Starkey Laboratories, Inc.

Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)

FCC 15.247:2022

RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021

Bluetooth Low Energy (DTS) Radio

Report: STAK0278.3 Rev 01, Issue Date: December 7, 2022

CERT #3310.05

CERTIFICATE OF TEST

Last Date of Test: October 19, 2022
Starkey Laboratories, Inc.
EUT: Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2022	ANSI C63.10:2013, FCC KDB 558074 v05r02:2019
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

Results

Test Description	Result	FCC Section(s)	RSS Section(s)	ANSI C63.10 Section(s)	Comments
Powerline Conducted Emissions	N/A	15.207	RSS-Gen 8.8	6.2	Not required for a battery powered EUT.
Occupied Bandwidth	Pass	KDB 558074 -2.1	RSS-Gen 6.7	6.9.3	
Duty Cycle	Pass	KDB 558074 -6.0	RSS-Gen 3.2	11.6	
DTS Bandwidth	Pass	15.247(a)(2), KDB 558074 -8.2	RSS-247 5.2(a)	11.8.2	
Equivalent Isotropic Radiated Power (EIRP)	Pass	15.247(b)(3), KDB 558074 -8.3.2	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.2	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Power Spectral Density	Pass	15.247(e), KDB 558074 -8.4	RSS-247 5.2(b)	11.10.2	
Band Edge Compliance	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
Spurious Conducted Emissions	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 - 8.6, 8.7	RSS-247 5.5, RSS-Gen 6.13, 8.10	11.12.1, 11.13.2, 6.5, 6.6	

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		
01	Updated last date of test,	2022-12-06	2, 10
01	Updated antenna gain values and added modulation type	2022-12-06	11
01	Corrected test date	2022-12-06	13
01	Corrected antenna gain	2022-12-06	44-47
01	Split up spurious data into separate datasheets	2022-12-06	68-75
01	Replaced Antenna Appendix	2022-12-06	77-84
01	Duty Cycle Correction Factor applied	2022-12-07	70-71, 74-75

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

Canada

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

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

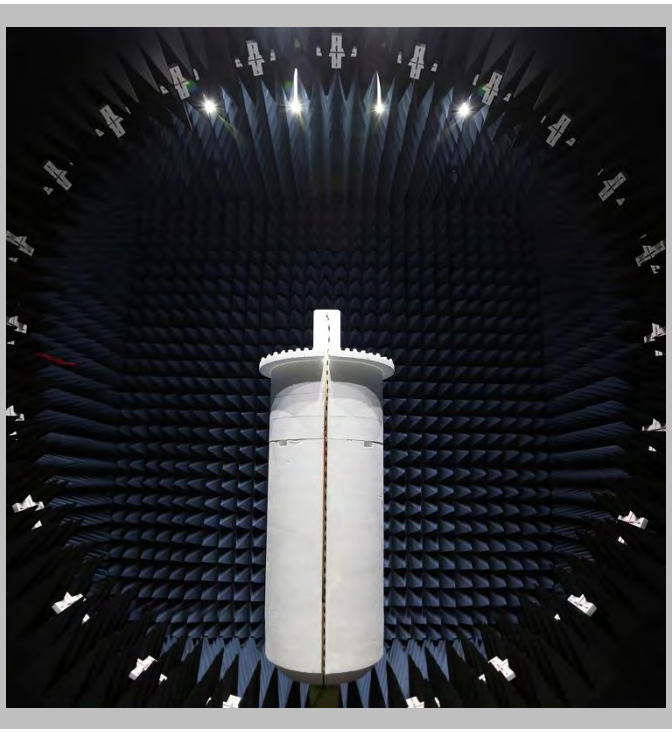
For details on the Scopes of our Accreditations, please visit:

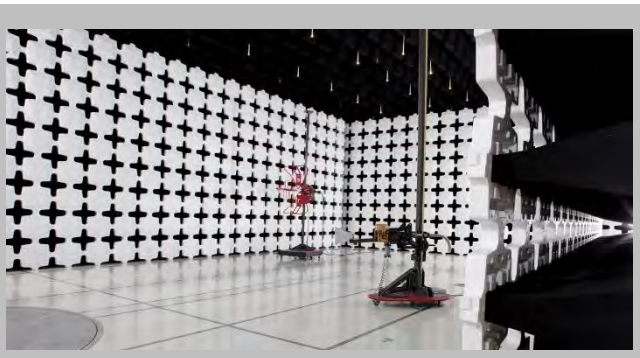
California Minnesota Oregon Texas Washington

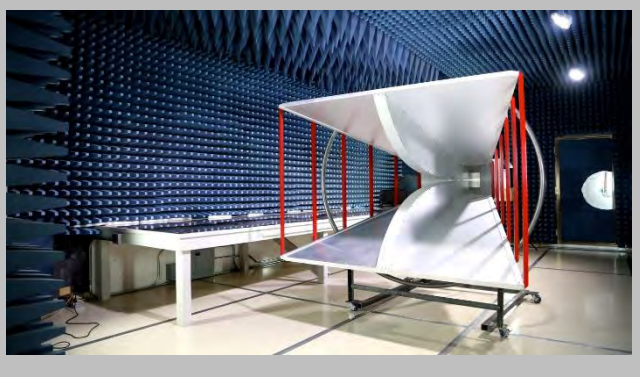
FACILITIES

element
2020.12.15

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
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

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

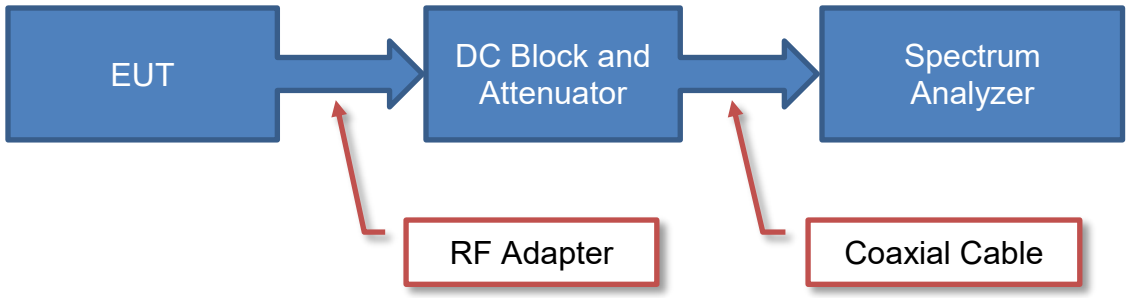
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

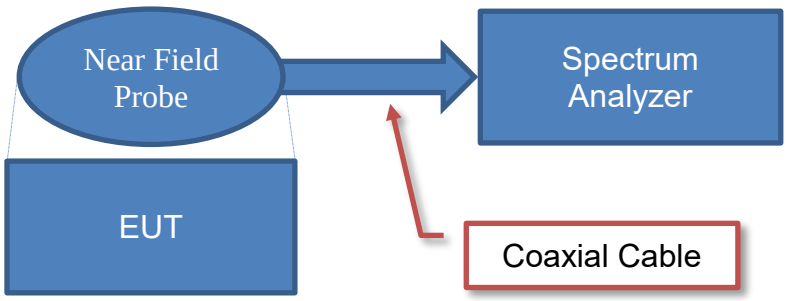
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

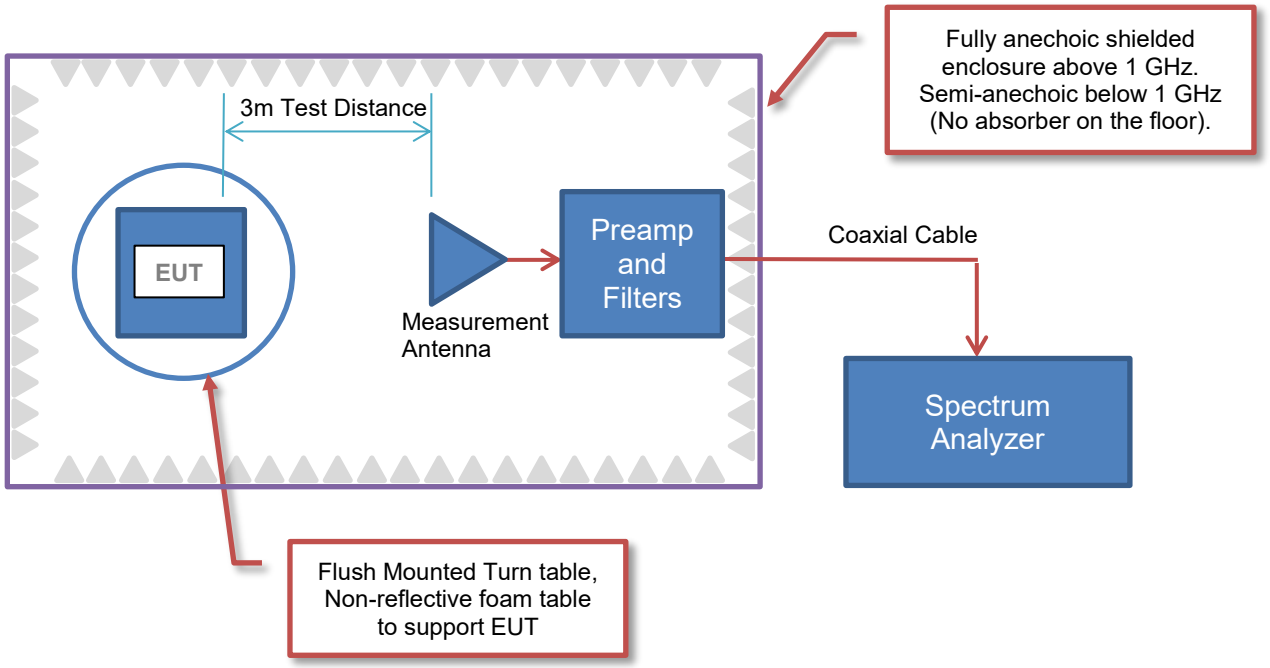


Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)		Factor: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

Conducted Emissions:

Measured Level (Amplitude)		Factor: Transducer Factor		Factor: Cable Factor		External Attenuation		Adjusted Level
26.7	+	0.3	+	0.1	+	20.0	=	**47.1**

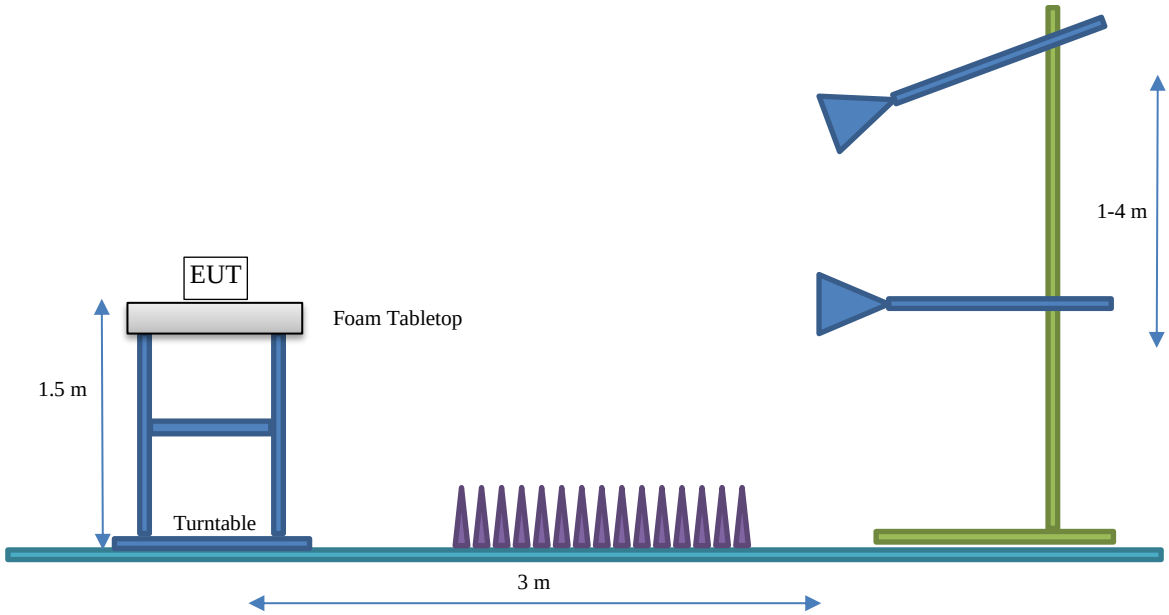
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)		Substitution Antenna Factor (dBi)		EIRP to ERP (if applicable)		Measured power (dBm ERP/EIRP)
10.0	+	6.0	-	2.15	=	**13.9/16.0**

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:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)
First Date of Test:	July 29, 2022
Last Date of Test:	October 19, 2022
Receipt Date of Samples:	July 29, 2022
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Hearing Aid

Testing Objective:
To demonstrate compliance of the Bluetooth Low Energy (DTS) radio to FCC 15.247 and RSS-247 requirements.

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
PCB Printed	Starkey Laboratories, Inc	2400-2485	-1.78

The EUT was tested using the power settings provided by the manufacturer which were based upon:

☒ Test software settings Test software/firmware installed on EUT:_____Rev 8.2.2.0_____

☐ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting
BLE 1 Mbps, 2 Mbps, GFSK	DTS	0 or 37	2402	+2
		20 or 18	2442	+2
		39	2480	+2

CONFIGURATIONS

Configuration STAK0278- 5

Software/Firmware Running During Test	
Description	**Version**
Firmware	Rev 8.2.2.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)	Starkey Laboratories, Inc.	56021-108	2911334794

Configuration STAK0278- 12

Software/Firmware Running During Test	
Description	**Version**
Firmware	Rev 8.2.2.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)	Starkey Laboratories, Inc.	56021-108	2911334780

Configuration STAK0278- 13

Software/Firmware Running During Test	
Description	**Version**
Firmware	Rev 8.2.2.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)	Starkey Laboratories, Inc.	56021-108	2911334780

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-07-29	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-08-17	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.
3	2022-08-18	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
4	2022-08-18	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.
5	2022-08-18	DTS 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.
6	2022-08-18	Equivalent Isotropic Radiated Power (EIRP)	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	2022-08-18	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	2022-08-18	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.
9	2022-08-18	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
10	2022-10-19	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			Work Order:	STAK0278
Serial Number:	2911334794			Date:	18-Aug-22
Customer:	Starkey Laboratories, Inc.			Temperature:	20.7 °C
Attendees:	John Quach			Humidity:	55.7% RH
Project:	None			Barometric Pres.:	1014 mbar
Tested by:	Christopher Heintzelman	Power:	Battery	Job Site:	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

DEVIATIONS FROM TEST STANDARD

None

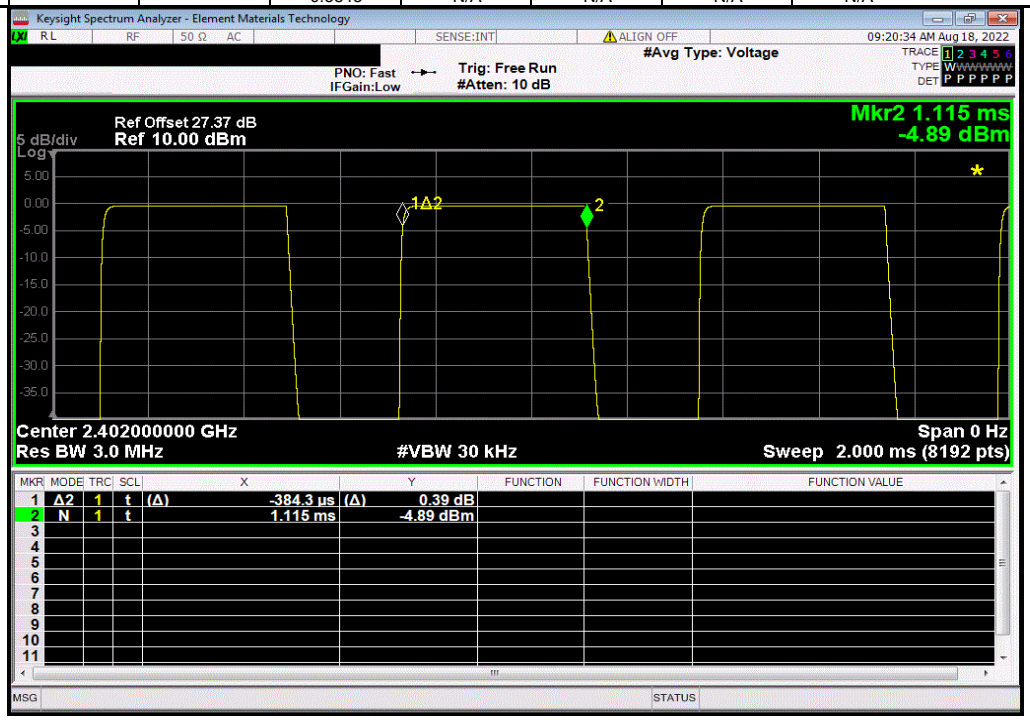
Configuration #	5	Signature

		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
1 Mbps						
	BLE/GFSK Low Channel, 2402 MHz					
	Pulse Length	0.3843	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	5.3802	N/A	N/A
	Period	N/A	N/A	N/A	50.01	10.76
	Repeatability	N/A	N/A	N/A	N/A	N/A
	BLE/GFSK Mid Channel, 2442 MHz					
	Pulse Length	0.389	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	5.446	N/A	N/A
	Period	N/A	N/A	N/A	50	10.89
	Repeatability	N/A	N/A	N/A	N/A	N/A
	BLE/GFSK High Channel, 2480 MHz					
	Pulse Length	0.3826	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	5.3564	N/A	N/A
	Period	N/A	N/A	N/A	50	10.71
	Repeatability	N/A	N/A	N/A	N/A	N/A
2 Mbps						
	BLE/GFSK Low Channel, 2402 MHz					
	Pulse Length	0.1963	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	2.7482	N/A	N/A
	Period	N/A	N/A	N/A	50.01	5.50
	Repeatability	N/A	N/A	N/A	N/A	N/A
	BLE/GFSK Mid Channel, 2442 MHz					
	Pulse Length	0.1963	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	2.7482	N/A	N/A
	Period	N/A	N/A	N/A	50	5.50
	Repeatability	N/A	N/A	N/A	N/A	N/A
	BLE/GFSK High Channel, 2480 MHz					
	Pulse Length	0.1902	N/A	N/A	N/A	N/A
	Pulse Count	N/A	14	2.6628	N/A	N/A
	Period	N/A	N/A	N/A	50	5.33
	Repeatability	N/A	N/A	N/A	N/A	N/A

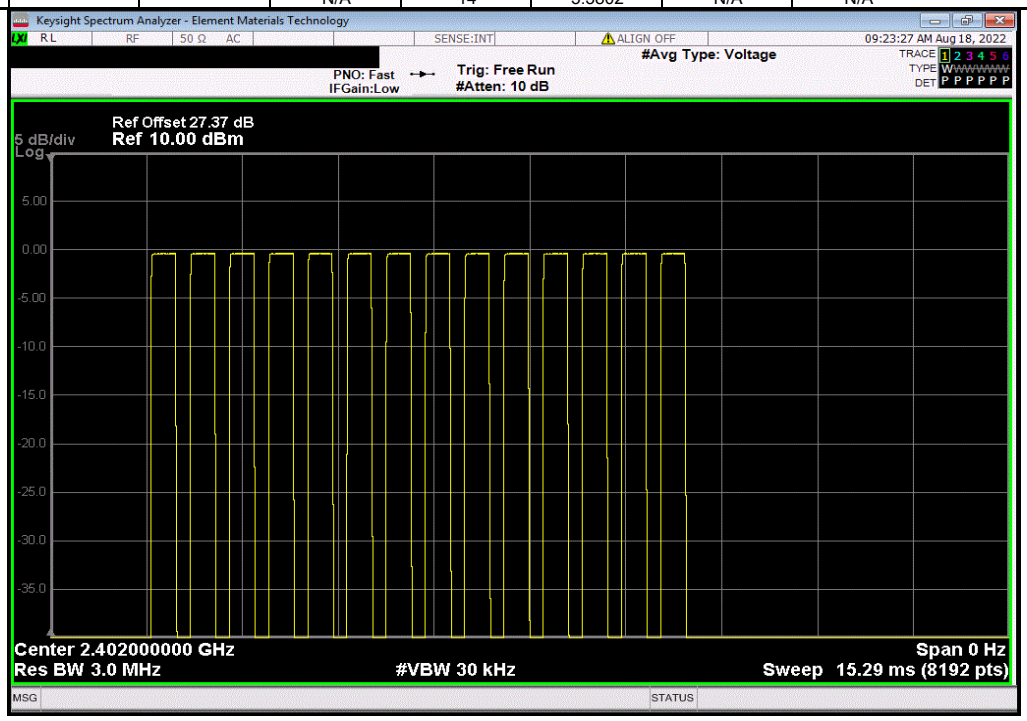
DUTY CYCLE

XMit 2022.02.07.0

1 Mbps, BLE/GFSK Low Channel, 2402 MHz, Pulse Length						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		0.3843	N/A	N/A	N/A	N/A



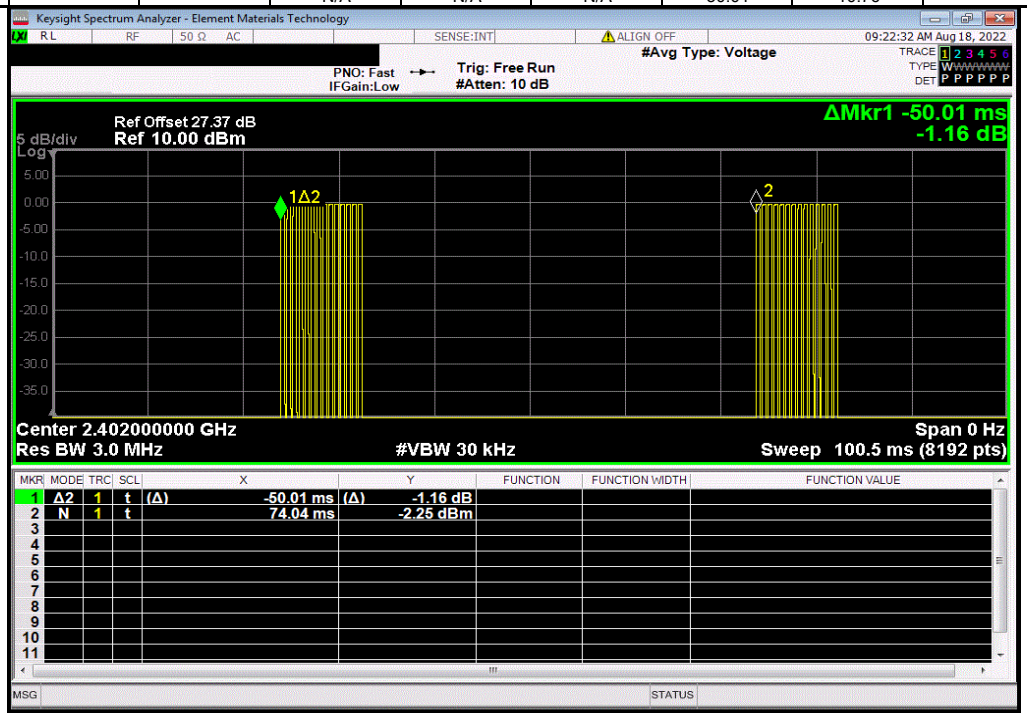
1 Mbps, BLE/GFSK Low Channel, 2402 MHz, Pulse Count						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	14	5.3802	N/A	N/A



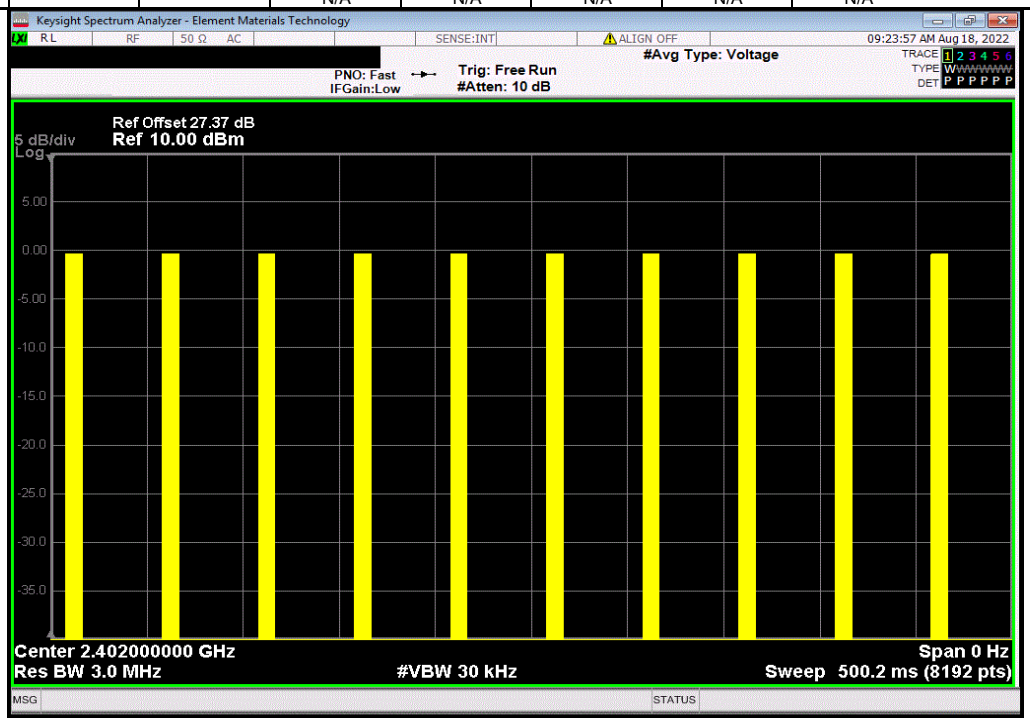
DUTY CYCLE

XMit 2022.02.07.0

1 Mbps, BLE/GFSK Low Channel, 2402 MHz, Period						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	50.01	10.76



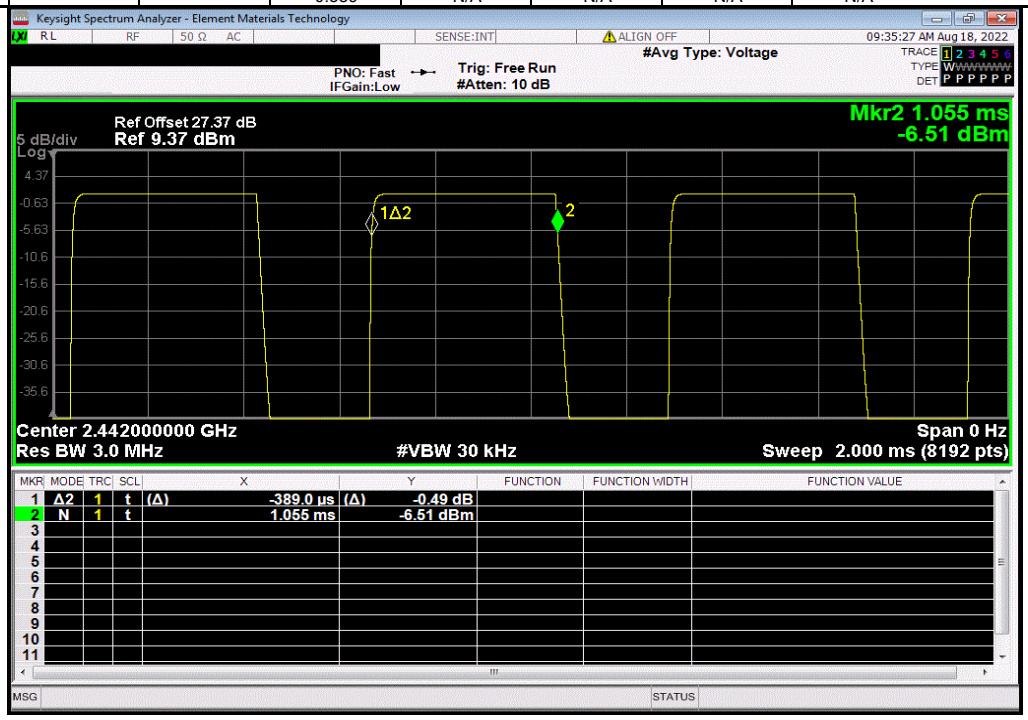
1 Mbps, BLE/GFSK Low Channel, 2402 MHz, Repeatability						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	N/A	N/A



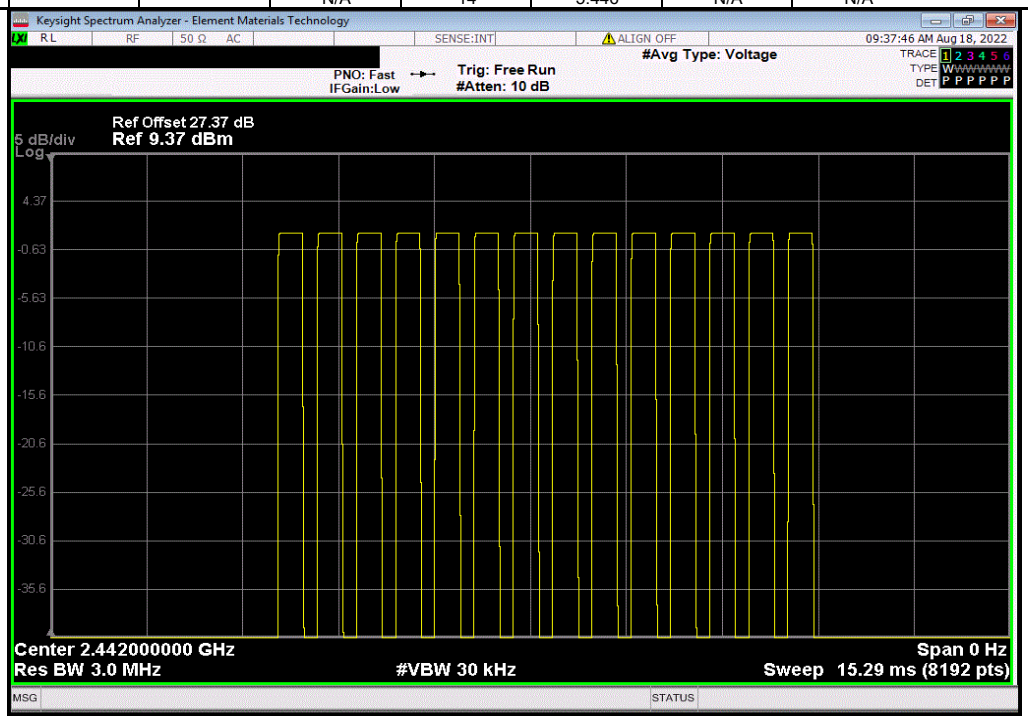
DUTY CYCLE

XMit 2022.02.07.0

1 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Pulse Length						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		0.389	N/A	N/A	N/A	N/A



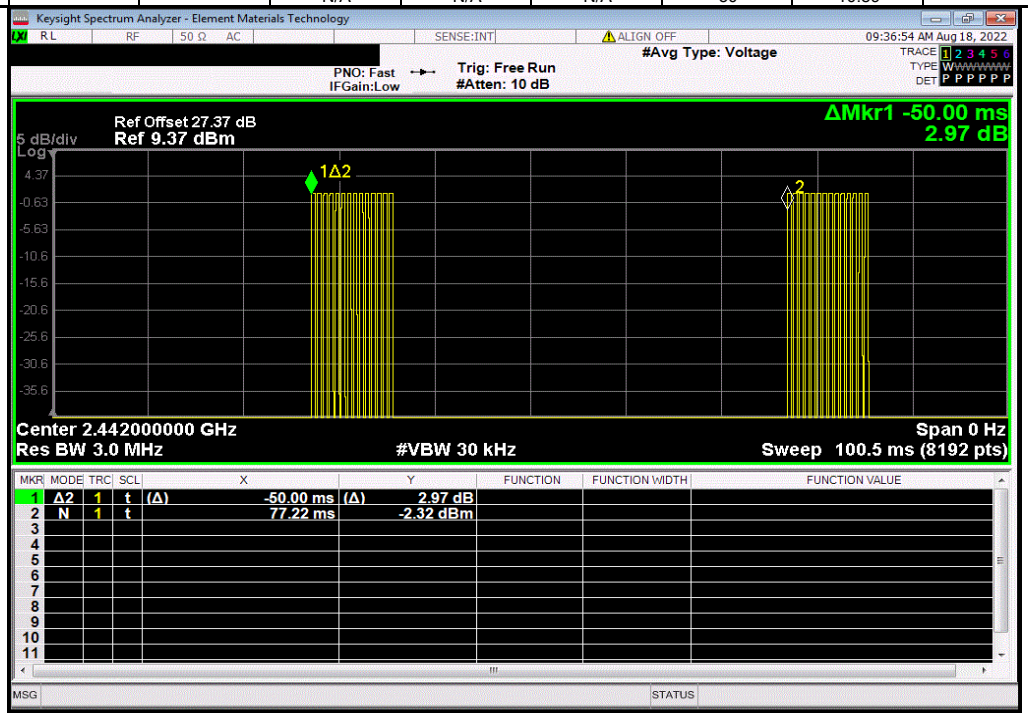
1 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Pulse Count						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	14	5.446	N/A	N/A



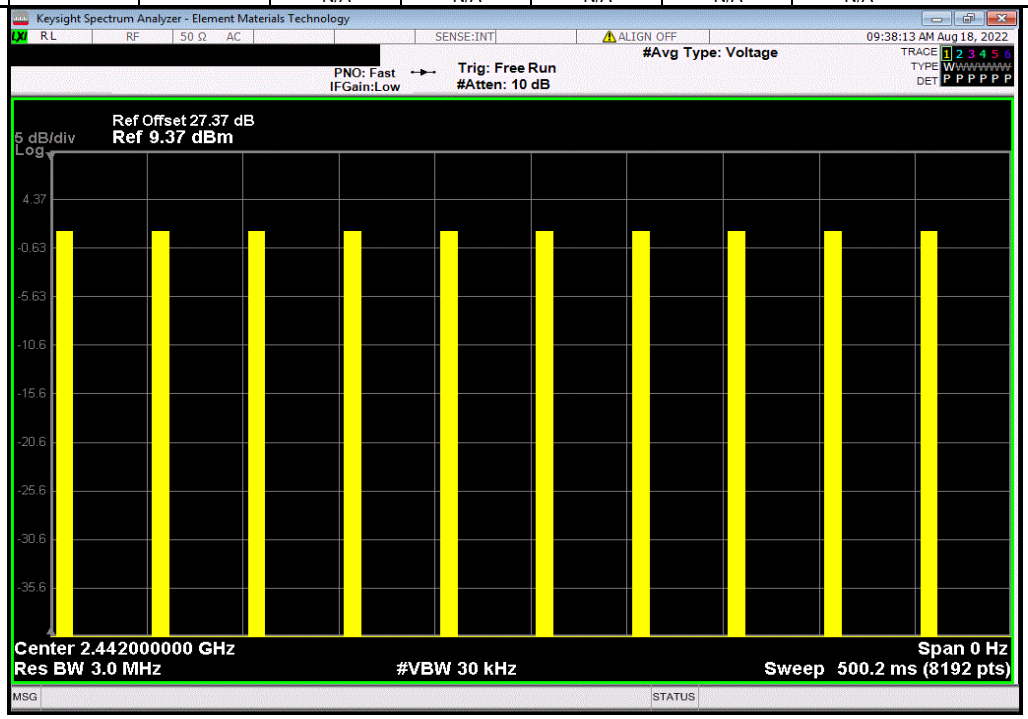
DUTY CYCLE

XMit 2022.02.07.0

1 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Period						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	50	10.89



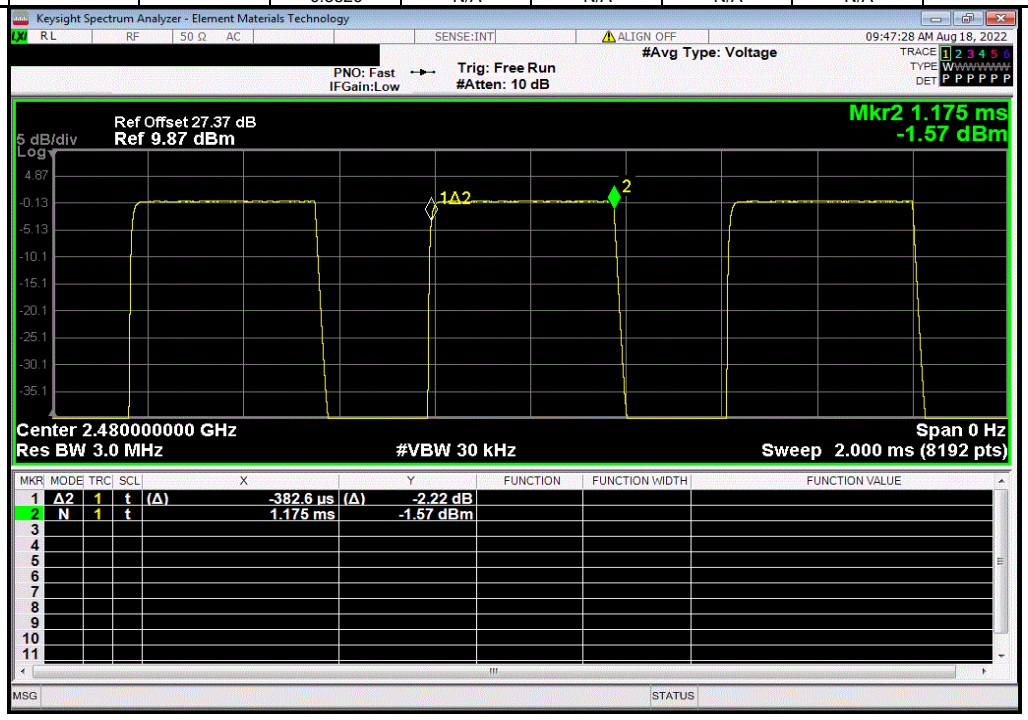
1 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Repeatability						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	N/A	N/A



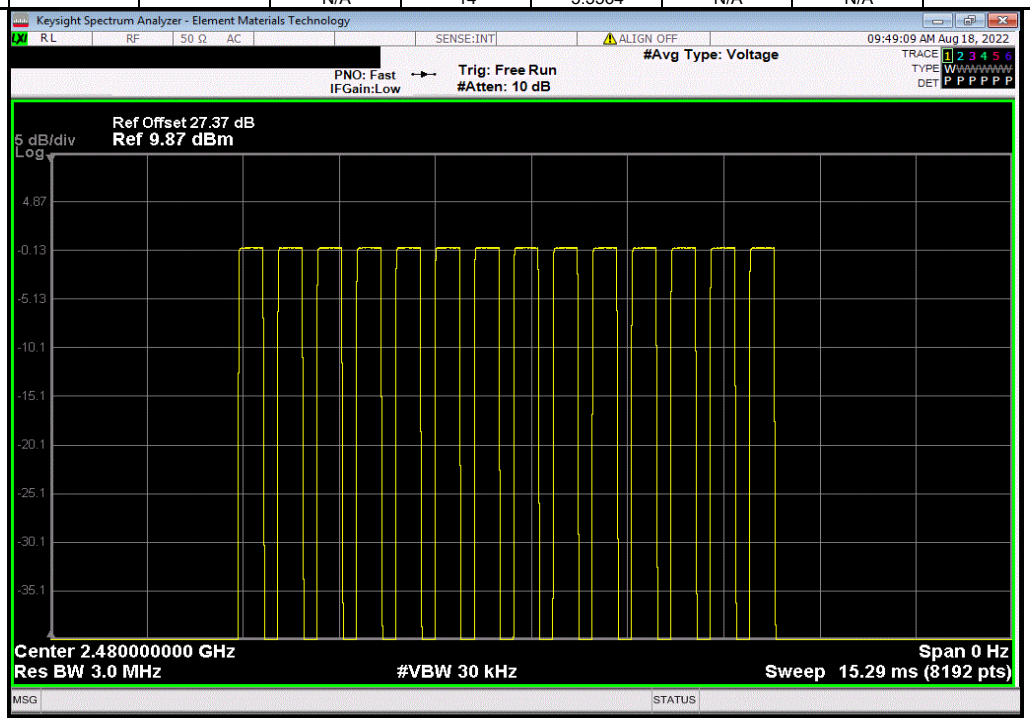
DUTY CYCLE

XMit 2022.02.07.0

1 Mbps, BLE/GFSK High Channel, 2480 MHz, Pulse Length						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		0.3826	N/A	N/A	N/A	N/A

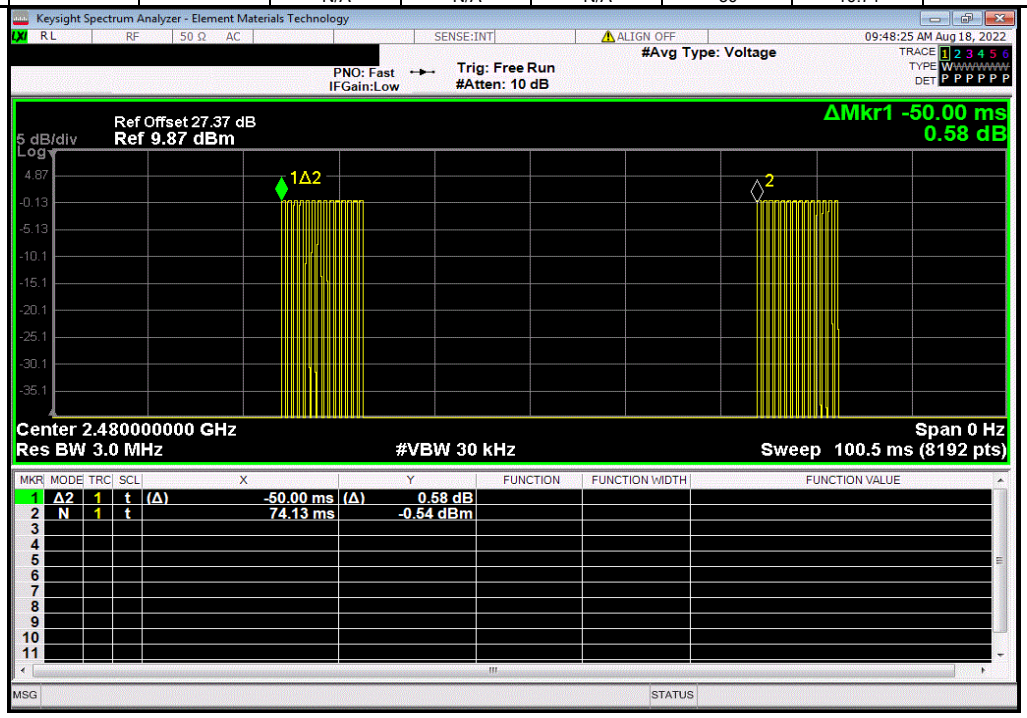


1 Mbps, BLE/GFSK High Channel, 2480 MHz, Pulse Count						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	14	5.3564	N/A	N/A

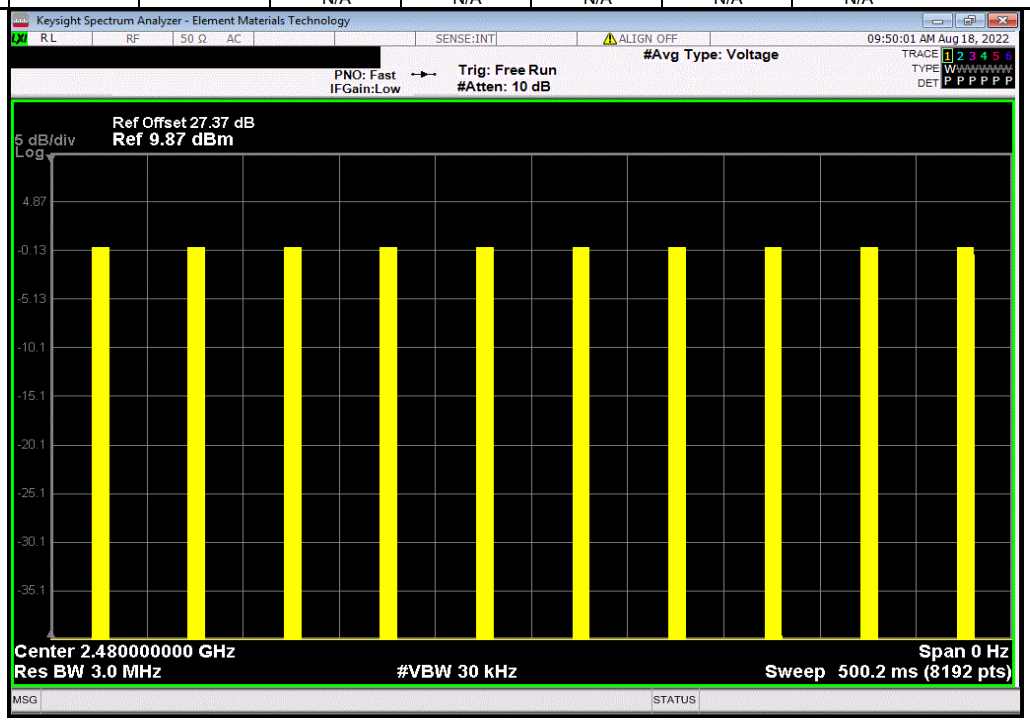


DUTY CYCLE

1 Mbps, BLE/GFSK High Channel, 2480 MHz, Period						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	50	10.71



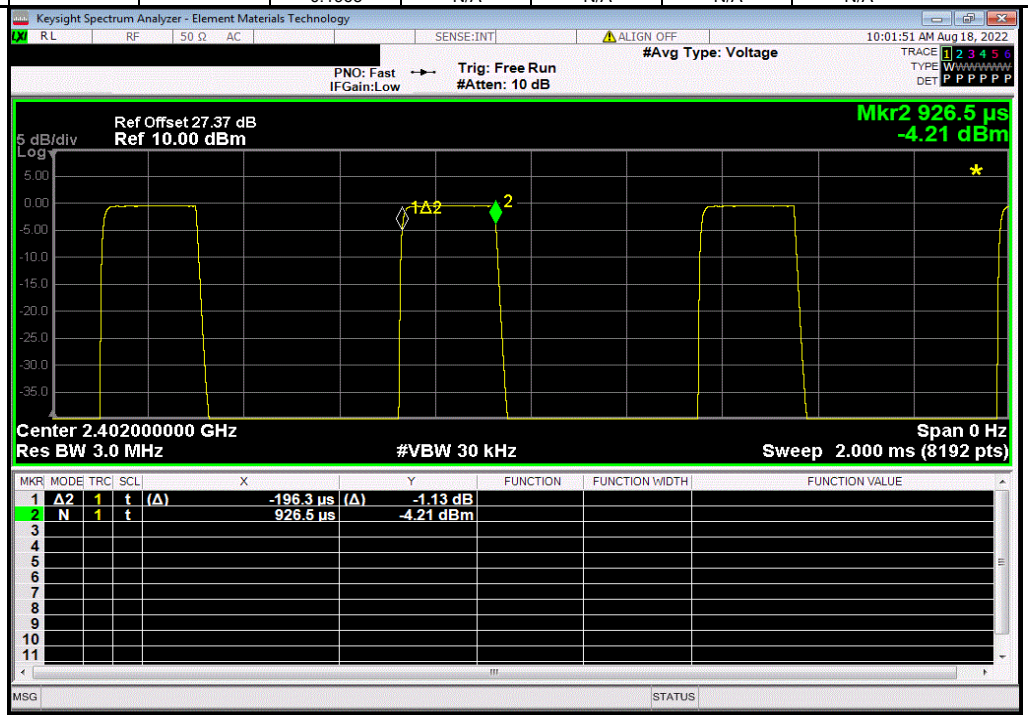
1 Mbps, BLE/GFSK High Channel, 2480 MHz, Repeatability						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	N/A	N/A



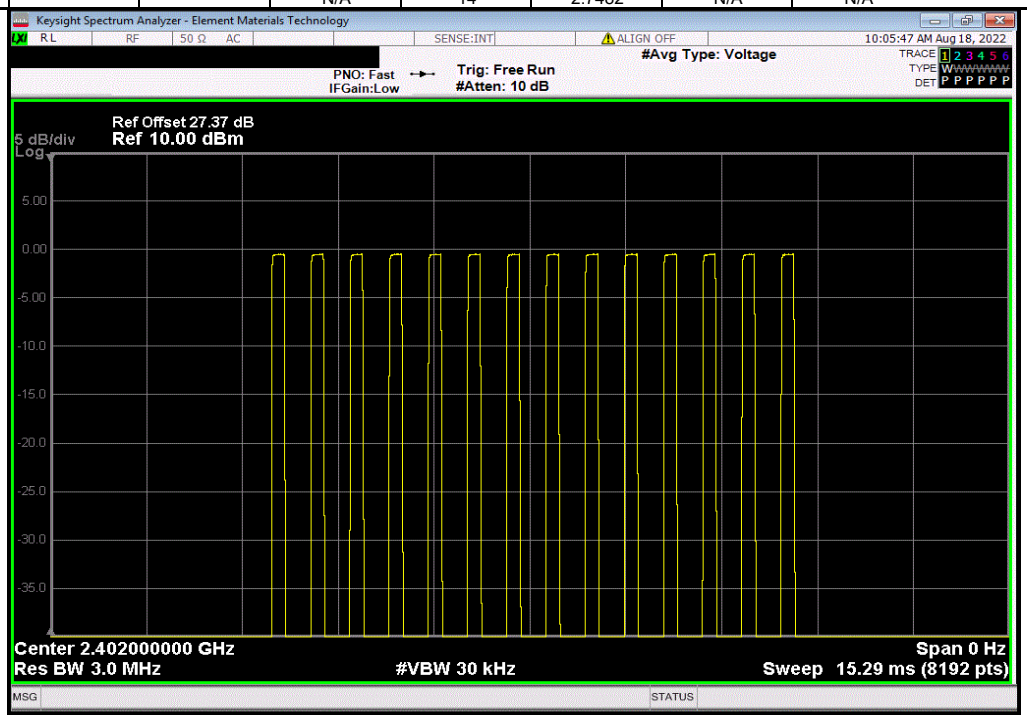
DUTY CYCLE

XMit 2022.02.07.0

2 Mbps, BLE/GFSK Low Channel, 2402 MHz, Pulse Length						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		0.1963	N/A	N/A	N/A	N/A



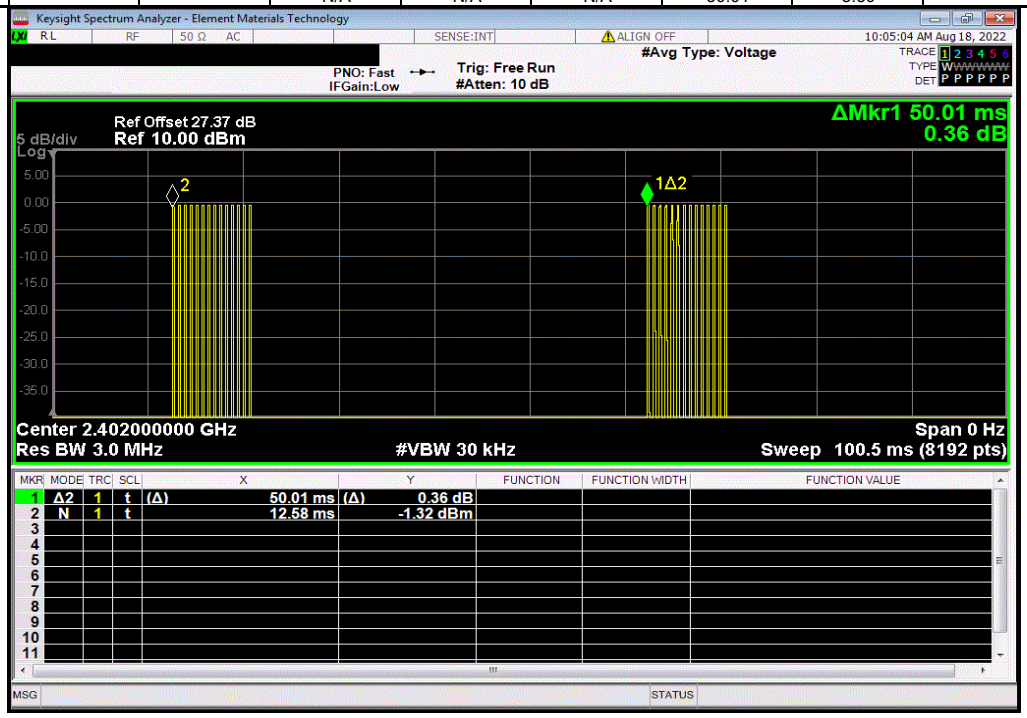
2 Mbps, BLE/GFSK Low Channel, 2402 MHz, Pulse Count						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	14	2.7482	N/A	N/A



DUTY CYCLE

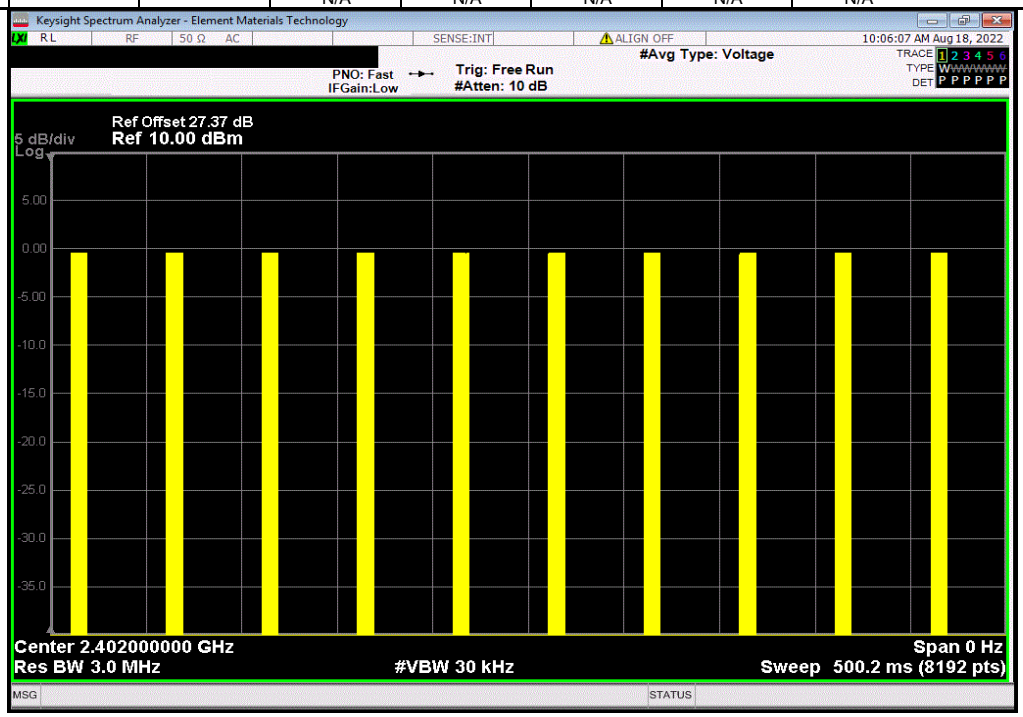
2 Mbps, BLE/GFSK Low Channel, 2402 MHz, Period

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	N/A	N/A	50.01	5.50



2 Mbps, BLE/GFSK Low Channel, 2402 MHz, Repeatability

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	N/A	N/A	N/A	N/A

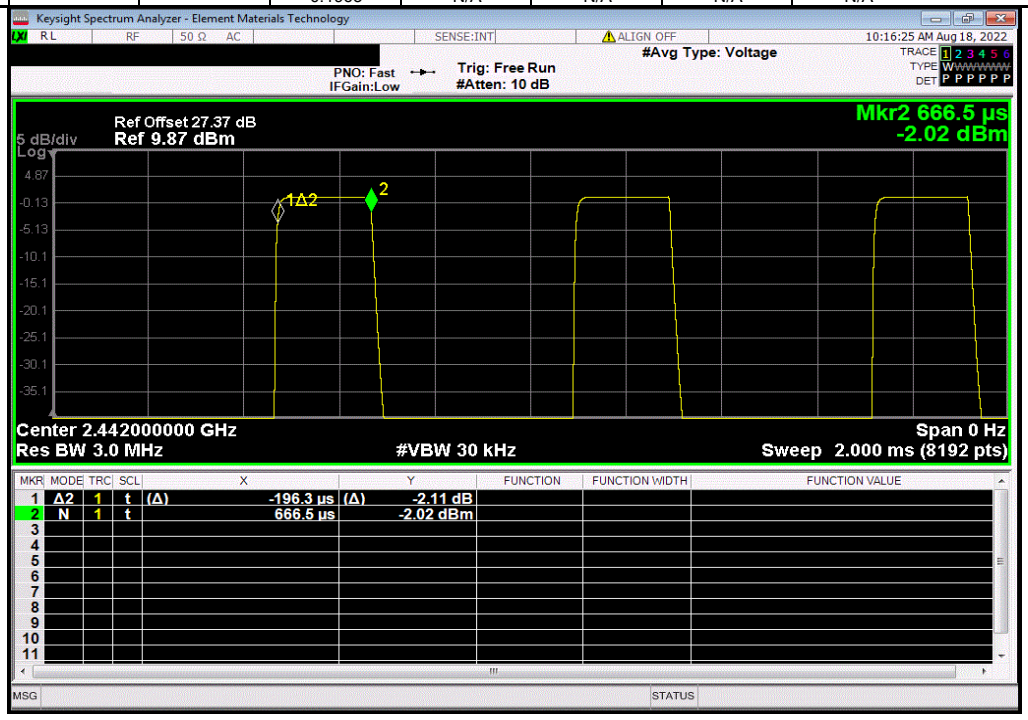


DUTY CYCLE

XMit 2022.02.07.0

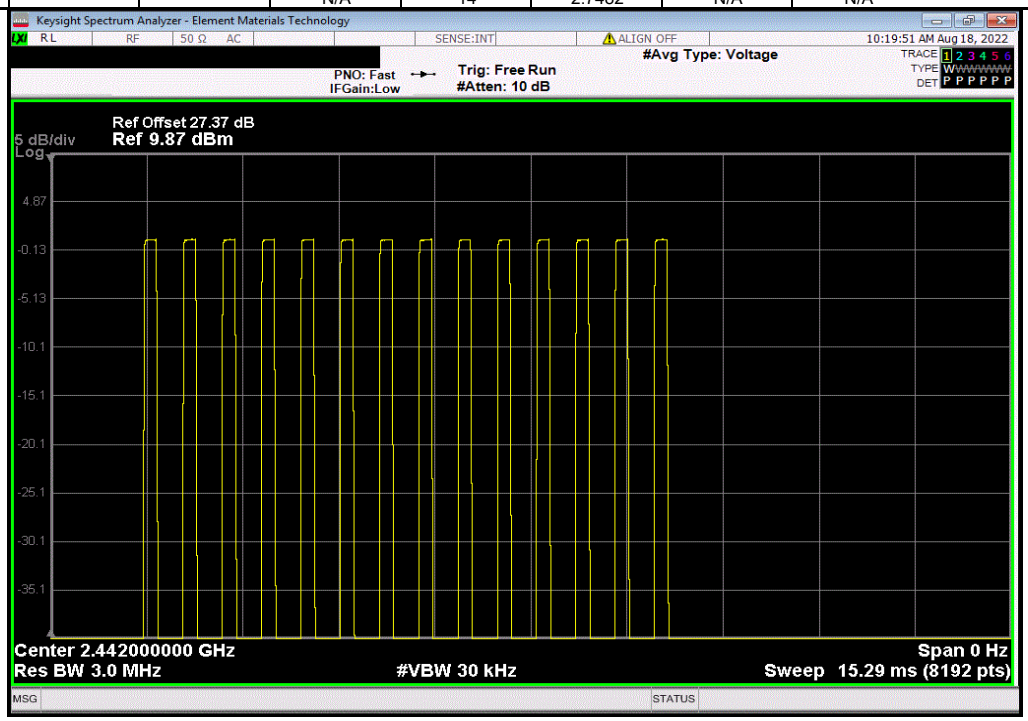
2 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Pulse Length

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
0.1963	N/A	N/A	N/A	N/A



2 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Pulse Count

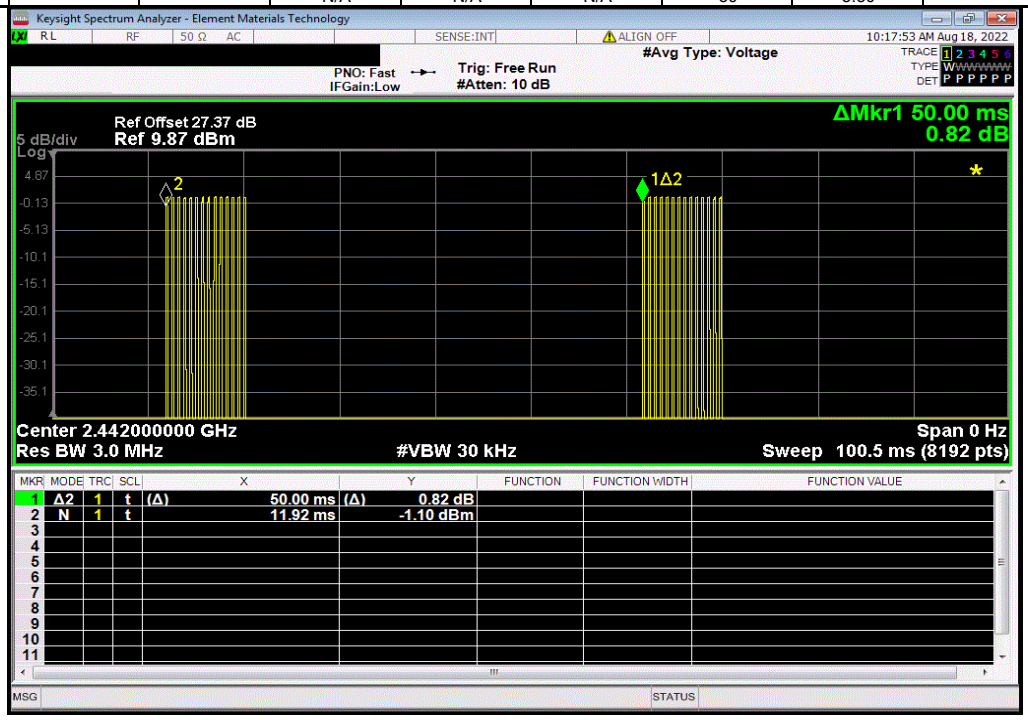
Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	14	2.7482	N/A	N/A



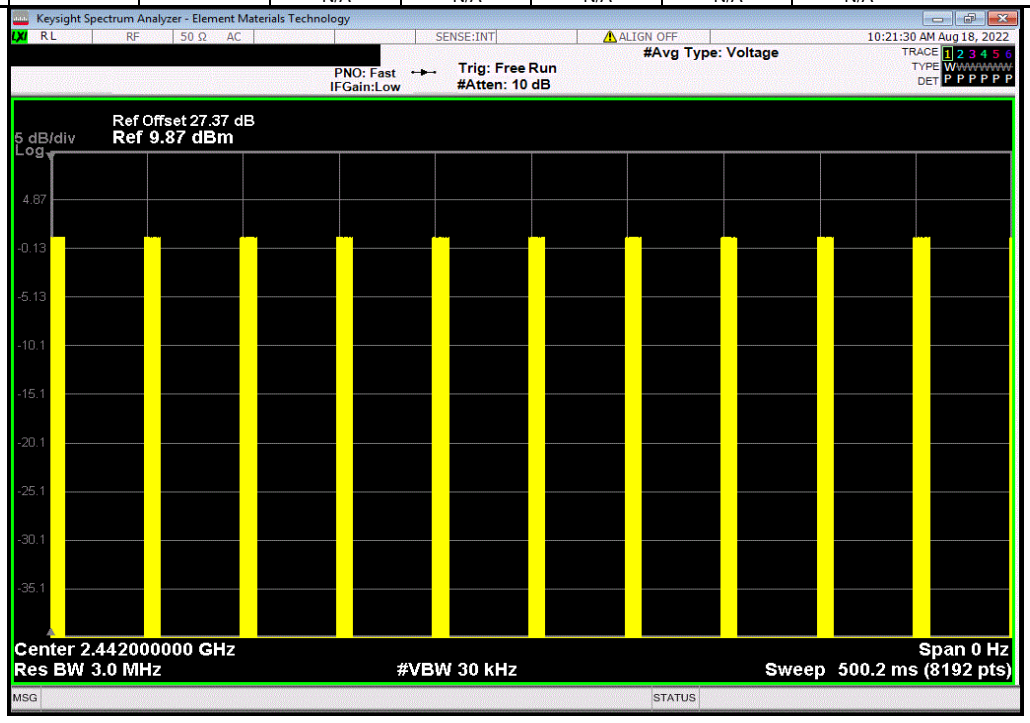
DUTY CYCLE

XMit 2022.02.07.0

2 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Period						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	50	5.50



2 Mbps, BLE/GFSK Mid Channel, 2442 MHz, Repeatability						
		Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
		N/A	N/A	N/A	N/A	N/A

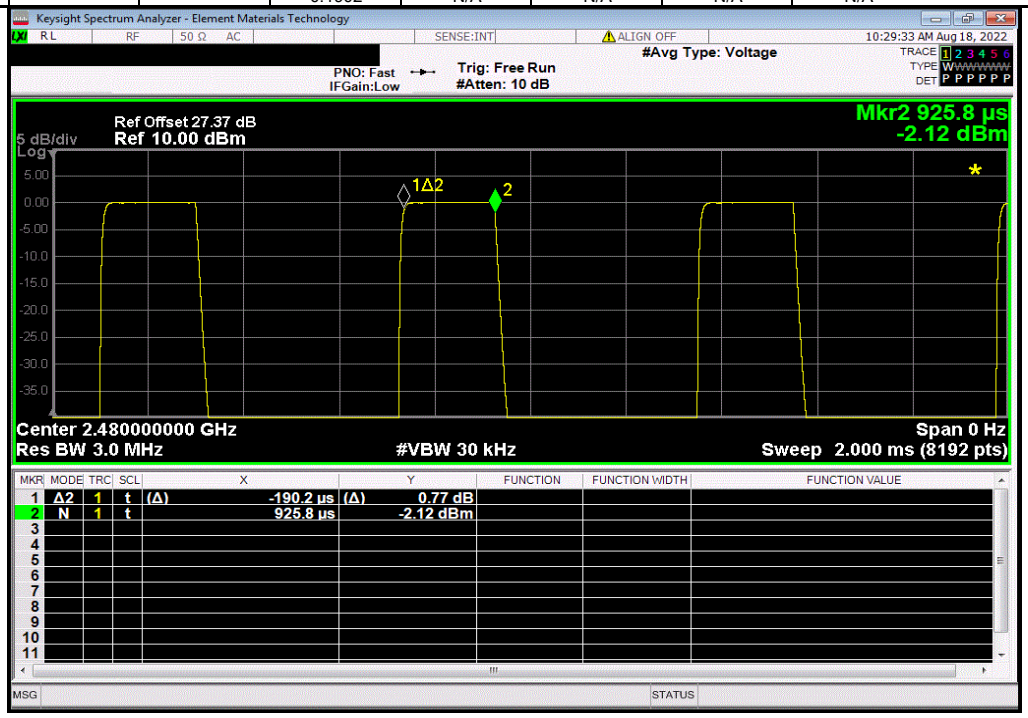


DUTY CYCLE

XMit 2022.02.07.0

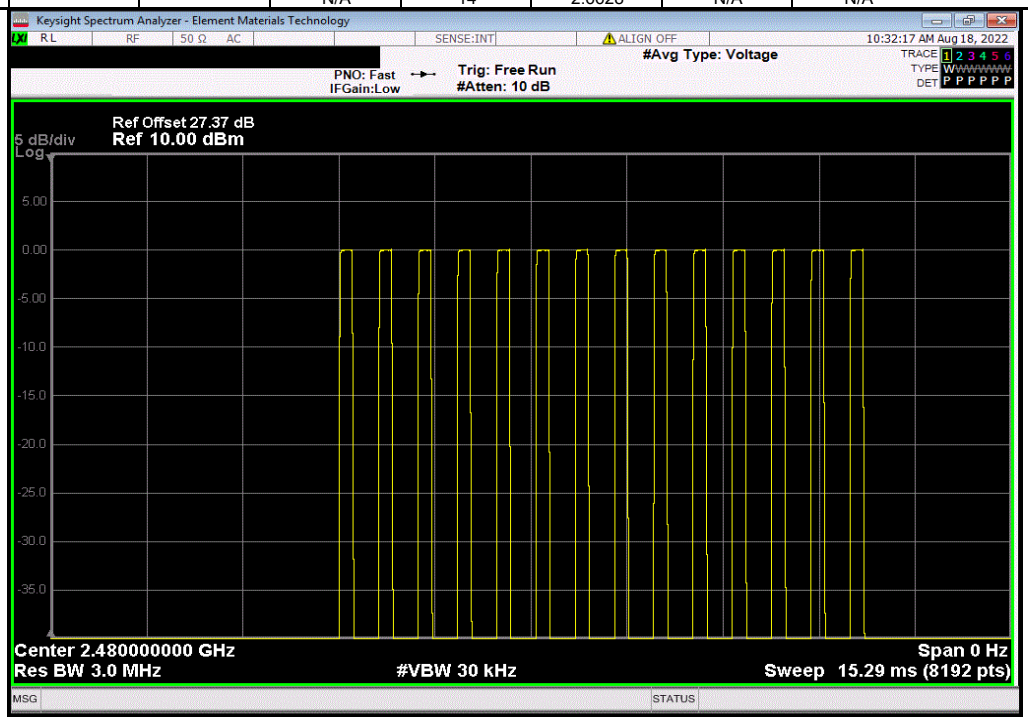
2 Mbps, BLE/GFSK High Channel, 2480 MHz, Pulse Length

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
0.1902	N/A	N/A	N/A	N/A



2 Mbps, BLE/GFSK High Channel, 2480 MHz, Pulse Count

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	14	2.6628	N/A	N/A

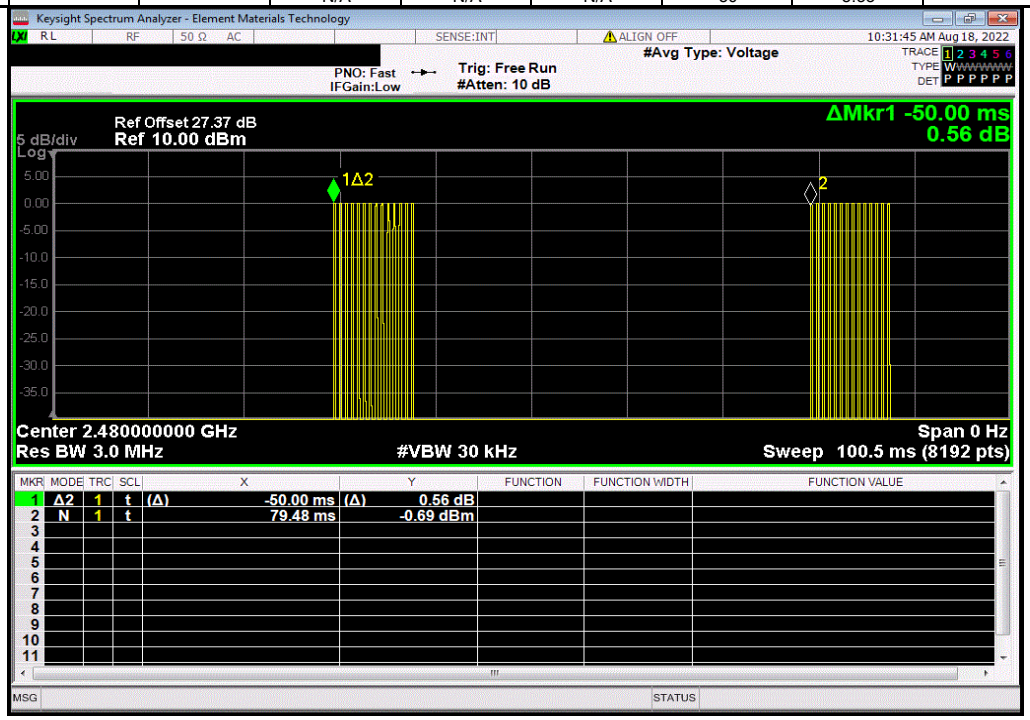


DUTY CYCLE

XMit 2022.02.07.0

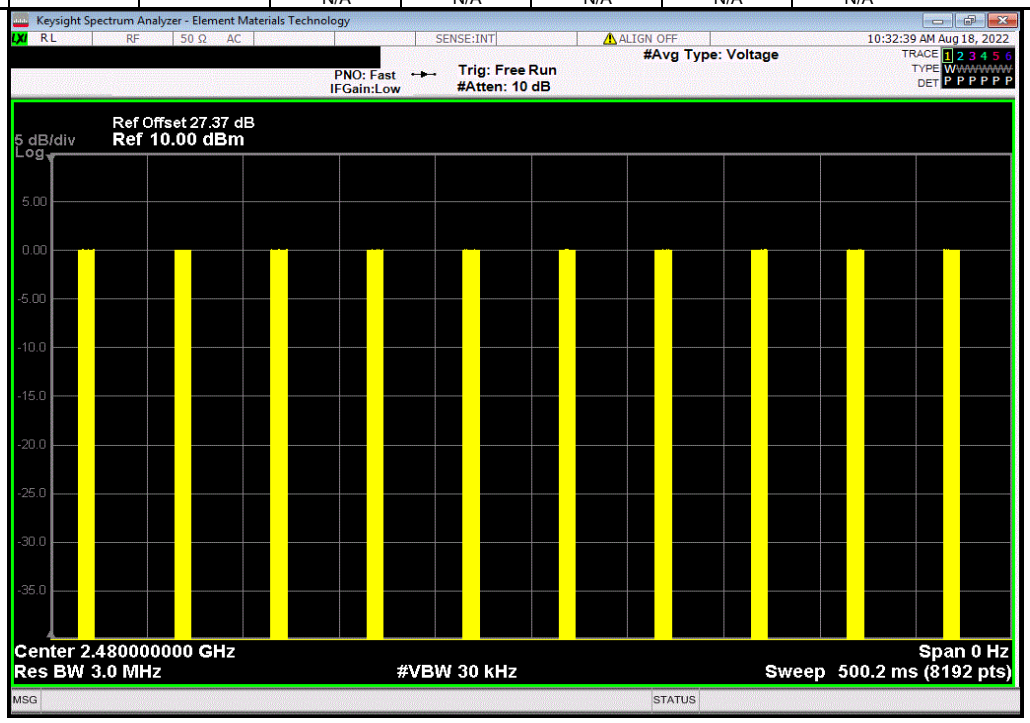
2 Mbps, BLE/GFSK High Channel, 2480 MHz, Period

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	N/A	N/A	50	5.33



2 Mbps, BLE/GFSK High Channel, 2480 MHz, Repeatability

Pulse Length (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Duty Cycle (%)
N/A	N/A	N/A	N/A	N/A



DTS BANDWIDTH (6dB)

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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

The 6dB DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

DTS BANDWIDTH (6dB)

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			Work Order:	STAK0278
Serial Number:	2911334794			Date:	18-Aug-22
Customer:	Starkey Laboratories, Inc.			Temperature:	20.6 °C
Attendees:	John Quach			Humidity:	55.1% RH
Project:	None			Barometric Pres.:	1016 mbar
Tested by:	Christopher Heintzelman	Power:	Battery	Job Site:	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

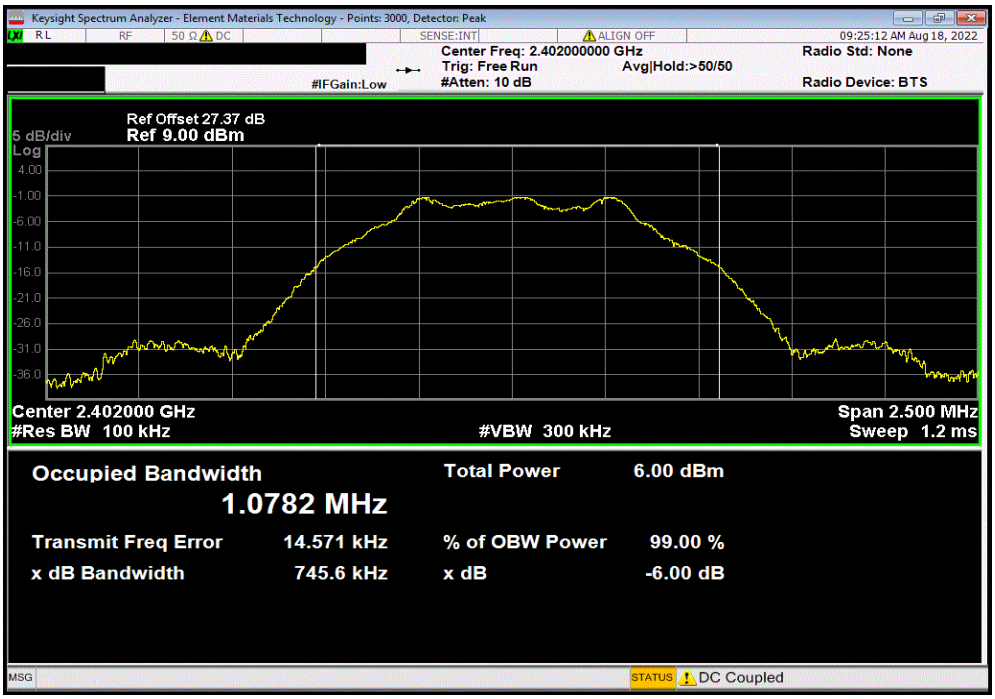
DEVIATIONS FROM TEST STANDARD

None

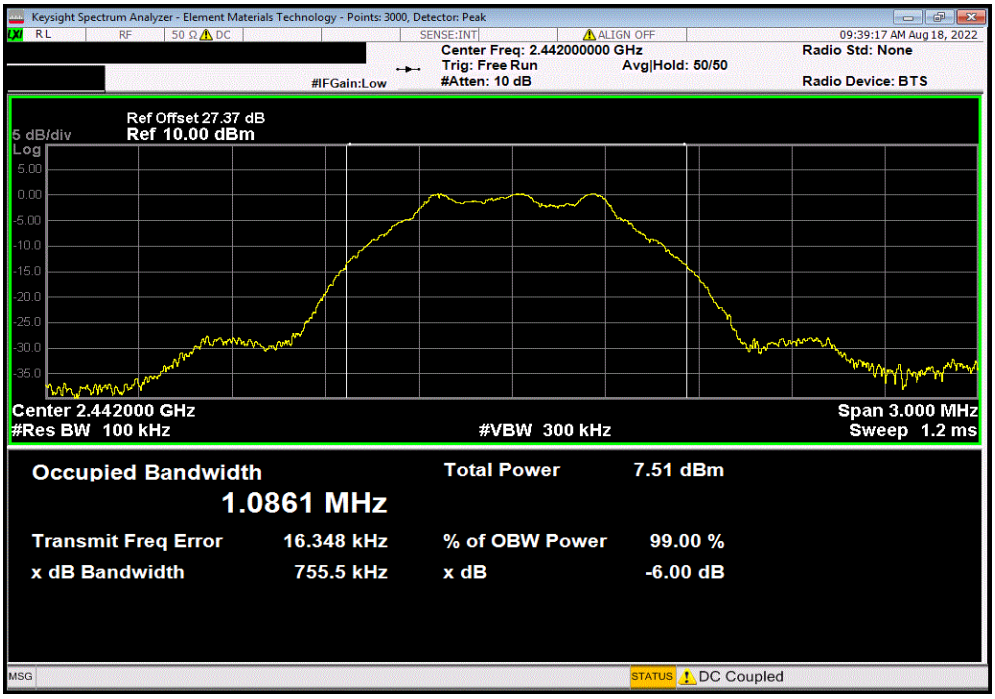
Configuration #	5	Signature

	Value	Limit (≥)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	745.639 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	755.509 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	752.219 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	1.275 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	1.28 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	1.263 MHz	500 kHz	Pass

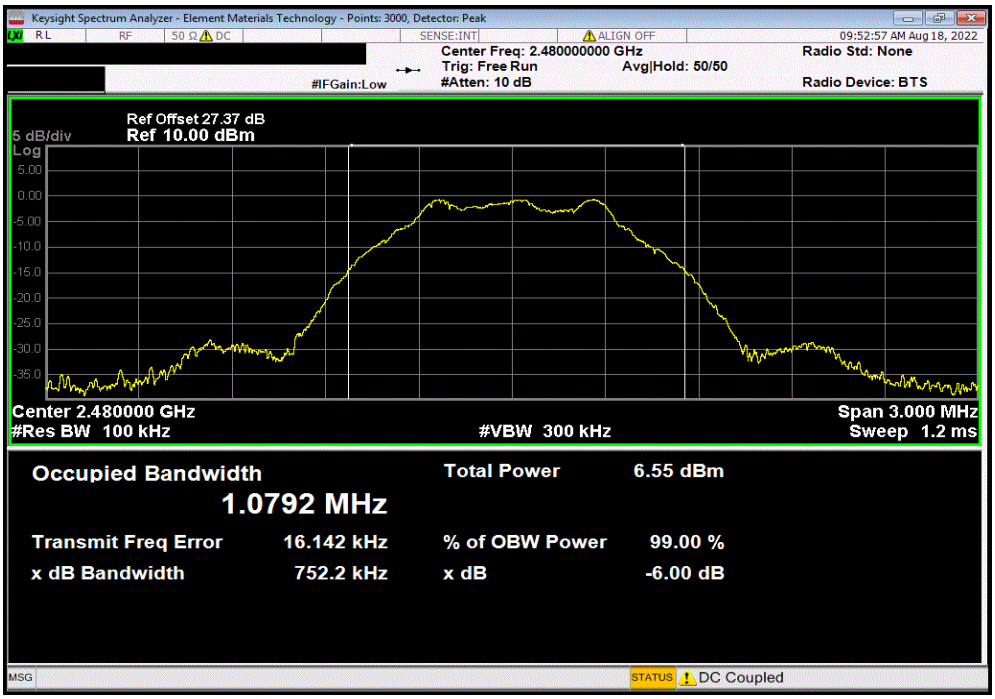
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				745.639 kHz	500 kHz	Pass



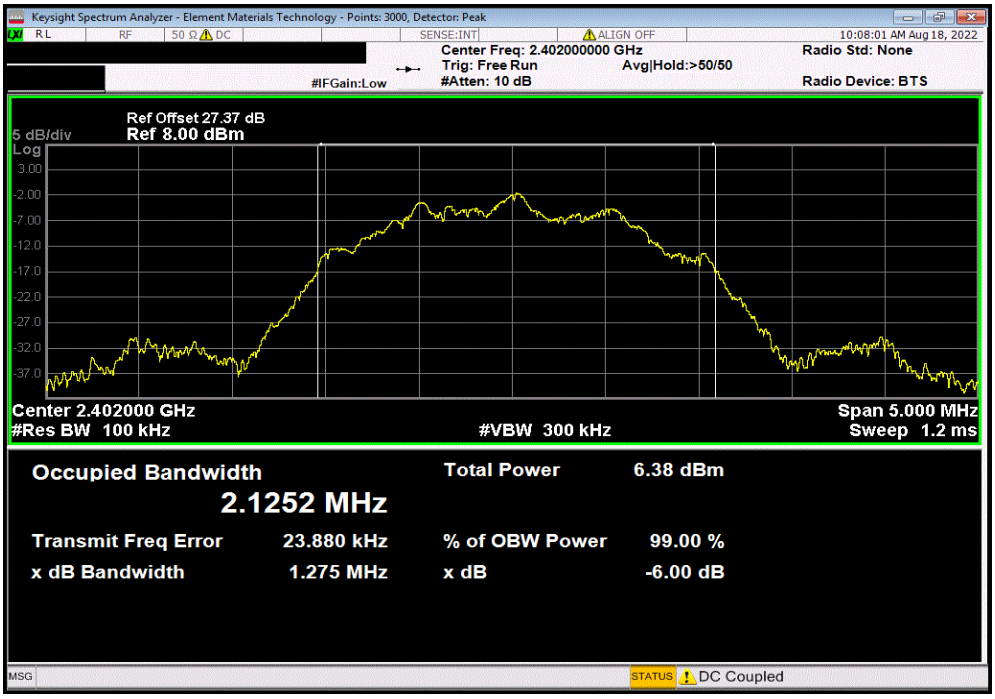
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				755.509 kHz	500 kHz	Pass



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

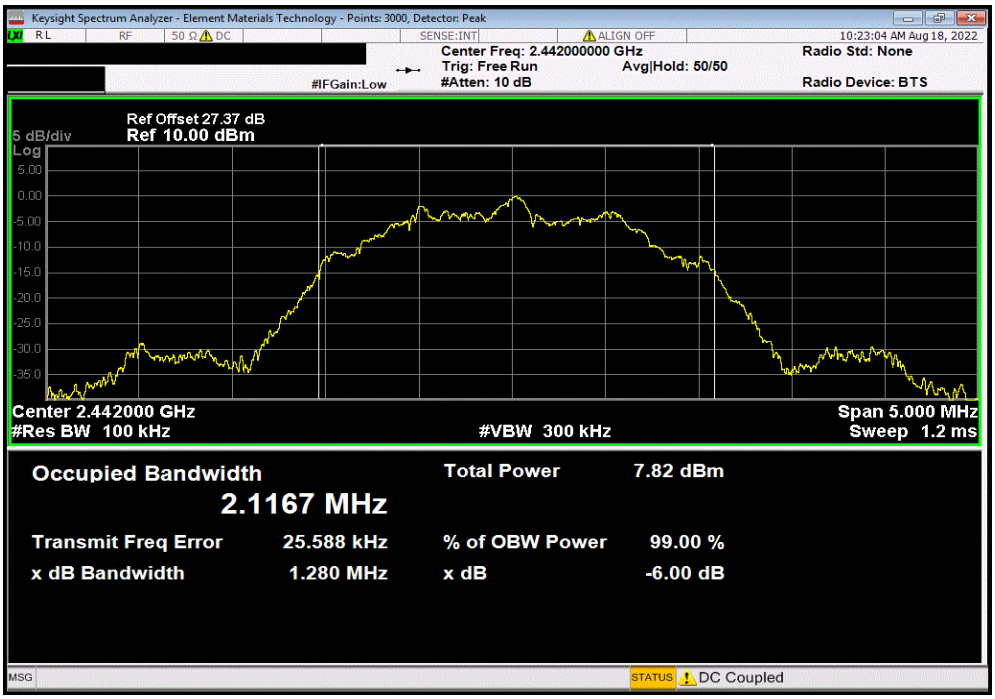


BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				1.275 MHz	500 kHz	Pass

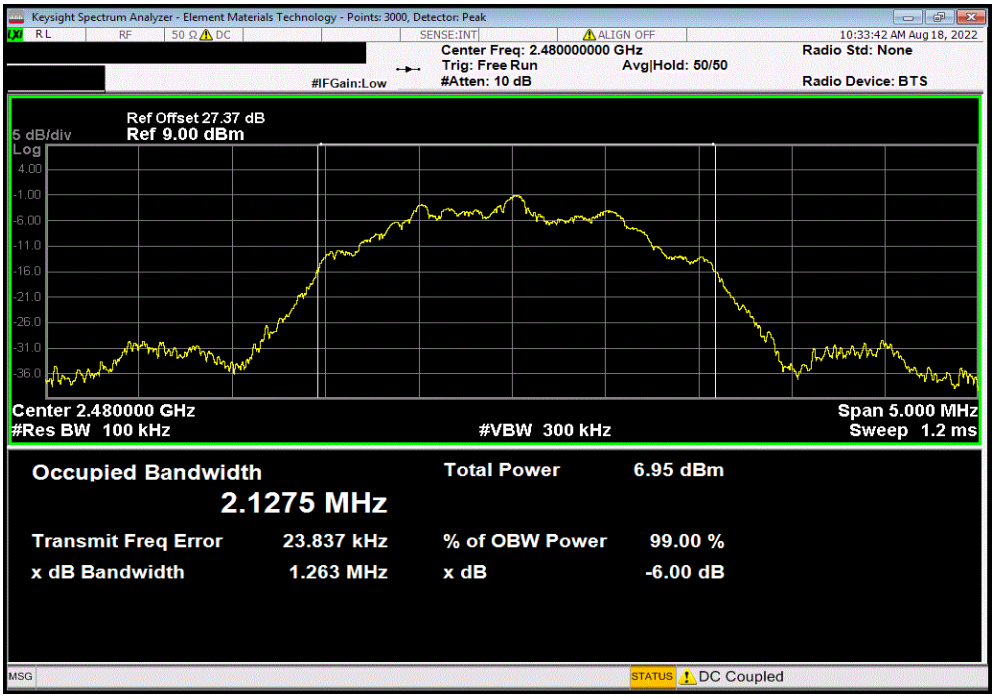


DTS BANDWIDTH (6dB)

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



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



OCCUPIED BANDWIDTH (99%)

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation.

Per ANSI C63.10:2013, 6.9.3, the spectrum analyzer was configured as follows:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.

The spectrum analyzer occupied bandwidth measurement function was used to sum the power of the transmission in linear terms to obtain the 99% bandwidth.

OCCUPIED BANDWIDTH (99%)

element

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			**Work Order:**	STAK0278
Serial Number:	2911334794			**Date:**	18-Aug-22
Customer:	Starkey Laboratories, Inc.			**Temperature:**	20.6 °C
Attendees:	John Quach			**Humidity:**	54.8% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Christopher Heintzelman	**Power:**	Battery	**Job Site:**	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

DEVIATIONS FROM TEST STANDARD

None

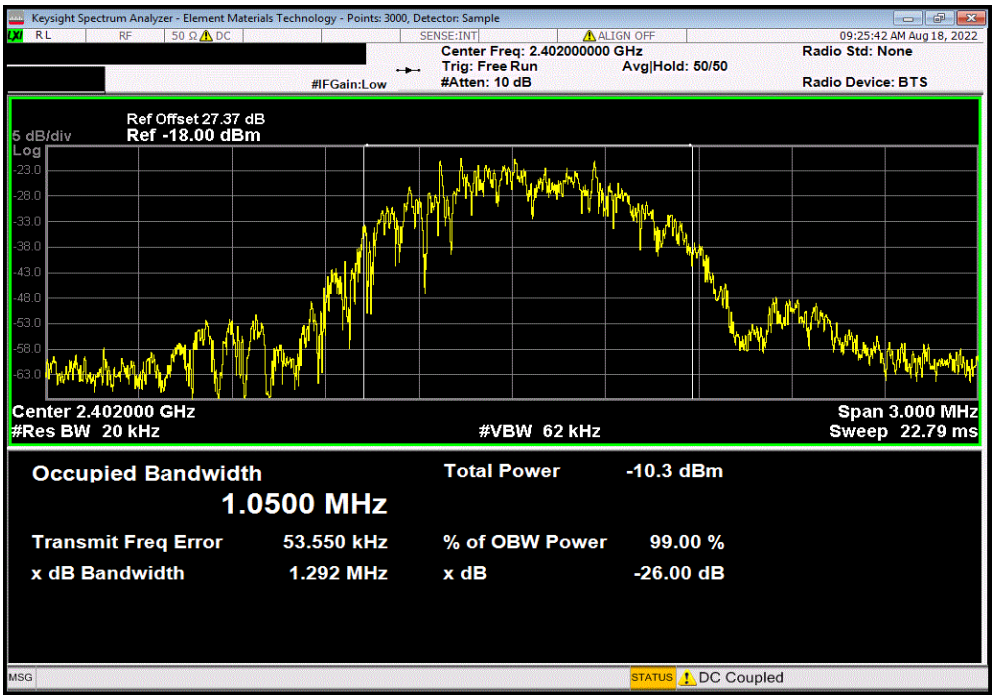
Configuration #	5	Signature

	Value	Limit	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	1.05 MHz	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	1.046 MHz	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz	1.029 MHz	N/A	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	2.061 MHz	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	2.098 MHz	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz	2.096 MHz	N/A	N/A

OCCUPIED BANDWIDTH (99%)

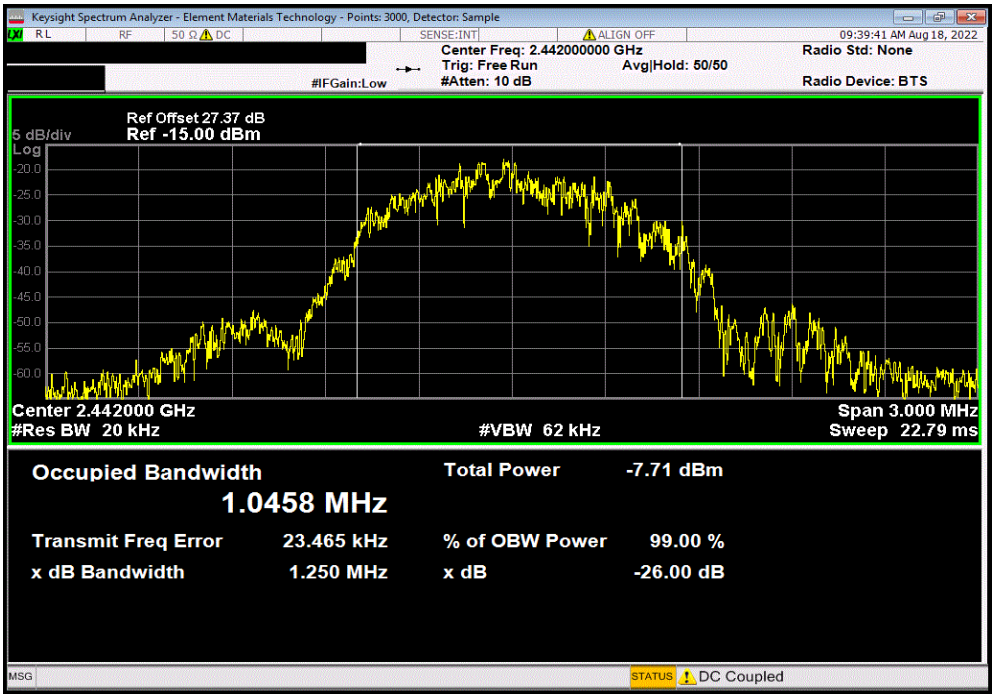
BLE/GFSK 1 Mbps Low Channel, 2402 MHz

				Value	Limit	Result
				1.05 MHz	N/A	N/A



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz

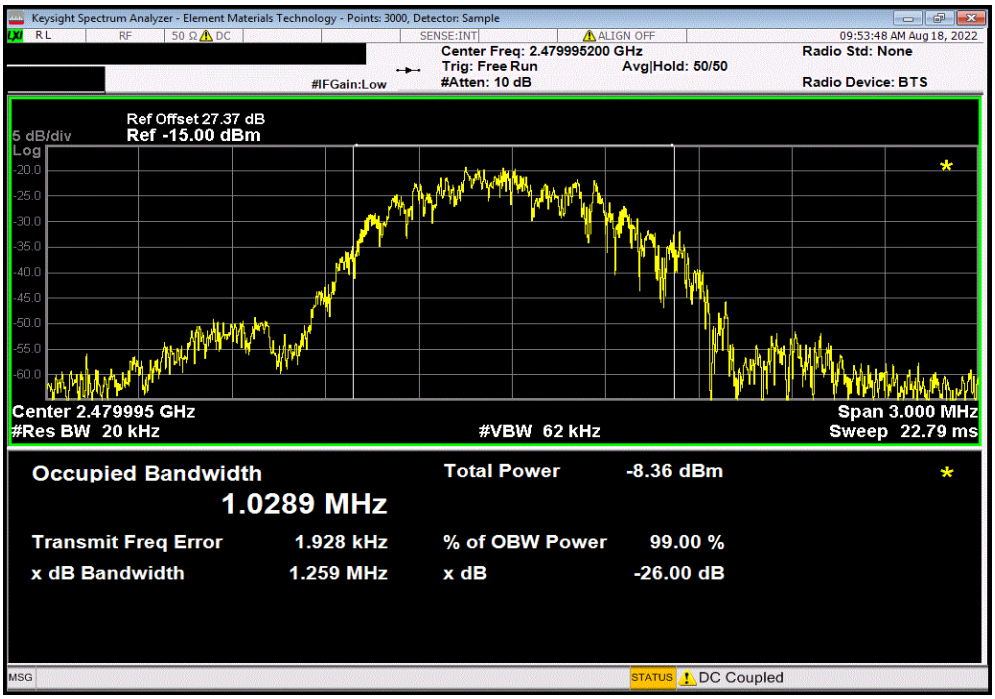
				Value	Limit	Result
				1.046 MHz	N/A	N/A



OCCUPIED BANDWIDTH (99%)

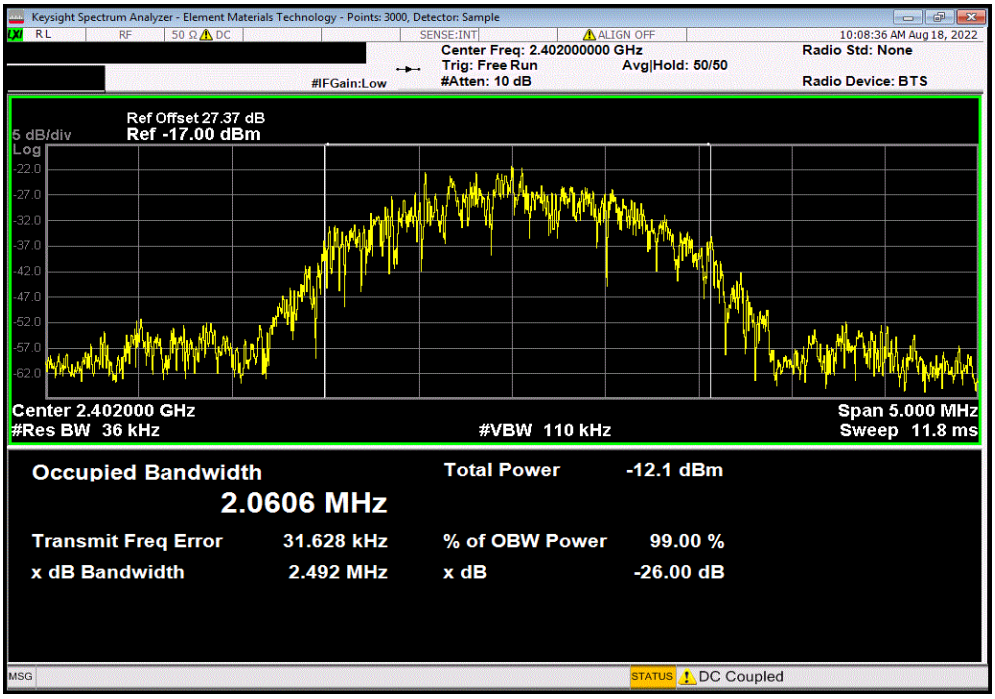
BLE/GFSK 1 Mbps High Channel, 2480 MHz

				Value	Limit	Result
				1.029 MHz	N/A	N/A



BLE/GFSK 2 Mbps Low Channel, 2402 MHz

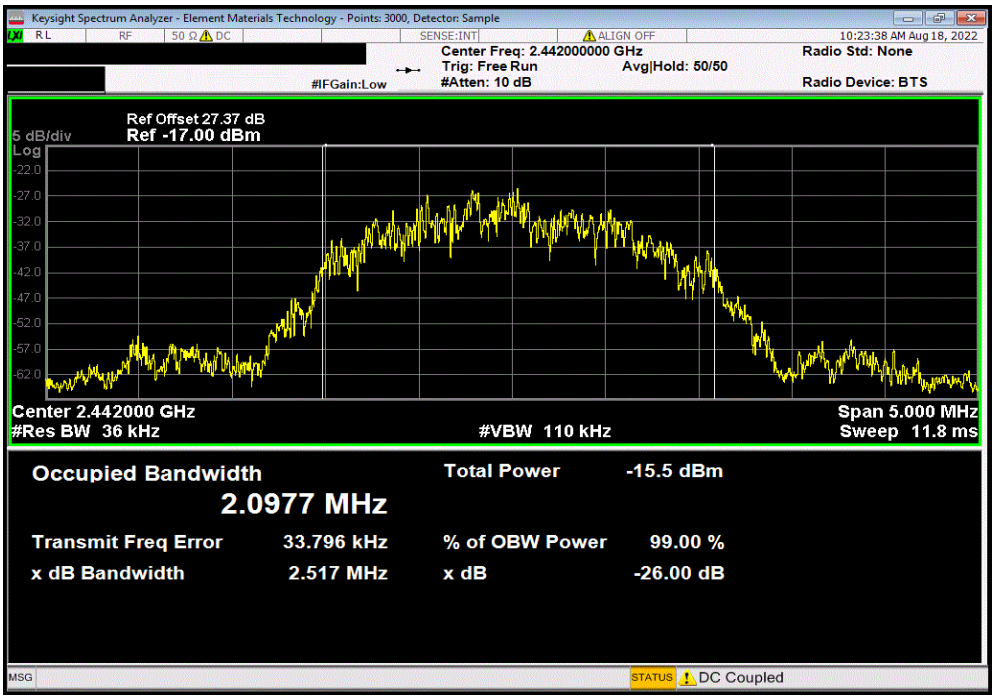
				Value	Limit	Result
				2.061 MHz	N/A	N/A



OCCUPIED BANDWIDTH (99%)

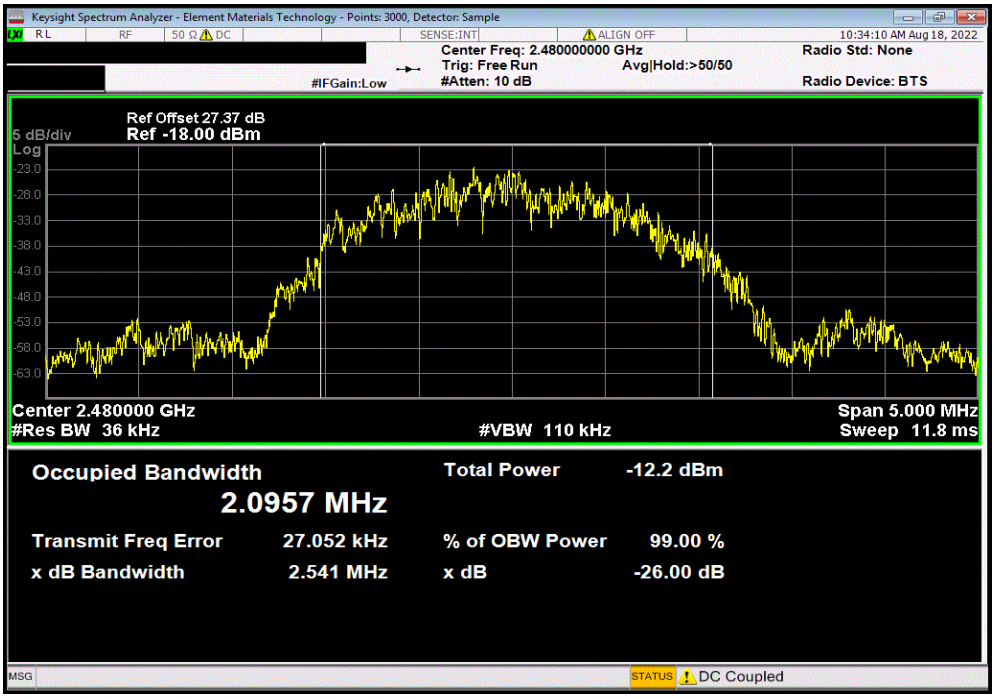
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz

				Value	Limit	Result
				2.098 MHz	N/A	N/A



BLE/GFSK 2 Mbps High Channel, 2480 MHz

				Value	Limit	Result
				2.096 MHz	N/A	N/A



OUTPUT POWER

XMit 2022.02.07.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	Fairview Microwave	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			Work Order:	STAK0278
Serial Number:	2911334794			Date:	18-Aug-22
Customer:	Starkey Laboratories, Inc.			Temperature:	20.6 °C
Attendees:	John Quach			Humidity:	54.6% RH
Project:	None			Barometric Pres.:	1016 mbar
Tested by:	Christopher Heintzelman	Power:	Battery	Job Site:	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

DEVIATIONS FROM TEST STANDARD

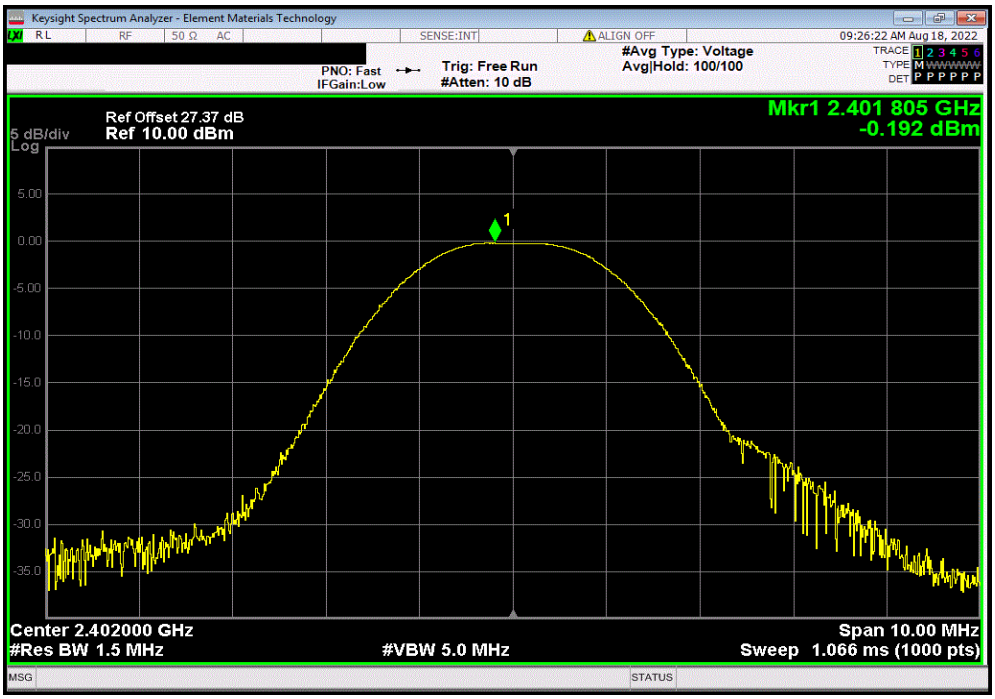
None

Configuration #	5	Signature

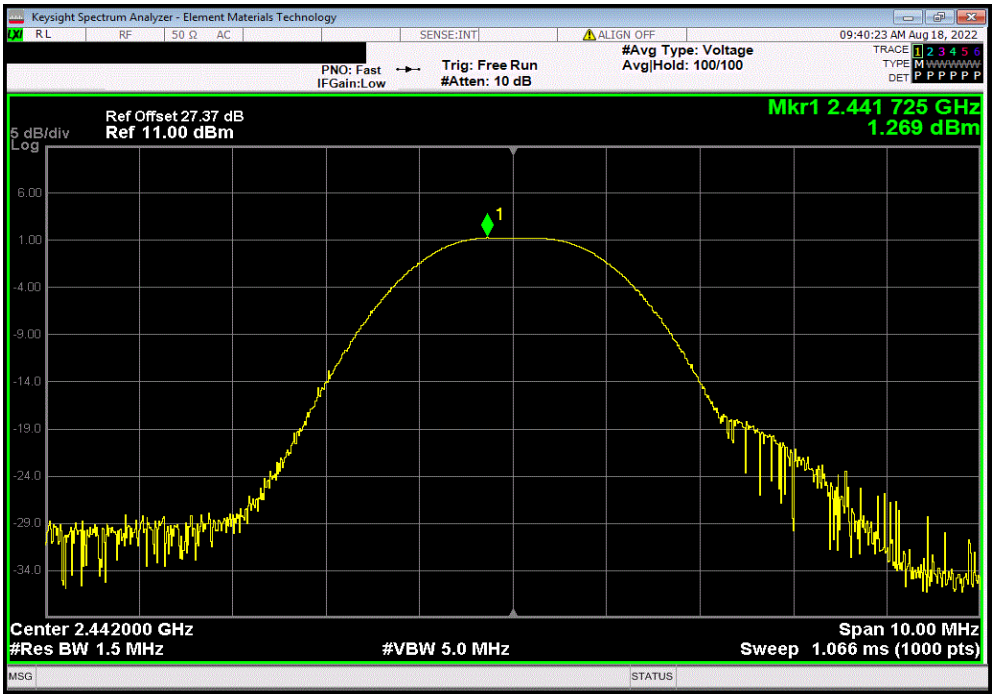
	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-0.192	30	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	1.269	30	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	0.371	30	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-0.096	30	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	1.334	30	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	0.465	30	Pass

OUTPUT POWER

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-0.192	30	Pass

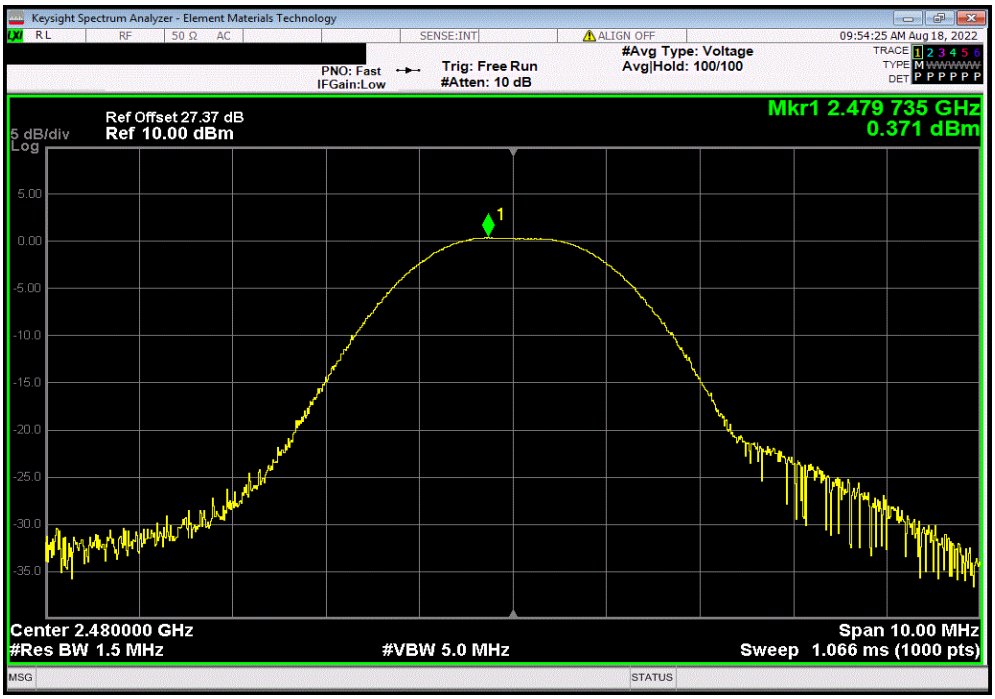


BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.269	30	Pass

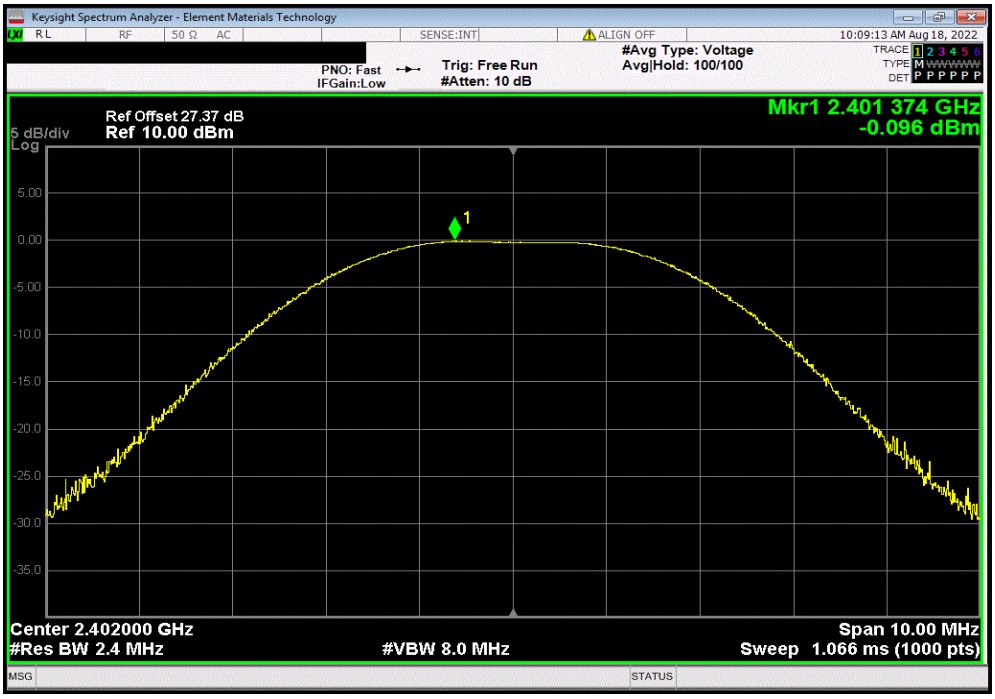


OUTPUT POWER

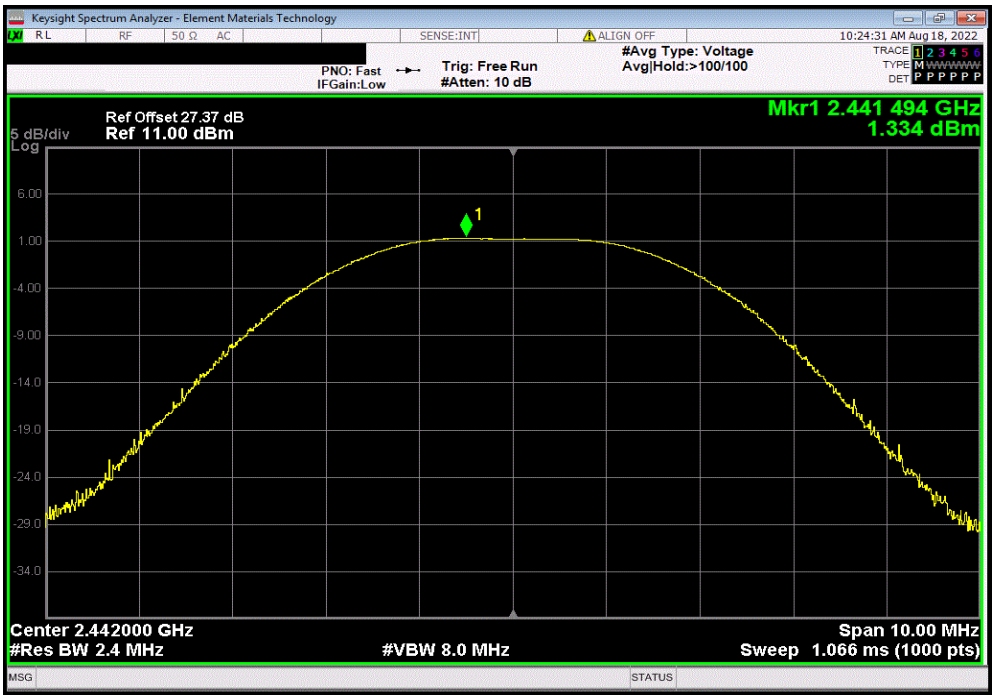
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.371	30	Pass



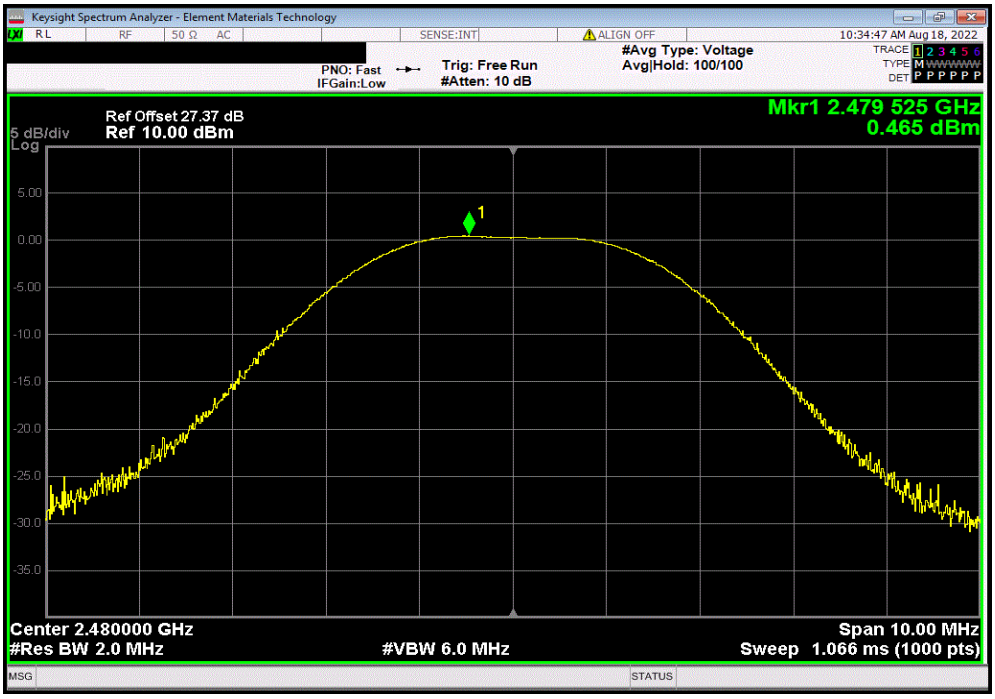
BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-0.096	30	Pass



BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.334	30	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.465	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			**Work Order:**	STAK0278
Serial Number:	2911334794			**Date:**	18-Aug-22
Customer:	Starkey Laboratories, Inc.			**Temperature:**	20.6 °C
Attendees:	John Quach			**Humidity:**	54.9% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Christopher Heintzelman	**Power:**	Battery	**Job Site:**	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

DEVIATIONS FROM TEST STANDARD

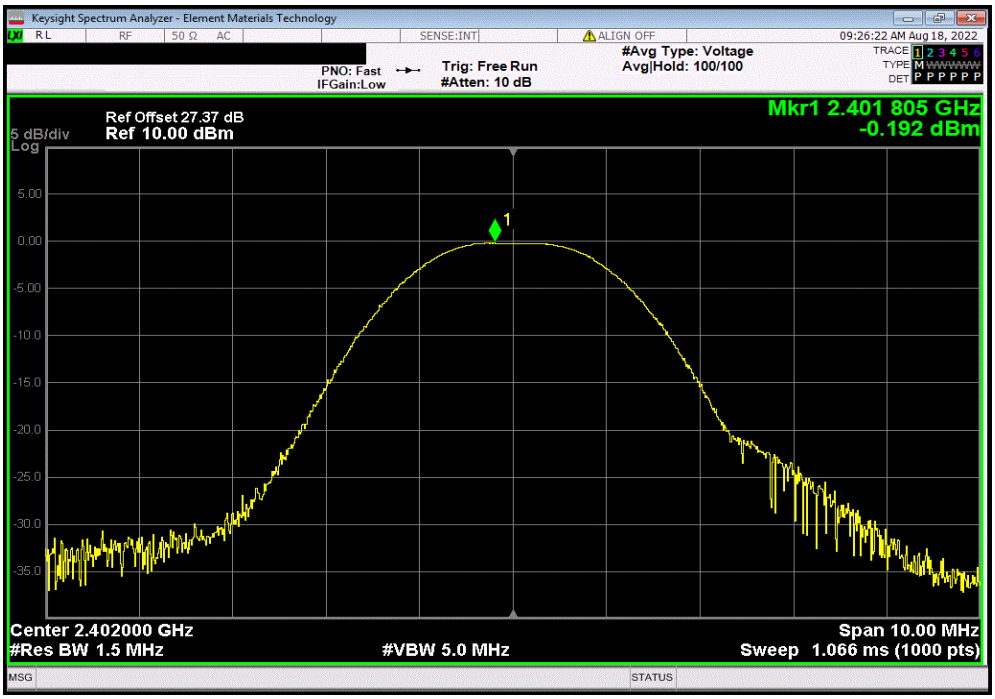
None

Configuration #	5	Signature

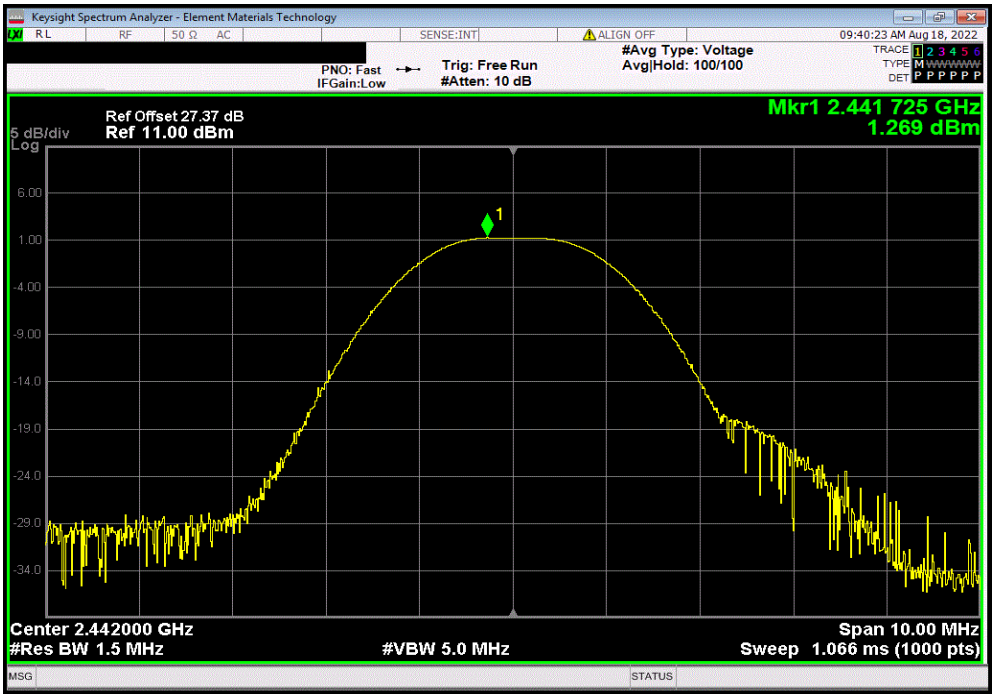
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-0.192	-1.78	-1.972	36	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	1.269	-1.78	-0.511	36	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	0.371	-1.78	-1.409	36	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-0.096	-1.78	-1.876	36	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	1.334	-1.78	-0.446	36	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	0.465	-1.78	-1.315	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
		-0.192	-1.78	-1.972	36	Pass



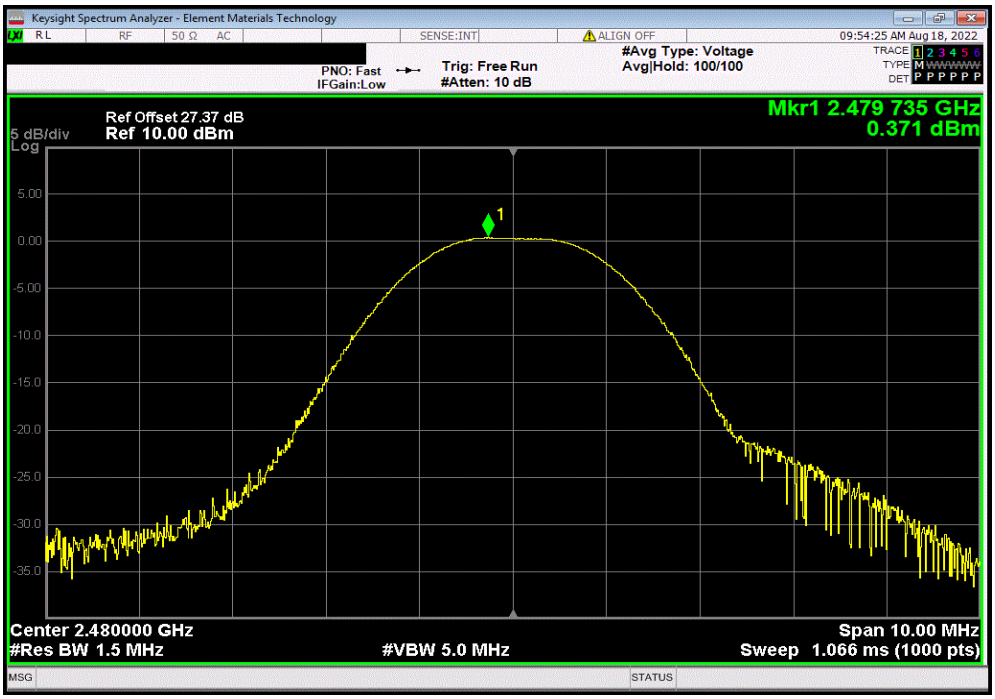
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		1.269	-1.78	-0.511	36	Pass



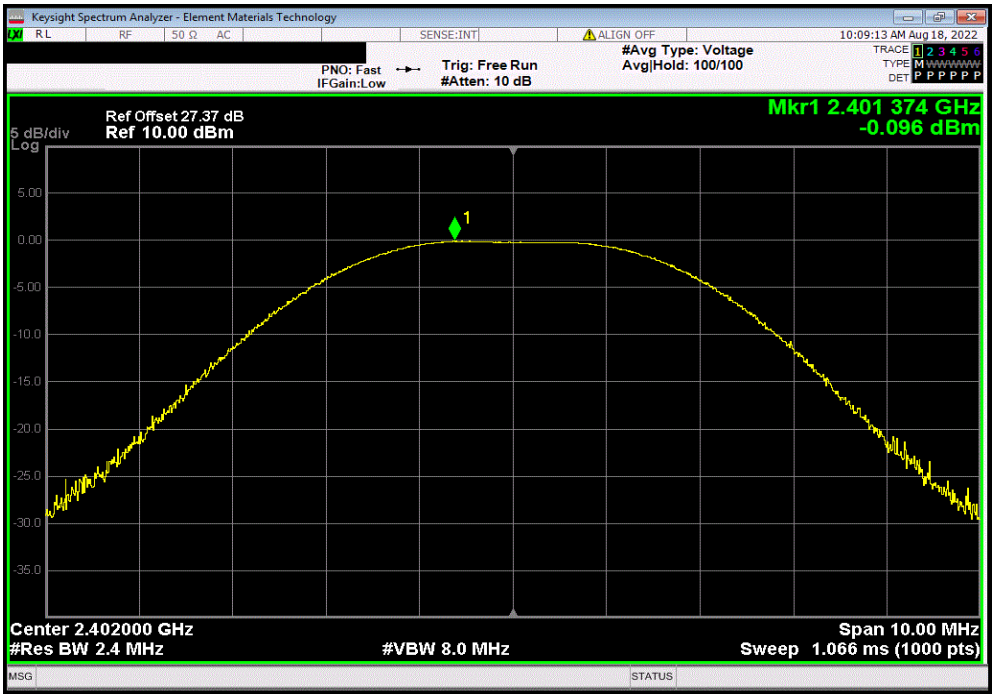
EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2022.06.03.0 XMit 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		0.371	-1.78	-1.409	36	Pass



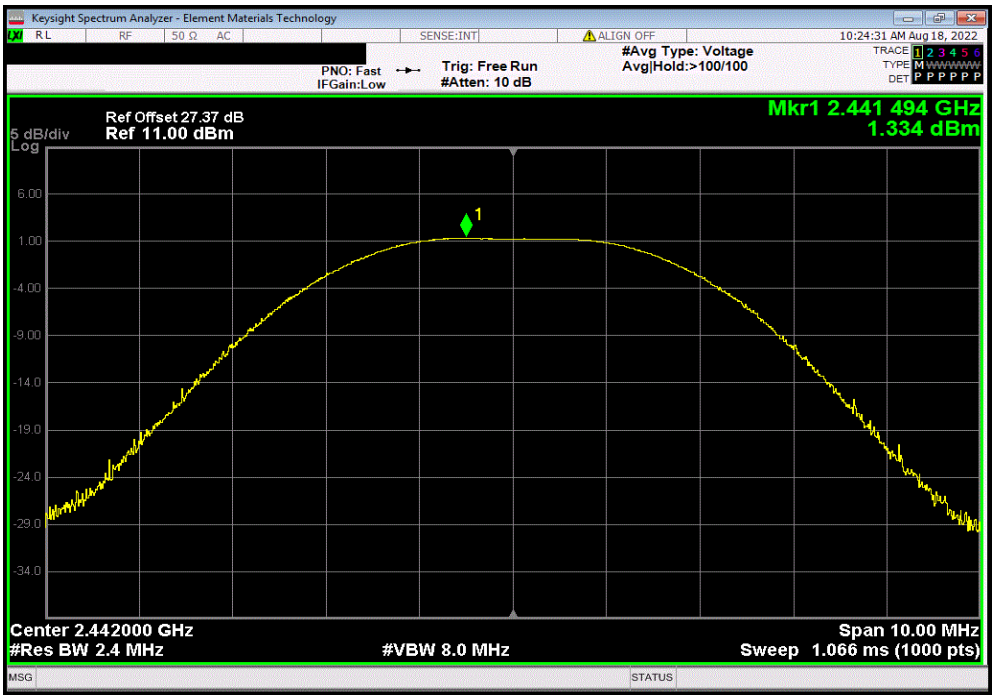
BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-0.096	-1.78	-1.876	36	Pass



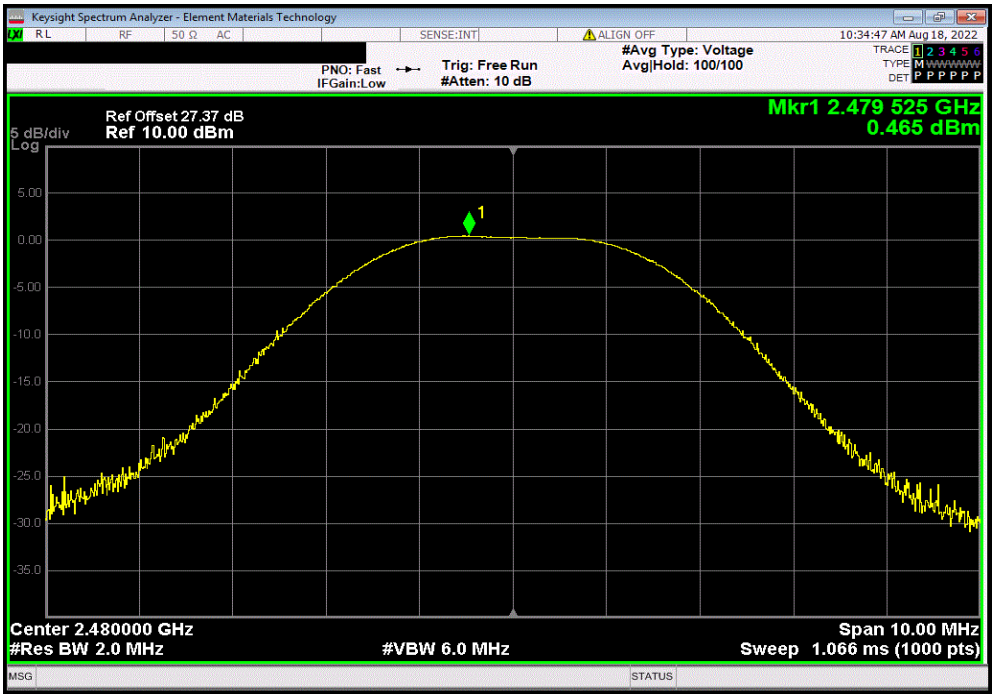
EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2022.06.03.0 XMit 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		1.334	-1.78	-0.446	36	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		0.465	-1.78	-1.315	36	Pass



POWER SPECTRAL DENSITY

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			Work Order:	STAK0278
Serial Number:	2911334794			Date:	18-Aug-22
Customer:	Starkey Laboratories, Inc.			Temperature:	20.6 °C
Attendees:	John Quach			Humidity:	55% RH
Project:	None			Barometric Pres.:	1016 mbar
Tested by:	Christopher Heintzelman	Power:	Battery	Job Site:	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

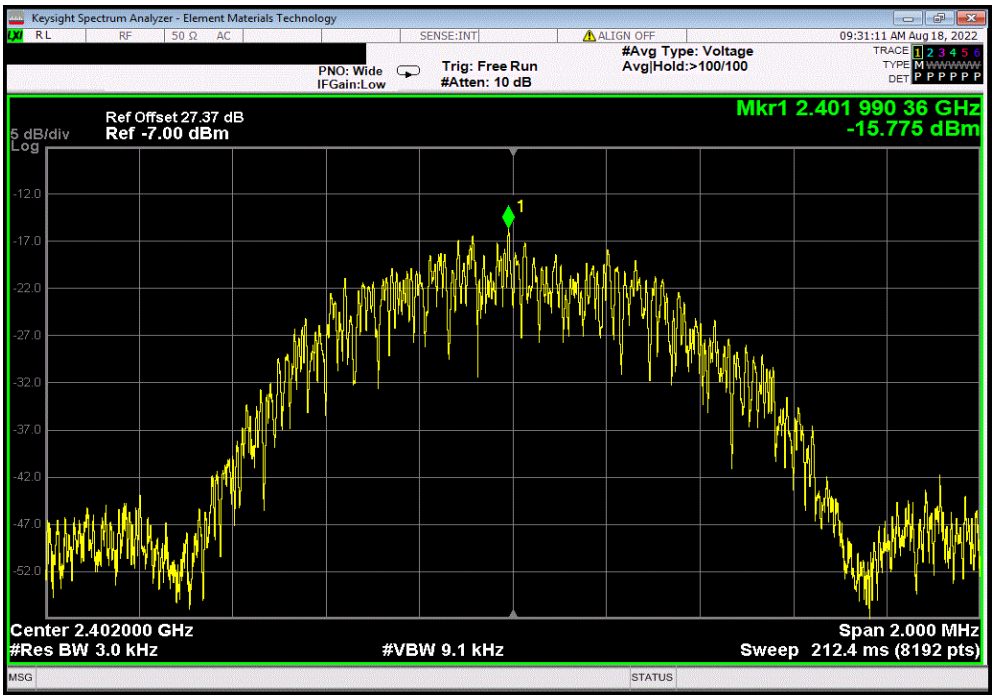
DEVIATIONS FROM TEST STANDARD

None

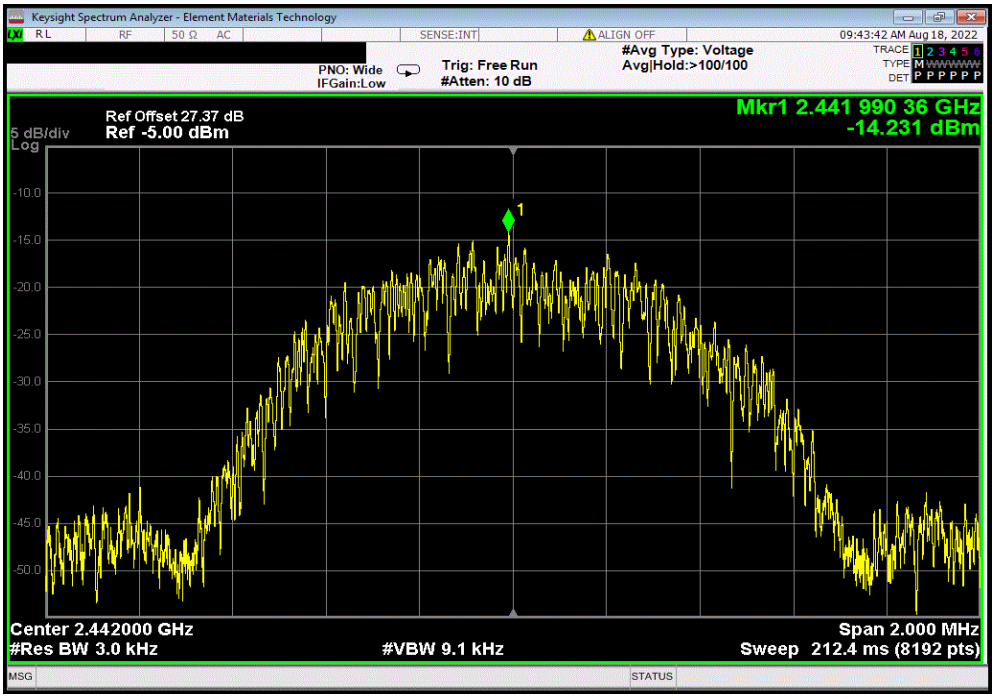
Configuration #	5	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-15.775	8	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-14.231	8	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-15.123	8	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-18.241	8	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	-16.69	8	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-17.86	8	Pass

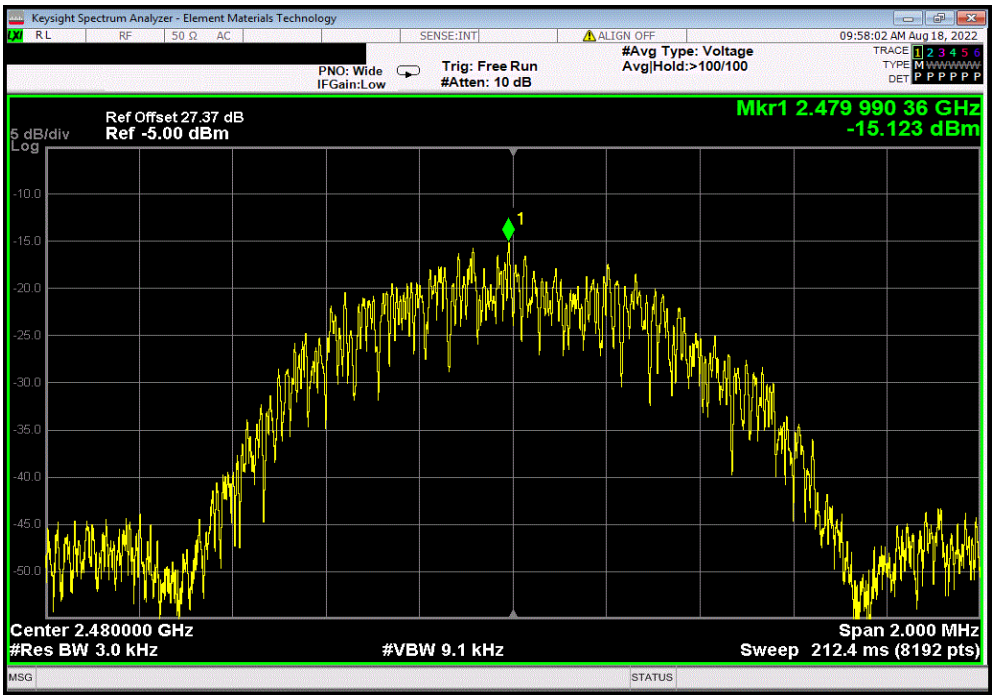
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.775	8	Pass



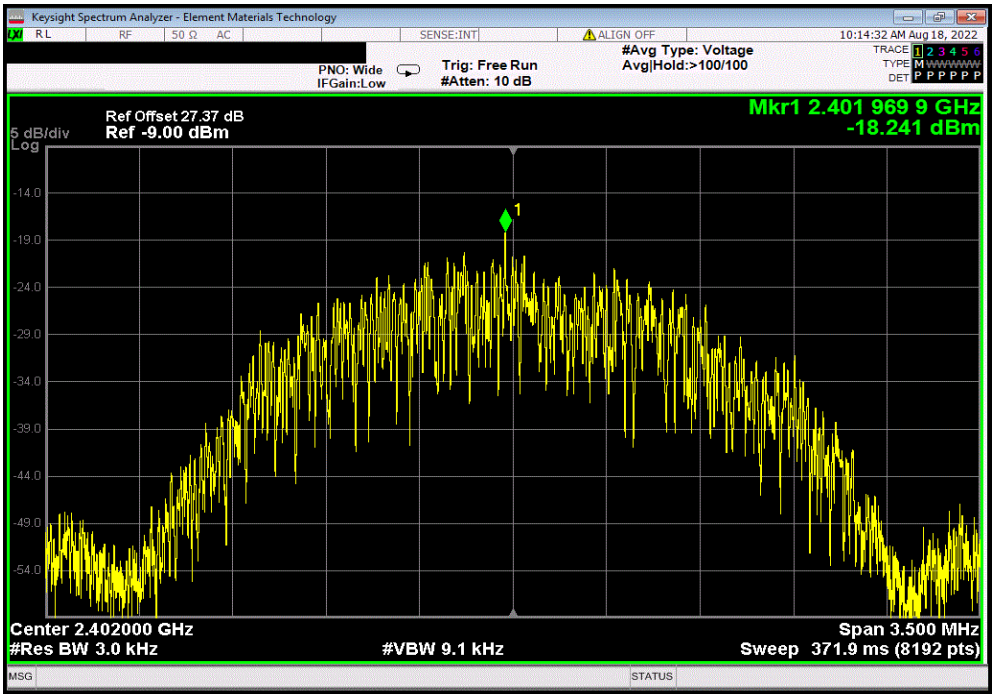
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.231	8	Pass



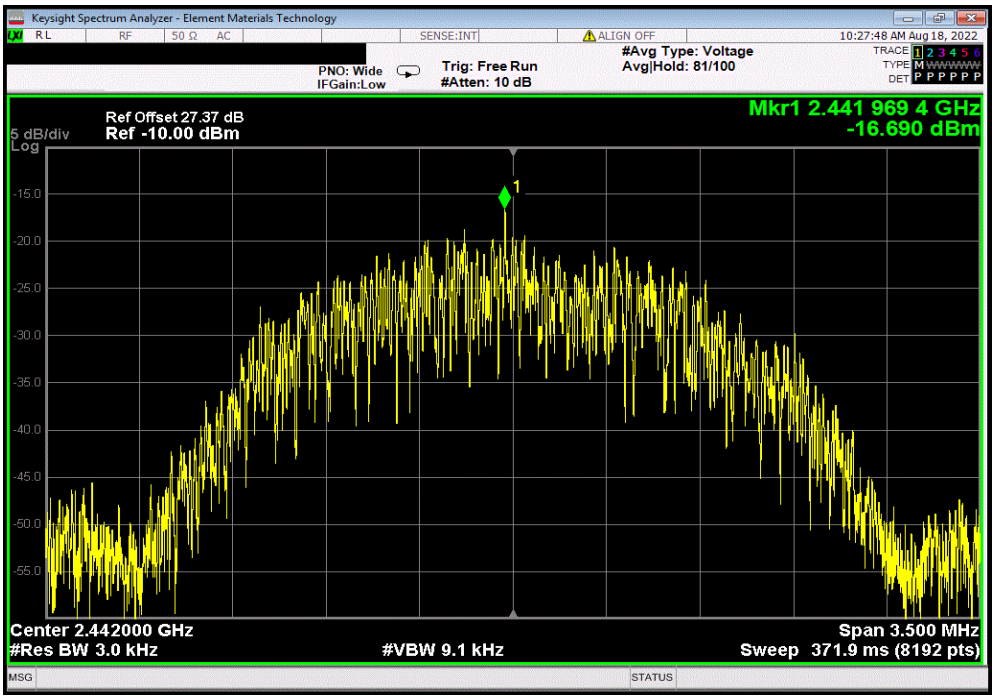
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.123	8	Pass



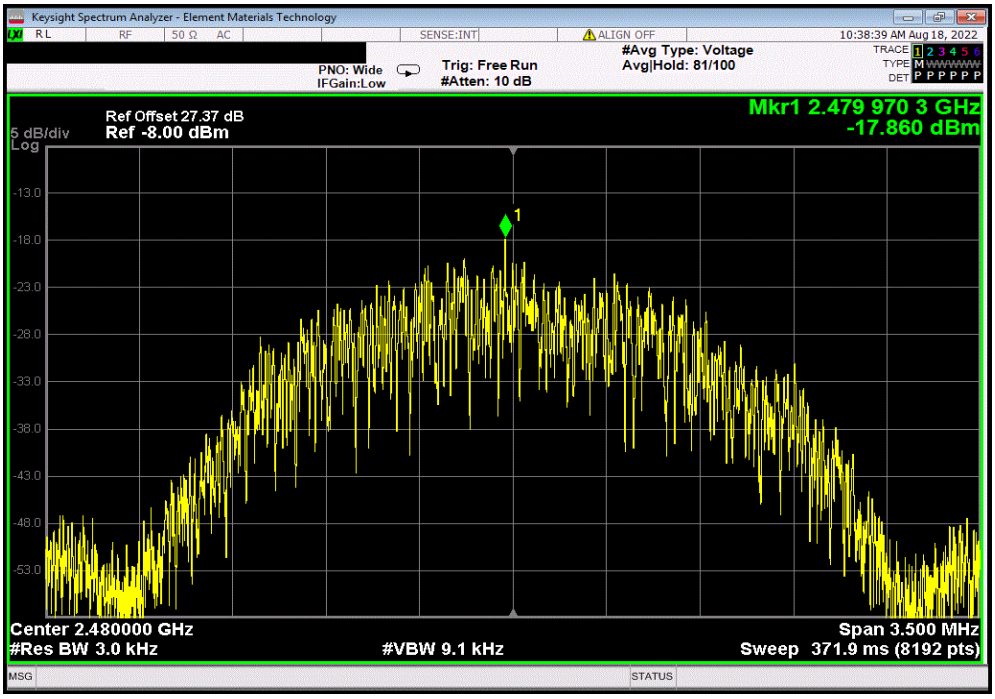
BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-18.241	8	Pass



BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-16.69	8	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.86	8	Pass



BAND EDGE COMPLIANCE

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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

element

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			Work Order:	STAK0278
Serial Number:	2911334794			Date:	18-Aug-22
Customer:	Starkey Laboratories, Inc.			Temperature:	20.7 °C
Attendees:	John Quach			Humidity:	55.3% RH
Project:	None			Barometric Pres.:	1016 mbar
Tested by:	Christopher Heintzelman	Power:	Battery	Job Site:	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

DEVIATIONS FROM TEST STANDARD

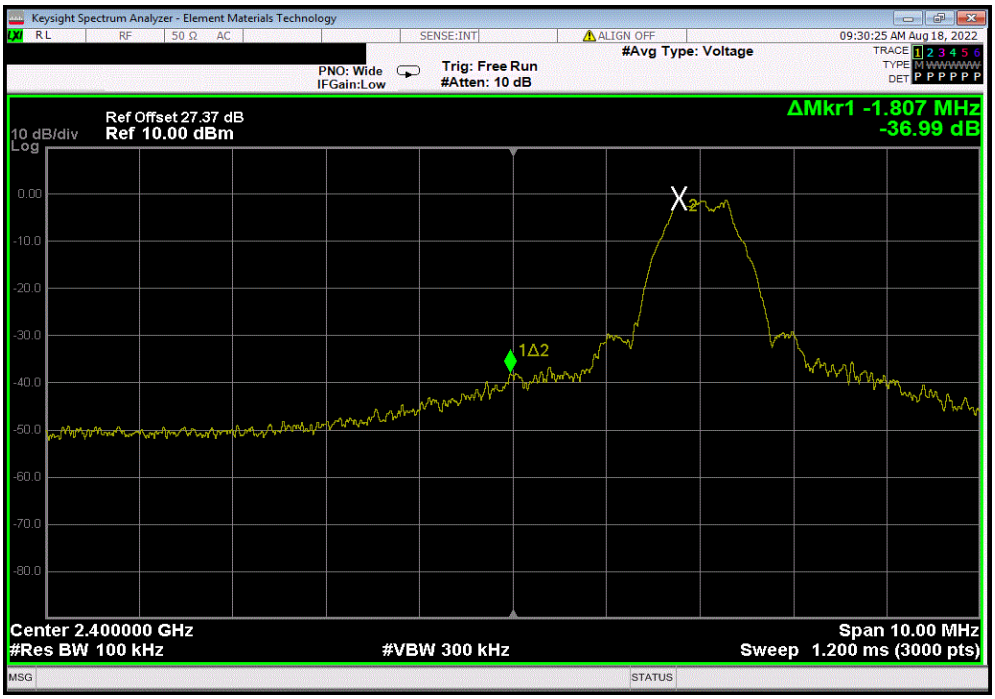
None

Configuration #	5	Signature

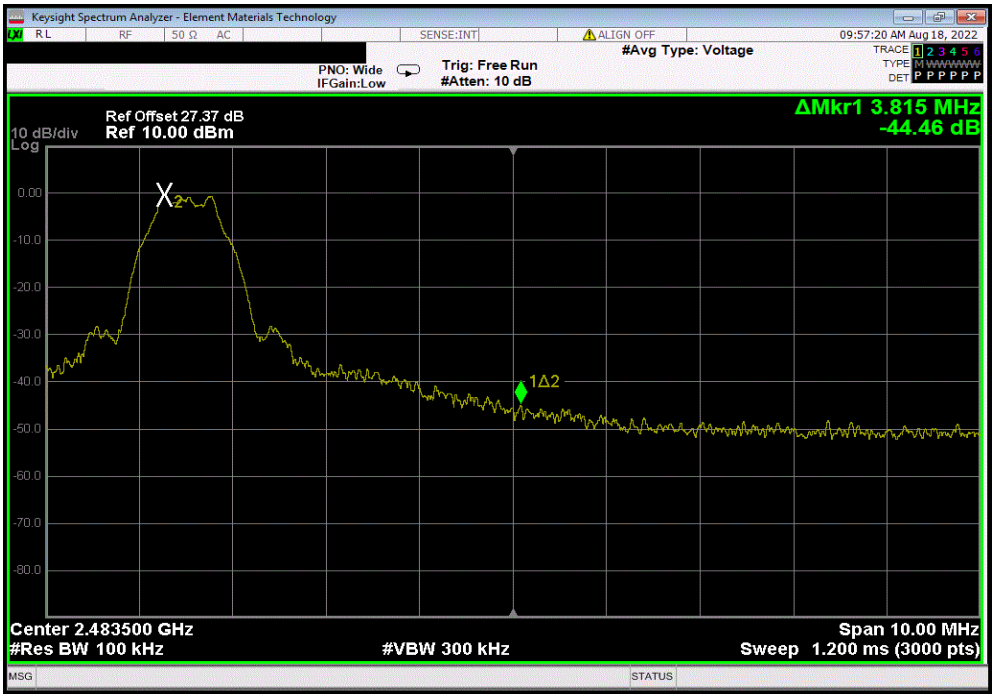
	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-36.99	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-44.46	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-28.69	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-37.69	-20	Pass

BAND EDGE COMPLIANCE

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-36.99	-20	Pass

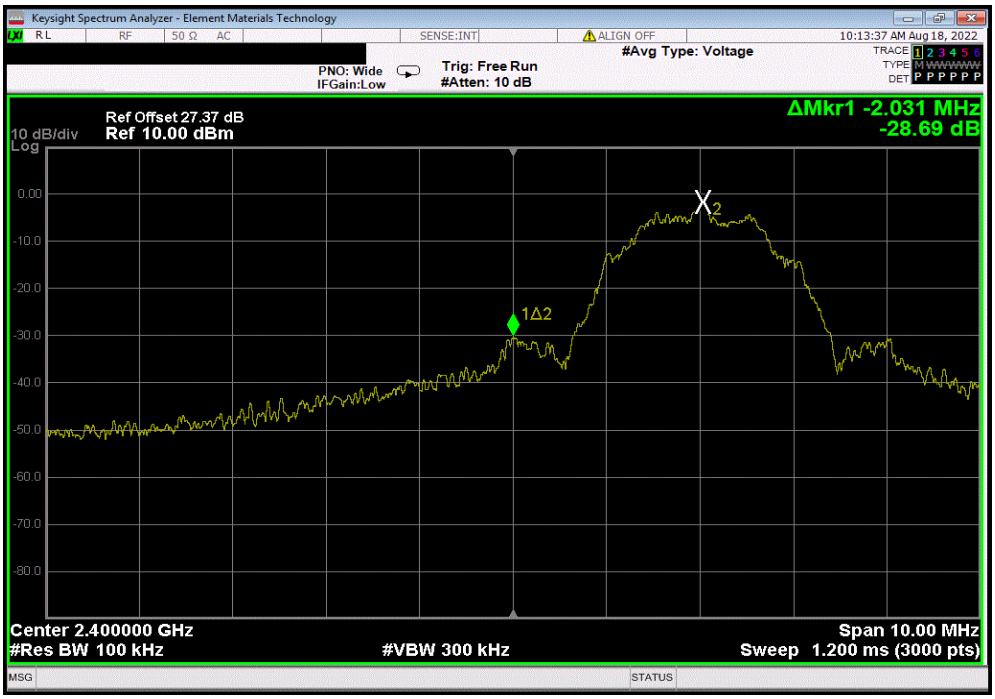


BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.46	-20	Pass

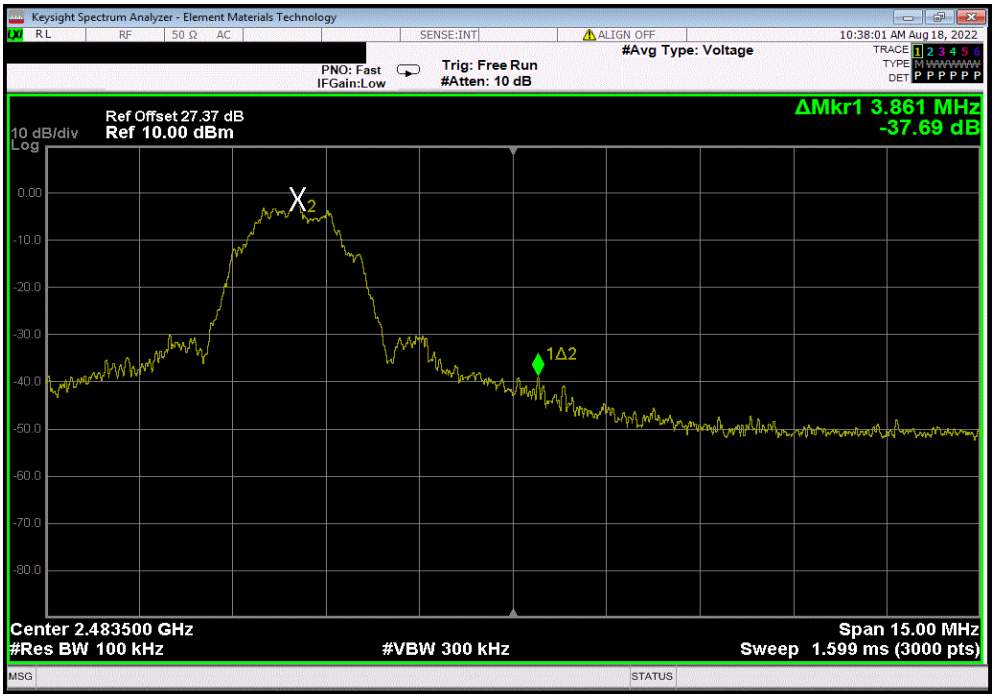


BAND EDGE COMPLIANCE

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-28.69	-20	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-37.69	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2022.02.07.0

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	18B5W-26	RFY	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-08-13	2023-08-13
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = “Internal” cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)			**Work Order:**	STAK0278
Serial Number:	2911334794			**Date:**	18-Aug-22
Customer:	Starkey Laboratories, Inc.			**Temperature:**	20.6 °C
Attendees:	John Quach			**Humidity:**	55% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Christopher Heintzelman	**Power:**	Battery	**Job Site:**	MN11

TEST SPECIFICATIONS	Test Method
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

COMMENTS

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

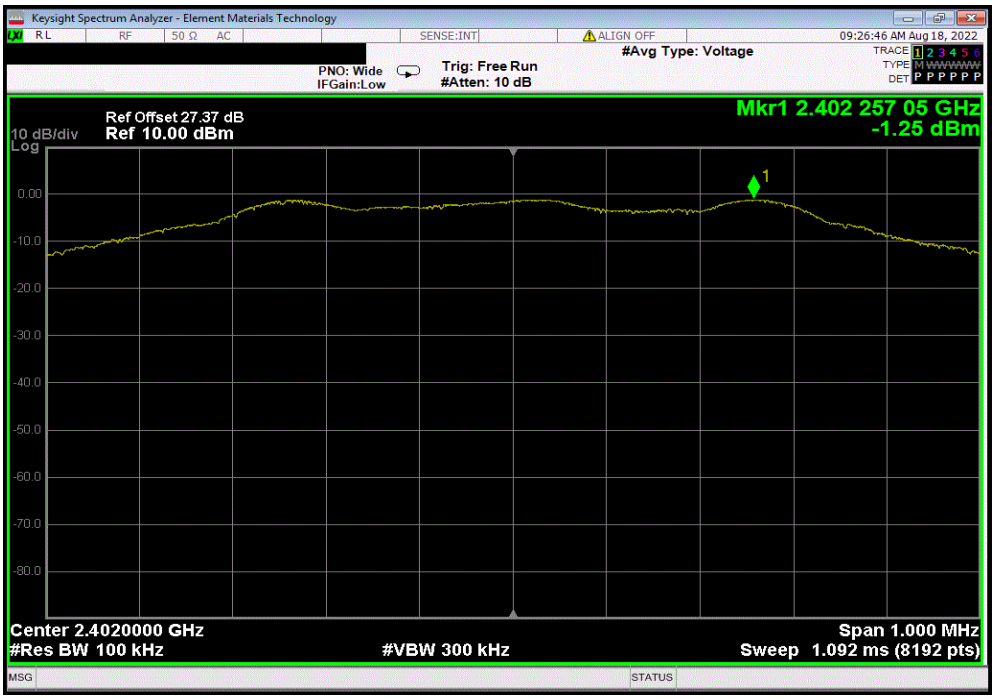
DEVIATIONS FROM TEST STANDARD

None

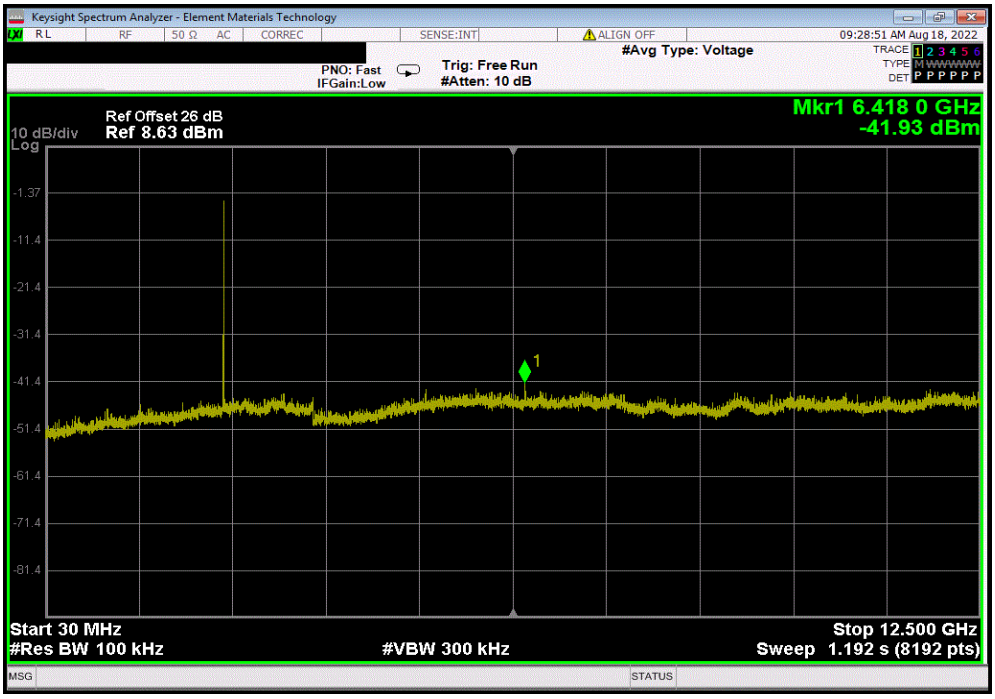
Configuration #	5	Signature

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	Fundamental	2402.26	N/A	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	30 MHz - 12.5 GHz	6418	-40.68	-20	Pass
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24940.48	-29.84	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	Fundamental	2442.26	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	6028.27	-42.67	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24966.43	-30.98	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	Fundamental	2480.03	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz	30 MHz - 12.5 GHz	6657.02	-41.94	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	12.5 GHz - 25 GHz	24655.11	-29.94	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	Fundamental	2402.04	N/A	N/A	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	30 MHz - 12.5 GHz	11782.95	-41.17	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24963.37	-28.27	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	Fundamental	2442.02	N/A	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	6582.42	-42.85	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24957.27	-30.71	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	Fundamental	2480.02	N/A	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz	30 MHz - 12.5 GHz	12420.84	-42.21	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	12.5 GHz - 25 GHz	24894.7	-29.61	-20	Pass

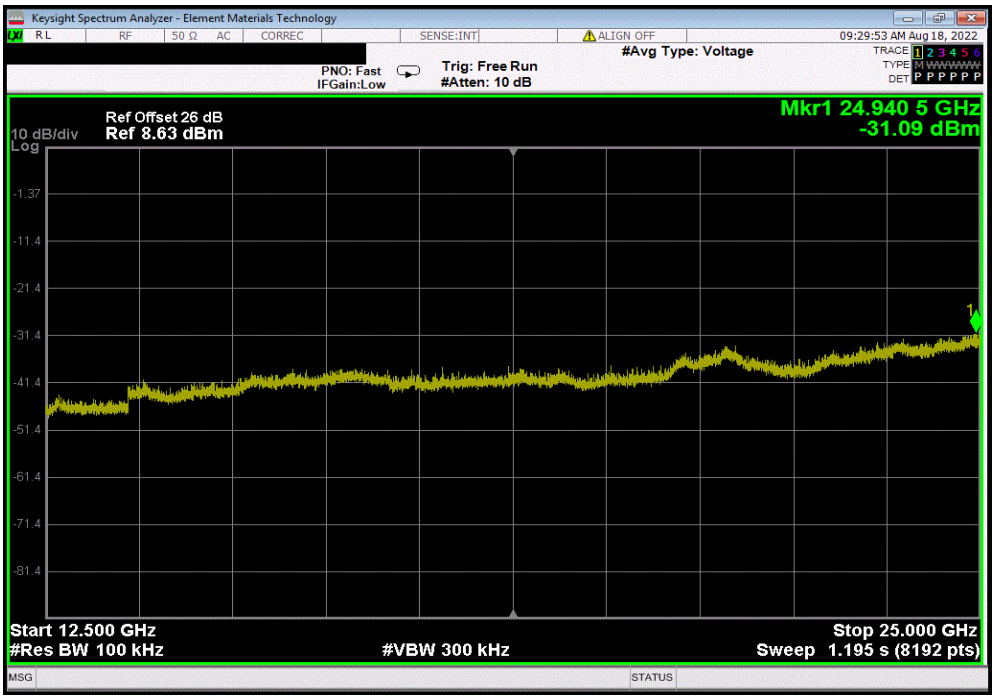
BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2402.26	N/A	N/A	N/A



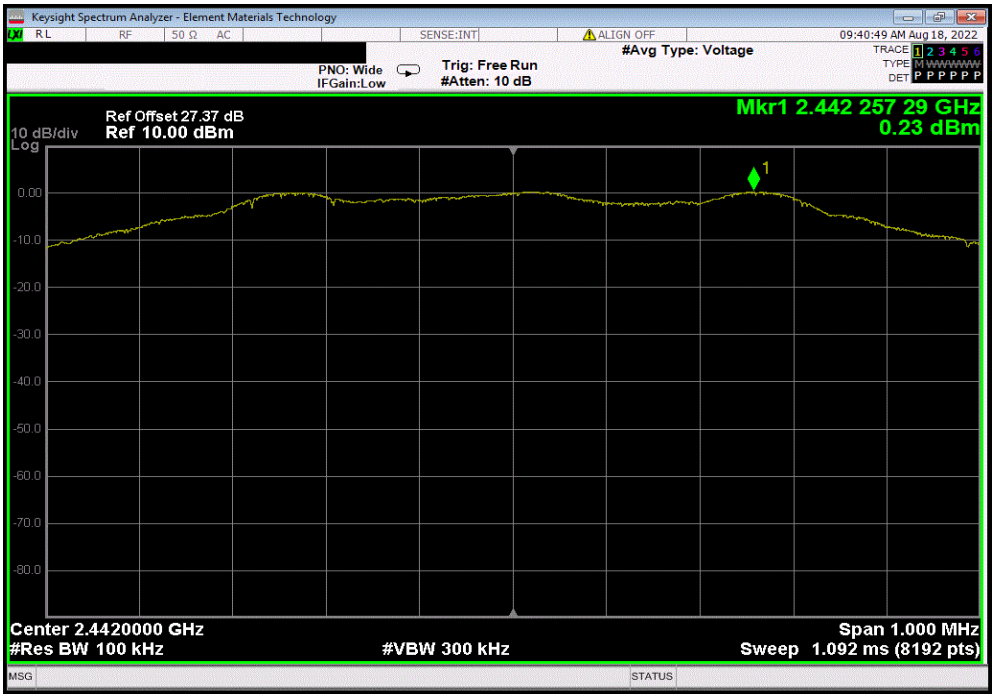
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6418	-40.68	-20	Pass



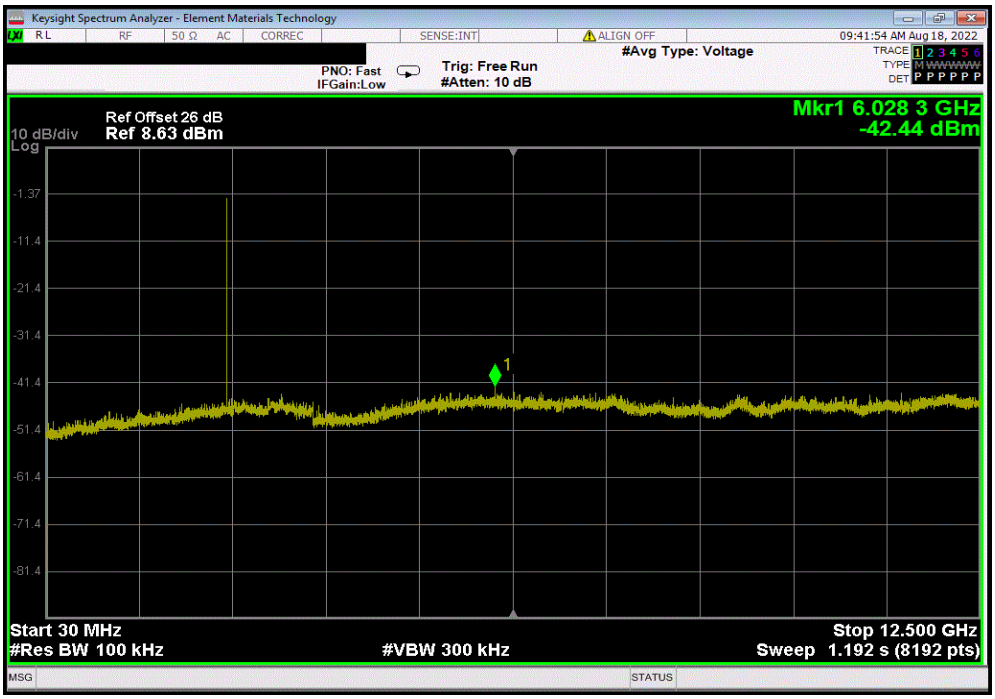
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24940.48	-29.84	-20	Pass



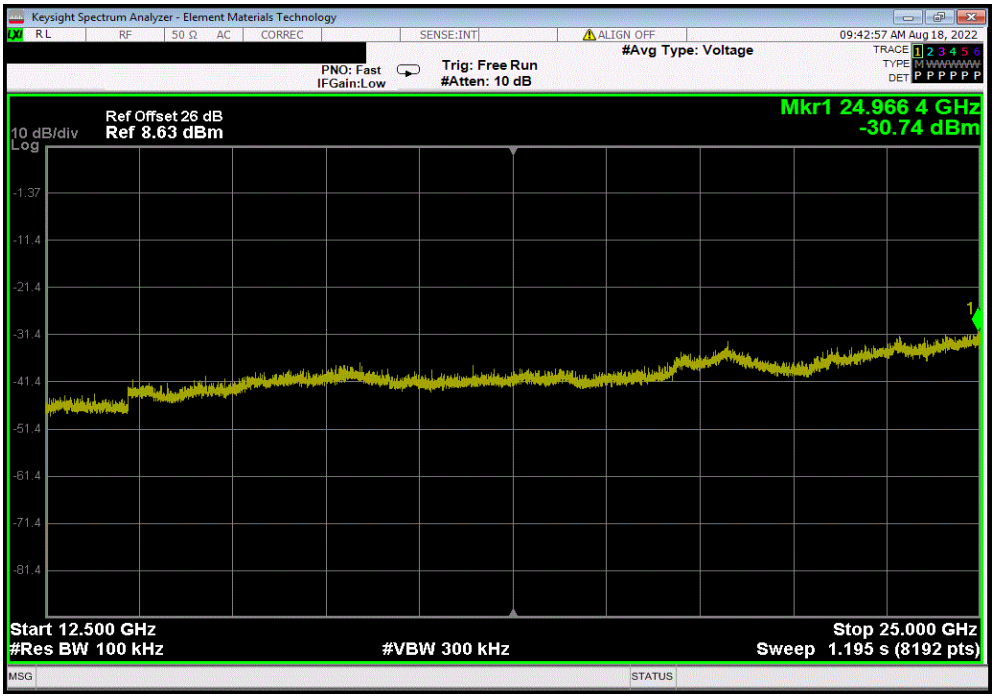
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2442.26	N/A	N/A	N/A



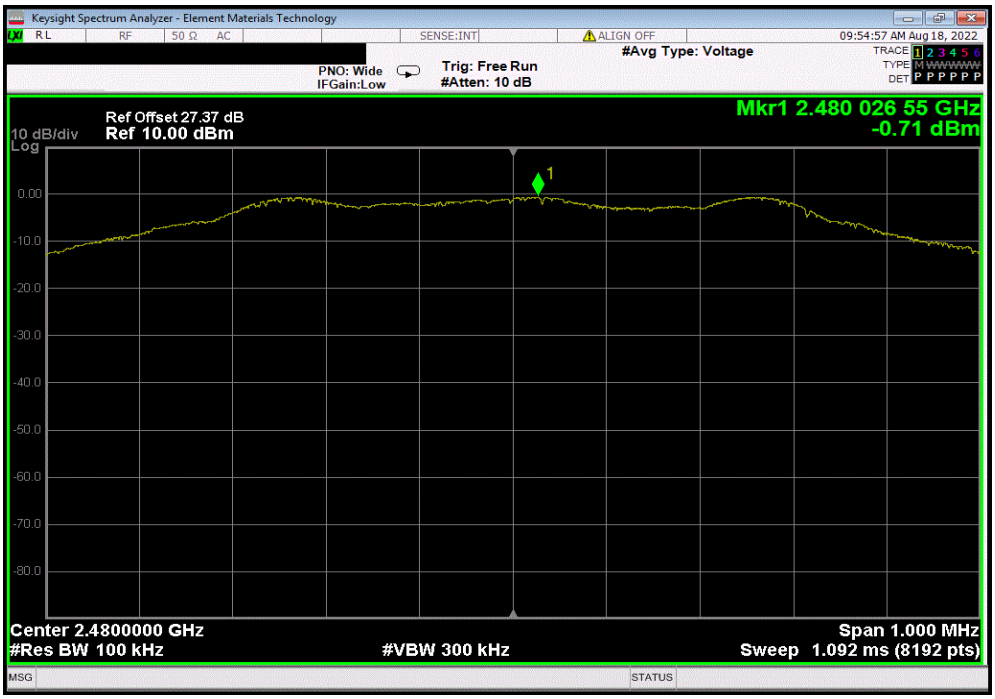
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6028.27	-42.67	-20	Pass



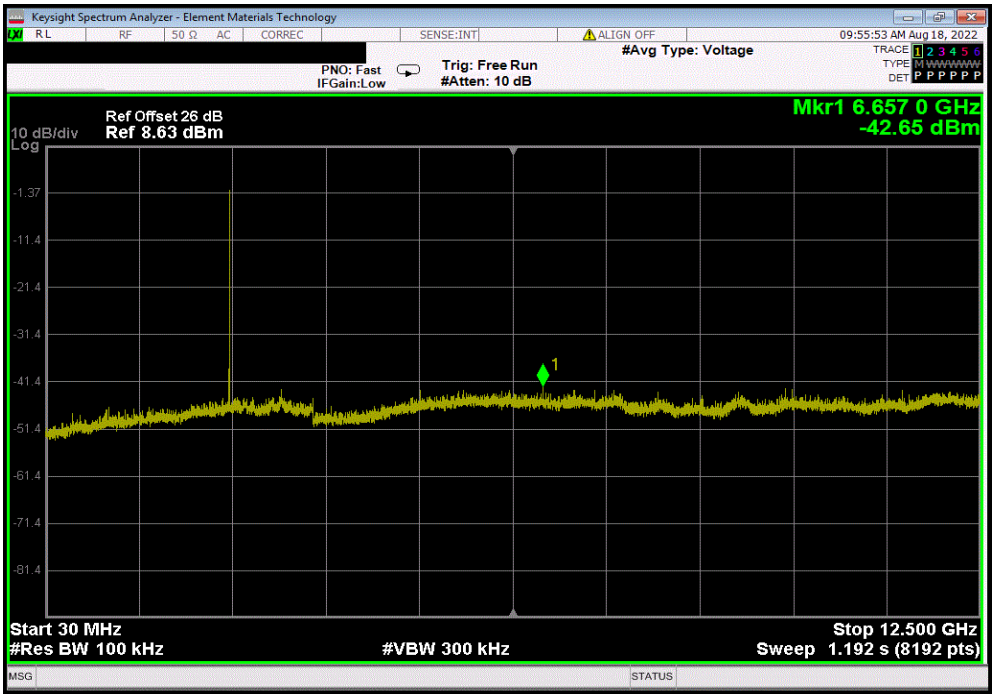
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24966.43	-30.98	-20	Pass



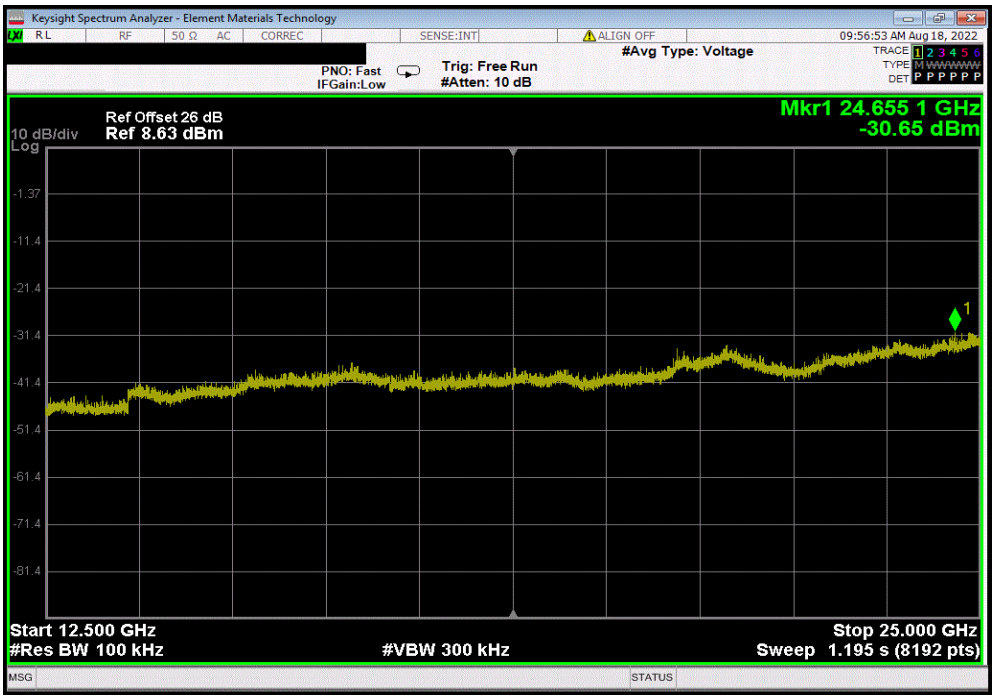
BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2480.03	N/A	N/A	N/A



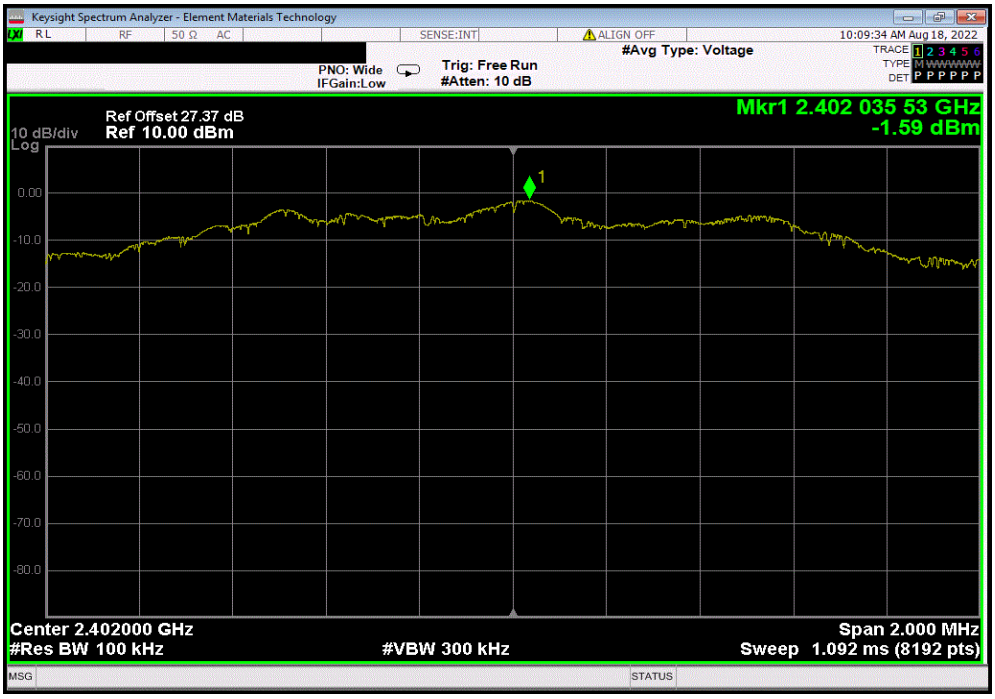
BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6657.02	-41.94	-20	Pass



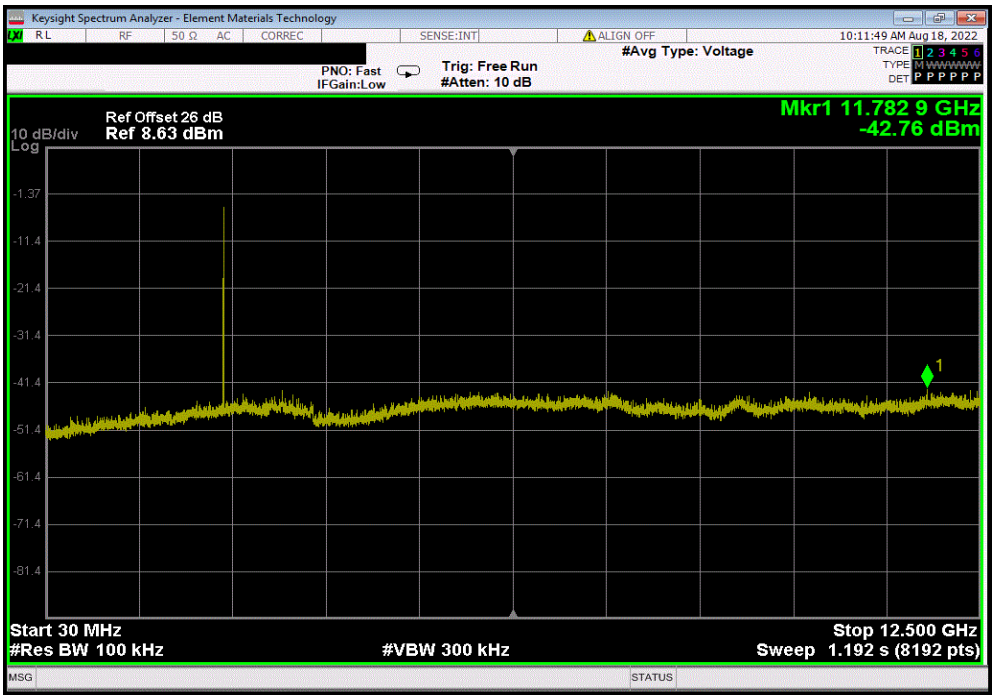
BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24655.11	-29.94	-20	Pass



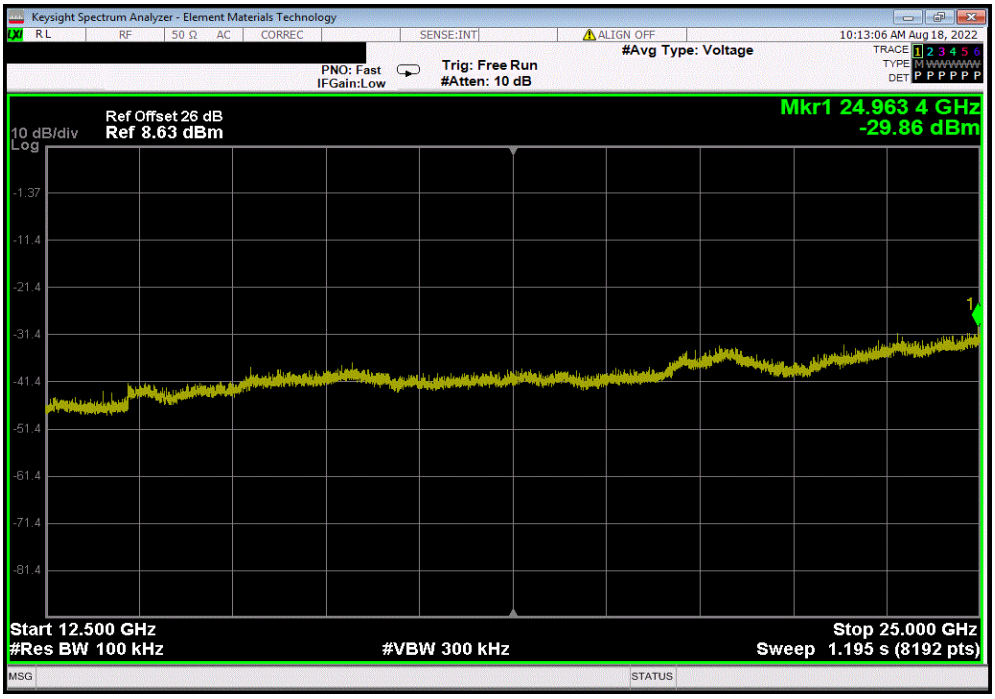
BLE/GFSK 2 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2402.04	N/A	N/A	N/A



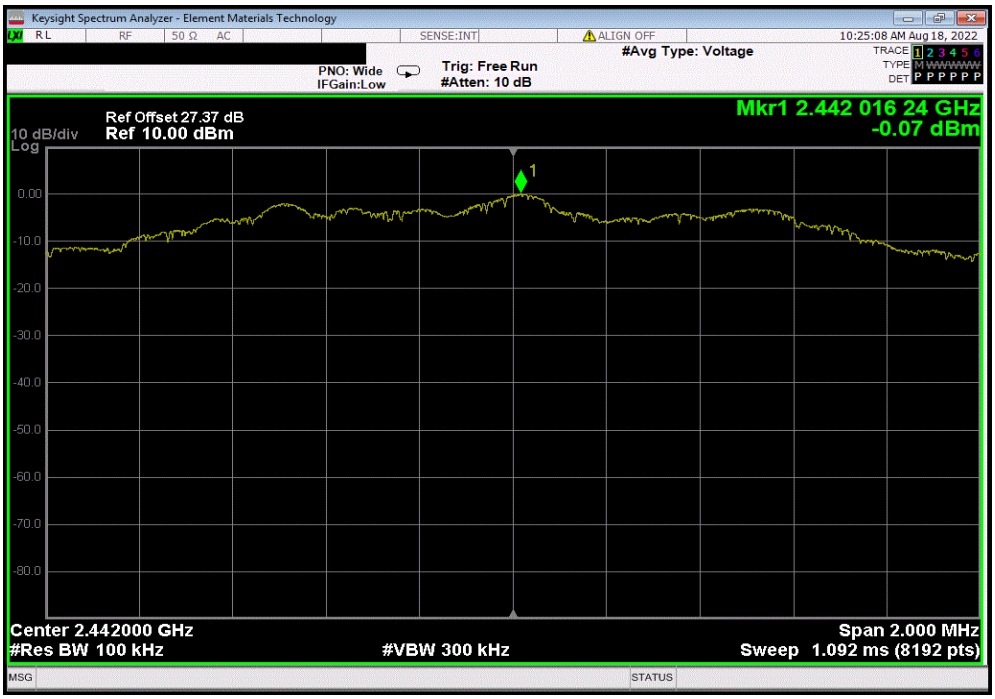
BLE/GFSK 2 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	11782.95	-41.17	-20	Pass



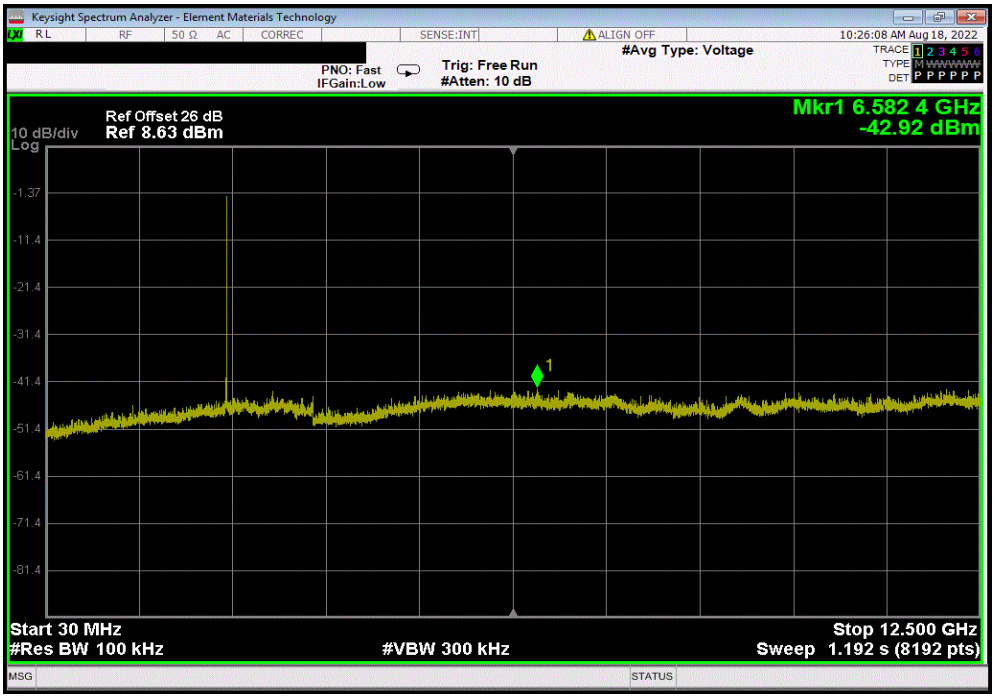
BLE/GFSK 2 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24963.37	-28.27	-20	Pass



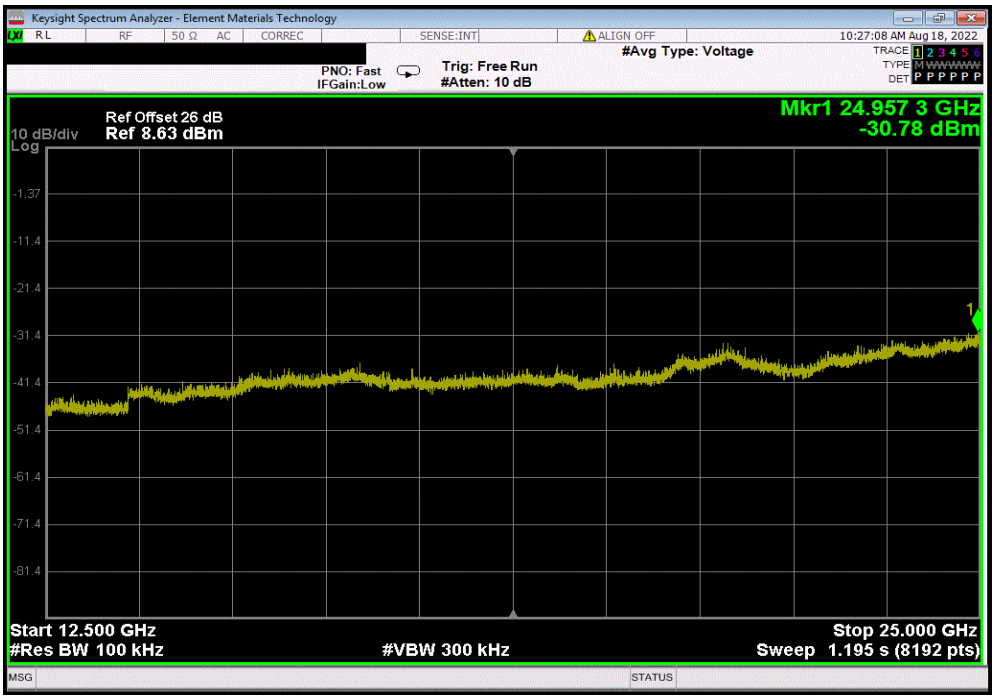
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2442.02	N/A	N/A	N/A



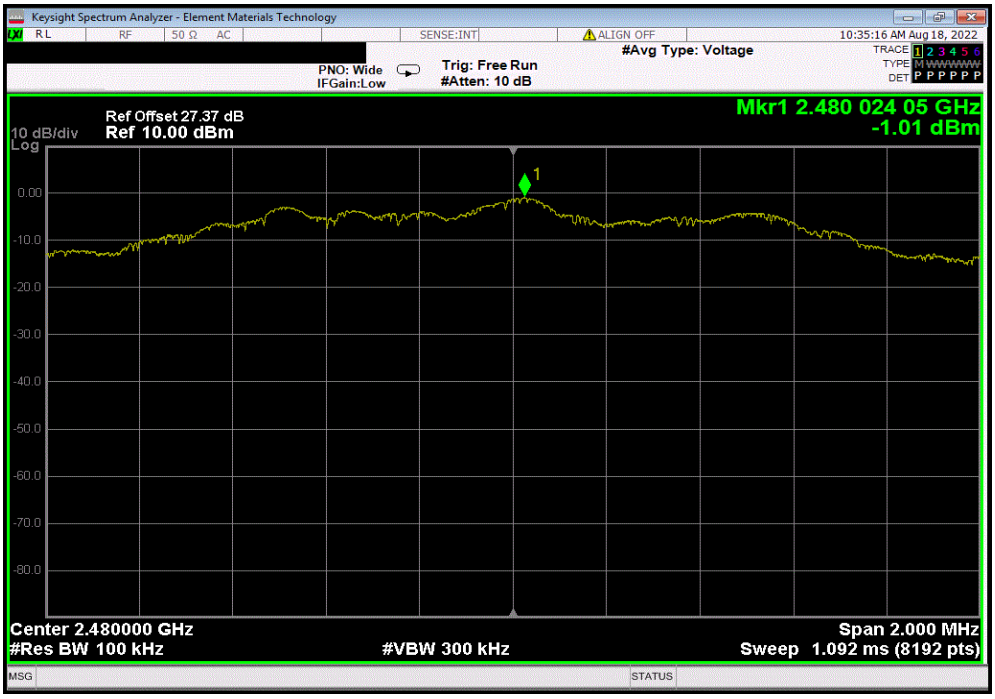
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6582.42	-42.85	-20	Pass



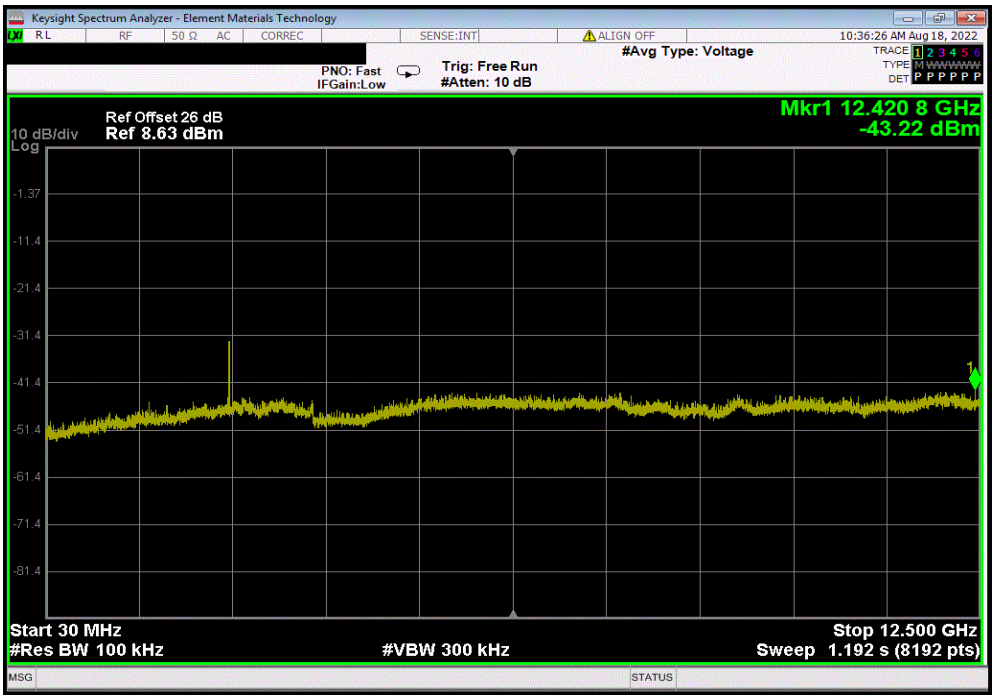
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24957.27	-30.71	-20	Pass



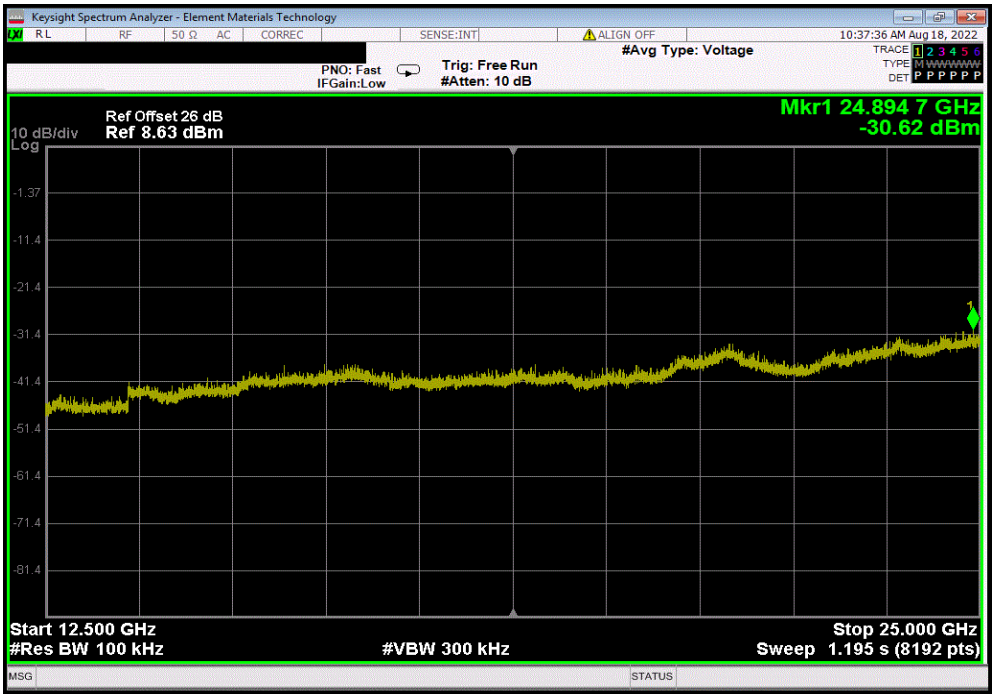
BLE/GFSK 2 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2480.02	N/A	N/A	N/A



BLE/GFSK 2 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	12420.84	-42.21	-20	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24894.7	-29.61	-20	Pass



SPURIOUS RADIATED EMISSIONS

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

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
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2021-03-09	2023-03-09
Cable	ESM Cable Corp.	Bilog Cables	MNH	2021-10-13	2022-10-13
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2021-10-13	2022-10-13
Antenna - Double Ridge	ETS Lindgren	3115	AJQ	2021-01-25	2023-01-25
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2022-01-18	2023-01-18
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2022-01-18	2023-01-18
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2022-01-18	2023-01-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2022-01-18	2023-01-18
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2022-01-18	2023-01-18
Attenuator	Fairview Microwave	SA18E-20	TWZ	2021-09-09	2022-09-09
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2021-09-09	2022-09-09
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2021-09-09	2022-09-09
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2021-09-09	2022-09-09
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Cable	Fairview Microwave	FMCA1975-200CM	MN1	2022-04-12	2023-04-12

SPURIOUS RADIATED EMISSIONS

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Narda Miteq	JSW45-26004000-40-5P	PBC	2022-04-12	2023-04-12
Antenna - Standard Gain	A.H. Systems, Inc.	SAS-588	AJO	NCR	NCR
Low Pass Filter, 0-1000 MHz	Micro-Tronics	LPM50004	LFK	2021-09-09	2022-09-09

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	+ 5.2	- 5.2

FREQUENCY RANGE INVESTIGATED

30 MHz TO 25000 MHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

STAK0278-12

MODES INVESTIGATED

Transmitting BLE Low Channel 2402 MHz, Mid Channel 2442 MHz, High Channel 2480 MHz, modulated, 1 or 2 Mbps.

SPURIOUS RADIATED EMISSIONS

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)	Work Order:	STAK0278
Serial Number:	2911334780	Date:	2022-07-29
Customer:	Starkey Laboratories, Inc.	Temperature:	20.8°C
Attendees:	John Quach	Relative Humidity:	52.3%
Customer Project:	None	Bar. Pressure (PMSL):	1021 mb
Tested By:	Chris Patterson	Job Site:	MN05
Power:	Battery	Configuration:	STAK0278-12

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	18	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

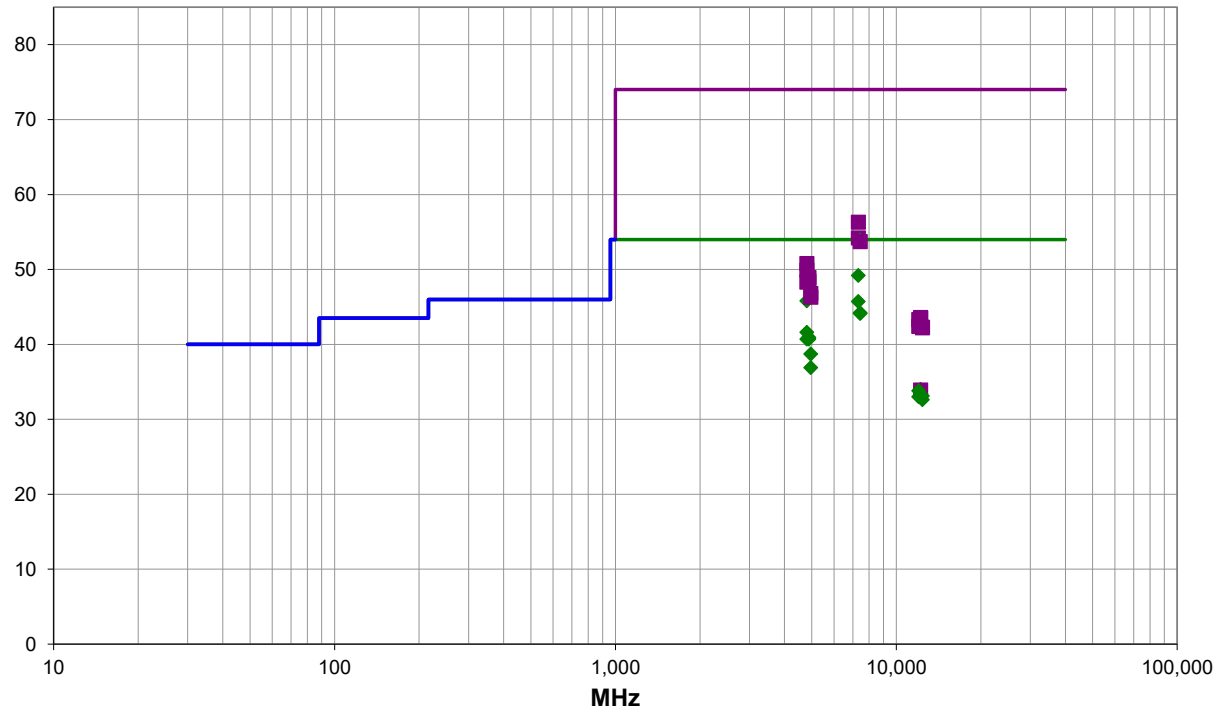
None

EUT OPERATING MODES

Transmitting BLE Low and High Chs (2402 and 2480 MHz), 1 Mbps and 2 Mbps. Test mode duty cycle is 10.71% (1 Mbps) and 5.33% (2 Mbps), operational duty cycle is 17% (1 Mbps) and 7% (2 Mbps). Duty cycle correction factor (DCCF) applied using DCCF=[10*log(1/test mode DC)]+[10*log(operational DC)]=2.0 dB (1 Mbps) or 1.2 dB (2 Mbps)

DEVIATIONS FROM TEST STANDARD

None



Run #: 18 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

RESULTS - Run #18

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
7325.442	35.9	11.3	2.9	95.0	2.0	0.0	Horz	AV	0.0	49.2	54.0	-4.8	EUT Horz, Mid Ch, 1 Mbps
4803.875	40.1	3.7	3.7	138.9	2.0	0.0	Horz	AV	0.0	45.8	54.0	-8.2	EUT Horz, Low Ch, 1 Mbps
7325.383	32.4	11.3	3.4	16.0	2.0	0.0	Vert	AV	0.0	45.7	54.0	-8.3	EUT Vert, Mid Ch, 1 Mbps
7442.467	30.4	11.8	1.5	63.0	2.0	0.0	Vert	AV	0.0	44.2	54.0	-9.8	EUT Vert, High Ch, 1 Mbps
7441.933	30.3	11.8	1.5	156.9	2.0	0.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT Horz, High Ch, 1 Mbps
4803.833	35.9	3.7	1.6	135.9	2.0	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT Vert, Low Ch, 1 Mbps
4884.025	34.8	4.1	3.7	48.0	2.0	0.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT Vert, Mid Ch, 1 Mbps
4803.125	35.8	3.7	1.5	4.0	1.2	0.0	Horz	AV	0.0	40.7	54.0	-13.3	EUT Horz, Low Ch, 2 Mbps
4883.950	34.6	4.1	2.6	23.9	2.0	0.0	Horz	AV	0.0	40.7	54.0	-13.3	EUT Horz, Mid Ch, 1 Mbps
4960.142	32.2	4.5	1.5	358.0	2.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	EUT Vert, High Ch, 1 Mbps
4958.642	30.4	4.5	1.5	217.0	2.0	0.0	Horz	AV	0.0	36.9	54.0	-17.1	EUT Horz, High Ch, 1 Mbps
7326.783	45.0	11.3	2.9	95.0	0.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT Horz, Mid Ch, 1 Mbps
7325.508	42.9	11.3	3.4	16.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	EUT Vert, Mid Ch, 1 Mbps
12211.170	30.7	1.3	2.6	199.0	2.0	0.0	Vert	AV	0.0	34.0	54.0	-20.0	EUT Vert, Mid Ch, 1 Mbps
12211.170	30.6	1.3	1.5	227.0	2.0	0.0	Horz	AV	0.0	33.9	54.0	-20.1	EUT Horz, Mid Ch, 1 Mbps
7439.375	42.1	11.8	1.5	156.9	0.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	EUT Horz, High Ch, 1 Mbps
12011.470	31.3	0.5	1.8	283.9	2.0	0.0	Vert	AV	0.0	33.8	54.0	-20.2	EUT Vert, Low Ch, 1 Mbps
7438.258	41.9	11.8	1.5	63.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	EUT Vert, High Ch, 1 Mbps
12398.670	30.2	0.9	1.5	131.9	2.0	0.0	Vert	AV	0.0	33.1	54.0	-20.9	EUT Vert, High Ch, 1 Mbps
12012.150	30.5	0.5	1.5	337.9	2.0	0.0	Horz	AV	0.0	33.0	54.0	-21.0	EUT Horz, Low Ch, 1 Mbps
12398.900	29.7	0.9	1.5	174.0	2.0	0.0	Horz	AV	0.0	32.6	54.0	-21.4	EUT Horz, High Ch, 1 Mbps
4803.392	47.1	3.7	3.7	138.9	0.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT Horz, Low Ch, 1 Mbps
4802.867	46.2	3.7	1.5	4.0	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	EUT Horz, Low Ch, 2 Mbps
4883.892	44.8	4.1	3.7	48.0	0.0	0.0	Vert	PK	0.0	48.9	74.0	-25.1	EUT Vert, Mid Ch, 1 Mbps
4883.558	44.3	4.1	2.6	23.9	0.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	EUT Horz, Mid Ch, 1 Mbps
4804.283	44.6	3.7	1.6	135.9	0.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	EUT Vert, Low Ch, 1 Mbps
4960.317	42.3	4.5	1.5	358.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	EUT Vert, High Ch, 1 Mbps
4959.933	41.8	4.5	1.5	217.0	0.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	EUT Horz, High Ch, 1 Mbps
12208.920	42.3	1.3	1.5	227.0	0.0	0.0	Horz	PK	0.0	43.6	74.0	-30.4	EUT Horz, Mid Ch, 1 Mbps
12210.540	42.2	1.3	2.6	199.0	0.0	0.0	Vert	PK	0.0	43.5	74.0	-30.5	EUT Vert, Mid Ch, 1 Mbps
12012.250	42.8	0.5	1.8	283.9	0.0	0.0	Vert	PK	0.0	43.3	74.0	-30.7	EUT Vert, Low Ch, 1 Mbps
12010.580	41.9	0.5	1.5	337.9	0.0	0.0	Horz	PK	0.0	42.4	74.0	-31.6	EUT Horz, Low Ch, 1 Mbps
12399.560	41.4	0.9	1.5	174.0	0.0	0.0	Horz	PK	0.0	42.3	74.0	-31.7	EUT Horz, High Ch, 1 Mbps
12399.640	41.3	0.9	1.5	131.9	0.0	0.0	Vert	PK	0.0	42.2	74.0	-31.8	EUT Vert, High Ch, 1 Mbps

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS – BAND EDGE

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

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
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2022-09-01	2024-09-01
Cable	Element	Double Ridge Guide Horn Cables	MNV	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2022-01-24	2023-01-24
Attenuator	Coaxicom	3910-20	AXY	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2022-03-22	2023-03-22

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	+ 5.2	- 5.2

FREQUENCY RANGE INVESTIGATED

2300 MHz TO 2500 MHz

POWER INVESTIGATED

Battery

SPURIOUS RADIATED EMISSIONS – BAND EDGE

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

CONFIGURATIONS INVESTIGATED

STAK0278-13

MODES INVESTIGATED

Transmitting BLE Low Channel 2402 MHz, High Channel 2480 MHz, modulated, 1 or 2 Mbps.

SPURIOUS RADIATED EMISSIONS – BAND EDGE

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

EUT:	Genesis AI ITE and ITC custom wireless rechargeable hearing aid (Left ear)	Work Order:	STAK0278
Serial Number:	2911334780	Date:	2022-10-19
Customer:	Starkey Laboratories, Inc.	Temperature:	21.7°C
Attendees:	John Quach	Relative Humidity:	23.6%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	STAK0278-13

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	33	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

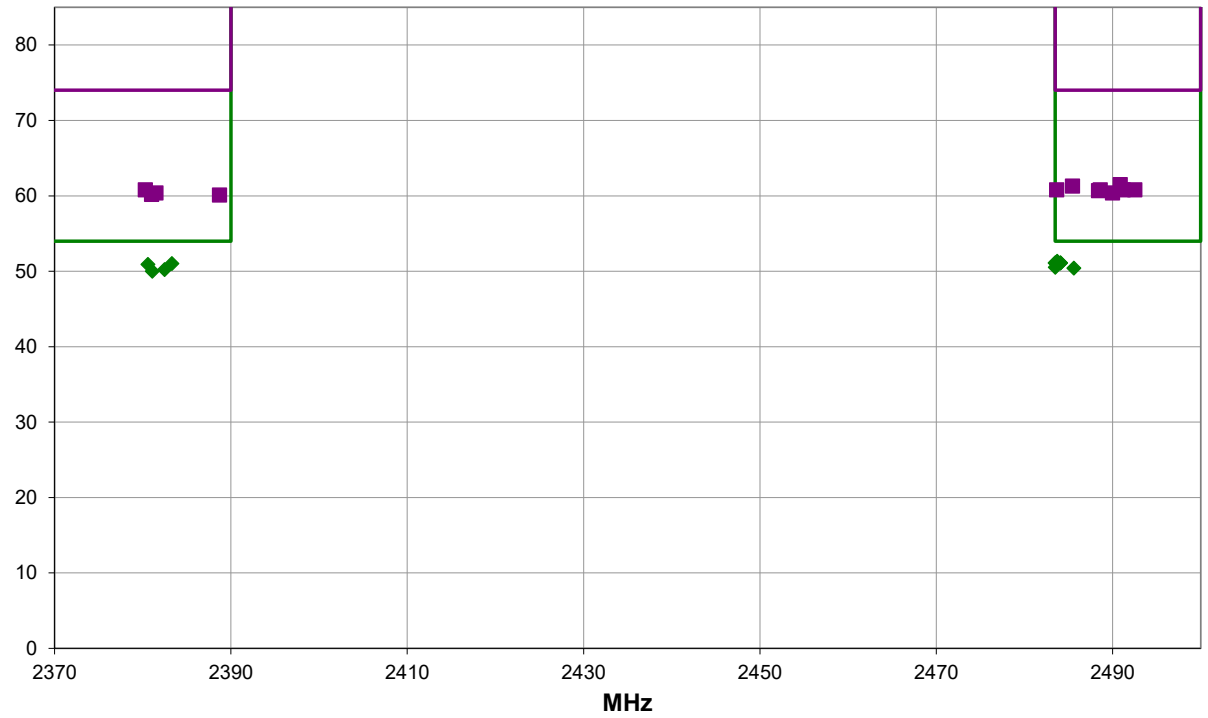
Left Ear

EUT OPERATING MODES

Transmitting BLE Low and High Chs (2402 and 2480 MHz), 1 Mbps and 2 Mbps. Test mode duty cycle is 10.71% (1 Mbps) and 5.33% (2 Mbps), operational duty cycle is 17% (1 Mbps) and 7% (2 Mbps). Duty cycle correction factor (DCCF) applied using DCCF=[10*log(1/test mode DC)]+[10*log(operational DC)]=2.0 dB (1 Mbps) or 1.2 dB (2 Mbps)

DEVIATIONS FROM TEST STANDARD

None



Run #: 33 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – BAND EDGE

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.1.12.0

RESULTS - Run #33

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
2483.733	31.5	-2.2	1.5	122.0	2.0	20.0	Horz	AV	0.0	51.3	54.0	-2.7	EUT Horz, High Ch, 1 Mbps
2483.600	31.3	-2.2	1.5	190.0	2.0	20.0	Vert	AV	0.0	51.1	54.0	-2.9	EUT Horz, High Ch, 1 Mbps
2484.100	31.3	-2.2	1.5	268.0	2.0	20.0	Horz	AV	0.0	51.1	54.0	-2.9	EUT On Side, High Ch, 1 Mbps
2484.117	31.3	-2.2	1.5	140.0	2.0	20.0	Vert	AV	0.0	51.1	54.0	-2.9	EUT On Side, High Ch, 1 Mbps
2483.500	31.3	-2.2	1.3	325.0	2.0	20.0	Horz	AV	0.0	51.1	54.0	-2.9	EUT Vert, High Ch, 1 Mbps
2483.583	31.3	-2.2	1.5	250.0	2.0	20.0	Vert	AV	0.0	51.1	54.0	-2.9	EUT Vert, High Ch, 1 Mbps
2383.317	31.4	-2.4	1.5	267.0	2.0	20.0	Horz	AV	0.0	51.0	54.0	-3.0	EUT Horz, Low Ch, 1 Mbps
2380.583	31.3	-2.4	1.5	146.0	2.0	20.0	Vert	AV	0.0	50.9	54.0	-3.1	EUT Horz, Low Ch, 1 Mbps
2483.517	31.5	-2.2	1.5	81.0	1.2	20.0	Horz	AV	0.0	50.5	54.0	-3.5	EUT Horz, High Ch, 2 Mbps
2485.633	31.4	-2.2	1.5	360.0	1.2	20.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT Horz, High Ch, 2 Mbps
2382.483	31.4	-2.4	1.2	167.0	1.2	20.0	Horz	AV	0.0	50.2	54.0	-3.8	EUT Horz, Low Ch, 2 Mbps
2381.100	31.2	-2.4	1.5	13.0	1.2	20.0	Vert	AV	0.0	50.0	54.0	-4.0	EUT Horz, Low Ch, 2 Mbps
2490.867	43.7	-2.2	1.5	81.0	0.0	20.0	Horz	PK	0.0	61.5	74.0	-12.5	EUT Horz, High Ch, 2 Mbps
2485.467	43.5	-2.2	1.5	360.0	0.0	20.0	Vert	PK	0.0	61.3	74.0	-12.7	EUT Horz, High Ch, 2 Mbps
2491.200	43.1	-2.3	1.5	122.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT Horz, High Ch, 1 Mbps
2492.517	43.1	-2.3	1.5	190.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT Horz, High Ch, 1 Mbps
2483.650	43.0	-2.2	1.5	268.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT On Side, High Ch, 1 Mbps
2488.600	43.0	-2.2	1.5	250.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT Vert, High Ch, 1 Mbps
2380.283	43.2	-2.4	1.5	13.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT Horz, Low Ch, 2 Mbps
2488.400	42.9	-2.2	1.5	140.0	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	EUT On Side, High Ch, 1 Mbps
2489.983	42.6	-2.2	1.3	325.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	EUT Vert, High Ch, 1 Mbps
2381.483	42.8	-2.4	1.2	167.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	EUT Horz, Low Ch, 2 Mbps
2381.000	42.6	-2.4	1.5	267.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	EUT Horz, Low Ch, 1 Mbps
2388.700	42.4	-2.3	1.5	146.0	0.0	20.0	Vert	PK	0.0	60.1	74.0	-13.9	EUT Horz, Low Ch, 1 Mbps

CONCLUSION

Pass

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APPENDIX

Genesis AI Custom ITE Antenna Description

The Bluetooth 2.4 GHz antenna is a PIFA component. The same antenna is used in both the left and right hearing aids. The antenna is manufactured by Optiprint and its part number is 82188-100.

The peak gain of the antenna in the assembled DUT is nominally-2 dBi (see calculations on page 8, below).

Date of antenna pattern measurement: Left hearing aid – July 25, 2022
Right hearing aid – July 22, 2022.

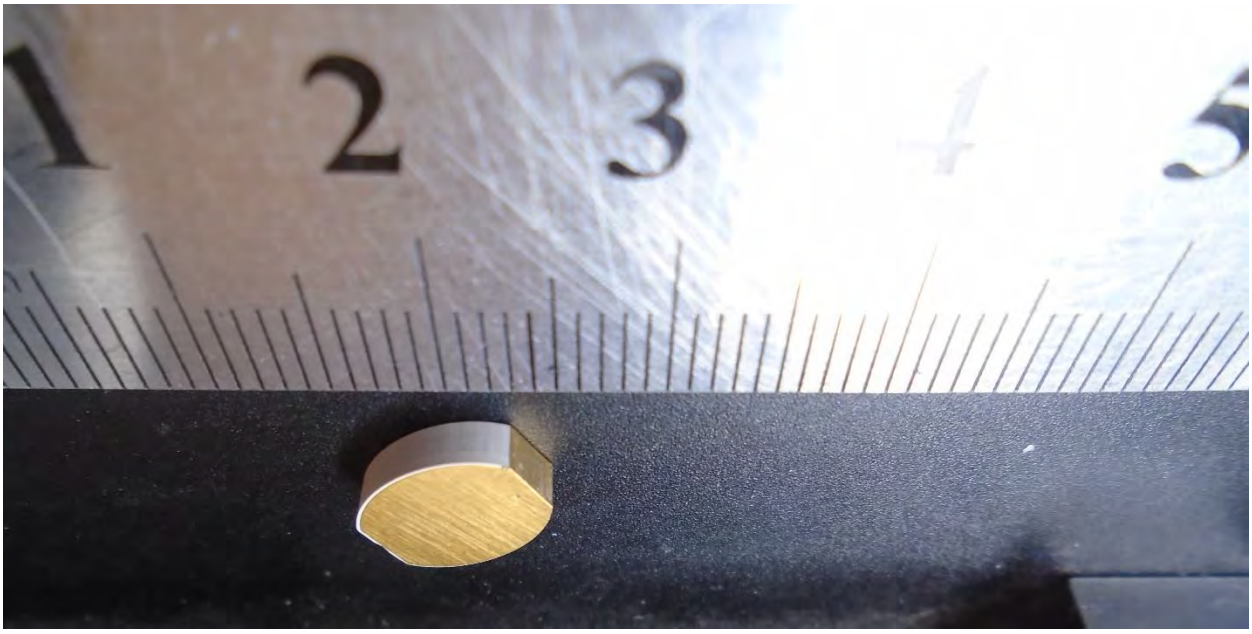
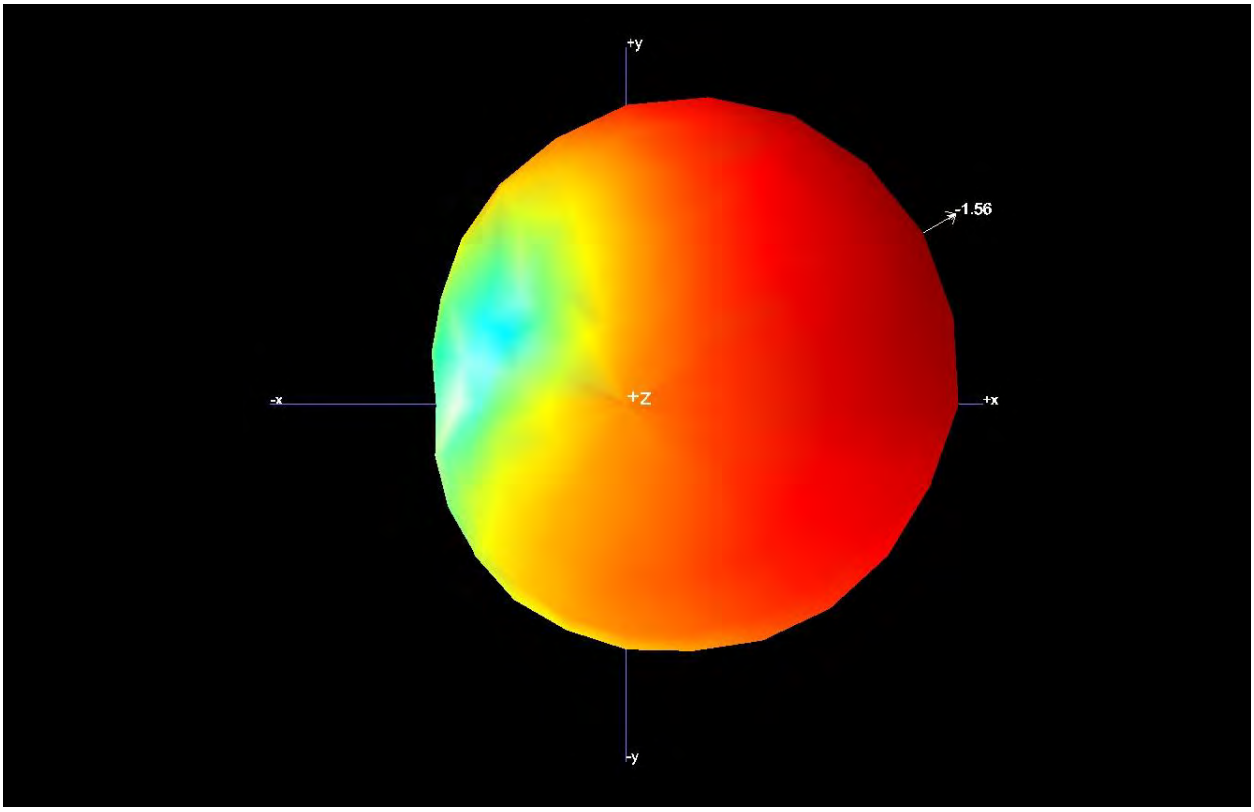
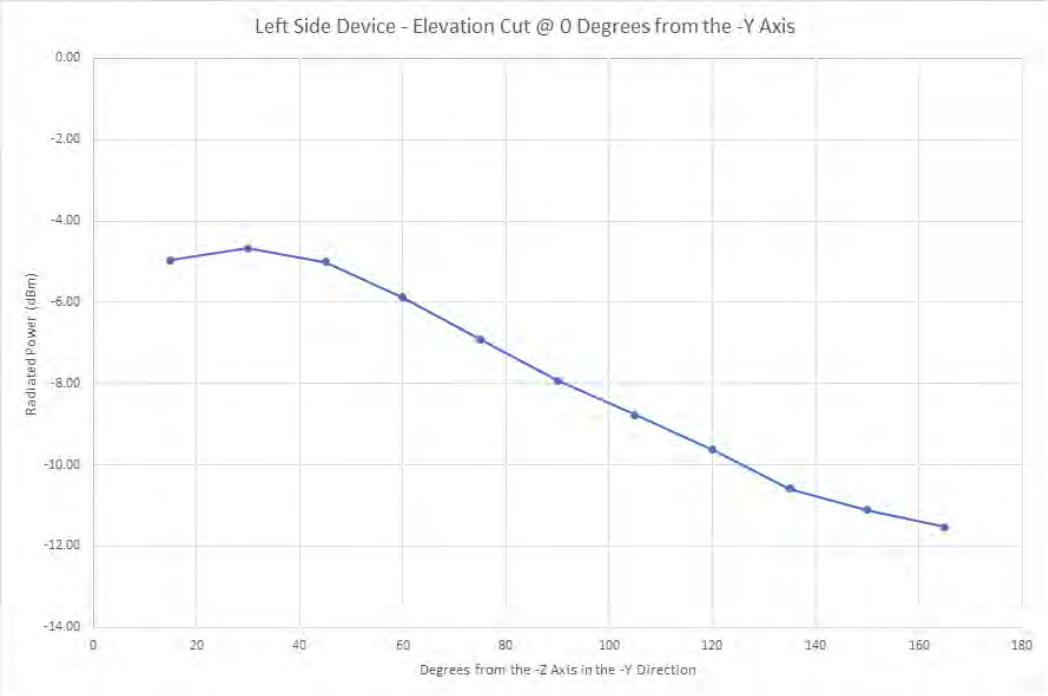


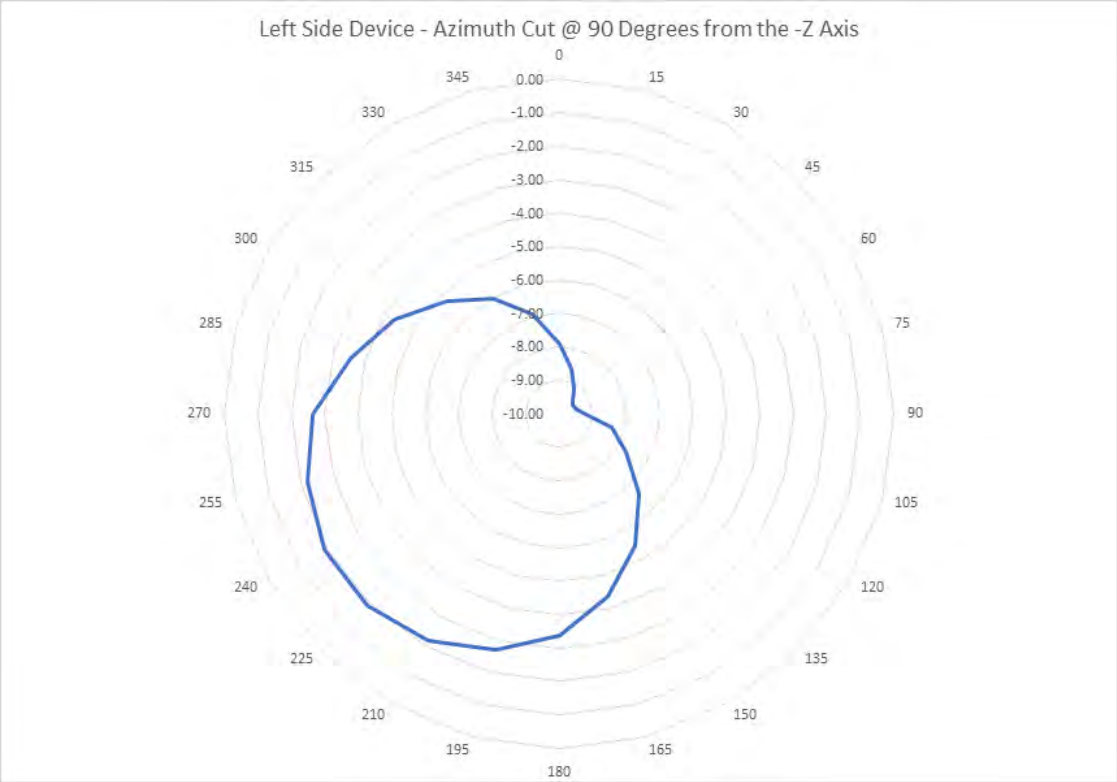
Figure 1 2.4 GHz Antenna (scale in cm)



Three-dimensional pattern (scale in dBm noted)

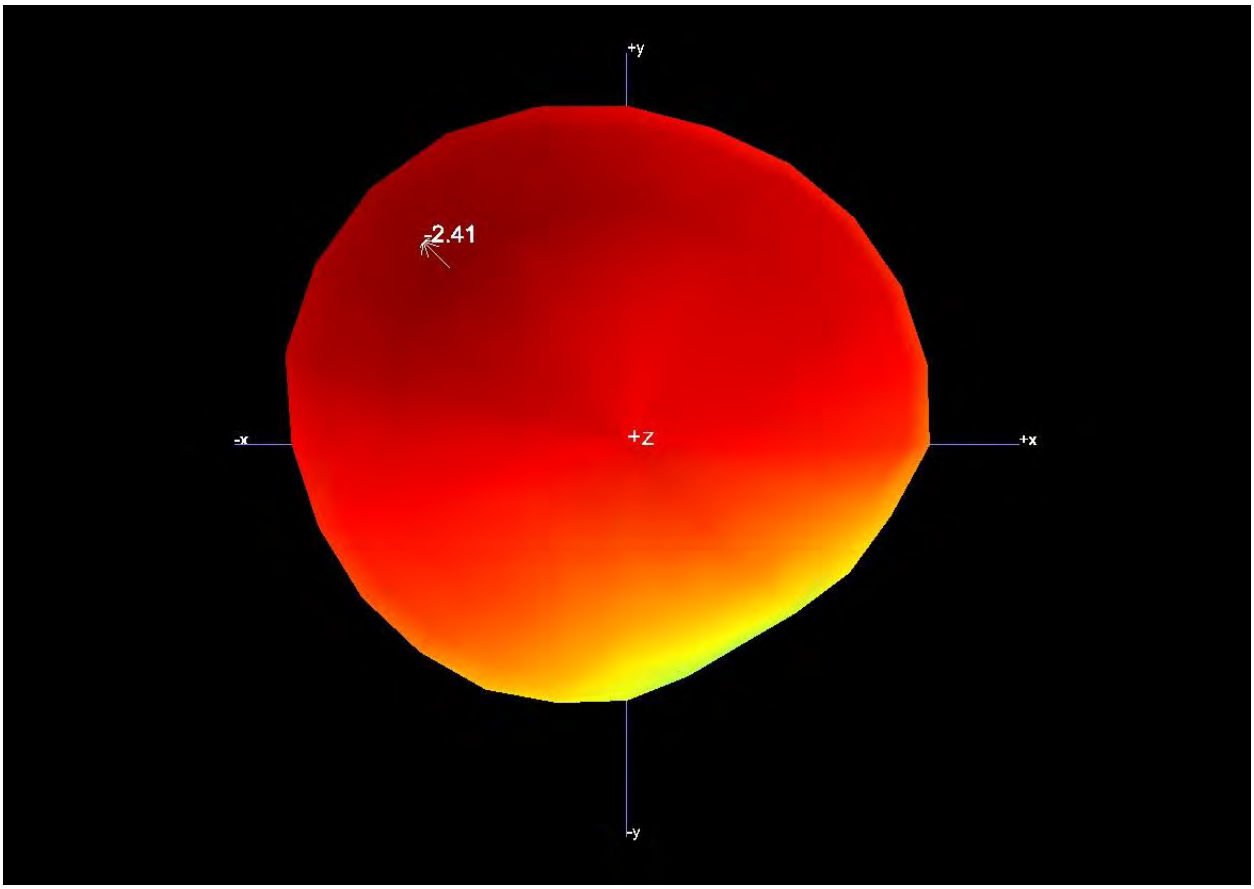
Figure 2a Left Hearing Aid 3 Dimensional Antenna Pattern





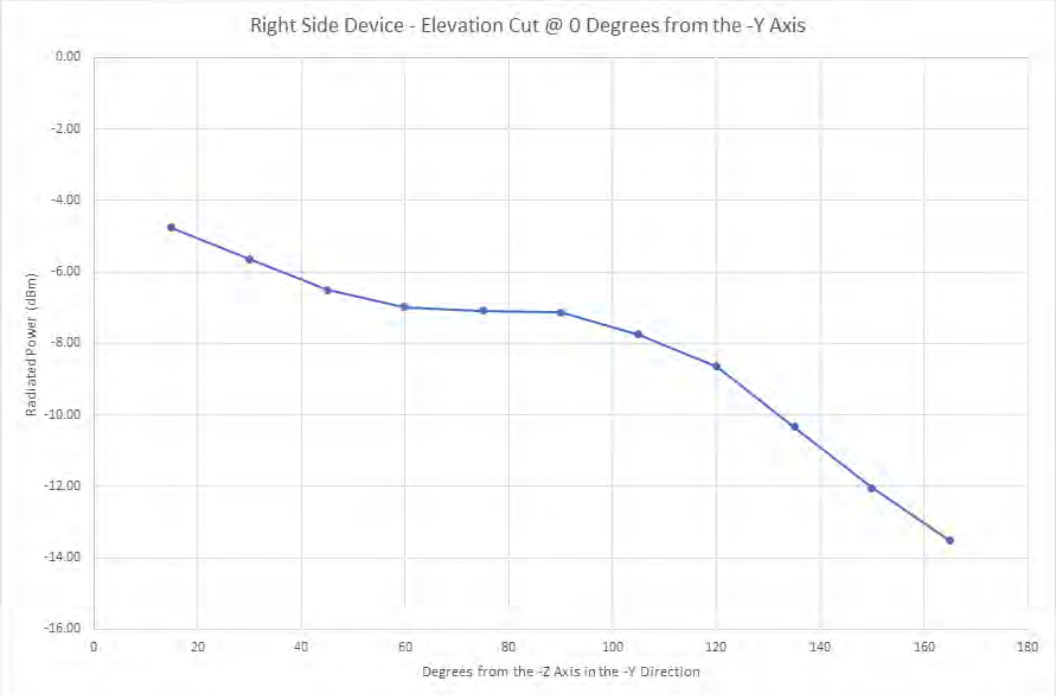
scale in dBm

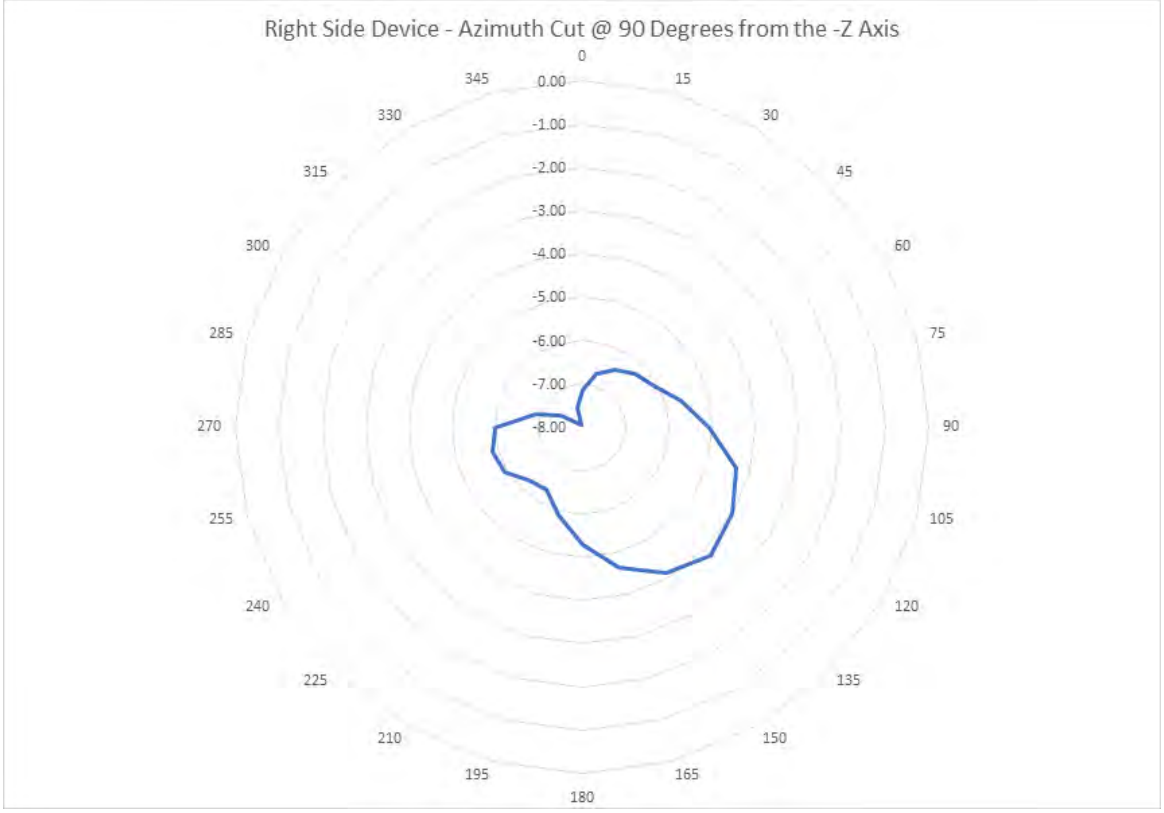
Figure 2b Left Hearing Aid Antenna Elevation and Azimuth Cuts



Three-dimensional pattern (scale in dBm noted)

Figure 3a Right Hearing Aid Antenna Pattern





scale in dBm

Figure 3b Right Hearing Aid Antenna Elevation and Azimuth Cuts

Antenna Pattern Measurement Information

The antenna patterns shown in Figures 2a and 3a were measured using a
MVG SGL24L antenna test system, serial number ATL0232S
located at Starkey Laboratories, Inc., 6600 Washington Avenue, South, Eden Prairie, MN 55344

System was calibrated on September 9, 2021 and September 16, 2022, due for calibration in September 2023.

Signal levels were measured using an Agilent N9020A MXA Signal Analyzer (Spectrum Analyzer). serial number MY50410289,
calibrated on July 19, 2021 and October 26, 2022, due for calibration on October 31, 2024.

The antenna pattern plots in Figures 2 and 3 are generated by the SG24L test system software.

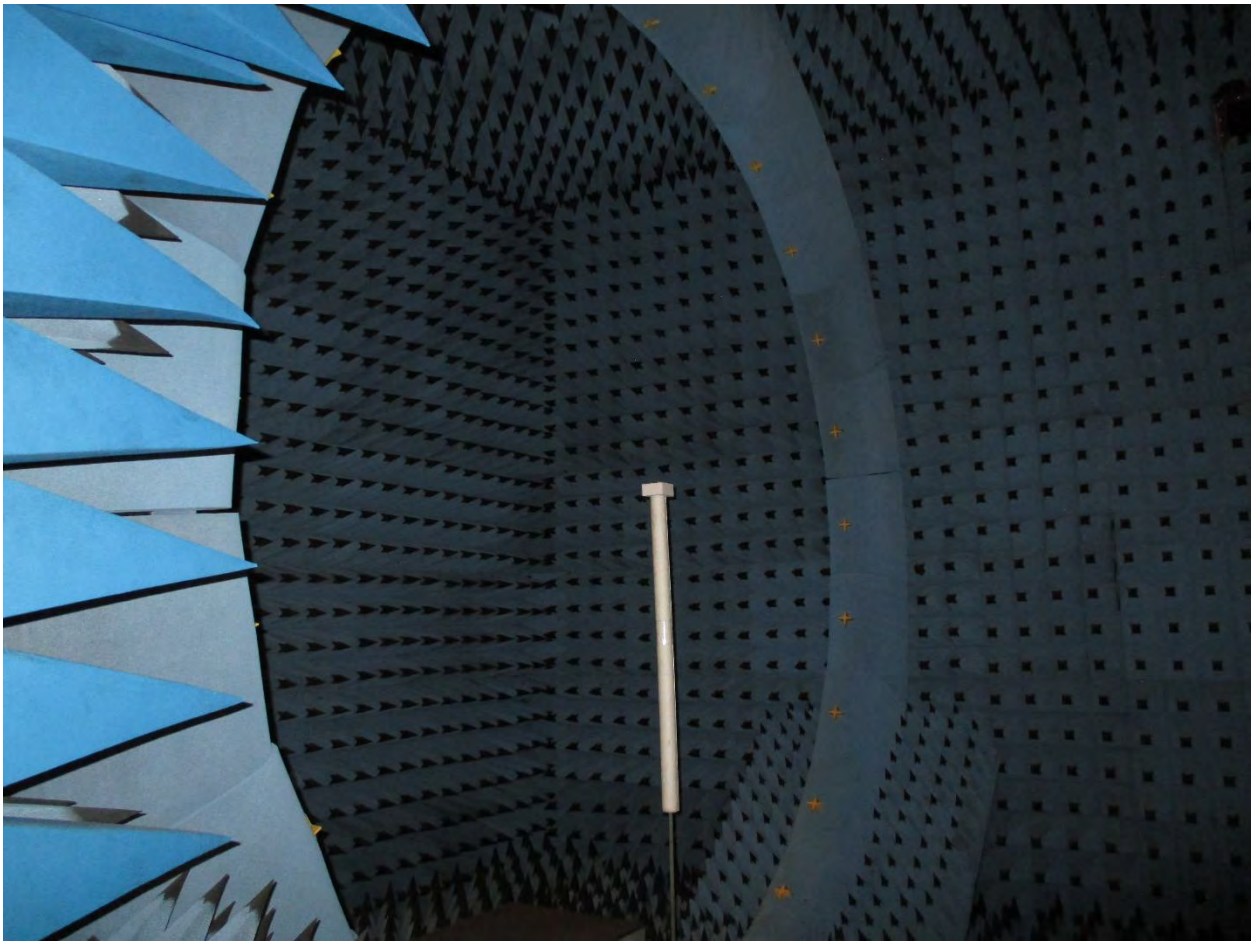


Figure 4a Overall view of SG24L test chamber, showing ring of receiving antennas

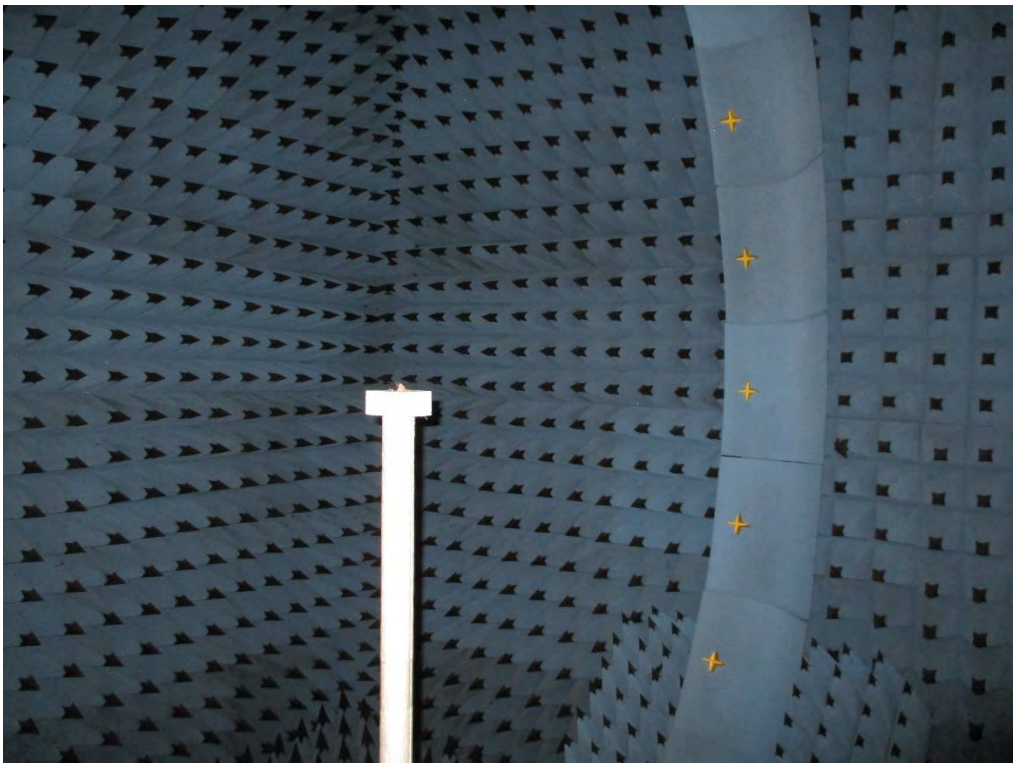


Figure 4b Test stand in SG24L test chamber

Figure 4c close-up of unit under test in test chamber

Antenna Gain Measurement Information

The MVG SGL24L antenna test system runs internal scripts that yield the maximum EIRP from each radiated power measurement. From there, the equation:

Max Gain = Max EIRP – Power at antenna pads

can be used together with a conducted measurement of the power at the antenna pads by directly connecting a spectrum analyzer to the antenna pads. Note that the same procedure was used by Element's Brooklyn Park, MN laboratory in the FCC Part 15.247 test reports for these hearing aids.

Subtracting the conducted power at the antenna pads from the EIRP value, yields the antenna gain as follows:

Right side hearing aid:

- Max EIRP = -2.41dBm
- Power delivered to antenna terminal = 0.79dBm
- Therefore, Gain = -2.41 – 0.79 = -3.20dBi

Left side hearing aid:

- Max EIRP = -1.56dBm
- Power delivered to antenna terminal = 0.22dBm
- Therefore, Gain = -1.56 – 0.22 = -1.78dBi

End of Test Report