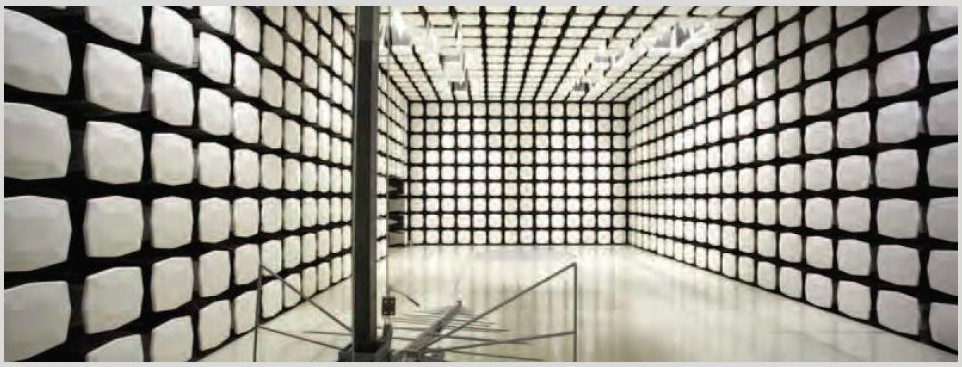
Starkey Laboratories, Inc.

Evolv AI Power Plus BTE 13 BLE Hearing Aid

FCC 15.247:2021
Bluetooth Low Energy (DTS) Radio

Report: STAK0238, Issue Date: July 22, 2021



NVLAP LAB CODE: 200881-0

CERTIFICATE OF TEST

Last Date of Test: May 21, 2021
Starkey Laboratories, Inc.
EUT: Evolv AI Power Plus BTE 13 BLE Hearing Aid

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.
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated 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	

Deviations From Test Standards

None

Approved By:

Eric Brandon, Department Manager

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

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

element
2021.02.26

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

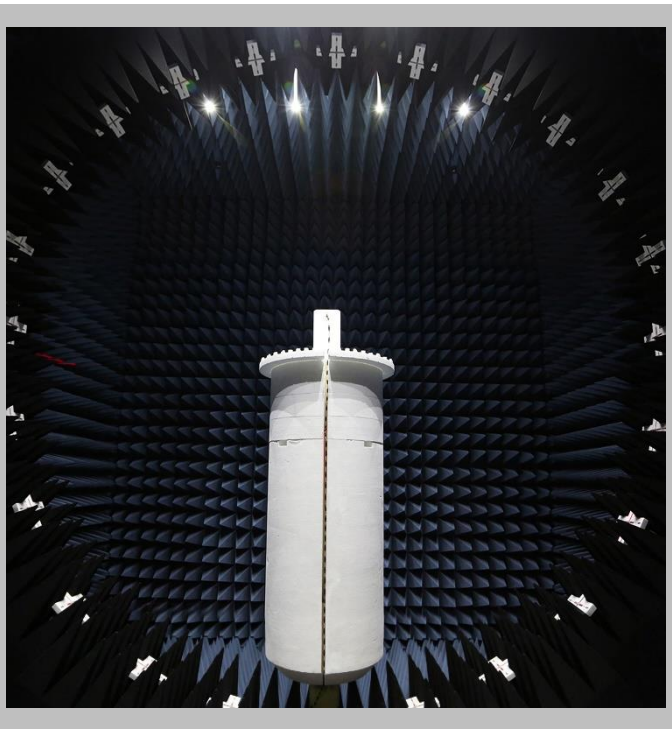
MIC – Recognized by MIC as a CAB for the acceptance of test data.

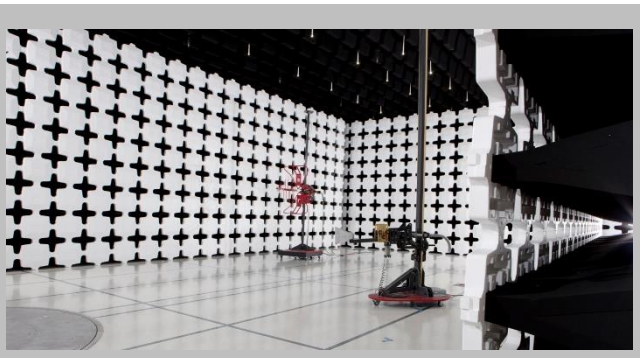
SCOPE

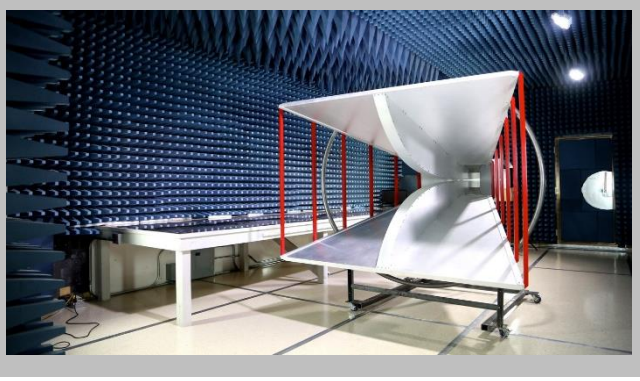
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
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.

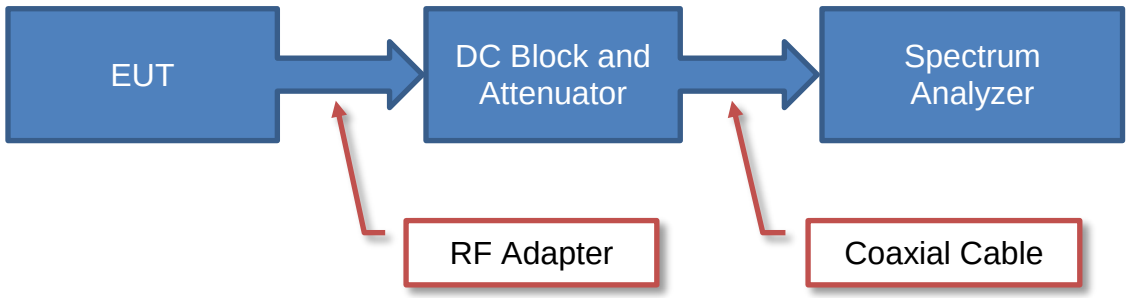
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific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

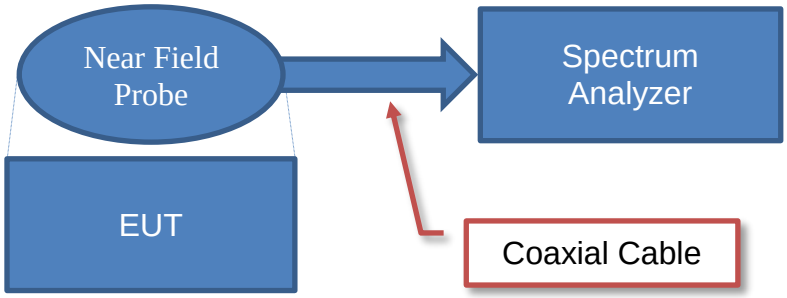
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

Test Setup Block Diagrams

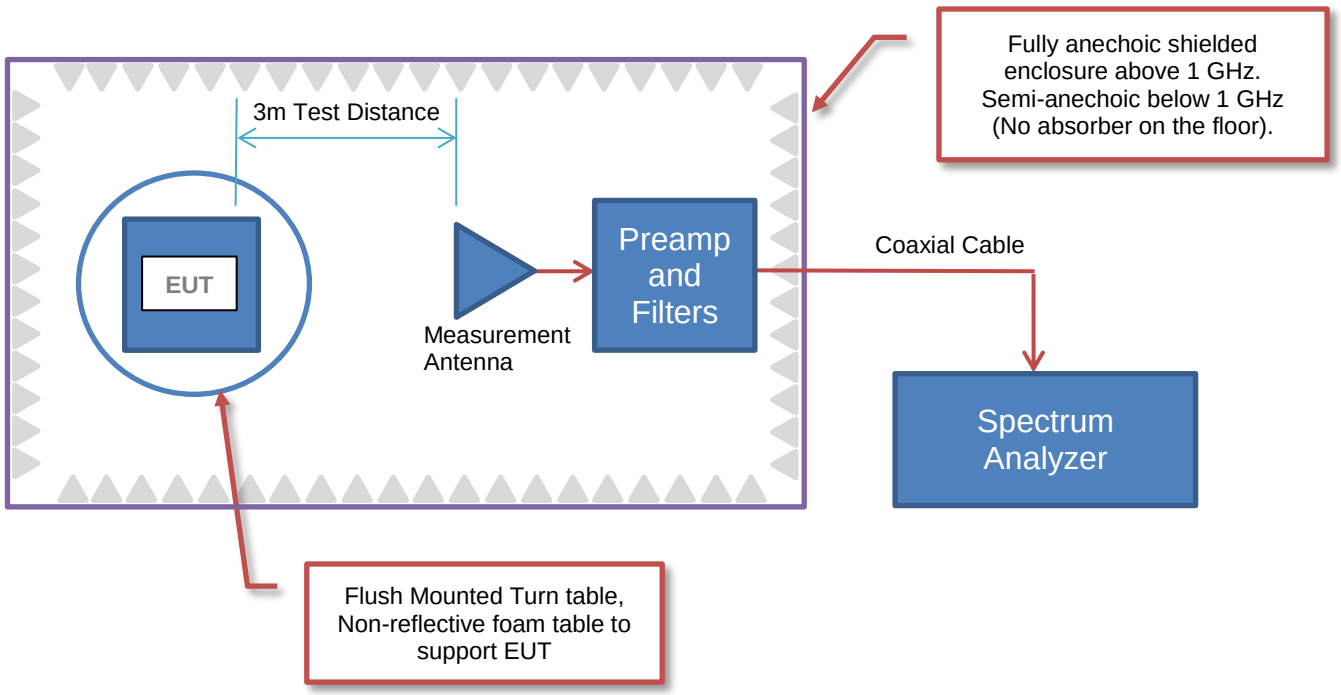
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



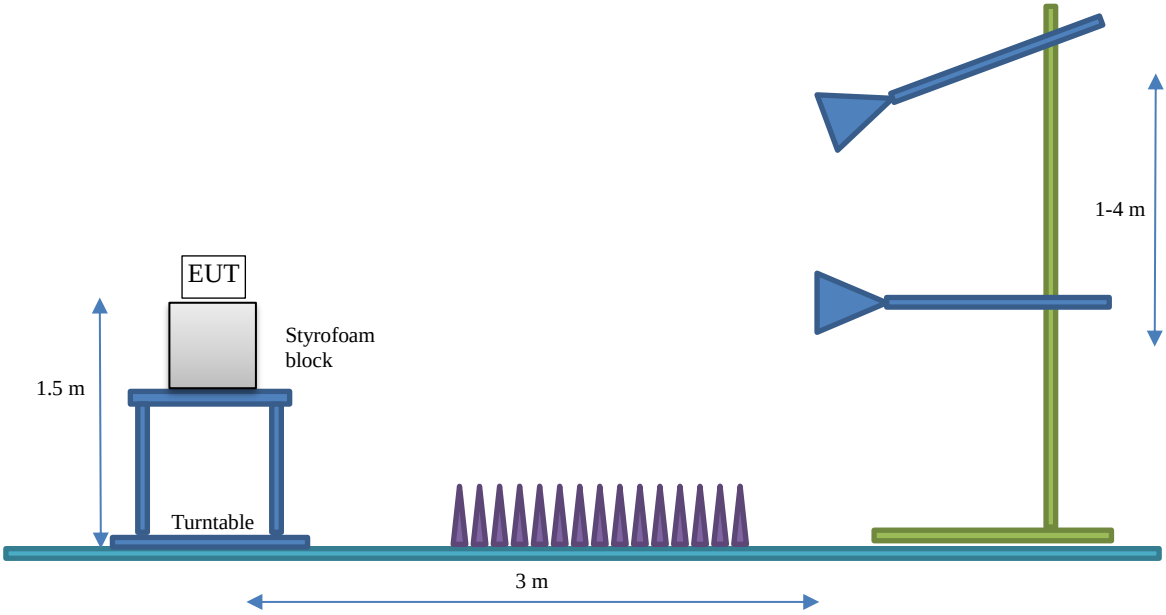
Spurious Radiated Emissions



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:	Starkey Laboratories, Inc.
Address:	6600 Washington Ave S
City, State, Zip:	Eden Prairie, MN 55344-3404
Test Requested By:	Bill Mitchell
EUT:	Evolv AI Power Plus BTE 13 BLE Hearing Aid
First Date of Test:	May 17, 2021
Last Date of Test:	May 21, 2021
Receipt Date of Samples:	May 17,2021
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

New BLE 5.0 Hearing Aid

Model Equivalency Statement:

Evolv AI 2400 Power Plus BTE 13
Evolv AI 2000 Power Plus BTE 13
Evolv AI 1600 Power Plus BTE 13
Evolv AI 1200 Power Plus BTE 13
Evolv AI 1000 Power Plus BTE 13

Hardware and RF performance is identical. Firmware is identical. The different numbers indicated represent different levels of features (such as the number of noise reduction levels) that are unlocked in the device firmware when the device is programmed at manufacture. The level is set at manufacture and cannot be changed in the field. This allows the various levels to be sold at different price points.

Testing Objective:

To demonstrate compliance of the Bluetooth Low Energy (DTS) radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration STAK0238- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey	Evolv AI Power Plus BTE 13	210990482

Configuration STAK0238- 2

Software/Firmware Running during test	
Description	**Version**
Firmware	Rev 7.5.0.5

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey	Evolv AI Power Plus BTE 13	210990483

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-05-17	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	2021-05-17	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	2021-05-17	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	2021-05-17	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	2021-05-17	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	2021-05-17	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	2021-05-17	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	2021-05-21	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)
Polyimide flexible circuit "Bow tie"	Manufacturer	2402-2480	-7.5

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

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
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.
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).

TEST EQUIPMENT

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

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

STAK0238-2

MODES INVESTIGATED

Transmitting Bluetooth Low Energy Low and High Ch (2402, 2480 MHz), 1 Mbps and 2 Mbps
Transmitting Bluetooth Low Energy Low, Mid, and High Channels (2402, 2442, and 2480 MHz); 1 Mbps and 2 Mbps

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

EUT:	Evolv AI Power Plus BTE 13 BLE Hearing Aid	Work Order:	STAK0238
Serial Number:	210990483	Date:	2021-05-21
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4°C
Attendees:	John Quach	Relative Humidity:	55%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Christopher Heintzelman	Job Site:	MN05
Power:	Battery	Configuration:	STAK0238-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	12	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

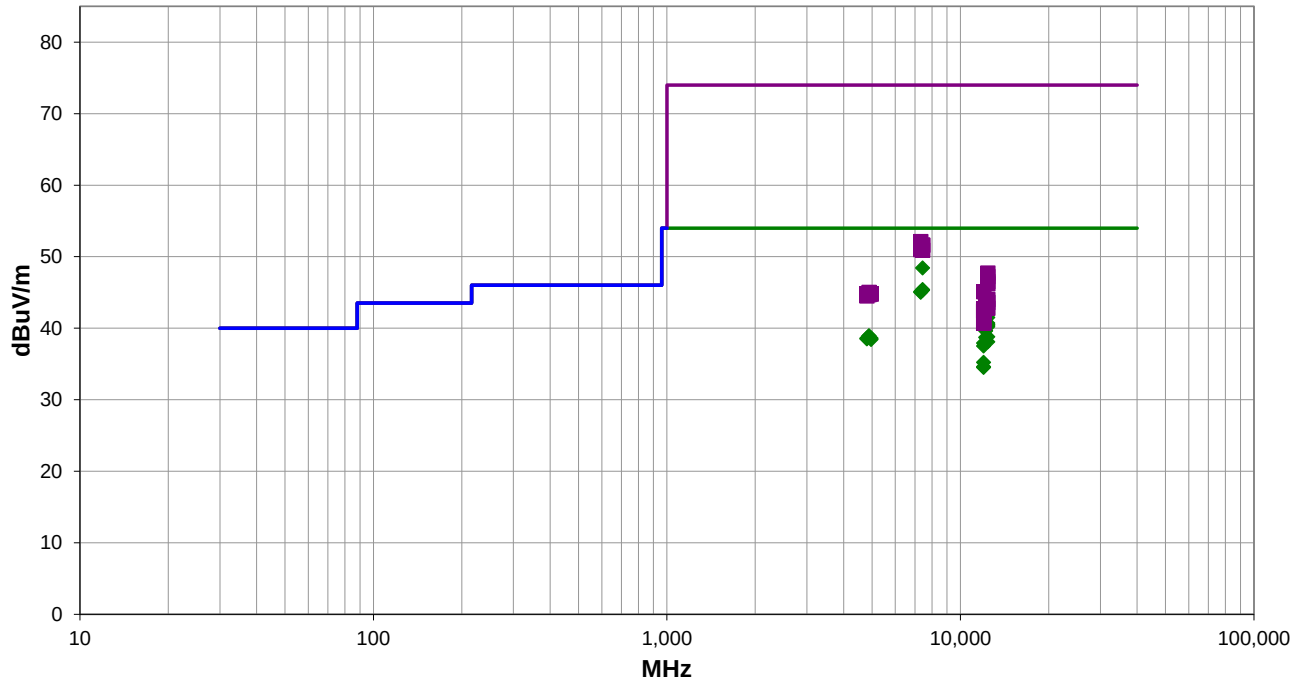
DCCF (2Mbps)=10*log(1/0.14)=8.5dB
DCCF (1Mbps)=10*log(1/0.28)=5.5dB

EUT OPERATING MODES

Transmitting Bluetooth Low Energy Low, Mid, and High Channels (2402, 2442, and 2480 MHz); 1 Mbps and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 12 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #12

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7438.517	30.7	9.2	1.1	116.0	8.5	0.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT Horz, High Ch, 2 Mbps
7438.325	30.7	9.2	1.5	192.9	5.5	0.0	Horz	AV	0.0	45.4	54.0	-8.6	EUT Horz, High Ch, 1 Mbps
7438.025	30.6	9.2	1.5	83.0	5.5	0.0	Vert	AV	0.0	45.3	54.0	-8.7	EUT Vert, High Ch, 1 Mbps
7328.467	30.4	9.2	1.5	83.0	5.5	0.0	Vert	AV	0.0	45.1	54.0	-8.9	EUT Vert, Mid Ch, 1 Mbps
7327.867	30.3	9.2	1.5	138.9	5.5	0.0	Horz	AV	0.0	45.0	54.0	-9.0	EUT Horz, Mid Ch, 1 Mbps
12401.070	30.0	6.0	1.0	360.0	5.5	0.0	Vert	AV	0.0	41.5	54.0	-12.5	EUT Vert, High Ch, 1 Mbps
12008.790	35.8	-0.1	1.9	188.0	5.5	0.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT Horz, Low Ch, 1 Mbps
12401.030	29.2	6.0	1.0	99.0	5.5	0.0	Horz	AV	0.0	40.7	54.0	-13.3	EUT Vert, High Ch, 1 Mbps
12401.400	29.0	6.0	1.0	297.9	5.5	0.0	Vert	AV	0.0	40.5	54.0	-13.5	EUT Horz, High Ch, 1 Mbps
12397.530	30.9	1.0	2.5	267.0	8.5	0.0	Horz	AV	0.0	40.4	54.0	-13.6	EUT Horz, High Ch, 2 Mbps
12400.860	28.7	6.0	1.0	45.9	5.5	0.0	Horz	AV	0.0	40.2	54.0	-13.8	EUT Horz, High Ch, 1 Mbps
12208.740	34.0	0.1	1.9	199.0	5.5	0.0	Horz	AV	0.0	39.6	54.0	-14.4	EUT Horz, Mid Ch, 1 Mbps
4884.475	30.9	2.5	1.5	193.9	5.5	0.0	Vert	AV	0.0	38.9	54.0	-15.1	EUT Vert, Mid Ch, 1 Mbps
4883.158	30.9	2.5	1.5	16.0	5.5	0.0	Horz	AV	0.0	38.9	54.0	-15.1	EUT Horz, Mid Ch, 1 Mbps
12398.790	32.3	1.0	2.2	163.9	5.5	0.0	Horz	AV	0.0	38.8	54.0	-15.2	EUT Horz, High Ch, 1 Mbps
12208.880	33.1	0.1	2.4	152.0	5.5	0.0	Vert	AV	0.0	38.7	54.0	-15.3	EUT Vert, Mid Ch, 1 Mbps
4801.733	30.8	2.3	3.6	312.9	5.5	0.0	Vert	AV	0.0	38.6	54.0	-15.4	EUT Vert, Low Ch, 1 Mbps
4961.992	30.5	2.6	1.5	328.0	5.5	0.0	Horz	AV	0.0	38.6	54.0	-15.4	EUT Horz, High Ch, 1 Mbps
4801.642	30.7	2.3	1.5	138.9	5.5	0.0	Horz	AV	0.0	38.5	54.0	-15.5	EUT Horz, Low Ch, 1 Mbps
4962.150	30.3	2.6	1.5	332.0	5.5	0.0	Vert	AV	0.0	38.4	54.0	-15.6	EUT Vert, High Ch, 1 Mbps
12398.730	31.6	1.0	2.3	166.0	5.5	0.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT Vert, High Ch, 1 Mbps
12008.970	32.5	-0.1	2.6	246.9	5.5	0.0	Horz	AV	0.0	37.9	54.0	-16.1	EUT Vert, Low Ch, 1 Mbps
12008.930	32.1	-0.1	1.8	307.9	5.5	0.0	Vert	AV	0.0	37.5	54.0	-16.5	EUT Vert, Low Ch, 1 Mbps
12008.880	29.8	-0.1	2.2	131.0	5.5	0.0	Vert	AV	0.0	35.2	54.0	-18.8	EUT Horz, Low Ch, 1 Mbps
12009.020	29.2	-0.1	1.5	204.9	5.5	0.0	Vert	AV	0.0	34.6	54.0	-19.4	EUT On Side, Low Ch, 1 Mbps
12008.980	29.1	-0.1	1.5	127.9	5.5	0.0	Horz	AV	0.0	34.5	54.0	-19.5	EUT On Side, Low Ch, 1 Mbps
7328.400	42.9	9.2	1.5	138.9		0.0	Horz	PK	0.0	52.1	74.0	-21.9	EUT Horz, Mid Ch, 1 Mbps
7439.642	42.4	9.2	1.5	192.9		0.0	Horz	PK	0.0	51.6	74.0	-22.4	EUT Horz, High Ch, 1 Mbps
7438.292	42.4	9.2	1.5	83.0		0.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT Vert, High Ch, 1 Mbps
7324.875	41.8	9.2	1.5	83.0		0.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Vert, Mid Ch, 1 Mbps
7442.225	41.7	9.2	1.1	116.0		0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz, High Ch, 2 Mbps
12401.340	41.7	6.0	1.0	360.0		0.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT Vert, High Ch, 1 Mbps
12402.150	41.2	6.0	1.0	99.0		0.0	Horz	PK	0.0	47.2	74.0	-26.8	EUT Vert, High Ch, 1 Mbps
12401.240	40.5	6.0	1.0	45.9		0.0	Horz	PK	0.0	46.5	74.0	-27.5	EUT Horz, High Ch, 1 Mbps
12401.100	40.2	6.0	1.0	297.9		0.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT Horz, High Ch, 1 Mbps
12011.370	45.2	-0.1	1.9	188.0		0.0	Horz	PK	0.0	45.1	74.0	-28.9	EUT Horz, Low Ch, 1 Mbps
4882.833	42.5	2.5	1.5	193.9		0.0	Vert	PK	0.0	45.0	74.0	-29.0	EUT Vert, Mid Ch, 1 Mbps
4804.183	42.5	2.3	1.5	138.9		0.0	Horz	PK	0.0	44.8	74.0	-29.2	EUT Horz, Low Ch, 1 Mbps
4961.717	42.2	2.6	1.5	328.0		0.0	Horz	PK	0.0	44.8	74.0	-29.2	EUT Horz, High Ch, 1 Mbps
4962.408	42.2	2.6	1.5	322.9		0.0	Vert	PK	0.0	44.8	74.0	-29.2	EUT Vert, High Ch, 1 Mbps

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4957.858	42.3	2.5	1.5	332.0		0.0	Vert	PK	0.0	44.8	74.0	-29.2	EUT Vert, High Ch, 1 Mbps
4884.492	42.2	2.5	1.5	16.0		0.0	Horz	PK	0.0	44.7	74.0	-29.3	EUT Horz, Mid Ch, 1 Mbps
4803.658	42.2	2.3	3.6	312.9		0.0	Vert	PK	0.0	44.5	74.0	-29.5	EUT Vert, Low Ch, 1 Mbps
12398.530	43.0	1.0	2.2	163.9		0.0	Horz	PK	0.0	44.0	74.0	-30.0	EUT Horz, High Ch, 1 Mbps
12208.580	43.8	0.1	1.9	199.0		0.0	Horz	PK	0.0	43.9	74.0	-30.1	EUT Horz, Mid Ch, 1 Mbps
12397.760	42.6	1.0	2.5	267.0		0.0	Horz	PK	0.0	43.6	74.0	-30.4	EUT Horz, High Ch, 2 Mbps
12208.330	43.1	0.1	2.4	152.0		0.0	Vert	PK	0.0	43.2	74.0	-30.8	EUT Vert, Mid Ch, 1 Mbps
12398.830	41.8	1.0	2.3	166.0		0.0	Vert	PK	0.0	42.8	74.0	-31.2	EUT Vert, High Ch, 1 Mbps
12008.480	42.8	-0.1	2.6	246.9		0.0	Horz	PK	0.0	42.7	74.0	-31.3	EUT Vert, Low Ch, 1 Mbps
12010.280	42.5	-0.1	1.8	307.9		0.0	Vert	PK	0.0	42.4	74.0	-31.6	EUT Vert, Low Ch, 1 Mbps
12011.120	41.3	-0.1	2.2	131.0		0.0	Vert	PK	0.0	41.2	74.0	-32.8	EUT Horz, Low Ch, 1 Mbps
12011.130	40.9	-0.1	1.5	127.9		0.0	Horz	PK	0.0	40.8	74.0	-33.2	EUT On Side, Low Ch, 1 Mbps
12009.980	40.8	-0.1	1.5	204.9		0.0	Vert	PK	0.0	40.7	74.0	-33.3	EUT On Side, Low Ch, 1 Mbps

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

EUT:	Evolv AI Power Plus BTE 13 BLE Hearing Aid	Work Order:	STAK0238
Serial Number:	210990483	Date:	2021-05-21
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4°C
Attendees:	John Quach	Relative Humidity:	55%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Christopher Heintzelman	Job Site:	MN05
Power:	Battery	Configuration:	STAK0238-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

COMMENTS

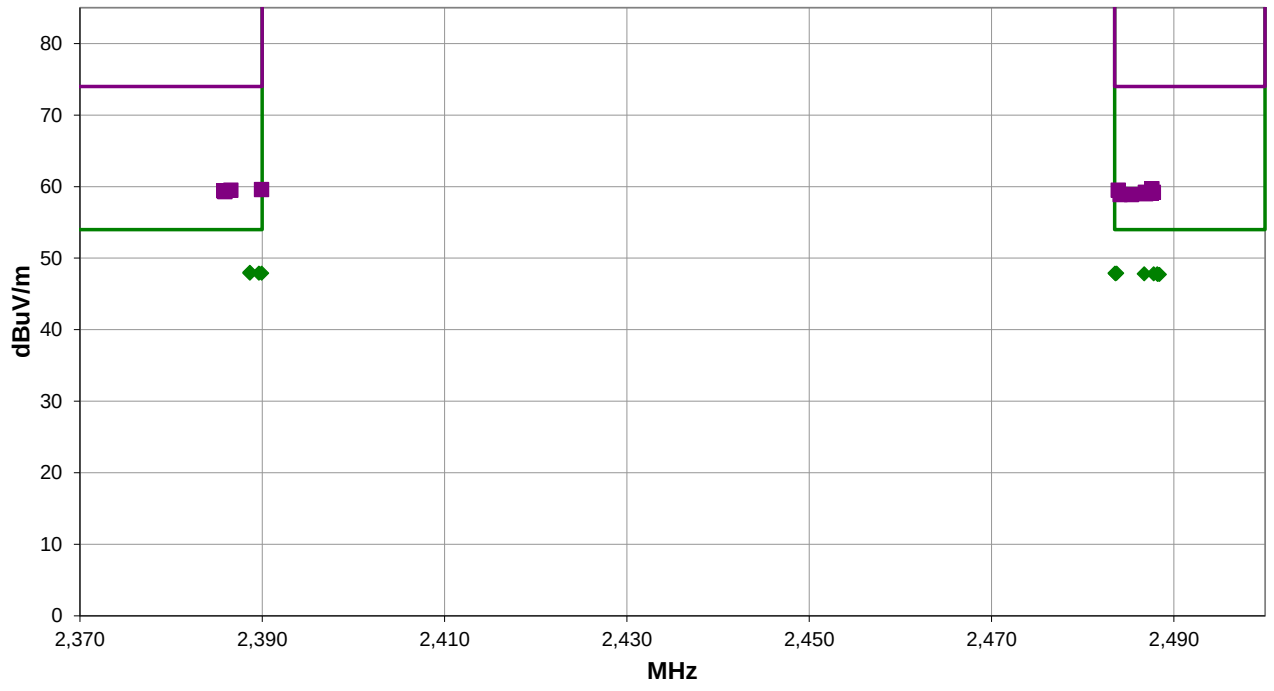
Band edge measurements are noise floor so no DCCF applied.

EUT OPERATING MODES

Transmitting Bluetooth Low Energy Low and High Ch (2402, 2480 MHz), 1 Mbps and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 19 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.04.01.1
EmiR5 2021.05.14.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #19

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
2388.642	32.6	-4.6	2.05	45.9	3.0	20.0	Vert	AV	0.0	48.0	54.0	-6.0	EUT Vert, Low Ch, 1 Mbps
2483.733	32.7	-4.8	1.5	252.0	3.0	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT Vert, High Ch, 1 Mbps
2483.542	32.7	-4.8	1.5	224.0	3.0	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT Vert, High Ch, 2 Mbps
2389.633	32.5	-4.6	1.5	160.0	3.0	20.0	Horz	AV	0.0	47.9	54.0	-6.1	EUT Vert, Low Ch, 1 Mbps
2388.650	32.5	-4.6	3.11	120.0	3.0	20.0	Horz	AV	0.0	47.9	54.0	-6.1	EUT Vert, Low Ch, 2 Mbps
2389.942	32.5	-4.6	1.5	16.9	3.0	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT Vert, Low Ch, 2 Mbps
2488.183	32.7	-4.9	1.5	134.0	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT Vert, High Ch, 1 Mbps
2486.750	32.6	-4.8	1.5	350.0	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT On Side, High Ch, 1 Mbps
2483.617	32.6	-4.8	1.5	358.9	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	EUT On Side, High Ch, 1 Mbps
2487.792	32.6	-4.8	1.5	181.0	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT Vert, High Ch, 2 Mbps
2488.233	32.6	-4.9	1.95	217.9	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	EUT Horz, High Ch, 1 Mbps
2488.408	32.6	-4.9	1.5	342.0	3.0	20.0	Vert	AV	0.0	47.7	54.0	-6.3	EUT Horz, High Ch, 1 Mbps
2487.583	44.5	-4.8	1.5	181.0	3.0	20.0	Horz	PK	0.0	59.7	74.0	-14.3	EUT Vert, High Ch, 2 Mbps
2389.925	44.2	-4.6	3.11	120.0	3.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT Vert, Low Ch, 2 Mbps
2483.900	44.3	-4.8	1.5	252.0	3.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT Vert, High Ch, 1 Mbps
2386.542	44.1	-4.6	2.05	45.9	3.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT Vert, Low Ch, 1 Mbps
2385.792	44.0	-4.6	1.5	16.9	3.0	20.0	Vert	PK	0.0	59.4	74.0	-14.6	EUT Vert, Low Ch, 2 Mbps
2385.900	43.9	-4.6	1.5	160.0	3.0	20.0	Horz	PK	0.0	59.3	74.0	-14.7	EUT Vert, Low Ch, 1 Mbps
2486.875	44.0	-4.8	1.5	134.0	3.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT Vert, High Ch, 1 Mbps
2487.742	44.0	-4.8	1.5	350.0	3.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT On Side, High Ch, 1 Mbps
2487.517	43.9	-4.8	1.5	342.0	3.0	20.0	Vert	PK	0.0	59.1	74.0	-14.9	EUT Horz, High Ch, 1 Mbps
2486.908	43.8	-4.8	1.5	358.9	3.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	EUT On Side, High Ch, 1 Mbps
2484.108	43.7	-4.8	1.95	217.9	3.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT Horz, High Ch, 1 Mbps
2485.333	43.7	-4.8	1.5	224.0	3.0	20.0	Vert	PK	0.0	58.9	74.0	-15.1	EUT Vert, High Ch, 2 Mbps

CONCLUSION

Pass

Tested By

DUTY CYCLE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14

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

XMit 2020.12.30.0

EUT:	Evolv AI Power Plus BTE 13 BLE Hearing Aid			**Work Order:**	STAK0238
Serial Number:	210990482			**Date:**	17-May-21
Customer:	Starkey Laboratories, Inc.			**Temperature:**	22.2 °C
Attendees:	John Quach			**Humidity:**	45.2% RH
Project:	None			**Barometric Pres.:**	1022 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, and DC block.

DEVIATIONS FROM TEST STANDARD

None

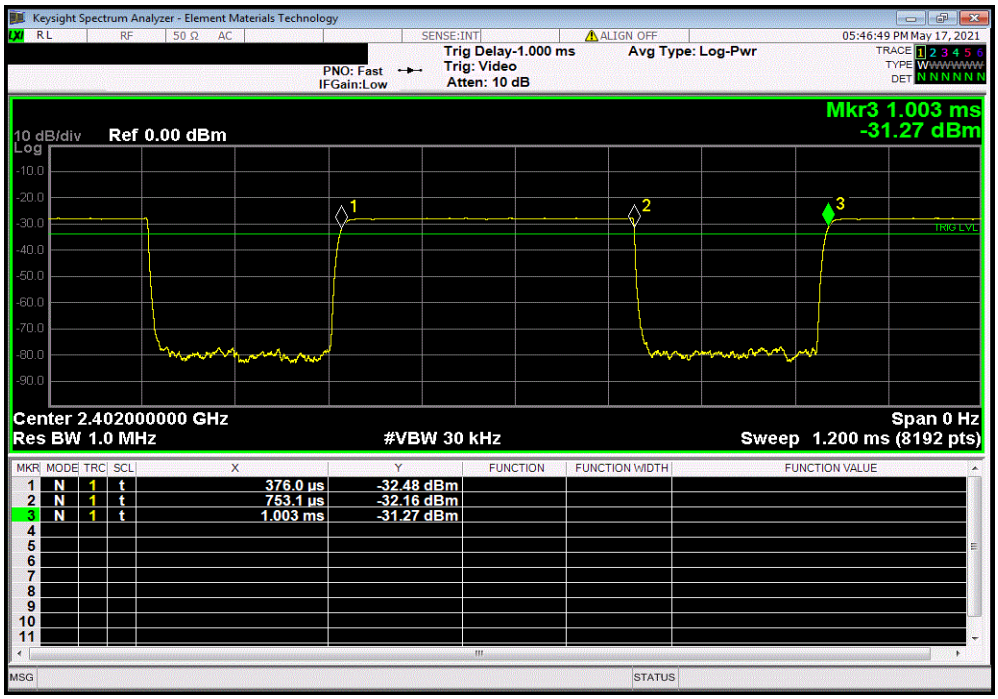
Configuration #	1	*Signature* Andrew Rogstad

	Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz							
Pulse Length	0.3771	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	11.313	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	39.99	28.29	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz							
Pulse Length	0.3764	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	11.292	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	39.99	28.24	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz							
Pulse Length	0.3778	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	11.334	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	39.99	28.34	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz							
Pulse Length	0.1891	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	5.673	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	40.00	14.18	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz							
Pulse Length	0.1902	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	5.706	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	39.99	14.27	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz							
Pulse Length	0.1891	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	30	5.673	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	40.00	14.18	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A

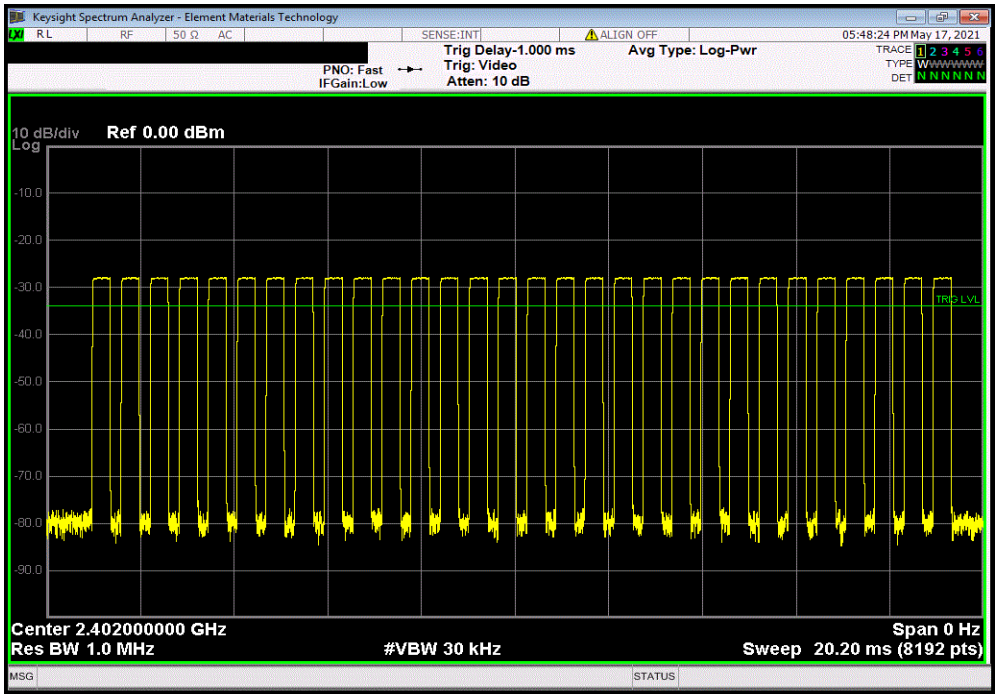
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.3771	N/A	N/A	N/A	N/A	N/A	N/A



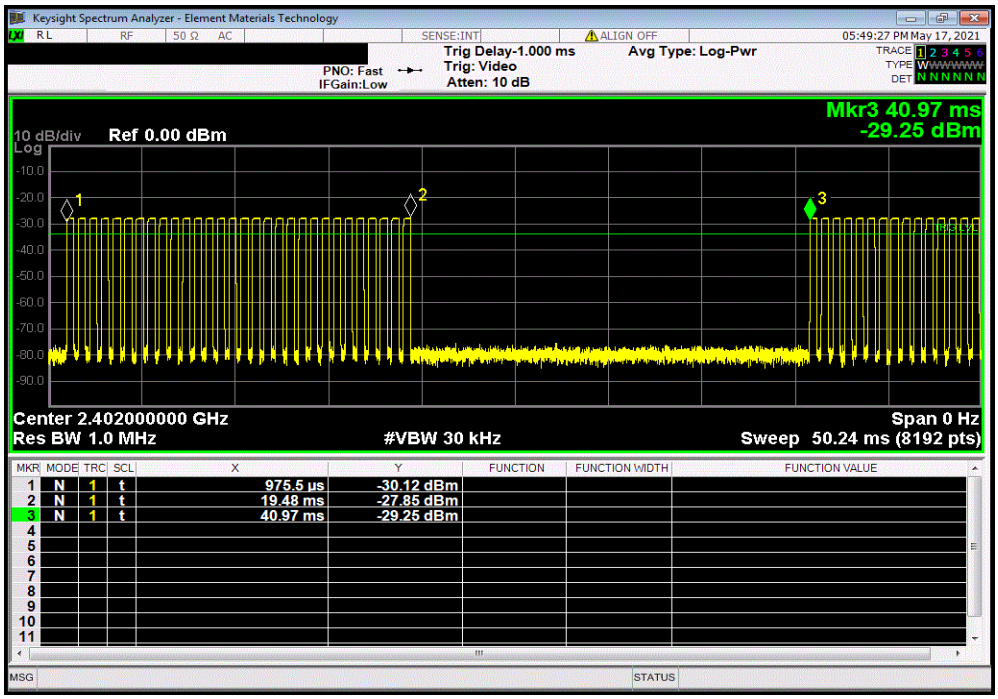
BLE/GFSK 1 Mbps Low Channel, 2402 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	11.313	N/A	N/A	N/A	N/A



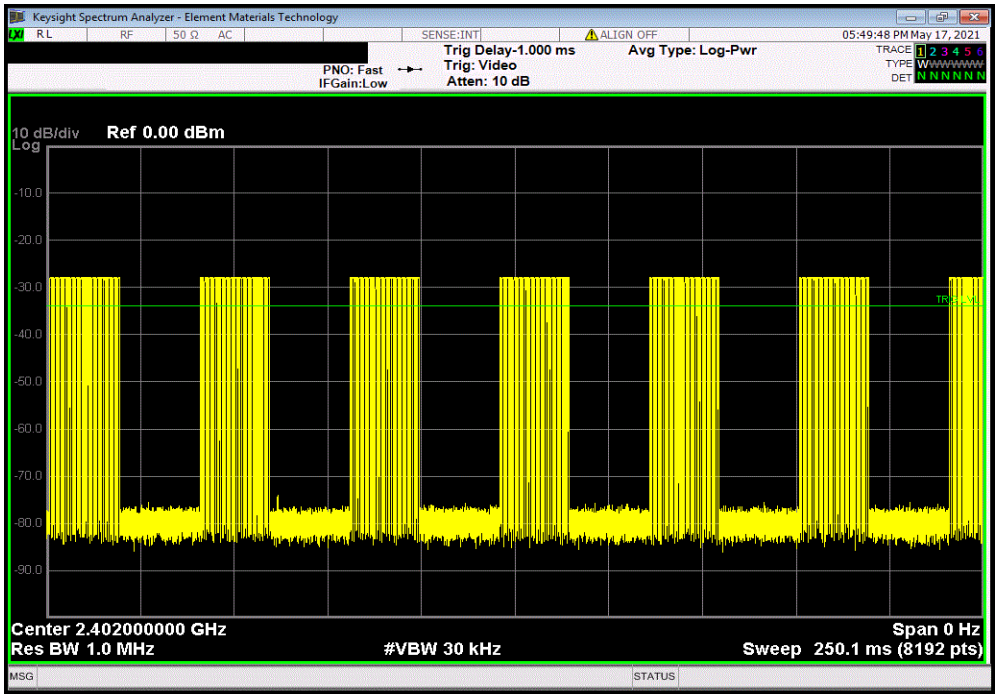
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	39.99	28.29	N/A	N/A



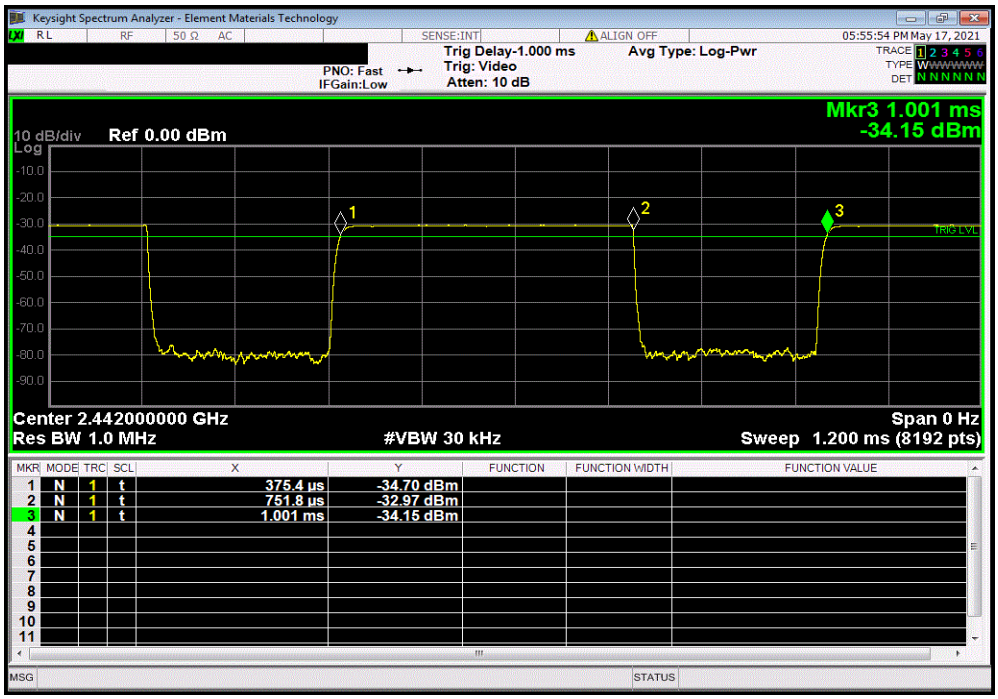
BLE/GFSK 1 Mbps Low Channel, 2402 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



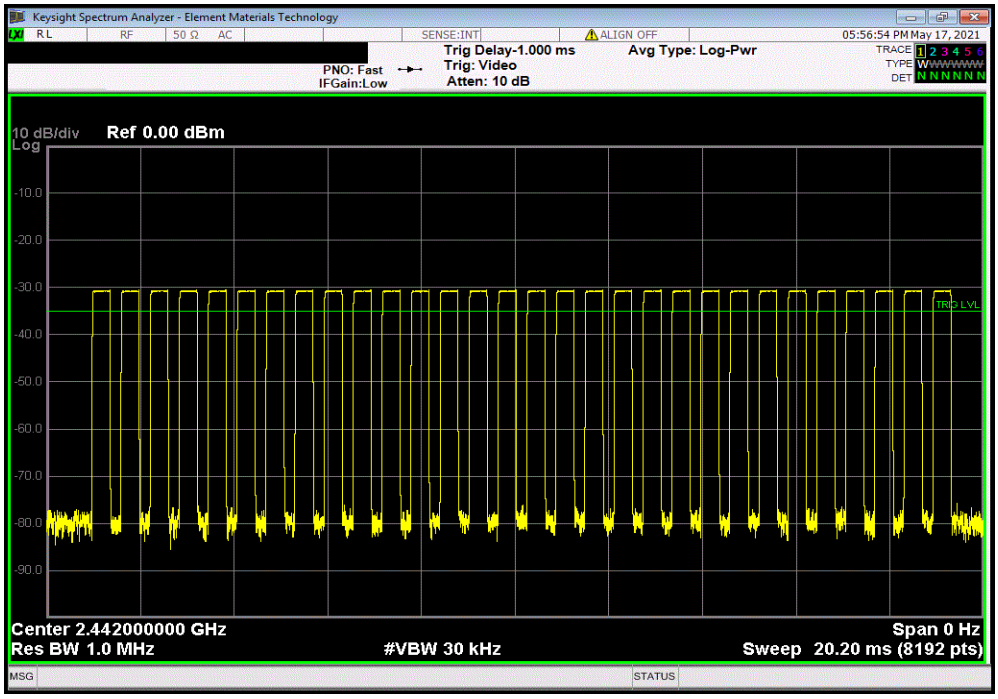
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps Mid Channel, 2442 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.3764	N/A	N/A	N/A	N/A	N/A	N/A



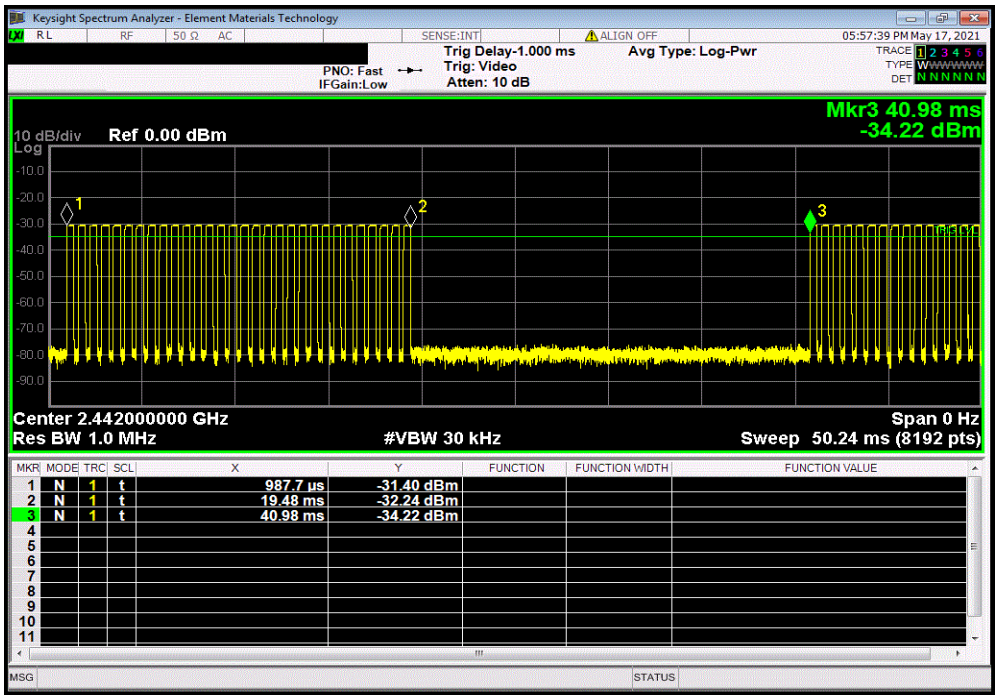
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	11.292	N/A	N/A	N/A	N/A



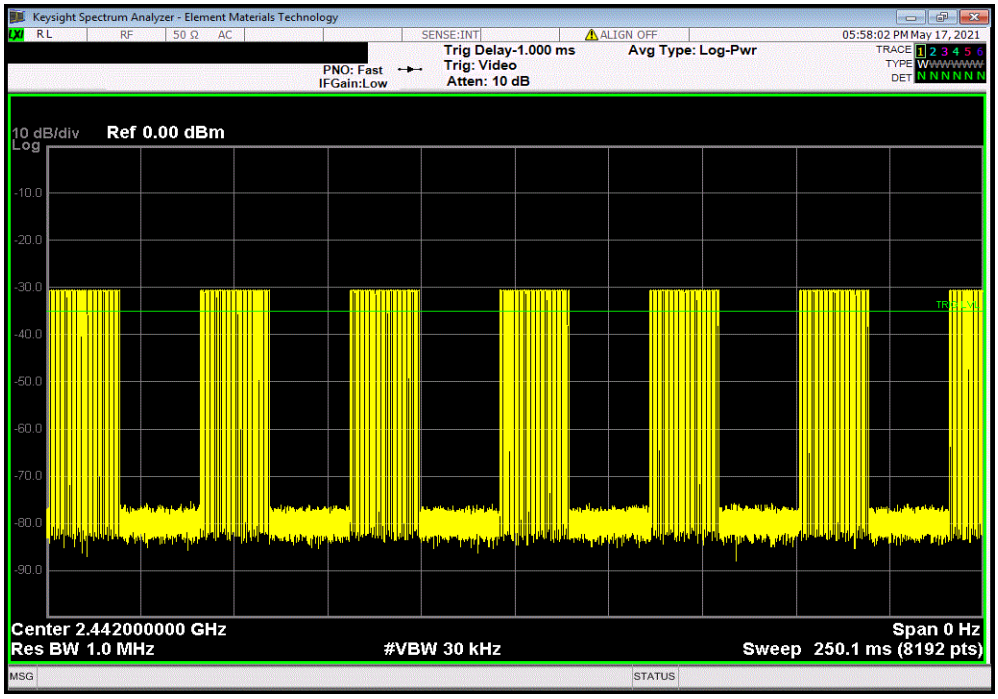
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps Mid Channel, 2442 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	39.99	28.24	N/A	N/A



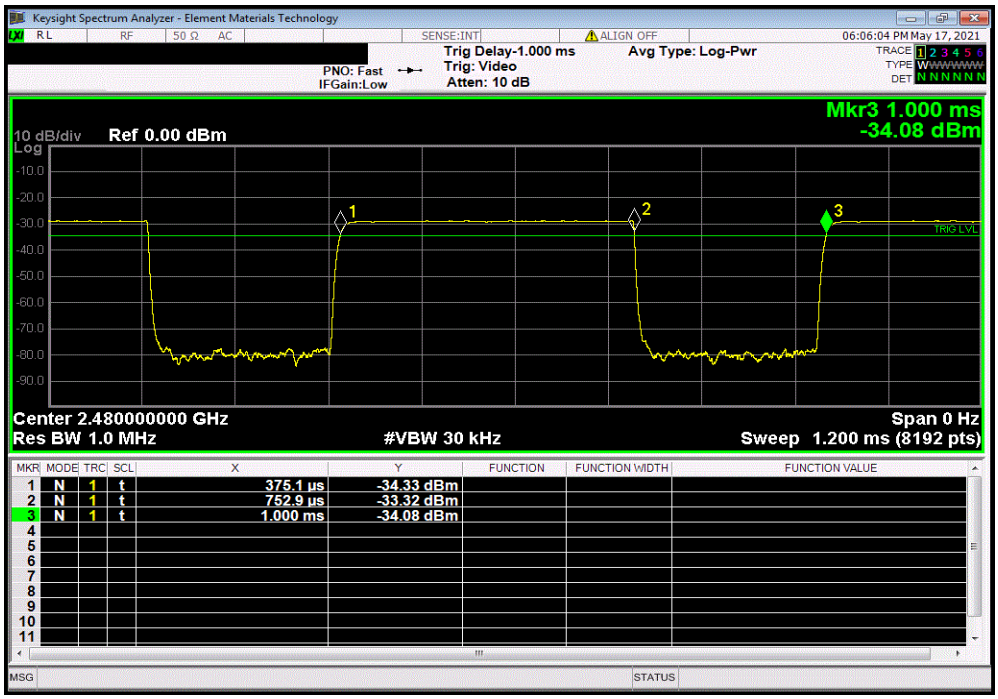
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



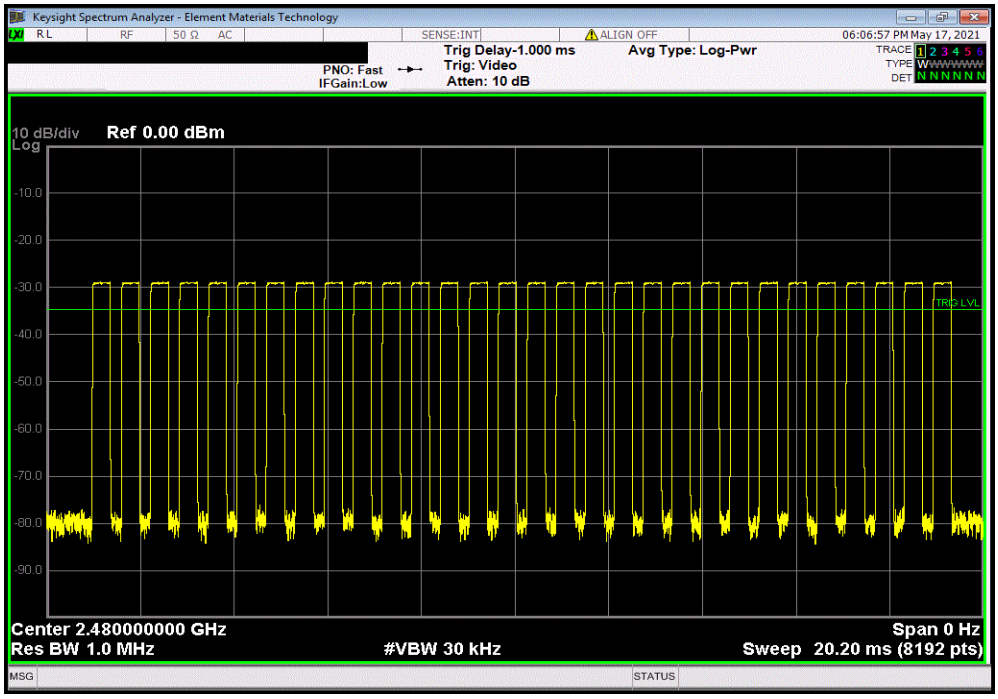
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.3778	N/A	N/A	N/A	N/A	N/A	N/A



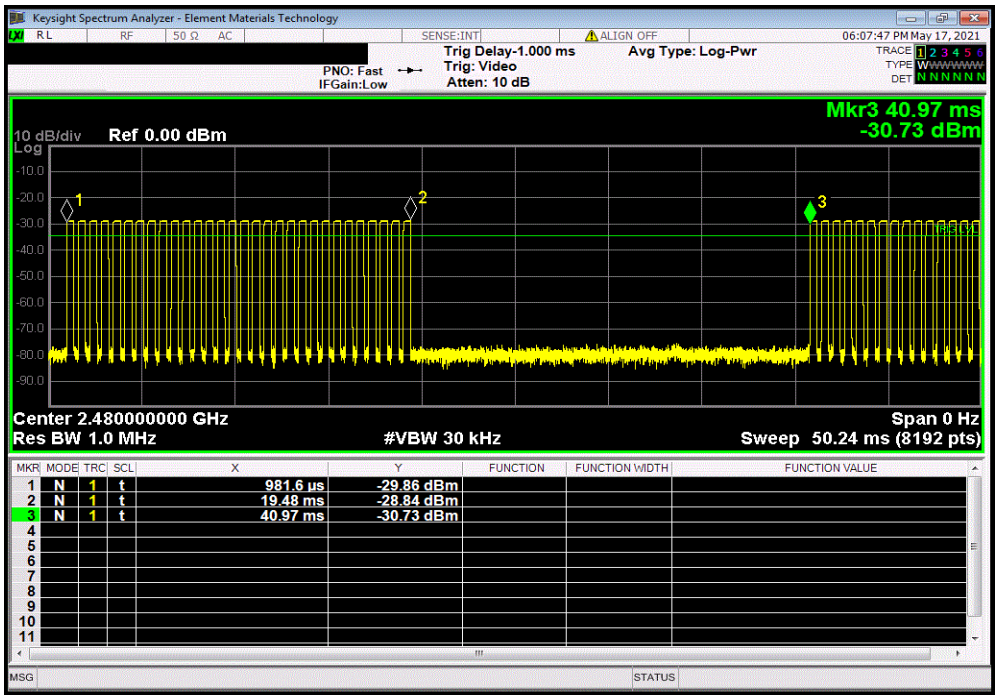
BLE/GFSK 1 Mbps High Channel, 2480 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	11.334	N/A	N/A	N/A	N/A



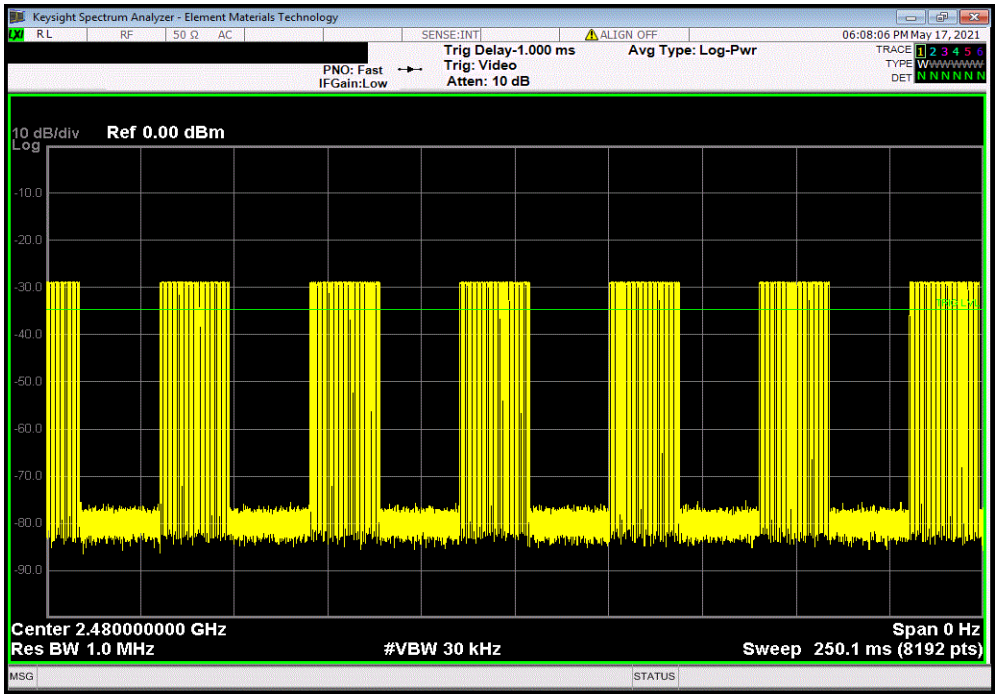
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	39.99	28.34	N/A	N/A



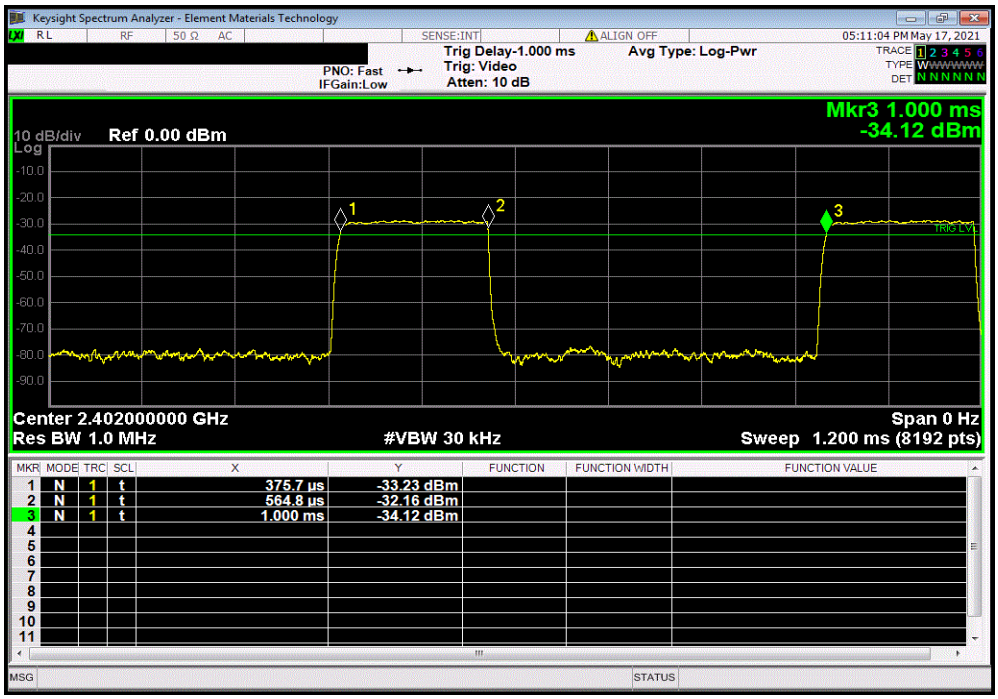
BLE/GFSK 1 Mbps High Channel, 2480 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



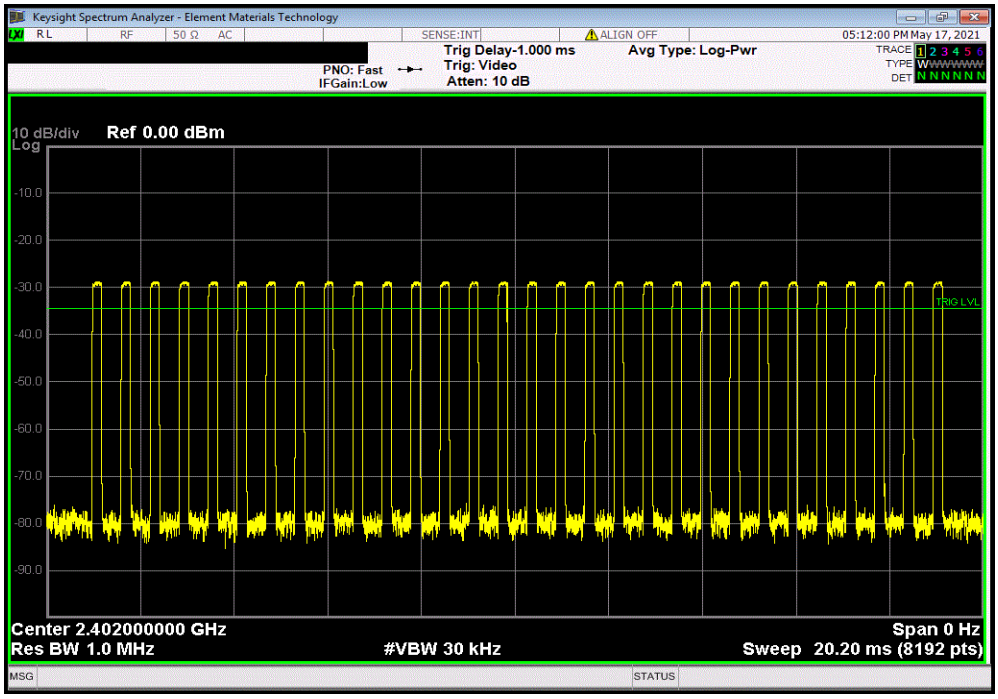
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.1891	N/A	N/A	N/A	N/A	N/A	N/A



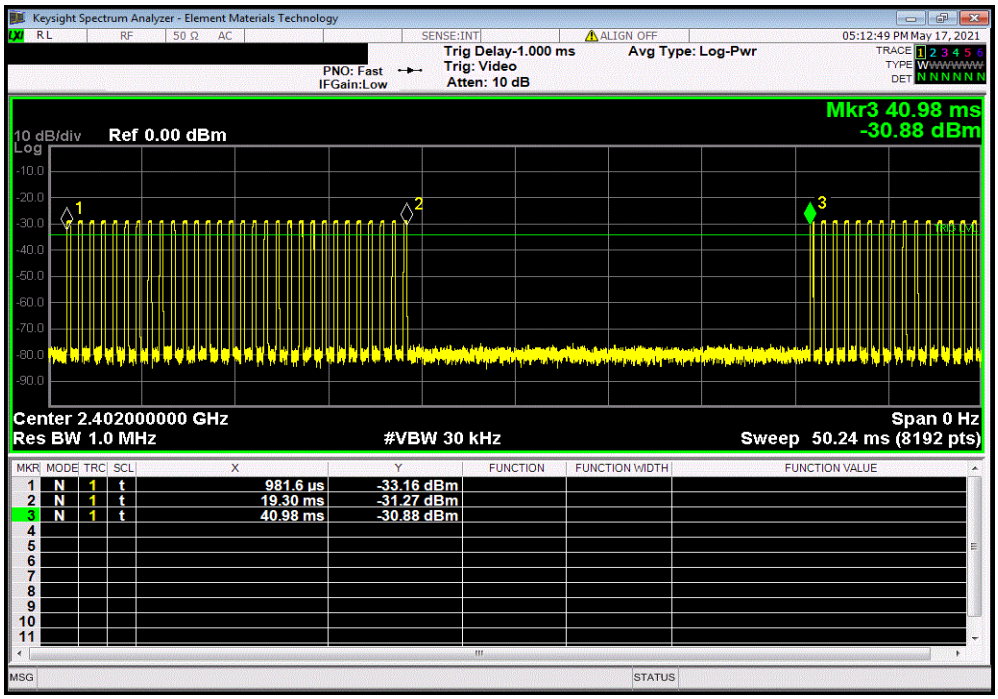
BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	5.673	N/A	N/A	N/A	N/A



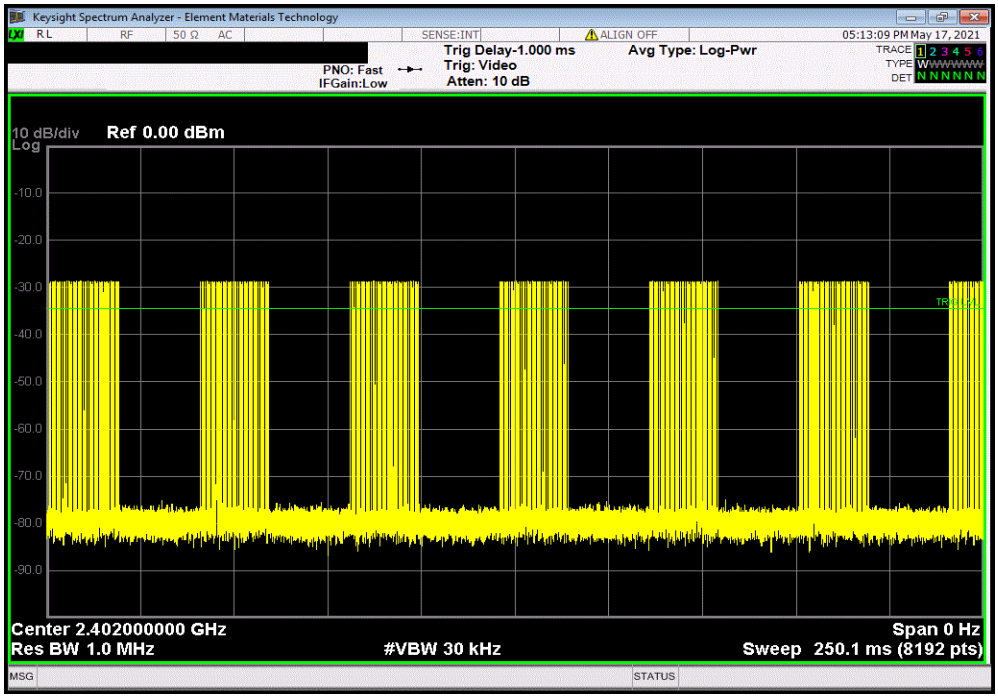
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	40.00	14.18	N/A	N/A



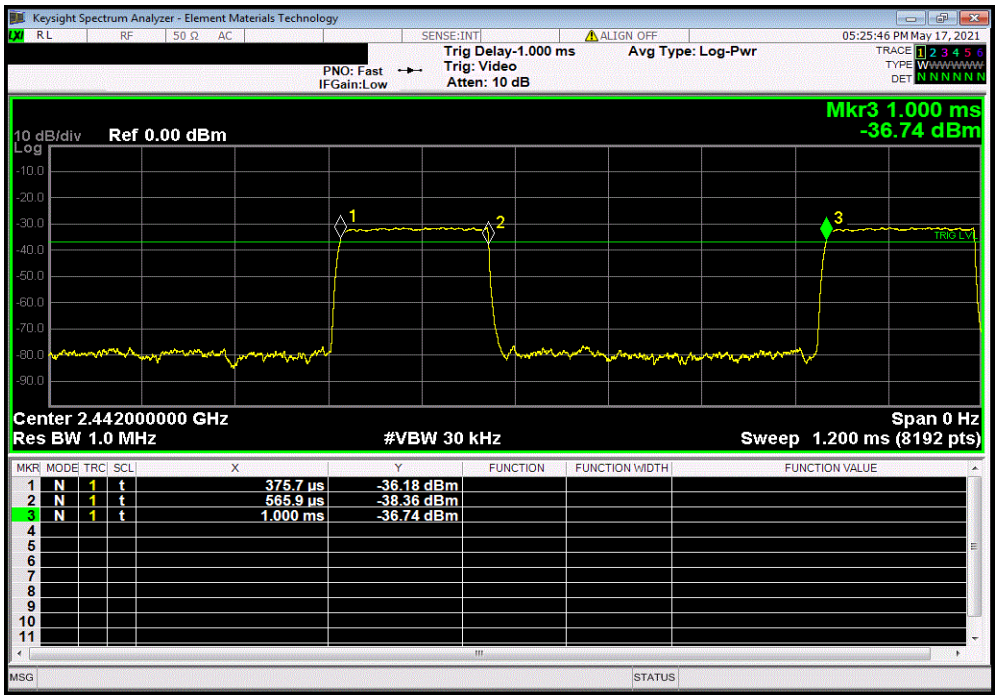
BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



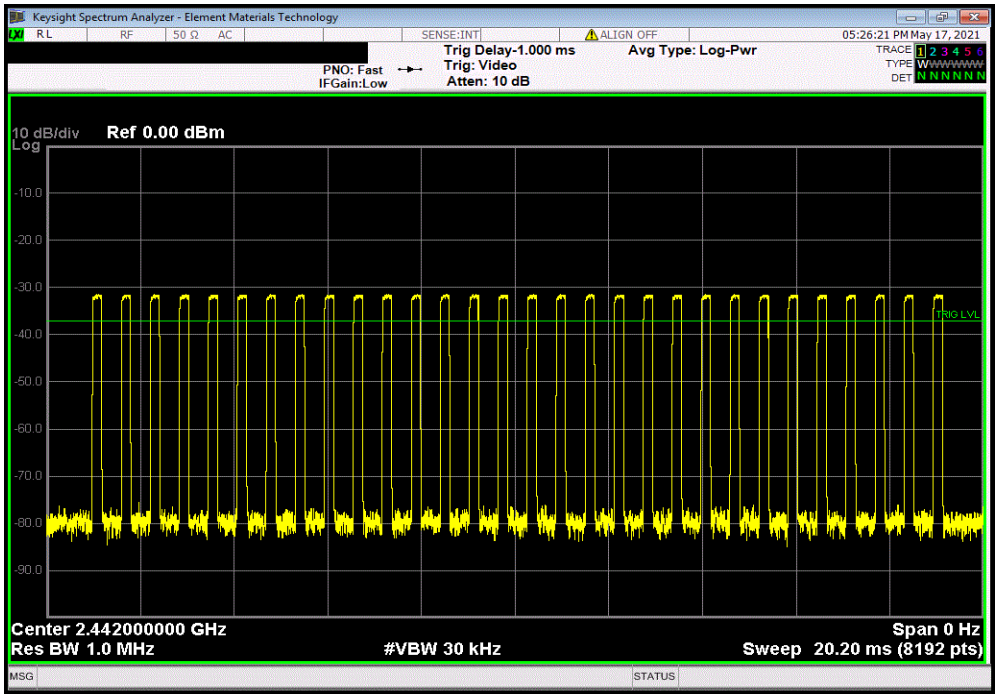
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.1902	N/A	N/A	N/A	N/A	N/A	N/A



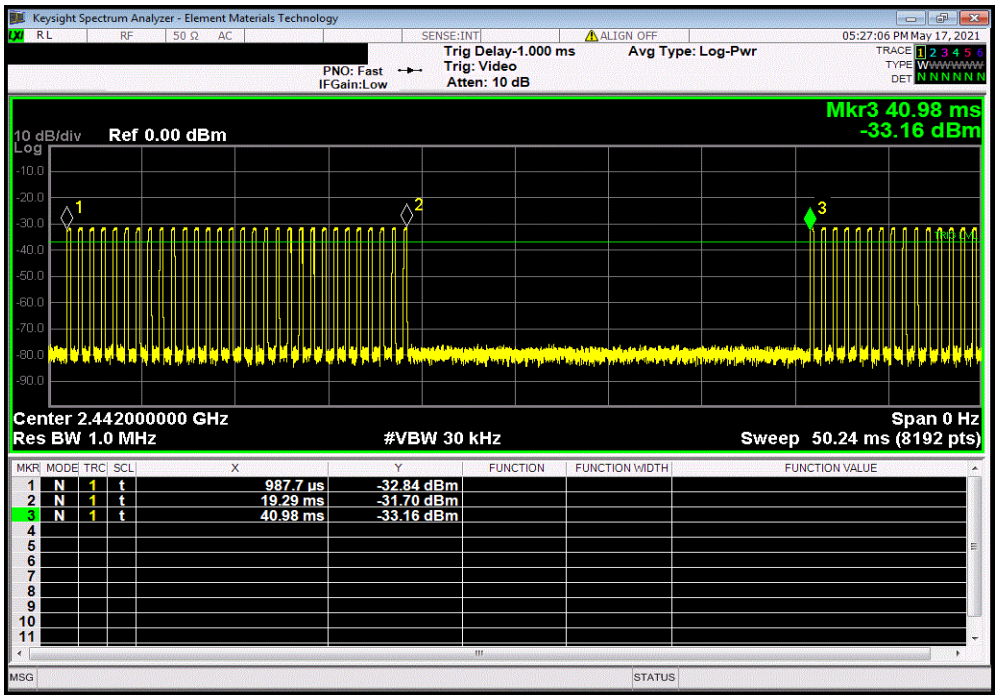
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	5.706	N/A	N/A	N/A	N/A



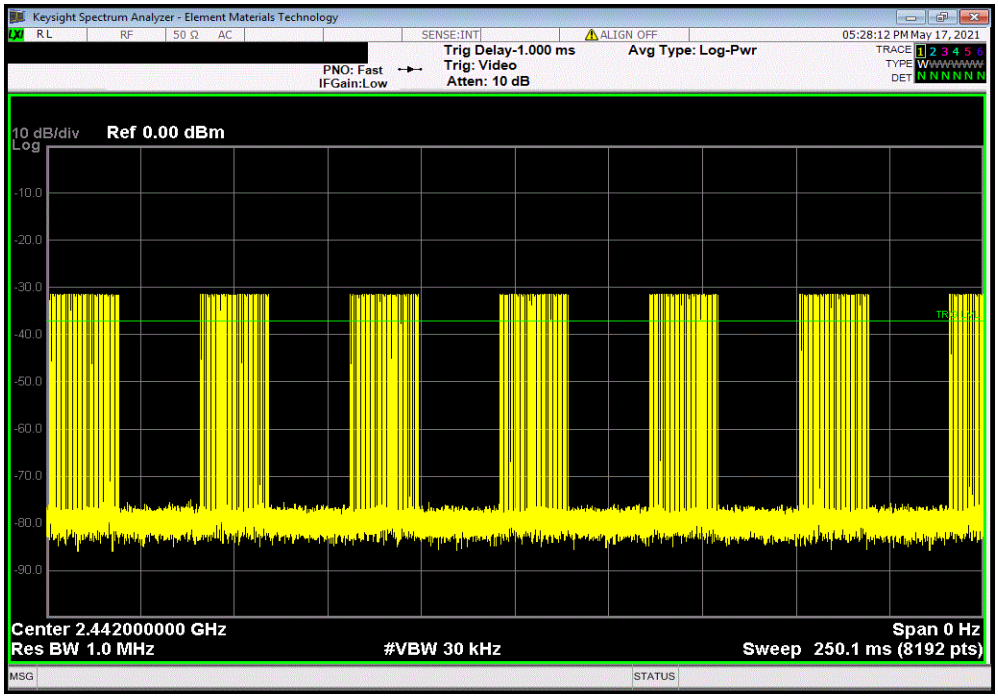
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	39.99	14.27	N/A	N/A



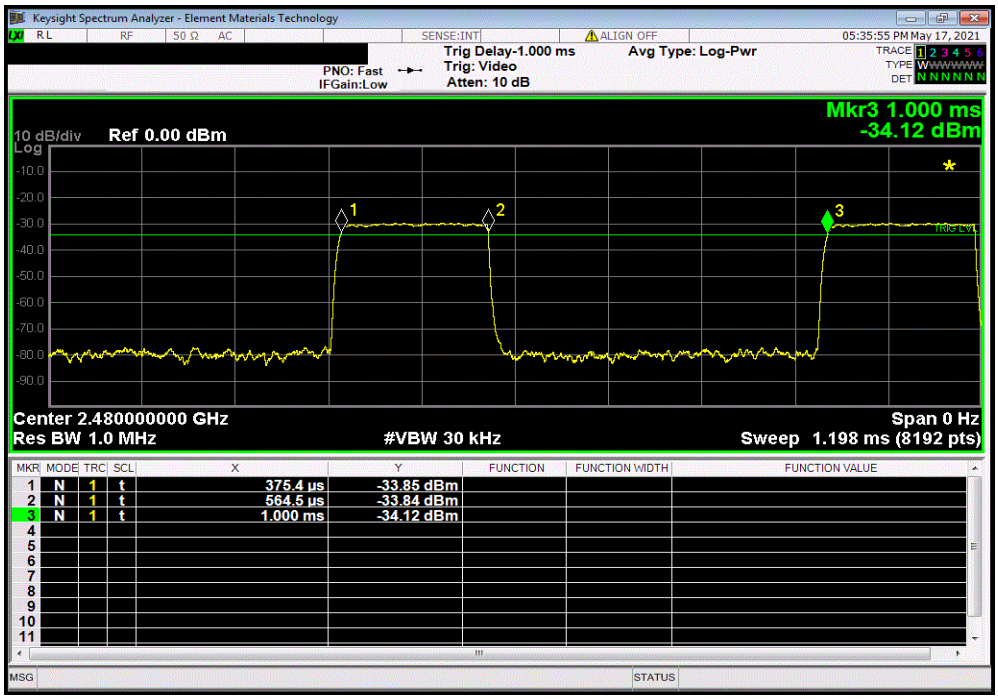
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



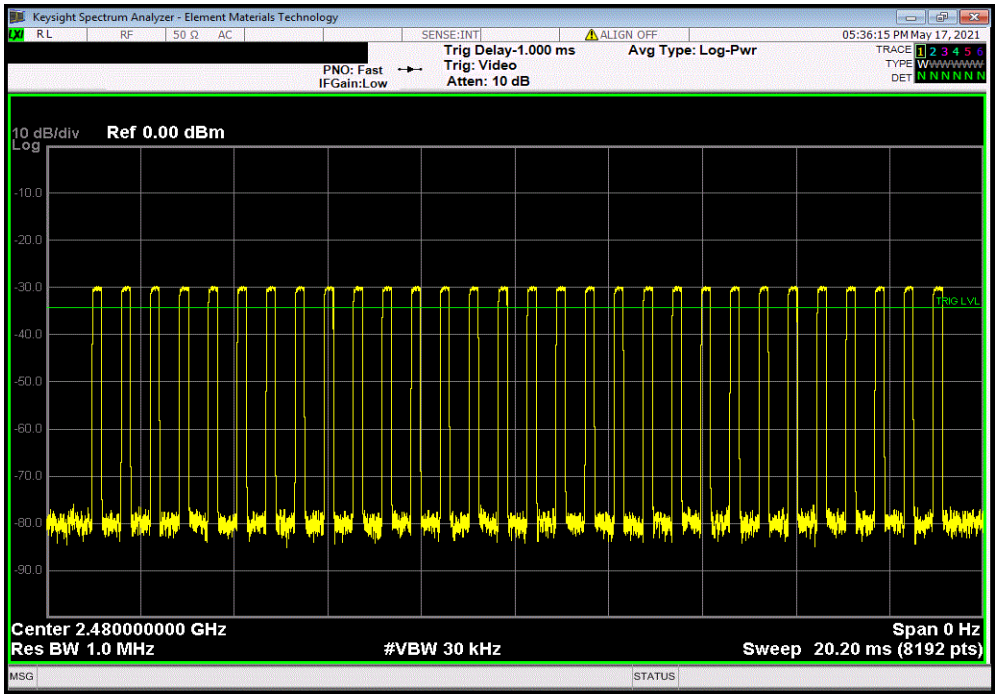
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz, Pulse Length						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
0.1891	N/A	N/A	N/A	N/A	N/A	N/A



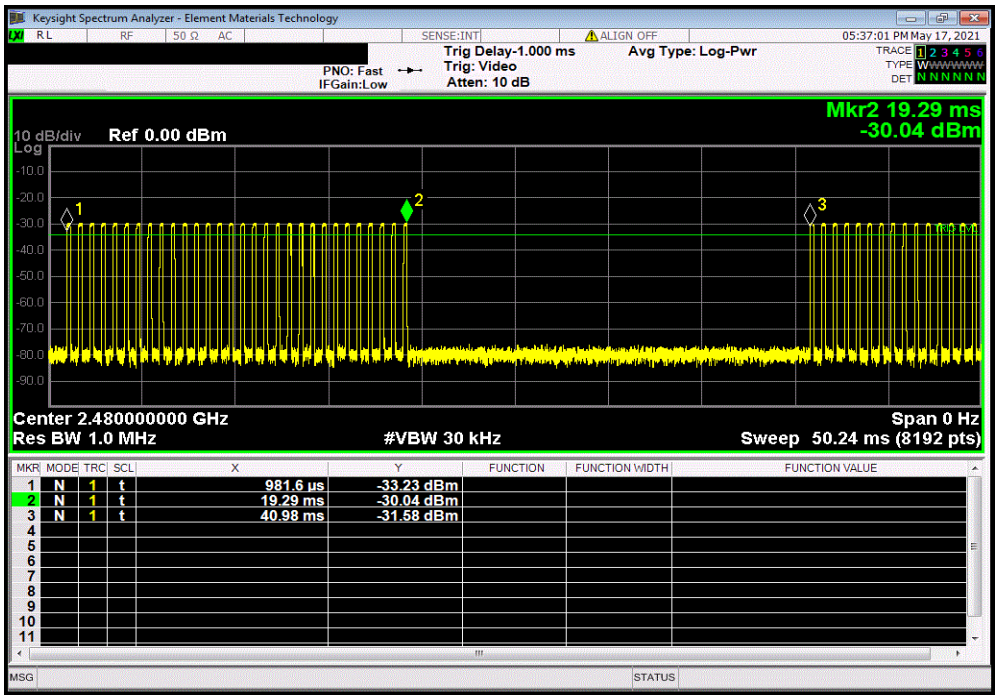
BLE/GFSK 2 Mbps High Channel, 2480 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	30	5.673	N/A	N/A	N/A	N/A



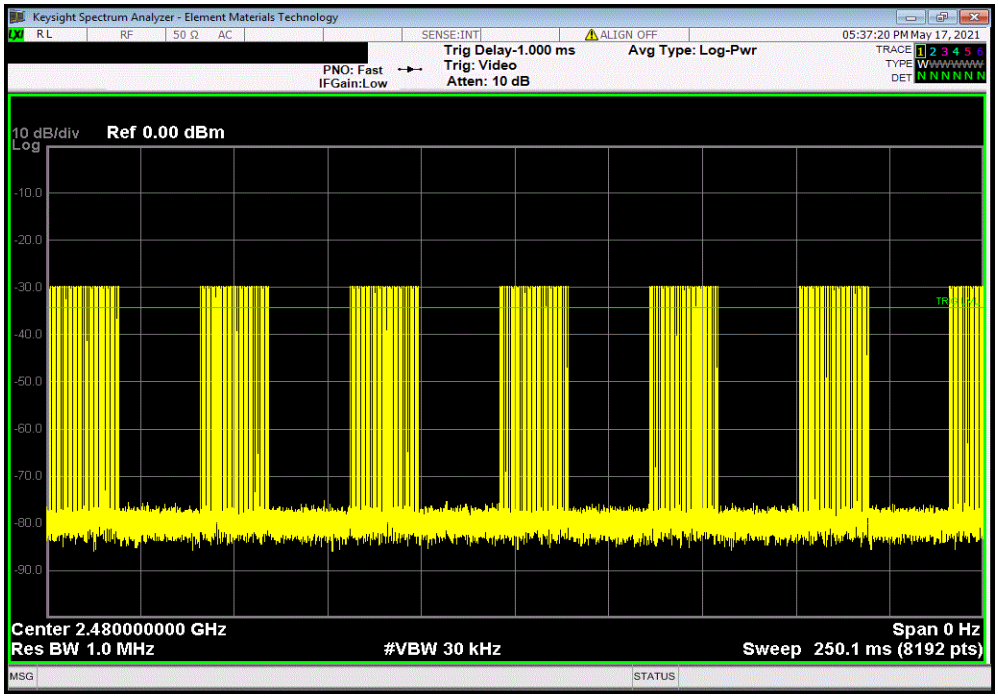
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	40.00	14.18	N/A	N/A



BLE/GFSK 2 Mbps High Channel, 2480 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14

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

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Evolv AI Power Plus BTE 13 BLE Hearing Aid**			**Work Order:**	**STAK0238**
Serial Number:	**210990482**			**Date:**	**17-May-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.3 °C**
Attendees:	**John Quach**			**Humidity:**	**45% RH**
Project:	**None**			**Barometric Pres.:**	**1023 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, and DC block.

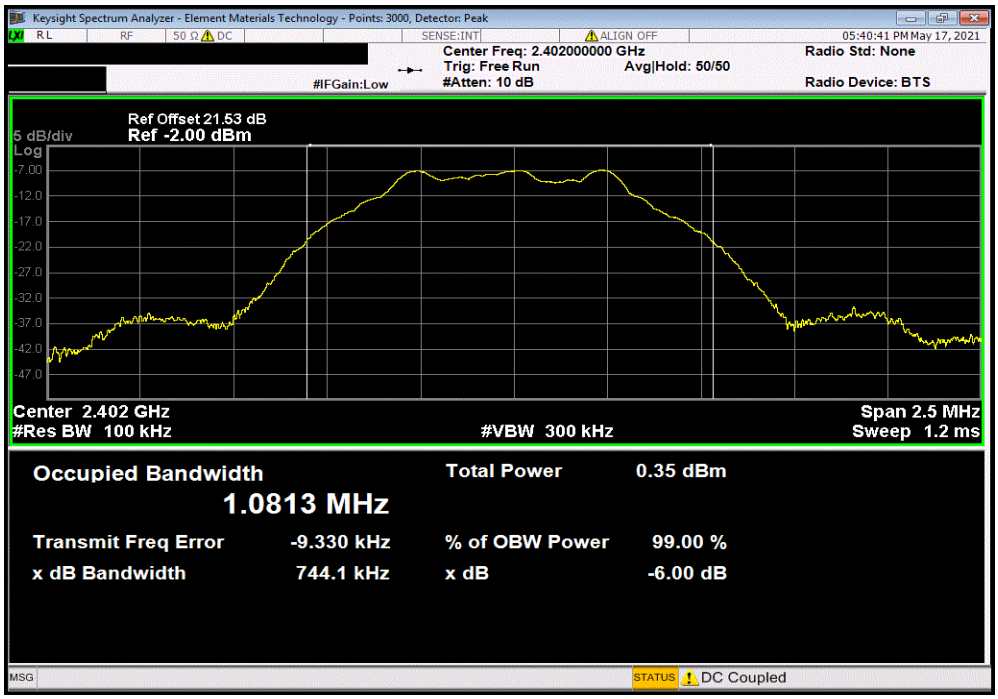
DEVIATIONS FROM TEST STANDARD

None

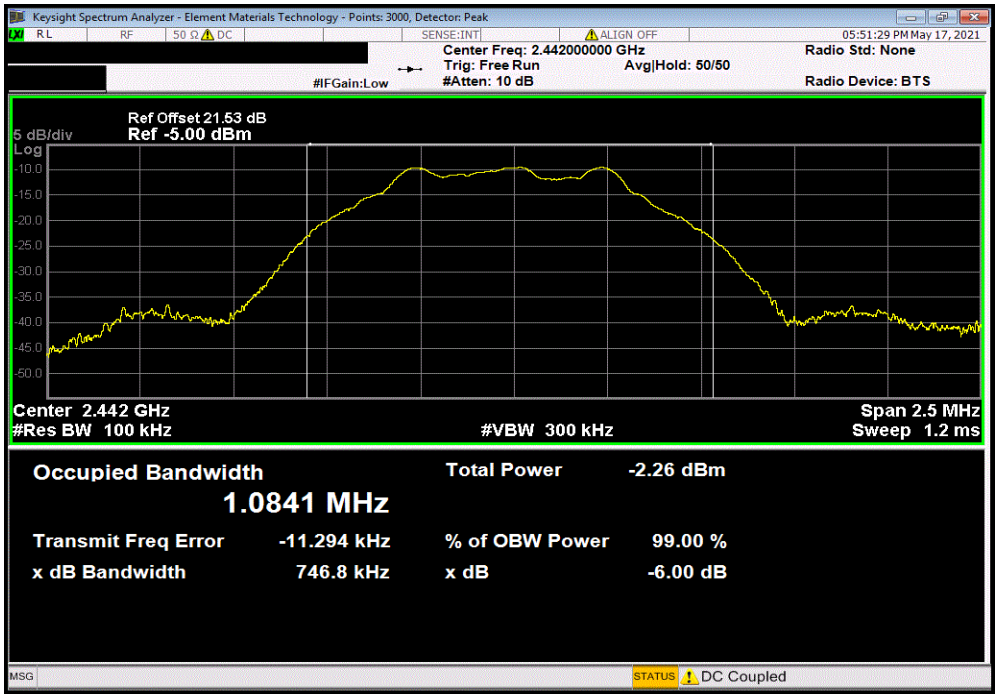
Configuration #	**1**	*Signature* Andrew Rogstad

	Value	**Limit (≥)**	**Result**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	744.079 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	746.817 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	747.829 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	1.282 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	1.277 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	1.32 MHz	500 kHz	Pass

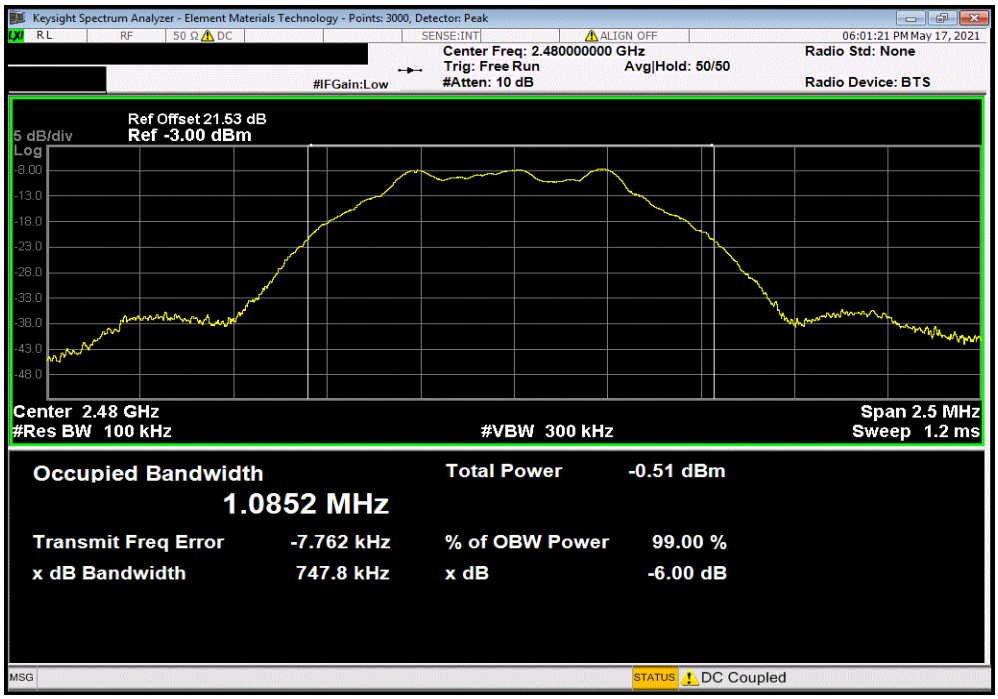
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				744.079 kHz	500 kHz	Pass



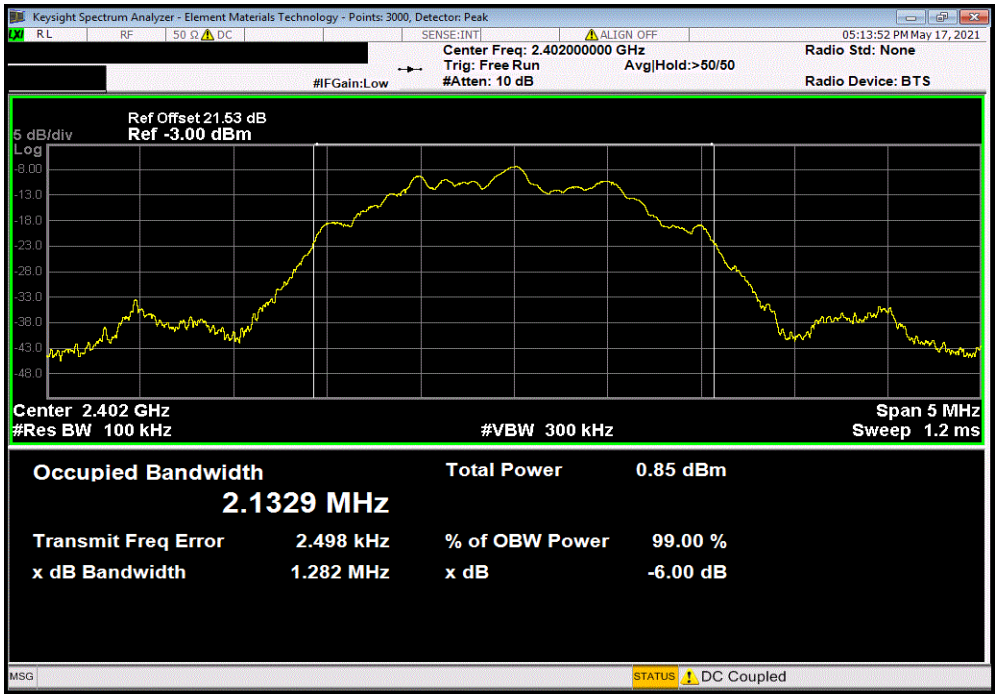
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				746.817 kHz	500 kHz	Pass



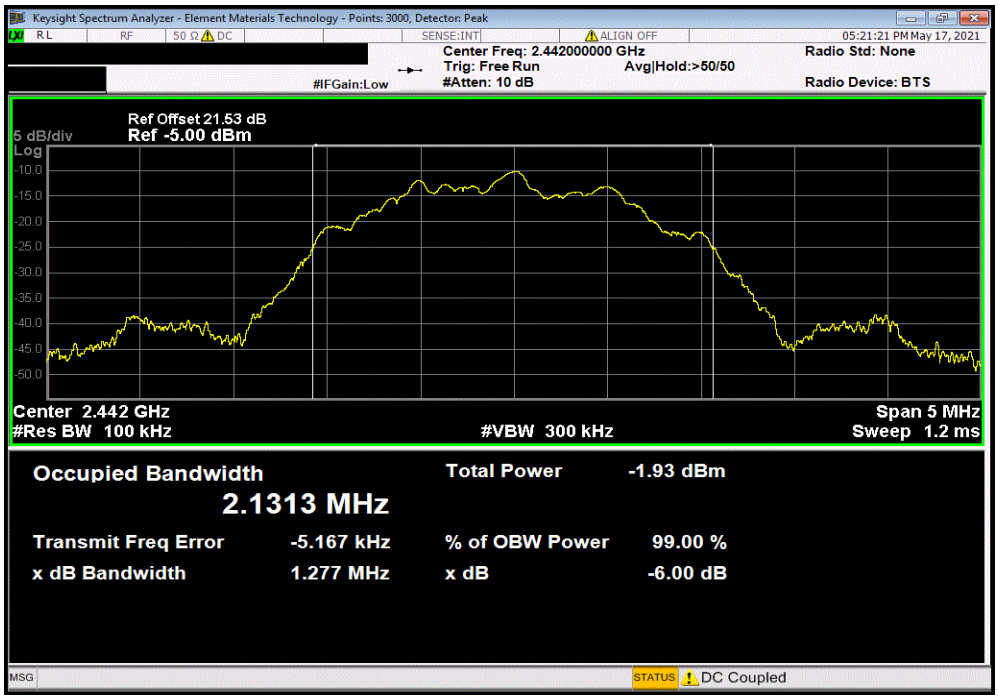
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				747.829 kHz	500 kHz	Pass



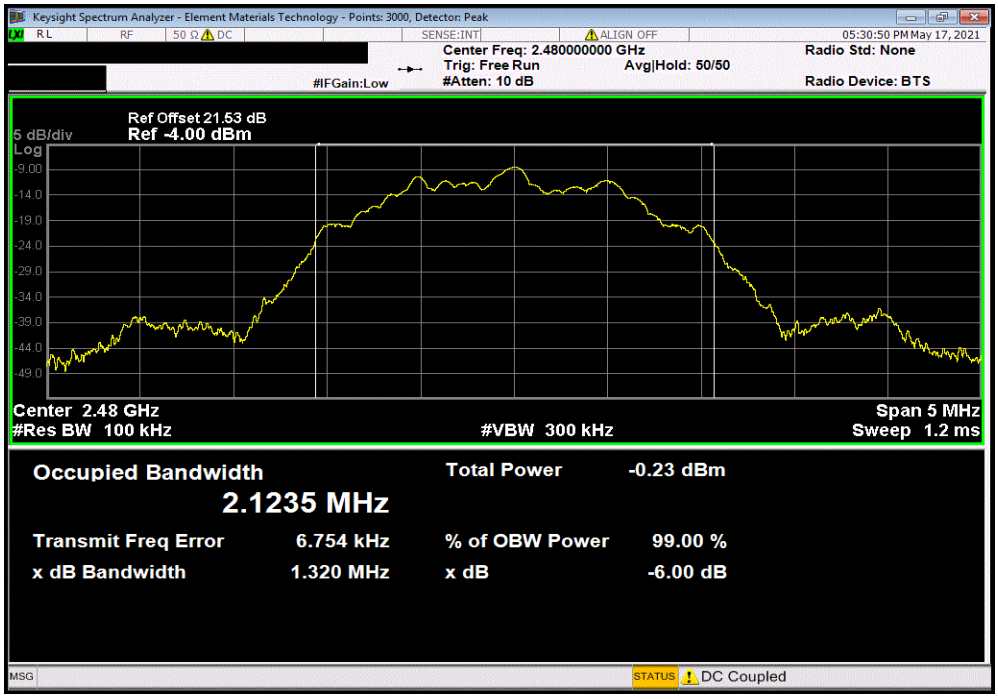
BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				1.282 MHz	500 kHz	Pass



BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				1.277 MHz	500 kHz	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				1.32 MHz	500 kHz	Pass



OUTPUT POWER

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14

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 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Evolv AI Power Plus BTE 13 BLE Hearing Aid**			**Work Order:**	**STAK0238**
Serial Number:	**210990482**			**Date:**	**17-May-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.2 °C**
Attendees:	**John Quach**			**Humidity:**	**44.9% RH**
Project:	**None**			**Barometric Pres.:**	**1023 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, and DC block.

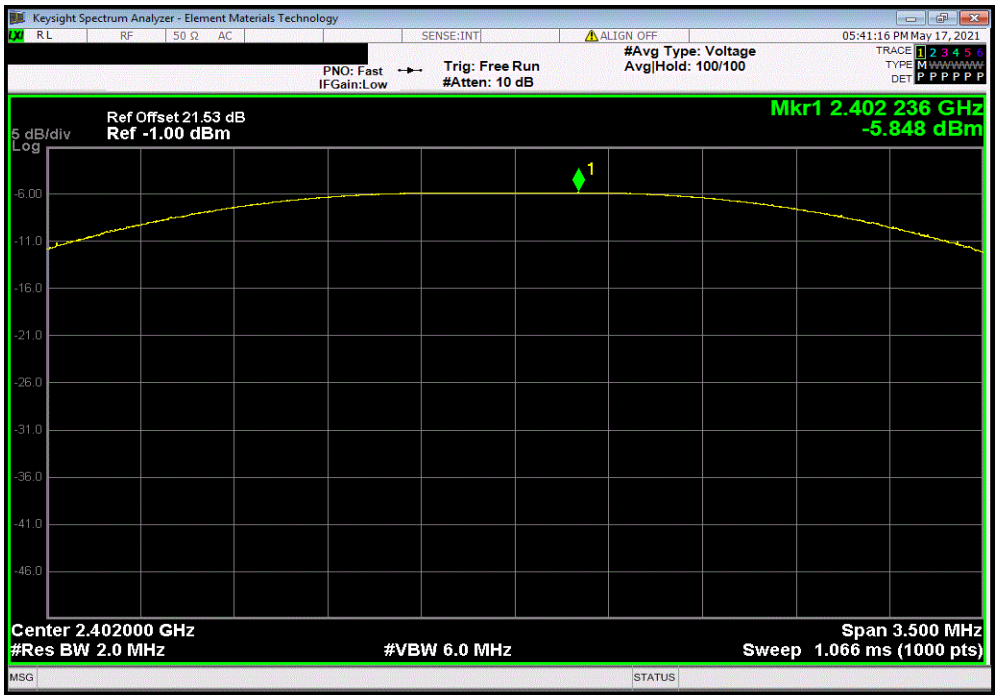
DEVIATIONS FROM TEST STANDARD

None

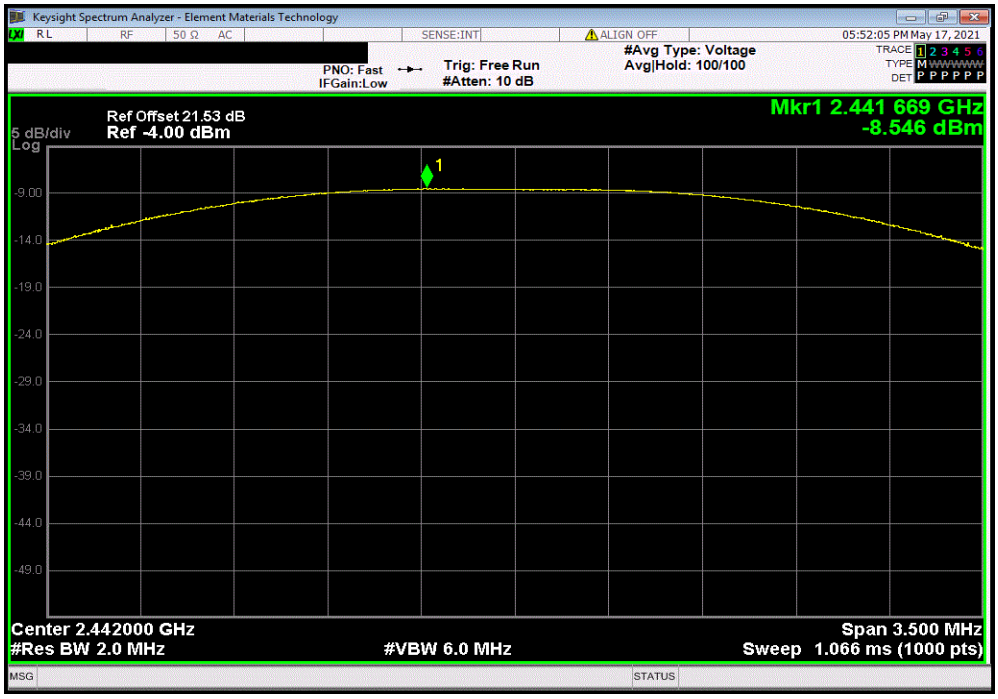
Configuration #	**1**	*Signature* Andrew Rogstad

	Out Pwr (dBm)	**Limit (dBm)**	**Result**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-5.848	30	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-8.546	30	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-6.799	30	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-5.697	30	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	-8.387	30	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-6.684	30	Pass

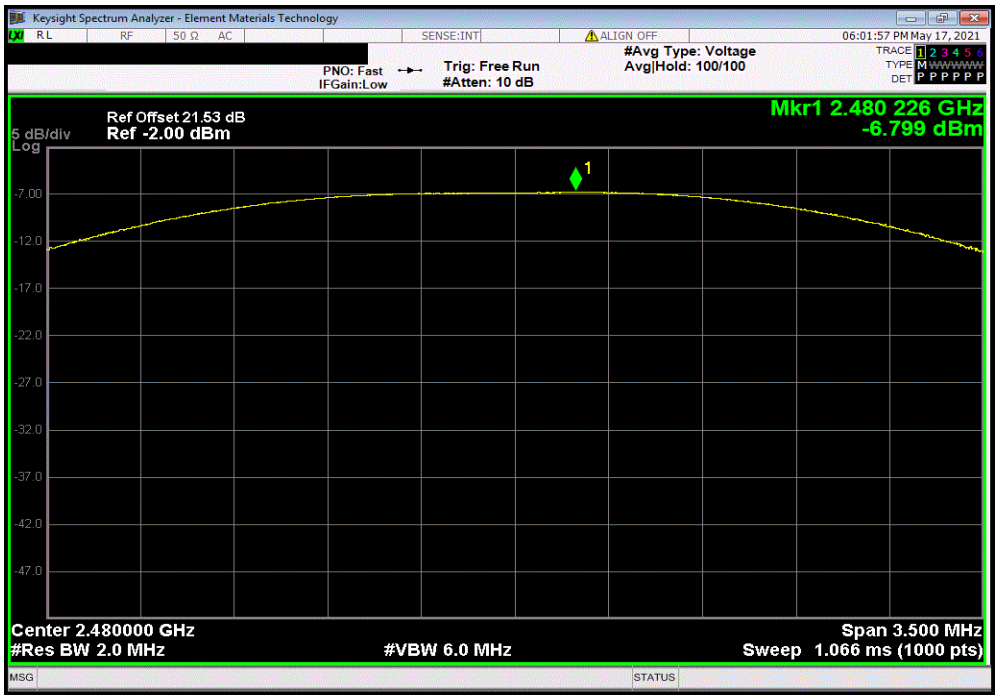
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-5.848	30	Pass



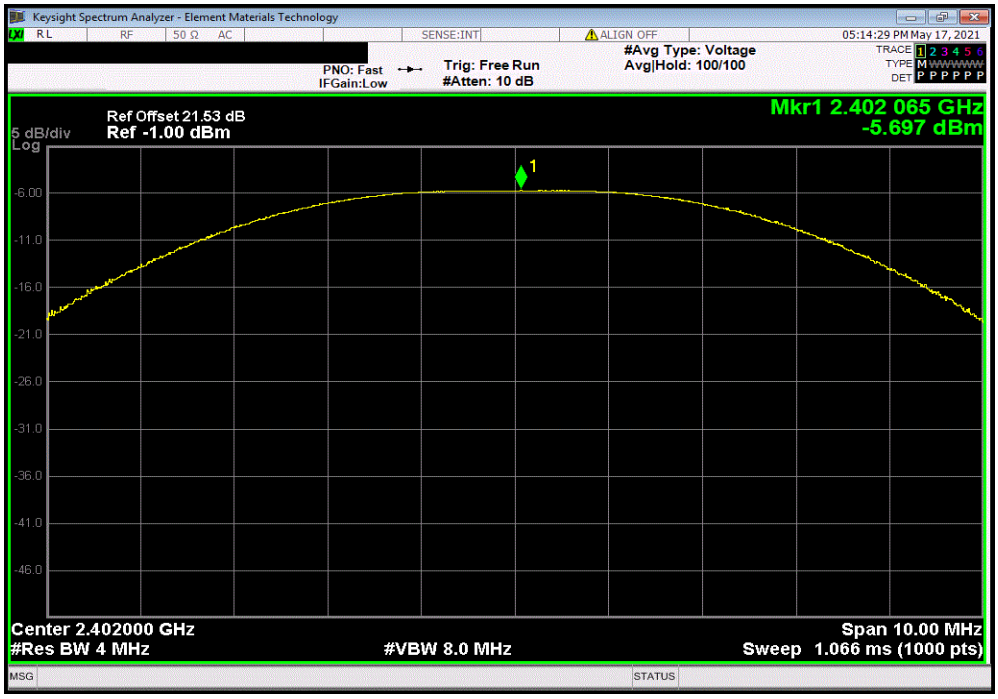
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-8.546	30	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-6.799	30	Pass

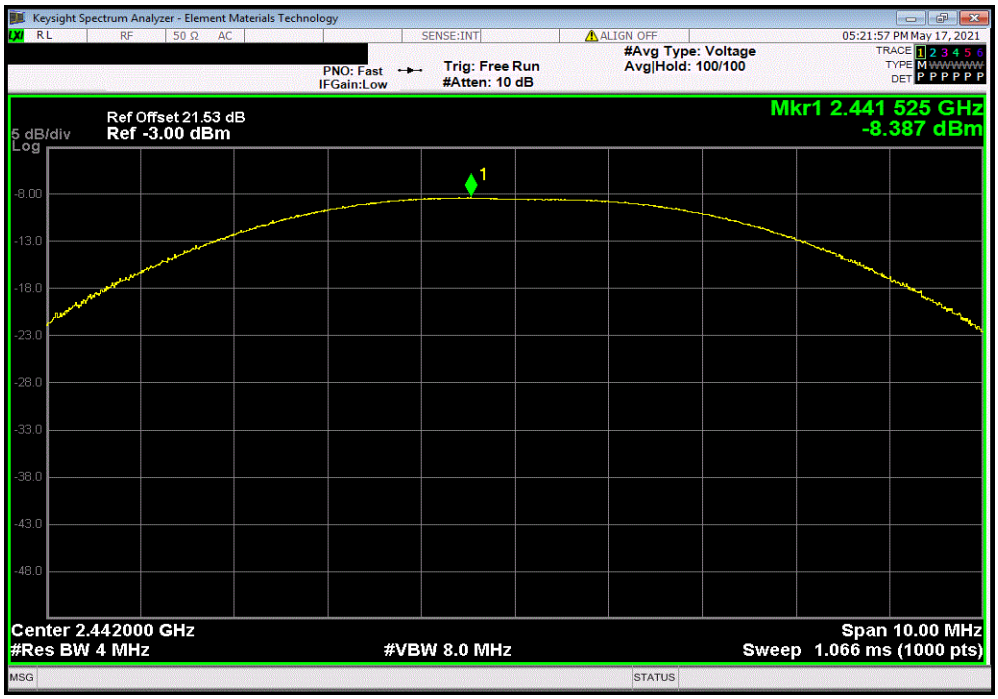


BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-5.697	30	Pass

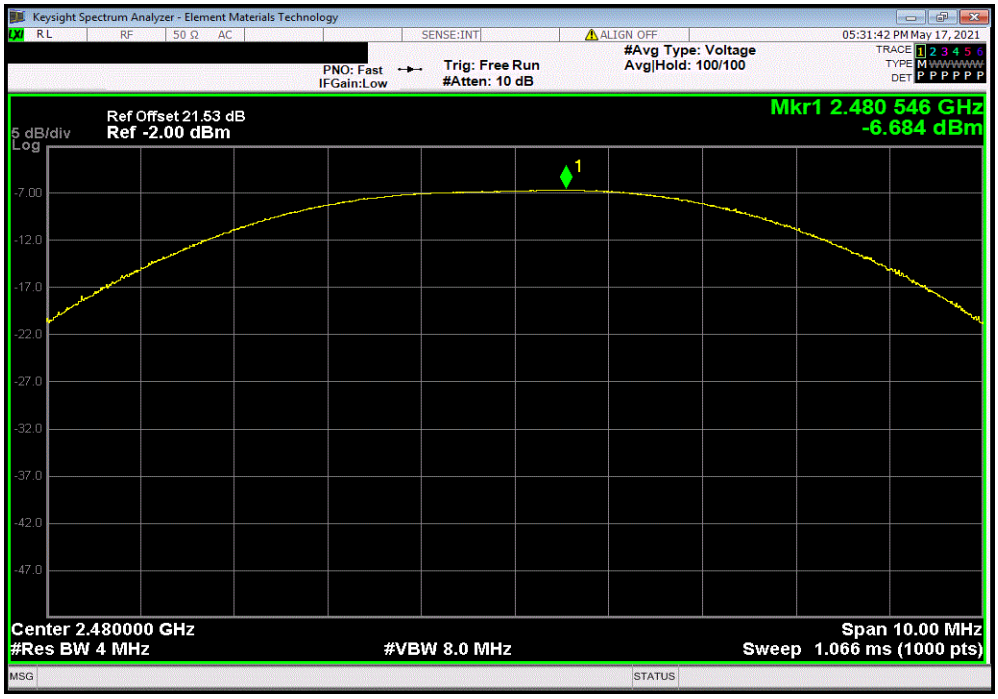


OUTPUT POWER

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-8.387	30	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-6.684	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	D150A-1-0720-200	MNL	2020-09-14	2021-09-14

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 2021.03.19.1 XMit 2020.12.30.0

EUT:	Evolv AI Power Plus BTE 13 BLE Hearing Aid			**Work Order:**	STAK0238
Serial Number:	210990482			**Date:**	17-May-21
Customer:	Starkey Laboratories, Inc.			**Temperature:**	22.3 °C
Attendees:	John Quach			**Humidity:**	45.1% RH
Project:	None			**Barometric Pres.:**	1023 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, and DC block.

DEVIATIONS FROM TEST STANDARD

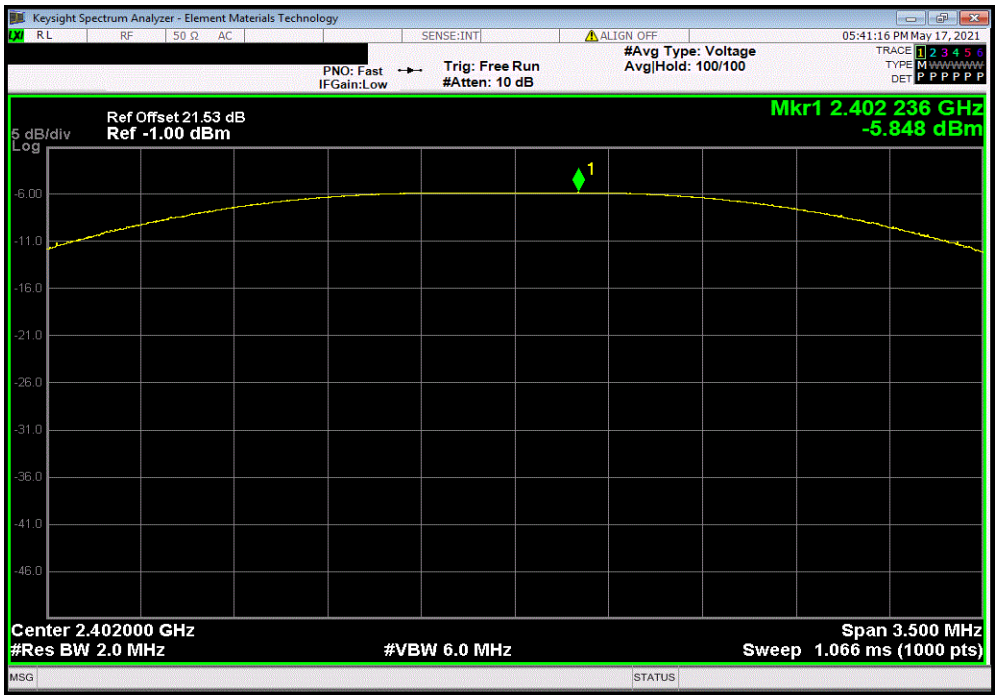
None

Configuration #	1	*Signature* Andrew Rogstad

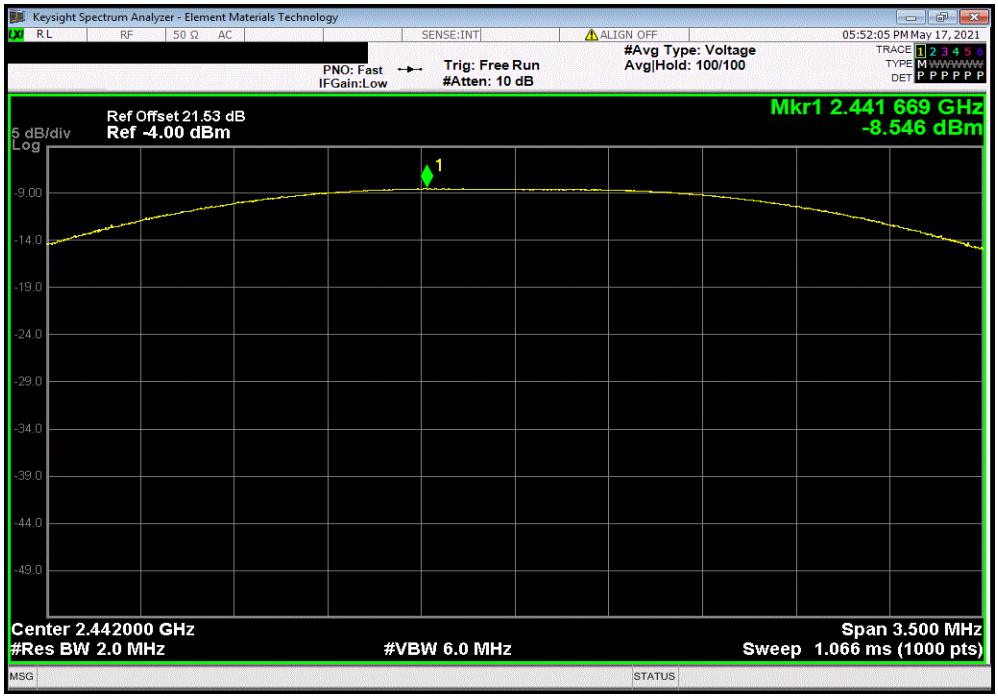
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-5.848	-7.5	-13.3	36	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-8.546	-7.5	-16.0	36	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-6.799	-7.5	-14.3	36	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-5.697	-7.5	-13.2	36	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	-8.387	-7.5	-15.9	36	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-6.684	-7.5	-14.2	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
		-5.848	-7.5	-13.3	36	Pass

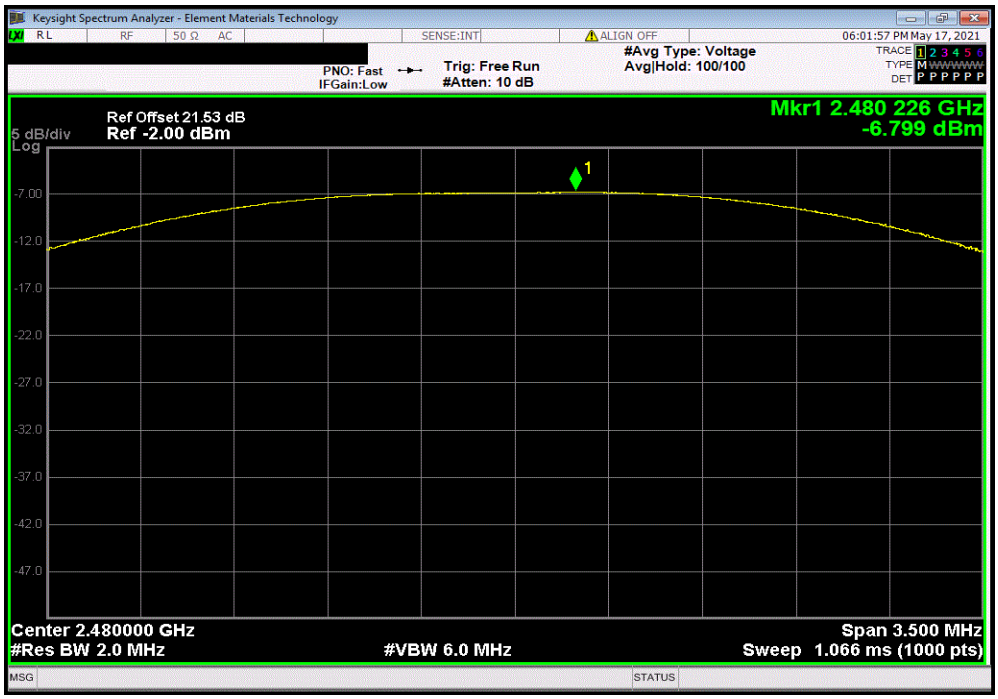


BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-8.546	-7.5	-16.0	36	Pass

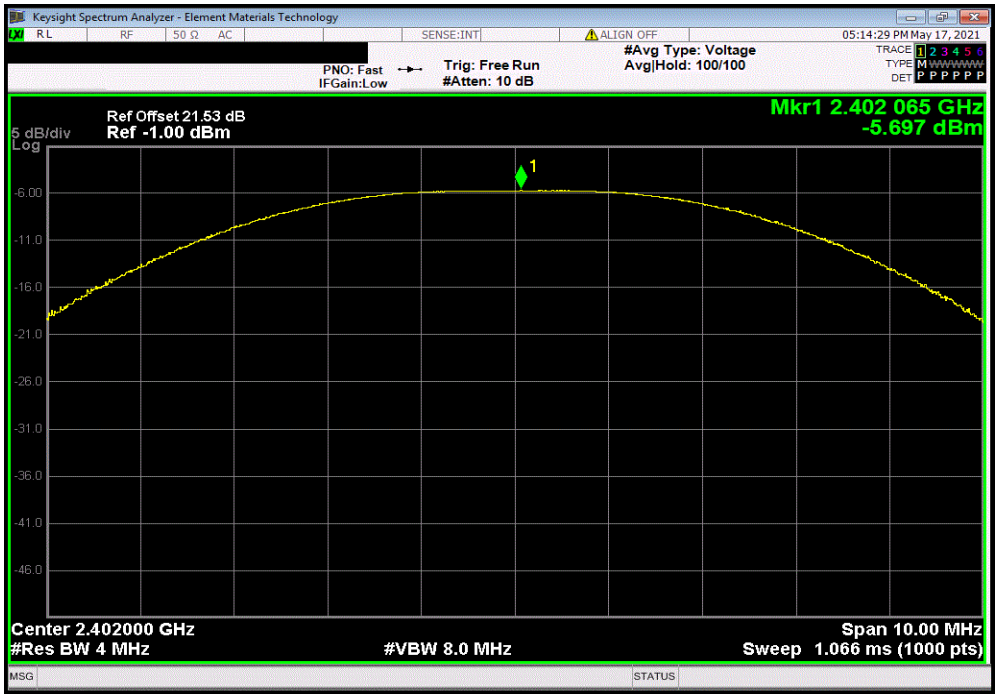


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-6.799	-7.5	-14.3	36	Pass

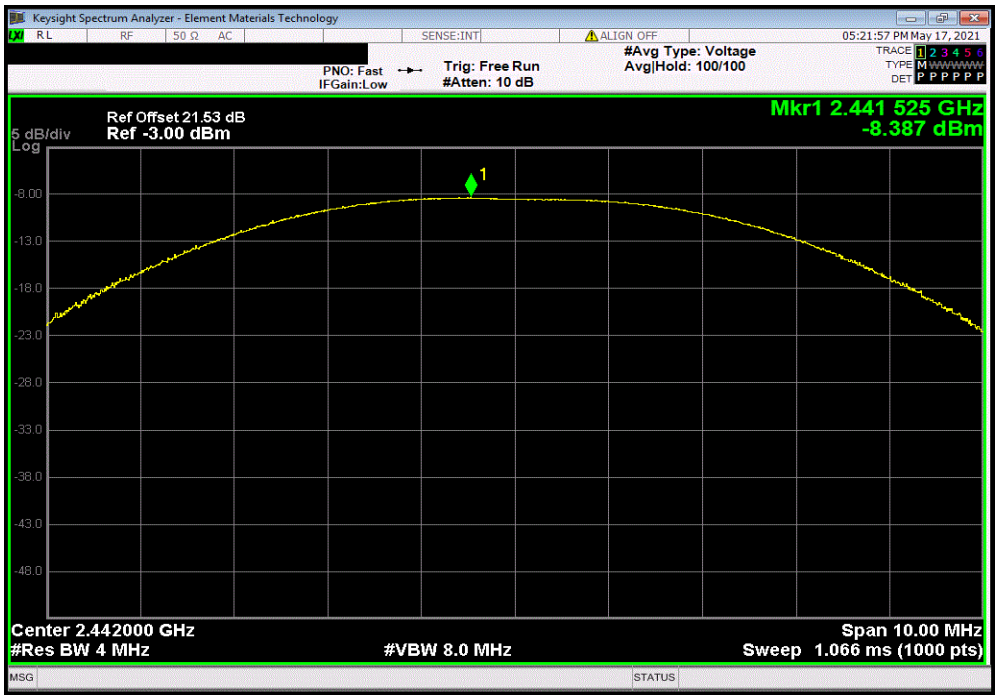


BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-5.697	-7.5	-13.2	36	Pass

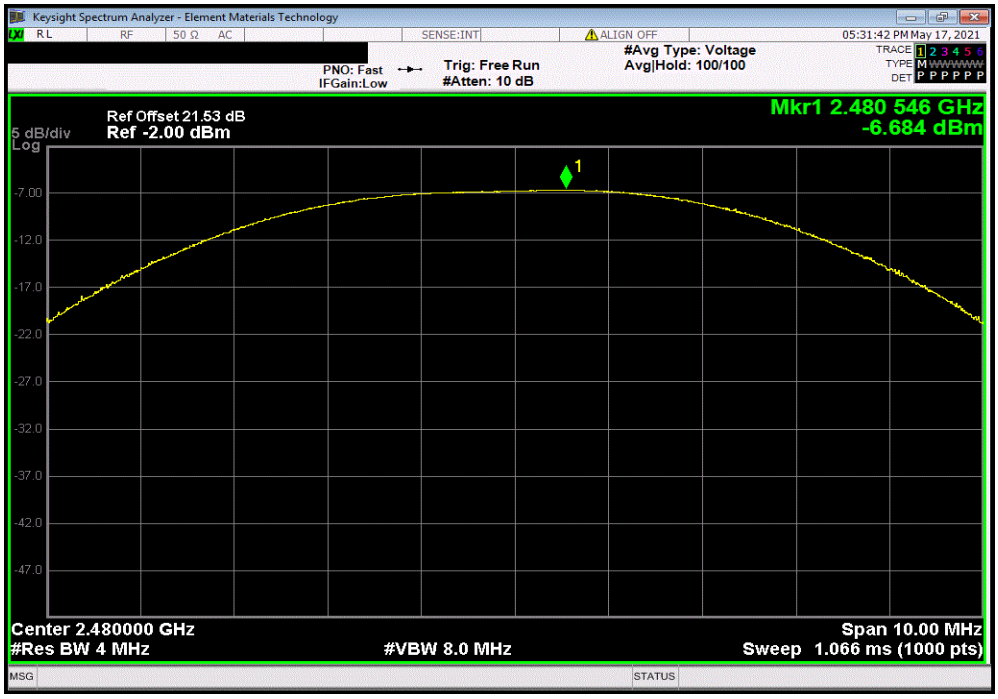


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-8.387	-7.5	-15.9	36	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-6.684	-7.5	-14.2	36	Pass



POWER SPECTRAL DENSITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2020-09-14	2021-09-14

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

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Evolv AI Power Plus BTE 13 BLE Hearing Aid**			**Work Order:**	**STAK0238**
Serial Number:	**210990482**			**Date:**	**17-May-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.2 °C**
Attendees:	**John Quach**			**Humidity:**	**44.9% RH**
Project:	**None**			**Barometric Pres.:**	**1023 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, and DC block.

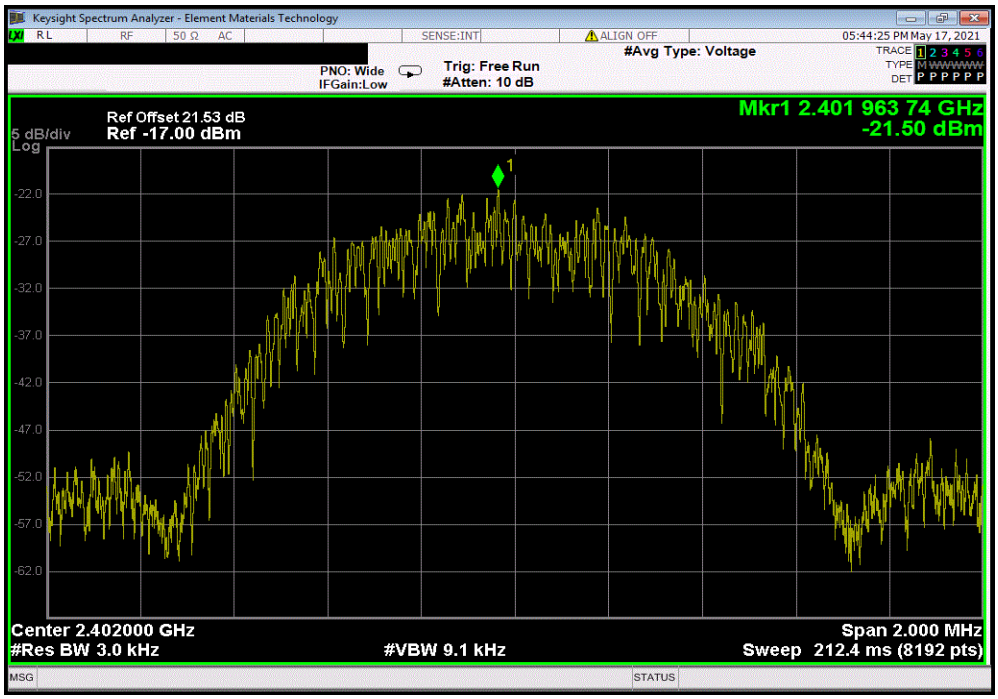
DEVIATIONS FROM TEST STANDARD

None

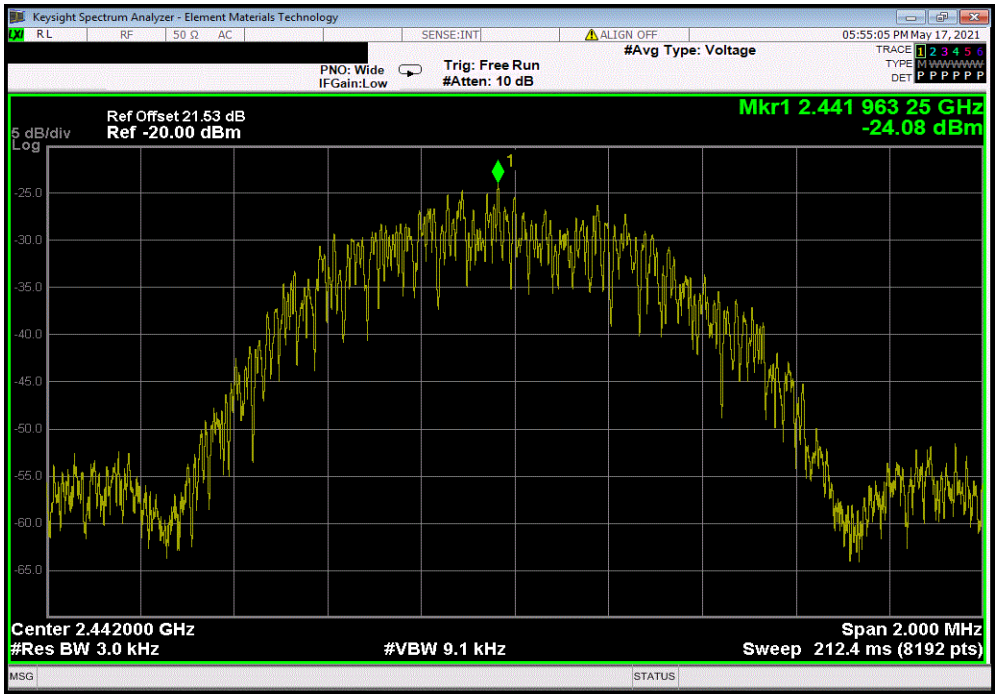
Configuration #	**1**	*Signature*

	Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-21.504	8	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-24.081	8	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-22.476	8	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-23.882	8	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	-26.696	8	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-25	8	Pass

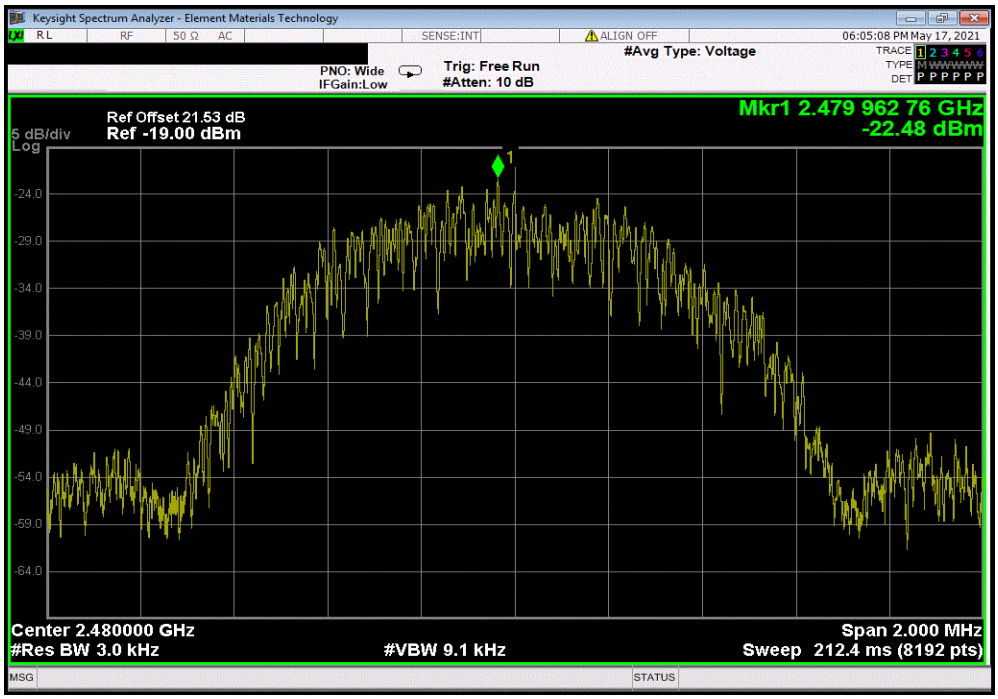
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-21.504	8	Pass



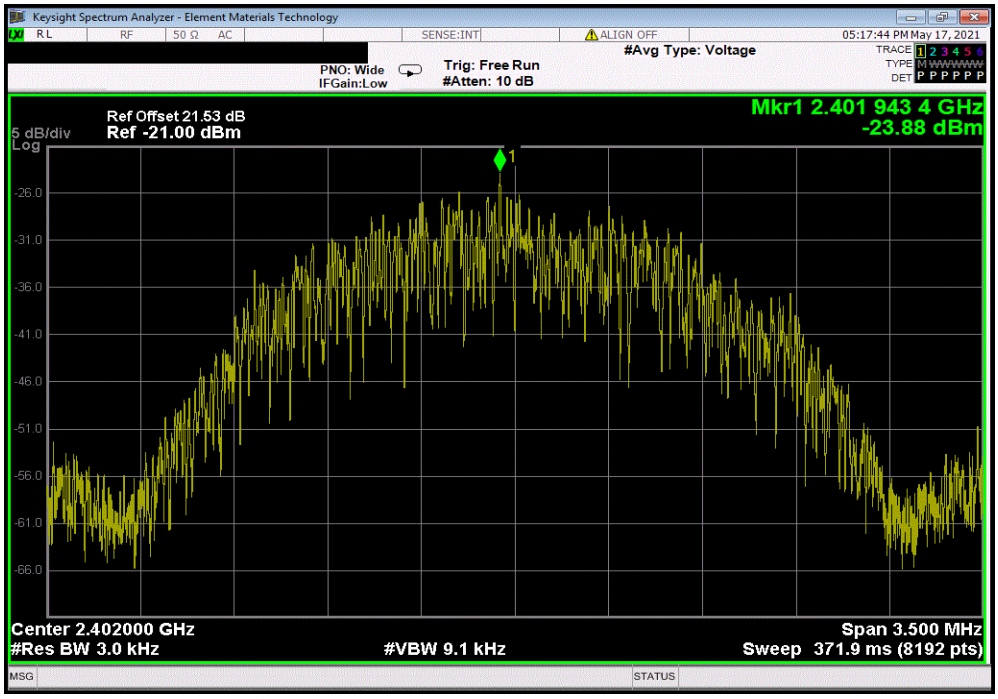
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-24.081	8	Pass



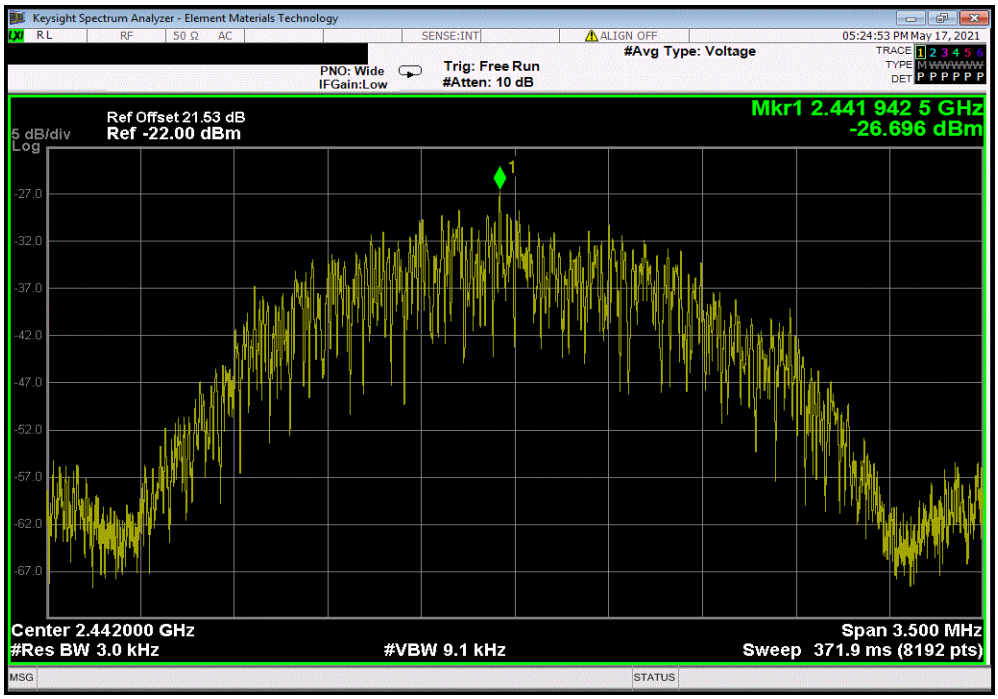
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-22.476	8	Pass



BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-23.882	8	Pass



BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-26.696	8	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-25	8	Pass