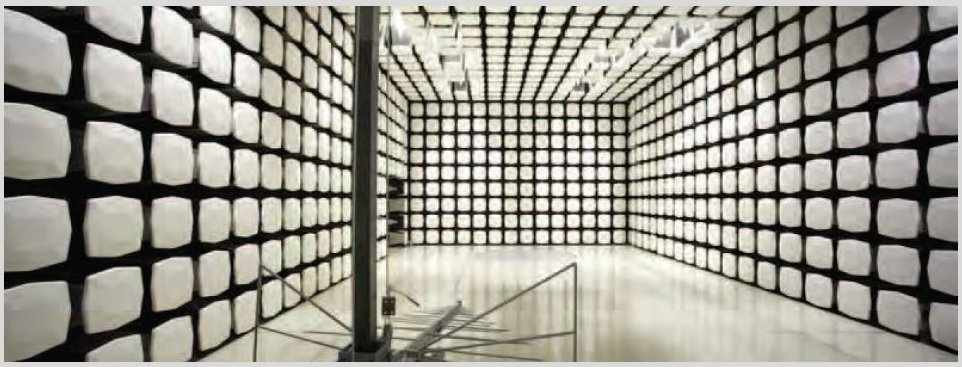
Paragon Innovations, Inc.

Smart Tracking Collar

FCC 15.247:2021
Bluetooth

Report: PAON0005.1, Issue Date: June 24, 2021



NVLAP LAB CODE: 201049-0, 200881-0

CERTIFICATE OF TEST

Last Date of Test: May 21, 2021
Paragon Innovations, Inc.
EUT: Smart Tracking Collar

Radio Equipment Testing

Standards

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

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:

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 – 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

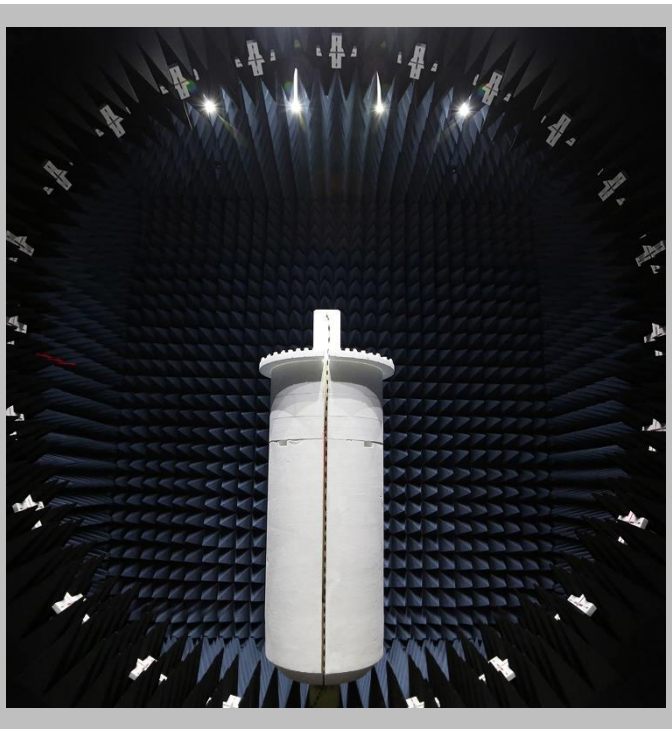
MIC – Recognized by MIC as a CAB for the acceptance of test data.

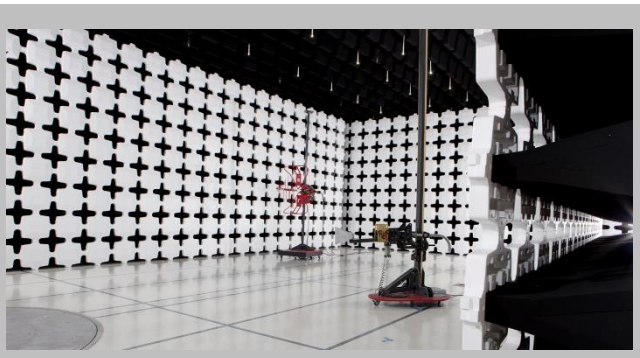
SCOPE

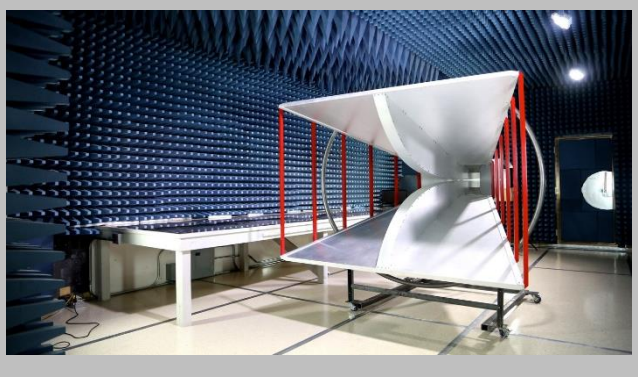
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 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
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

element
TMU.2015.07.10

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.

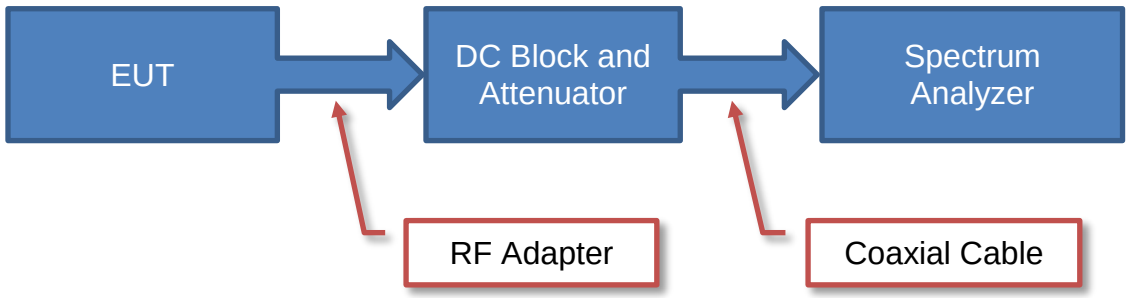
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

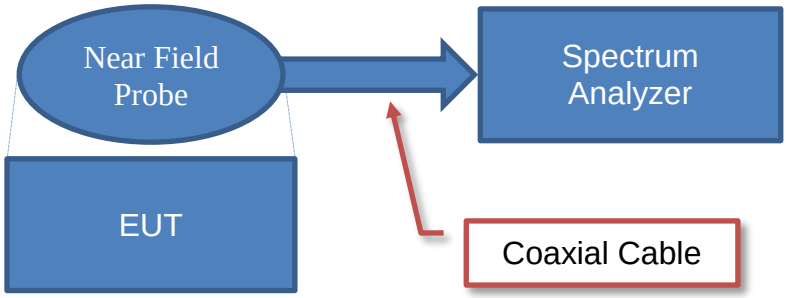
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field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

Test Setup Block Diagrams

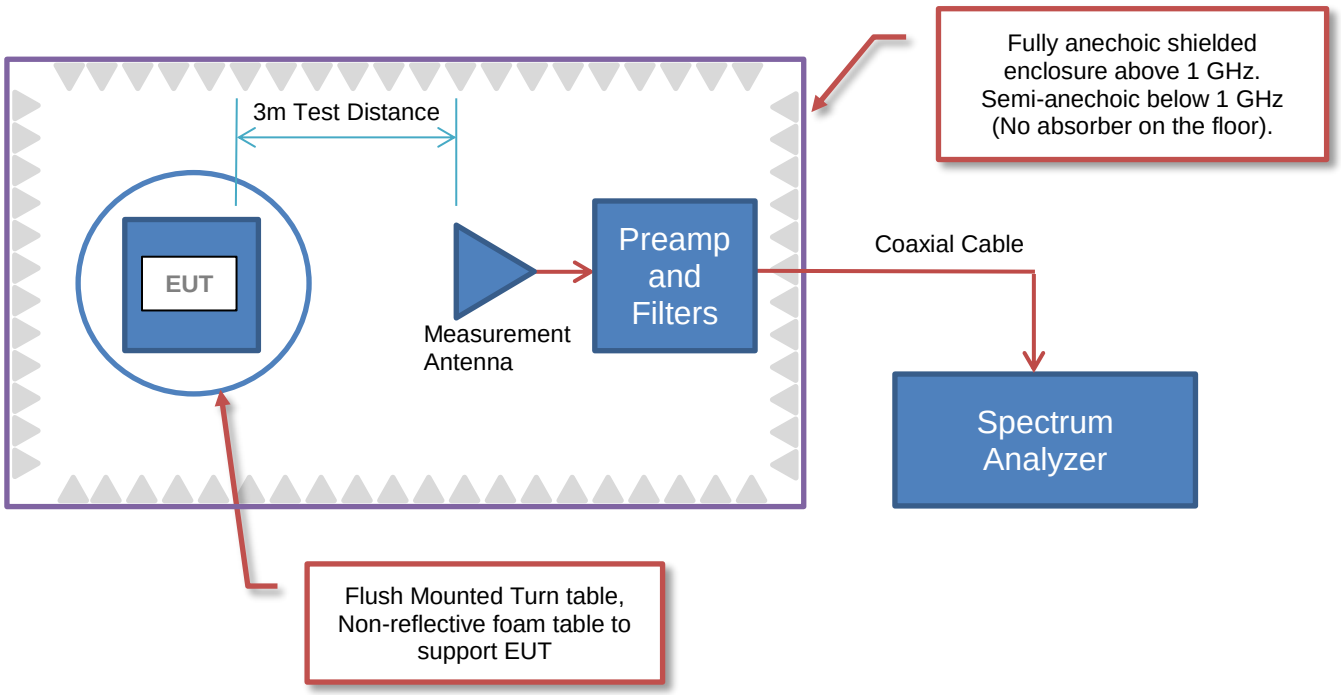
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Paragon Innovations, Inc.
Address:	3305 Matrix Drive
City, State, Zip:	Richardson, TX 75082
Test Requested By:	Alan Hasty
EUT:	Smart Tracking Collar
First Date of Test:	August 26, 2020
Last Date of Test:	May 21, 2021
Receipt Date of Samples:	August 26, 2020
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Dog tracking collar

Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration PAON0005- 1

Software/Firmware Running during test	
Description	**Version**
M1 Link Collar Sw	00.03.01-c3
BT Link Collar Sw	00.03.01-c2
M1 Modem Firmware	1.1.2
BT Direct Test Mode Sw (fixed channels 0,19,39)	0.0.2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Smart Tracking Collar	Link	LT3A	0013

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
USB Charger	Link	S005BPU0500100	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Charging Cable	No	1m	No	Smart Tracking Collar	AC Main

Configuration PAON0005- 2

Software/Firmware Running during test	
Description	**Version**
M1 Link Collar Sw	00.03.01-c3
BT Link Collar Sw	00.03.01-c2
M1 modem firmware	1.1.2
BT Direct Test Mode Sw (fixed channels 0,19,39)	0.0.2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Smart Tracking Collar Device	Link	LT3A	0013

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
USB Charger	Link	S005BPU0500100	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Charging Cable	No	1m	No	Smart Tracking Collar	AC Main

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-08-26	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was complete.
2	2020-11-13	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.
3	2020-11-13	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.
4	2020-11-13	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.
5	2021-04-15	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.
6	2021-04-15	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.
7	2021-04-15	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.
8	2021-04-15	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.
9	2021-05-21	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWER SETTINGS AND ANTENNAS

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

ANTENNA GAIN (dBi)

Type	Provided by	Frequency Range (MHz)	Gain (dBi)
Wideband SMD Chip Antenna	Customer	2300 - 2700	2.5

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Type	Channel	Position	Frequency (MHz)	Power Setting
BLE	DTS	0	Low Channel	2402	0 dBm
		20	Mid Channel	2440	0 dBm
		39	High Channel	2480	0 dBm

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.03.25.0
PSA-ESCI 2021.03.17.0

TEST DESCRIPTION

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss	TDEMI 30M	ARL	2021-03-23	2022-03-23
Cable - Conducted Cable Assembly	Northwest EMC	TXA, HFC, TQU	TXAA	2021-01-26	2022-01-26
LISN	Solar Electronics	9252-50-R-24-BNC	LJK	2020-08-25	2021-08-25
Power Source/Analyzer	Hewlett Packard	6841A	THC	NCR	NCR

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.6 dB	-2.6 dB

CONFIGURATIONS INVESTIGATED

POAN0005-2

MODES INVESTIGATED

BT Mid Channel 2440 MHz Continuous Tx 1 Mbps

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.03.25.0
PSA-ESCI 2021.03.17.0

EUT:	Smart Tracking Collar	Work Order:	PAON0005
Serial Number:	0013	Date:	2021-05-21
Customer:	Paragon Innovations, Inc.	Temperature:	22.4°C
Attendees:	Alan Hasty	Relative Humidity:	53.7%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Brandon Hobbs	Job Site:	TX01
Power:	5 VDC	Configuration:	POAN0005-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	1	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

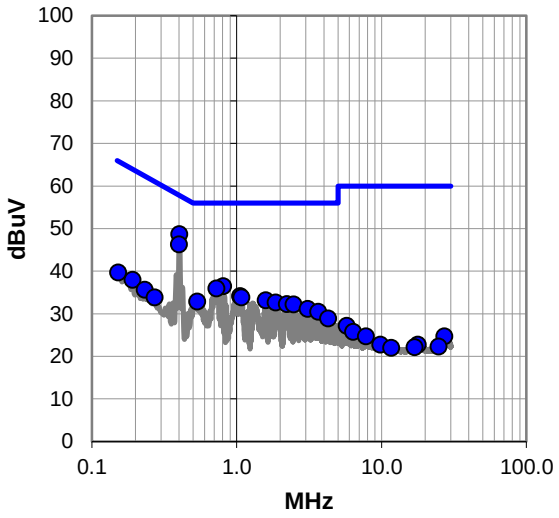
EUT OPERATING MODES

BT Mid Channel 2440 MHz Continuous Tx 1 Mbps

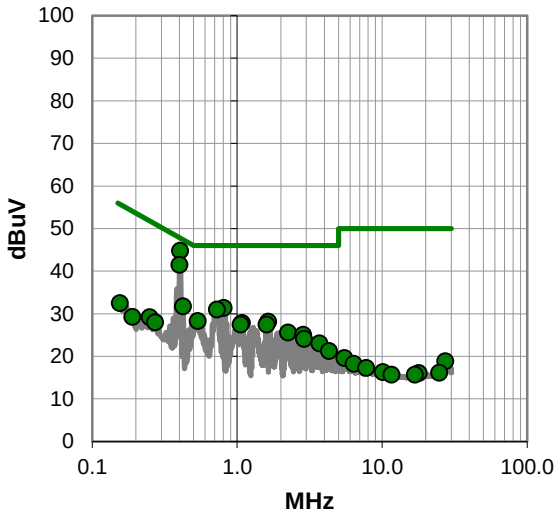
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.03.25.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #1

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.402	28.5	20.2	48.7	57.8	-9.1
0.399	26.1	20.2	46.3	57.9	-11.6
0.805	16.3	20.2	36.5	56.0	-19.5
0.724	15.8	20.2	36.0	56.0	-20.0
1.056	14.0	20.2	34.2	56.0	-21.8
1.077	13.7	20.2	33.9	56.0	-22.1
1.590	12.9	20.3	33.2	56.0	-22.8
0.535	12.7	20.2	32.9	56.0	-23.1
1.862	12.4	20.3	32.7	56.0	-23.3
2.224	12.0	20.3	32.3	56.0	-23.7
2.475	11.9	20.3	32.2	56.0	-23.8
3.089	10.9	20.3	31.2	56.0	-24.8
3.663	10.2	20.3	30.5	56.0	-25.5
0.191	17.6	20.4	38.0	64.0	-26.0
0.152	19.3	20.4	39.7	65.9	-26.2
0.232	15.3	20.4	35.7	62.4	-26.7
4.277	8.6	20.3	28.9	56.0	-27.1
0.271	13.5	20.4	33.9	61.1	-27.2
5.757	6.8	20.4	27.2	60.0	-32.8
6.352	5.4	20.4	25.8	60.0	-34.2
7.790	4.1	20.6	24.7	60.0	-35.3
27.090	2.2	22.5	24.7	60.0	-35.3
9.827	2.2	20.6	22.8	60.0	-37.2
17.819	1.4	21.4	22.8	60.0	-37.2
24.818	0.1	22.2	22.3	60.0	-37.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.404	24.6	20.2	44.8	47.8	-3.0
0.399	21.3	20.2	41.5	47.9	-6.4
0.807	11.2	20.2	31.4	46.0	-14.6
0.724	10.8	20.2	31.0	46.0	-15.0
0.422	11.6	20.2	31.8	47.4	-15.6
0.532	8.1	20.2	28.3	46.0	-17.7
1.633	7.9	20.3	28.2	46.0	-17.8
1.077	7.7	20.2	27.9	46.0	-18.1
1.056	7.3	20.2	27.5	46.0	-18.5
1.592	7.2	20.3	27.5	46.0	-18.5
2.244	5.3	20.3	25.6	46.0	-20.4
2.842	4.8	20.3	25.1	46.0	-20.9
2.883	3.8	20.3	24.1	46.0	-21.9
0.248	8.8	20.4	29.2	51.8	-22.6
3.688	2.8	20.3	23.1	46.0	-22.9
0.271	7.6	20.4	28.0	51.1	-23.1
0.155	12.1	20.4	32.5	55.8	-23.3
4.299	1.0	20.3	21.3	46.0	-24.7
0.189	8.9	20.4	29.3	54.1	-24.8
5.485	-0.8	20.4	19.6	50.0	-30.4
27.177	-3.6	22.5	18.9	50.0	-31.1
6.350	-2.1	20.4	18.3	50.0	-31.7
7.769	-3.3	20.6	17.3	50.0	-32.7
10.115	-4.4	20.7	16.3	50.0	-33.7
24.731	-6.0	22.2	16.2	50.0	-33.8

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.03.25.0
PSA-ESCI 2021.03.17.0

EUT:	Smart Tracking Collar	Work Order:	PAON0005
Serial Number:	0013	Date:	2021-05-21
Customer:	Paragon Innovations, Inc.	Temperature:	22.4°C
Attendees:	Alan Hasty	Relative Humidity:	53.7%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Brandon Hobbs	Job Site:	TX01
Power:	5 VDC	Configuration:	POAN0005-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	2	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

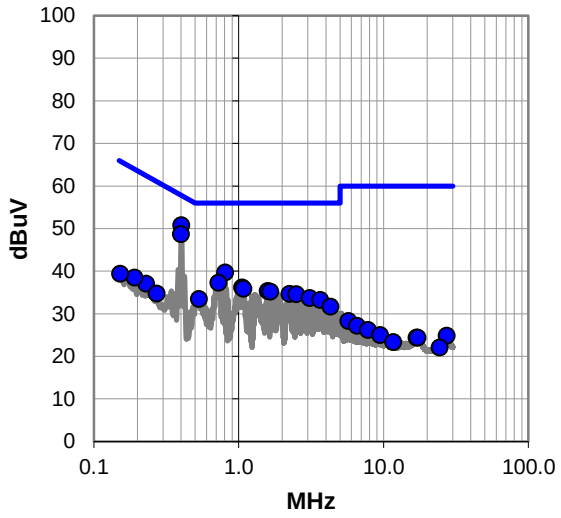
EUT OPERATING MODES

BT Mid Channel 2440 MHz Continuous Tx 1 Mbps

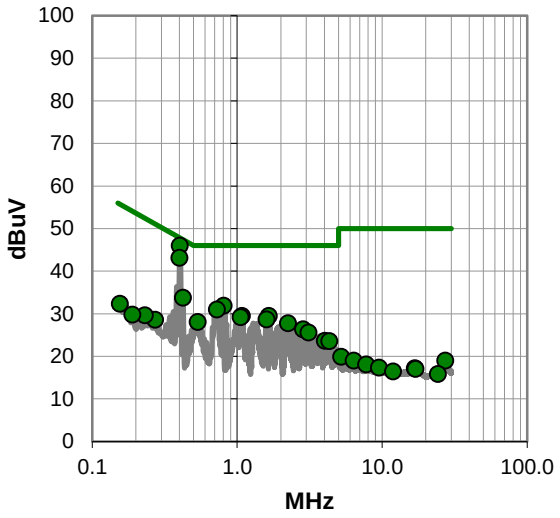
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.03.25.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.402	30.6	20.2	50.8	57.8	-7.0
0.399	28.5	20.2	48.7	57.9	-9.2
0.805	19.5	20.2	39.7	56.0	-16.3
0.724	17.1	20.2	37.3	56.0	-18.7
1.056	16.0	20.2	36.2	56.0	-19.8
1.077	15.7	20.2	35.9	56.0	-20.1
1.590	15.1	20.3	35.4	56.0	-20.6
1.649	14.9	20.3	35.2	56.0	-20.8
2.244	14.4	20.3	34.7	56.0	-21.3
2.494	14.3	20.3	34.6	56.0	-21.4
3.086	13.4	20.3	33.7	56.0	-22.3
0.532	13.3	20.2	33.5	56.0	-22.5
3.661	13.0	20.3	33.3	56.0	-22.7
4.293	11.4	20.3	31.7	56.0	-24.3
0.230	16.7	20.4	37.1	62.4	-25.3
0.191	18.1	20.4	38.5	64.0	-25.5
0.271	14.4	20.4	34.8	61.1	-26.3
0.152	19.0	20.4	39.4	65.9	-26.5
5.732	7.9	20.4	28.3	60.0	-31.7
6.556	6.8	20.4	27.2	60.0	-32.8
7.783	5.6	20.6	26.2	60.0	-33.8
9.490	4.4	20.6	25.0	60.0	-35.0
27.340	2.4	22.5	24.9	60.0	-35.1
16.947	3.0	21.4	24.4	60.0	-35.6
17.151	3.0	21.4	24.4	60.0	-35.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.402	25.8	20.2	46.0	47.8	-1.8
0.399	23.0	20.2	43.2	47.9	-4.7
0.422	13.6	20.2	33.8	47.4	-13.6
0.805	11.7	20.2	31.9	46.0	-14.1
0.724	10.8	20.2	31.0	46.0	-15.0
1.651	9.2	20.3	29.5	46.0	-16.5
1.077	9.3	20.2	29.5	46.0	-16.5
1.056	9.0	20.2	29.2	46.0	-16.8
1.590	8.4	20.3	28.7	46.0	-17.3
0.532	7.9	20.2	28.1	46.0	-17.9
2.244	7.5	20.3	27.8	46.0	-18.2
2.839	6.1	20.3	26.4	46.0	-19.6
3.109	5.3	20.3	25.6	46.0	-20.4
4.025	3.4	20.3	23.7	46.0	-22.3
4.315	3.3	20.3	23.6	46.0	-22.4
0.271	8.2	20.4	28.6	51.1	-22.5
0.230	9.3	20.4	29.7	52.4	-22.7
0.155	12.0	20.4	32.4	55.8	-23.4
0.189	9.4	20.4	29.8	54.1	-24.3
5.203	-0.4	20.3	19.9	50.0	-30.1
6.348	-1.4	20.4	19.0	50.0	-31.0
27.232	-3.5	22.5	19.0	50.0	-31.0
7.765	-2.5	20.6	18.1	50.0	-31.9
9.490	-3.2	20.6	17.4	50.0	-32.6
16.805	-4.2	21.4	17.2	50.0	-32.8

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	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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

element

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			**Work Order:**	PAON0005
Serial Number:	02			**Date:**	28-Aug-20
Customer:	Paragon Innovations, Inc.			**Temperature:**	22.7 °C
Attendees:	Alan Hasty			**Humidity:**	53% RH
Project:	None			**Barometric Pres.:**	1011 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

DEVIATIONS FROM TEST STANDARD

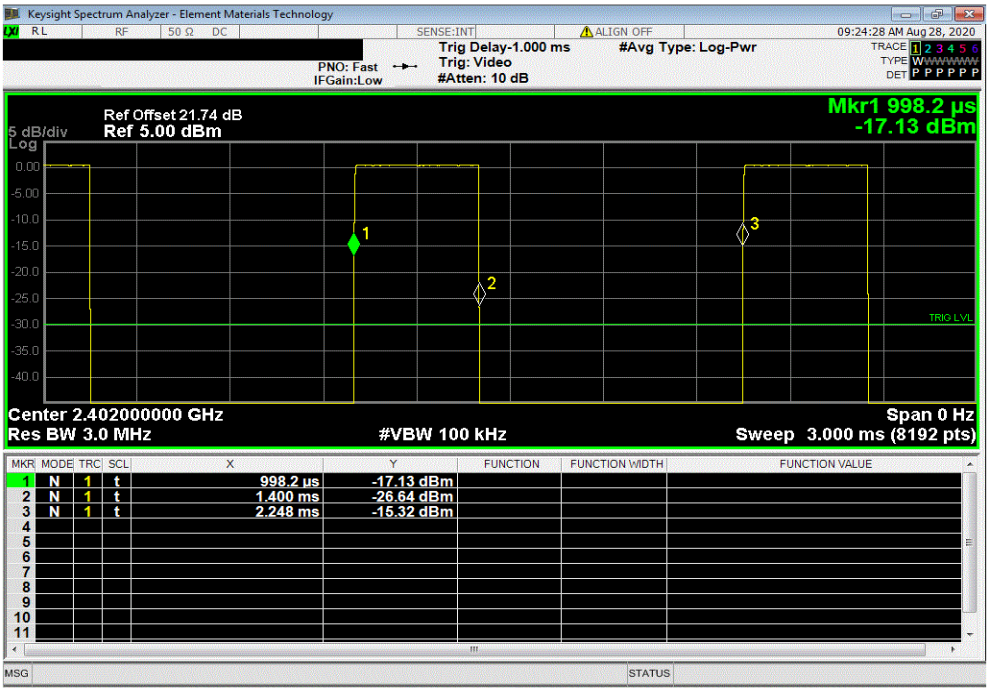
None

Configuration #	1	Signature

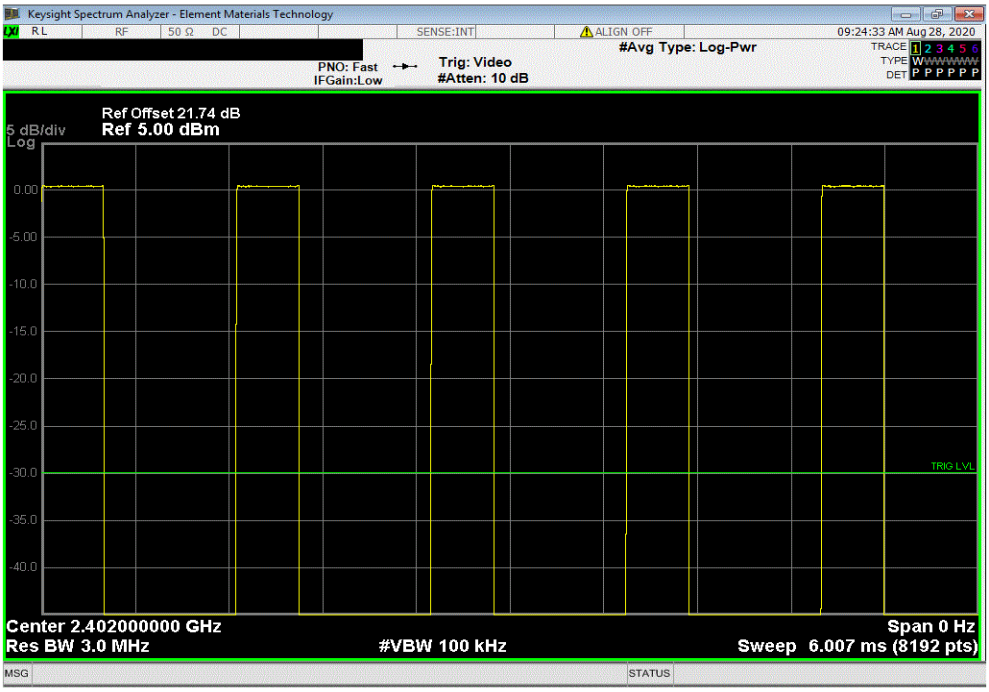
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	401.662 us	1.25 ms	1	32.1	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	402.166 us	1.25 ms	1	32.2	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz	401.26 us	1.25 ms	1	32.1	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

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	401.662 us	1.25 ms	1	32.1	N/A	N/A

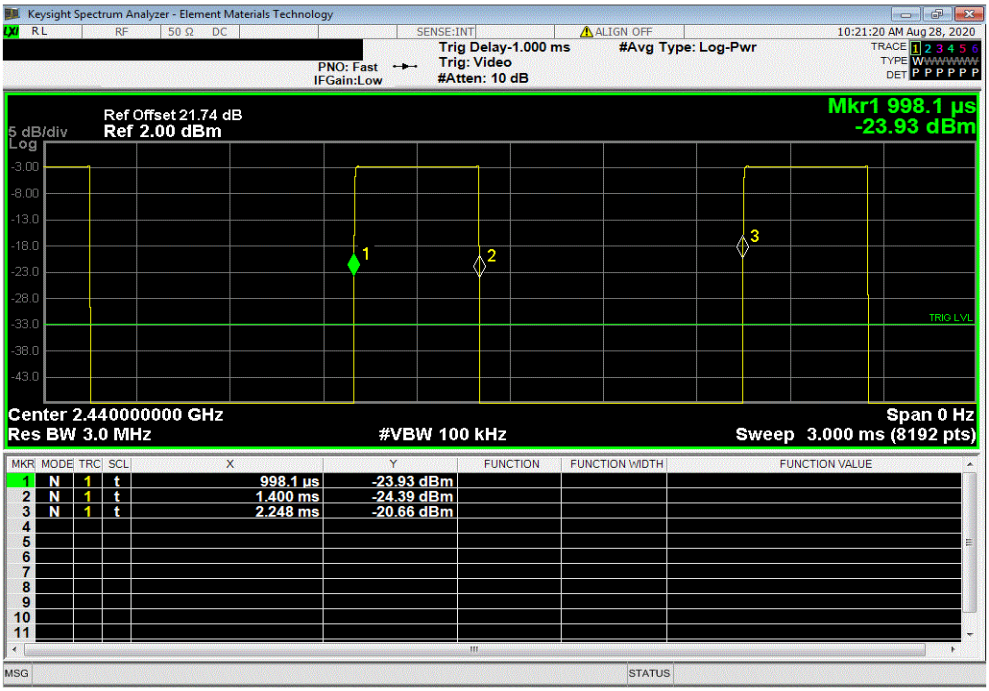


BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

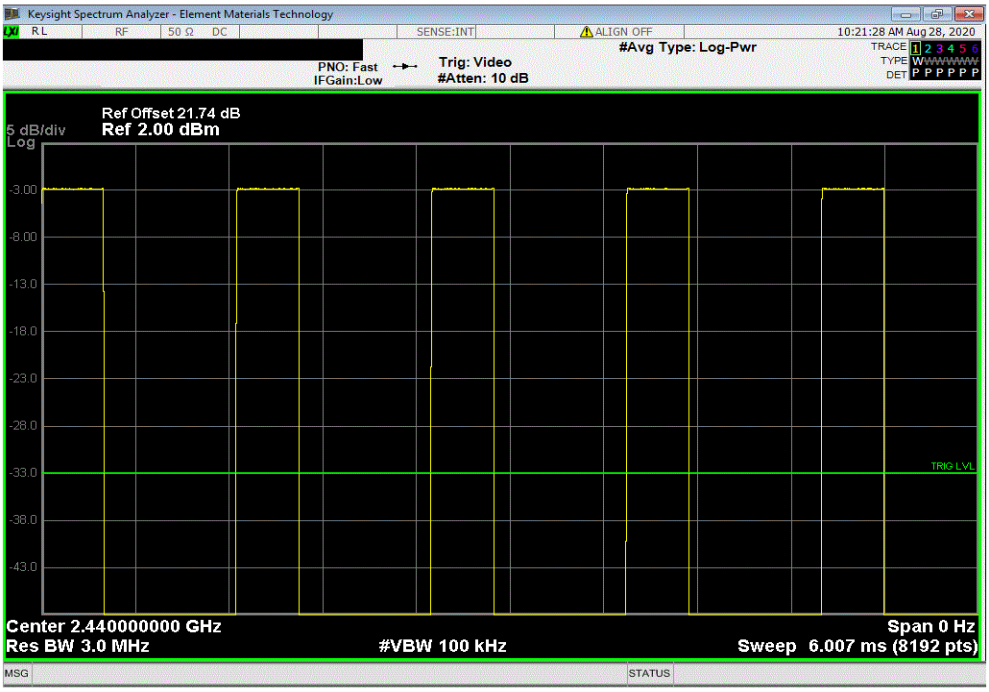


DUTY CYCLE

BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	402.166 us	1.25 ms	1	32.2	N/A	N/A

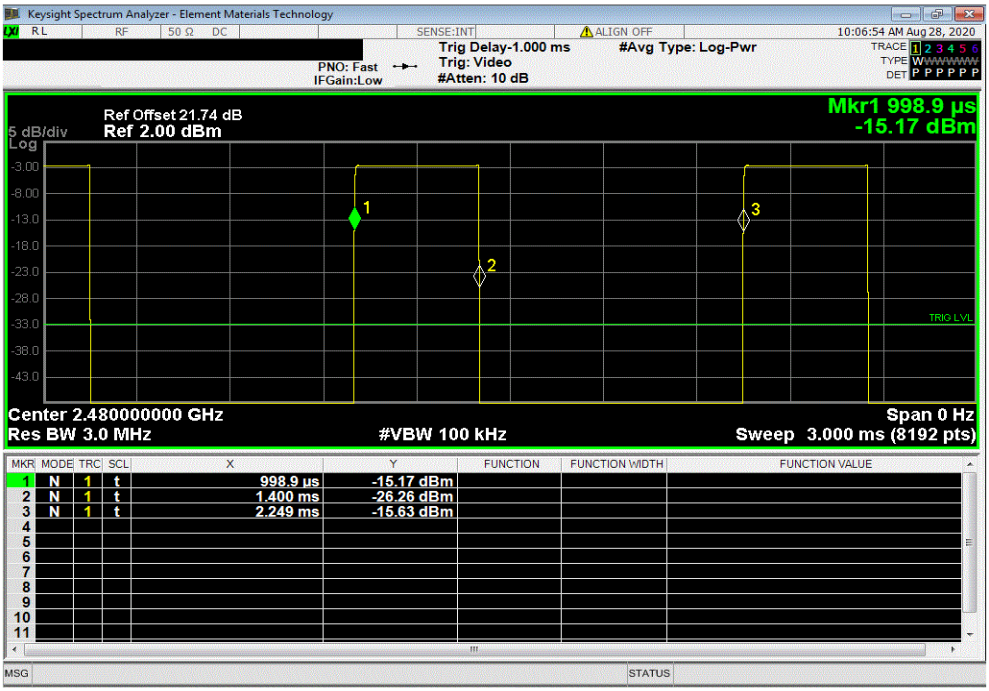


BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

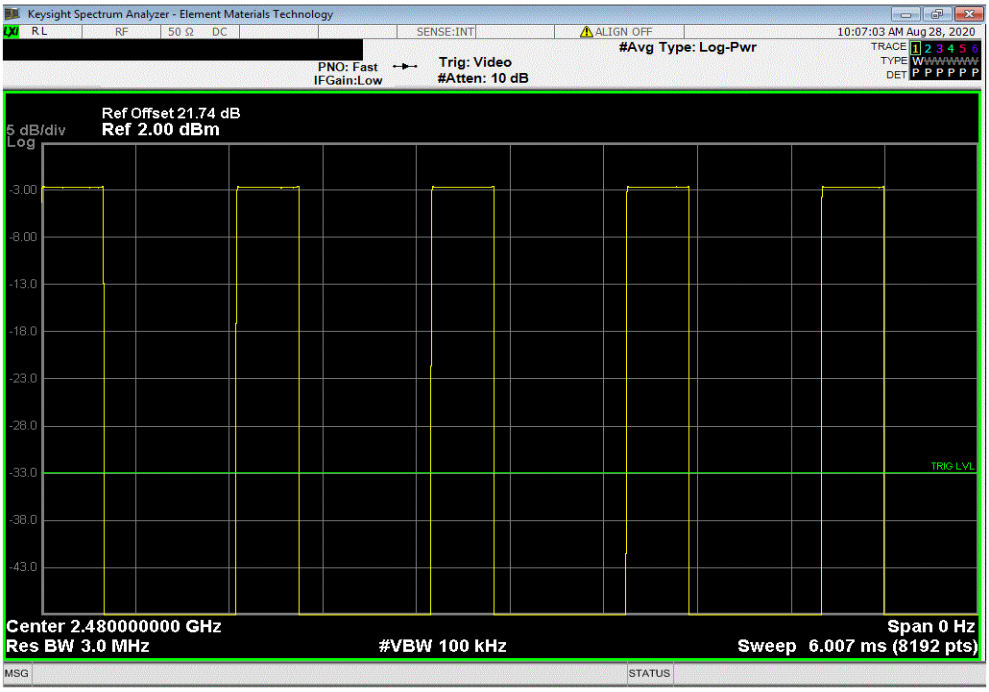


DUTY CYCLE

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	401.26 us	1.25 ms	1	32.1	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	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			**Work Order:**	PAON0005
Serial Number:	02			**Date:**	28-Aug-20
Customer:	Paragon Innovations, Inc.			**Temperature:**	22.6 °C
Attendees:	Alan Hasty			**Humidity:**	54.1% RH
Project:	None			**Barometric Pres.:**	1012 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

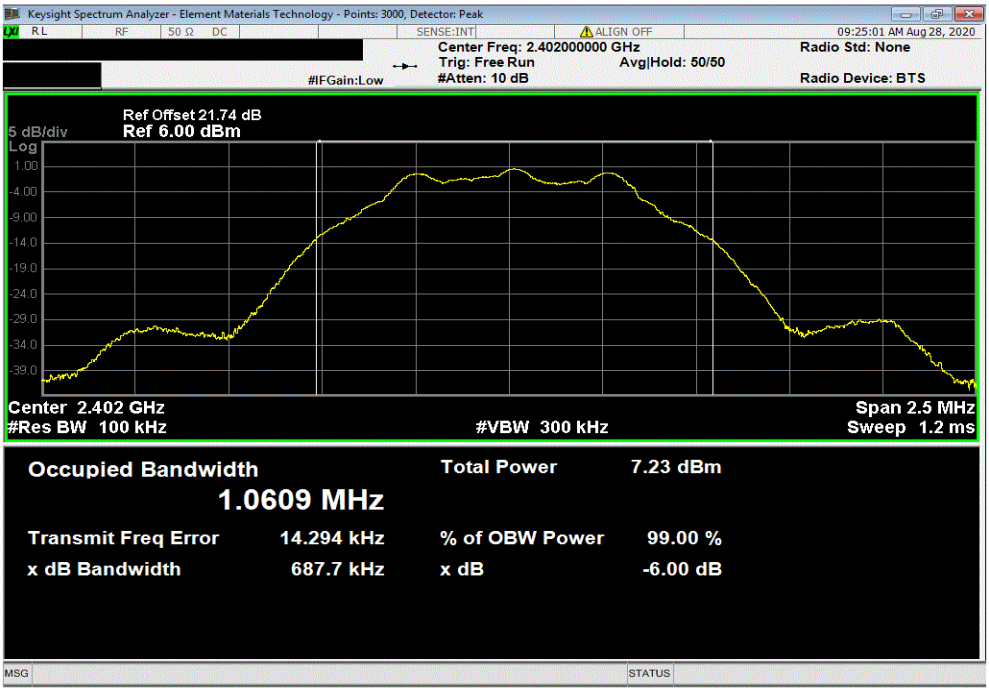
DEVIATIONS FROM TEST STANDARD

None

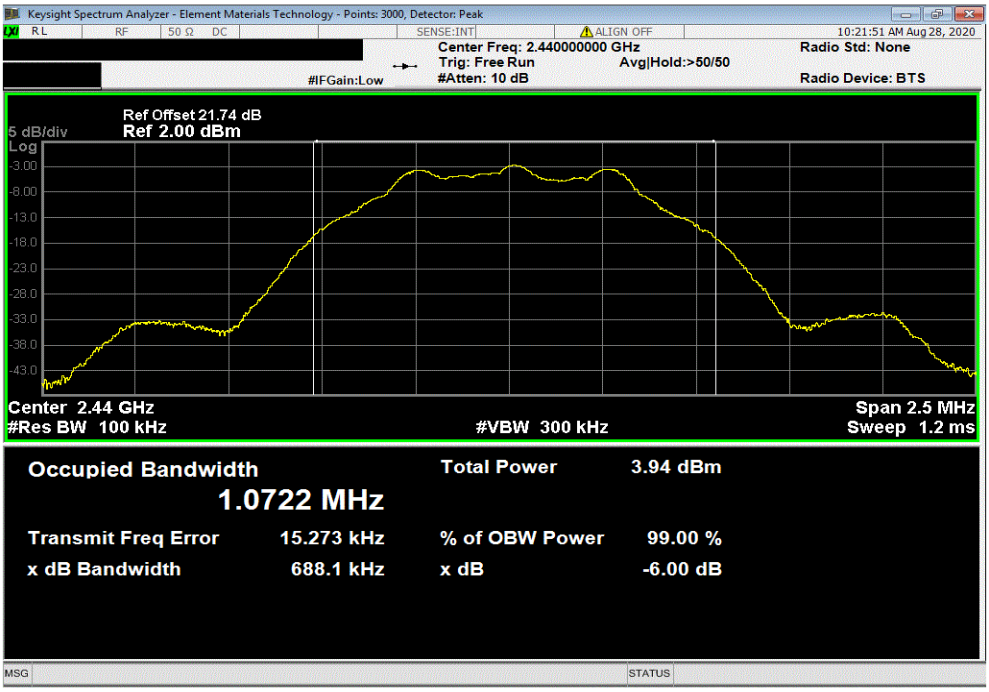
Configuration #	1	Signature

	Value	Limit (≥)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	687.724 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	688.103 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	709.839 kHz	500 kHz	Pass

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



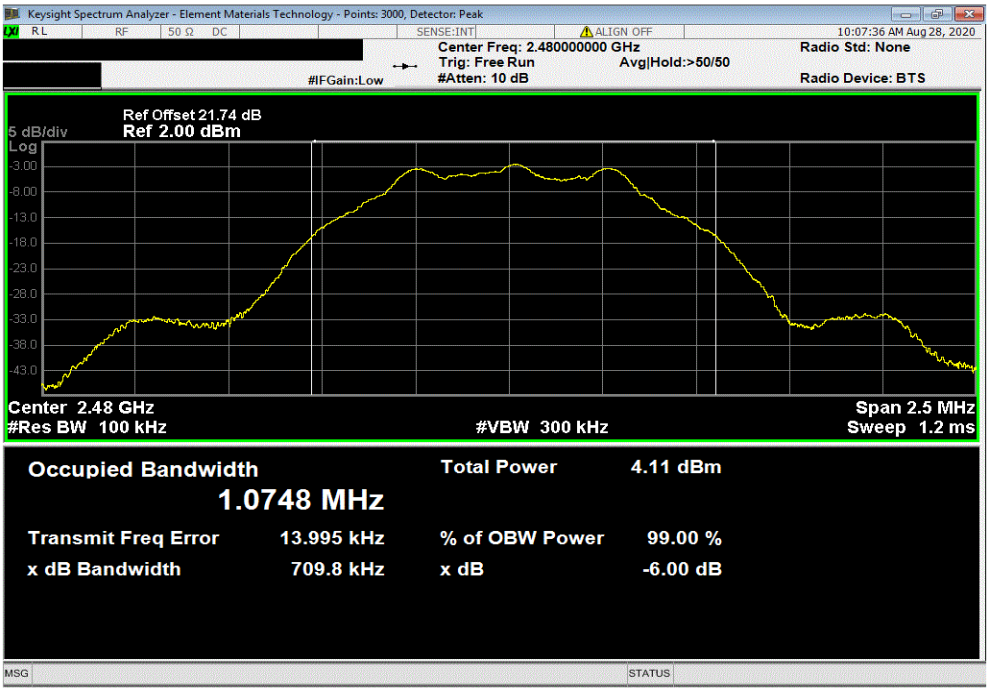
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
				Value	Limit (≥)	Result
				688.103 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH

TbtTx 2019.08.30.0 XMit 2020.03.25.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				709.839 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	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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

element

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			**Work Order:**	PAON0005
Serial Number:	02			**Date:**	28-Aug-20
Customer:	Paragon Innovations, Inc.			**Temperature:**	22.9 °C
Attendees:	Alan Hasty			**Humidity:**	53.8% RH
Project:	None			**Barometric Pres.:**	1012 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

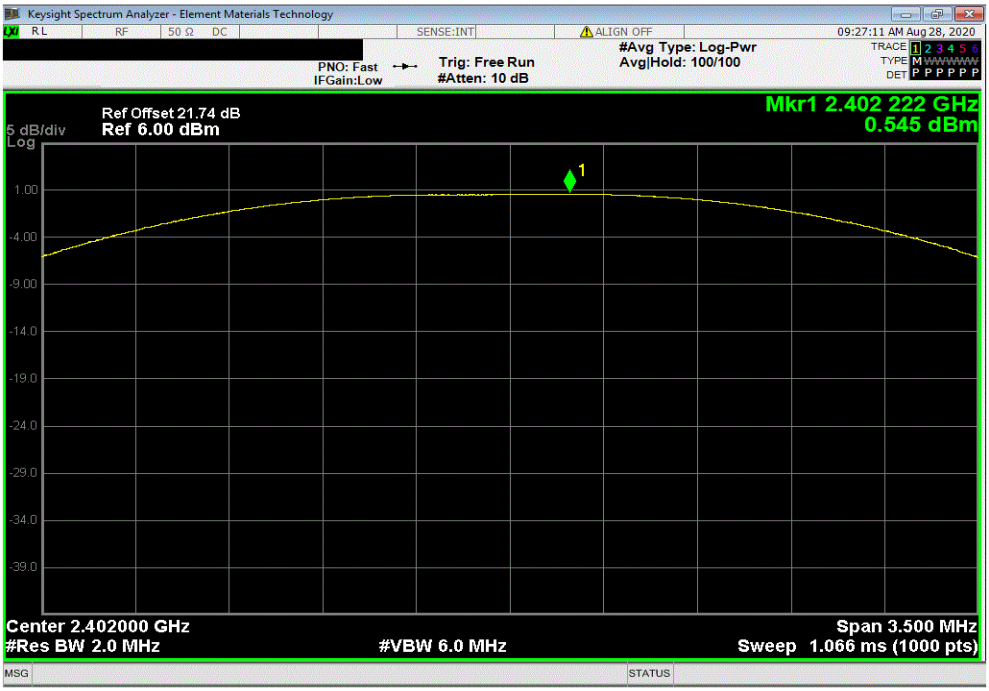
DEVIATIONS FROM TEST STANDARD

None

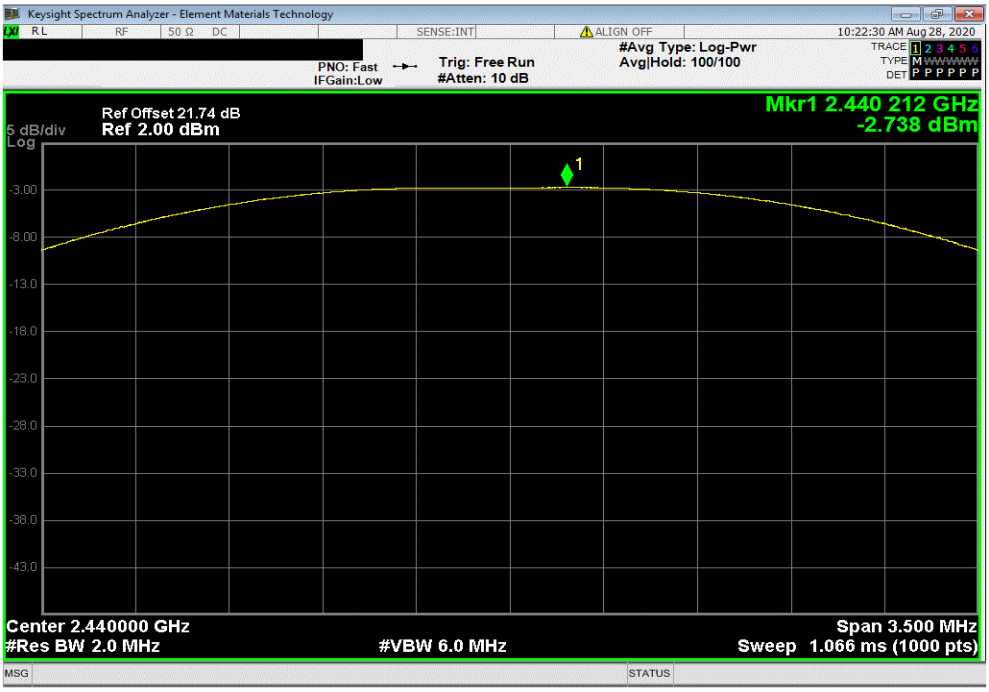
Configuration #	1	Signature

	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	0.545	30	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	-2.738	30	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-2.531	30	Pass

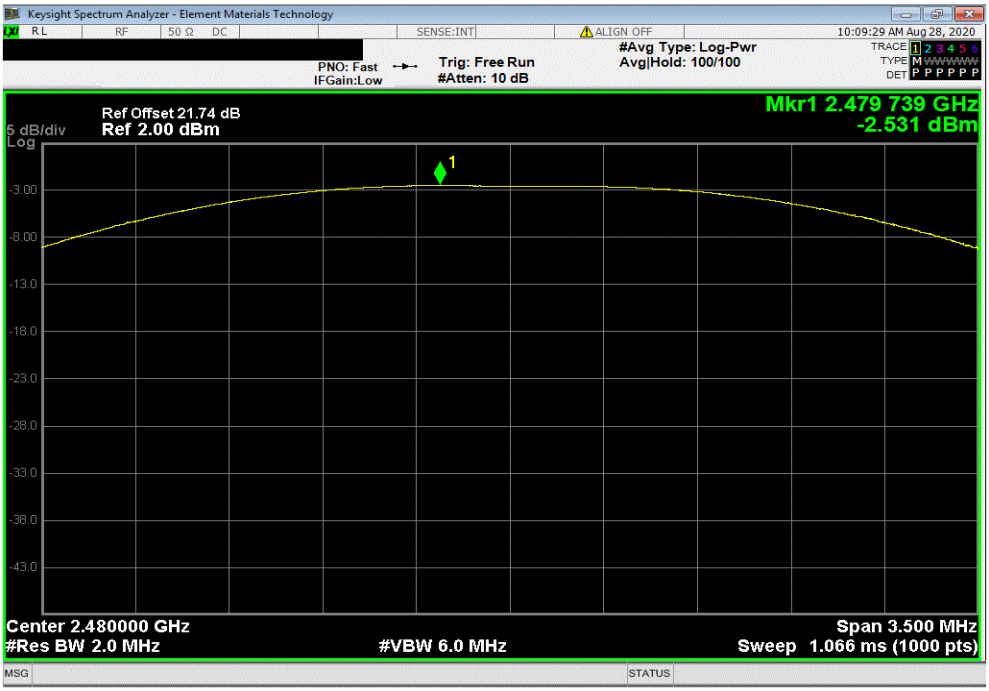
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.545	30	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-2.738	30	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-2.531	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
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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)

element

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			**Work Order:**	PAON0005
Serial Number:	02			**Date:**	28-Aug-20
Customer:	Paragon Innovations, Inc.			**Temperature:**	22.9 °C
Attendees:	Alan Hasty			**Humidity:**	55.7% RH
Project:	None			**Barometric Pres.:**	1013 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

DEVIATIONS FROM TEST STANDARD

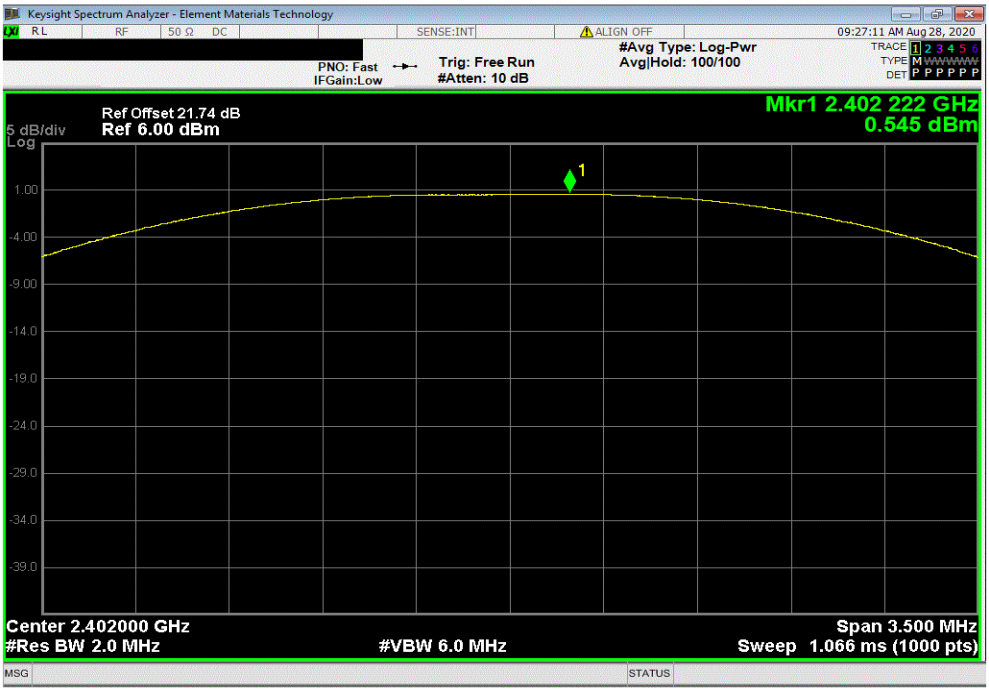
None

Configuration #	1	Signature

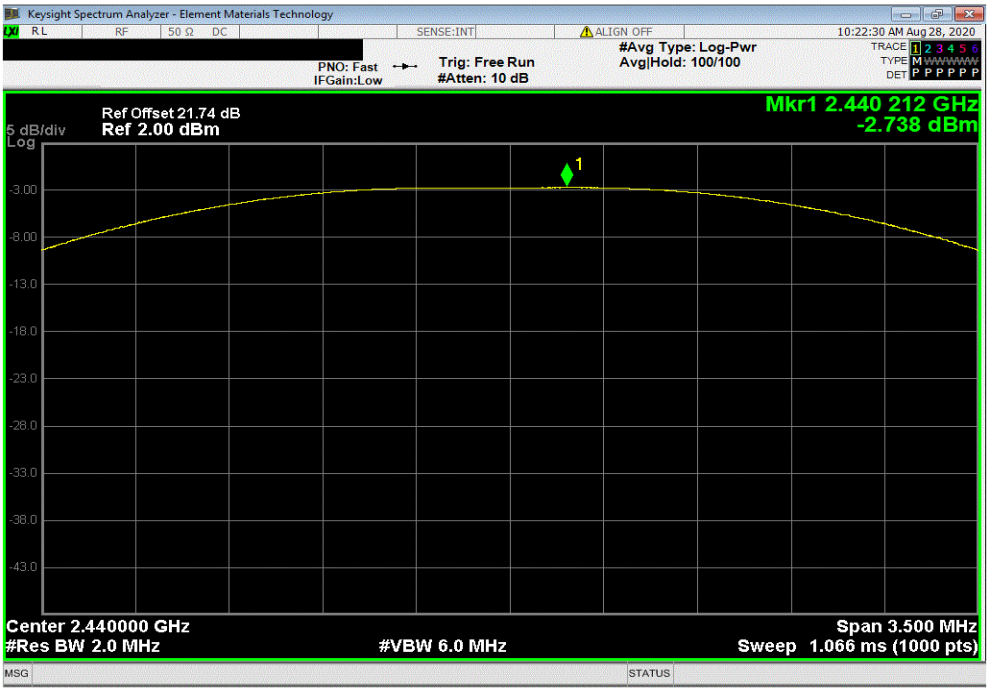
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	0.545	2.5	3.045	36	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	-2.738	2.5	-0.238	36	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-2.531	2.5	-0.031	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		0.545	2.5	3.045	36	Pass

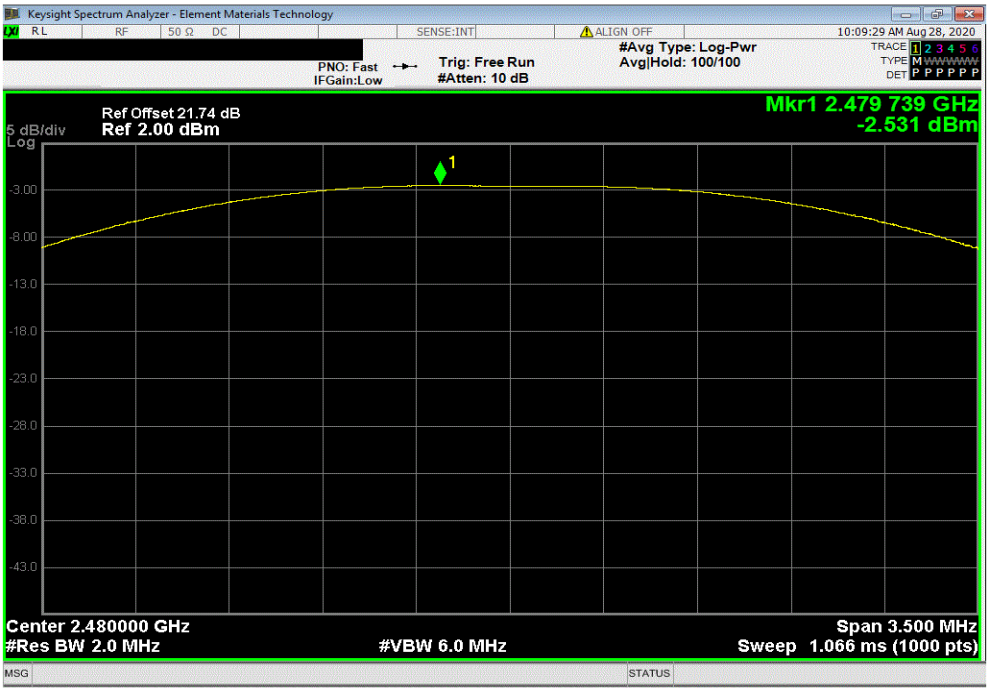


BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-2.738	2.5	-0.238	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-2.531	2.5	-0.031	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	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			Work Order:	PAON0005
Serial Number:	02			Date:	28-Aug-20
Customer:	Paragon Innovations, Inc.			Temperature:	22.8 °C
Attendees:	Alan Hasty			Humidity:	53.2% RH
Project:	None			Barometric Pres.:	1012 mbar
Tested by:	Brandon Hobbs	Power:	5 VDC	Job Site:	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

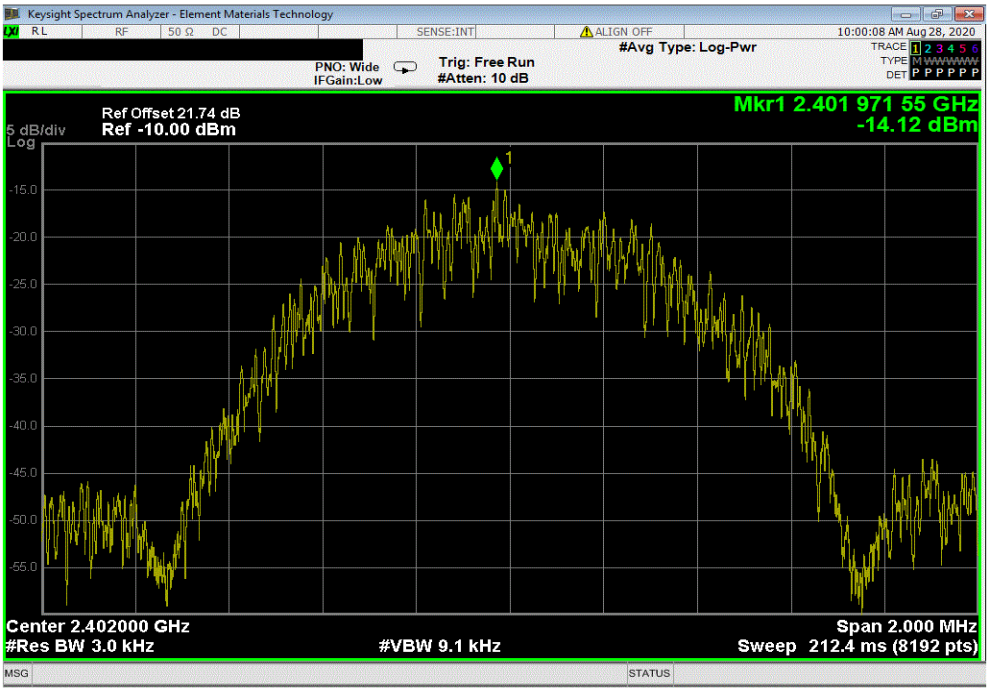
DEVIATIONS FROM TEST STANDARD

None

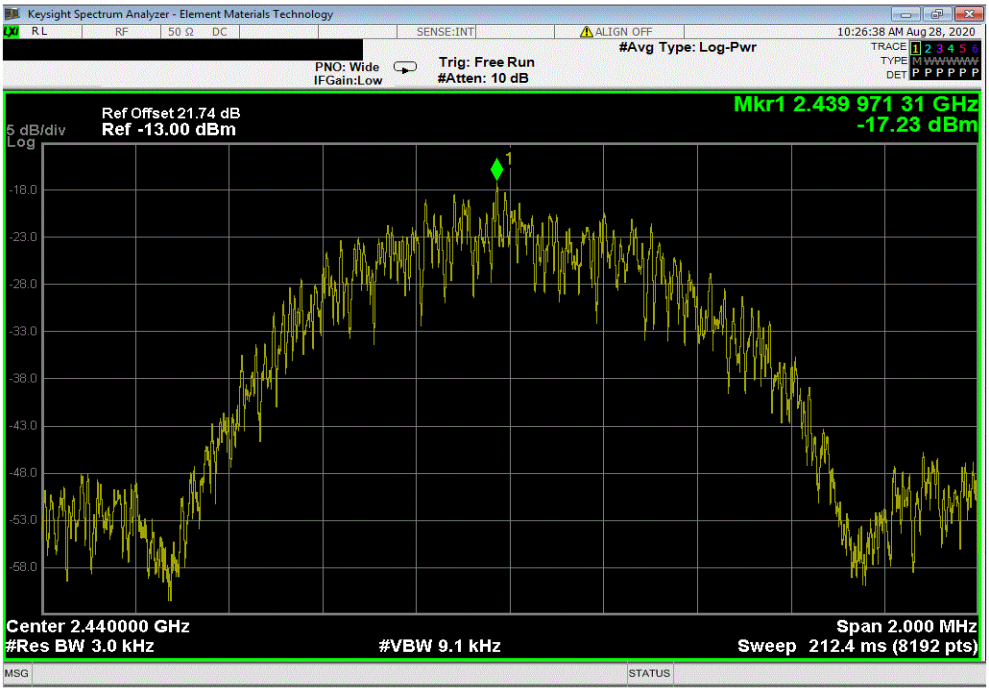
Configuration #	1	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-14.117	8	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	-17.233	8	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-17.242	8	Pass

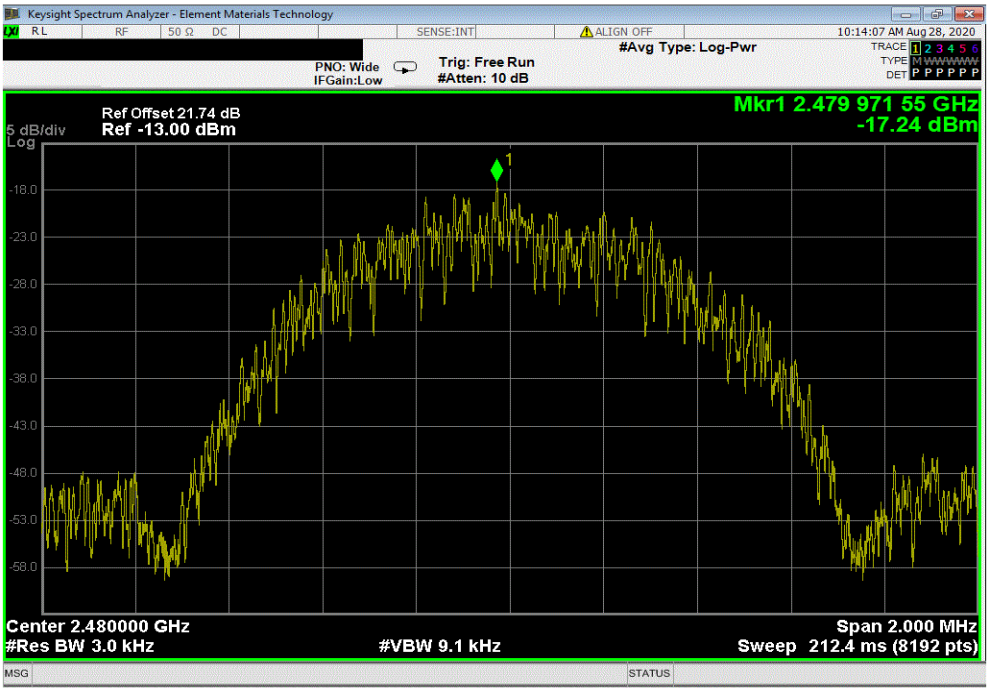
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.117	8	Pass



BLE/GFSK 1 Mbps Mid Channel, 2440 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.233	8	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.242	8	Pass



BAND EDGE COMPLIANCE

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	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20

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

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			Work Order:	PAON0005
Serial Number:	02			Date:	28-Aug-20
Customer:	Paragon Innovations, Inc.			Temperature:	22.4 °C
Attendees:	Alan Hasty			Humidity:	54.2% RH
Project:	None			Barometric Pres.:	1012 mbar
Tested by:	Brandon Hobbs	Power:	Battery	Job Site:	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

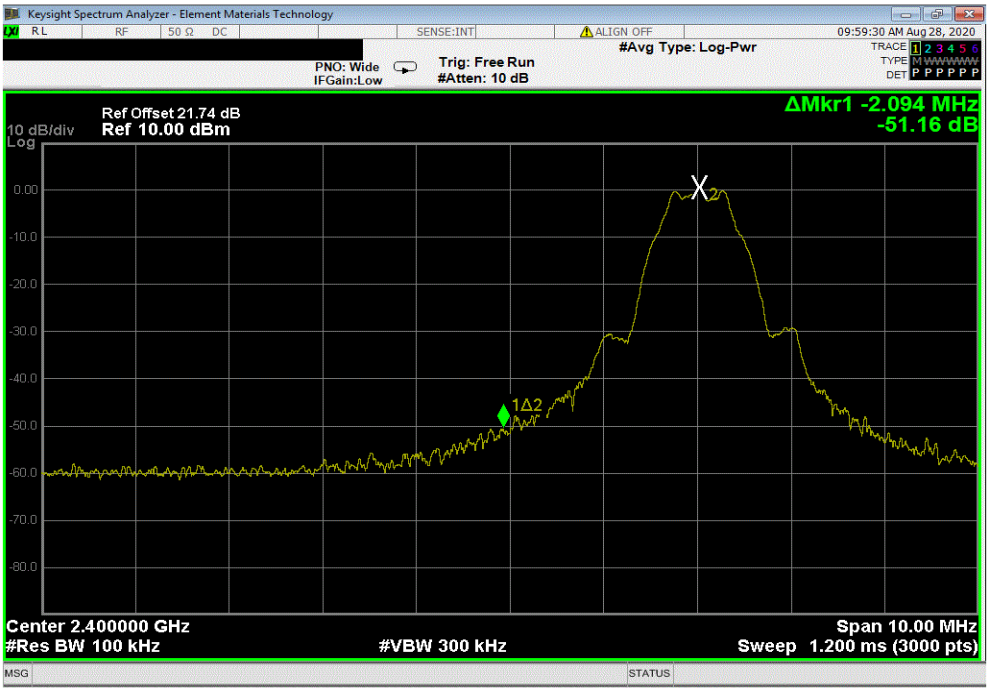
DEVIATIONS FROM TEST STANDARD

None

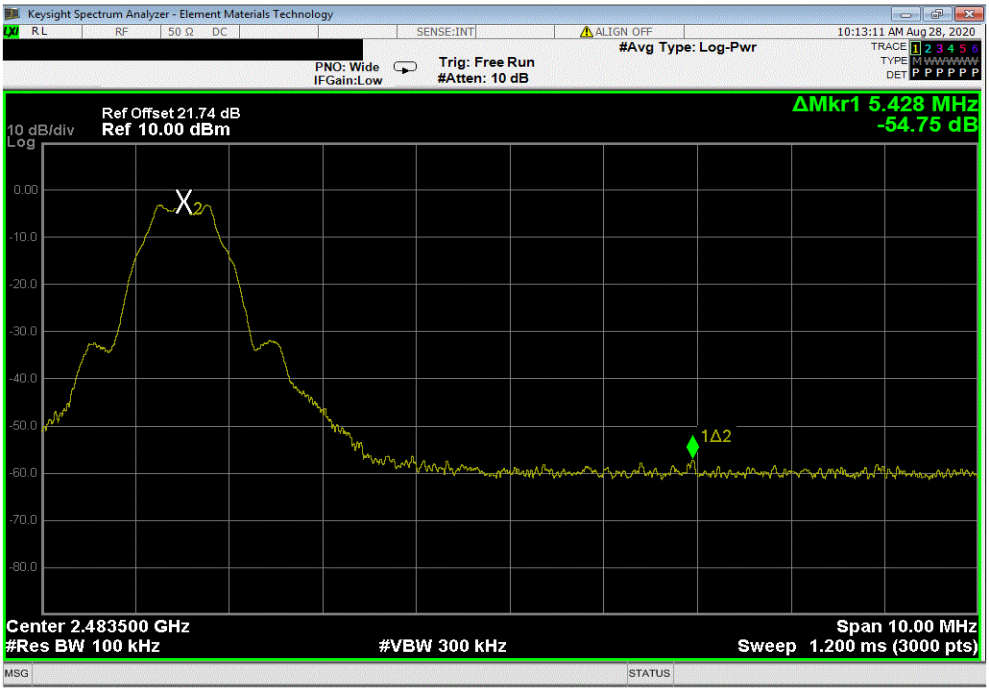
Configuration #	1	Signature

	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-51.16	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-54.75	-20	Pass

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.16	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.75	-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
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	18-Sep-19	18-Sep-20
Block - DC	Fairview Microwave	SD3379	AMM	13-Mar-20	13-Mar-21
Attenuator	Fairview Microwave	SA4018-20	TYW	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-20	27-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-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

TbtTx 2019.08.30.0 XMit 2020.03.25.0

EUT:	Smart Tracking Collar			**Work Order:**	PAON0005
Serial Number:	02			**Date:**	28-Aug-20
Customer:	Paragon Innovations, Inc.			**Temperature:**	22.6 °C
Attendees:	Alan Hasty			**Humidity:**	55.7% RH
Project:	None			**Barometric Pres.:**	1013 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC	**Job Site:**	TX05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

All losses in the RF measurement path were accounted for: DC block, attenuator, cable.

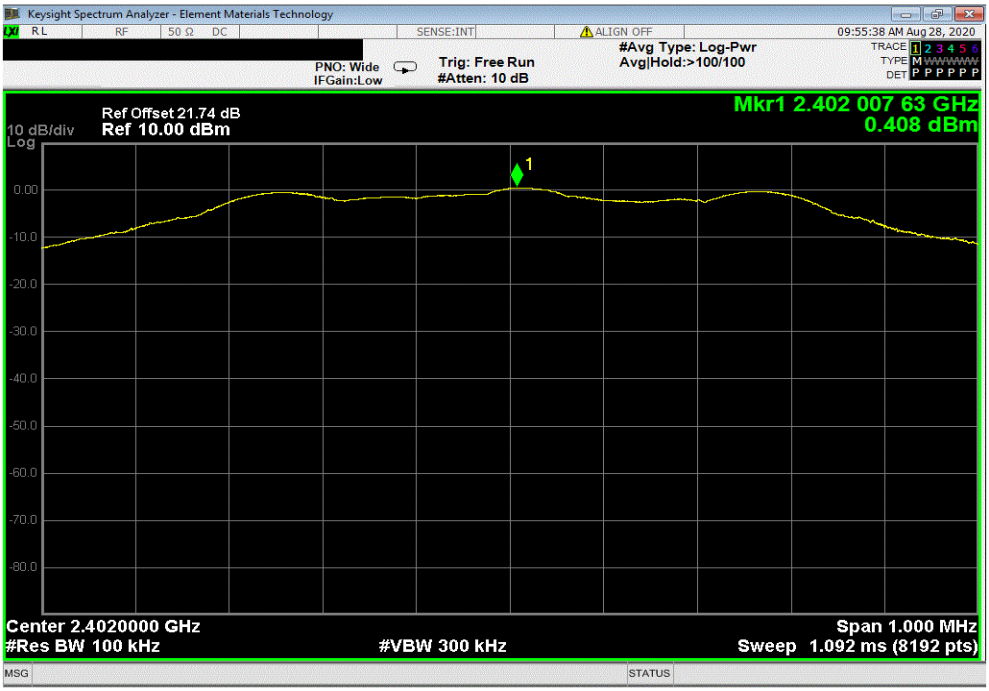
DEVIATIONS FROM TEST STANDARD

None

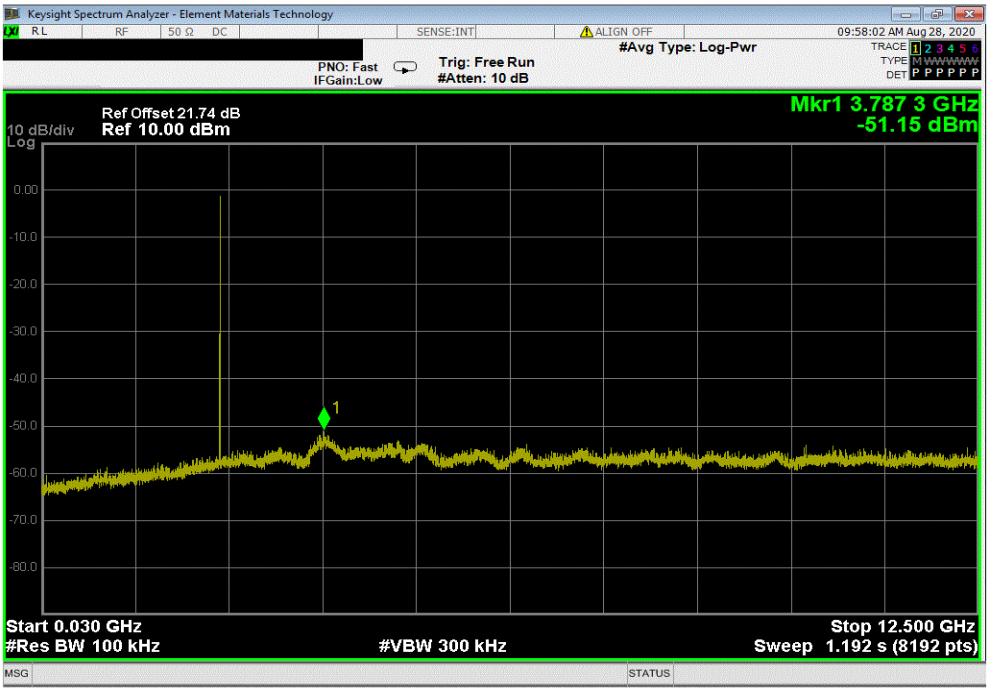
Configuration #	1	Signature

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	Fundamental	2402.01	N/A	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	30 MHz - 12.5 GHz	3787.29	-51.15	-20	Pass
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	12.5 GHz - 25 GHz	23992.8	-51.04	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	Fundamental	2440.01	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	5204.65	-46.56	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	24145.4	-48.57	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	Fundamental	2480.01	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz	30 MHz - 12.5 GHz	3772.07	-48.57	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	12.5 GHz - 25 GHz	24090.47	-47.7	-20	Pass

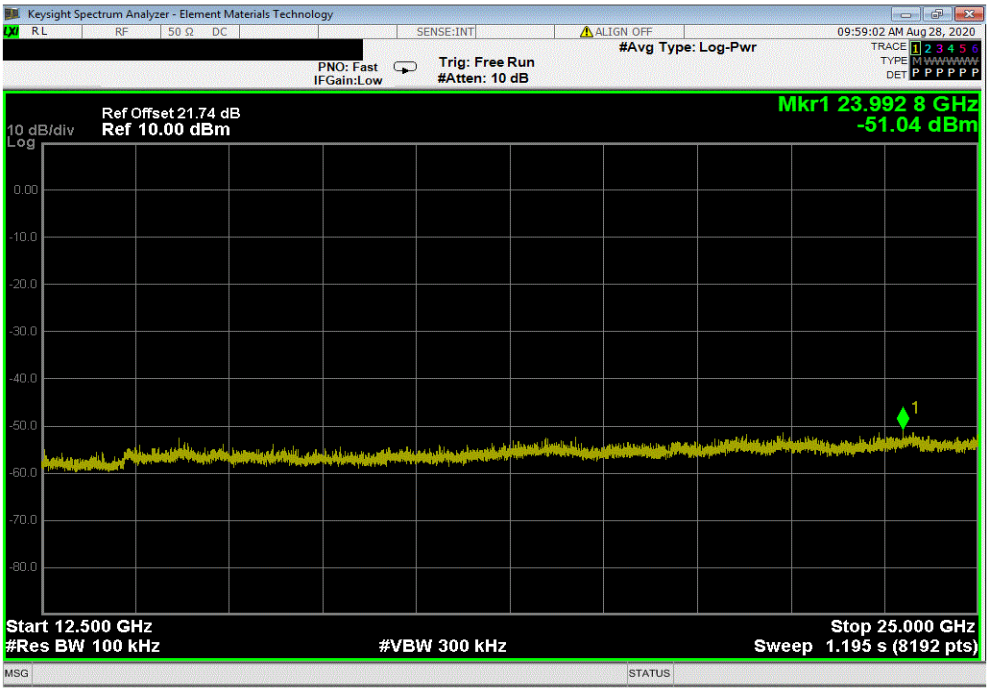
BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2402.01	N/A	N/A	N/A



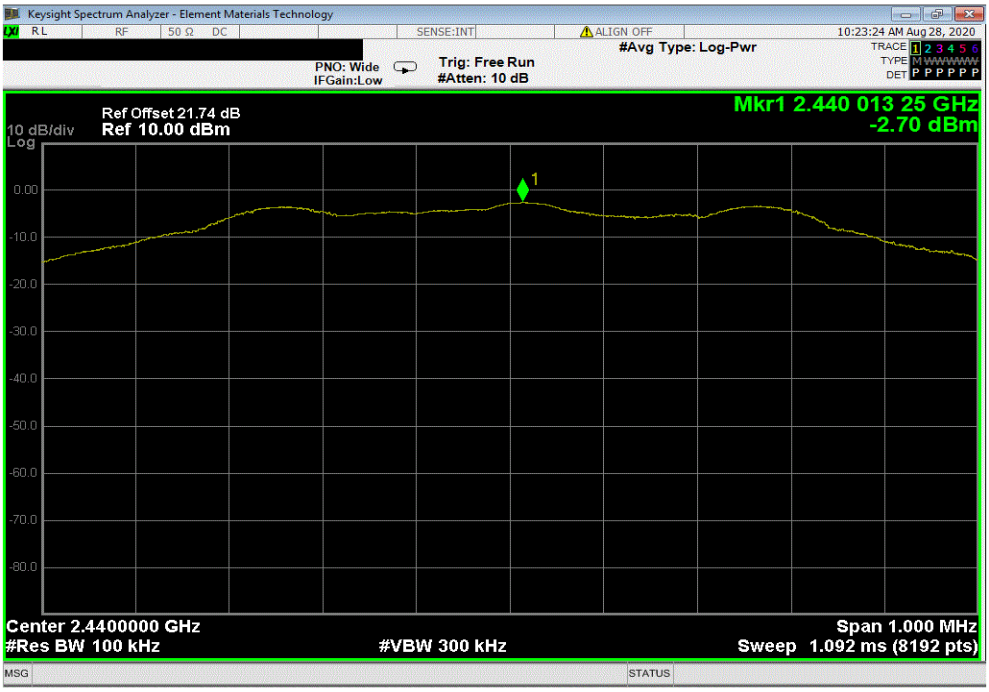
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3787.29	-51.15	-20	Pass



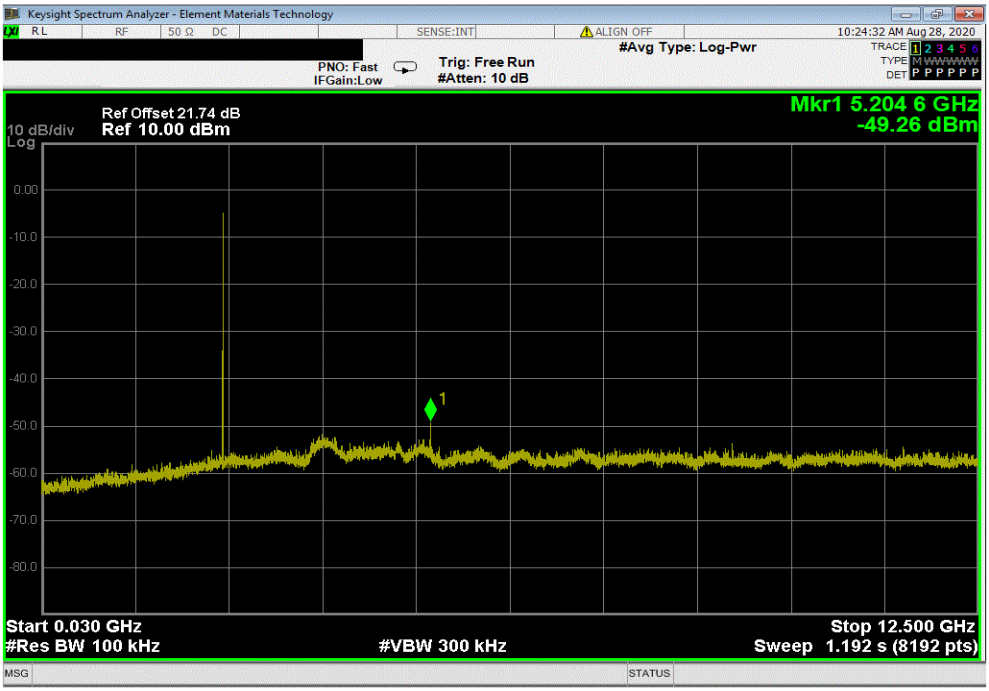
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	23992.8	-51.04	-20	Pass



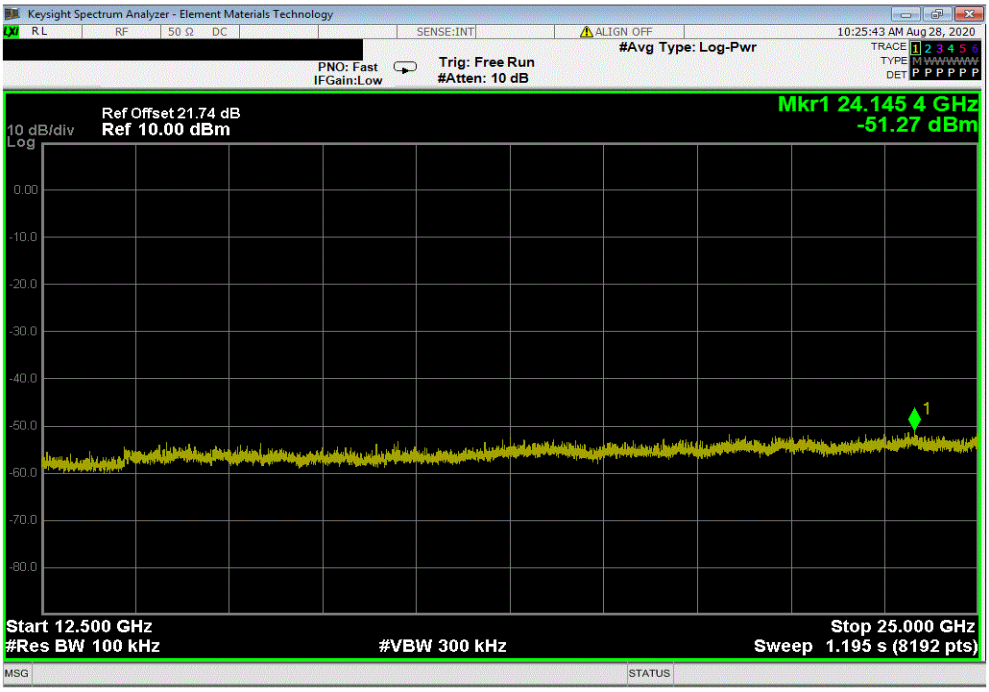
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2440.01	N/A	N/A	N/A



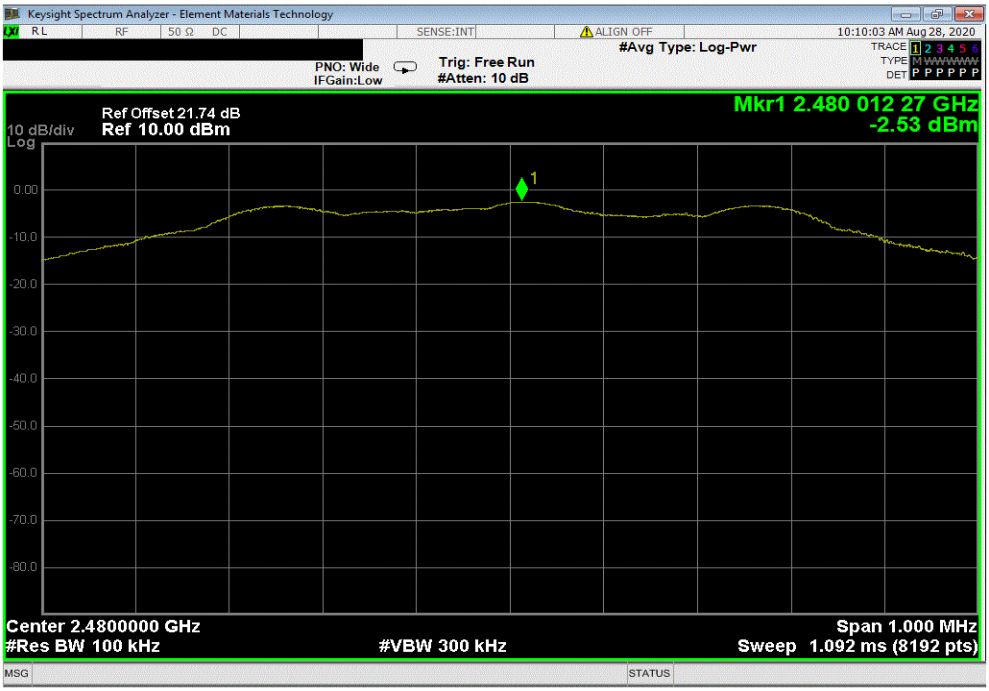
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	5204.65	-46.56	-20	Pass



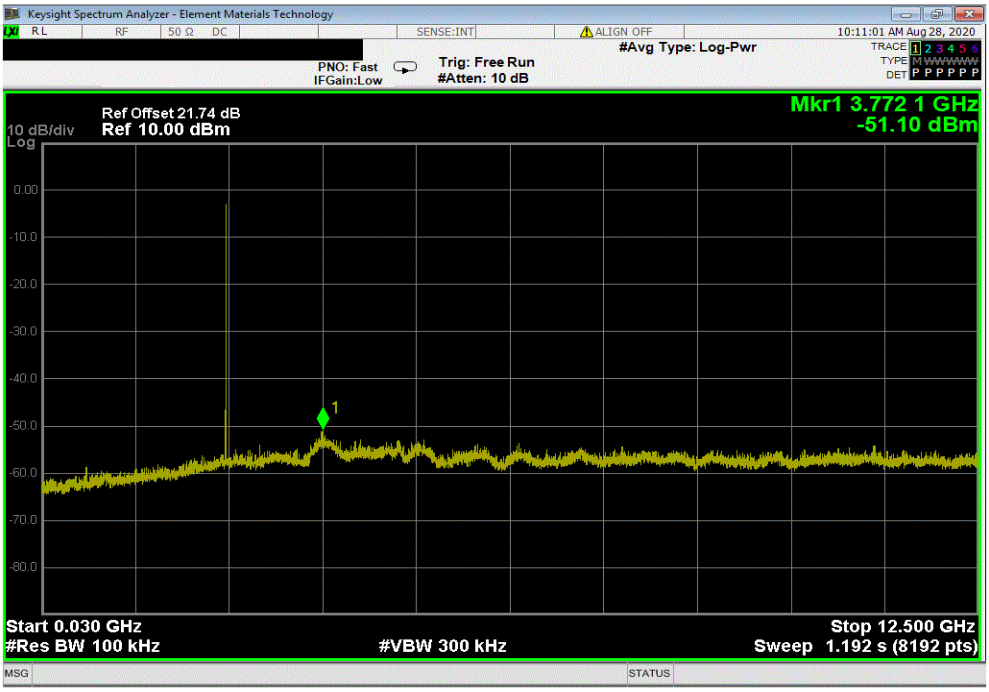
BLE/GFSK 1 Mbps Mid Channel, 2440 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24145.4	-48.57	-20	Pass



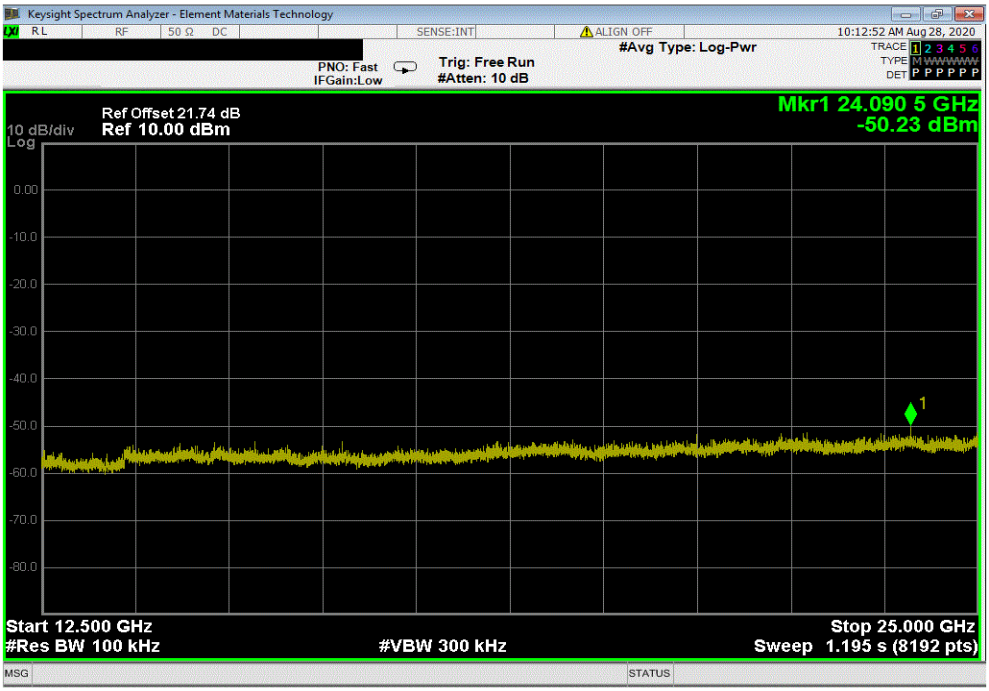
BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2480.01	N/A	N/A	N/A



BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3772.07	-48.57	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24090.47	-47.7	-20	Pass



SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2020.04.03.0

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

BTLE continuous Tx, Low Channel 2402 MHz
BTLE continuous Tx, Mid Channel 2440 MHz
BTLE continuous Tx, High Channel 2480 MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

PAON0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

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
Antenna - Biconilog	Teseq	CBL 6141B	AYD	2020-02-05	24 mo
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	2020-05-28	12 mo
Attenuator	Weinschel Corp	4H-20	AWB	2020-03-11	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	0 mo
Cable	Northwest EMC	18-40GHz	TXE	2019-09-20	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	2019-09-20	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	2020-09-18	12 mo
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	2020-05-28	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2020-05-07	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJL	2018-10-11	24 mo
Cable	Northwest EMC	1-8.2 GHz	TXC	2020-06-02	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	2020-06-02	12 mo
Cable	Northwest EMC	8-18GHz	TXD	2020-05-14	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	2020-09-18	12 mo
Filter - high Pass	Micro-Tronics	HPM50108	HGD	2020-09-18	12 mo

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*log(1/dc).

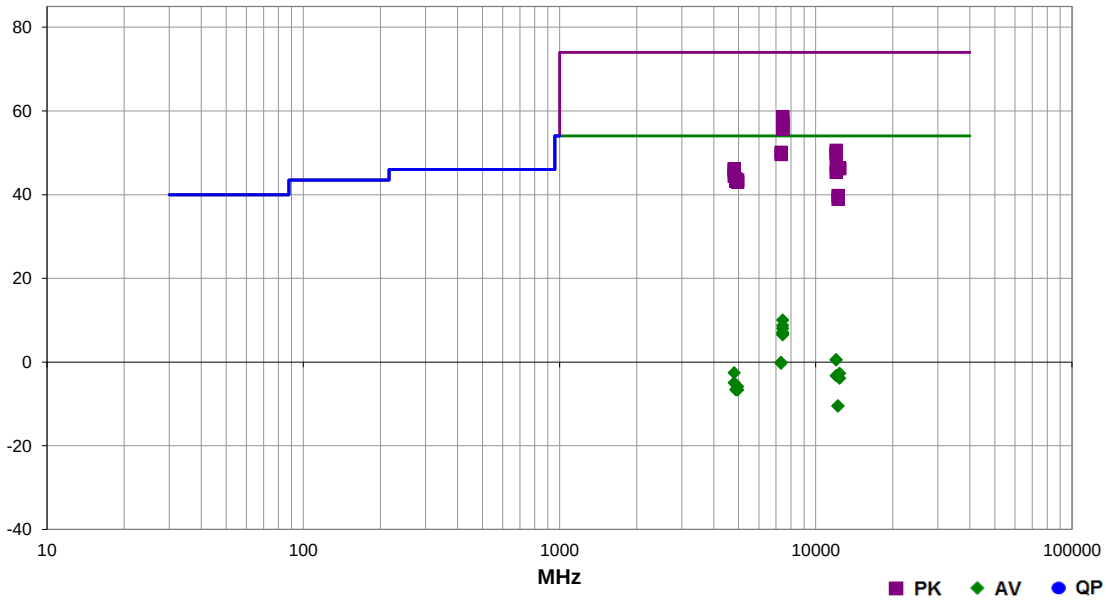
SPURIOUS RADIATED EMISSIONS

EmiR5 2020.04.20.0 PSA-ESCI 2020.04.03.0

Work Order:	PAON0005	**Date:**	2020-08-26		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	TX02	**Humidity:**	52.6% RH		
Serial Number:	0013	**Barometric Pres.:**	1016 mbar	**Tested by:**	Willie Love, Brandon Hobbs
EUT:	Smart Tracking Collar				
Configuration:	1				
Customer:	Paragon Innovations, Inc.				
Attendees:	Alan Hasty				
EUT Power:	Battery				
Operating Mode:	BTLE continuous Tx, 32% duty cycle, please reference data comments for EUT orientation and channel.				
Deviations:	None				
Comments:	Duty Cycle correction added to measurements to account for not operating at the required 100% duty cycle. Correction formula is as described 10*Log(1/.32) = 4.95 dB added to the measurement values. Per the KDB 558074 Guidance, when operating in normal DTS mode, the worst-case duty cycle using a 100 ms period is less than 1%. Therefore, the downward DCCF correction applied based on 20*log(On Time(.592 ms)/(100 ms) Pulse Period length) = -50.57. Total correction applied to the average measurement = -39.6.				

Test Specifications	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

Run #	17	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
7440.945	48.7	9.9	1.3	337.0	0.0	0.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT standing vertical, high Ch
7440.662	47.6	9.9	2.0	171.9	0.0	0.0	Vert	PK	0.0	57.5	74.0	-16.5	EUT Laying flat, high Ch
7439.278	46.8	9.9	2.5	360.0	0.0	0.0	Vert	PK	0.0	56.7	74.0	-17.3	EUT standing vertical, high Ch
7439.537	46.1	9.9	3.5	0.0	0.0	0.0	Vert	PK	0.0	56.0	74.0	-18.0	EUT on it's side, high Ch
7440.845	45.8	9.9	1.7	246.0	0.0	0.0	Horz	PK	0.0	55.7	74.0	-18.3	EUT Laying flat, high Ch
7440.587	45.7	9.9	1.6	249.9	0.0	0.0	Horz	PK	0.0	55.6	74.0	-18.4	EUT on it's side, high Ch
12011.450	54.0	-3.4	2.8	85.0	0.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	EUT standing vertical low ch
7327.708	40.2	9.9	1.5	261.9	0.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	EUT standing vertical mid ch
12011.250	53.4	-3.4	2.8	90.0	0.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	EUT standing vertical low ch
12011.270	53.3	-3.4	2.8	90.0	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	EUT standing vertical low ch
7328.117	39.7	9.9	1.5	45.0	0.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	EUT standing vertical mid ch
12011.410	50.4	-3.4	4.0	80.0	0.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	EUT standing vertical low ch
12398.660	48.6	-2.2	1.5	0.0	0.0	0.0	Horz	PK	0.0	46.4	74.0	-27.6	EUT standing vertical high ch.
12398.580	48.4	-2.2	1.5	360.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	EUT standing vertical high ch.
4803.742	42.6	3.6	2.0	270.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	EUT standing vertical low ch
4803.633	42.5	3.6	2.0	270.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	EUT standing vertical low ch
4805.067	41.7	3.6	3.0	225.0	0.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	EUT standing vertical low ch
12008.930	48.7	-3.4	2.0	157.0	0.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	EUT standing vertical low ch
4803.667	40.8	3.6	2.0	45.0	0.0	0.0	Vert	PK	0.0	44.4	74.0	-29.6	EUT standing vertical low ch
4881.508	40.1	3.7	1.5	225.0	0.0	0.0	Horz	PK	0.0	43.8	74.0	-30.2	EUT standing vertical mid ch
4958.708	39.6	3.9	3.0	270.0	0.0	0.0	Horz	PK	0.0	43.5	74.0	-30.5	EUT standing vertical, high Ch

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
4881.625	39.5	3.7	1.5	90.0	0.0	0.0	Vert	PK	0.0	43.2	74.0	-30.8	EUT standing vertical mid ch
4961.750	39.1	3.9	2.5	0.0	0.0	0.0	Vert	PK	0.0	43.0	74.0	-31.0	EUT standing vertical, high Ch
12207.940	42.8	-3.0	1.5	225.0	0.0	0.0	Horz	PK	0.0	39.8	74.0	-34.2	EUT standing vertical mid ch
12212.180	42.0	-3.1	1.5	135.0	0.0	0.0	Vert	PK	0.0	38.9	74.0	-35.1	EUT standing vertical mid ch
7439.478	39.7	9.9	1.3	337.0	-39.6	0.0	Horz	AV	0.0	10.0	54.0	-44.0	EUT standing vertical, high Ch
7439.445	38.4	9.9	2.0	171.9	-39.6	0.0	Vert	AV	0.0	8.7	54.0	-45.3	EUT Laying flat, high Ch
7439.445	37.7	9.9	2.5	360.0	-39.6	0.0	Vert	AV	0.0	8.0	54.0	-46.0	EUT standing vertical, high Ch
7439.412	36.8	9.9	1.7	246.0	-39.6	0.0	Horz	AV	0.0	7.1	54.0	-46.9	EUT Laying flat, high Ch
7439.403	36.4	9.9	3.5	0.0	-39.6	0.0	Vert	AV	0.0	6.7	54.0	-47.3	EUT on it's side, high Ch
7439.445	36.2	9.9	1.6	249.9	-39.6	0.0	Horz	AV	0.0	6.5	54.0	-47.5	EUT on it's side, high Ch
12008.920	43.5	-3.4	2.8	90.0	-39.6	0.0	Horz	AV	0.0	0.5	54.0	-53.5	EUT standing vertical low ch
12008.910	43.5	-3.4	2.8	90.0	-39.6	0.0	Horz	AV	0.0	0.5	54.0	-53.5	EUT standing vertical low ch
7328.408	29.6	9.9	1.5	261.9	-39.6	0.0	Horz	AV	0.0	-0.1	54.0	-54.1	EUT standing vertical mid ch
7327.517	29.4	9.9	1.5	45.0	-39.6	0.0	Vert	AV	0.0	-0.3	54.0	-54.3	EUT standing vertical mid ch
4803.925	33.4	3.6	2.0	270.0	-39.6	0.0	Horz	AV	0.0	-2.6	54.0	-56.6	EUT standing vertical low ch
12398.880	39.1	-2.2	4.0	360.0	-39.6	0.0	Vert	AV	0.0	-2.7	54.0	-56.7	EUT standing vertical high ch.
12008.970	39.7	-3.4	4.0	80.0	-39.6	0.0	Vert	AV	0.0	-3.3	54.0	-57.3	EUT standing vertical low ch
12398.880	37.9	-2.2	1.5	360.0	-39.6	0.0	Horz	AV	0.0	-3.9	54.0	-57.9	EUT standing vertical high ch.
4803.833	31.0	3.6	2.0	45.0	-39.6	0.0	Vert	AV	0.0	-5.0	54.0	-59.0	EUT standing vertical low ch
4959.833	29.8	3.9	3.0	270.0	-39.6	0.0	Horz	AV	0.0	-5.9	54.0	-59.9	EUT standing vertical, high Ch
4883.467	29.2	3.8	1.5	225.0	-39.6	0.0	Horz	AV	0.0	-6.6	54.0	-60.6	EUT standing vertical mid ch
4959.683	29.0	3.9	2.5	0.0	-39.6	0.0	Vert	AV	0.0	-6.7	54.0	-60.7	EUT standing vertical, high Ch
4883.842	29.1	3.8	1.5	90.0	-39.6	0.0	Vert	AV	0.0	-6.7	54.0	-60.7	EUT standing vertical mid ch
12208.390	32.1	-3.0	1.5	225.0	-39.6	0.0	Horz	AV	0.0	-10.5	54.0	-64.5	EUT standing vertical mid ch
12208.480	32.1	-3.0	1.5	135.0	-39.6	0.0	Vert	AV	0.0	-10.5	54.0	-64.5	EUT standing vertical mid ch

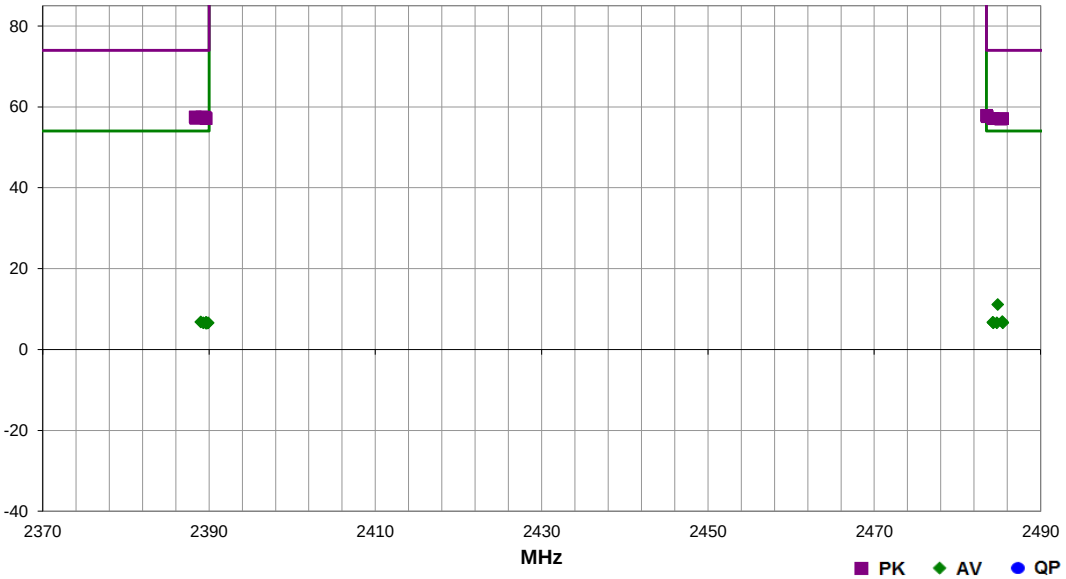
SPURIOUS RADIATED EMISSIONS

EmiR5 2020.04.20.0 PSA-ESCI 2020.04.03.0

Work Order:	PAON0005	**Date:**	2020-08-26		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	TX02	**Humidity:**	52.6% RH		
Serial Number:	0013	**Barometric Pres.:**	1016 mbar	**Tested by:**	Willie Love, Brandon Hobbs
EUT:	Smart Tracking Collar				
Configuration:	1				
Customer:	Paragon Innovations, Inc.				
Attendees:	Alan Hasty				
EUT Power:	Battery				
Operating Mode:	BTLE continuous Tx, 32% duty cycle, please reference data comments for EUT orientation and channel.				
Deviations:	None				
Comments:	Duty Cycle correction added to measurements to account for not operating at the required 100% duty cycle. Correction formula is as described 10*Log(1/.32) = 4.95 dB added to the measurement values. Per the KDB 558074 Guidance, when operating in normal DTS mode, the worst-case duty cycle using a 100 ms period is less than 1%. Therefore, the downward DCCF correction applied based on 20*log(On Time(.592 ms)/(100 ms) Pulse Period length) = -50.57. Total correction applied to the average measurement = -39.6.				

Test Specifications	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

Run #	23	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
2483.513	44.0	-6.1	1.5	274.9	0.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	Band edge high ch EUT laying flat
2483.587	43.7	-6.1	2.4	75.0	0.0	20.0	Horz	PK	0.0	57.6	74.0	-16.4	Band edge high ch EUT standing vertical
2389.150	43.9	-6.4	1.5	280.9	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	Band edge low ch EUT on it's side
2388.350	43.9	-6.4	1.5	295.0	0.0	20.0	Horz	PK	0.0	57.5	74.0	-16.5	Band edge low ch EUT laying flat
2389.530	43.8	-6.4	3.3	290.0	0.0	20.0	Vert	PK	0.0	57.4	74.0	-16.6	Band edge low ch EUT standing vertical
2388.413	43.7	-6.4	1.5	337.0	0.0	20.0	Vert	PK	0.0	57.3	74.0	-16.7	Band edge low ch EUT laying flat
2388.417	43.6	-6.4	1.5	207.0	0.0	20.0	Horz	PK	0.0	57.2	74.0	-16.8	Band edge low ch EUT on it's side
2485.423	43.2	-6.1	1.5	51.9	0.0	20.0	Vert	PK	0.0	57.1	74.0	-16.9	Band edge high ch EUT standing vertical
2484.263	43.2	-6.1	1.5	204.0	0.0	20.0	Horz	PK	0.0	57.1	74.0	-16.9	Band edge high ch EUT on it's side
2484.293	43.2	-6.1	1.5	51.0	0.0	20.0	Vert	PK	0.0	57.1	74.0	-16.9	Band edge high ch EUT on it's side
2389.650	43.5	-6.4	3.5	225.0	0.0	20.0	Horz	PK	0.0	57.1	74.0	-16.9	Band edge low ch EUT standing vertical
2485.210	43.1	-6.1	2.9	105.9	0.0	20.0	Horz	PK	0.0	57.0	74.0	-17.0	Band edge high ch EUT laying flat
2484.847	36.8	-6.1	1.5	204.0	-39.6	20.0	Horz	AV	0.0	11.1	54.0	-42.9	Band edge high ch EUT on it's side
2485.417	32.6	-6.1	2.4	75.0	-39.6	20.0	Horz	AV	0.0	6.9	54.0	-47.1	Band edge high ch EUT standing vertical
2389.010	32.8	-6.4	1.5	295.0	-39.6	20.0	Horz	AV	0.0	6.8	54.0	-47.2	Band edge low ch EUT laying flat
2389.647	32.7	-6.4	1.5	207.0	-39.6	20.0	Horz	AV	0.0	6.7	54.0	-47.3	Band edge low ch EUT on it's side
2484.263	32.4	-6.1	2.9	105.9	-39.6	20.0	Horz	AV	0.0	6.7	54.0	-47.3	Band edge high ch EUT laying flat
2389.917	32.6	-6.4	1.5	280.9	-39.6	20.0	Vert	AV	0.0	6.6	54.0	-47.4	Band edge low ch EUT on it's side
2389.310	32.6	-6.4	1.5	337.0	-39.6	20.0	Vert	AV	0.0	6.6	54.0	-47.4	Band edge low ch EUT laying flat
2484.327	32.3	-6.1	1.5	51.9	-39.6	20.0	Vert	AV	0.0	6.6	54.0	-47.4	Band edge high ch EUT standing vertical
2485.467	32.3	-6.1	1.5	51.0	-39.6	20.0	Vert	AV	0.0	6.6	54.0	-47.4	Band edge high ch EUT on it's side
2484.747	32.3	-6.1	1.5	274.9	-39.6	20.0	Vert	AV	0.0	6.6	54.0	-47.4	Band edge high ch EUT laying flat
2389.767	32.5	-6.4	3.5	225.0	-39.6	20.0	Horz	AV	0.0	6.5	54.0	-47.5	Band edge low ch EUT standing vertical

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
2389.627	32.5	-6.4	3.3	290.0	-39.6	20.0	Vert	AV	0.0	6.5	54.0	-47.5	Band edge low ch EUT standing vertical