



Starkey Laboratories, Inc.

Edge AI RIC RT

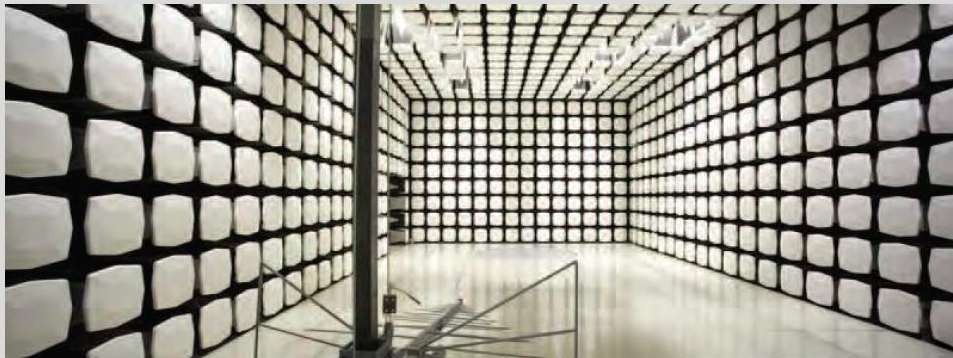
FCC 15.247:2024

RSS-247 Issue 3:2023

RSS-Gen Issue 5:2018+A1:2019+A2:2021

Bluetooth Radio

Report: STAK0329.0 Rev. 3, Issue Date: July 15, 2024



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CERTIFICATE OF TEST



Last Date of Test: June 10, 2024
Starkey Laboratories, Inc.
EUT: Edge AI RIC RT Hearing Aid

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	
RSS-Gen Issue 5:2018+A1:2019+A2:2021	

Guidance

FCC KDB 558074 v05r02:2019
Notice 2021 - CEB0001

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.
Duty Cycle	Pass	KDB 558074 -6.0	RSS-Gen 3.2	11.6	
DTS Bandwidth (6 dB)	Pass	15.247(a)(2), KDB 558074 -8.2	RSS-247 5.2(a)	11.8.2	
Occupied Bandwidth (99%)	Pass	KDB 558074 -2.1	RSS-Gen 6.7	6.9.3	
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Equivalent Isotropic Radiated Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	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

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.

CERTIFICATE OF TEST



Approved By:

Mark Baytan, Department Manager
Signed for and on behalf of Element

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
01	New data to support clients test mode	2024-06-18	All pages
02	2mbps updated to 0.3dB in Spurious Radiated Emissions	2024-07-10	42-50
03	Updated DCCF in Spurious Radiated Emissions	2024-07-17	42-50

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](#)

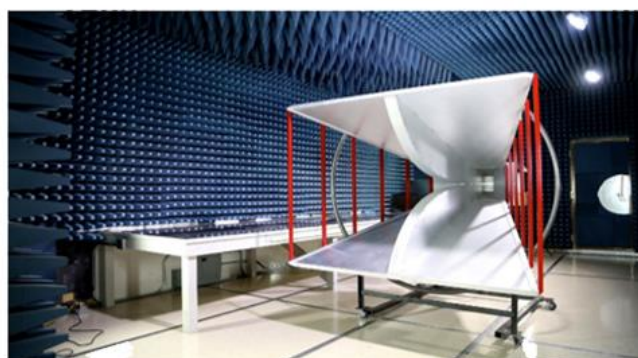
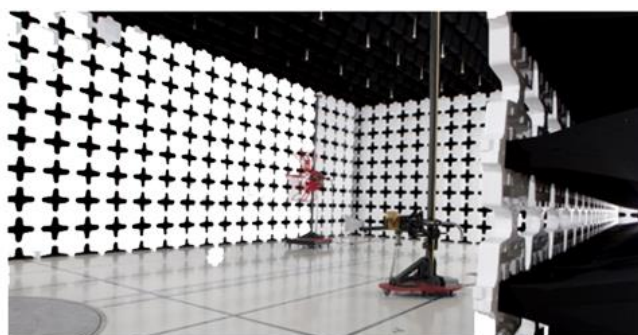
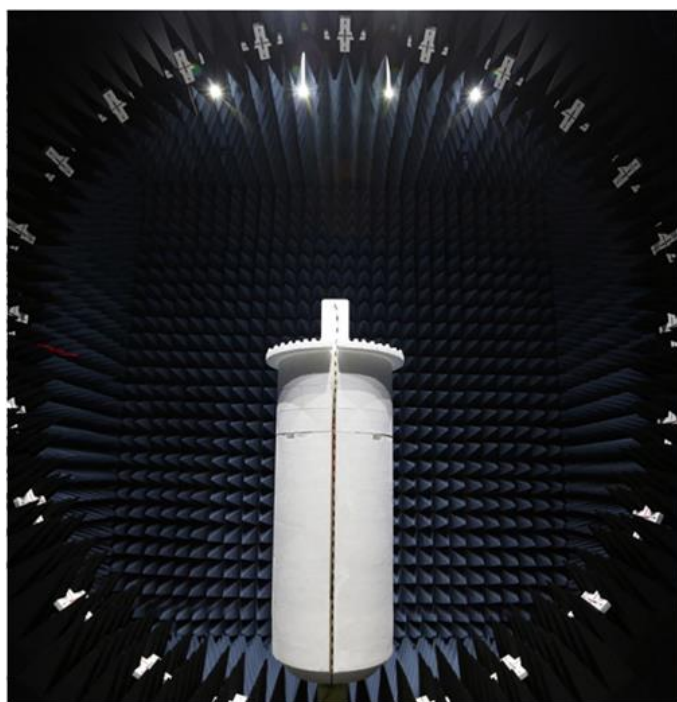
FACILITIES

Testing was performed at the following location(s)

	Location	Labs ⁽¹⁾	Address	A2LA ⁽²⁾	ISED ⁽³⁾	BSMI ⁽⁴⁾	VCCI ⁽⁵⁾	CAB ⁽⁶⁾	FDA ⁽⁷⁾
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☒	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☐	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	A-0201	US0191	TL-54
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

- (1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
- (2) A2LA Certificate No.
- (3) ISED Company No.
- (4) BSMI No.
- (5) VCCI Site Filing No.
- (6) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
- (7) FDA ASCA No.



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

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

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

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

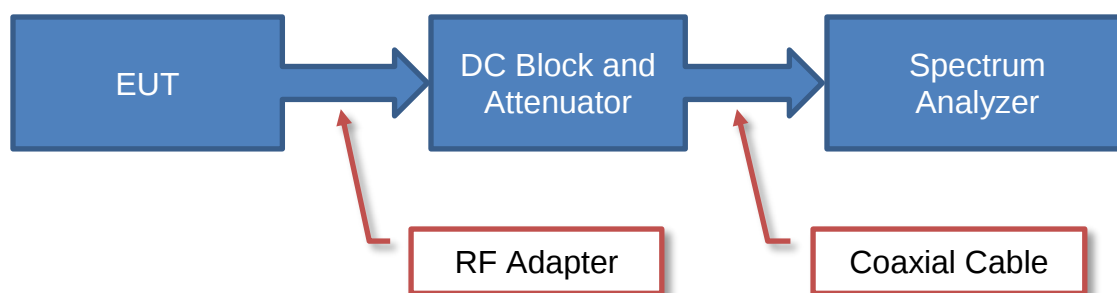
TEST SETUP BLOCK DIAGRAMS

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.

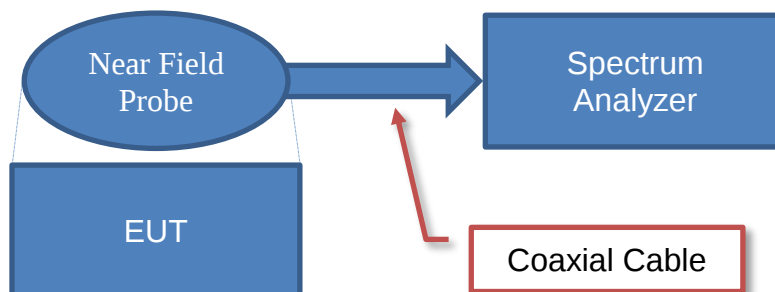
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

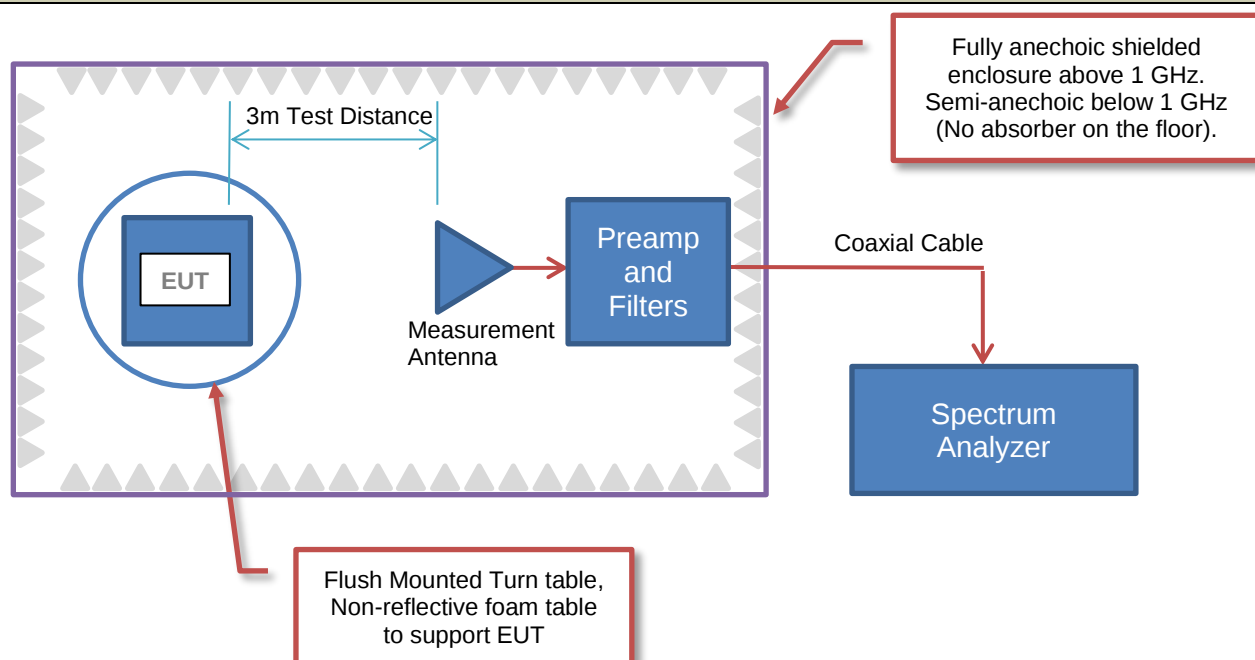


Sample Calculation (logarithmic units)

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			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

Conducted Emissions:

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

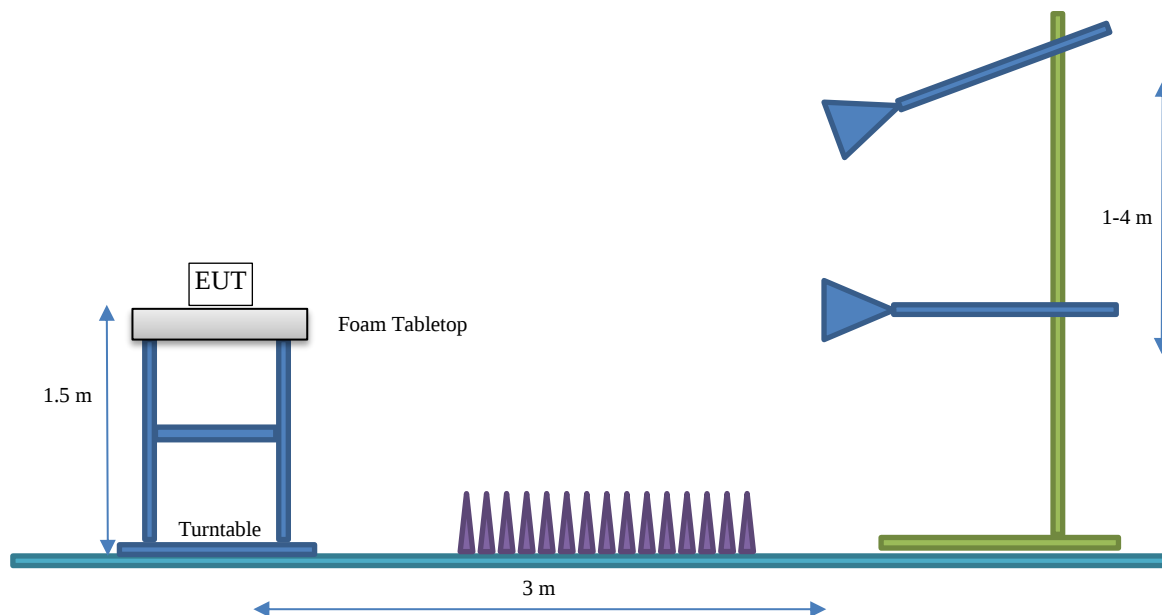
Radiated Power (ERP/EIRP) – Substitution Method:

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:	Edge AI RIC RT Hearing Aid
First Date of Test:	May 29, 2024
Last Date of Test:	June 10, 2024
Receipt Date of Samples:	May 29, 2024
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Hearing aid with near field magnetic induction and Bluetooth LE.
Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247/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)
Flexible Antenna	Starkey Laboratories, Inc	2400-2485	-4.3

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

- ☐ Test software settings
- ☒ Rated power settings

FW Version used for all other tests:
10.0.0.14.342

SW Version Monaco 7.0.2.0

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting (dBm)
BLE GFSK 1 Mbps	DTS	0 or 37	2402	4
		20 or 18	2442	4
		39	2480	4
BLE GFSK 2 Mbps	DTS	0 or 37	2402	4
		20 or 18	2442	4
		39	2480	4

CONFIGURATIONS



Configuration STAK0344-1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Edge AI RIC RT Hearing Aid	Starkey	P00002179	240583884

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	EP-3V3G0X2	N/A
Noahlink Wireless	HIMSA	CPD-1	1981280195

Configuration STAK0344-2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Edge AI RIC RT Hearing Aid	Starkey	P00002179	240583883

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	EP-3V3G0X2	N/A
Noahlink Wireless	HIMSA	CPD-1	1981280195

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2024-05-29	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	2024-06-10	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	2024-06-10	Band Edge Compliance	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2024-06-10	DTS Bandwidth (6 dB)	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	2024-06-10	Duty Cycle	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2024-06-10	Equivalent Isotropic Radiated Power	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2024-06-10	Occupied Bandwidth (99%)	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	2024-06-10	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.
9	2024-06-10	Power Spectral Density	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

TEST DESCRIPTION

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

The measurement was made using a direct connection between the RF output of the EUT and a RF Power Sensor capable of 1 million samples per second, which only measures across the high time of the burst of the carrier. The measured level was offset by the cable loss, attenuator, and DC block that was used between the power sensor and EUT. This offset was determined prior to testing using a signal generator and spectrum analyzer.

The RF duty cycle was measured with the EUT set to the channels and modes called out in the data sheets.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31
Meter - Power	ETS Lindgren	7002-008	SRA	2024-02-19	2025-02-19

DUTY CYCLE

EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.2°C
Attendees:	John Quach	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

N/A

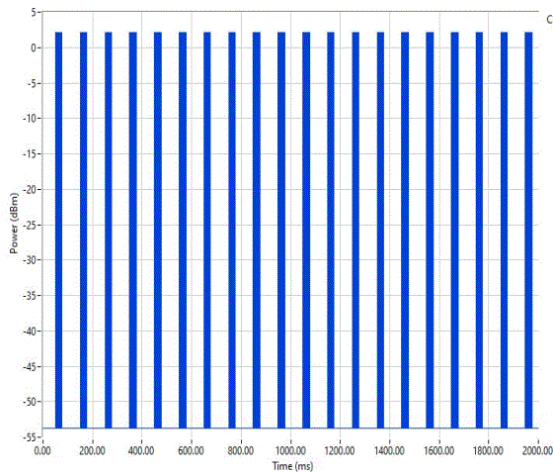


Tested By

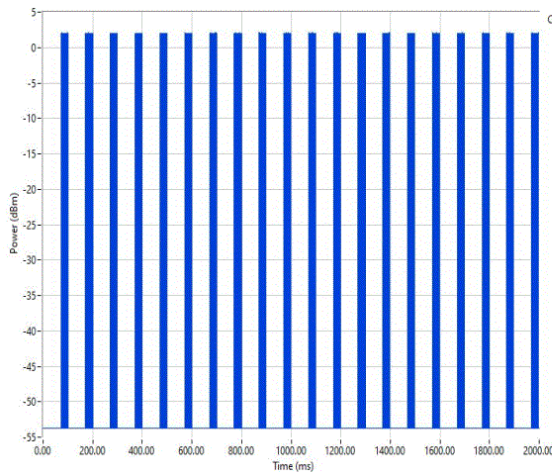
TEST RESULTS

		Duty Cycle (%)	Results
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	18.02	N/A
	Mid Channel, 2442 MHz	19.219	N/A
	High Channel, 2480 MHz	18.023	N/A
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	17.078	N/A
	Mid Channel, 2442 MHz	16.653	N/A
	High Channel, 2480 MHz	16.424	N/A

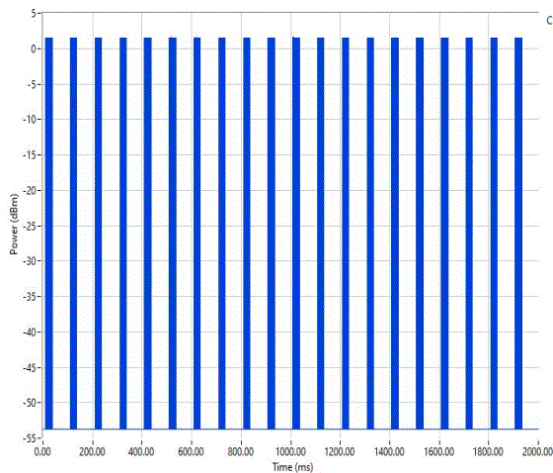
DUTY CYCLE



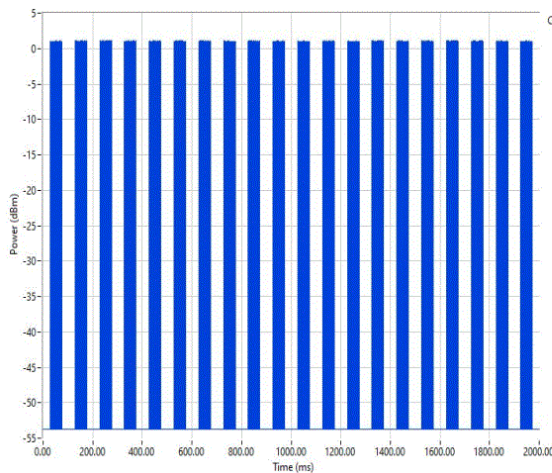
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz

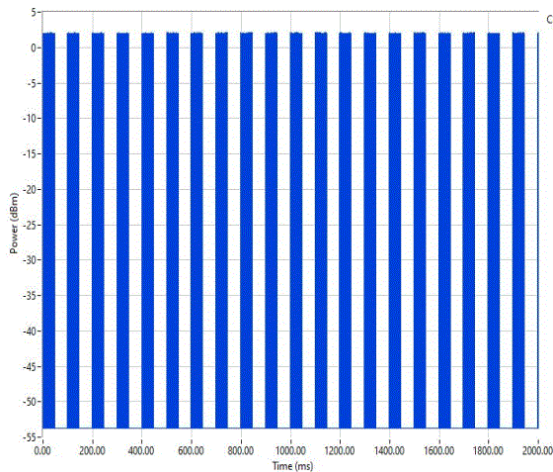


BLE/GFSK 1 Mbps
High Channel, 2480 MHz

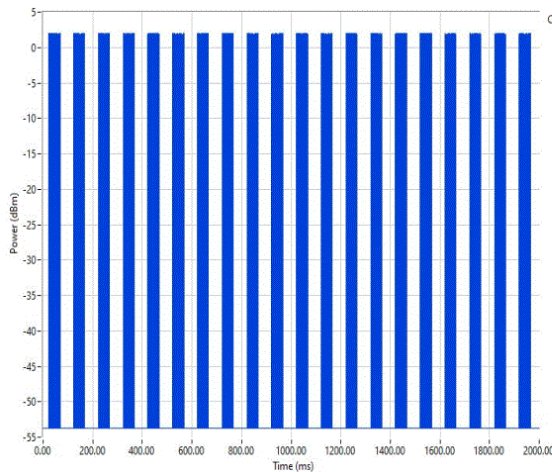


BLE/GFSK 2 Mbps
Low Channel, 2402 MHz

DUTY CYCLE



BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

DTS BANDWIDTH (6 dB)

TEST DESCRIPTION

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

The 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

DTS BANDWIDTH (6 dB)

EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.7%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

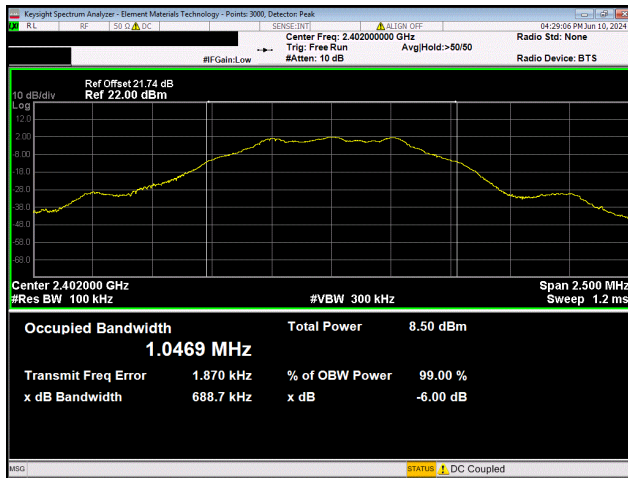


Tested By

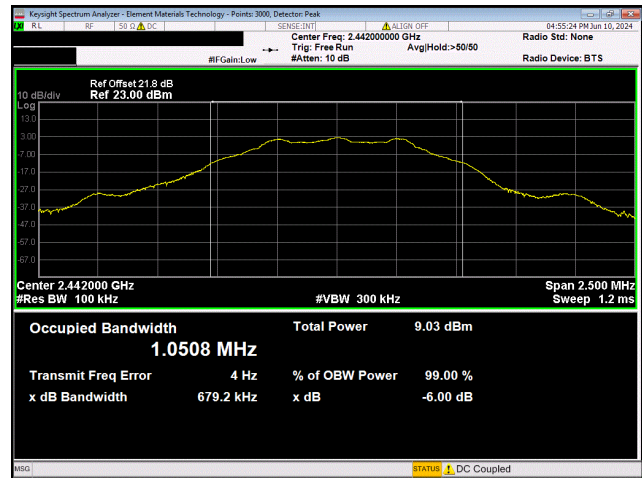
TEST RESULTS

		Value	Limit (≥)	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	688.738 kHz	500 kHz	Pass
	Mid Channel, 2442 MHz	679.223 kHz	500 kHz	Pass
	High Channel, 2480 MHz	688.826 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps				
	Low Channel, 2402 MHz	1.161 MHz	500 kHz	Pass
	Mid Channel, 2442 MHz	1.163 MHz	500 kHz	Pass
	High Channel, 2480 MHz	1.156 MHz	500 kHz	Pass

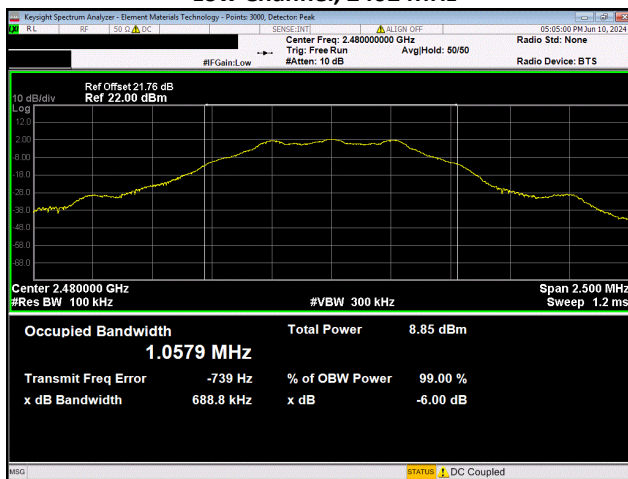
DTS BANDWIDTH (6 dB)



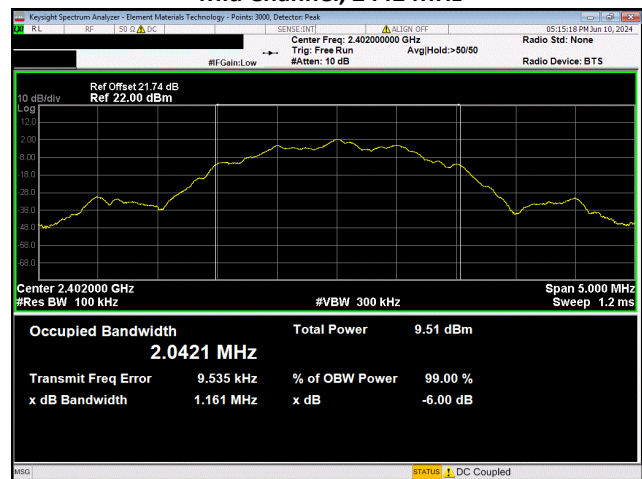
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



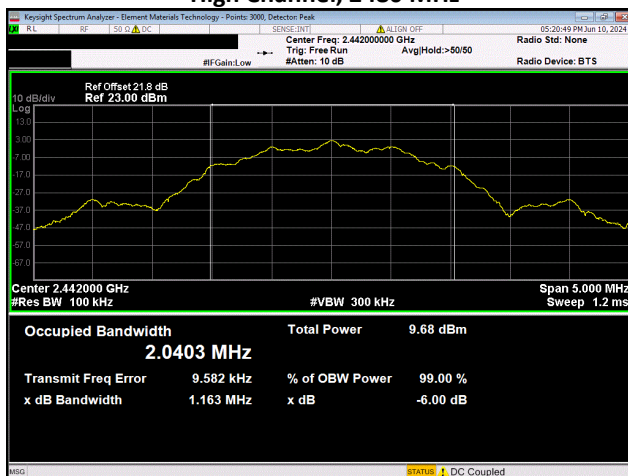
BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz



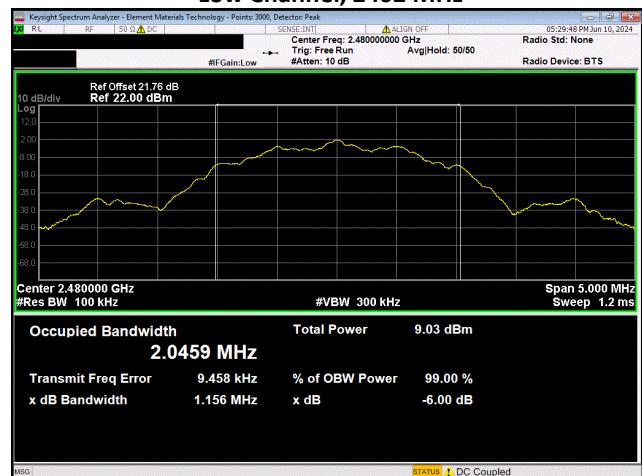
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

OCCUPIED BANDWIDTH (99%)

TEST DESCRIPTION

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

The 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

OCCUPIED BANDWIDTH (99%)



EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.7%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

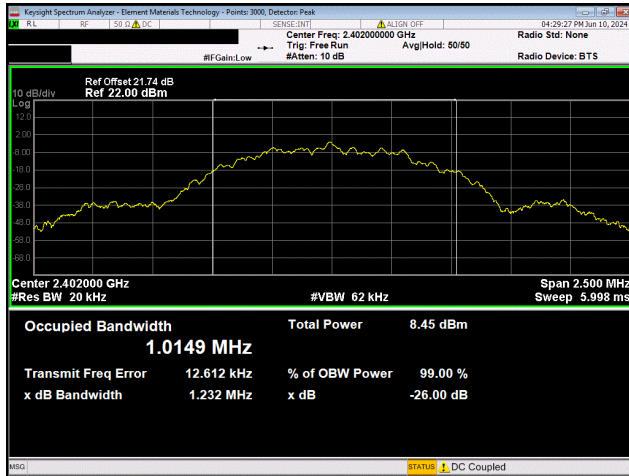
CONCLUSION

N/A	
	Tested By

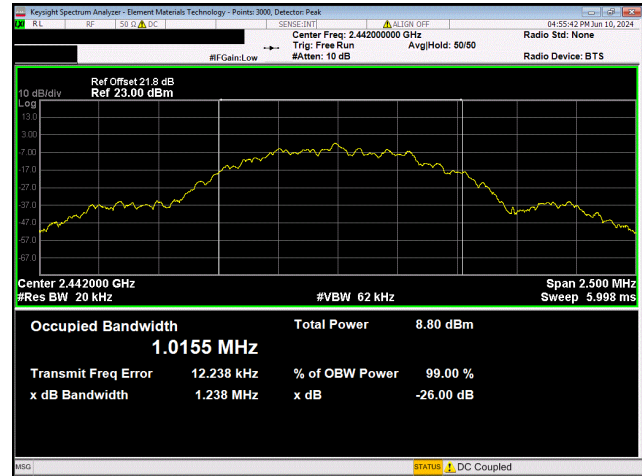
TEST RESULTS

		Value	Limit	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	1.015 MHz	N/A	N/A
	Mid Channel, 2442 MHz	1.016 MHz	N/A	N/A
	High Channel, 2480 MHz	1.02 MHz	N/A	N/A
BLE/GFSK 2 Mbps				
	Low Channel, 2402 MHz	2.011 MHz	N/A	N/A
	Mid Channel, 2442 MHz	2.008 MHz	N/A	N/A
	High Channel, 2480 MHz	2.01 MHz	N/A	N/A

OCCUPIED BANDWIDTH (99%)



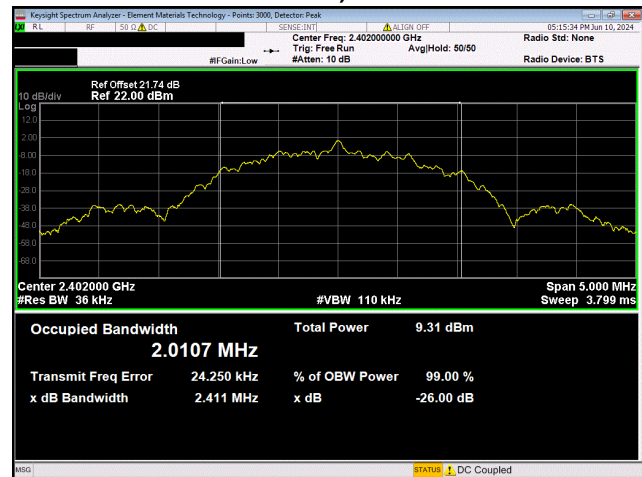
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



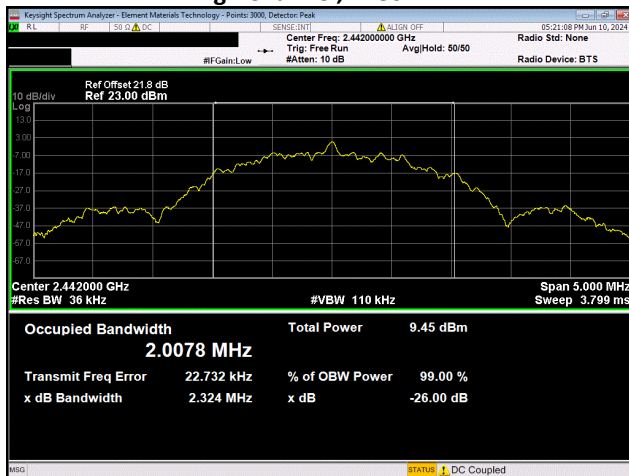
BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz



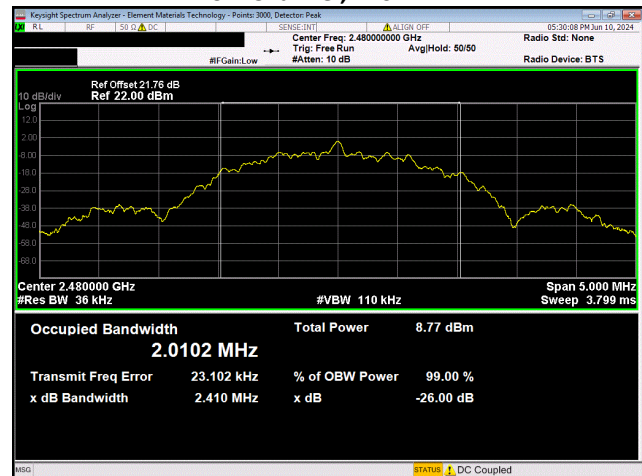
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

OUTPUT POWER

TEST DESCRIPTION

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

The 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

OUTPUT POWER



EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.6%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

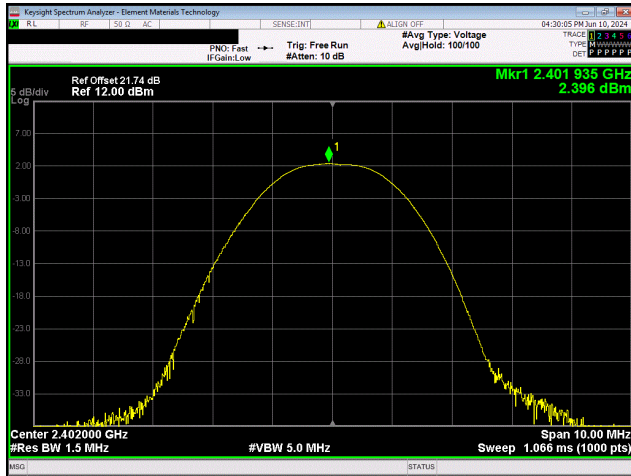
Pass

Tested By

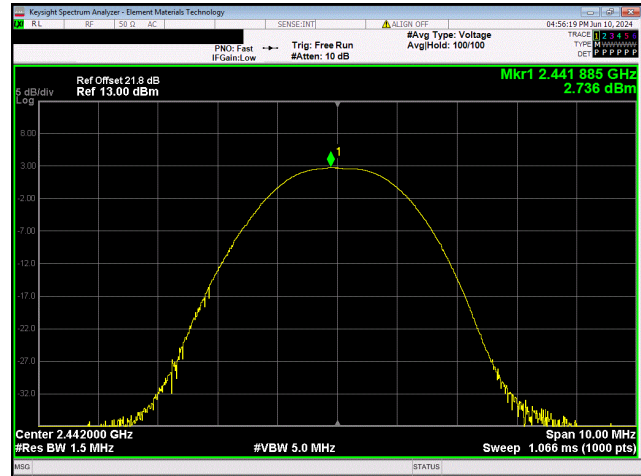
TEST RESULTS

		Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	2.396	30	Pass
	Mid Channel, 2442 MHz	2.736	30	Pass
	High Channel, 2480 MHz	2.588	30	Pass
BLE/GFSK 2 Mbps				
	Low Channel, 2402 MHz	2.698	30	Pass
	Mid Channel, 2442 MHz	2.799	30	Pass
	High Channel, 2480 MHz	2.166	30	Pass

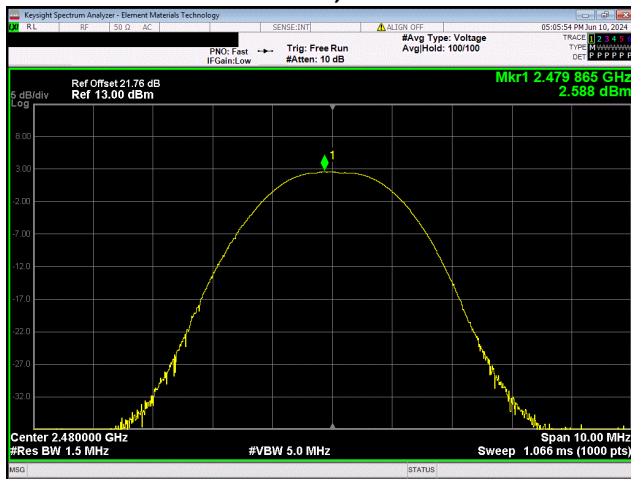
OUTPUT POWER



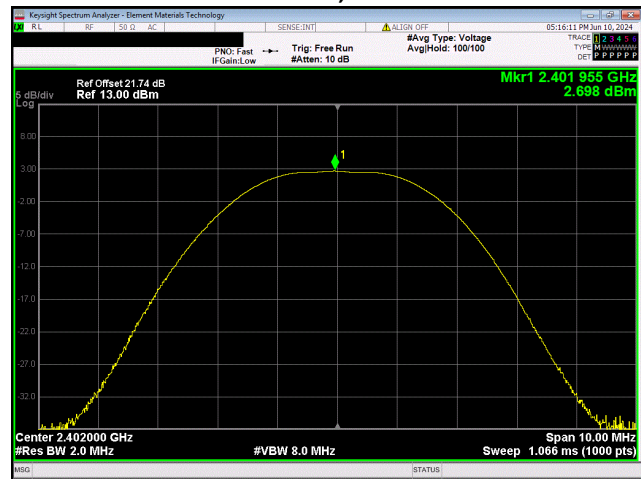
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



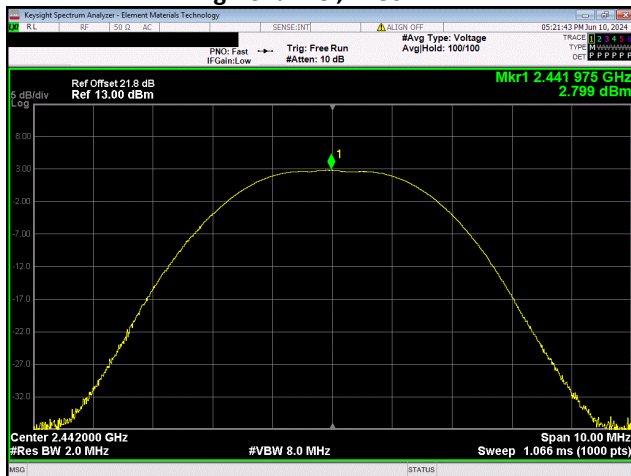
BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz



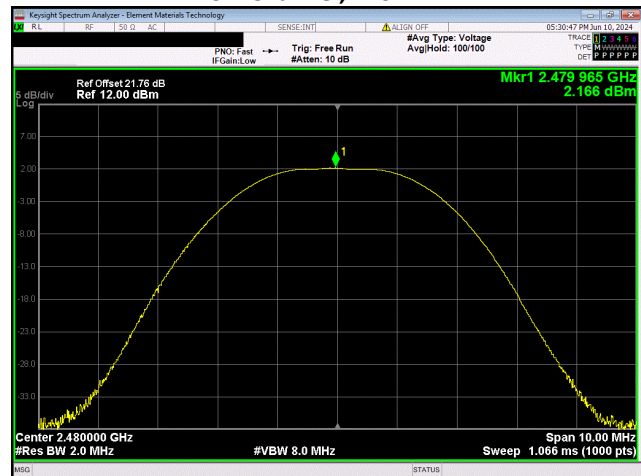
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TEST DESCRIPTION

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

The 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)

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.8%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	2.396	-4.3	-1.904	36	Pass
Mid Channel, 2442 MHz	2.736	-4.3	-1.564	36	Pass
High Channel, 2480 MHz	2.588	-4.3	-1.712	36	Pass
BLE/GFSK 2 Mbps					
Low Channel, 2402 MHz	2.698	-4.3	-1.602	36	Pass
Mid Channel, 2442 MHz	2.799	-4.3	-1.501	36	Pass
High Channel, 2480 MHz	2.166	-4.3	-2.134	36	Pass

POWER SPECTRAL DENSITY

TEST DESCRIPTION

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

The 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

POWER SPECTRAL DENSITY



EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	45.4%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

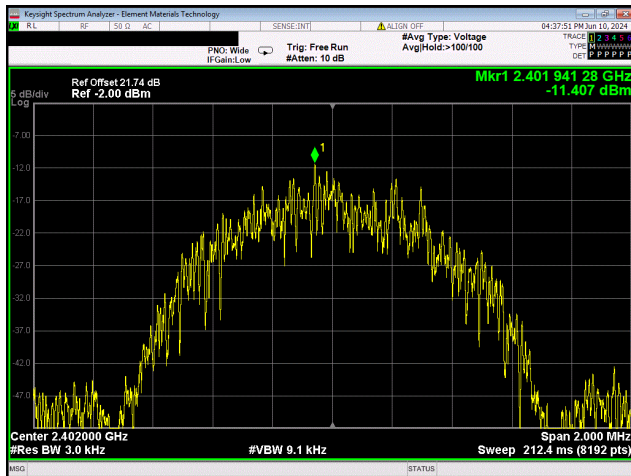
Pass

Tested By

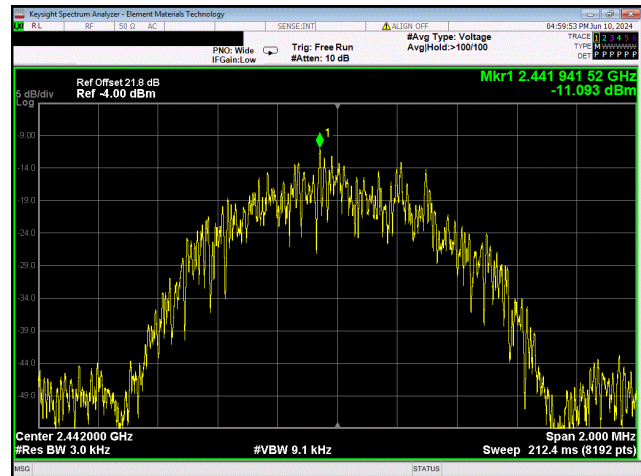
TEST RESULTS

		Value dBm/3kHz	Limit ≤ (dBm/3kHz)	Results
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	-11.407	8	Pass
	Mid Channel, 2442 MHz	-11.093	8	Pass
	High Channel, 2480 MHz	-11.392	8	Pass
BLE/GFSK 2 Mbps				
	Low Channel, 2402 MHz	-15.374	8	Pass
	Mid Channel, 2442 MHz	-15.382	8	Pass
	High Channel, 2480 MHz	-15.842	8	Pass

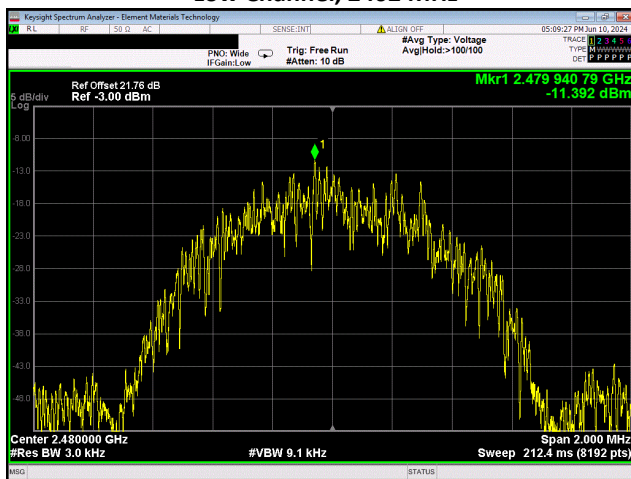
POWER SPECTRAL DENSITY



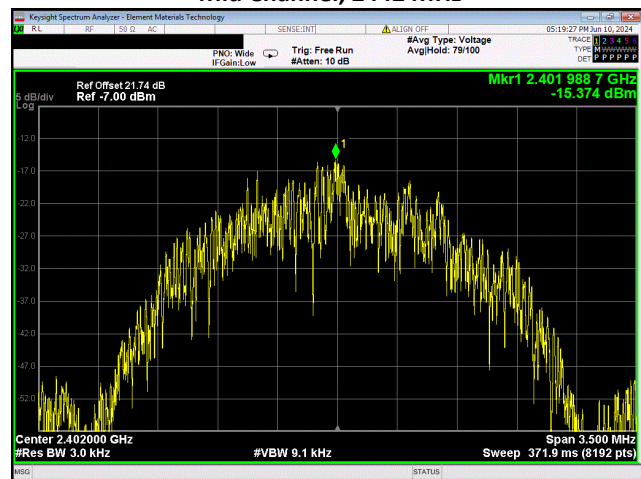
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



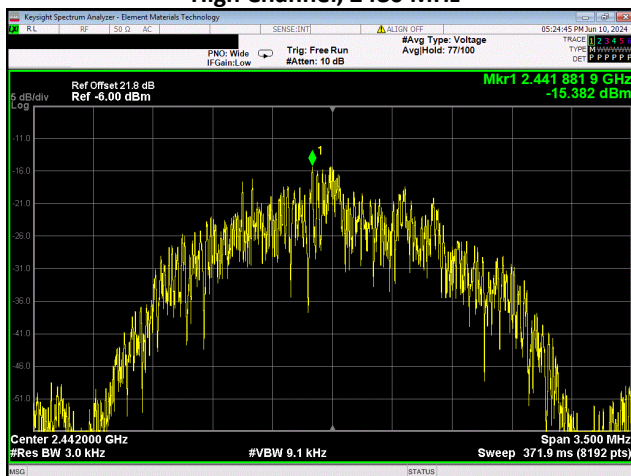
BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz



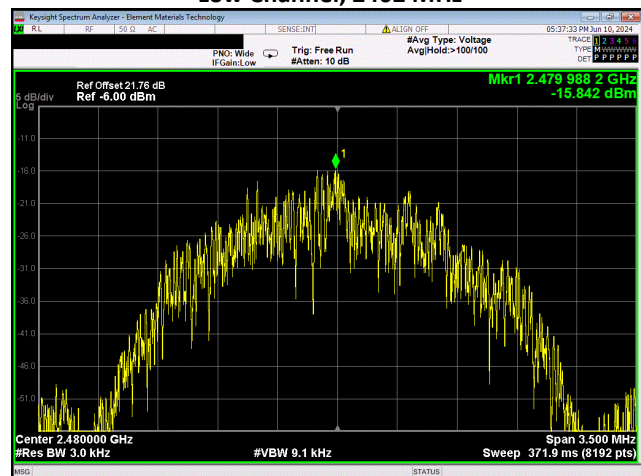
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

BAND EDGE COMPLIANCE

TEST DESCRIPTION

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

The 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. The analyzer screen captures for this test show an example of the emission mask for the test mode also used during the radiated spurious emissions at the restricted band edges test.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

BAND EDGE COMPLIANCE



EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.9%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

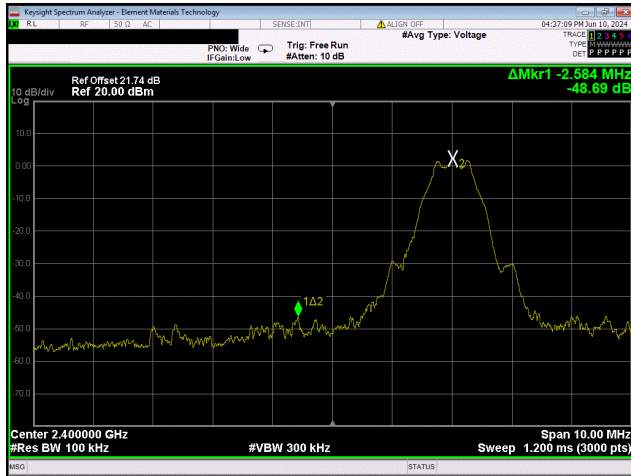
CONCLUSION

Pass	
	Tested By

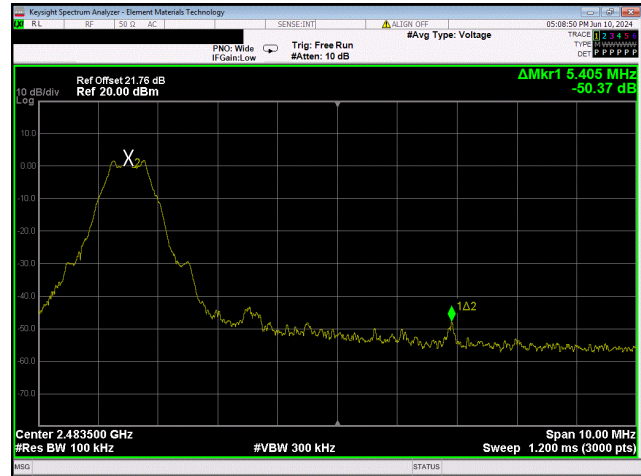
TEST RESULTS

		Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps				
	Low Channel, 2402 MHz	-48.69	-20	Pass
	High Channel, 2480 MHz	-50.37	-20	Pass
BLE/GFSK 2 Mbps				
	Low Channel, 2402 MHz	-33.01	-20	Pass
	High Channel, 2480 MHz	-49.85	-20	Pass

BAND EDGE COMPLIANCE



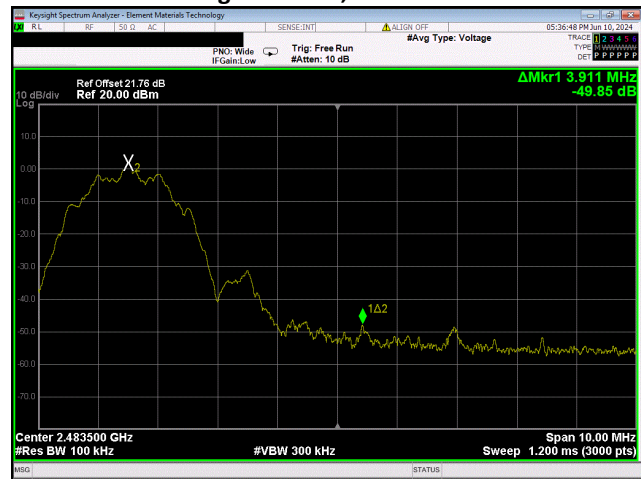
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

SPURIOUS CONDUCTED EMISSIONS

TEST DESCRIPTION

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

The 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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2023-07-27	2026-07-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2024-05-22	2025-05-22
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2024-01-31	2025-01-31

SPURIOUS CONDUCTED EMISSIONS

EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583883	Date:	2024-06-10
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3°C
Attendees:	John Quach	Relative Humidity:	44.6%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Lithium Battery	Configuration:	STAK0344-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013

COMMENTS

+4 dBm Power Setting.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

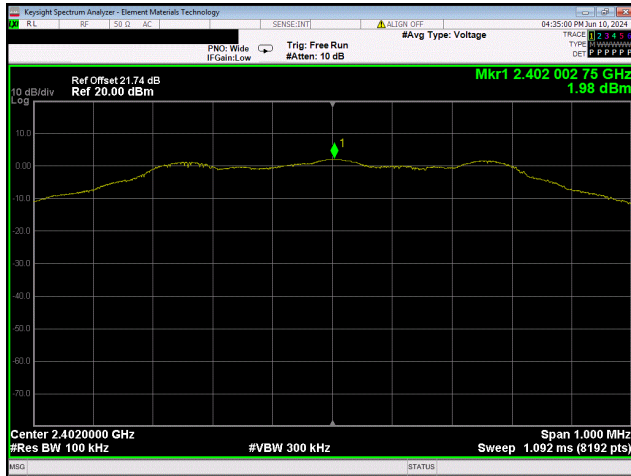


Tested By

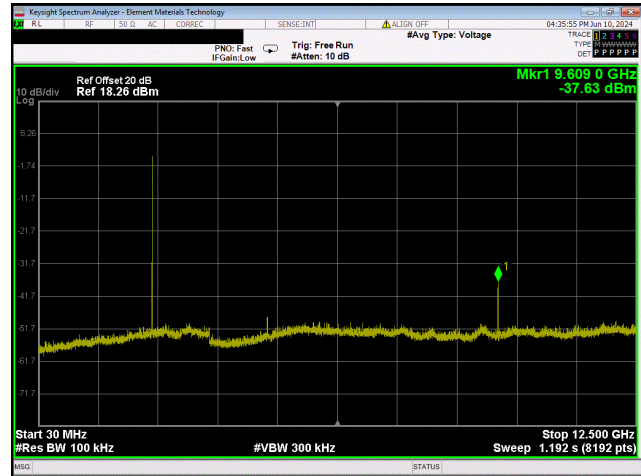
TEST RESULTS

		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps						
Low Channel, 2402 MHz	Fundamental	2402	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9608.96	-39.61	-20	Pass	
	12.5 GHz - 25 GHz	24987.79	-39.11	-20	Pass	
Mid Channel, 2442 MHz	Fundamental	2442	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	1715.3	-37.79	-20	Pass	
	12.5 GHz - 25 GHz	24911.49	-39.78	-20	Pass	
High Channel, 2480 MHz	Fundamental	2480	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9919.53	-38.82	-20	Pass	
	12.5 GHz - 25 GHz	24996.95	-38.82	-20	Pass	
BLE/GFSK 2 Mbps						
Low Channel, 2402 MHz	Fundamental	2402.01	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9605.91	-41.38	-20	Pass	
	12.5 GHz - 25 GHz	24948.11	-38.4	-20	Pass	
Mid Channel, 2442 MHz	Fundamental	2442	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9765.76	-40.1	-20	Pass	
	12.5 GHz - 25 GHz	24859.6	-39.25	-20	Pass	
High Channel, 2480 MHz	Fundamental	2480	N/A	N/A	N/A	
	30 MHz - 12.5 GHz	9919.53	-38.88	-20	Pass	
	12.5 GHz - 25 GHz	24980.16	-38.7	-20	Pass	

SPURIOUS CONDUCTED EMISSIONS



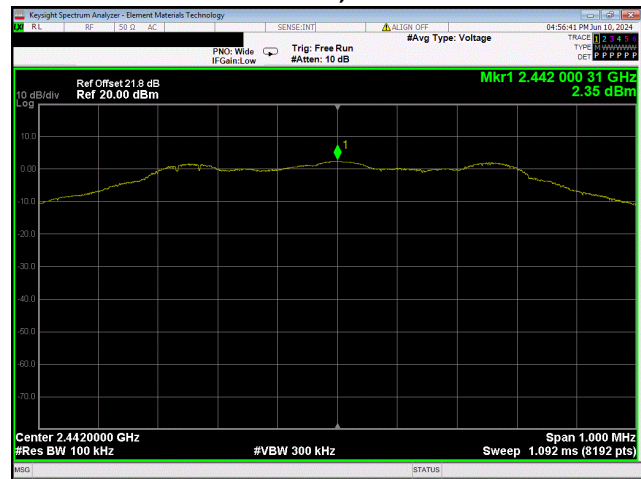
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



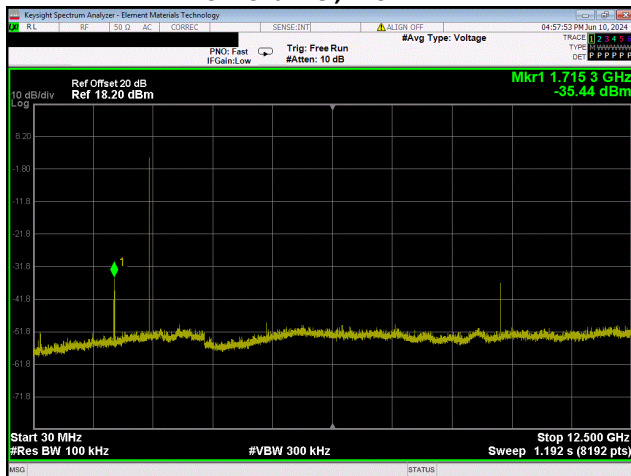
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



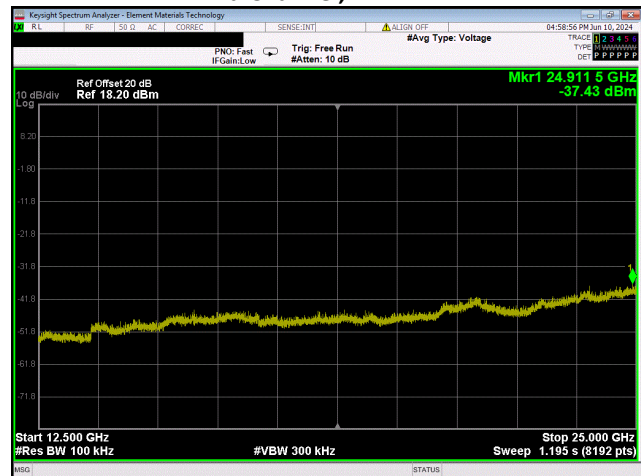
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz

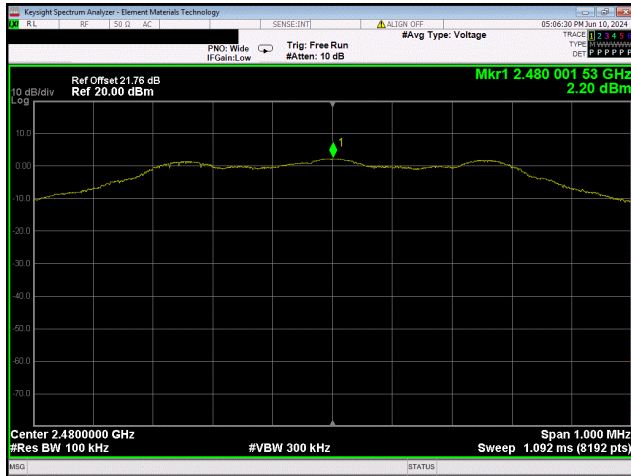


BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz

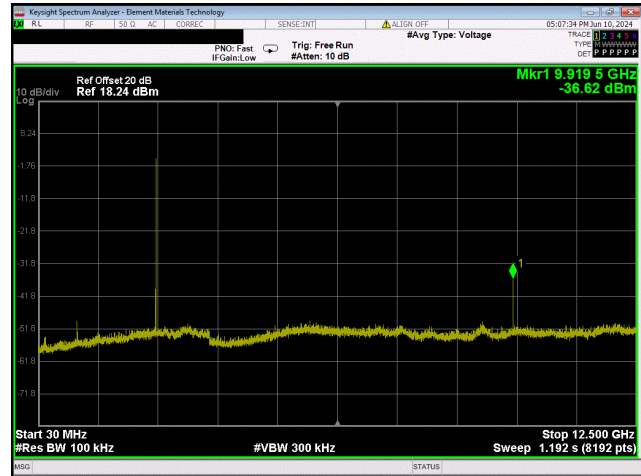


BLE/GFSK 1 Mbps
Mid Channel, 2442 MHz

SPURIOUS CONDUCTED EMISSIONS



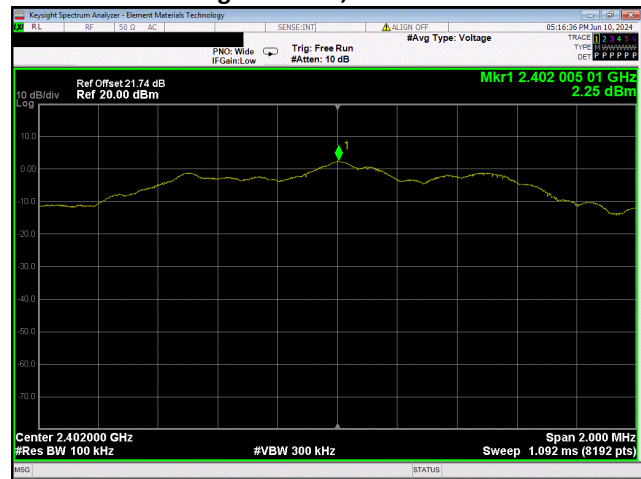
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



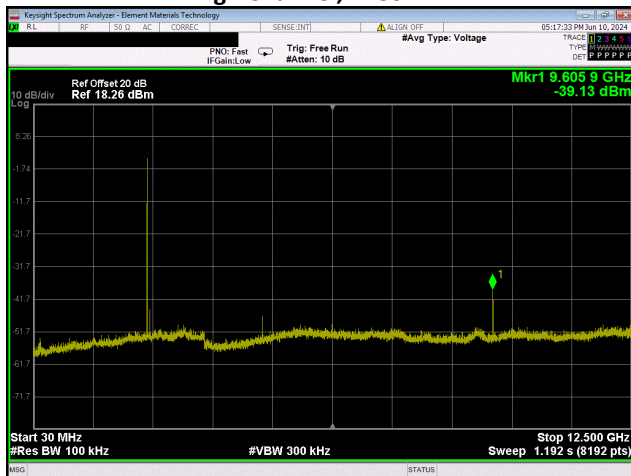
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



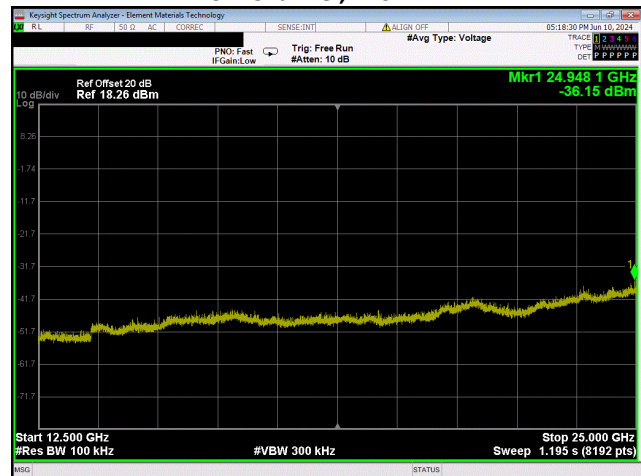
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz

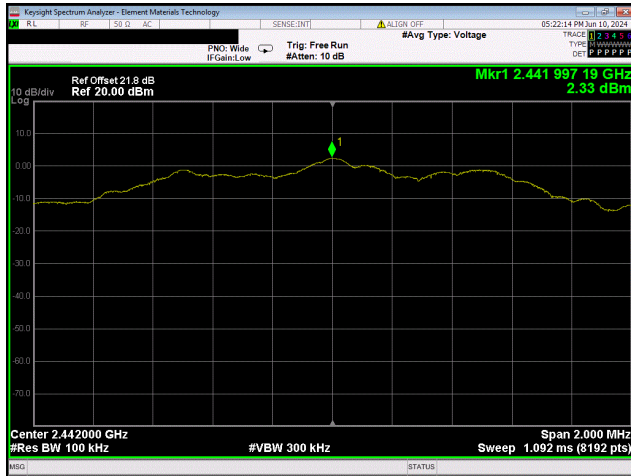


BLE/GFSK 2 Mbps
Low Channel, 2402 MHz

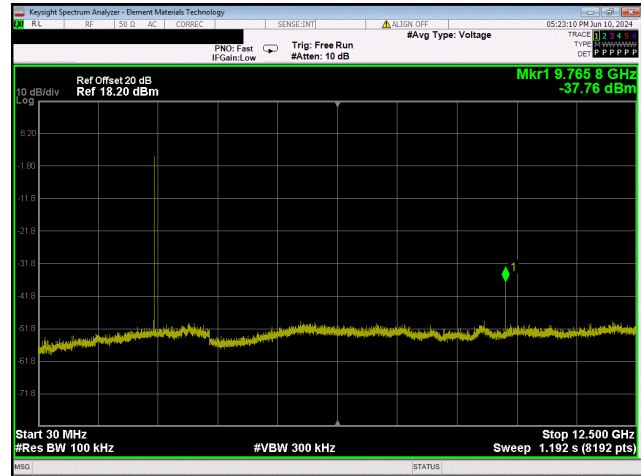


BLE/GFSK 2 Mbps
Low Channel, 2402 MHz

SPURIOUS CONDUCTED EMISSIONS



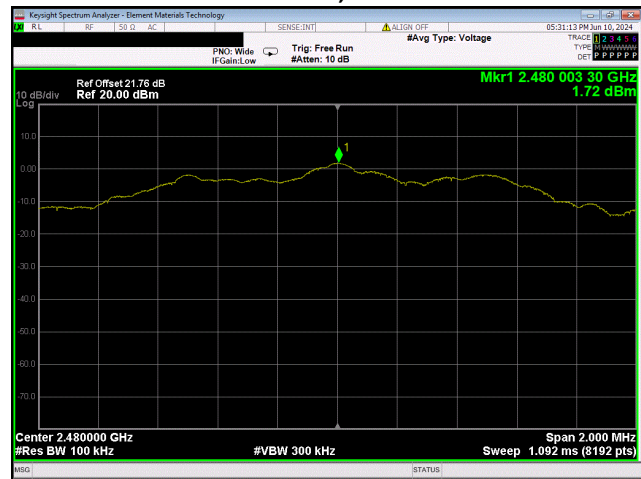
BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



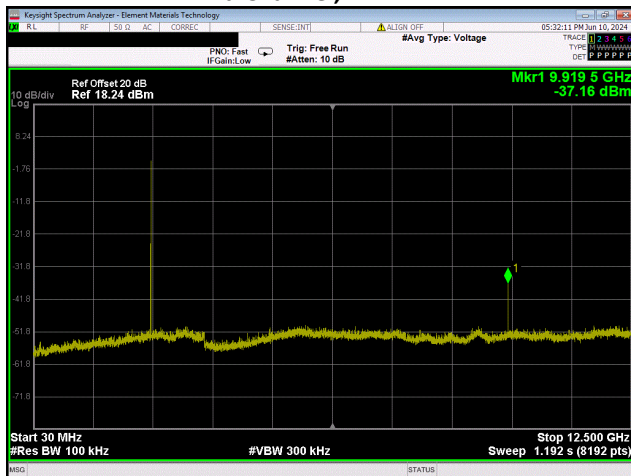
BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



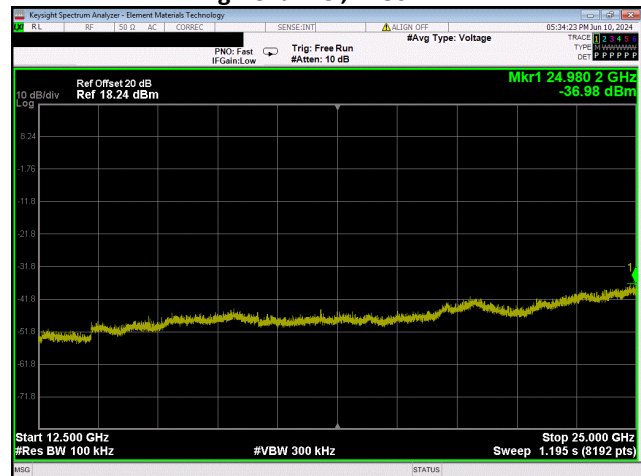
BLE/GFSK 2 Mbps
Mid Channel, 2442 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

SPURIOUS RADIATED EMISSIONS

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 $10 \cdot \log(1/dc)$.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	ETS Lindgren	3115	AIP	2022-07-20	2024-07-20
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2024-01-08	2025-01-08
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2024-01-08	2025-01-08
Attenuator	Fairview Microwave	SA18H-20	VAF	2023-09-11	2024-09-11
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2024-03-13	2025-03-13
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2023-08-23	2024-08-23
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2024-01-28	2025-01-28
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2024-01-08	2025-01-08
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2024-01-08	2025-01-08
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2023-10-02	2025-10-02
Cable	ESM Cable Corp.	Bilog Cables	MNH	2023-10-08	2024-10-08
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2023-10-08	2024-10-08
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2023-08-23	2024-08-23
Antenna - Loop	ETS Lindgren	6502	AOB	2023-06-12	2025-06-12
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2023-09-05	2024-09-05
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2023-09-05	2024-09-05

SPURIOUS RADIATED EMISSIONS

FREQUENCY RANGE INVESTIGATED

9 kHz TO 26500 MHz

POWER INVESTIGATED

Lithium Battery

CONFIGURATIONS INVESTIGATED

STAK0344-1

MODES INVESTIGATED

Transmitting BLE Low and High Chs (2402 and 2480 MHz) 1 Mbps and 2 Mbps

Transmitting BLE Low, Mid and High Chs (2402, 2442 and 2480 MHz) 1 Mbps and 2 Mbps

SPURIOUS RADIATED EMISSIONS

EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583884	Date:	2024-05-29
Customer:	Starkey Laboratories, Inc.	Temperature:	21.1°C
Attendees:	John Quach	Relative Humidity:	50%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Marcelo Aguayo	Job Site:	MN05
Power:	Lithium Battery	Configuration:	STAK0344-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	17	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

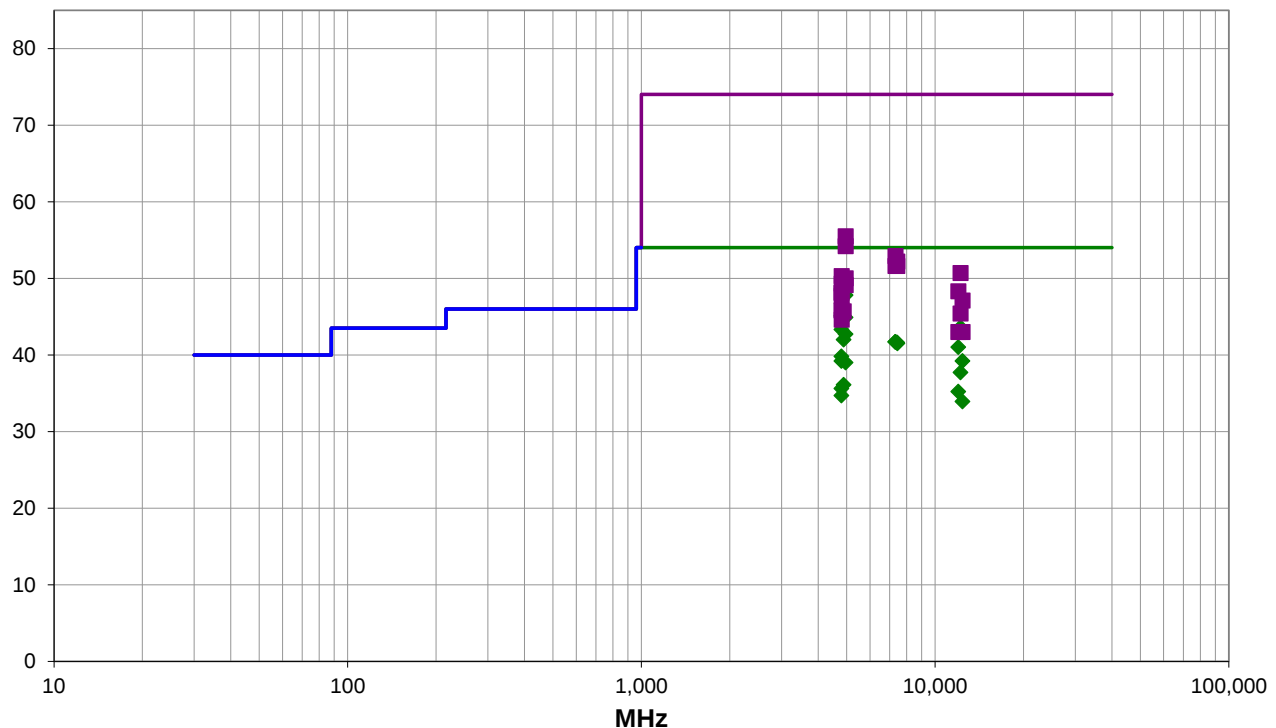
See comments for EUT orientation and data rate. Power +4dBm. Test mode duty cycle is 18.0% (1 Mbps) and 16.4% (2 Mbps), operational duty cycle is 16.8% (1 Mbps) and 17% (2 Mbps). Duty cycle correction factor (DCCF) applied using $DCCF = [10 \cdot \log(1/\text{test mode DC})] + [10 \cdot \log(\text{operational DC})] = -0.3 \text{ dB (1 Mbps) or } +0.2 \text{ dB (2 Mbps)}$

EUT OPERATING MODES

Transmitting BLE Low, Mid and High Chs (2402, 2442 and 2480 MHz) 1 Mbps and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 17

PK AV QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #17

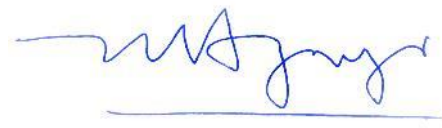
Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.942	42.5	5.2	2.4	0.0	-0.3	0.0	Horz	AV	0.0	47.4	54.0	-6.6	EUT On Side, High Ch 1Mbps
4803.925	39.9	5.1	2.9	40.0	-0.3	0.0	Horz	AV	0.0	44.7	54.0	-9.3	EUT On Side, Low Ch 1Mbps
4959.953	39.6	5.2	3.4	9.9	0.2	0.0	Horz	AV	0.0	45	54.0	-9	EUT On Side, High Ch 2Mbps
12209.060	44.3	-0.8	2.2	88.0	-0.3	0.0	Horz	AV	0.0	43.2	54.0	-10.8	EUT On Side, Mid Ch 1Mbps
4803.900	38.1	5.1	3.1	354.9	-0.3	0.0	Horz	AV	0.0	42.9	54.0	-11.1	EUT Horz, Low Ch 1Mbps
4959.892	37.4	5.2	2.9	319.9	-0.3	0.0	Vert	AV	0.0	42.3	54.0	-11.7	EUT Horz, High Ch 1Mbps
4883.933	36.8	5.1	1.7	340.9	-0.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT On Side, Mid Ch 1Mbps
7325.808	29.2	12.4	1.5	278.0	-0.3	0.0	Horz	AV	0.0	41.3	54.0	-12.7	EUT On Side, Mid Ch 1Mbps
7325.000	29.2	12.4	1.5	164.9	-0.3	0.0	Vert	AV	0.0	41.3	54.0	-12.7	EUT Horz, Mid Ch 1Mbps
7439.358	29.0	12.5	1.5	191.0	-0.3	0.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT On Side, High Ch 1Mbps
7441.158	28.9	12.5	1.5	324.0	-0.3	0.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT Horz, High Ch 1Mbps
12009.000	42.8	-1.9	2.2	88.9	-0.3	0.0	Horz	AV	0.0	40.6	54.0	-13.4	EUT On Side, Low Ch 1Mbps
4803.983	34.6	5.1	4.0	232.0	-0.3	0.0	Vert	AV	0.0	39.4	54.0	-14.6	EUT Horz, Low Ch 1Mbps
4803.975	34.0	5.1	1.2	1.9	-0.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Vert, Low Ch 1Mbps
12398.950	39.9	-0.8	2.2	95.9	-0.3	0.0	Horz	AV	0.0	38.8	54.0	-15.2	EUT On Side, High Ch 1Mbps
4960.010	33.7	5.2	2.8	274.0	0.2	0.0	Vert	AV	0.0	39.1	54.0	-14.9	EUT Horz, High Ch 2Mbps
12208.980	38.4	-0.8	1.6	62.0	-0.3	0.0	Vert	AV	0.0	37.3	54.0	-16.7	EUT Horz, Mid Ch 1Mbps
4883.950	30.9	5.1	1.5	357.0	-0.3	0.0	Vert	AV	0.0	35.7	54.0	-18.3	EUT Horz, Mid Ch 1Mbps
4804.017	30.4	5.1	1.6	263.0	-0.3	0.0	Horz	AV	0.0	35.2	54.0	-18.8	EUT Vert, Low Ch 1Mbps
12008.840	37.0	-1.9	1.5	62.0	-0.3	0.0	Vert	AV	0.0	34.8	54.0	-19.2	EUT Horz, Low Ch 1Mbps
4960.567	50.3	5.2	2.6	340.0	0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	EUT On Side, High Ch 1Mbps
4803.767	29.5	5.1	1.5	1.9	-0.3	0.0	Vert	AV	0.0	34.3	54.0	-19.7	EUT On Side, Low Ch 1Mbps
12398.900	34.6	-0.8	1.5	108.0	-0.3	0.0	Vert	AV	0.0	33.5	54.0	-20.5	EUT Horz, High Ch 1Mbps
4960.963	49.0	5.2	3.4	9.9	0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	EUT On Side, High Ch 2Mbps
7325.383	40.5	12.4	1.5	278.0	0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	EUT On Side, Mid Ch 1Mbps
7438.592	39.7	12.5	1.5	191.0	0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT On Side, High Ch 1Mbps
7326.217	39.2	12.4	1.5	164.9	0	0.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT Horz, Mid Ch 1Mbps
7438.692	39.1	12.5	1.5	324.0	0	0.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT Horz, High Ch 1Mbps
12208.900	51.5	-0.8	2.2	88.0	0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	EUT On Side, Mid Ch 1Mbps
4804.517	45.2	5.1	2.9	40.0	0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	EUT On Side, Low Ch 1Mbps
4960.293	44.8	5.2	2.8	274.0	0	0.0	Vert	PK	0.0	50	74.0	-24	EUT Horz, High Ch 2Mbps
4804.342	44.2	5.1	3.1	354.9	0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	EUT Horz, Low Ch 1Mbps
4884.133	44.1	5.1	1.7	340.9	0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT On Side, Mid Ch 1Mbps
4959.292	43.9	5.2	2.9	319.9	0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT Horz, High Ch 1Mbps
12009.530	50.2	-1.9	2.2	88.9	0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT On Side, Low Ch 1Mbps
4803.942	43.0	5.1	1.2	1.9	0	0.0	Vert	PK	0.0	48.1	74.0	-25.9	EUT Vert, Low Ch 1Mbps
4804.333	42.6	5.1	4.0	232.0	0	0.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT Horz, Low Ch 1Mbps
12398.880	47.9	-0.8	2.2	95.9	0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT On Side, High Ch 1Mbps
4803.483	40.7	5.1	1.6	263.0	0	0.0	Horz	PK	0.0	45.8	74.0	-28.2	EUT Vert, Low Ch 1Mbps
4886.350	40.6	5.1	1.5	357.0	0	0.0	Vert	PK	0.0	45.7	74.0	-28.3	EUT Horz, Mid Ch 1Mbps

SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12211.280	46.2	-0.8	1.6	62.0	0	0.0	Vert	PK	0.0	45.4	74.0	-28.6	EUT Horz, Mid Ch 1Mbps
4806.150	39.4	5.2	1.5	1.9	0	0.0	Vert	PK	0.0	44.6	74.0	-29.4	EUT On Side, Low Ch 1Mbps
12009.080	44.9	-1.9	1.5	62.0	0	0.0	Vert	PK	0.0	43	74.0	-31	EUT Horz, Low Ch 1Mbps
12398.650	43.8	-0.8	1.5	108.0	0	0.0	Vert	PK	0.0	43	74.0	-31	EUT Horz, High Ch 1Mbps

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	Edge AI RIC RT Hearing Aid	Work Order:	STAK0344
Serial Number:	240583884	Date:	2024-05-29
Customer:	Starkey Laboratories, Inc.	Temperature:	21.1°C
Attendees:	John Quach	Relative Humidity:	50%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Marcelo Aguayo	Job Site:	MN05
Power:	Lithium Battery	Configuration:	STAK0344-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	23	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

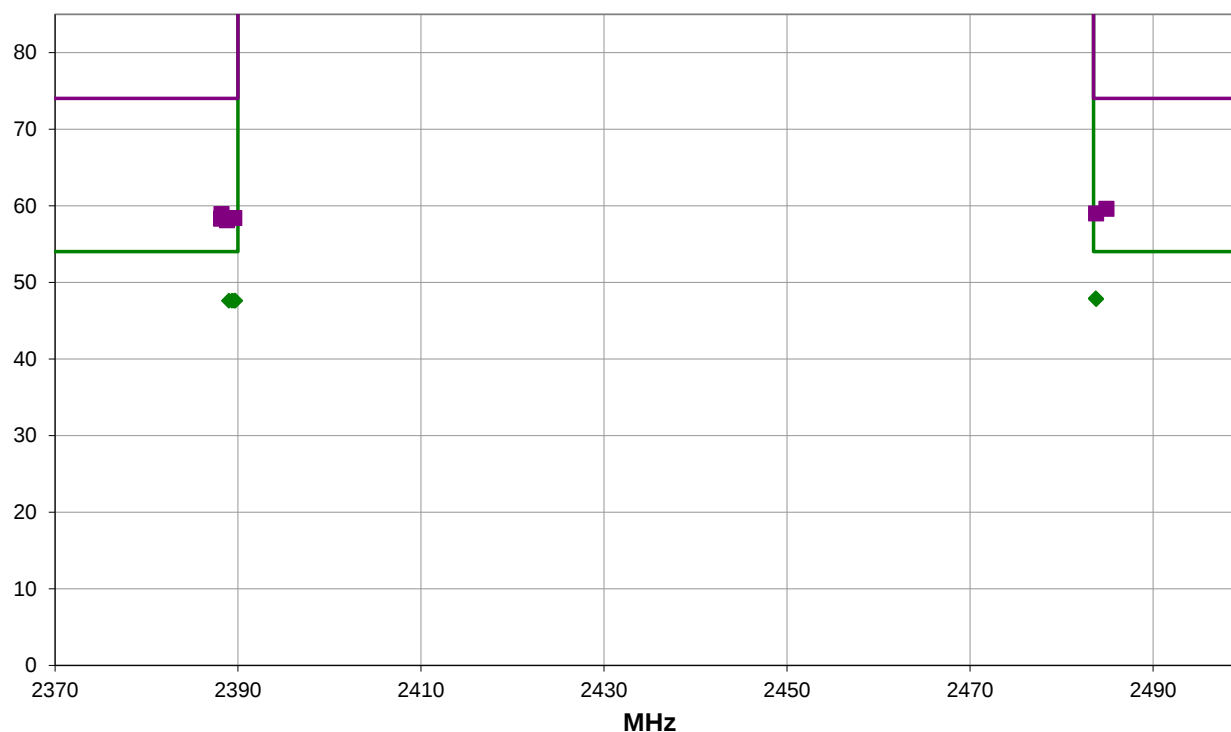
See comments for EUT orientation and data rate. Power +4dBm. Test mode duty cycle is 18.0% (1 Mbps) and 16.4% (2 Mbps), operational duty cycle is 16.8% (1 Mbps) and 17% (2 Mbps). Duty cycle correction factor (DCCF) applied using $DCCF = [10 \cdot \log(1/\text{test mode DC})] + [10 \cdot \log(\text{operational DC})] = -0.3 \text{ dB (1 Mbps) or } +0.2 \text{ dB (2 Mbps)}$

EUT OPERATING MODES

Transmitting BLE Low and High Chs (2402 and 2480 MHz) 1 Mbps and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 23

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #23

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.763	31.3	-3.5	1.5	321.0	0.2	20.0	Horz	AV	0.0	48	54.0	-6.0	EUT On Side, High Ch 2Mbps
2483.813	31.2	-3.5	1.5	310.0	0.2	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT Horz, High Ch 2Mbps
2389.363	31.6	-4.1	3.0	315.9	-0.3	20.0	Horz	AV	0.0	47.2	54.0	-6.8	EUT On Side, Low Ch 1Mbps
2389.597	31.6	-4.1	1.5	246.0	-0.3	20.0	Vert	AV	0.0	47.2	54.0	-6.8	EUT Horz, Low Ch 1Mbps
2389.713	31.6	-4.1	1.5	242.0	0.2	20.0	Vert	AV	0.0	47.5	54.0	-6.5	EUT Horz, Low Ch 2Mbps
2389.007	31.6	-4.1	1.5	333.0	0.2	20.0	Horz	AV	0.0	47.5	54.0	-6.5	EUT On Side, Low Ch 2Mbps
2484.923	43.1	-3.5	1.5	321.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT On Side, High Ch 1Mbps
2483.773	42.5	-3.5	1.5	310.0	0.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	EUT Horz, High Ch 2Mbps
2388.207	43.0	-4.1	1.5	246.0	0.0	20.0	Vert	PK	0.0	58.9	74.0	-15.1	EUT Horz, Low Ch 1Mbps
2389.603	42.5	-4.1	1.5	333.0	0.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	EUT On Side, Low Ch 2Mbps
2388.157	42.4	-4.1	3.0	315.9	0.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	EUT On Side, Low Ch 2Mbps
2388.797	42.2	-4.1	1.5	242.0	0.0	20.0	Vert	PK	0.0	58.1	74.0	-15.9	EUT Horz, Low Ch 2Mbps

CONCLUSION

Pass



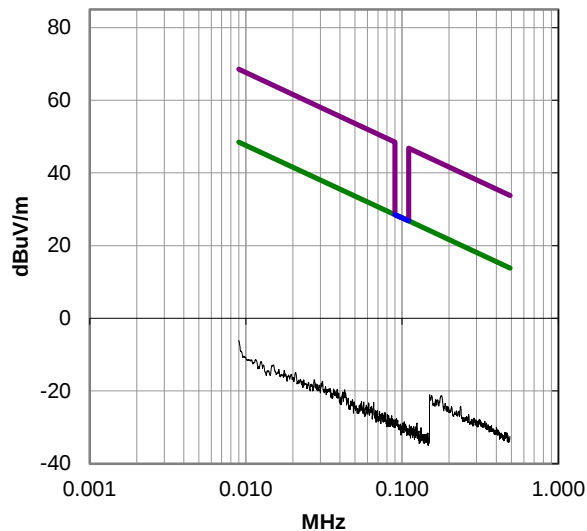
Tested By

SPURIOUS RADIATED EMISSIONS

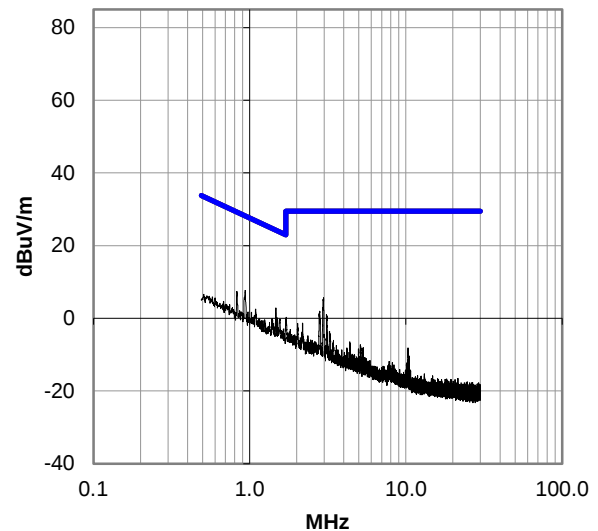
PRESCAN DATA

Radiated spurious emissions from the EUT are initially reviewed with Pre-scans (Preview scans). Pre-scans are performed, with the EUT transmitting on the lowest applicable data rate, for both vertical and horizontal polarizations. The Pre-scan plots below are shown with a peak detector and RBW for the following frequency ranges: 9 kHz RBW (< 30 MHz); 120 kHz RBW (30 - 1000 MHz); 1 MHz RBW (> 1 GHz). In the case where unintentional emissions are observed, an ambient or idle pre-scan with the radio off, will be shown for comparison.

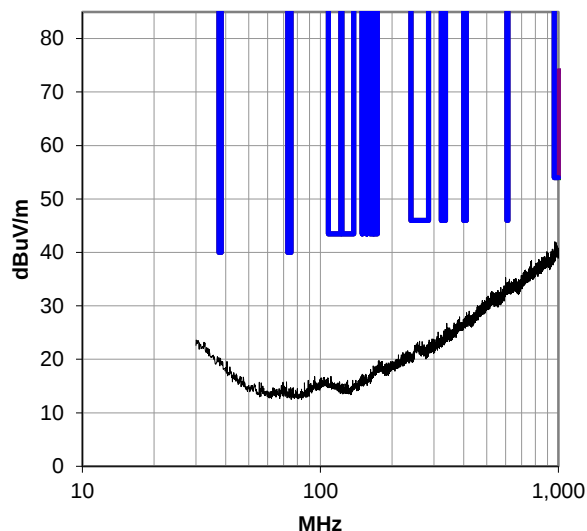
0.009-0.49 MHz, Run 27



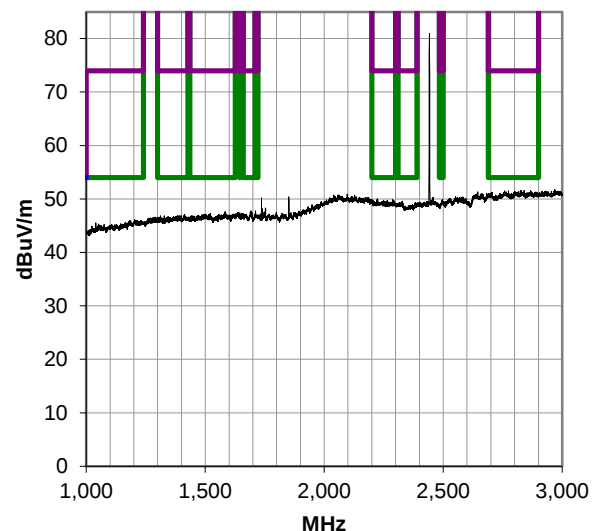
0.49-30 MHz, Run 28



30-1000 MHz, Run 26

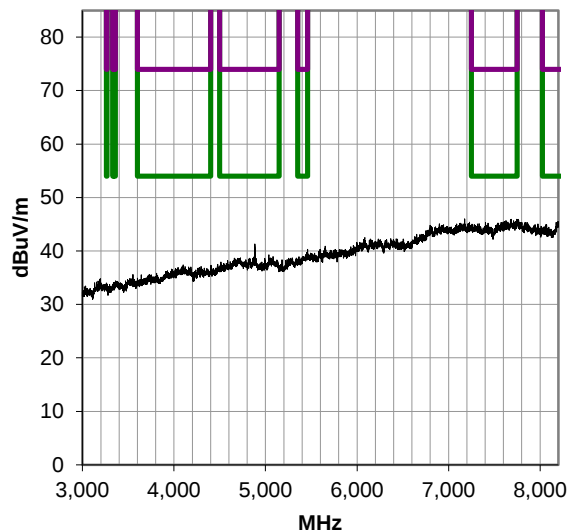


1000-3000 MHz, Run 10

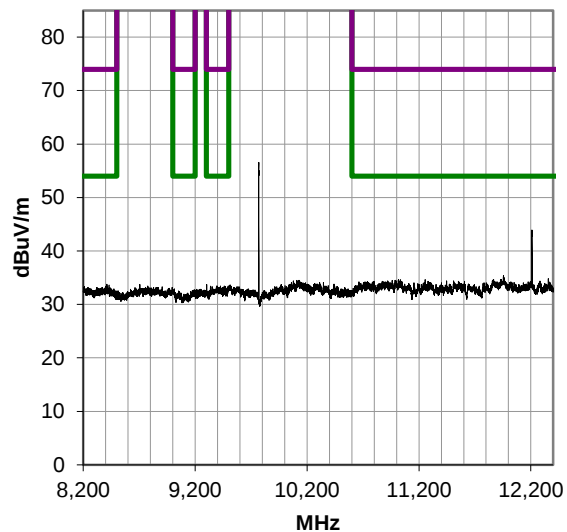


SPURIOUS RADIATED EMISSIONS

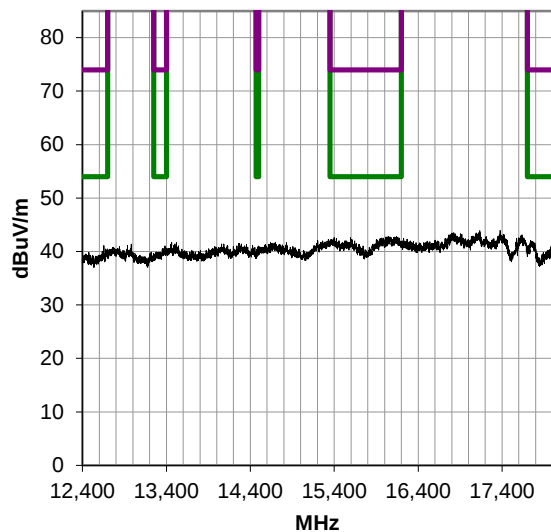
3000-8200 MHz, Run 11



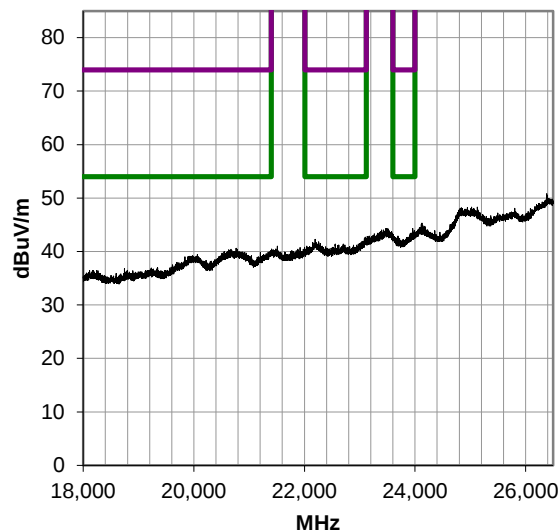
8200-12400 MHz, Run 12



12400-18000 MHz, Run 13



18000-26500 MHz, Run 35



End of Test Report