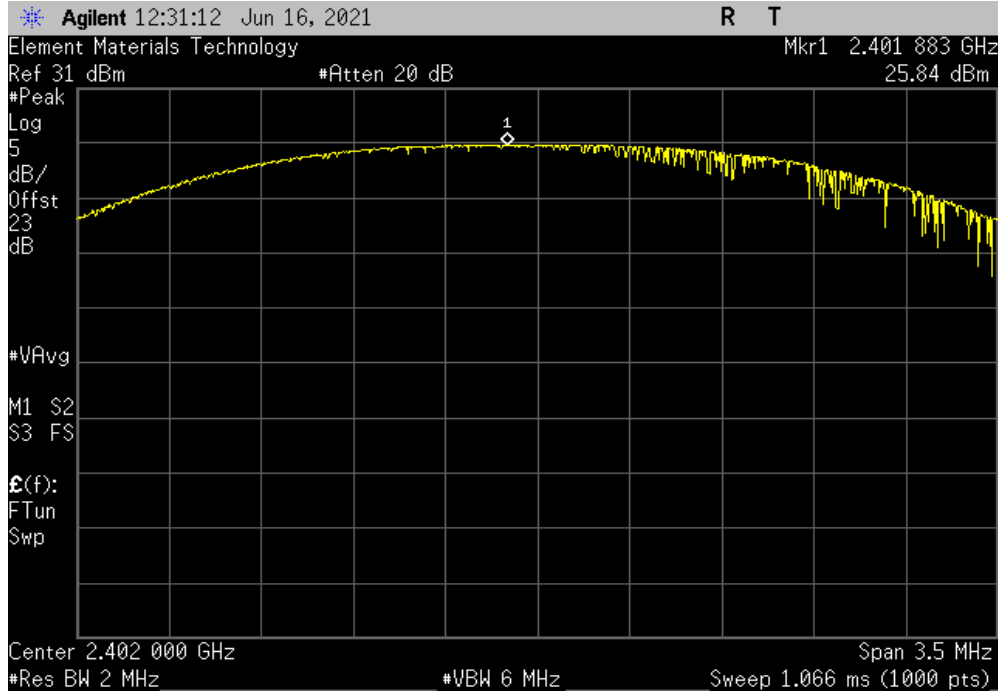
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011				
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21				
Customer: Appticity		Temperature: 21.7 °C				
Attendees: Welmin Peng		Humidity: 50.9% RH				
Project: None		Barometric Pres.: 1019 mbar				
Tested by: Mark Baytan	Power: Battery	Job Site: TX03				
TEST SPECIFICATIONS						
FCC 15.247:2021		Test Method: ANSI C63.10:2013				
COMMENTS						
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature 				
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		25.839	3.5	29.339	36	Pass
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		26.047	3.5	29.547	36	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		15.564	3.5	19.064	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

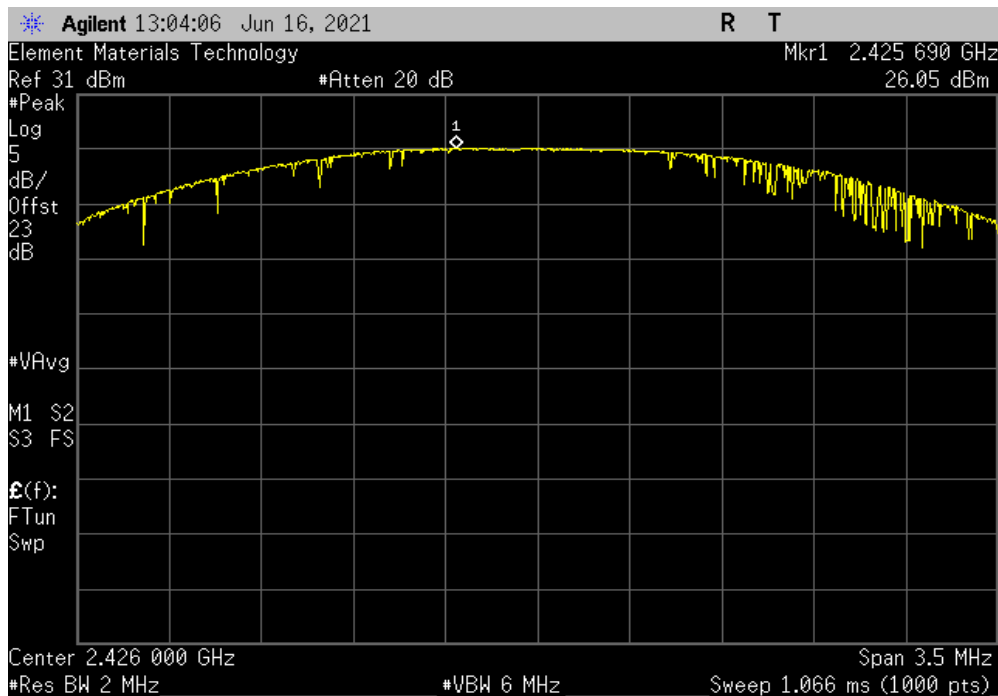


TuTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	25.839	3.5	29.339	36	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	26.047	3.5	29.547	36	Pass	

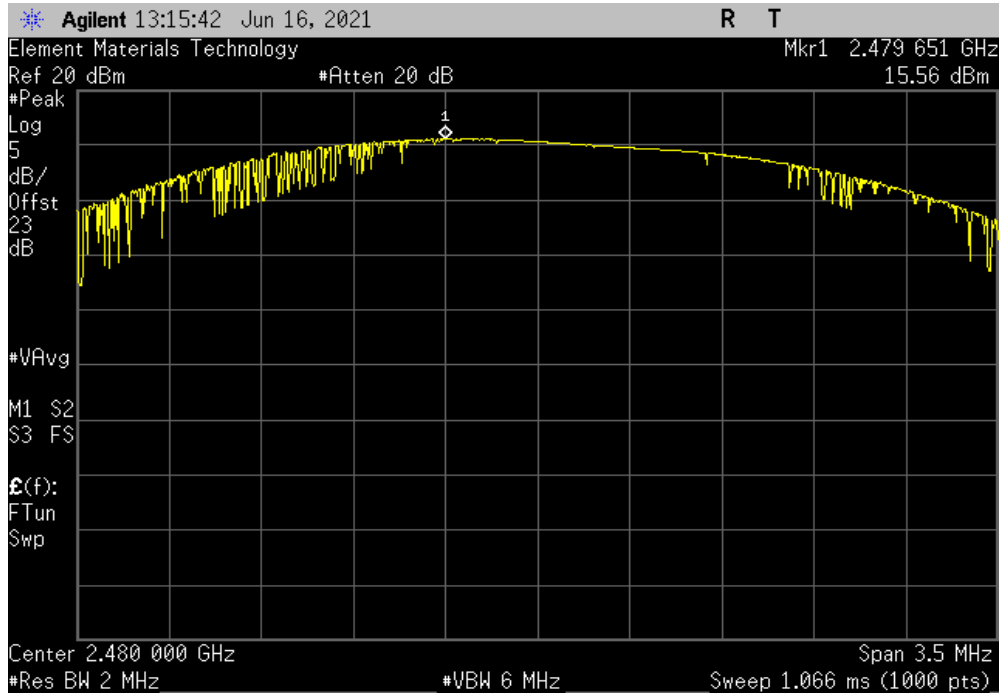


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TuTx 2021.03.19.1 XMt 2020.12.30.0

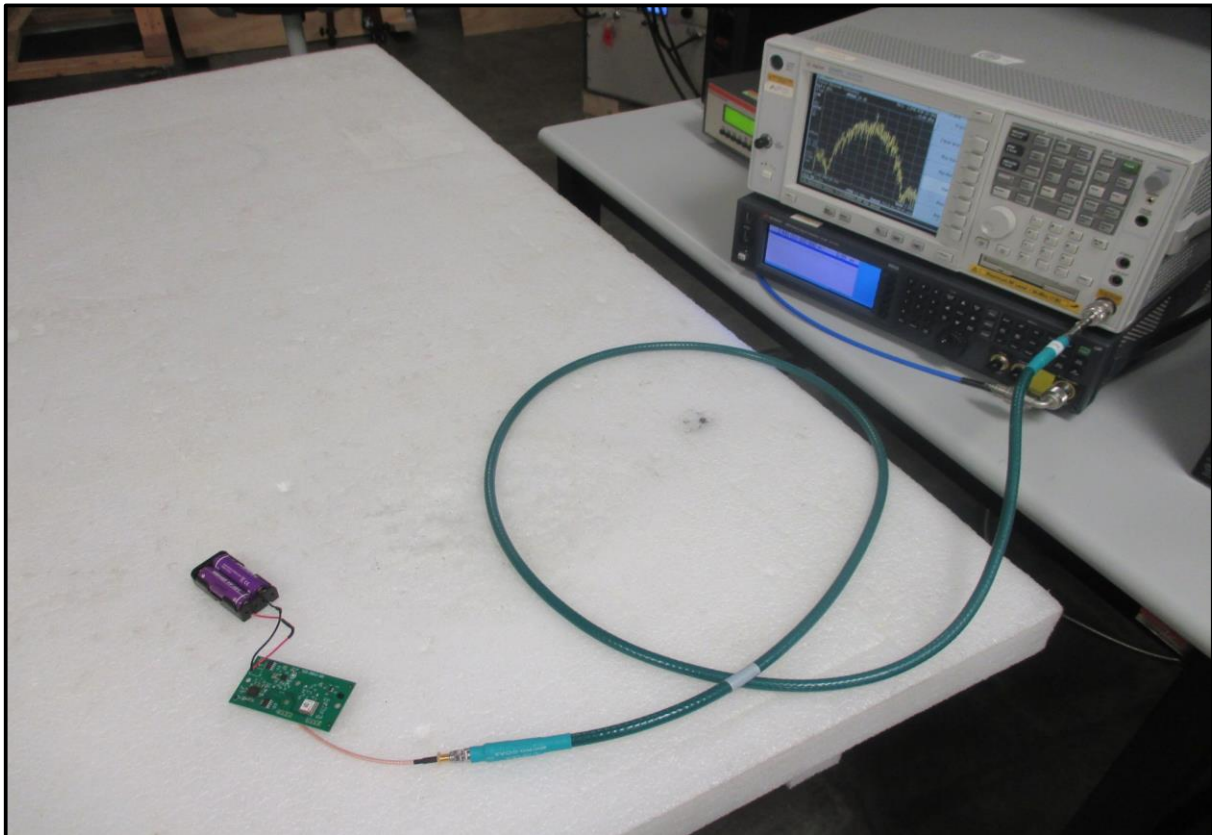
BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
15.564	3.5	19.064	36	Pass	



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



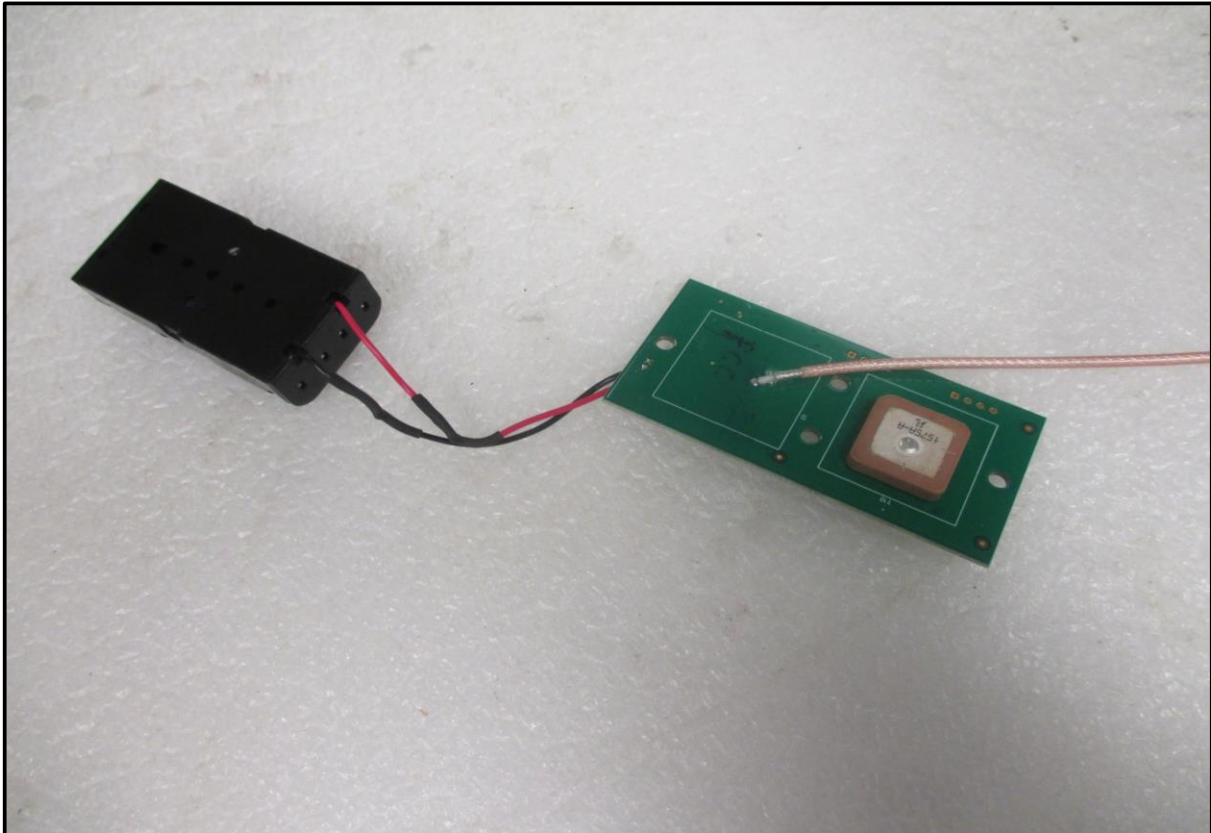
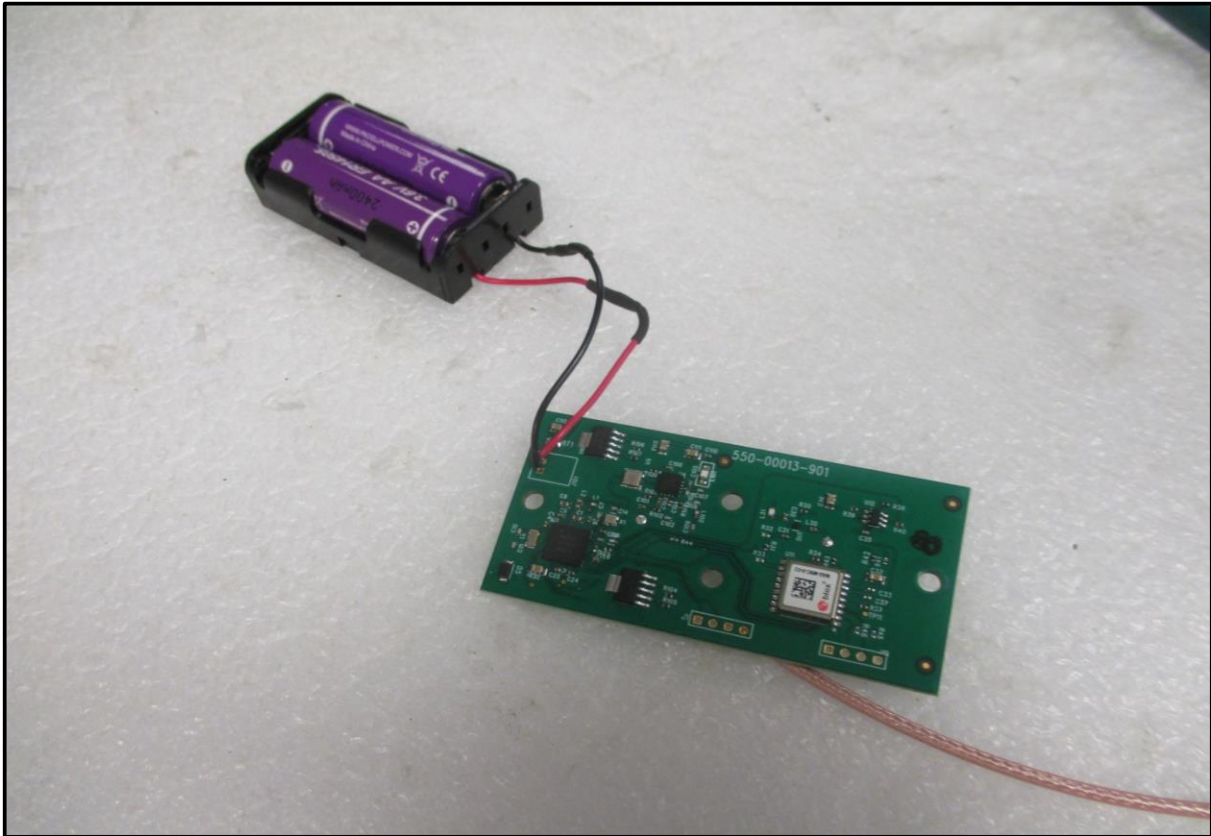
XMit 2020.12.30.0



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMit 2020.12.30.0





XMI 2020.12.30.0

POWER SPECTRAL DENSITY

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-506	TEV	2021-04-27	2024-04-27
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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



Tel: 2021.03.19.1 XMI: 2020.12.30.0

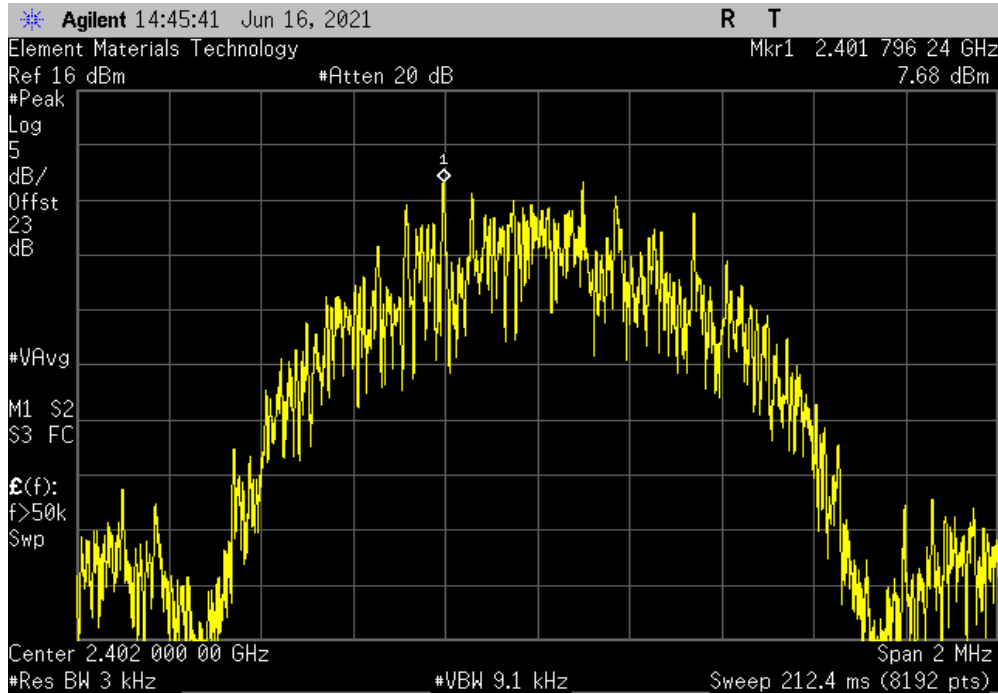
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011	
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21	
Customer: Aptricity		Temperature: 21.7 °C	
Attendees: Welmin Peng		Humidity: 50.9% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Mark Baytan	Power: Battery	Job Site: TX03	
TEST SPECIFICATIONS			
FCC 15.247:2021		Test Method: ANSI C63.10:2013	
COMMENTS			
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		7.684	8
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		7.929	8
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-0.395	8
			Results
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

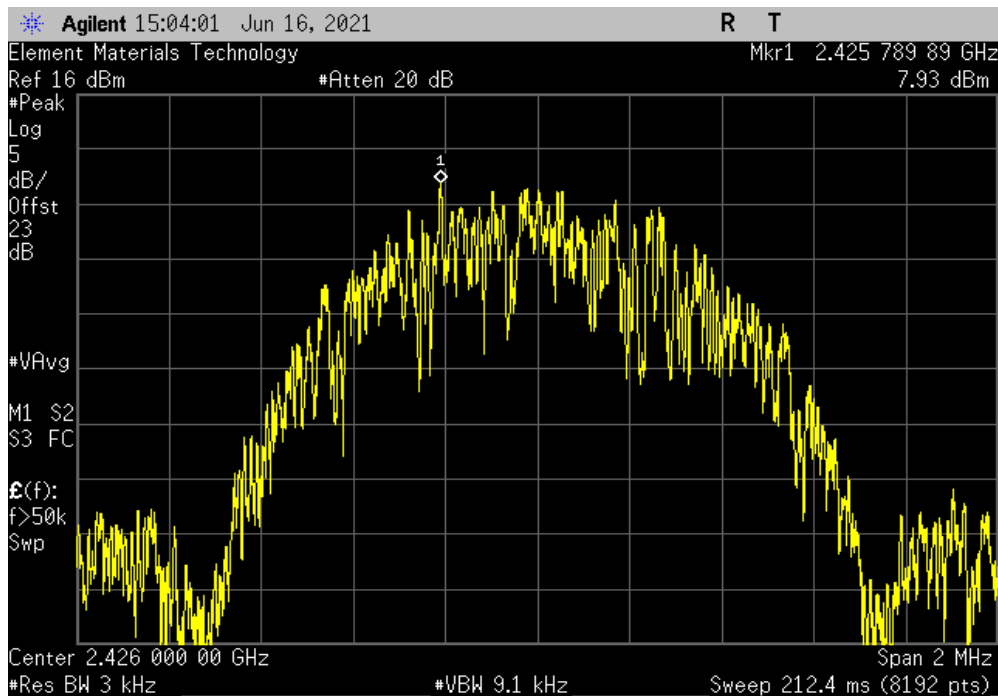


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	7.684	8	Pass



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	7.929	8	Pass

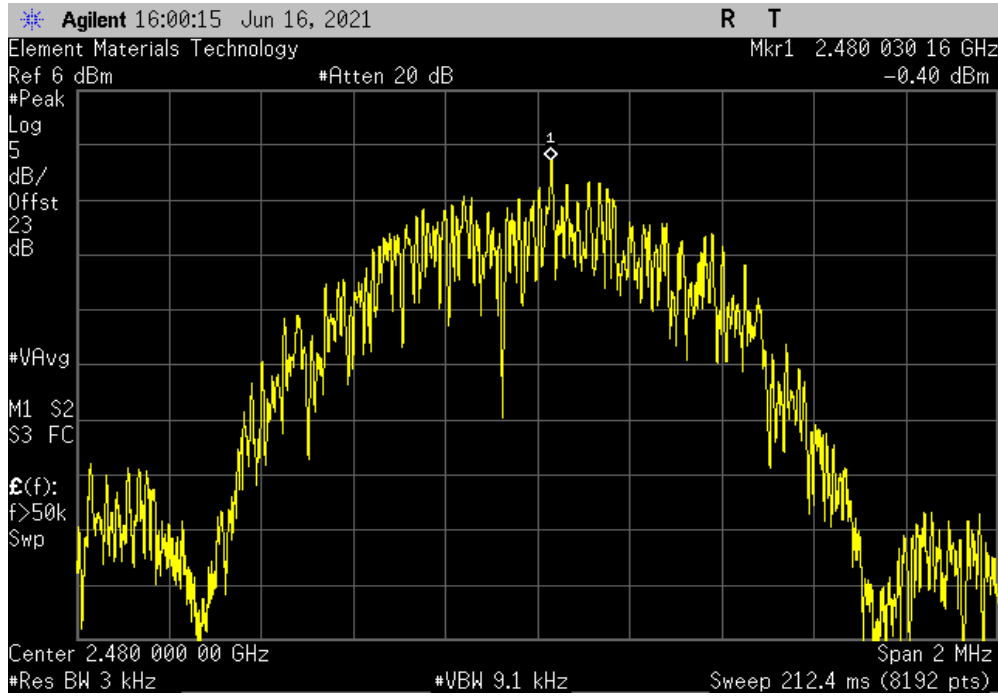


POWER SPECTRAL DENSITY



TuTx 2021.03.19.1 XMt 2020.12.30.0

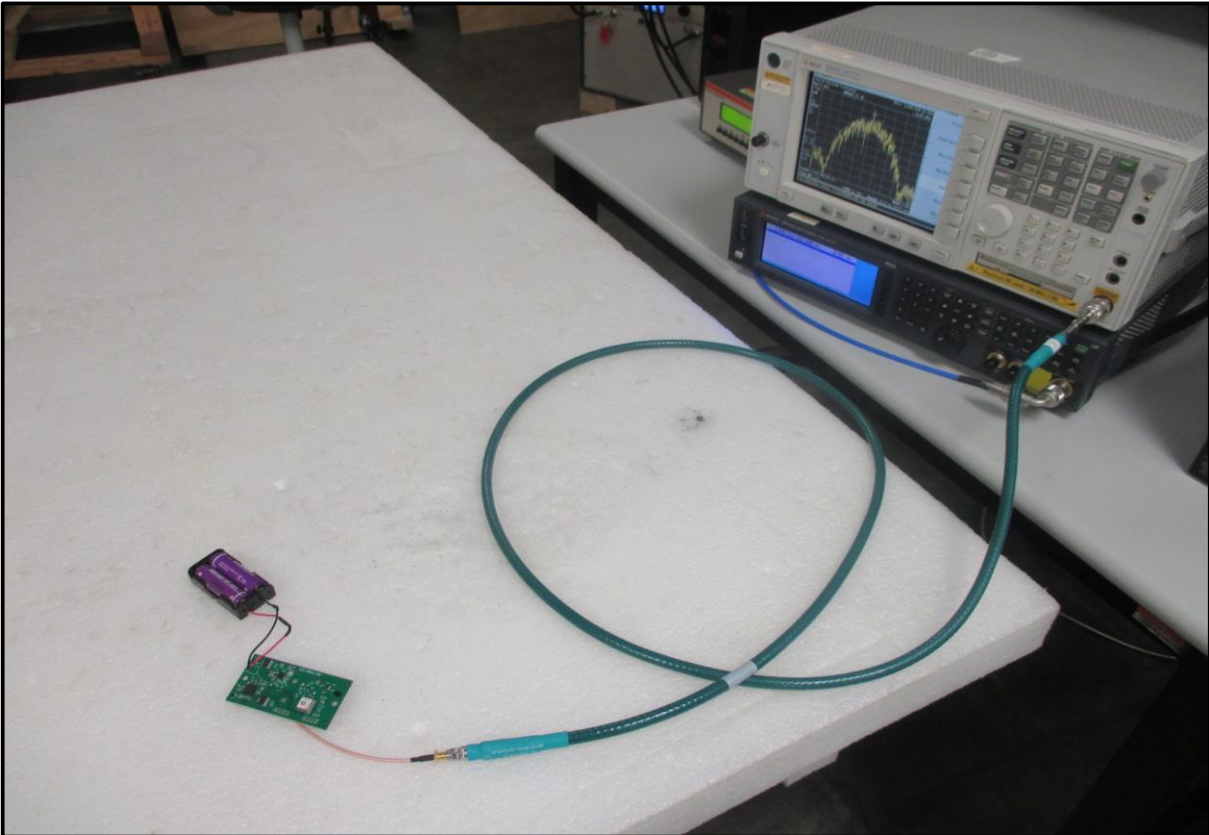
BLE/GFSK 1 Mbps High Channel, 2480 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-0.395	8	Pass



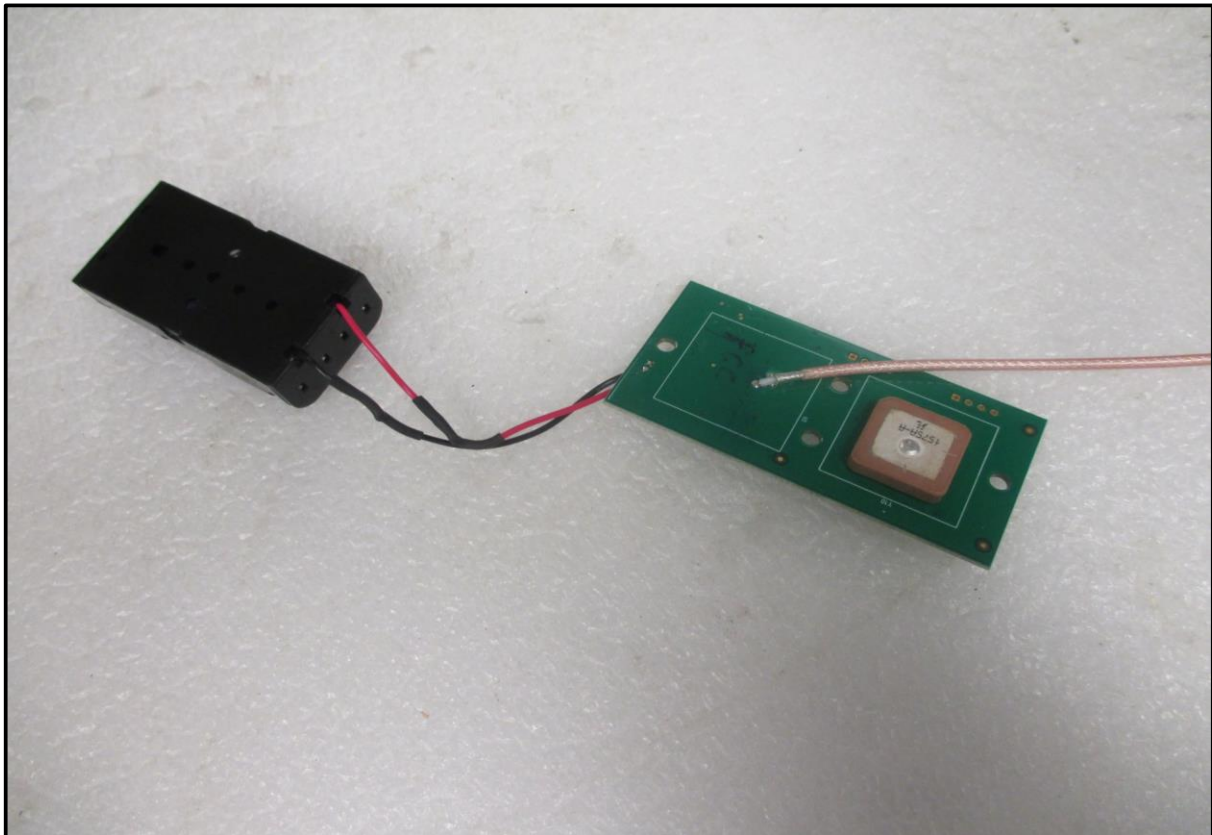
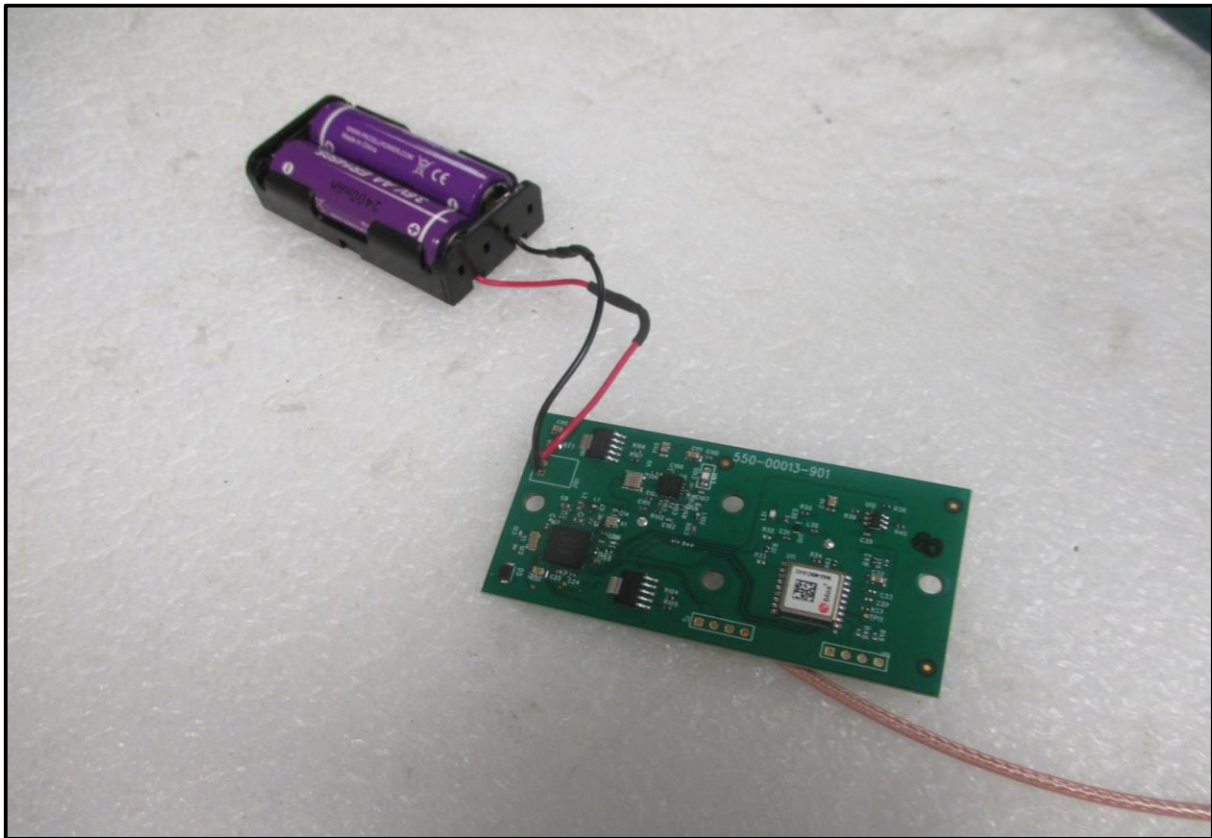
POWER SPECTRAL DENSITY



XMit 2020.12.30.0



POWER SPECTRAL DENSITY





XMI 2020.12.30.0

BAND EDGE COMPLIANCE

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	N5173B	TIW	2020-07-17	2023-07-17
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

TEST DESCRIPTION


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

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

BAND EDGE COMPLIANCE



Tel: 2021.03.19.1 XMI: 2020.12.30.0

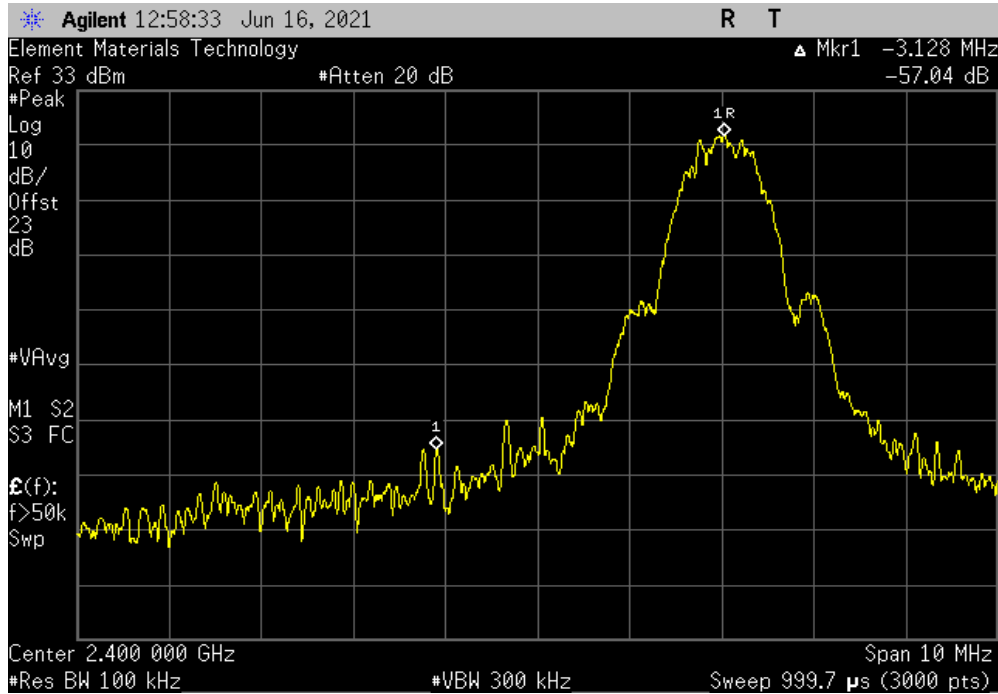
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21
Customer: Appticity		Temperature: 21.7 °C
Attendees: Welmin Peng		Humidity: 50.9% RH
Project: None		Barometric Pres.: 1019 mbar
Tested by: Mark Baytan	Power: Battery	Job Site: TX03
TEST SPECIFICATIONS		
FCC 15.247:2021		Test Method: ANSI C63.10:2013
COMMENTS		
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	1	Signature 
		Value (dBc) Limit ≤ (dBc) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		-57.04 -20 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-64.04 -20 Pass

BAND EDGE COMPLIANCE

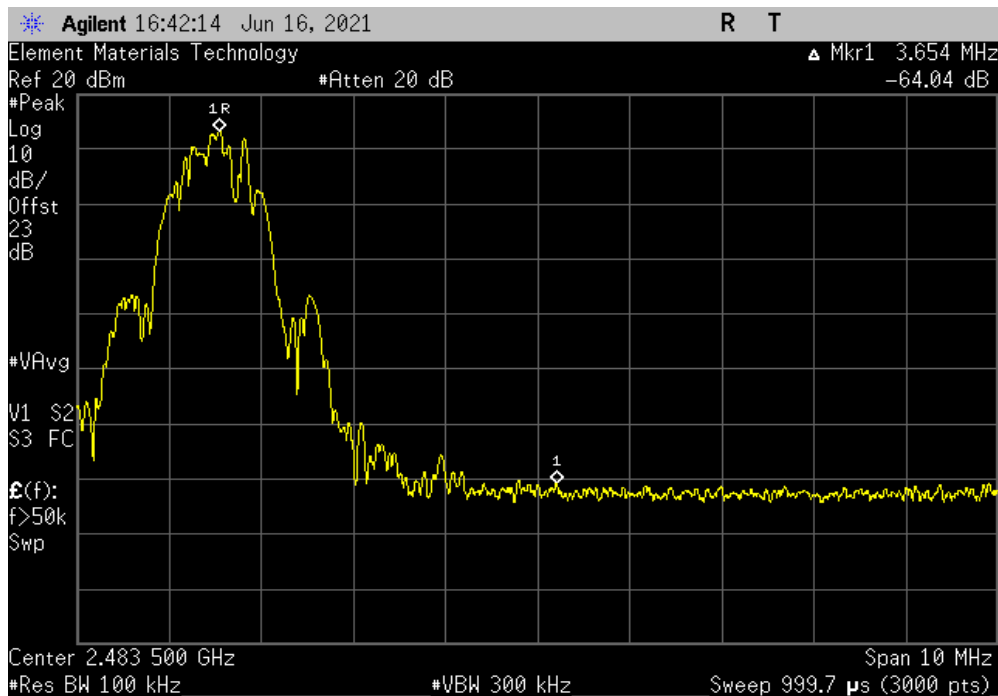


TuTx 2021.03.19.1 XMt 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz				Value	Limit	Result
				(dBc)	≤ (dBc)	
				-57.04	-20	Pass



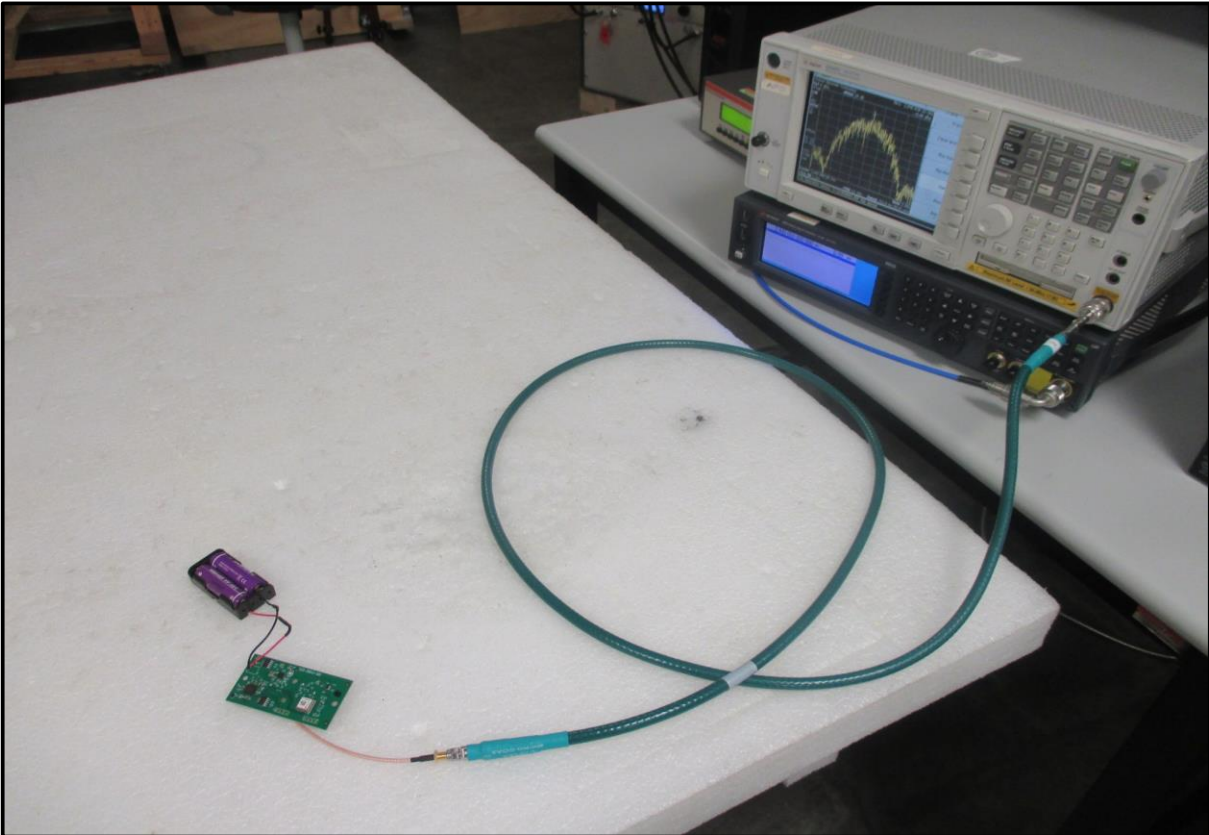
BLE/GFSK 1 Mbps High Channel, 2480 MHz				Value	Limit	Result
				(dBc)	≤ (dBc)	
				-64.04	-20	Pass



BAND EDGE COMPLIANCE



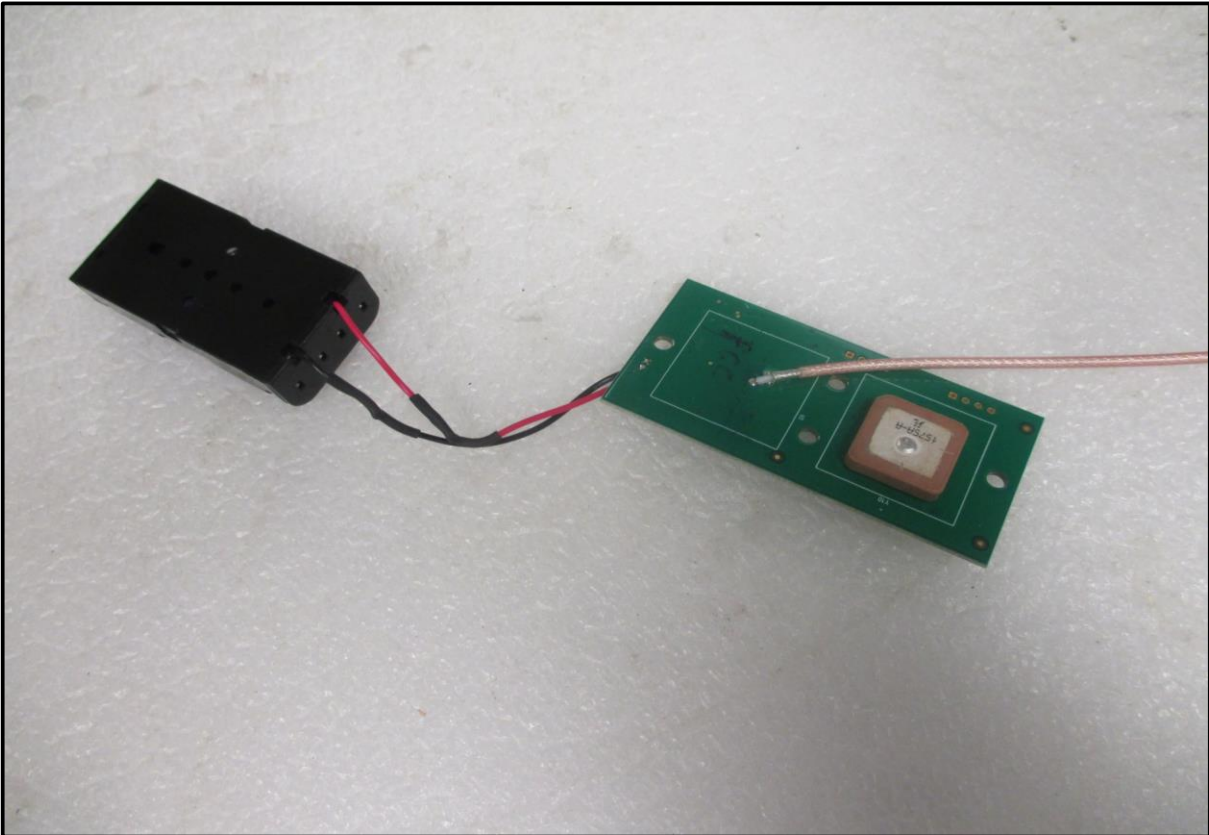
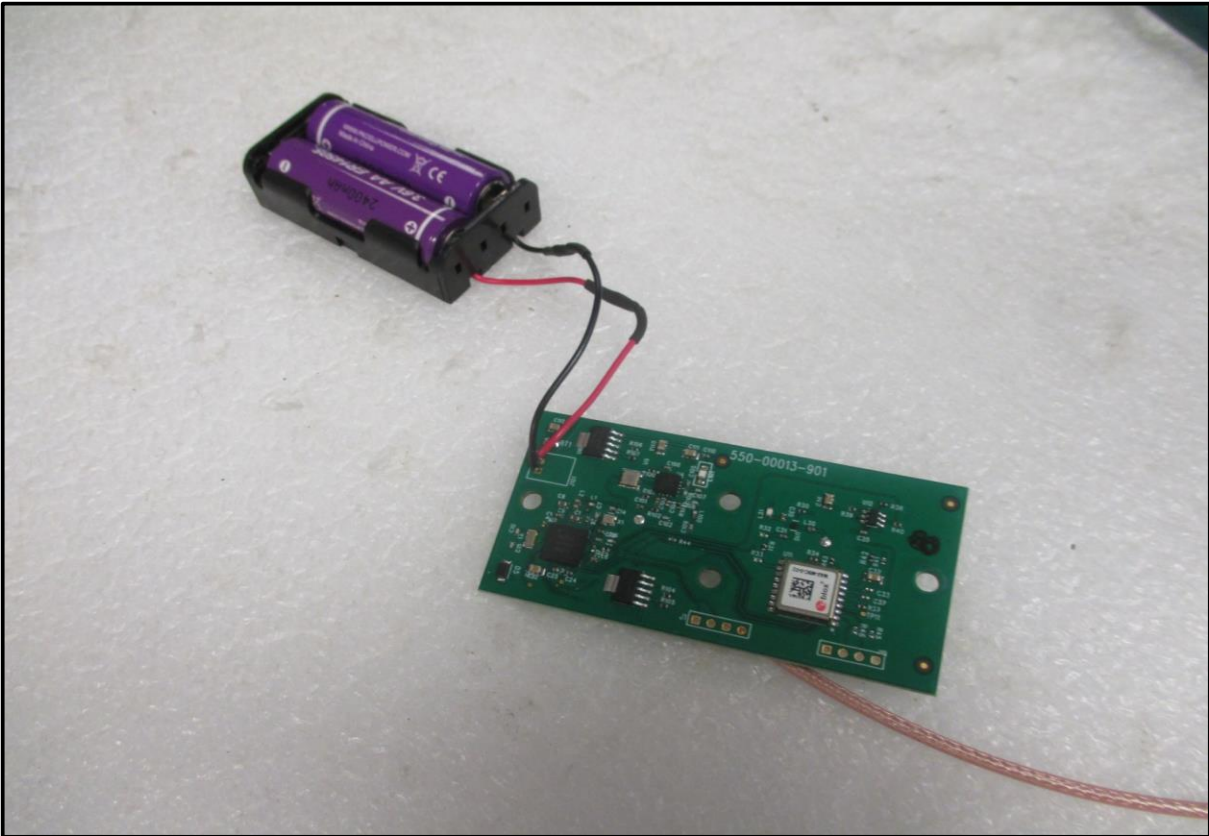
XMit 2020.12.30.0



BAND EDGE COMPLIANCE



XMit 2020.12.30.0



SPURIOUS CONDUCTED EMISSIONS



XMI 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B-506	TEV	2021-04-27	2024-04-27
Cable	Micro-Coax	D150A-1-0720-200	TXG	2020-09-18	2021-09-18
Attenuator	Fairview Microwave	SA18E 1913	TZV	2020-09-22	2021-09-22
Block - DC	Fairview Microwave	SD3379	AMM	2020-09-21	2021-09-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2020-07-30	2021-07-30

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 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



TelTx 2021.03.19.1 XMI 2020.12.30.0

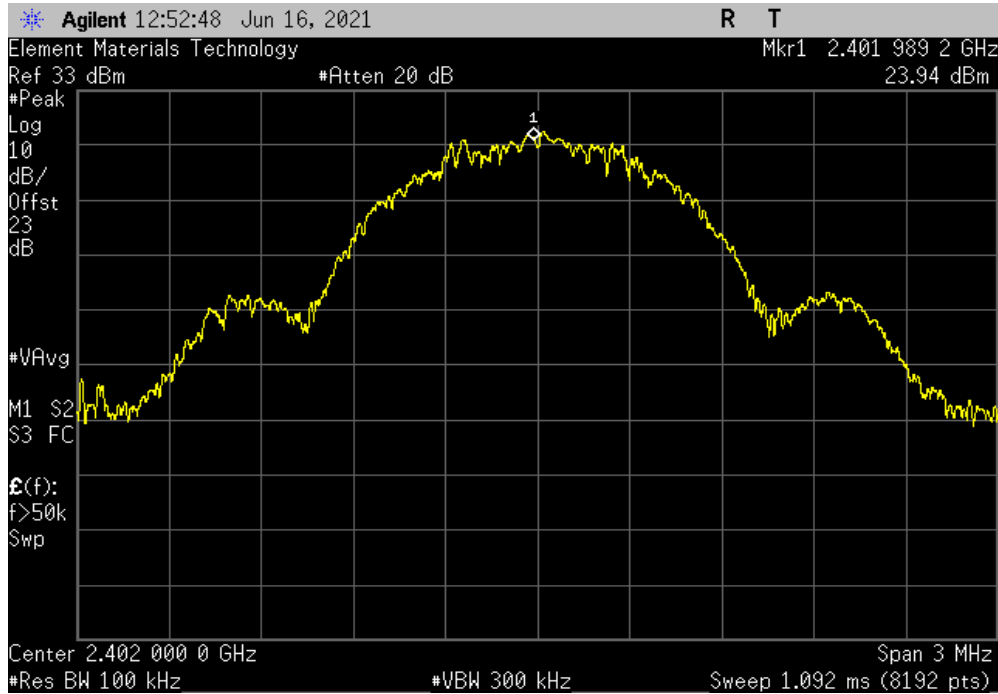
EUT: Ultra Long Range Bluetooth Tag with GPS		Work Order: APTY0011				
Serial Number: DC:7F:9D:19:7C:60		Date: 16-Jun-21				
Customer: Aptricity		Temperature: 21.7 °C				
Attendees: Welmin Peng		Humidity: 50.9% RH				
Project: None		Barometric Pres.: 1019 mbar				
Tested by: Mark Baytan	Power: Battery	Job Site: TX03				
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2021		ANSI C63.10:2013				
COMMENTS						
Reference level offset includes patch cable, RF cable, 20dB attenuator, and DC block.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		Fundamental	2401.99	N/A	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		30 MHz - 12.5 GHz	6783.4	-70.04	-20	Pass
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		12.5 GHz - 25 GHz	13632.3	-67.25	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		Fundamental	2425.76	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		30 MHz - 12.5 GHz	7039.1	-69.17	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2426 MHz		12.5 GHz - 25 GHz	13632.3	-67.03	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		Fundamental	2480.22	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz		30 MHz - 12.5 GHz	6934.1	-27.99	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		12.5 GHz - 25 GHz	13568.2	-25.33	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

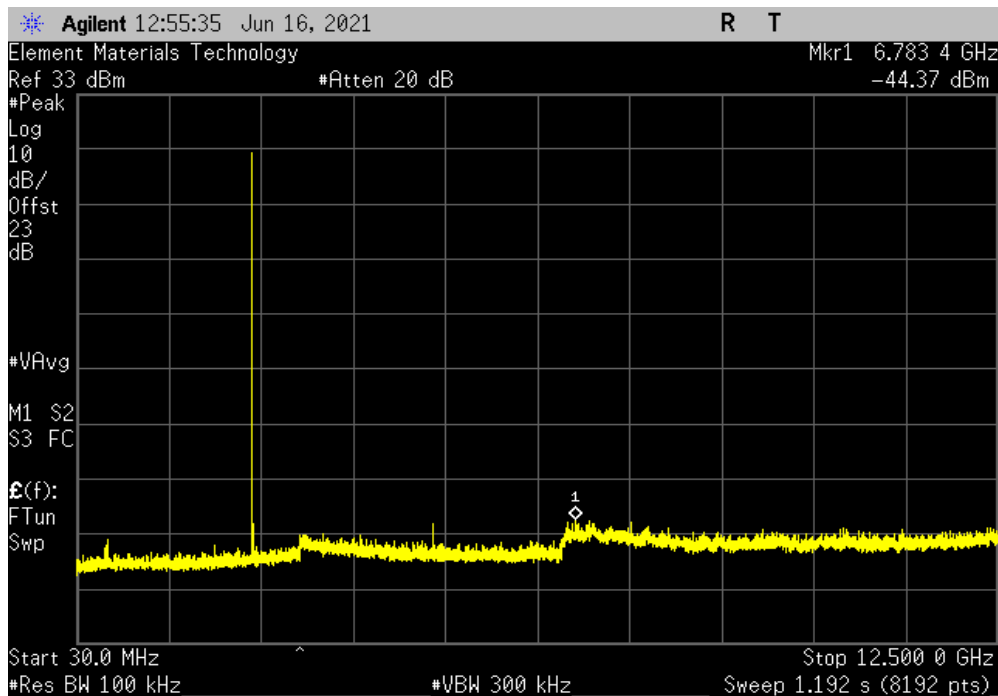


TuTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2401.99	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	6783.4	-70.04	-20	Pass	

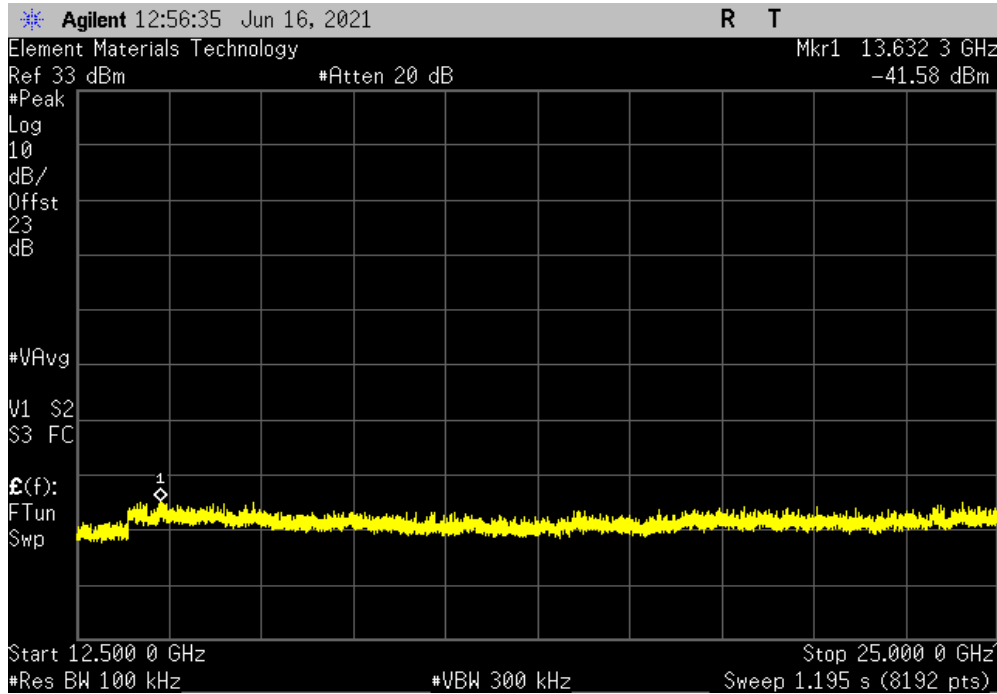


SPURIOUS CONDUCTED EMISSIONS

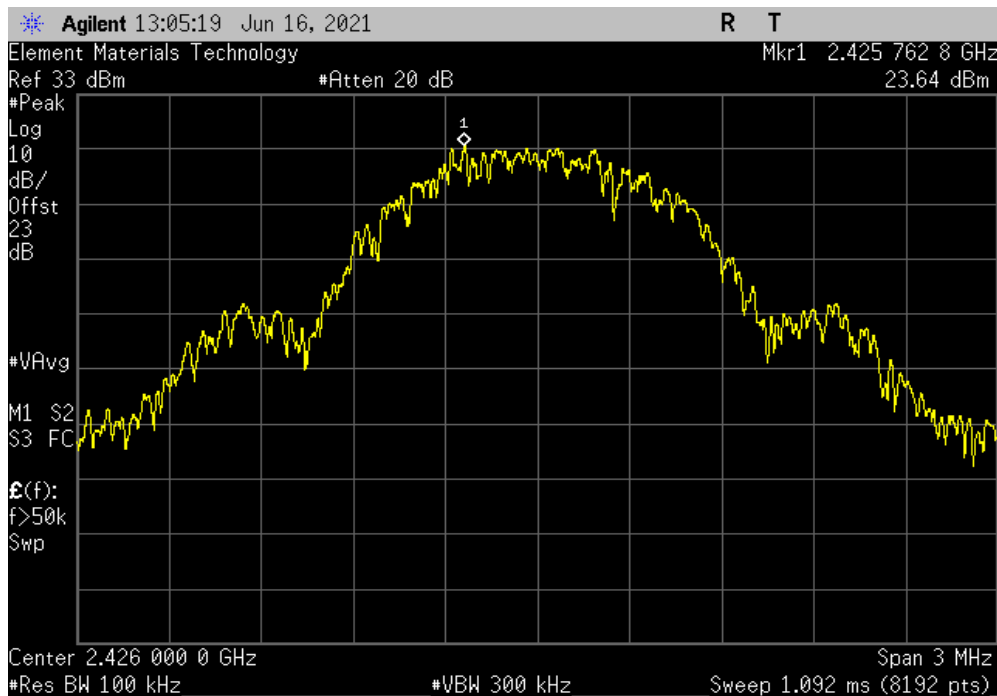


TuTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	13632.3	-67.25	-20	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2425.76	N/A	N/A	N/A	

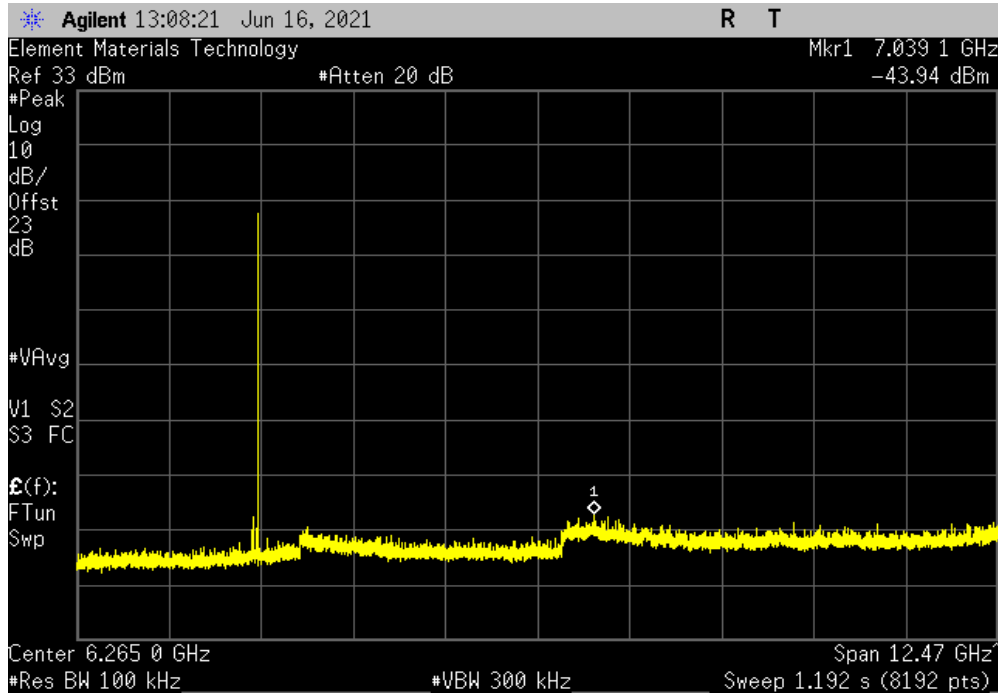


SPURIOUS CONDUCTED EMISSIONS

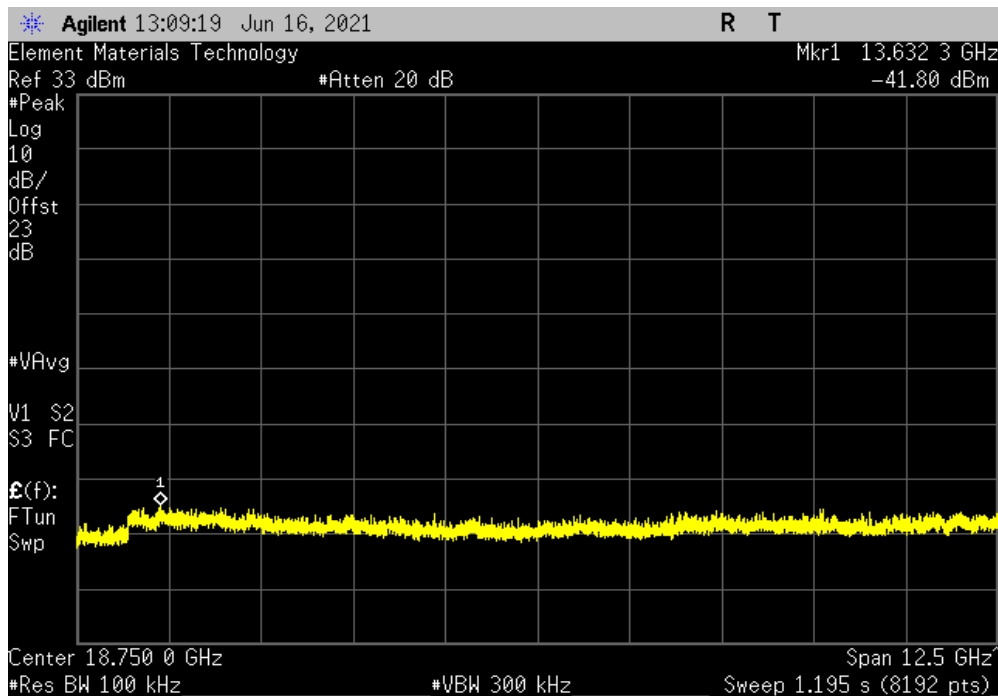


TuTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK 1 Mbps Mid Channel, 2426 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	7039.1	-69.17	-20	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2426 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	13632.3	-67.03	-20	Pass	

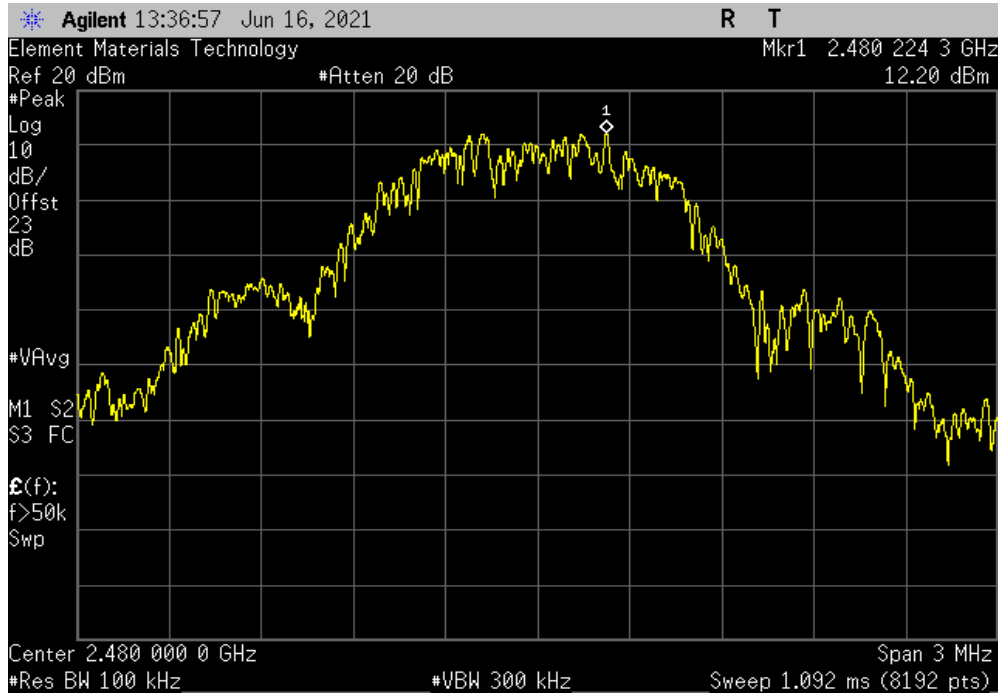


SPURIOUS CONDUCTED EMISSIONS

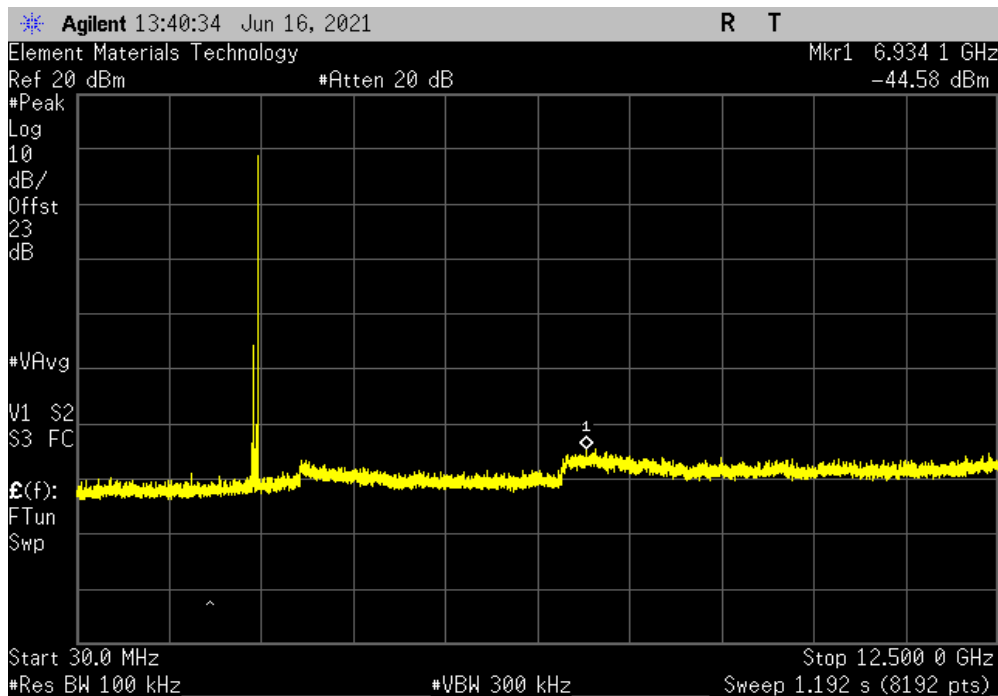


TuTx 2021.03.19.1 XMI 2020.12.30.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.22	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	6934.1	-27.99	-20	Pass	

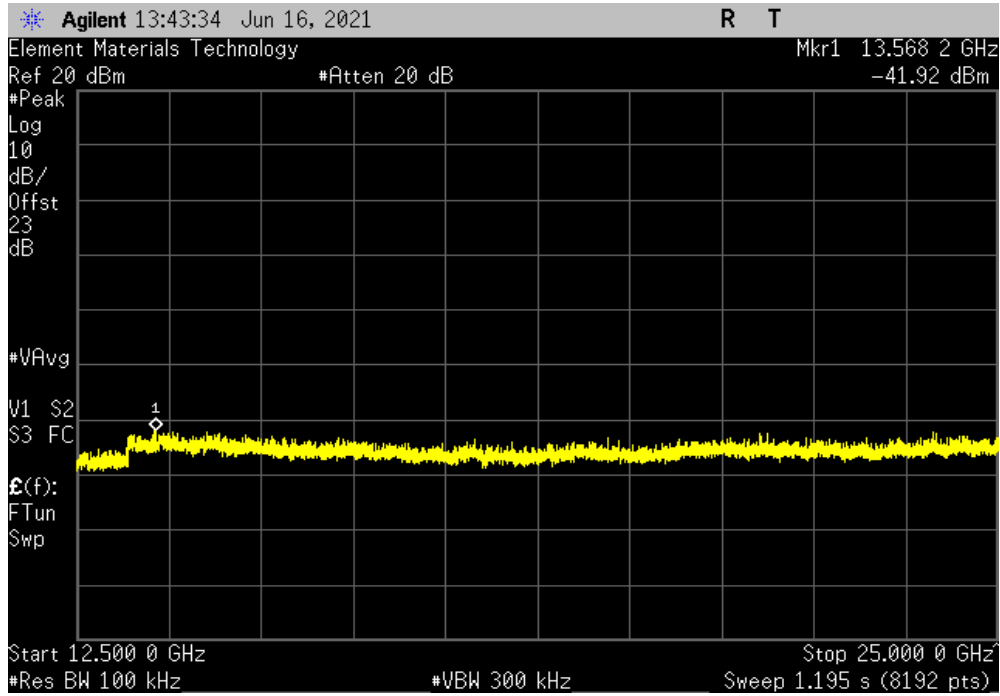


SPURIOUS CONDUCTED EMISSIONS

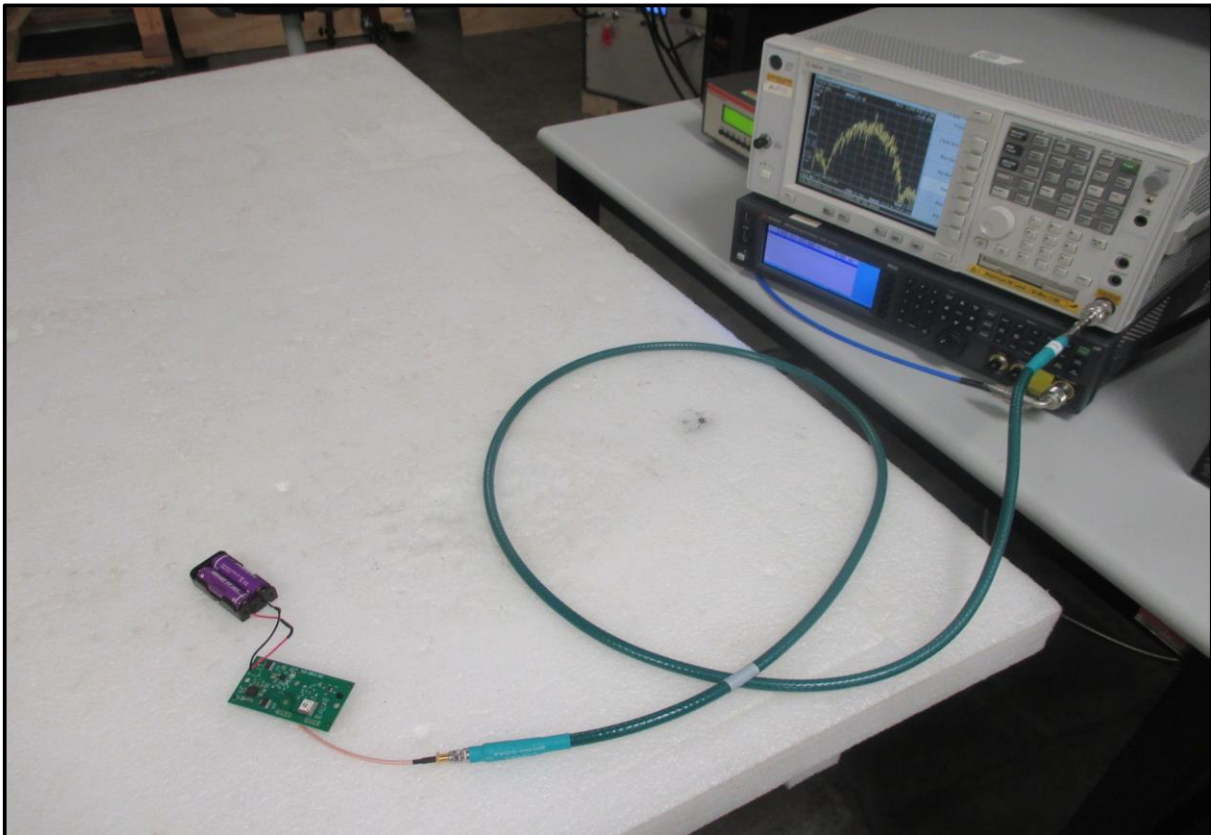


TbTx 2021.03.19.1 XMI 2020.12.30.0

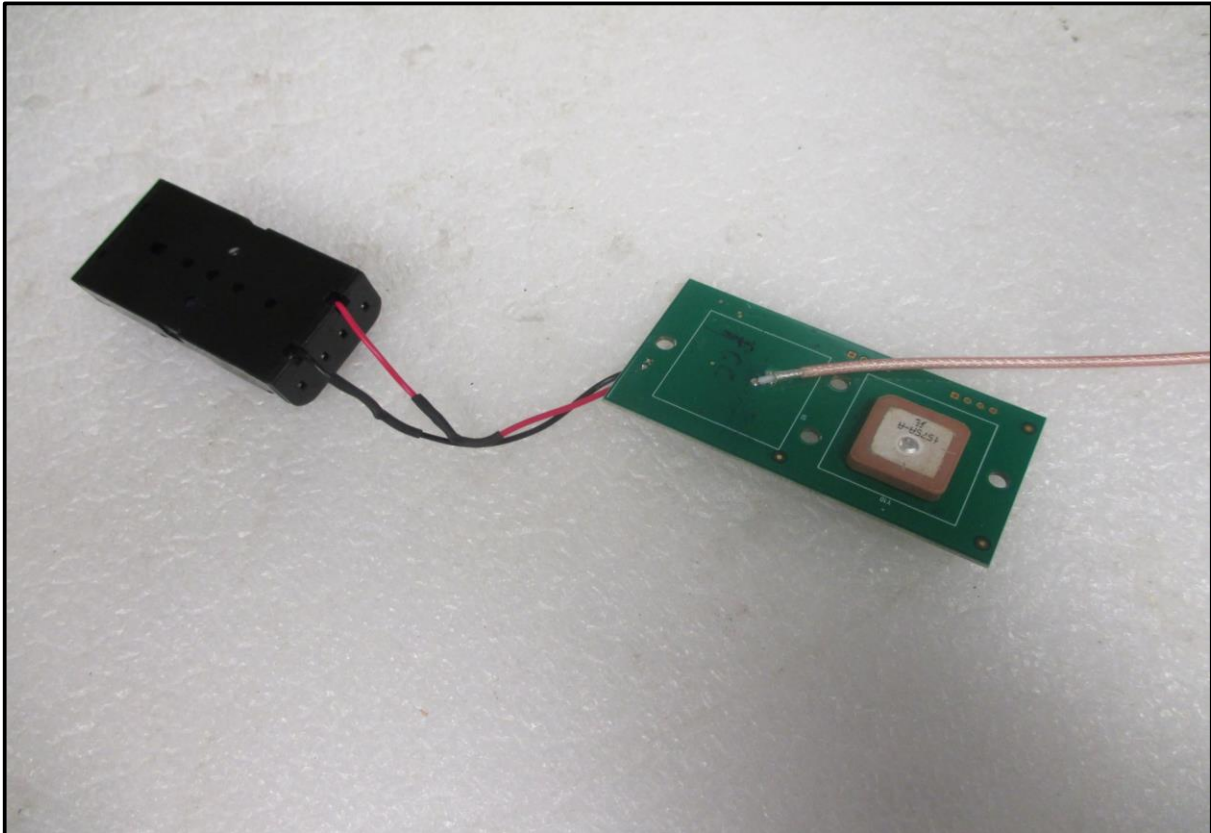
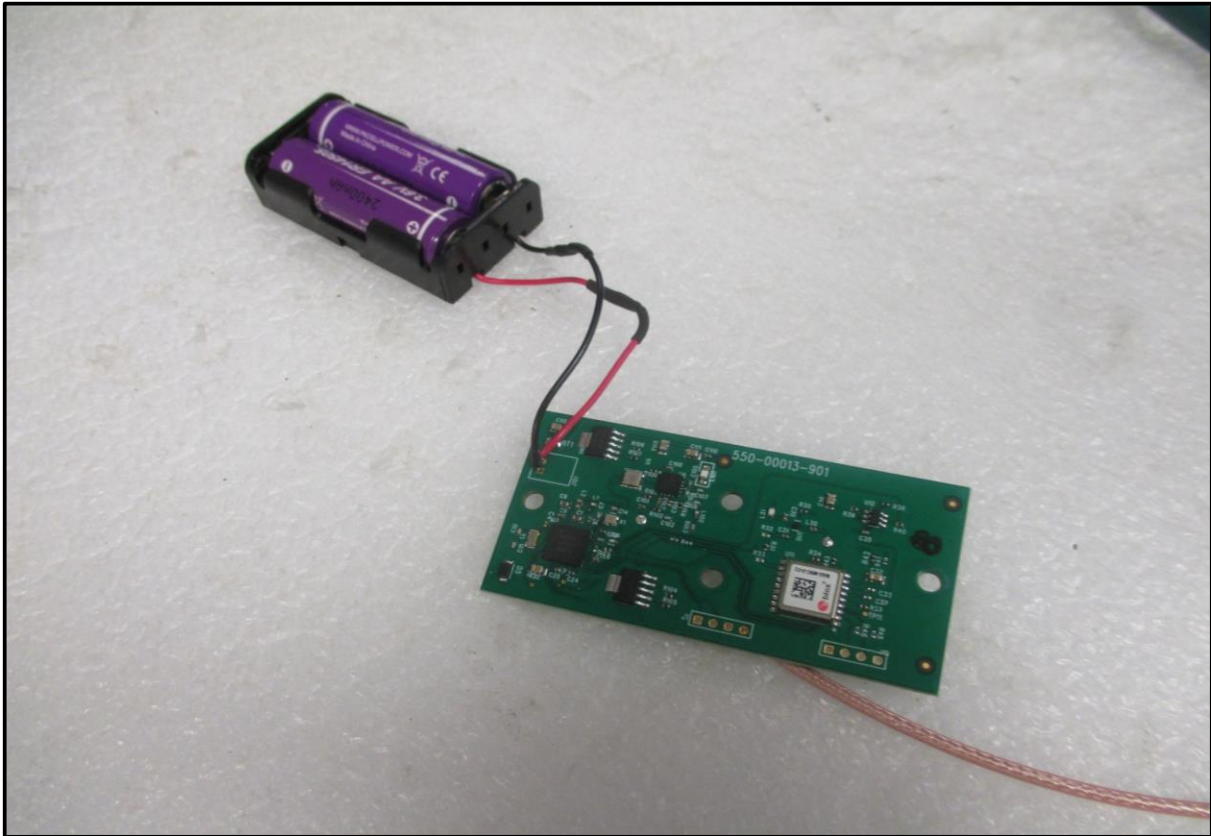
BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	13568.2	-25.33	-20	Pass



SPURIOUS CONDUCTED EMISSIONS



SPURIOUS CONDUCTED EMISSIONS



SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2021.03.17.0

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

MODES OF OPERATION

Operating BT DTS: Low Ch 0 (2402 MHz), Mid Ch (2426 MHz), High Ch 39 (2480 MHz)

Operating BT DTS: Low Ch 0 (2402 MHz), High Ch 39 (2480 MHz)

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

APTY0011 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	Weinschel Corp	4H-10	AWA	2021-03-09	2022-03-09
Filter - High Pass	Micro-Tronics	HPM50111	HGC	2021-03-09	2022-03-09
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	2020-09-18	2021-09-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	2020-09-18	2021-09-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	2020-09-17	2021-09-17
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	2020-06-02	2021-06-02
Cable	Northwest EMC	18-40GHz	TXE	2020-09-18	2021-09-18
Cable	Northwest EMC	8-18GHz	TXD	2021-04-30	2022-04-30
Cable	Northwest EMC	1-8.2 GHz	TXC	2020-06-02	2021-06-02
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXW	2020-09-02	2022-09-02
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	NCR
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	2020-05-28	2021-05-28
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	2020-05-28	2021-05-28
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	2020-08-04	2021-08-04
Antenna - Biconilog	ETS Lindgren	3143B	AYF	2020-06-25	2022-06-25
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2021-01-06	2022-01-06

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2021.03.17.0

TEST DESCRIPTION

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

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

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

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

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

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

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

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

When average measurements were required, the average measurement was made with the radio using the highest operational duty cycle that it would use in the field and guidance from ANSI C63.10 11.12.2.5.2.

SPURIOUS RADIATED EMISSIONS



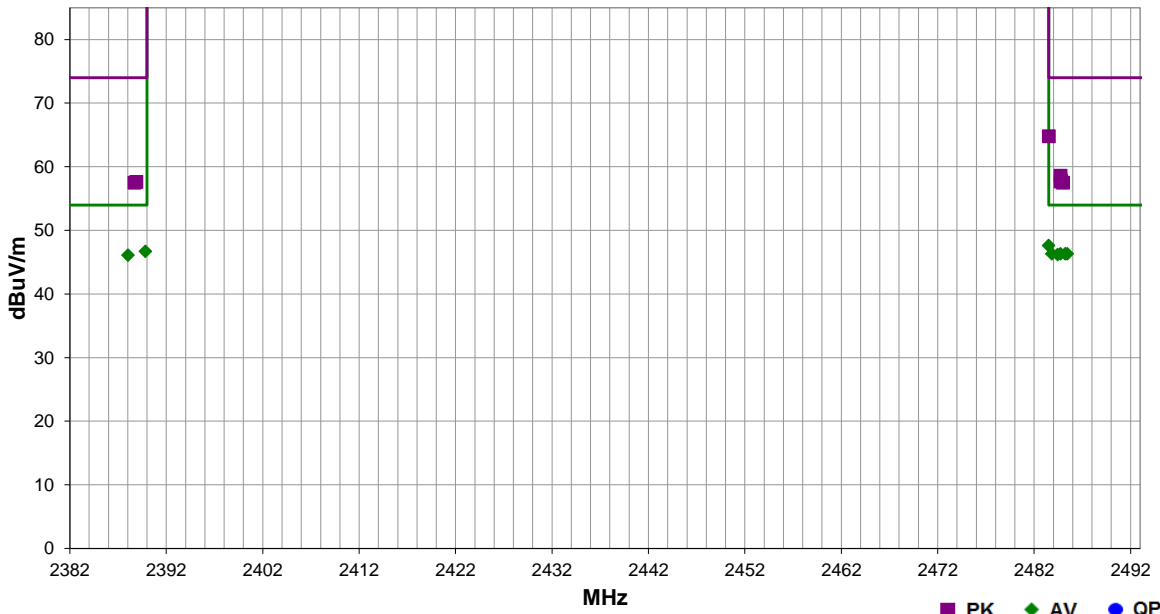
Work Order:	APTY0011	Date:	2021-05-19	
Project:	None	Temperature:	21.3 °C	
Job Site:	TX02	Humidity:	50.6% RH	
Serial Number:	F4:45:E4:3A:D8:AC	Barometric Pres.:	1014 mbar	
EUT:	Ultra Long Range Bluetooth Tag with GPS			
Configuration:	2			
Customer:	Appticity			
Attendees:	Weimin Peng			
EUT Power:	Battery			
Operating Mode:	Operating BT DTS: Low Ch 0 (2402 MHz), High Ch 39 (2480 MHz)			
Deviations:	None			
Comments:	None			

EmiRS 2021.01.08.0

PSA-ESCI 2021.03.17.0

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

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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■ PK ◆ AV ● QP

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
2483.500	33.7	-6.1	1.94	27.0	3.0	20.0	Vert	AV	0.0	47.6	54.0	-6.4	High Ch, 1 Mbps, EUT Vert
2389.833	33.1	-6.4	1.5	69.9	3.0	20.0	Vert	AV	0.0	46.7	54.0	-7.3	Low Ch, 1 Mbps, EUT Vert
2485.443	32.4	-6.1	1.81	201.0	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	High Ch, 1 Mbps, EUT Horz
2483.840	32.4	-6.1	1.5	346.9	3.0	20.0	Vert	AV	0.0	46.3	54.0	-7.7	High Ch, 1 Mbps, EUT Horz
2484.737	32.4	-6.1	1.5	318.0	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	High Ch, 1 Mbps, EUT Vert
2485.230	32.4	-6.1	1.5	316.9	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	High Ch, 1 Mbps, EUT On Side
2484.437	32.3	-6.1	1.5	252.0	3.0	20.0	Vert	AV	0.0	46.2	54.0	-7.8	High Ch, 1 Mbps, EUT On Side
2388.037	32.5	-6.4	1.5	331.0	3.0	20.0	Horz	AV	0.0	46.1	54.0	-7.9	Low Ch, 1 Mbps, EUT Horz
2483.527	50.9	-6.1	1.94	27.0	3.0	20.0	Vert	PK	0.0	64.8	74.0	-9.2	High Ch, 1 Mbps, EUT Vert
2484.730	44.7	-6.1	1.5	318.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	High Ch, 1 Mbps, EUT Vert
2484.800	43.9	-6.1	1.81	201.0	3.0	20.0	Horz	PK	0.0	57.8	74.0	-16.2	High Ch, 1 Mbps, EUT Horz
2484.803	43.8	-6.1	1.5	316.9	3.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	High Ch, 1 Mbps, EUT On Side
2484.743	43.8	-6.1	1.5	252.0	3.0	20.0	Vert	PK	0.0	57.7	74.0	-16.3	High Ch, 1 Mbps, EUT On Side
2388.900	44.0	-6.4	1.5	331.0	3.0	20.0	Horz	PK	0.0	57.6	74.0	-16.4	Low Ch, 1 Mbps, EUT Horz
2484.987	43.6	-6.1	1.5	346.9	3.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	High Ch, 1 Mbps, EUT Horz
2388.707	43.9	-6.4	1.5	69.9	3.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	Low Ch, 1 Mbps, EUT Vert

SPURIOUS RADIATED EMISSIONS

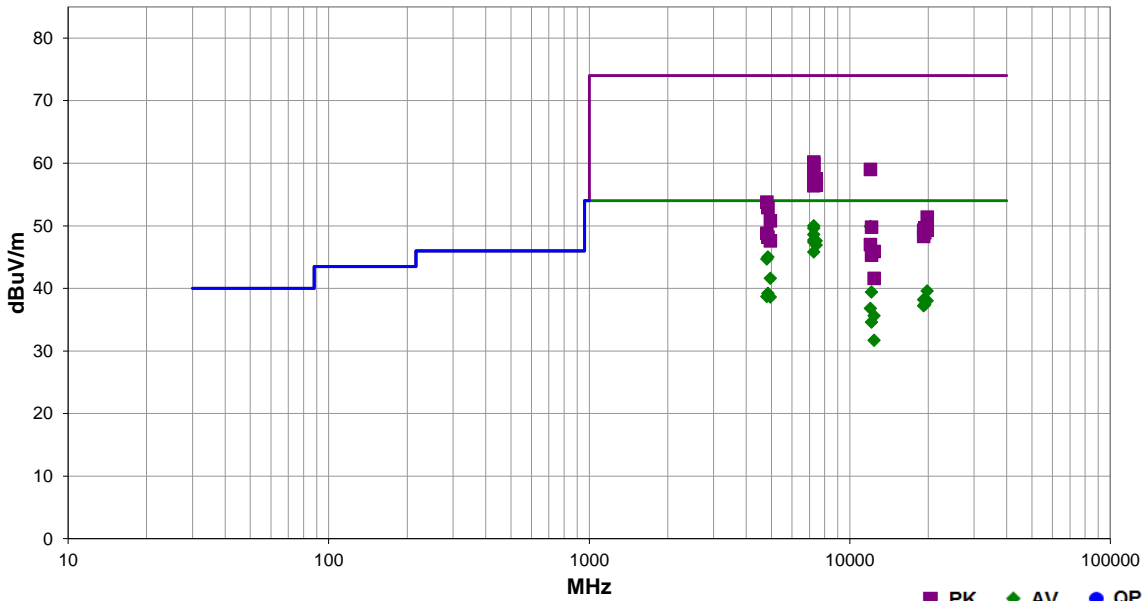


EmiR5 2021.01.08.0 PSA-ESCI 2021.03.17.0

Work Order:	APTY0011	Date:	2021-05-19	
Project:	None	Temperature:	21.3 °C	
Job Site:	TX02	Humidity:	50.6% RH	
Serial Number:	F4:45:E4:3A:D8:AC	Barometric Pres.:	1014 mbar	
EUT:	Ultra Long Range Bluetooth Tag with GPS			
Configuration:	2			
Customer:	Apptricity			
Attendees:	Weimin Peng			
EUT Power:	Battery			
Operating Mode:	Operating BT DTS: Low Ch 0 (2402 MHz), Mid Ch (2426 MHz), High Ch 39 (2480 MHz)			
Deviations:	None			
Comments:	None			

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

Run #	4	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	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
7278.758	40.2	9.8	1.5	360.0	3.0	0.0	Vert	AV	0.0	50.0	54.0	-4.0	Mid Ch, 1 Mbps, EUT Horz
12009.280	53.2	-3.3	3.5	225.0	3.0	0.0	Horz	AV	0.0	49.9	54.0	-4.1	Low Ch, 1 Mbps, EUT Vert
7278.717	39.8	9.8	1.5	90.0	3.0	0.0	Vert	AV	0.0	49.6	54.0	-4.4	Mid Ch, 1 Mbps, EUT On Side
7278.725	38.8	9.8	1.5	270.0	3.0	0.0	Vert	AV	0.0	48.6	54.0	-5.4	Mid Ch, 1 Mbps, EUT Vert
7277.675	37.9	9.8	1.5	315.0	3.0	0.0	Horz	AV	0.0	47.7	54.0	-6.3	Mid Ch, 1 Mbps, EUT Vert
7439.650	37.8	9.8	3.0	225.0	3.0	0.0	Horz	AV	0.0	47.6	54.0	-6.4	High Ch, 1 Mbps, EUT Vert
7277.667	37.6	9.8	1.5	135.0	3.0	0.0	Horz	AV	0.0	47.4	54.0	-6.6	Mid Ch, 1 Mbps, EUT On Side
7439.733	37.1	9.8	1.5	331.0	3.0	0.0	Vert	AV	0.0	46.9	54.0	-7.1	High Ch, 1 Mbps, EUT Horz
7277.717	36.0	9.8	1.0	360.0	3.0	0.0	Horz	AV	0.0	45.8	54.0	-8.2	Mid Ch, 1 Mbps, EUT Horz
4852.042	41.3	3.7	2.0	135.0	3.0	0.0	Horz	AV	0.0	45.0	54.0	-9.0	Mid Ch, 1 Mbps, EUT Vert
4804.183	41.0	3.7	1.5	90.0	3.0	0.0	Horz	AV	0.0	44.7	54.0	-9.3	Low Ch, 1 Mbps, EUT Vert
4960.233	37.7	3.9	1.5	90.0	3.0	0.0	Horz	AV	0.0	41.6	54.0	-12.4	High Ch, 1 Mbps, EUT Vert
7279.133	50.4	9.8	1.5	360.0	3.0	0.0	Vert	PK	0.0	60.2	74.0	-13.8	Mid Ch, 1 Mbps, EUT Horz
7278.258	50.1	9.8	1.5	90.0	3.0	0.0	Vert	PK	0.0	59.9	74.0	-14.1	Mid Ch, 1 Mbps, EUT On Side
19842.090	47.9	-8.3	1.5	344.0	3.0	0.0	Vert	AV	0.0	39.6	54.0	-14.4	High Ch, 1 Mbps, EUT Horz
12129.340	42.3	-2.9	1.5	270.0	3.0	0.0	Horz	AV	0.0	39.4	54.0	-14.6	Mid Ch, 1 Mbps, EUT Vert
4851.925	35.5	3.7	1.5	126.0	3.0	0.0	Vert	AV	0.0	39.2	54.0	-14.8	Mid Ch, 1 Mbps, EUT Horz
12011.680	62.3	-3.3	3.5	225.0	3.0	0.0	Horz	PK	0.0	59.0	74.0	-15.0	Low Ch, 1 Mbps, EUT Vert
4804.275	35.0	3.7	1.5	70.9	3.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	Low Ch, 1 Mbps, EUT Horz
4960.033	34.7	3.9	1.5	202.9	3.0	0.0	Vert	AV	0.0	38.6	54.0	-15.4	High Ch, 1 Mbps, EUT Horz
7277.625	48.6	9.8	1.5	270.0	3.0	0.0	Vert	PK	0.0	58.4	74.0	-15.6	Mid Ch, 1 Mbps, EUT Vert
19410.060	46.8	-8.5	1.5	190.9	3.0	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid Ch, 1 Mbps, EUT Horz

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
19218.430	46.7	-8.5	1.5	129.9	3.0	0.0	Vert	AV	0.0	38.2	54.0	-15.8	Low Ch, 1 Mbps, EUT Horz
19841.490	46.3	-8.3	1.5	98.0	3.0	0.0	Horz	AV	0.0	38.0	54.0	-16.0	High Ch, 1 Mbps, EUT Vert
7278.342	47.8	9.8	1.5	315.0	3.0	0.0	Horz	PK	0.0	57.6	74.0	-16.4	Mid Ch, 1 Mbps, EUT Vert
7439.817	47.7	9.8	3.0	225.0	3.0	0.0	Horz	PK	0.0	57.5	74.0	-16.5	High Ch, 1 Mbps, EUT Vert
19411.380	45.9	-8.5	1.5	258.0	3.0	0.0	Horz	AV	0.0	37.4	54.0	-16.6	Mid Ch, 1 Mbps, EUT Vert
7279.342	47.4	9.8	1.5	135.0	3.0	0.0	Horz	PK	0.0	57.2	74.0	-16.8	Mid Ch, 1 Mbps, EUT On Side
19221.050	45.7	-8.5	1.5	284.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Low Ch, 1 Mbps, EUT Vert
12009.280	40.1	-3.3	1.5	98.0	3.0	0.0	Vert	AV	0.0	36.8	54.0	-17.2	Low Ch, 1 Mbps, EUT Horz
7439.408	46.7	9.8	1.5	331.0	3.0	0.0	Vert	PK	0.0	56.5	74.0	-17.5	High Ch, 1 Mbps, EUT Horz
7277.875	46.6	9.8	1.0	360.0	3.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	Mid Ch, 1 Mbps, EUT Horz
12399.300	37.6	-2.0	2.0	270.0	3.0	0.0	Horz	AV	0.0	35.6	54.0	-18.4	High Ch, 1 Mbps, EUT Vert
12129.360	37.5	-2.9	2.2	148.9	3.0	0.0	Vert	AV	0.0	34.6	54.0	-19.4	Mid Ch, 1 Mbps, EUT Horz
4804.433	50.1	3.7	1.5	90.0	3.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	Low Ch, 1 Mbps, EUT Vert
4852.250	49.2	3.7	2.0	135.0	3.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	Mid Ch, 1 Mbps, EUT Vert
12399.230	33.7	-2.0	1.5	178.9	3.0	0.0	Vert	AV	0.0	31.7	54.0	-22.3	High Ch, 1 Mbps, EUT Horz
19840.700	59.7	-8.3	1.5	344.0	3.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	High Ch, 1 Mbps, EUT Horz
4959.483	46.9	3.9	1.5	90.0	3.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	High Ch, 1 Mbps, EUT Vert
12131.890	52.7	-2.9	1.5	270.0	3.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	Mid Ch, 1 Mbps, EUT Vert
19409.830	58.2	-8.5	1.5	190.9	3.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	Mid Ch, 1 Mbps, EUT Horz
19215.930	57.8	-8.5	1.5	129.9	3.0	0.0	Vert	PK	0.0	49.3	74.0	-24.7	Low Ch, 1 Mbps, EUT Horz
19839.120	57.6	-8.3	1.5	98.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	High Ch, 1 Mbps, EUT Vert
19409.360	57.4	-8.5	1.5	258.0	3.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	Mid Ch, 1 Mbps, EUT Vert
4804.317	45.1	3.7	1.5	70.9	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Low Ch, 1 Mbps, EUT Horz
19220.280	56.8	-8.5	1.5	284.0	3.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	Low Ch, 1 Mbps, EUT Vert
4852.258	44.5	3.7	1.5	126.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	Mid Ch, 1 Mbps, EUT Horz
4959.858	43.7	3.9	1.5	202.9	3.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	High Ch, 1 Mbps, EUT Horz
12009.080	50.3	-3.3	1.5	98.0	3.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	Low Ch, 1 Mbps, EUT Horz
12399.490	47.9	-2.0	2.0	270.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High Ch, 1 Mbps, EUT Vert
12130.580	48.2	-2.9	2.2	148.9	3.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	Mid Ch, 1 Mbps, EUT Horz
12398.890	43.6	-2.0	1.5	178.9	3.0	0.0	Vert	PK	0.0	41.6	74.0	-32.4	High Ch, 1 Mbps, EUT Horz

End of Test Report