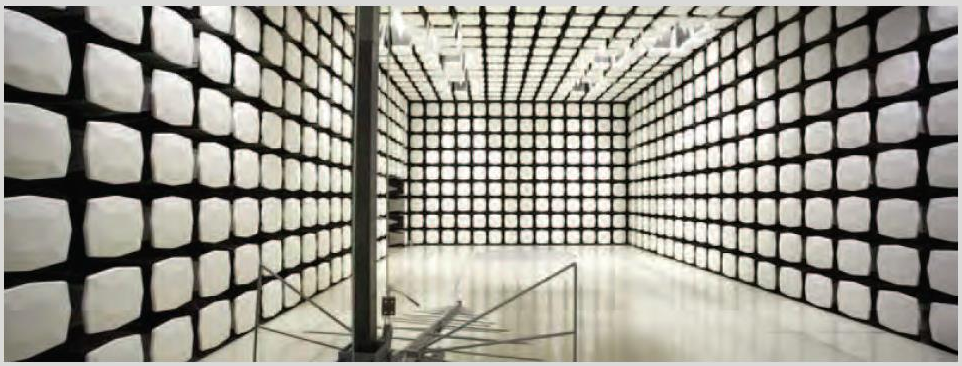
Starkey Laboratories, Inc.

Genesis 24 MRIC R

FCC 15.247:2022

Bluetooth Low Energy (DTS) Radio

Report: STAK0250.1 Rev. 1, Issue Date: April 8, 2022



ACCREDITED
CERT #3310.05

CERTIFICATE OF TEST

Last Date of Test: January 5, 2022
Starkey Laboratories, Inc.
EUT: Genesis 24 MRIC R

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2022	ANSI C63.10:2013, KDB 558074 D01 v05 r02

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
11.6	Duty Cycle	Yes	N/A	There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

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
01	Updated EUT name	2022-02-24	1, 2, 10, 12, 15, 23, 27, 32, 36, 40, 44, 48, 52, 56, 59, 62, 69, 77, 79, 84, 86
	Updated Std date	2022-04-02	1
	Updated Std date, added KDB version, duty cycle to N/A with comment	2022-04-02	2
	Updated to 2022 for items 4 thru 8	2022-04-02	13
	Mod was for SRE, updated	2022-04-02	13
	Added RE sample calculation	2022-04-02	7-9
	Added direct connect wording to TDs	2022-04-02	All direct connect
	Added duty cycle measurements used for 1-5-22 1Mbps SRE retesting, removed old duty cycle data	2022-04-02	79-87
	Reformatted x-axis	2022-04-02	79
	Added antenna type info	2022-04-02	9

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.

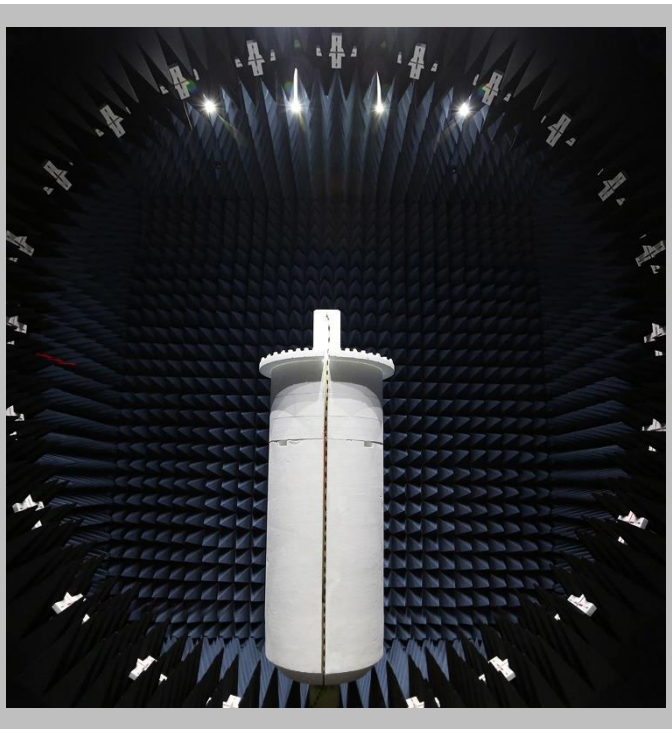
SCOPE

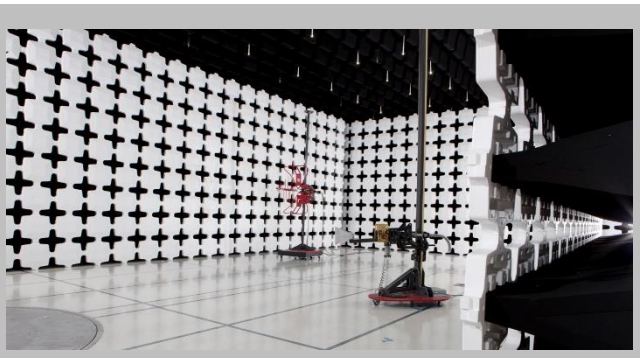
For details on the Scopes of our Accreditations, please visit:

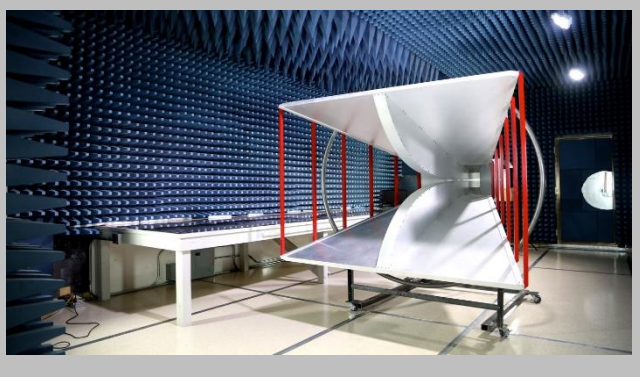
California Minnesota Oregon Texas Washington

FACILITIES

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.

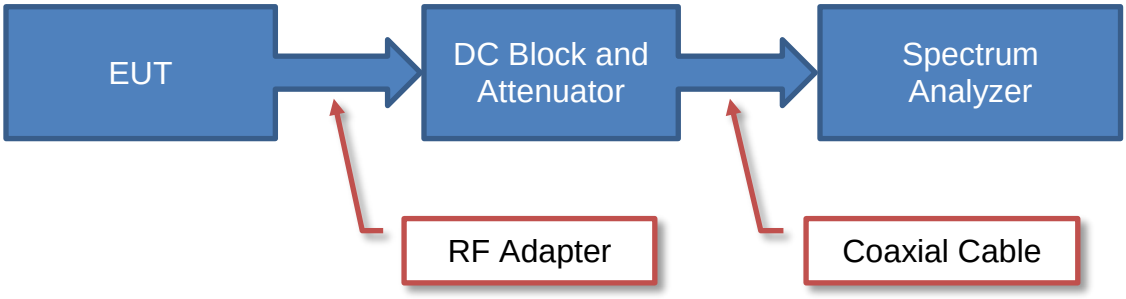
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific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

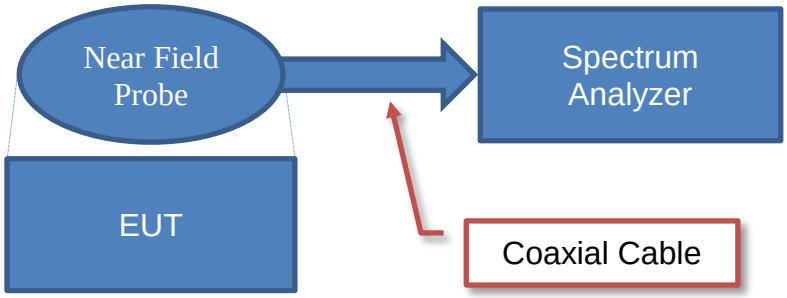
Antenna Port Conducted Measurements



Sample Calculation

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

Near Field Test Fixture Measurements

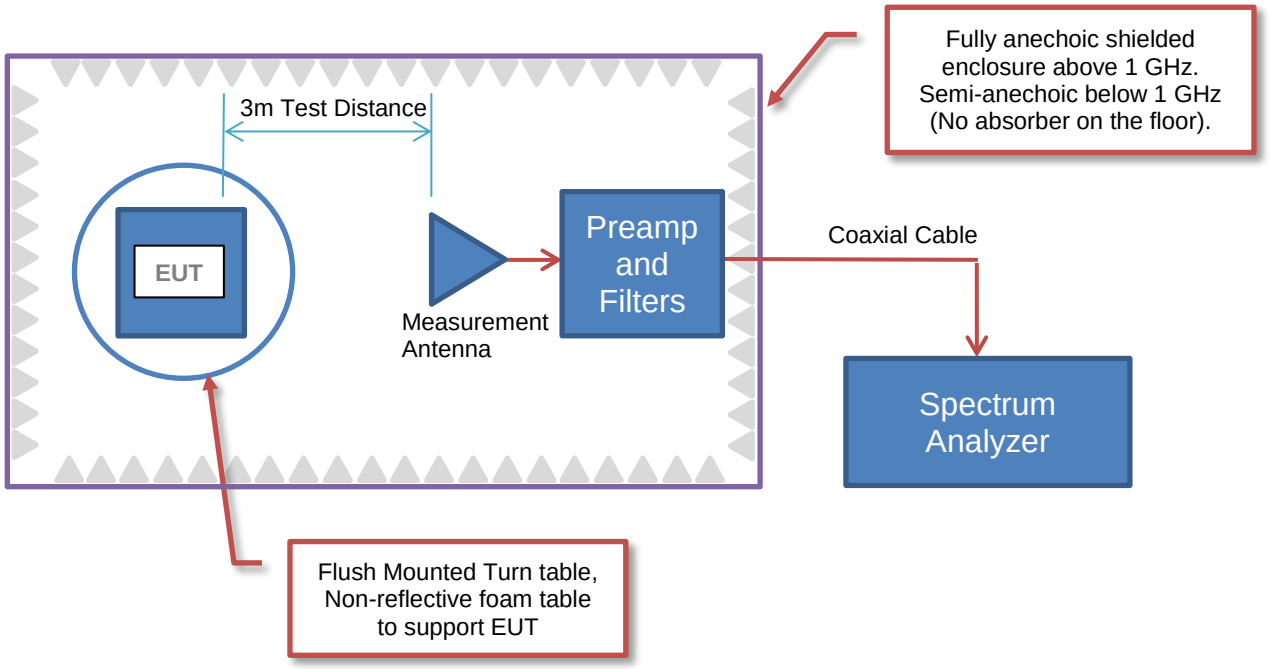


Sample Calculation

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

TEST SETUP BLOCK DIAGRAMS

Spurious Radiated Emissions



Sample Calculation (logarithmic units)

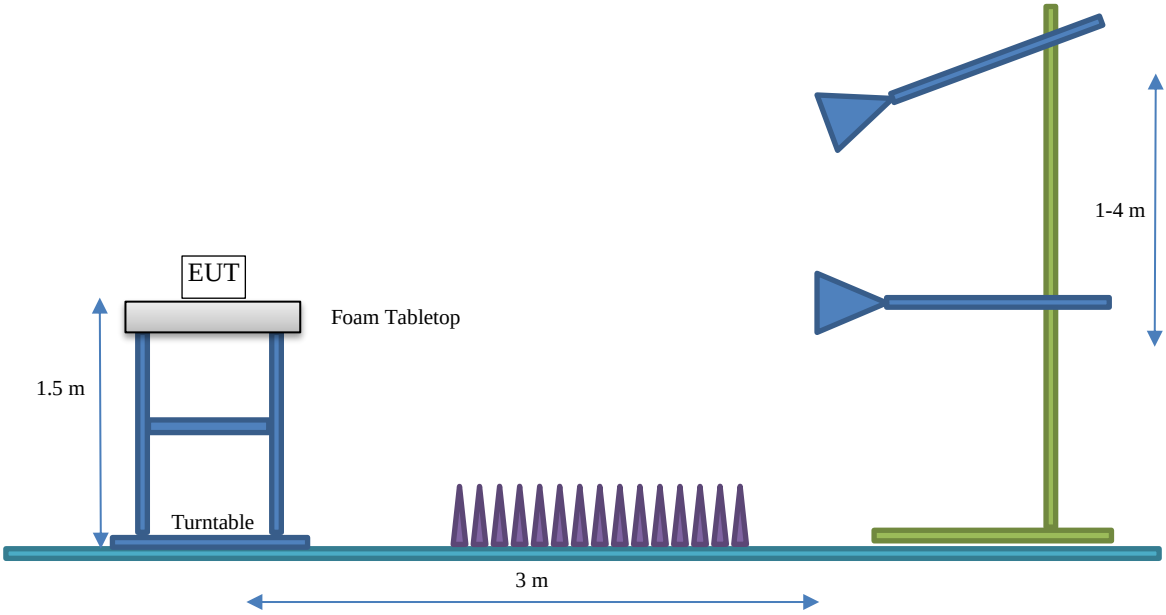
Radiated Emissions:

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**

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 24 MRIC R
First Date of Test:	October 13, 2021
Last Date of Test:	January 5, 2022
Receipt Date of Samples:	October 13, 2021
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Hearing aid with BLE supporting 1 and 2 Mbps datarates

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

ANTENNA

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Bow tie constructed on a polyimide flexible circuit, uses 1 ounce copper (1.4 mil)	Starkey Laboratories, Inc.	Not Provided	-8

POWER SETTINGS

Radio	Modulation	Channel	Power Setting
BLE	1 Mbps	Low, Mid, and High Ch. (2402, 2442, and 2480 MHz)	0 dBm
	2 Mbps		2 dBm

CONFIGURATIONS

Configuration STAK0250- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Genesis 24 MRIC R	211772493

Configuration STAK0250- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Genesis 24 MRIC R	211772499

Configuration STAK0258- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Genesis 24 MRIC R	211772497

Configuration STAK0258- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Genesis 24 MRIC R	211772495

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-10-13	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-01-05	Power Spectral Density	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.
3	2022-01-05	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	2022-01-05	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-01-05	Duty Cycle	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.
6	2022-01-05	Spurious Radiated Emissions	Modified from delivered configuration.	Power level was lowered to pass 3rd harmonic. Modification authorized by John Quach.	EUT remained at Element following the test.
7	2022-01-05	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	2022-01-05	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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

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EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0250**
Serial Number:	**211772499**			**Date:**	**13-Oct-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**21.8 °C**
Attendees:	**John Quach**			**Humidity:**	**49.1% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

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

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

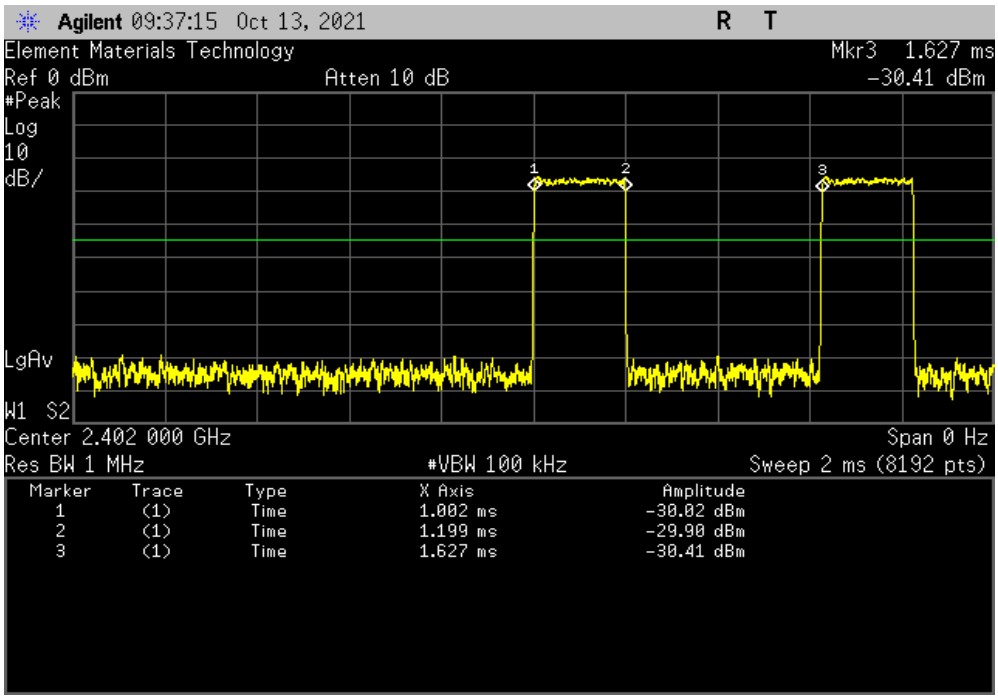
Configuration #	**2**	*Signature* Andrew Rogstad

	Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
BLE/GFSK 2 Mbps Low Channel, 2402 MHz							
Pulse Length	0.20	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	14	2.76	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	40.01	6.89	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz							
Pulse Length	0.20	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	14	2.74	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	40	6.86	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz							
Pulse Length	0.20	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	14	2.74	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	40.01	6.86	N/A	N/A
Repeatability	N/A	N/A	N/A	N/A	N/A	N/A	N/A

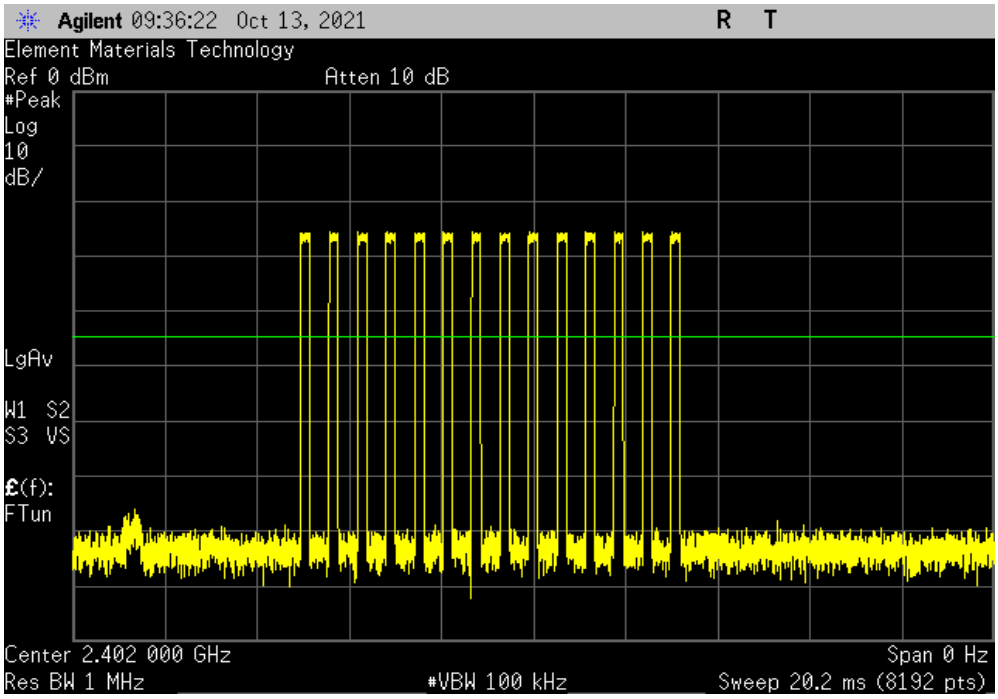
DUTY CYCLE

XMit 2020.12.30.0

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



BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	14	2.76	N/A	N/A	N/A	N/A



DUTY CYCLE

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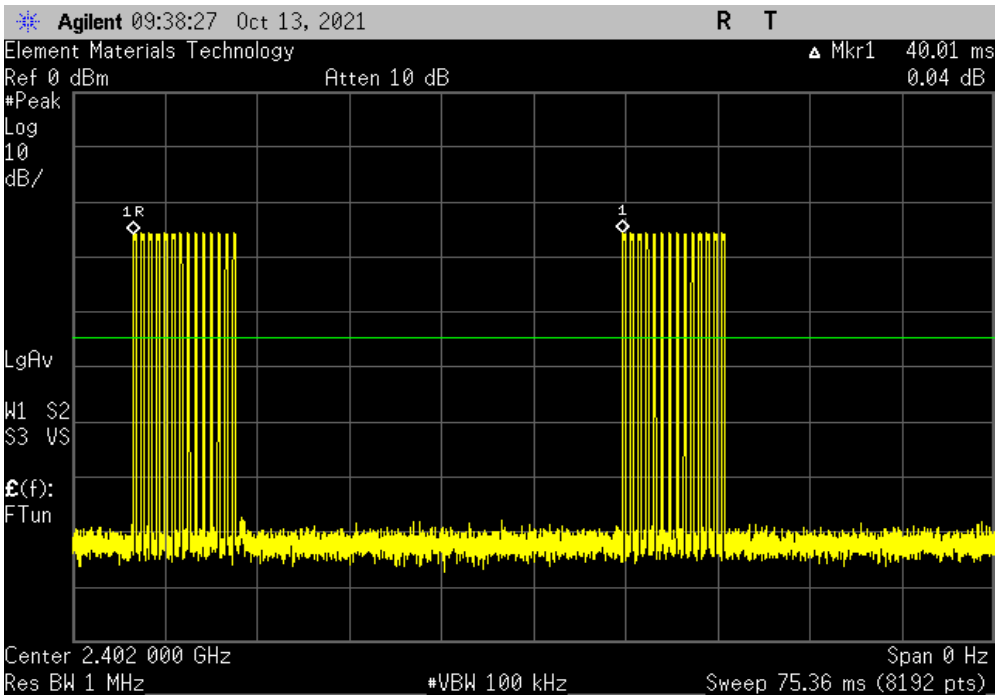
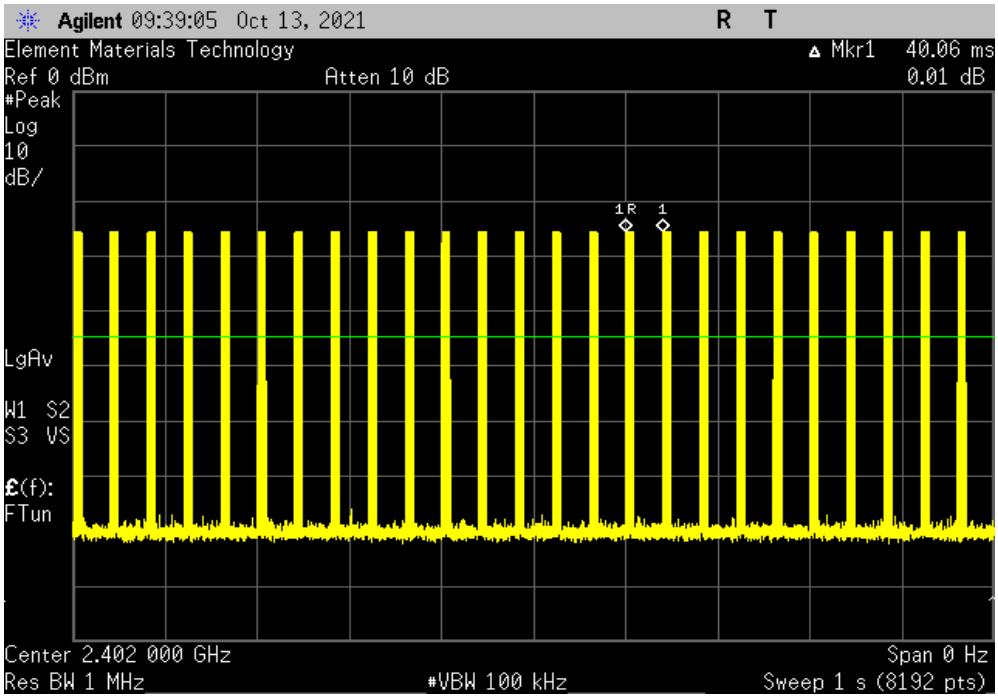
BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	40.01	6.89	N/A	N/A



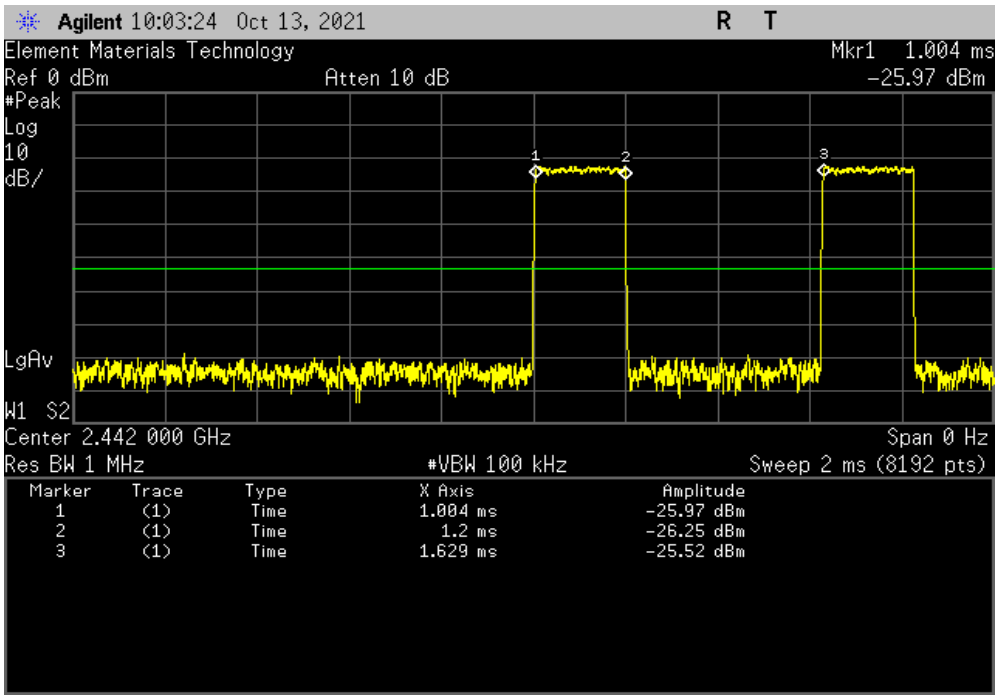
BLE/GFSK 2 Mbps Low Channel, 2402 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



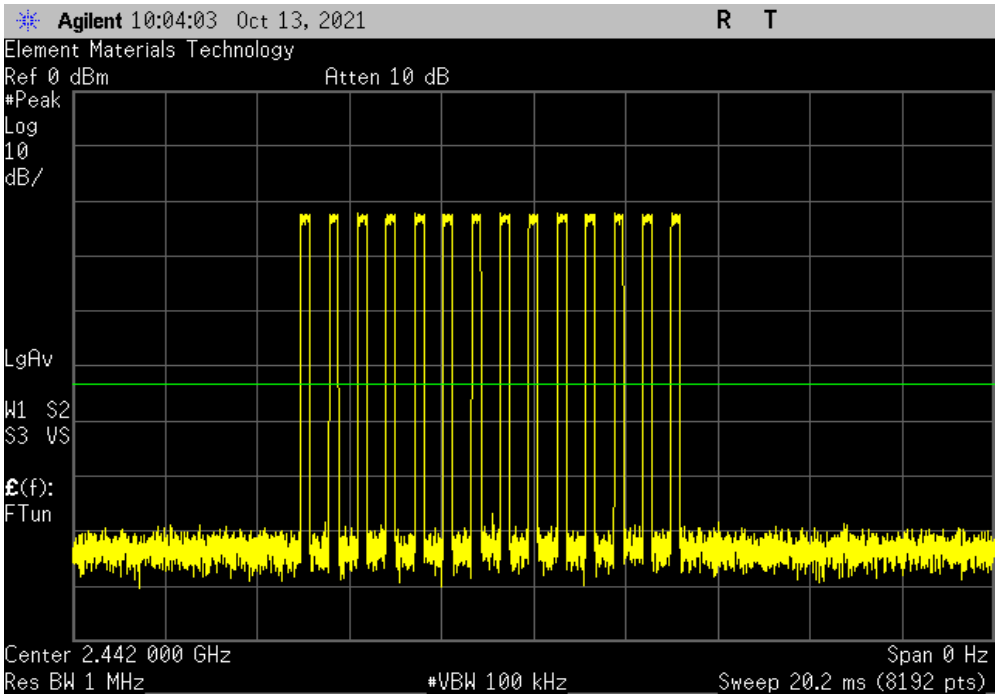
DUTY CYCLE

XMit 2020.12.30.0

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



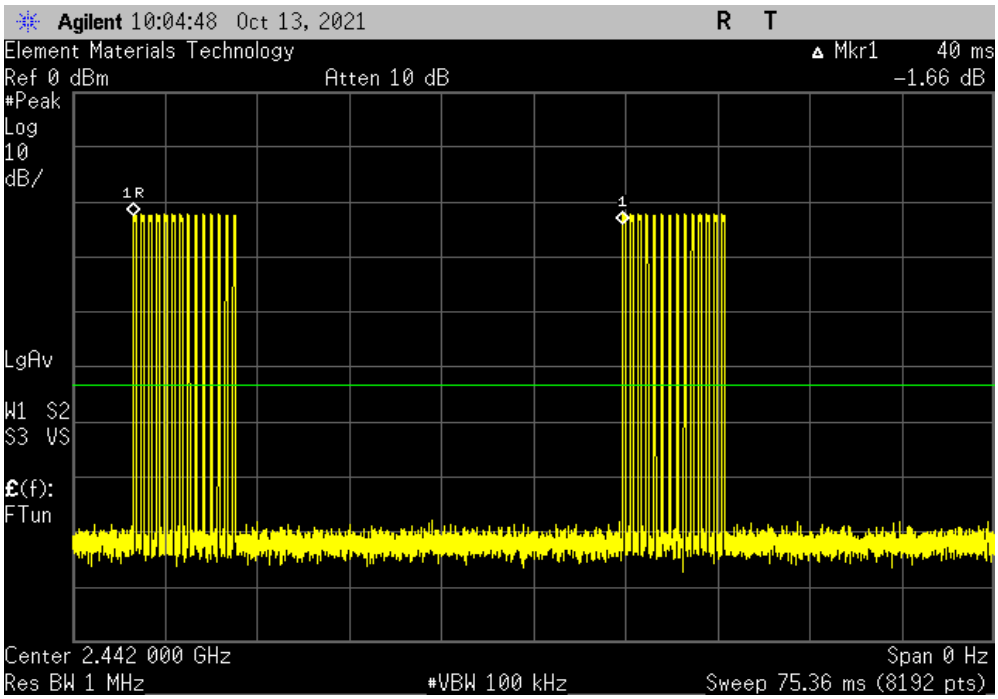
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	14	2.74	N/A	N/A	N/A	N/A



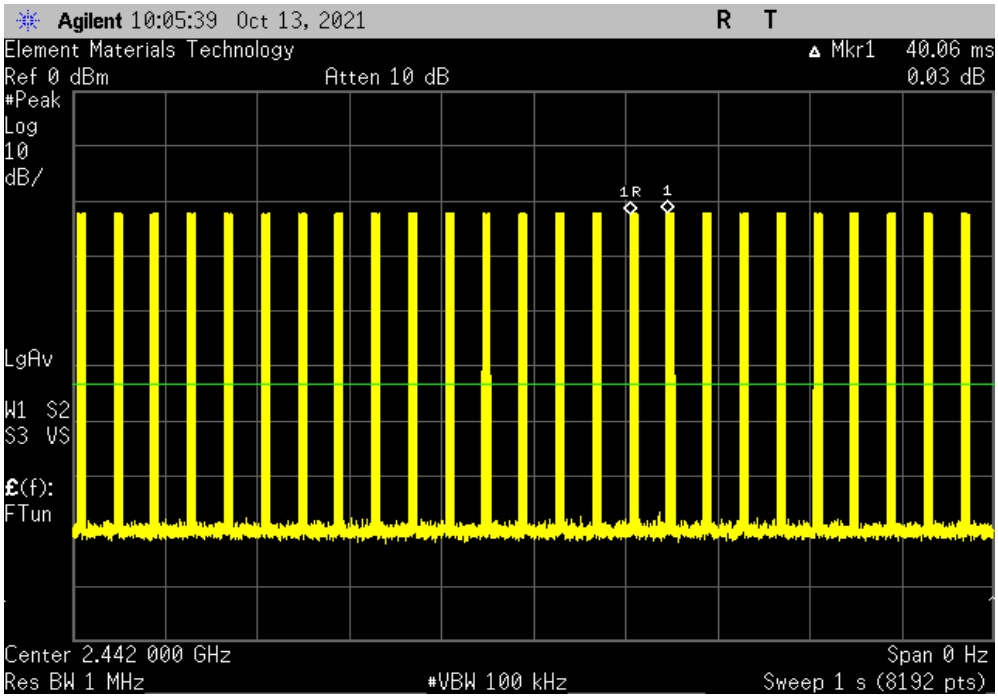
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	40	6.86	N/A	N/A



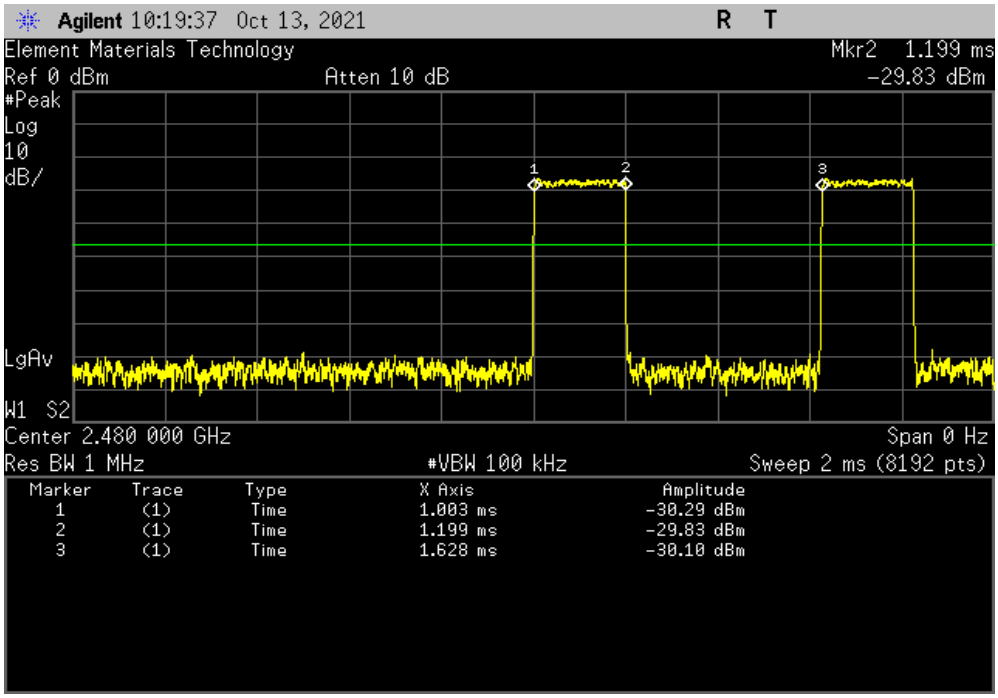
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz, Repeatability						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A



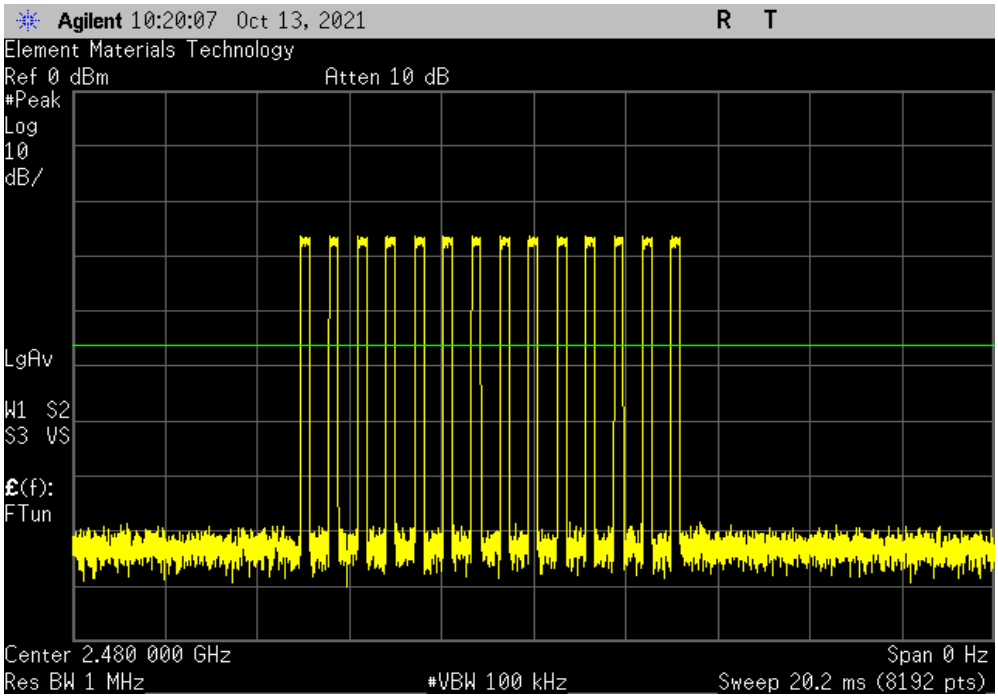
DUTY CYCLE

XMit 2020.12.30.0

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



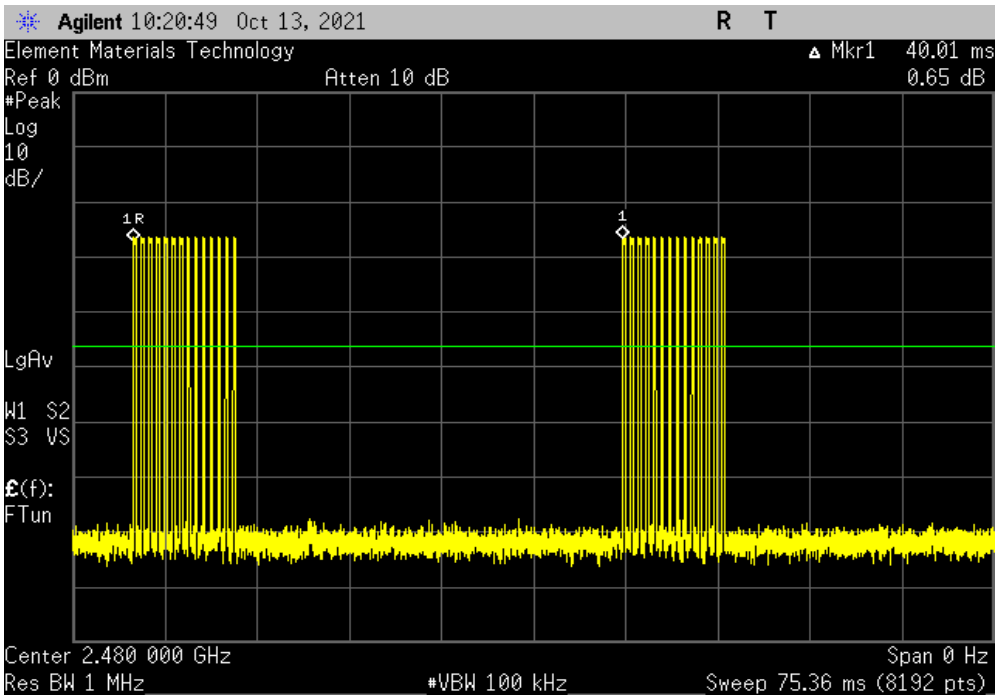
BLE/GFSK 2 Mbps High Channel, 2480 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	14	2.74	N/A	N/A	N/A	N/A



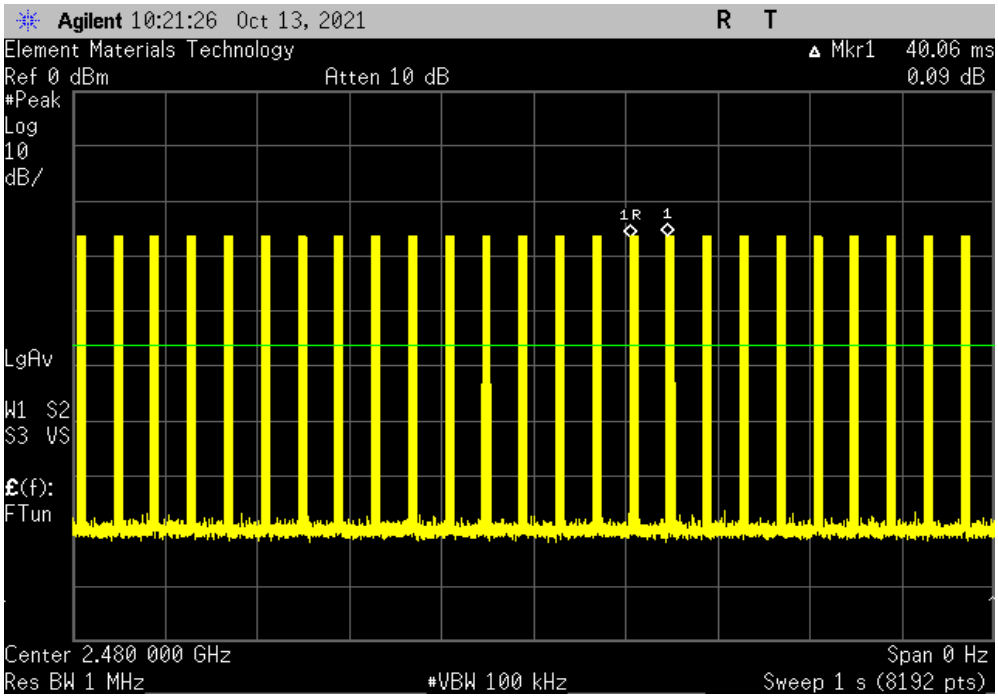
DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	40.01	6.86	N/A	N/A



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



DUTY CYCLE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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 2020.12.30.0

EUT:	Genesis 24 MRIC R			**Work Order:**	STAK0258
Serial Number:	211772497			**Date:**	5-Jan-22
Customer:	Starkey Laboratories, Inc.			**Temperature:**	21.8 °C
Attendees:	John Quach			**Humidity:**	49.1% RH
Project:	None			**Barometric Pres.:**	1009 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

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

COMMENTS

Duty cycle measurements take at 3rd harmonic of High Channel (2480 MHz), worst case Emissions signal.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	1	Signature

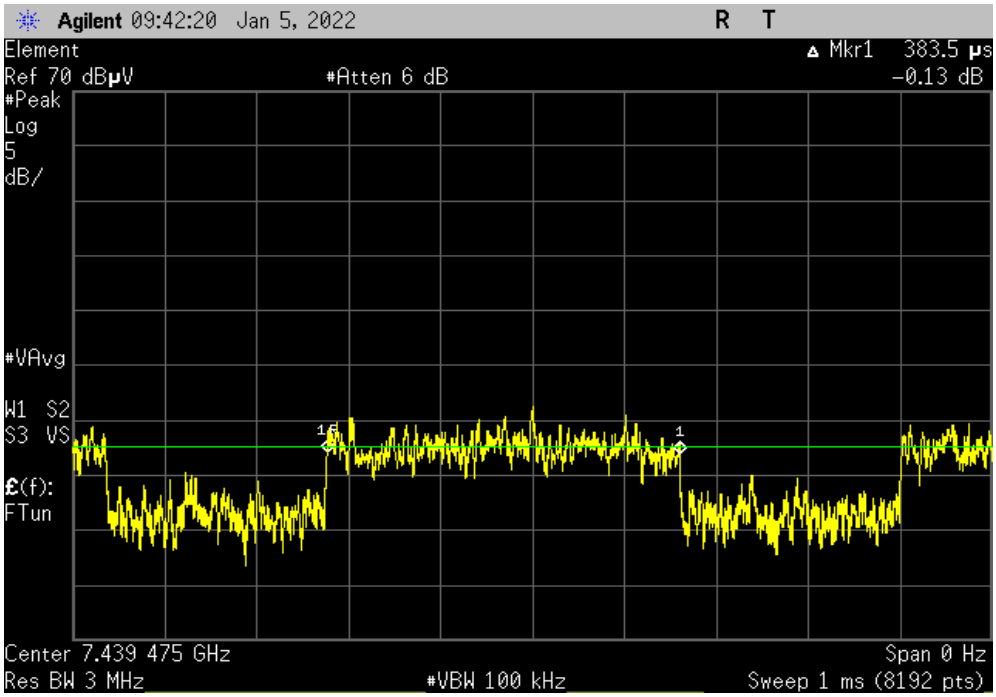
	Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
BLE/GFSK 1 Mbps High Channel, 2480 MHz							
Pulse Length	0.38	N/A	N/A	N/A	N/A	N/A	N/A
Pulse Count	N/A	14	5.37	N/A	N/A	N/A	N/A
Overall Period	N/A	N/A	N/A	50	10.74	N/A	N/A

DUTY CYCLE

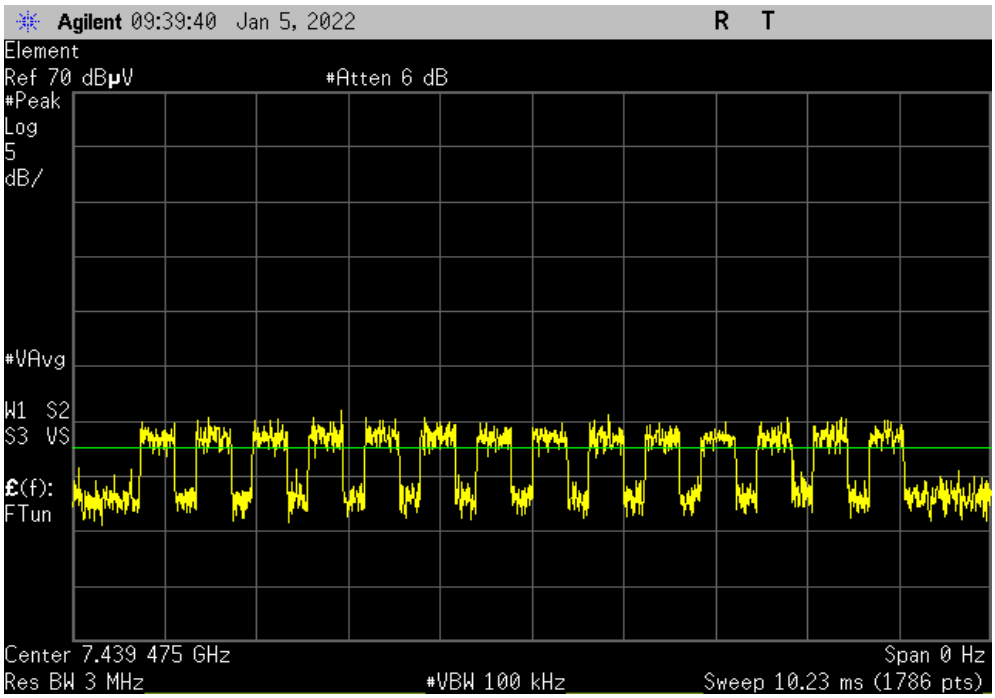
element

XMit 2020.12.30.0

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



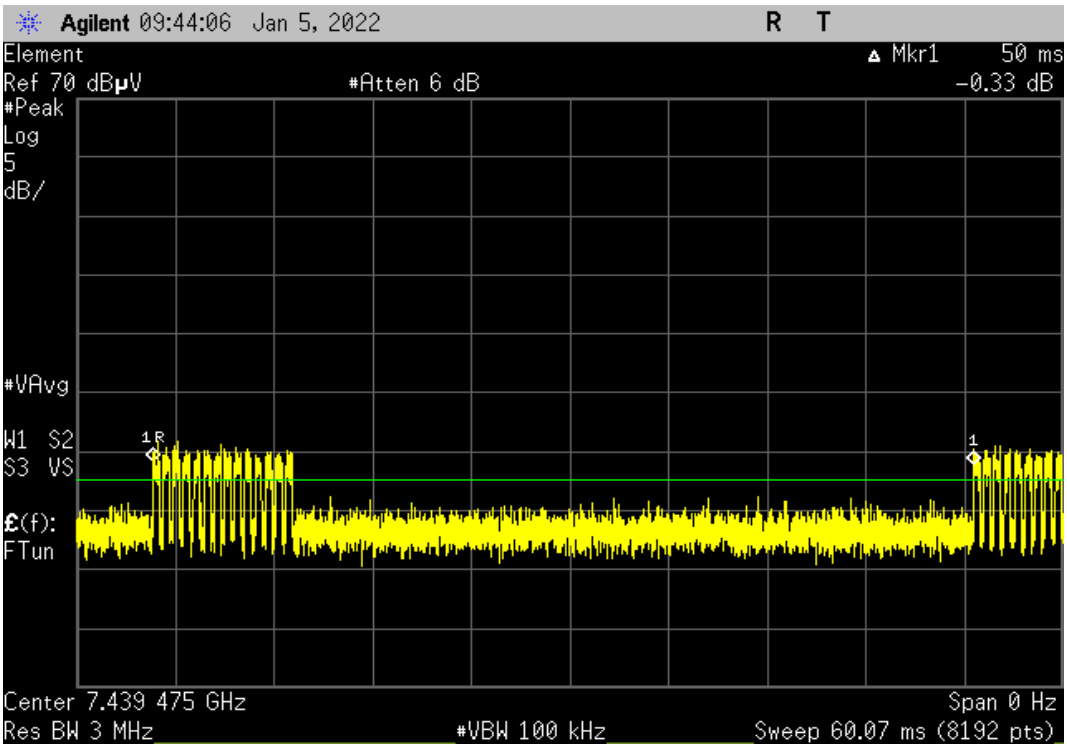
BLE/GFSK 2 Mbps High Channel, 2480 MHz, Pulse Count						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	14	5.37	N/A	N/A	N/A	N/A



DUTY CYCLE

XMit 2020.12.30.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz, Overall Period						
Pulse Width (ms)	Number of Pulses	Total On-Time (ms)	Period (ms)	Value (%)	Limit (%)	Result
N/A	N/A	N/A	50	10.74	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2020.12.30.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

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

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

OCCUPIED BANDWIDTH

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	Genesis 24 MRIC R			**Work Order:**	STAK0250
Serial Number:	211772499			**Date:**	13-Oct-21
Customer:	Starkey Laboratories, Inc.			**Temperature:**	21.6 °C
Attendees:	John Quach			**Humidity:**	48.4% RH
Project:	None			**Barometric Pres.:**	1009 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

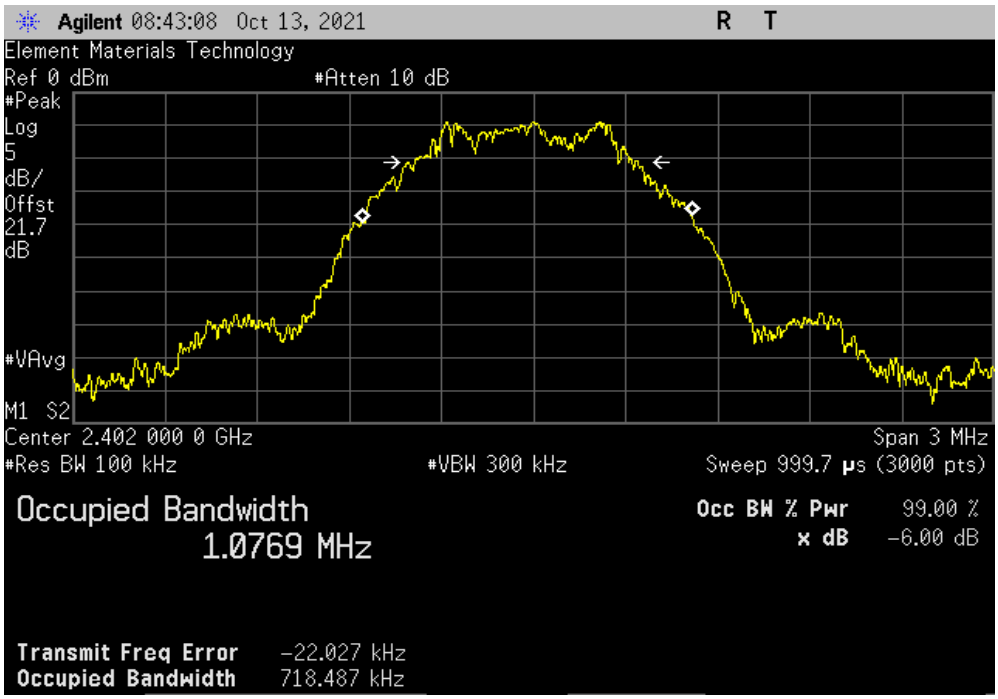
DEVIATIONS FROM TEST STANDARD

None

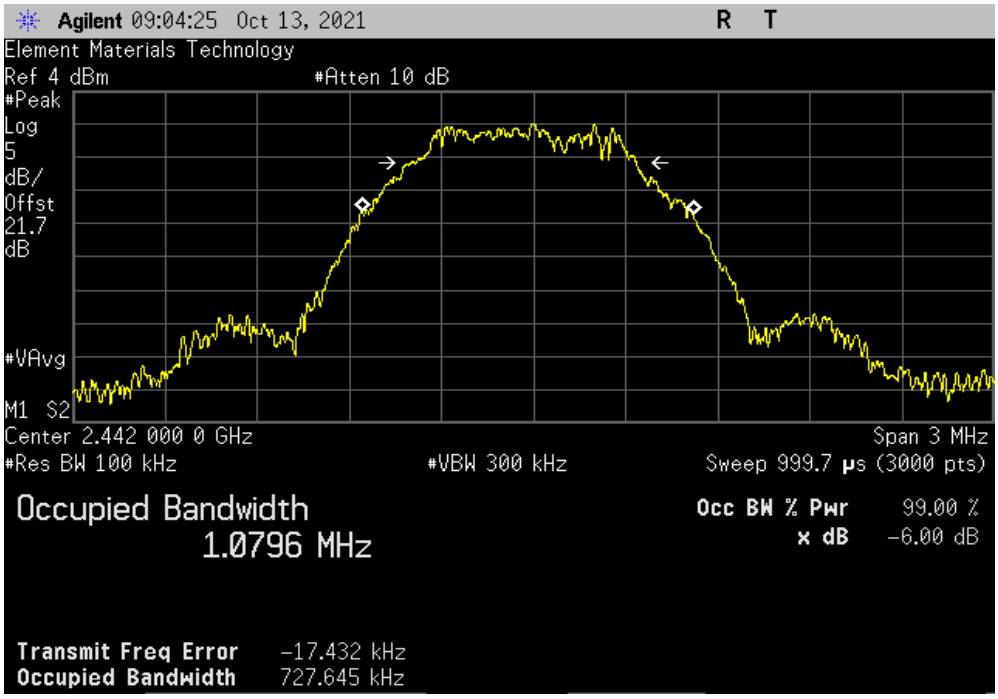
Configuration #	2	Signature

	Value	Limit (≥)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	718.487 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	727.645 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	732.566 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	1.378 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	1.399 MHz	500 kHz	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	1.301 MHz	500 kHz	Pass

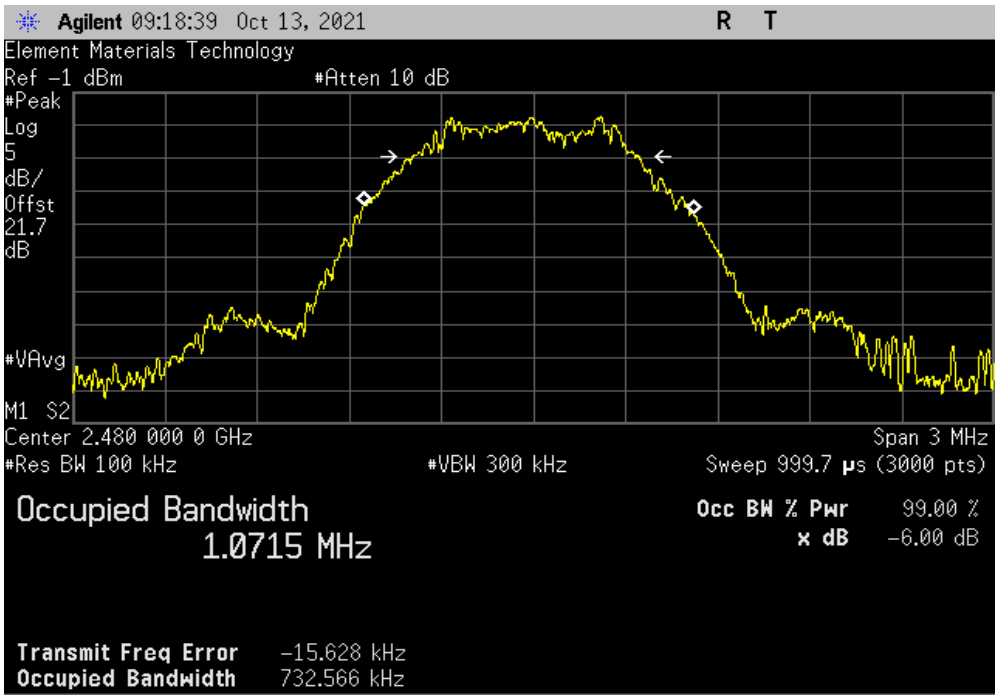
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				718.487 kHz	500 kHz	Pass



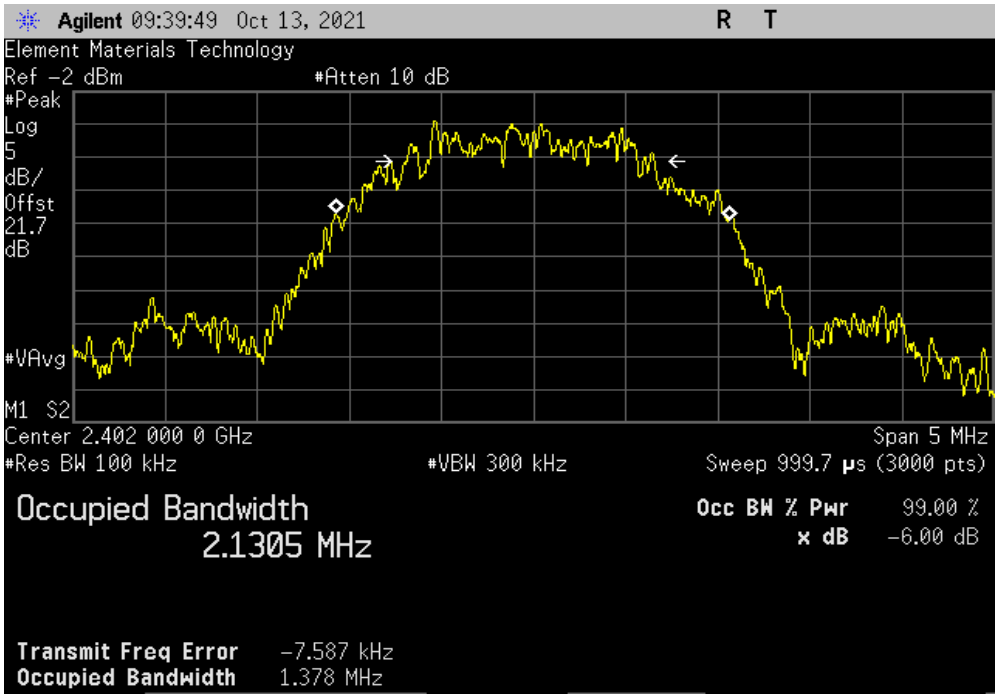
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				727.645 kHz	500 kHz	Pass



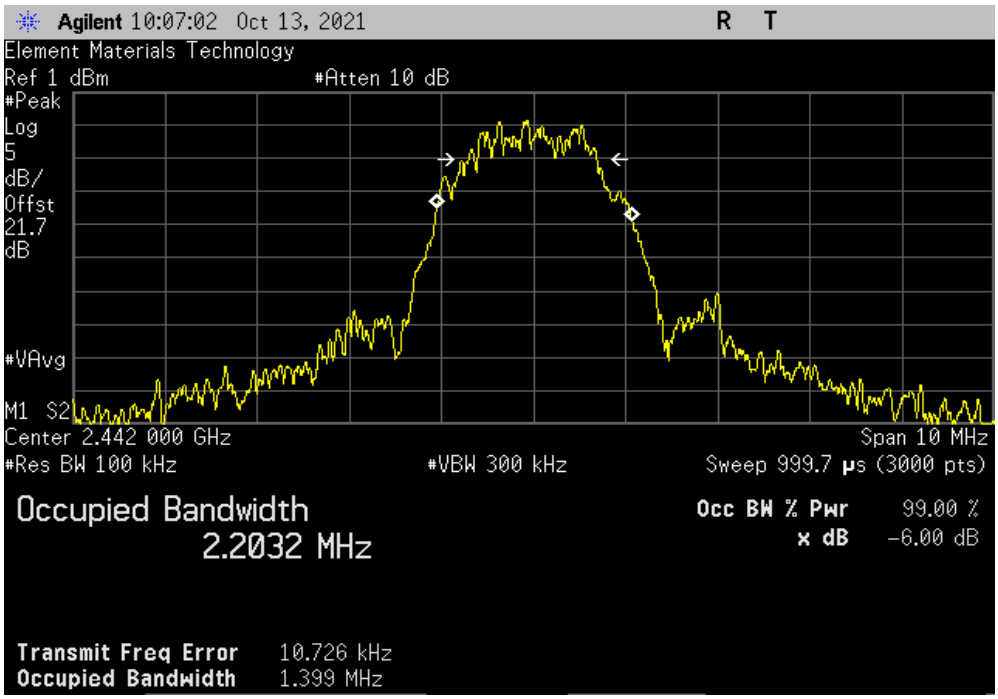
BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				732.566 kHz	500 kHz	Pass



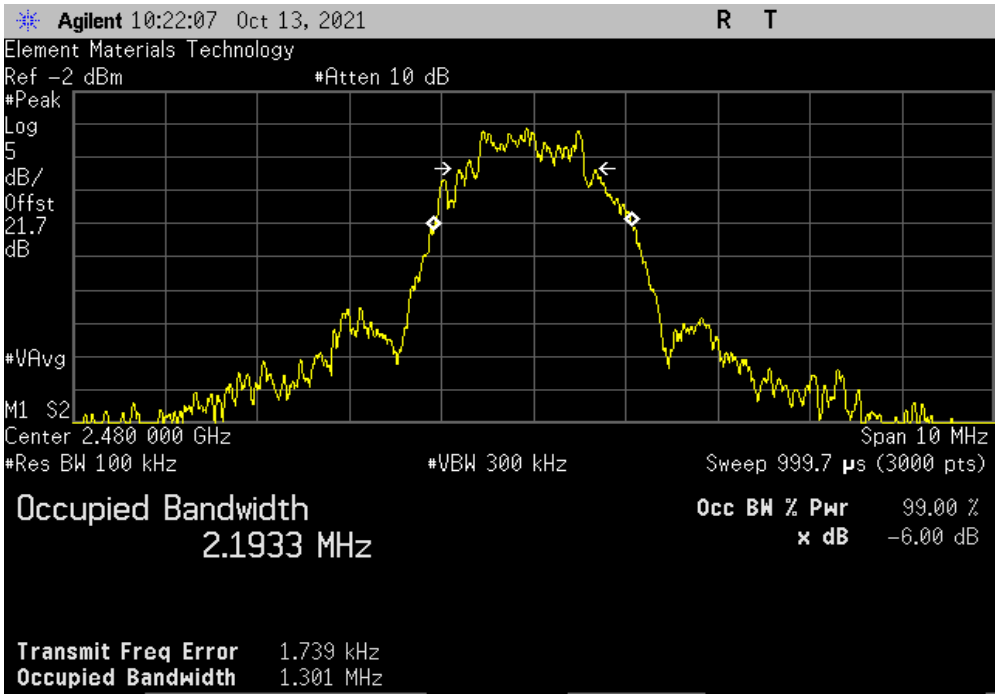
BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				1.378 MHz	500 kHz	Pass



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



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



OUTPUT POWER

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	2020-04-28	2023-04-28
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16

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 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0258**
Serial Number:	**211772495**			**Date:**	**5-Jan-22**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**John Quach**			**Humidity:**	**20.5% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2022	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

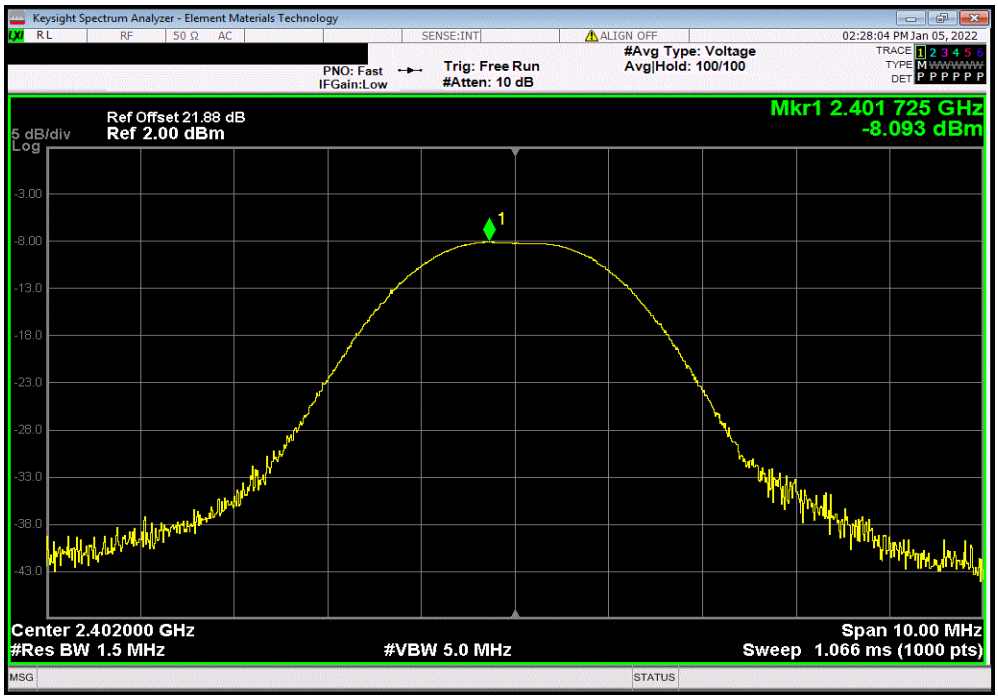
DEVIATIONS FROM TEST STANDARD

None

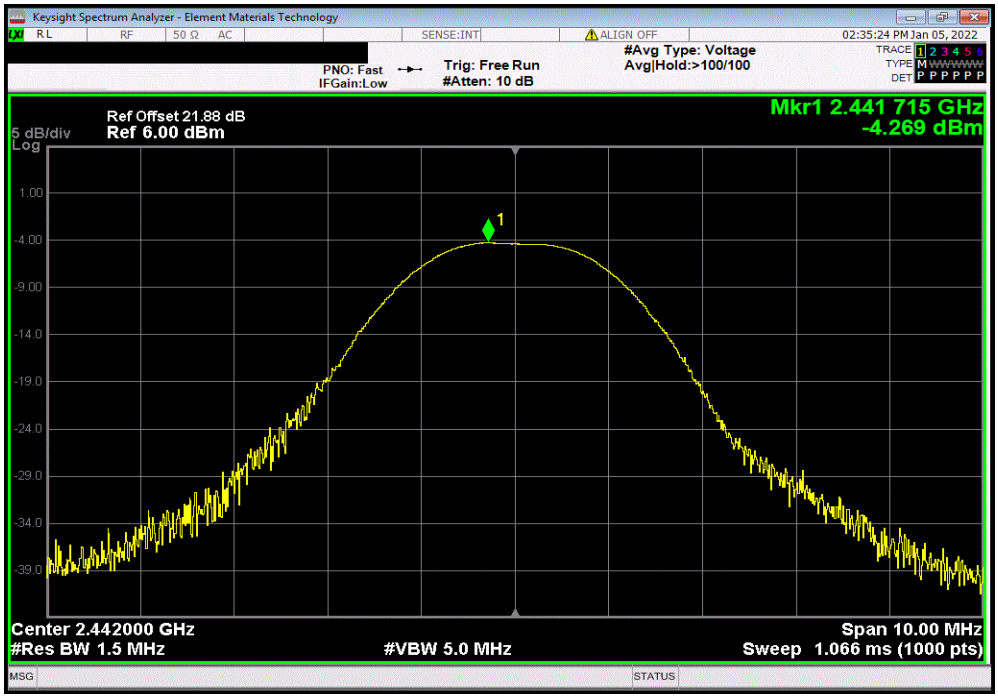
Configuration #	**2**	*Signature* Andrew Rogstad

	Out Pwr (dBm)	**Limit (dBm)**	**Result**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-8.093	30	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-4.269	30	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-9.153	30	Pass

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-8.093	30	Pass

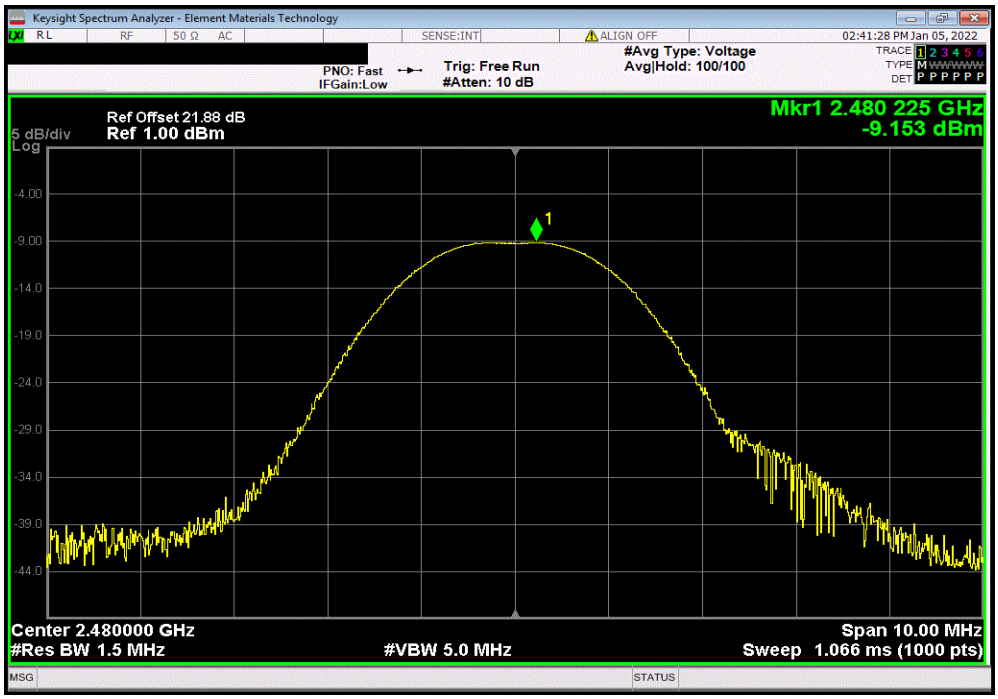


BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-4.269	30	Pass



OUTPUT POWER

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-9.153	30	Pass



OUTPUT POWER

XMit 2020.12.30.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0250**
Serial Number:	**211772499**			**Date:**	**13-Oct-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**21.6 °C**
Attendees:	**John Quach**			**Humidity:**	**48.3% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

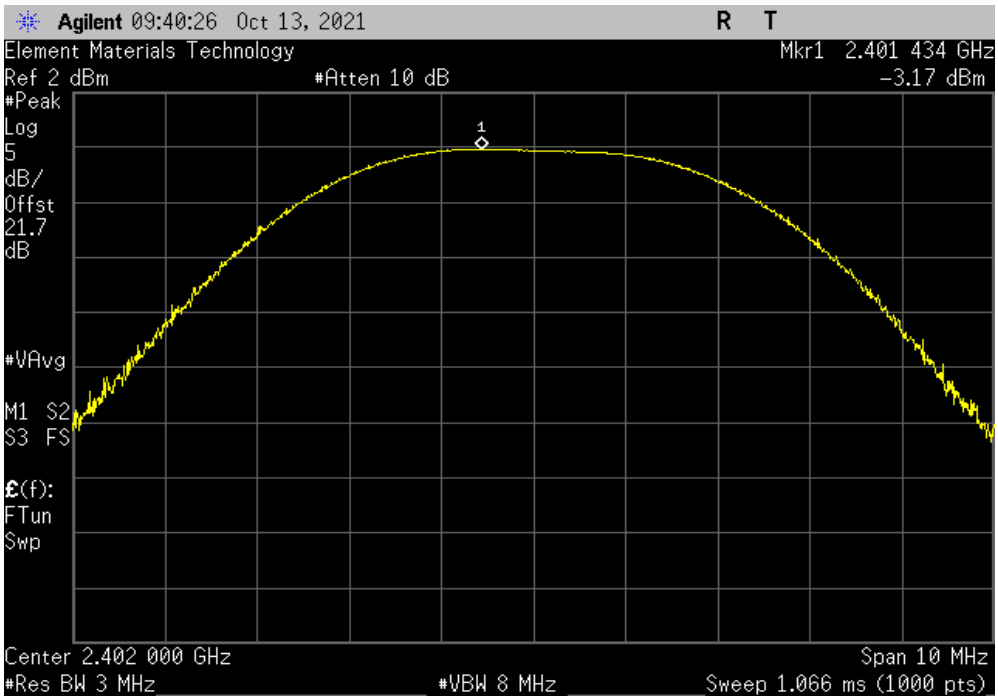
DEVIATIONS FROM TEST STANDARD

None

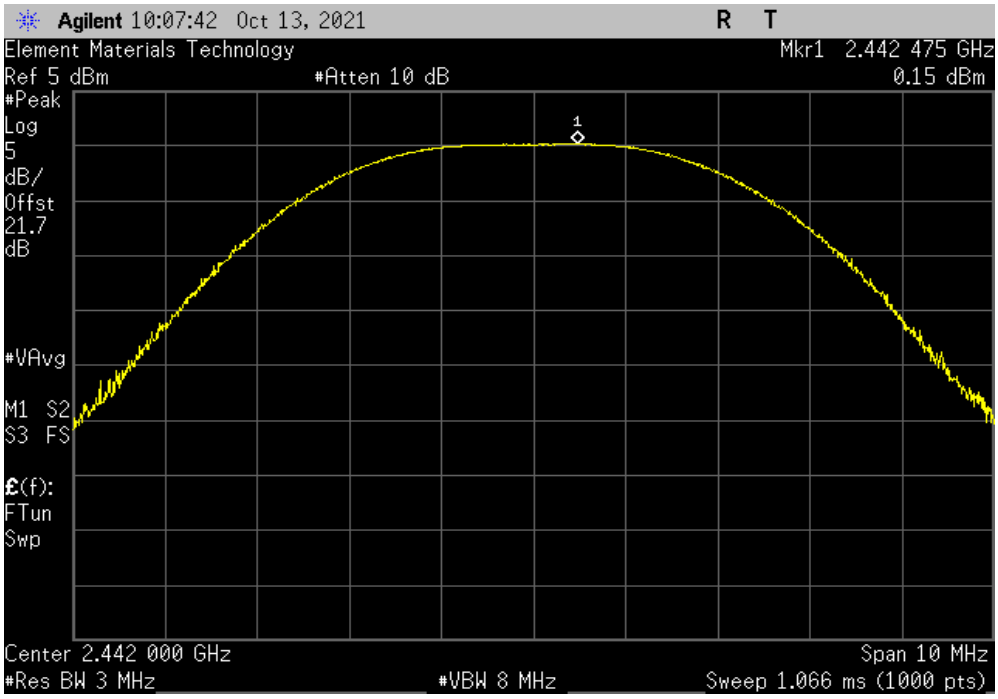
Configuration #	**2**	*Signature* Andrew Rogstad

	Out Pwr (dBm)	**Limit (dBm)**	**Result**
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-3.173	30	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	0.147	30	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-4	30	Pass

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-3.173	30	Pass

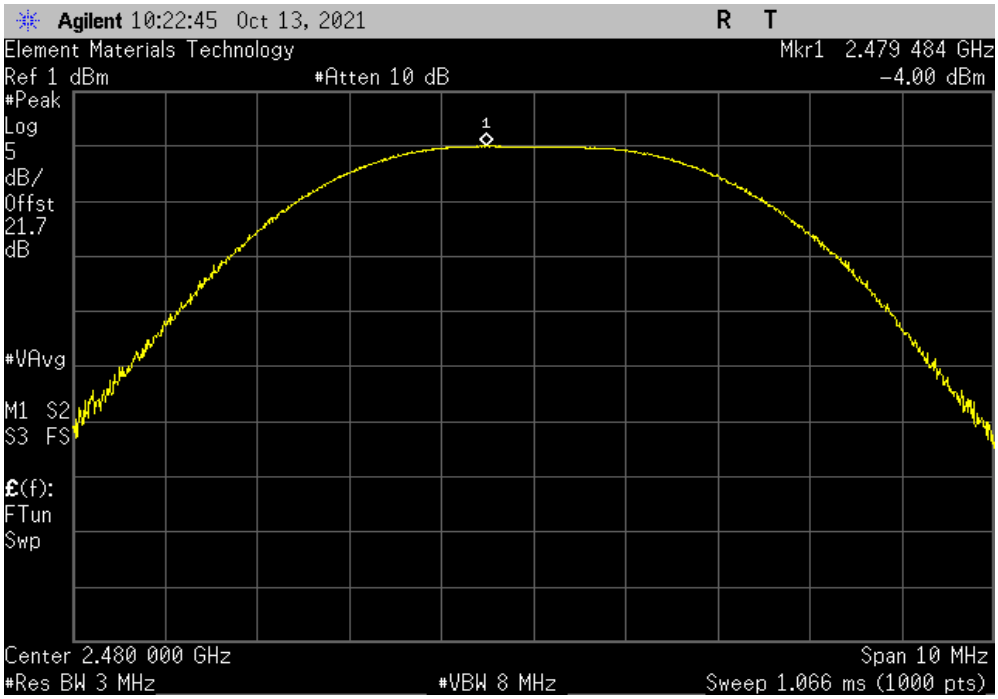


BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.147	30	Pass



OUTPUT POWER

BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				-4	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	2020-04-28	2023-04-28
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16

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 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0258**
Serial Number:	**211772495**			**Date:**	**5-Jan-22**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**John Quach**			**Humidity:**	**20.7% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2022	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

DEVIATIONS FROM TEST STANDARD

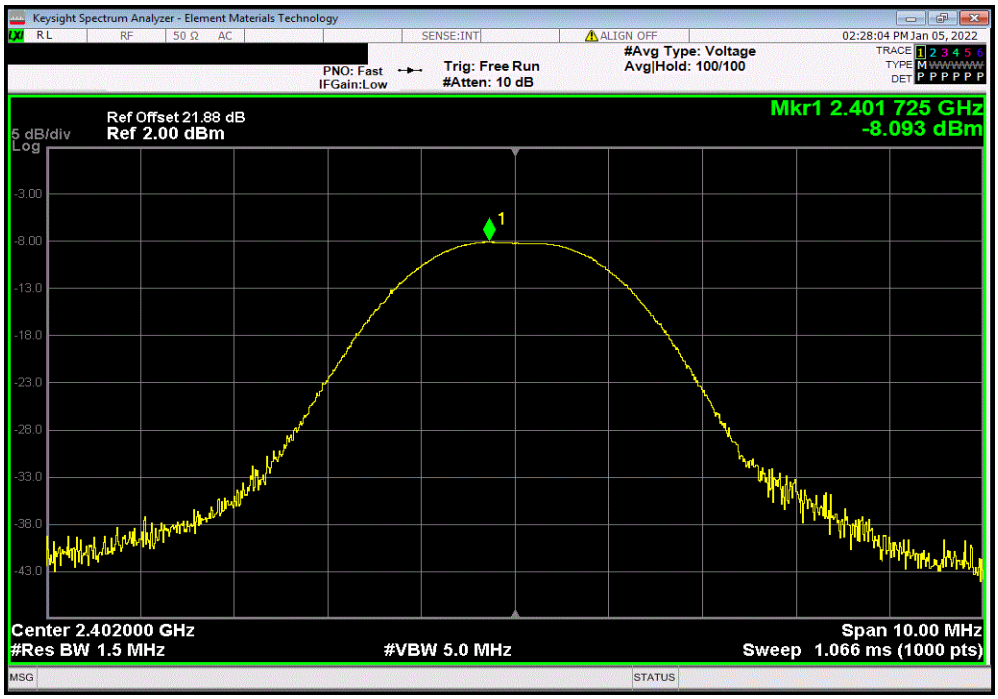
None

Configuration #	**2**	*Signature* Andrew Rogstad

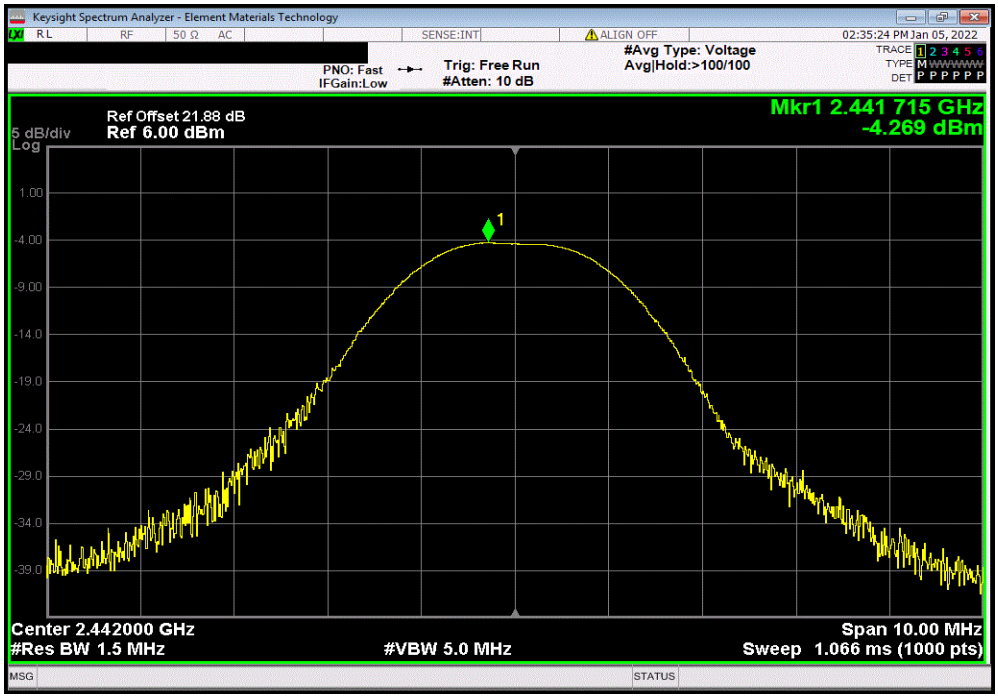
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-8.093	-8	-16.093	36	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-4.269	-8	-12.269	36	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-9.153	-8	-17.153	36	Pass

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
		-8.093	-8	-16.093	36	Pass

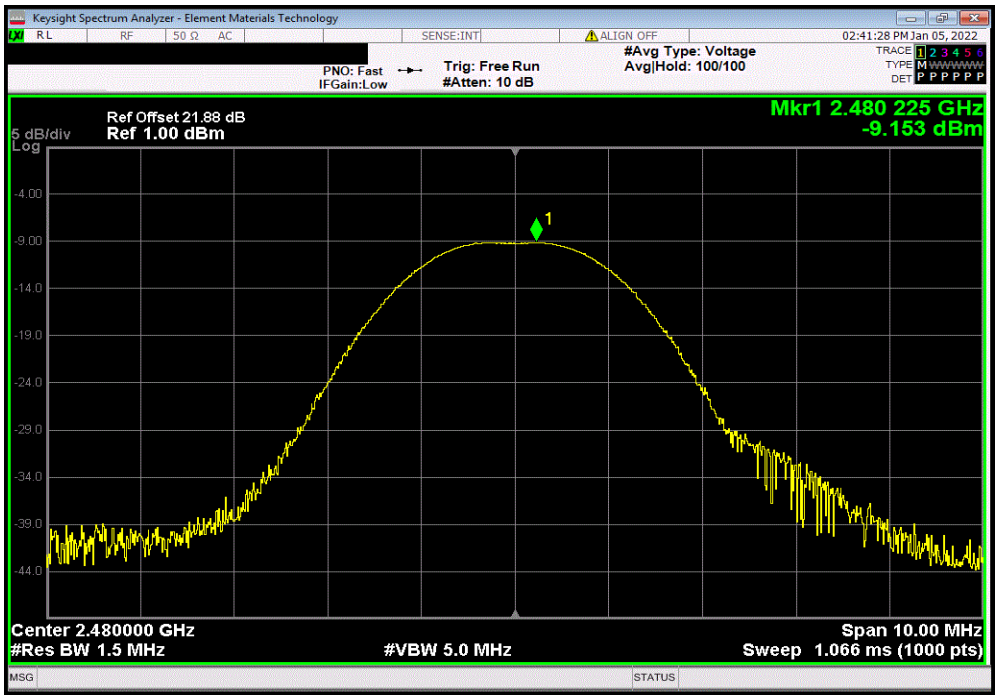


BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-4.269	-8	-12.269	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-9.153	-8	-17.153	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2020.12.30.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0250**
Serial Number:	**211772499**			**Date:**	**13-Oct-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**21.6 °C**
Attendees:	**John Quach**			**Humidity:**	**48.4% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

DEVIATIONS FROM TEST STANDARD

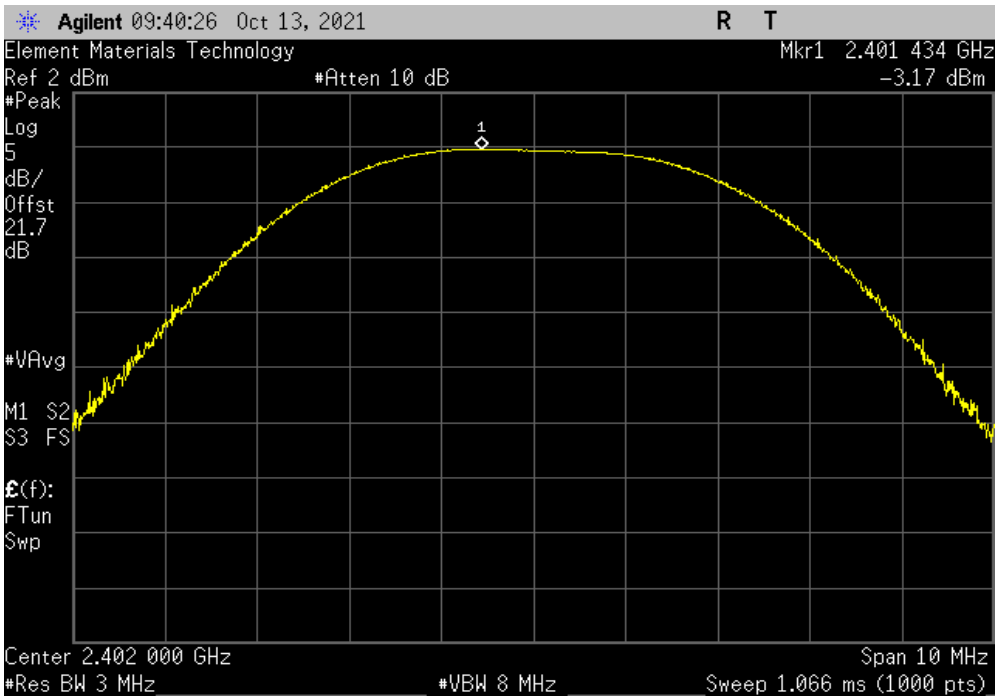
None

Configuration #	**2**	*Signature* Andrew Rogstad

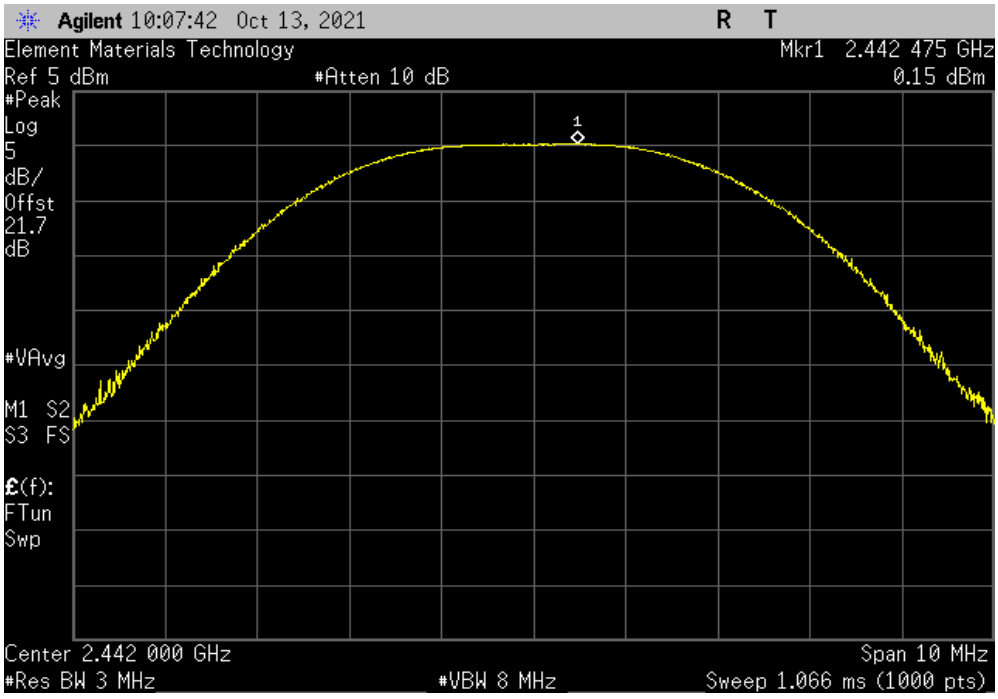
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-3.173	-8	-11.173	36	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	0.147	-8	-7.853	36	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-4	-8	-12	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-3.173	-8	-11.173	36	Pass

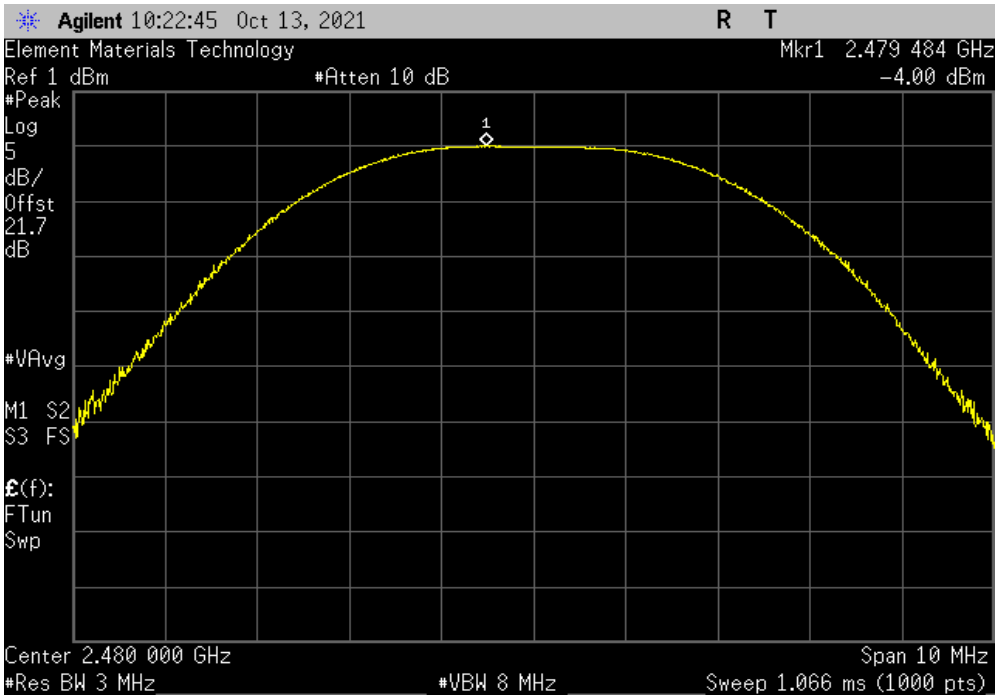


BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		0.147	-8	-7.853	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 2 Mbps High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		-4	-8	-12	36	Pass



POWER SPECTRAL DENSITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	2020-04-28	2023-04-28
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16

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 C63.10:2013 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

element

TbtTx 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0258**
Serial Number:	**211772495**			**Date:**	**5-Jan-22**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**John Quach**			**Humidity:**	**20.5% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2022	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

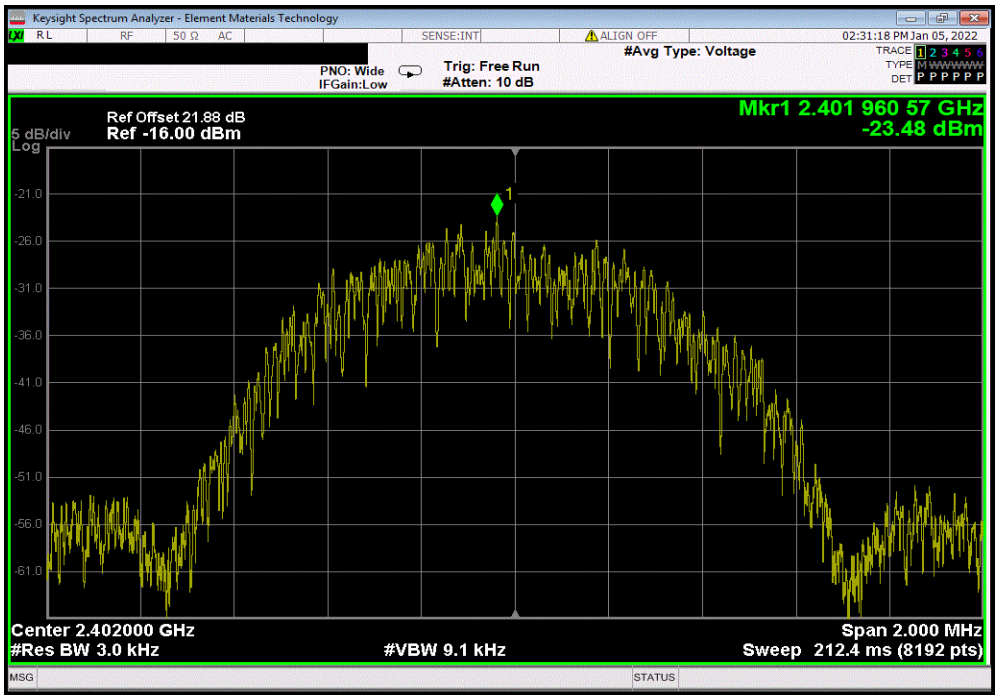
DEVIATIONS FROM TEST STANDARD

None

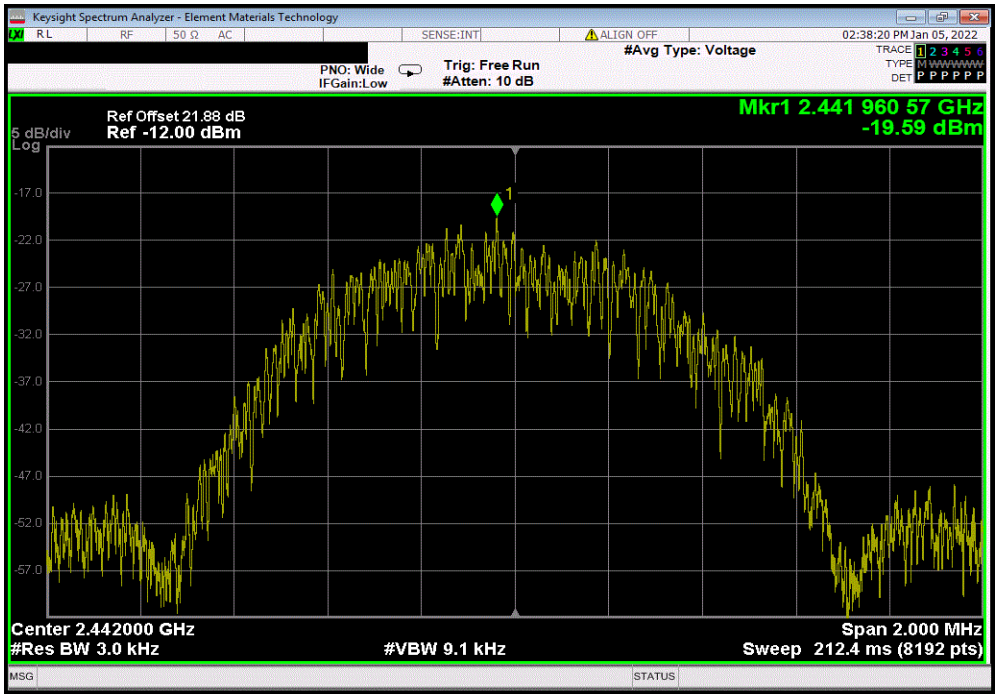
Configuration #	**2**	*Signature* Andrew Rogstad

	Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-23.477	8	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	-19.586	8	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-24.601	8	Pass

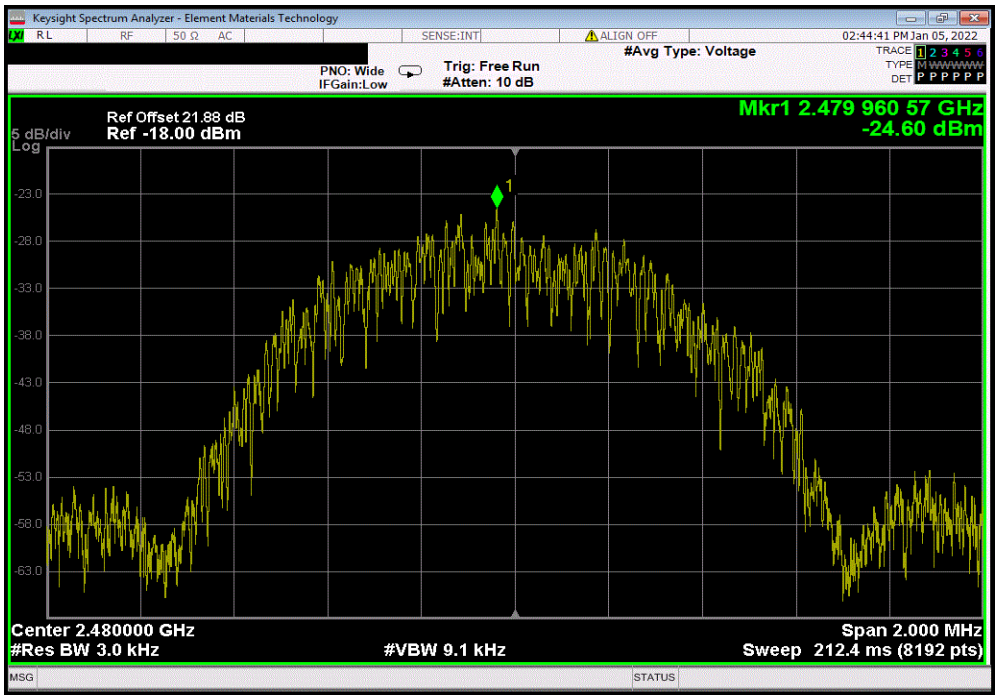
BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-23.477	8	Pass



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-19.586	8	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-24.601	8	Pass



POWER SPECTRAL DENSITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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 C63.10:2013 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	Genesis 24 MRIC R			Work Order:	STAK0250
Serial Number:	211772499			Date:	13-Oct-21
Customer:	Starkey Laboratories, Inc.			Temperature:	21.7 °C
Attendees:	John Quach			Humidity:	48.5% RH
Project:	None			Barometric Pres.:	1009 mbar
Tested by:	Andrew Rogstad	Power:	Battery	Job Site:	MN08

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

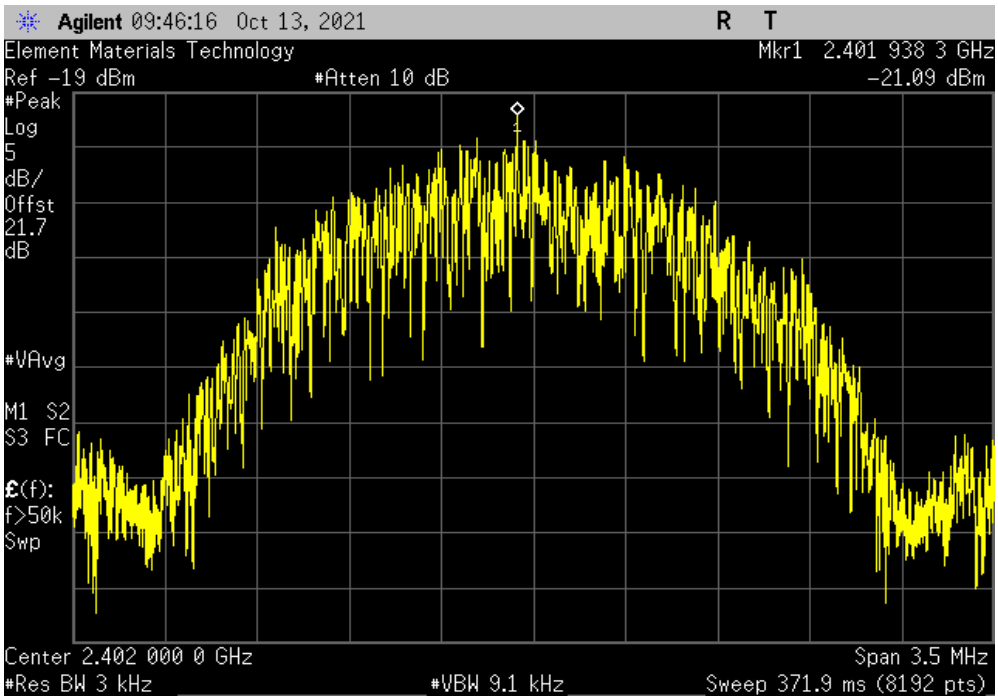
DEVIATIONS FROM TEST STANDARD

None

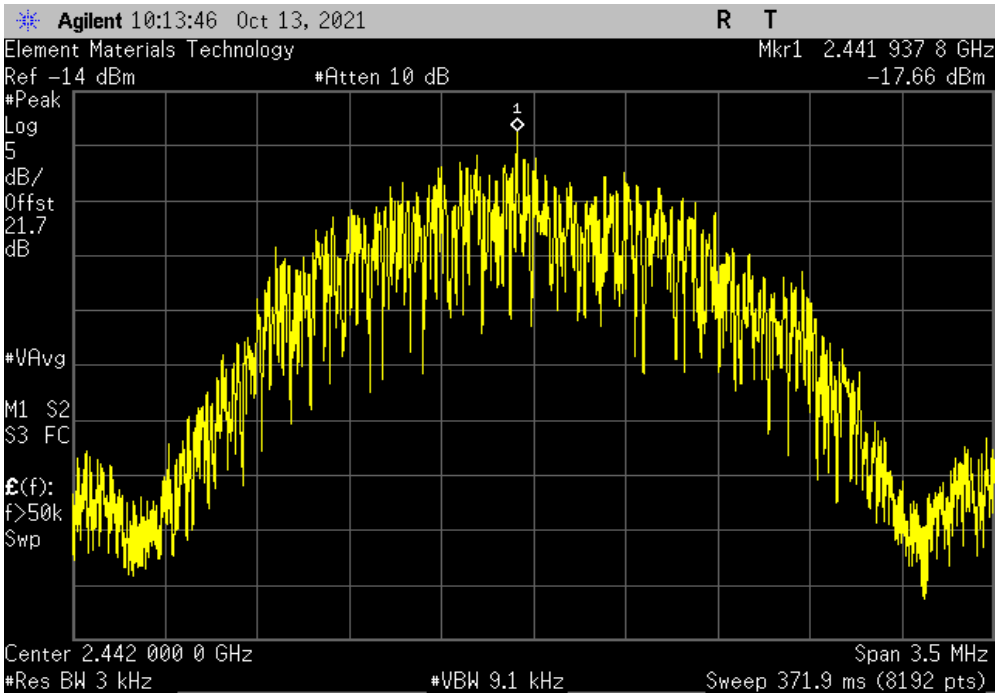
Configuration #	2	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-21.091	8	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	-17.663	8	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-21.954	8	Pass

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-21.091	8	Pass



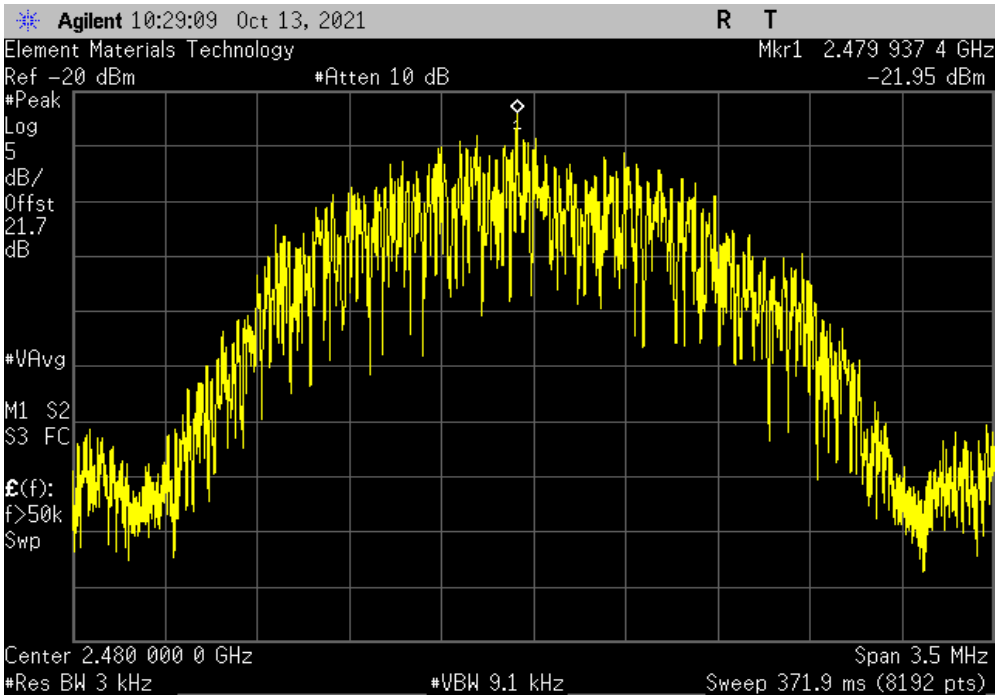
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-17.663	8	Pass



POWER SPECTRAL DENSITY

TbtTx 2021.03.19.1 XMit 2020.12.30.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-21.954	8	Pass



BAND EDGE COMPLIANCE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	2020-04-28	2023-04-28
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16

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 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0258**
Serial Number:	**211772495**			**Date:**	**5-Jan-22**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**John Quach**			**Humidity:**	**20.5% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2022	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

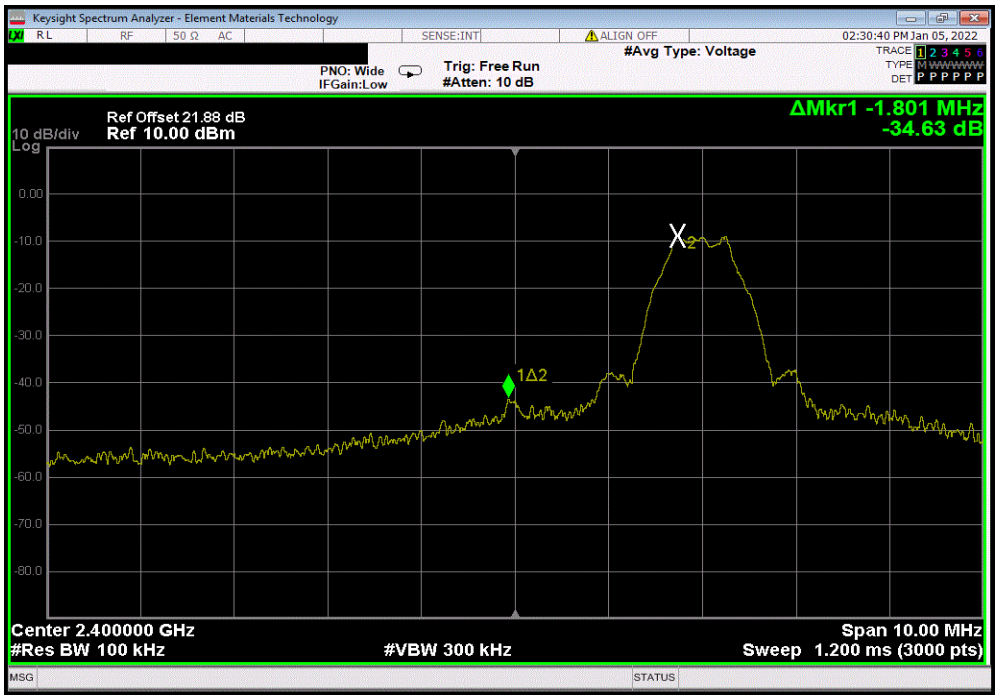
DEVIATIONS FROM TEST STANDARD

None

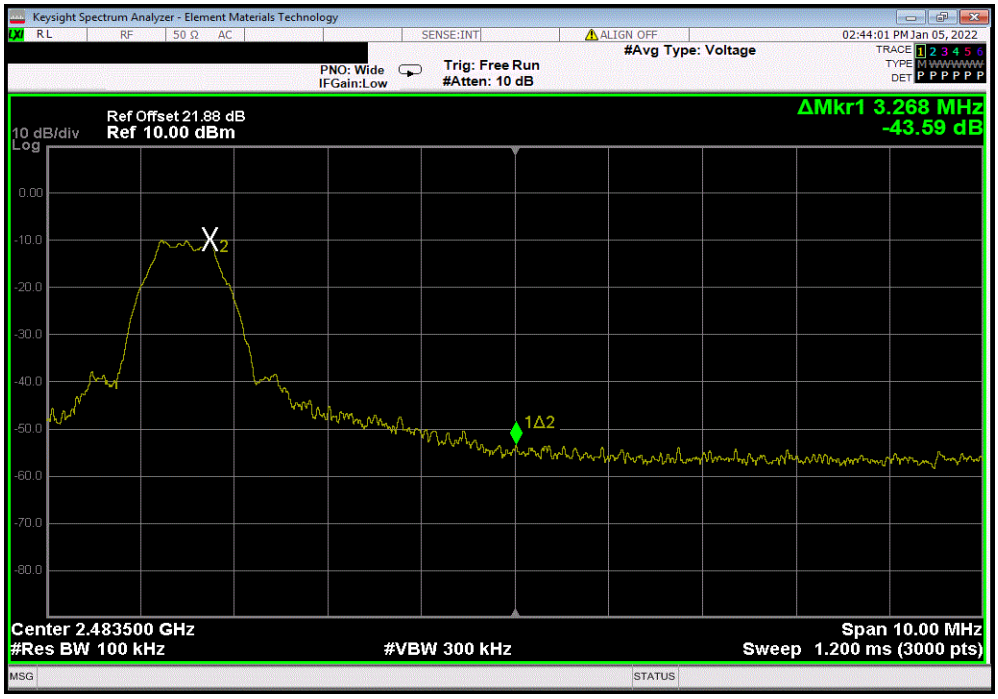
Configuration #	**2**	*Signature* Andrew Rogstad

	Value (dBc)	**Limit ≤ (dBc)**	**Result**
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	-34.63	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	-43.59	-20	Pass

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-34.63	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.59	-20	Pass



BAND EDGE COMPLIANCE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0250**
Serial Number:	**211772499**			**Date:**	**13-Oct-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**21.7 °C**
Attendees:	**John Quach**			**Humidity:**	**48.5% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

DEVIATIONS FROM TEST STANDARD

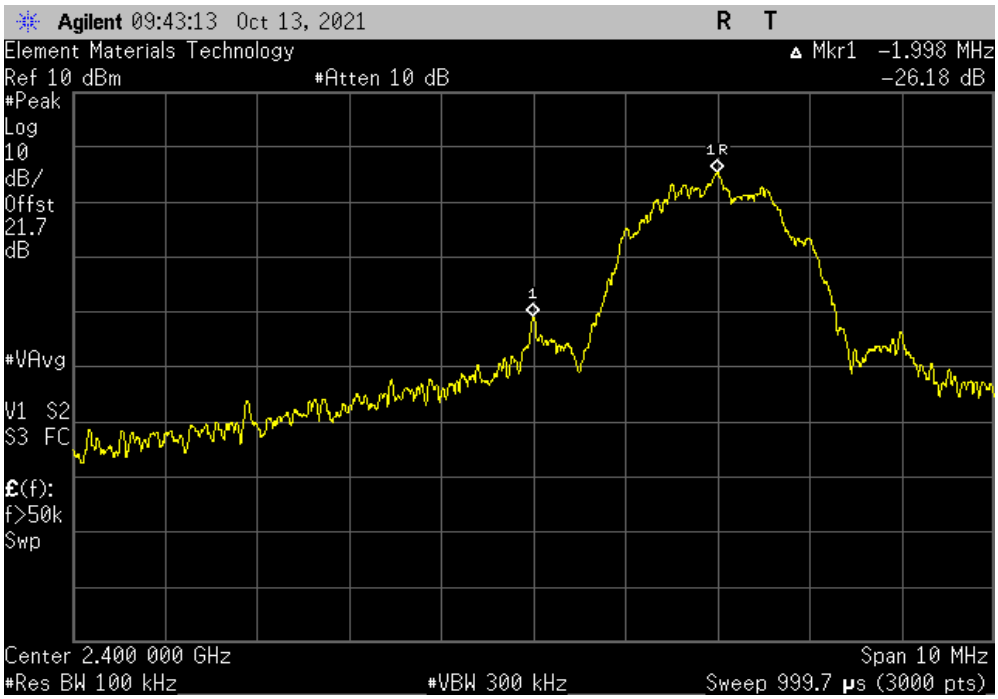
None

Configuration #	**2**	*Signature* Andrew Rogstad

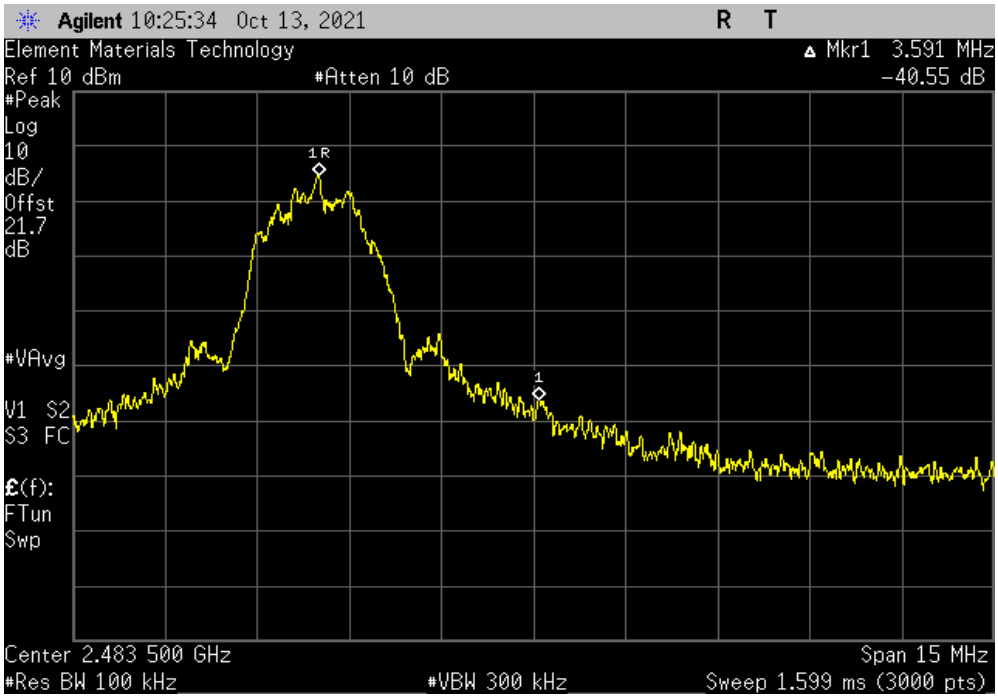
	Value (dBc)	**Limit ≤ (dBc)**	**Result**
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	-26.19	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	-40.56	-20	Pass

BAND EDGE COMPLIANCE

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-26.19	-20	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-40.56	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	2020-04-28	2023-04-28
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16

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.

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0258**
Serial Number:	**211772495**			**Date:**	**5-Jan-22**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**John Quach**			**Humidity:**	**20.4% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2022	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

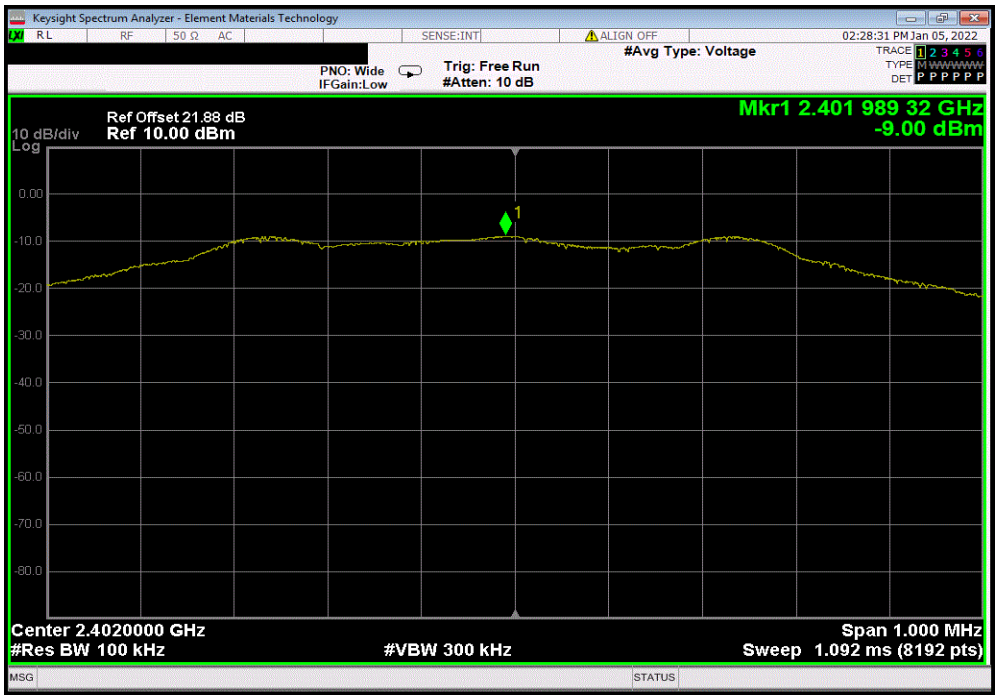
DEVIATIONS FROM TEST STANDARD

None

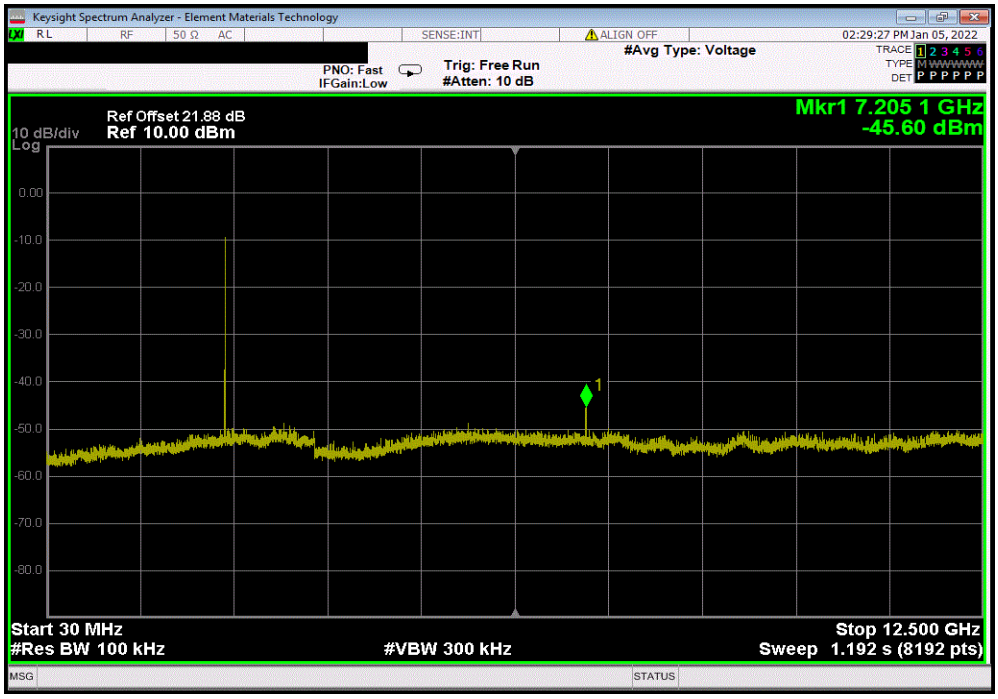
Configuration #	**2**	*Signature* Andrew Rogstad

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	Fundamental	2401.99	N/A	N/A	N/A
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	30 MHz - 12.5 GHz	7205.08	-36.6	-20	Pass
BLE/GFSK 1 Mbps Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24880.97	-29.97	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	Fundamental	2441.99	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	7326.88	-41.79	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24989.32	-33.59	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	Fundamental	2480.23	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz	30 MHz - 12.5 GHz	7441.06	-34.67	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz	12.5 GHz - 25 GHz	24942.01	-28.44	-20	Pass

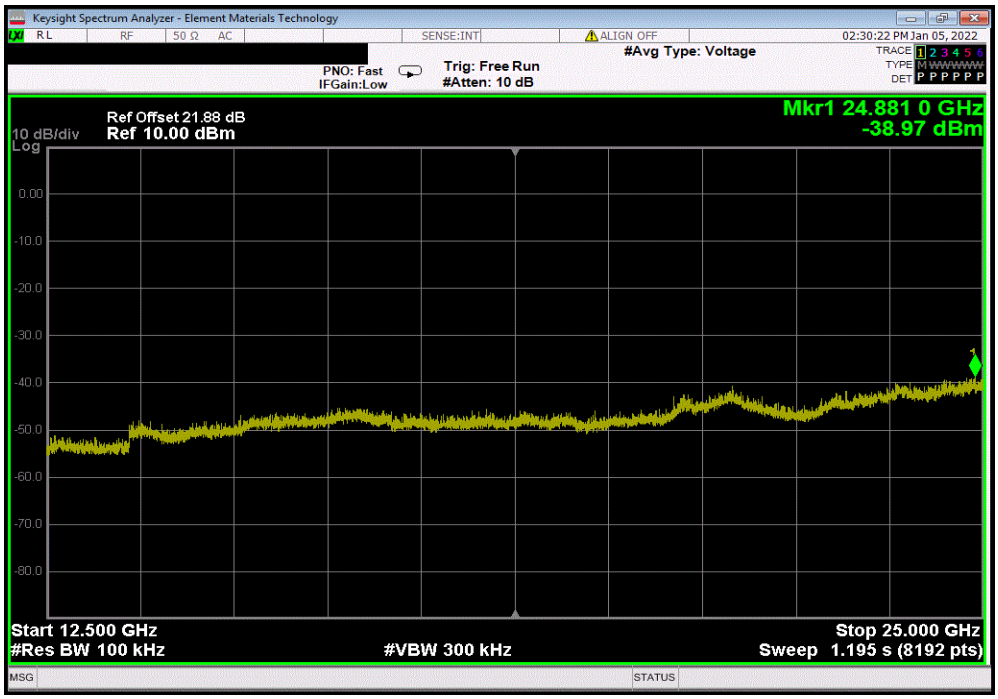
BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2401.99	N/A	N/A	N/A



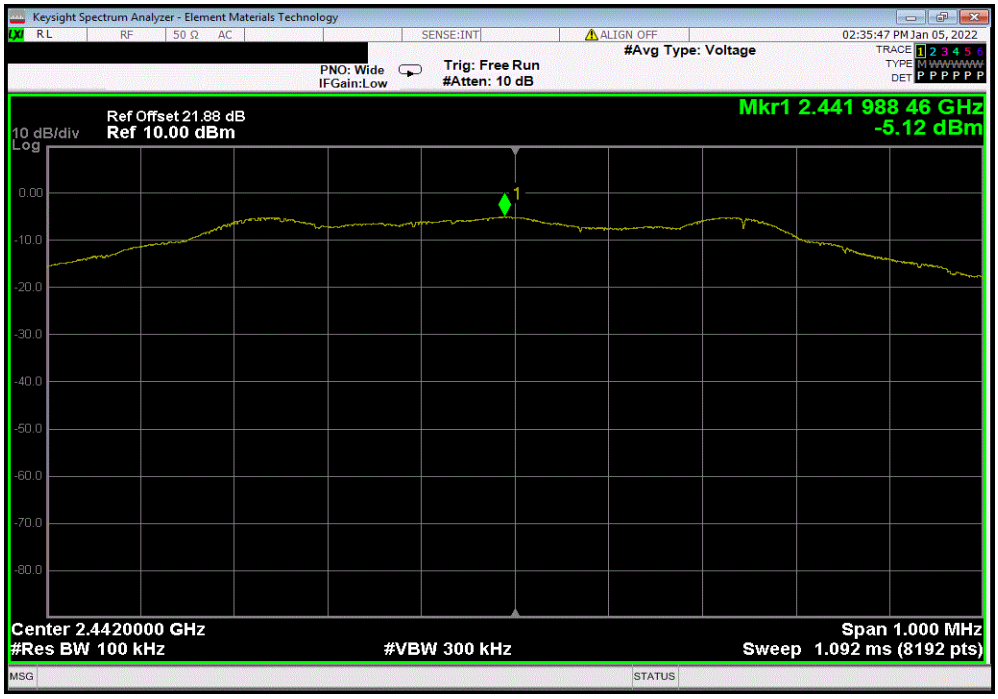
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7205.08	-36.6	-20	Pass



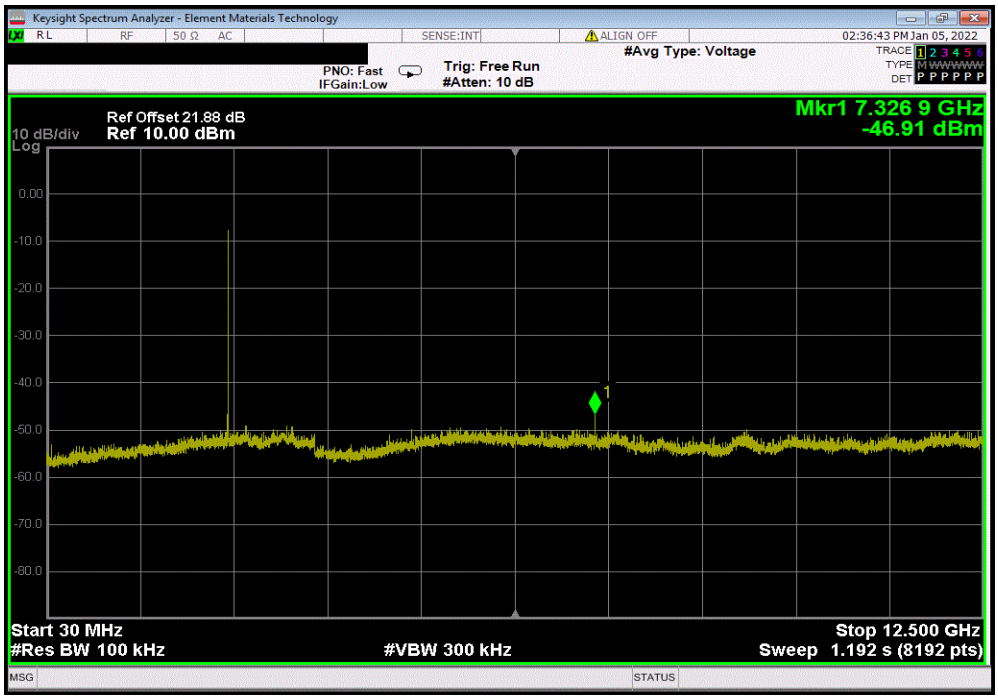
BLE/GFSK 1 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24880.97	-29.97	-20	Pass



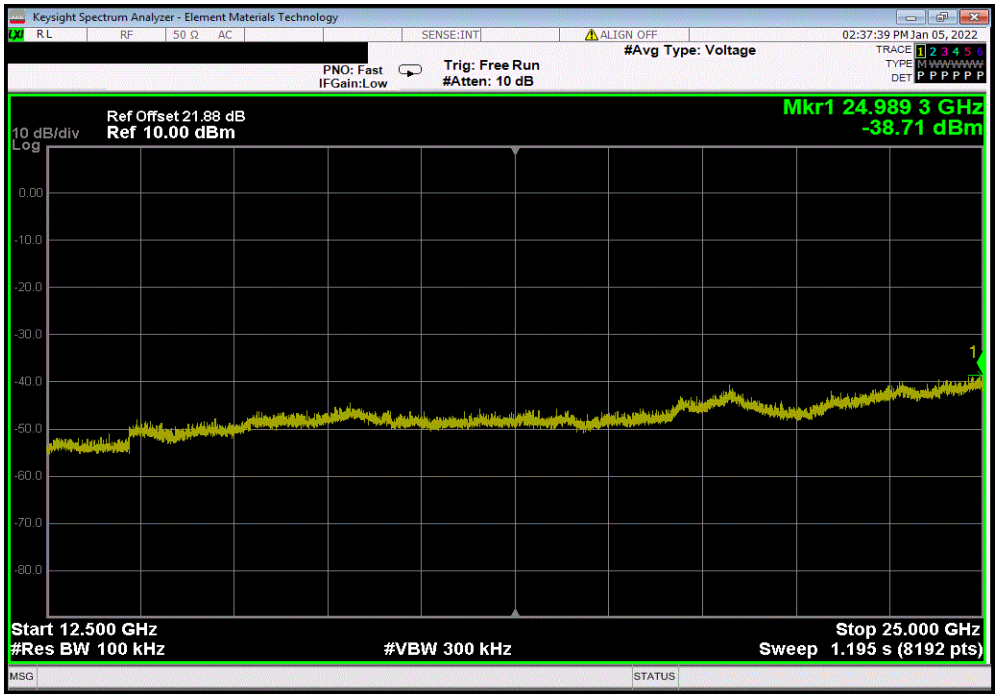
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2441.99	N/A	N/A	N/A



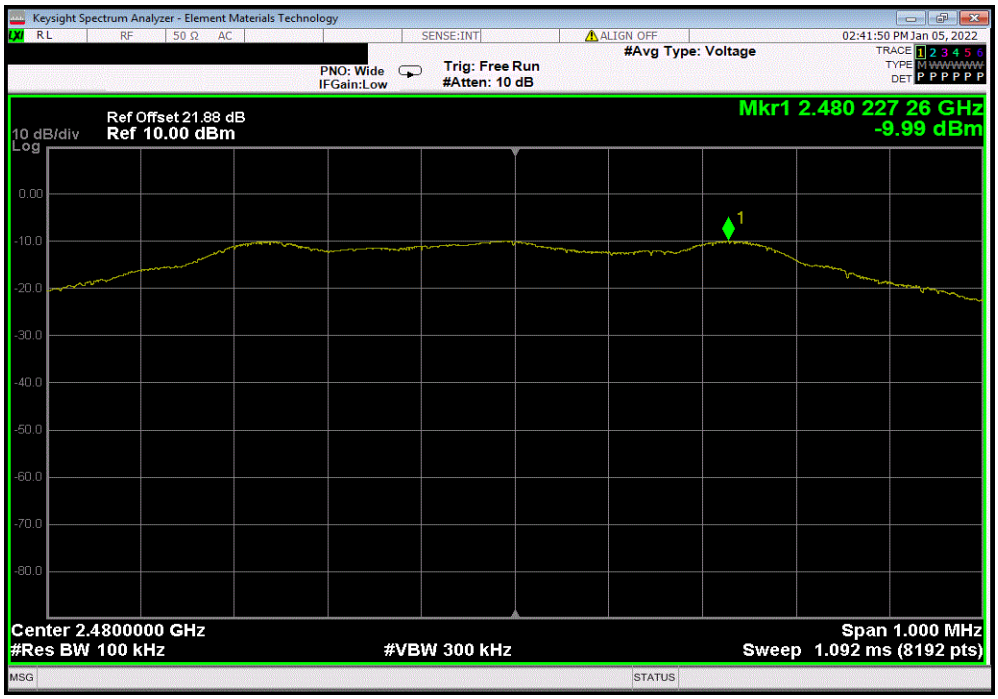
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7326.88	-41.79	-20	Pass



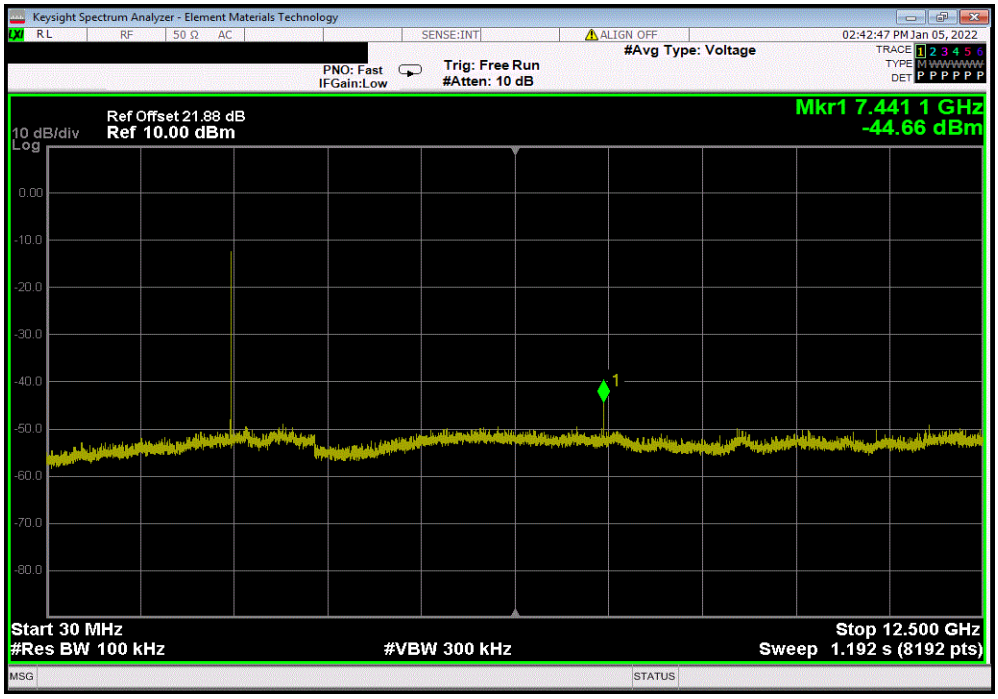
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24989.32	-33.59	-20	Pass



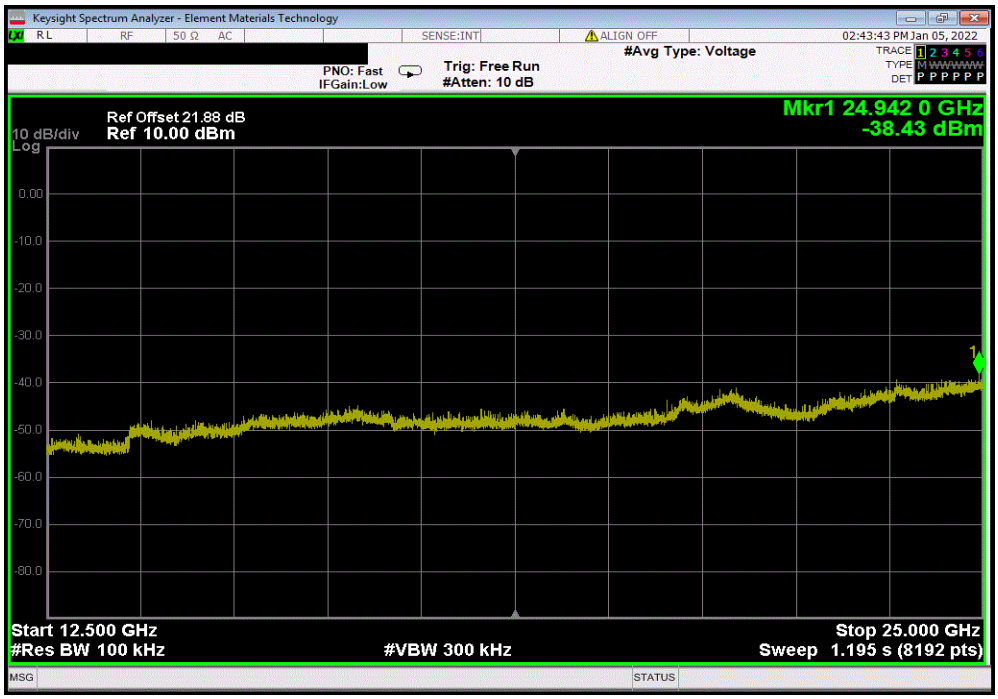
BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2480.23	N/A	N/A	N/A



BLE/GFSK 1 Mbps High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7441.06	-34.67	-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	24942.01	-28.44	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

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.

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Genesis 24 MRIC R**			**Work Order:**	**STAK0250**
Serial Number:	**211772499**			**Date:**	**13-Oct-21**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**21.7 °C**
Attendees:	**John Quach**			**Humidity:**	**48.6% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

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

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

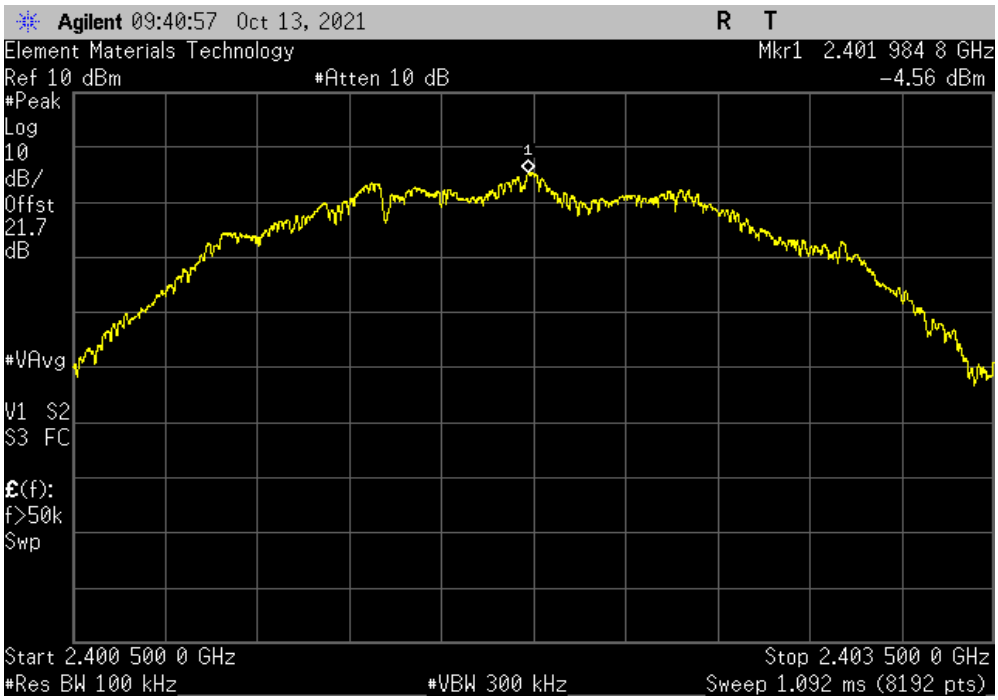
DEVIATIONS FROM TEST STANDARD

None

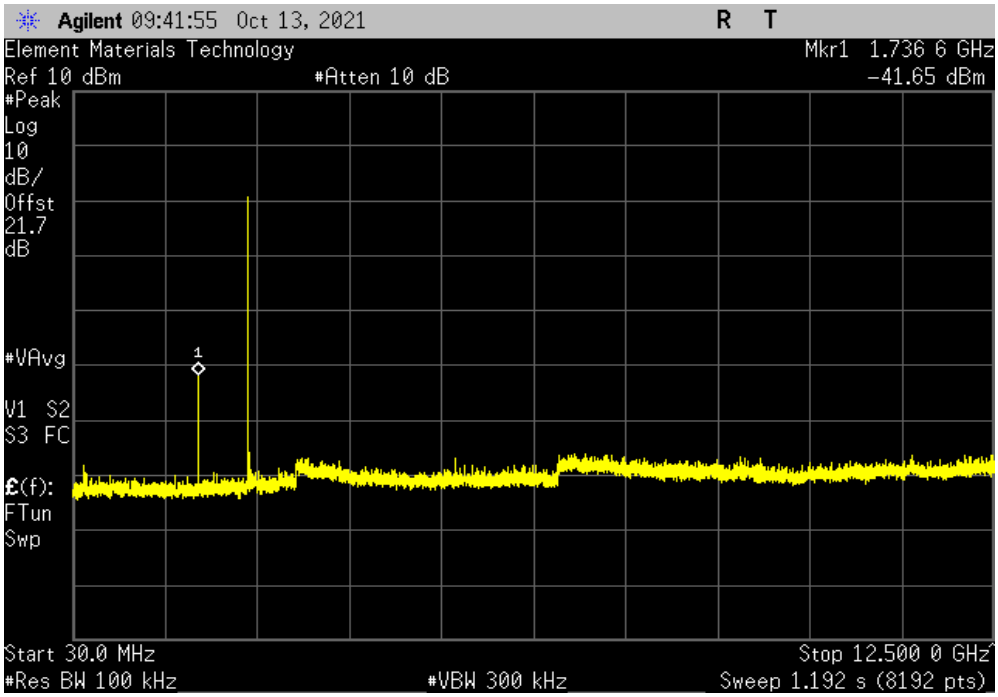
Configuration #	**2**	*Signature* Andrew Rogstad

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	Fundamental	2401.98	N/A	N/A	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	30 MHz - 12.5 GHz	1736.6	-37.1	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24968	-45.45	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	Fundamental	2441.99	N/A	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	1742.7	-46.15	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24798.6	-48.06	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	Fundamental	2479.98	N/A	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz	30 MHz - 12.5 GHz	7439.5	-43.12	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz	12.5 GHz - 25 GHz	24983.2	-44.25	-20	Pass

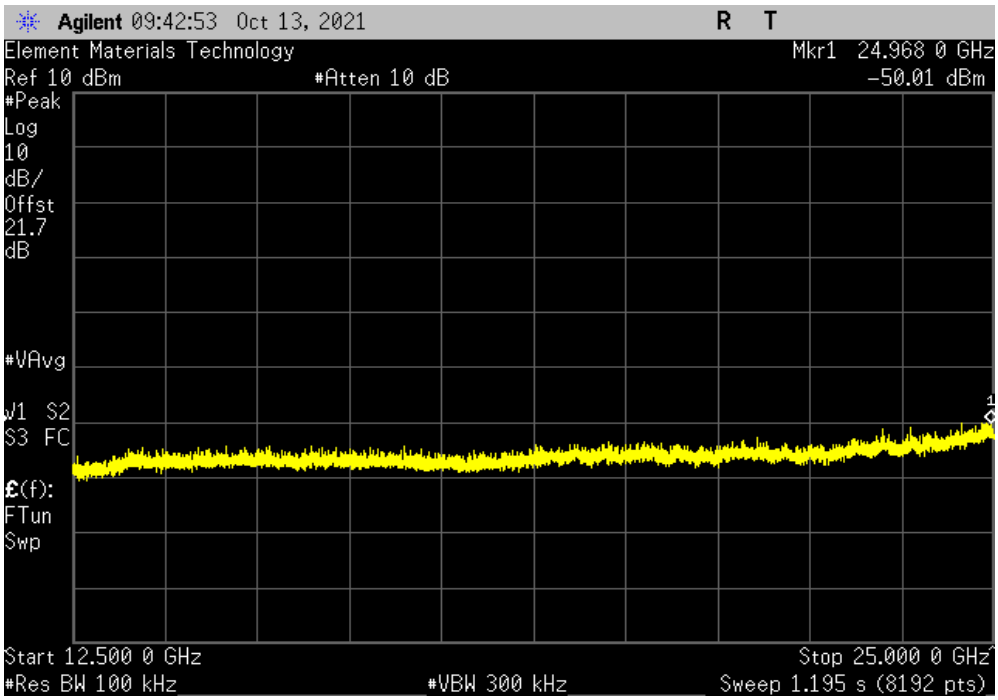
BLE/GFSK 2 Mbps Low Channel, 2402 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2401.98	N/A	N/A	N/A



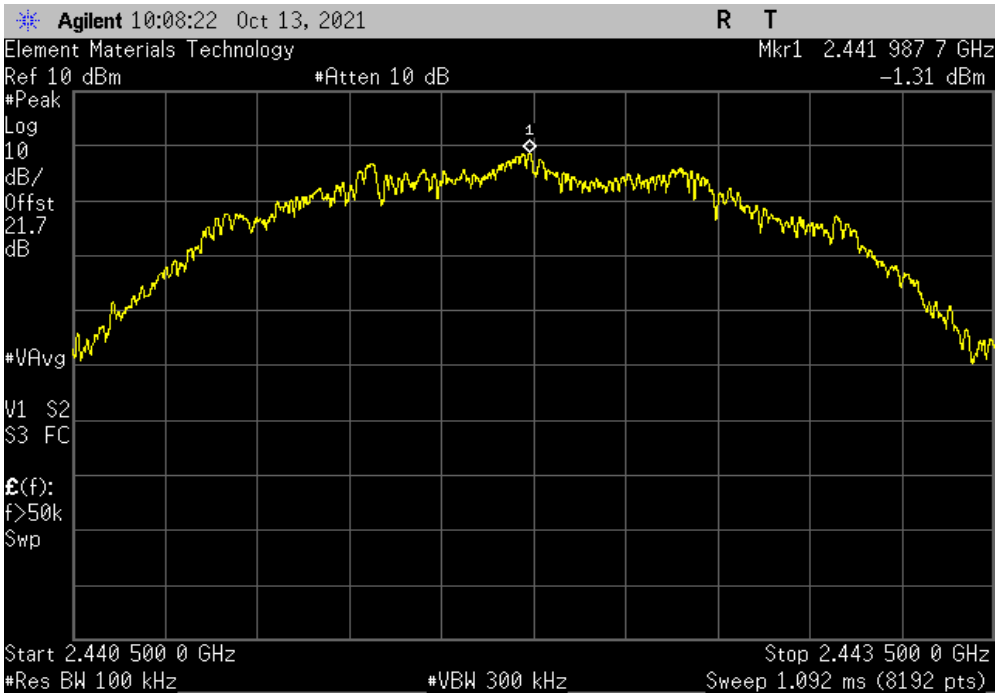
BLE/GFSK 2 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	1736.6	-37.1	-20	Pass



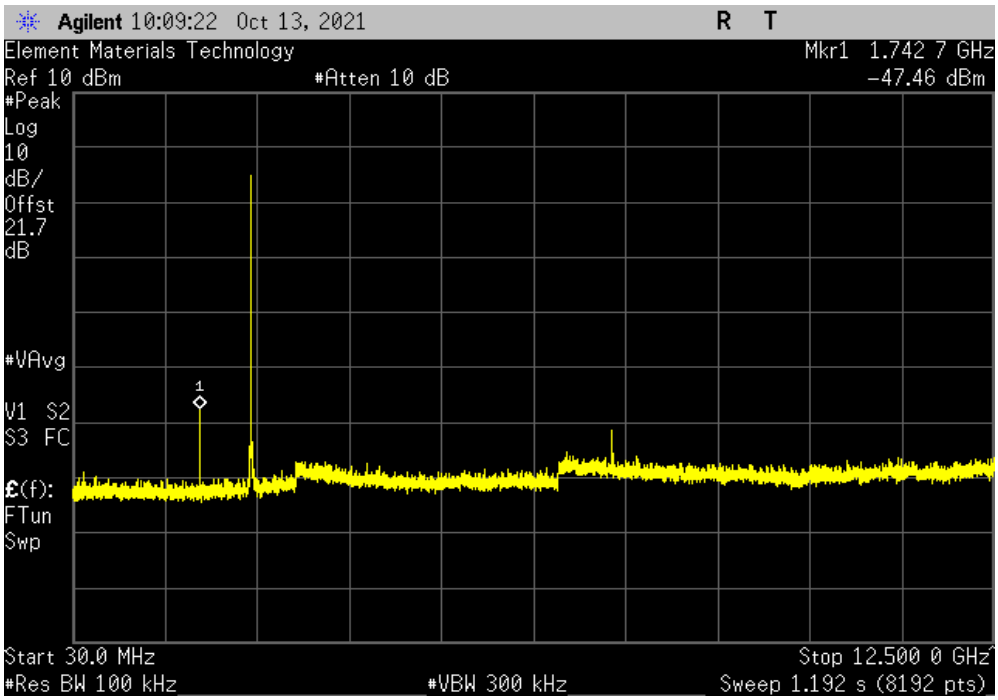
BLE/GFSK 2 Mbps Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24968	-45.45	-20	Pass



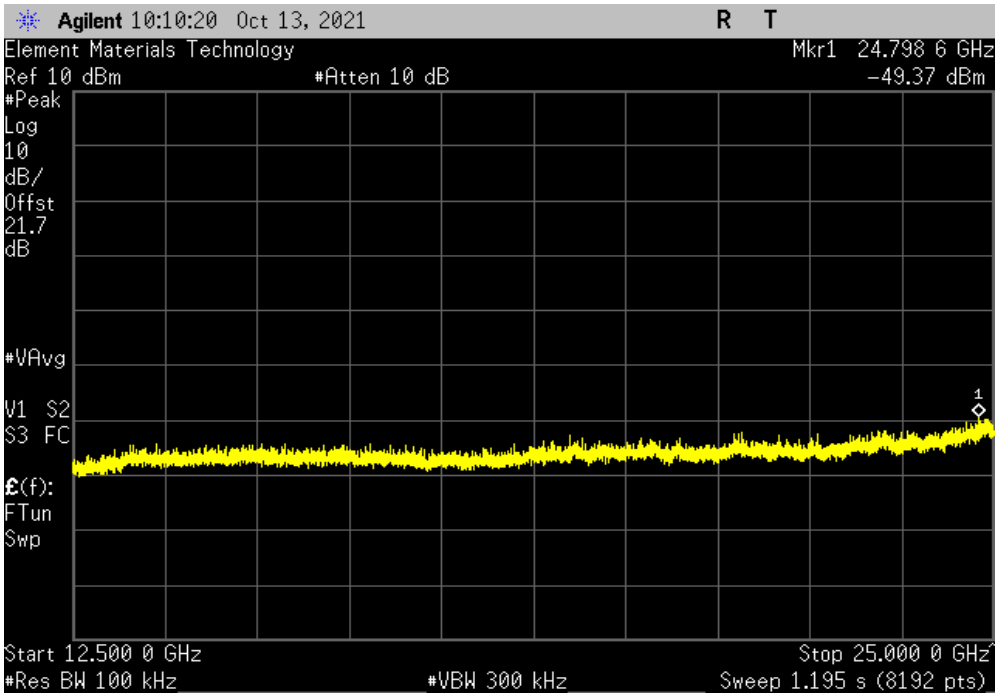
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental		2441.99	N/A	N/A	N/A



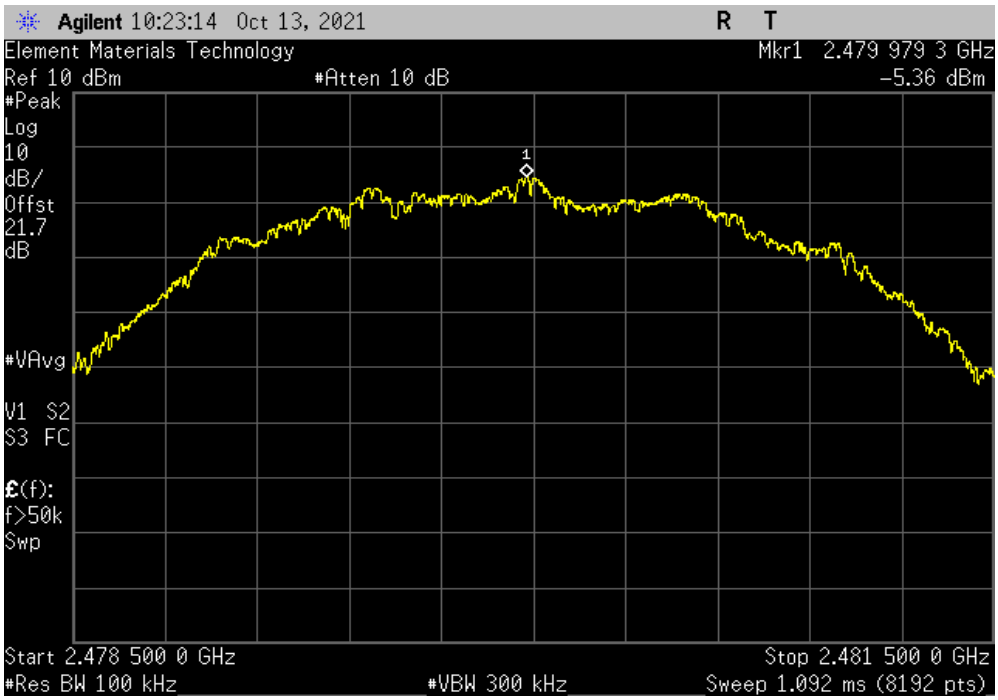
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz	1742.7	-46.15	-20	Pass



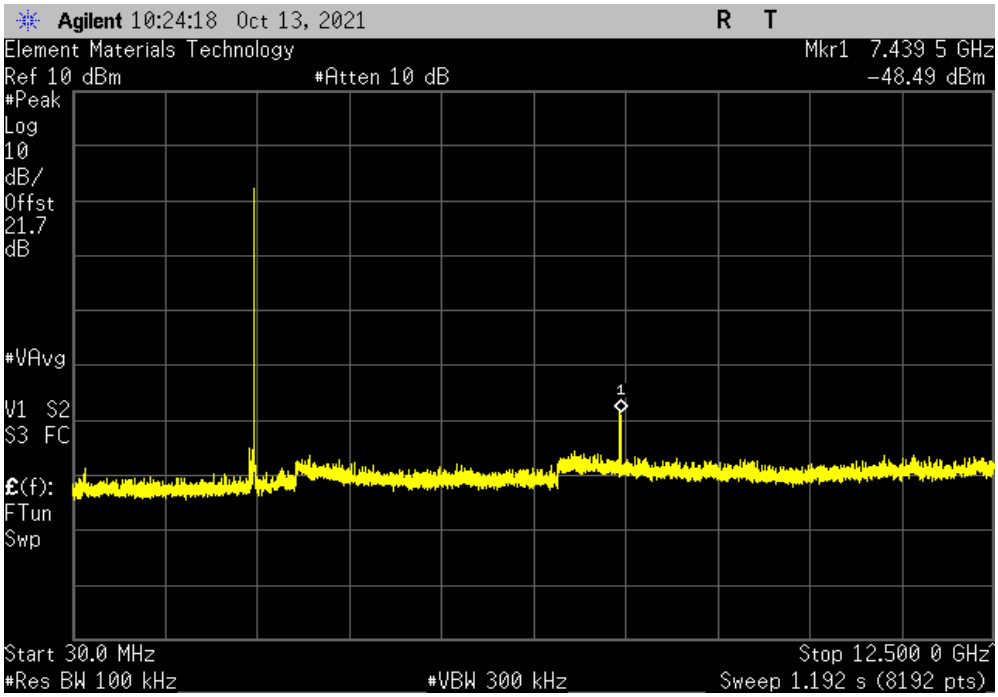
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz	24798.6	-48.06	-20	Pass



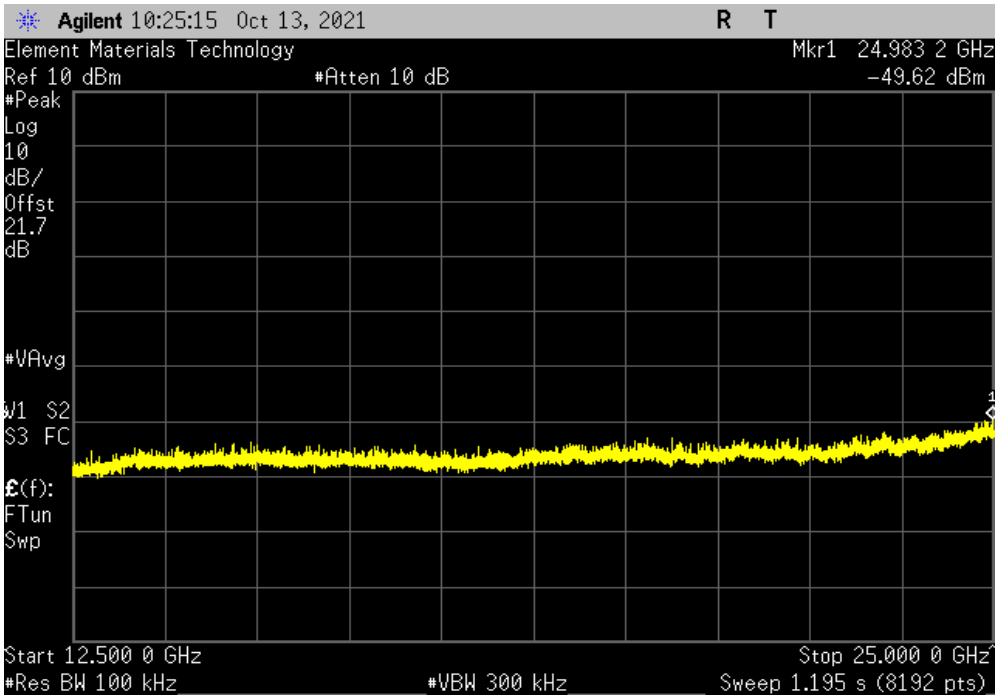
BLE/GFSK 2 Mbps High Channel, 2480 MHz						
	Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental		2479.98	N/A	N/A	N/A



BLE/GFSK 2 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7439.5	-43.12	-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	24983.2	-44.25	-20	Pass



SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

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 C63.10:2013). 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.

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 - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2021-09-09	2022-09-09
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2021-09-09	2022-09-09
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2020-09-03	2022-09-03
Cable	Element	Double Ridge Guide Horn Cables	MNV	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2021-02-01	2022-02-01
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Cable	Element	Standard Gain Cable	MNW	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2021-02-01	2022-02-01
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	L-3 Narda-Miteq	AMF-6F-12001800-30-10P	PAP	2021-02-01	2022-02-01
Antenna - Biconilog	Teseq	CBL 6141B	AYD	2020-02-05	2022-02-05
Cable	Element	Biconilog Cable	MNX	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2021-02-01	2022-02-01
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Attenuator	Coaxicom	3910-20	AXY	2021-09-10	2022-09-10
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2021-09-10	2022-09-10

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

STAK0258-1

MODES INVESTIGATED

Transmitting Bluetooth Low Energy on Low channel (2402 MHz) and High channel (2480 MHz), 1 Mbps, Power setting 0 dBm
Transmitting Bluetooth Low Energy on Low channel (2402 MHz), Mid channel (2442 MHz), and High channel (2480 MHz), 1 Mbps, Power setting 0 dBm

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

EUT:	Genesis 24 MRIC R	Work Order:	STAK0258
Serial Number:	211772497	Date:	2022-01-05
Customer:	Starkey Laboratories, Inc.	Temperature:	23.2°C
Attendees:	John Quach	Relative Humidity:	19.7%
Customer Project:	None	Bar. Pressure (PMSL):	1007 mb
Tested By:	Andrew Rogstad	Job Site:	MN09
Power:	Battery	Configuration:	STAK0258-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

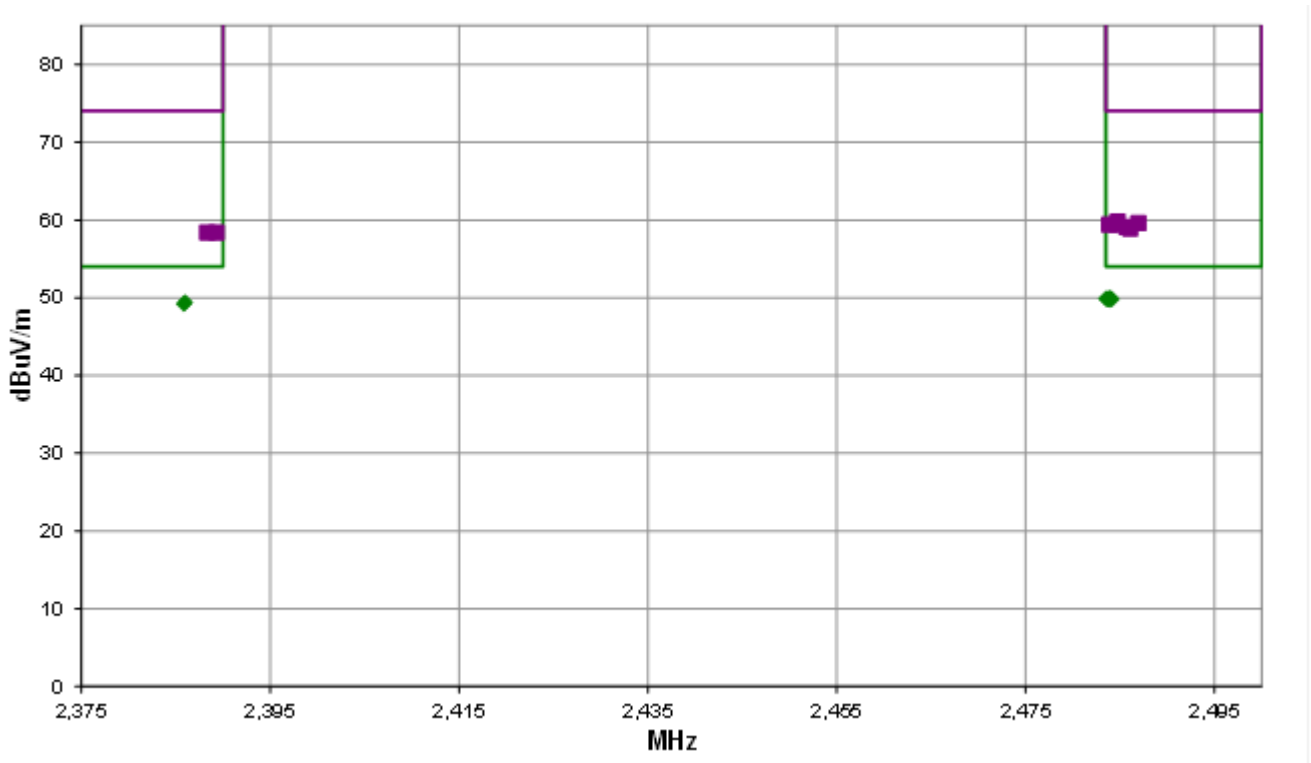
The test mode duty cycle (DC) was found to be 10.7%. Using the formula 10*log(1/DC), the upward Duty Cycle Correction Factor (DCCF) is 9.7 dB. The protocol-limited duty cycle in the field is declared to be 17%. Using the formula 10*log(DC), the downward DCCF is 7.7 dB. This leads to a net DCCF of 2.0 dB.

EUT OPERATING MODES

Transmitting Bluetooth Low Energy on Low channel (2402 MHz) and High channel (2480 MHz), 1 Mbps, Power setting 0 dBm

DEVIATIONS FROM TEST STANDARD

None



Run #: 18 ■ PK ◆ AV ● QP

RESULTS - Run #18

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.983	31.2	-3.2	1.5	105.0	2.0	20.0	Horz	AV	0.0	50.0	54.0	-4.0	EUT vert, High ch, 1 Mbps
2483.767	31.1	-3.2	1.5	77.0	2.0	20.0	Vert	AV	0.0	49.9	54.0	-4.1	EUT vert, High ch, 1 Mbps
2483.525	31.1	-3.2	1.5	184.0	2.0	20.0	Horz	AV	0.0	49.9	54.0	-4.1	EUT horz, High ch, 1 Mbps
2483.642	31.0	-3.2	1.5	313.0	2.0	20.0	Horz	AV	0.0	49.8	54.0	-4.2	EUT on side, High ch, 1 Mbps
2484.142	31.0	-3.2	1.5	255.0	2.0	20.0	Vert	AV	0.0	49.8	54.0	-4.2	EUT horz, High ch, 1 Mbps
2483.875	30.9	-3.2	1.5	219.0	2.0	20.0	Vert	AV	0.0	49.7	54.0	-4.3	EUT on side, High ch, 1 Mbps
2386.000	30.9	-3.5	1.5	132.0	2.0	20.0	Horz	AV	0.0	49.4	54.0	-4.6	EUT vert, Low ch, 1 Mbps
2385.867	30.7	-3.5	2.41	347.0	2.0	20.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT vert, Low ch, 1 Mbps
2484.758	43.0	-3.2	1.5	313.0		20.0	Horz	PK	0.0	59.8	74.0	-14.2	EUT on side, High ch, 1 Mbps
2486.942	42.8	-3.2	1.5	105.0		20.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT vert, High ch, 1 Mbps
2484.650	42.6	-3.2	1.5	77.0		20.0	Vert	PK	0.0	59.4	74.0	-14.6	EUT vert, High ch, 1 Mbps
2483.858	42.6	-3.2	1.5	255.0		20.0	Vert	PK	0.0	59.4	74.0	-14.6	EUT horz, High ch, 1 Mbps
2485.692	42.3	-3.2	1.5	184.0		20.0	Horz	PK	0.0	59.1	74.0	-14.9	EUT horz, High ch, 1 Mbps
2486.083	42.1	-3.2	1.5	219.0		20.0	Vert	PK	0.0	58.9	74.0	-15.1	EUT on side, High ch, 1 Mbps
2388.325	41.9	-3.5	1.5	132.0		20.0	Horz	PK	0.0	58.4	74.0	-15.6	EUT vert, Low ch, 1 Mbps
2389.333	41.9	-3.5	2.41	347.0		20.0	Vert	PK	0.0	58.4	74.0	-15.6	EUT vert, Low ch, 1 Mbps

CONCLUSION
Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

EUT:	Genesis 24 MRIC R	Work Order:	STAK0258
Serial Number:	211772497	Date:	2022-01-05
Customer:	Starkey Laboratories, Inc.	Temperature:	23.2°C
Attendees:	John Quach	Relative Humidity:	19.7%
Customer Project:	None	Bar. Pressure (PMSL):	1007 mb
Tested By:	Andrew Rogstad	Job Site:	MN09
Power:	Battery	Configuration:	STAK0258-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

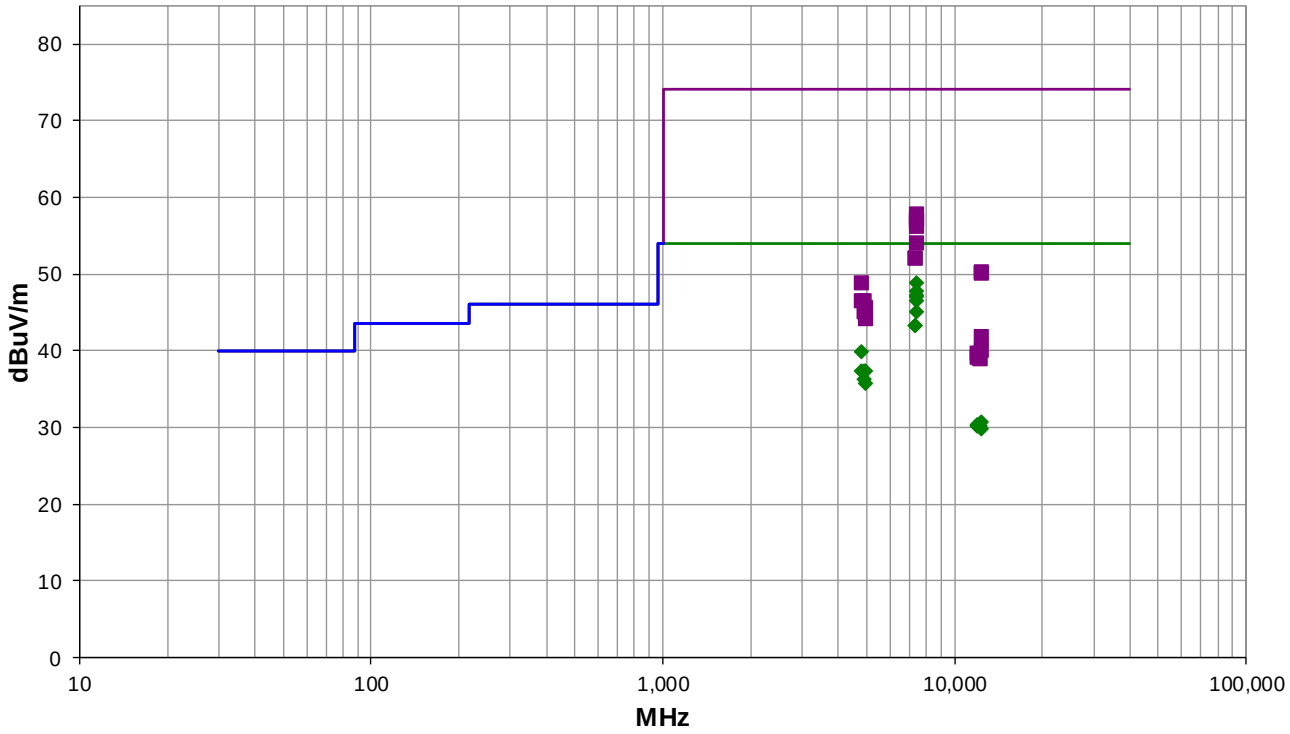
The test mode duty cycle (DC) was found to be 10.7%. Using the formula 10*log(1/DC), the upward Duty Cycle Correction Factor (DCCF) is 9.7 dB. The protocol-limited duty cycle in the field is declared to be 17%. Using the formula 10*log(DC), the downward DCCF is 7.7 dB. This leads to a net DCCF of 2.0 dB.

EUT OPERATING MODES

Transmitting Bluetooth Low Energy on Low channel (2402 MHz), Mid channel (2442 MHz), and High channel (2480 MHz), 1 Mbps, Power setting 0 dBm

DEVIATIONS FROM TEST STANDARD

None



Run #: 12 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

RESULTS - Run #12

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.283	33.1	13.7	2.5	322.0	2.0	0.0	Vert	AV	0.0	48.8	54.0	-5.2	EUT vert, High ch, 1 Mbps
7439.200	32.1	13.7	2.3	307.0	2.0	0.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT vert, High ch, 1 Mbps
7439.225	31.5	13.7	2.1	310.0	2.0	0.0	Horz	AV	0.0	47.2	54.0	-6.8	EUT horz, High ch, 1 Mbps
7439.633	31.3	13.7	2.4	12.0	2.0	0.0	Horz	AV	0.0	47.0	54.0	-7.0	EUT on side, High ch, 1 Mbps
7439.475	30.8	13.7	2.3	2.0	2.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT horz, High ch, 1 Mbps
7439.300	29.3	13.7	3.0	145.0	2.0	0.0	Vert	AV	0.0	45.0	54.0	-9.0	EUT on side, High ch, 1 Mbps
7328.500	28.2	13.1	3.4	89.0	2.0	0.0	Horz	AV	0.0	43.3	54.0	-10.7	EUT vert, Mid ch, 1 Mbps
7328.217	28.2	13.1	1.5	182.0	2.0	0.0	Vert	AV	0.0	43.3	54.0	-10.7	EUT vert, Mid ch, 1 Mbps
12402.220	24.8	13.9	1.5	122.0	2.0	0.0	Horz	AV	0.0	40.7	54.0	-13.3	EUT vert, High ch, 1 Mbps
12402.060	24.8	13.9	1.7	55.0	2.0	0.0	Vert	AV	0.0	40.7	54.0	-13.3	EUT vert, High ch, 1 Mbps
4804.042	33.0	4.9	1.5	331.0	2.0	0.0	Vert	AV	0.0	39.9	54.0	-14.1	EUT vert, Low ch, 1 Mbps
7439.342	44.1	13.7	2.3	307.0		0.0	Horz	PK	0.0	57.8	74.0	-16.2	EUT vert, High ch, 1 Mbps
4883.808	30.7	4.7	1.5	40.0	2.0	0.0	Vert	AV	0.0	37.4	54.0	-16.6	EUT vert, Mid ch, 1 Mbps
4803.758	30.5	4.9	1.5	277.0	2.0	0.0	Horz	AV	0.0	37.4	54.0	-16.6	EUT vert, Low ch, 1 Mbps
4959.833	30.6	4.7	1.5	38.0	2.0	0.0	Vert	AV	0.0	37.3	54.0	-16.7	EUT vert, High ch, 1 Mbps
7440.367	43.6	13.7	2.5	322.0		0.0	Vert	PK	0.0	57.3	74.0	-16.7	EUT vert, High ch, 1 Mbps
7440.842	43.2	13.7	2.1	310.0		0.0	Horz	PK	0.0	56.9	74.0	-17.1	EUT horz, High ch, 1 Mbps
7438.867	43.2	13.7	2.3	2.0		0.0	Vert	PK	0.0	56.9	74.0	-17.1	EUT horz, High ch, 1 Mbps
4884.333	29.6	4.7	1.5	17.0	2.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	EUT vert, Mid ch, 1 Mbps
7440.758	42.5	13.7	2.4	12.0		0.0	Horz	PK	0.0	56.2	74.0	-17.8	EUT on side, High ch, 1 Mbps
4959.917	29.1	4.7	1.5	284.0	2.0	0.0	Horz	AV	0.0	35.8	54.0	-18.2	EUT vert, High ch, 1 Mbps
7440.500	40.3	13.7	3.0	145.0		0.0	Vert	PK	0.0	54.0	74.0	-20.0	EUT on side, High ch, 1 Mbps
7328.358	39.0	13.1	3.4	89.0		0.0	Horz	PK	0.0	52.1	74.0	-21.9	EUT vert, Mid ch, 1 Mbps
7326.117	39.0	13.1	1.5	182.0		0.0	Vert	PK	0.0	52.1	74.0	-21.9	EUT vert, Mid ch, 1 Mbps
12398.820	29.5	-0.7	3.4	350.0	2.0	0.0	Horz	AV	0.0	30.8	54.0	-23.2	EUT vert, High ch, 1 Mbps
12010.580	29.8	-1.5	1.0	266.0	2.0	0.0	Horz	AV	0.0	30.3	54.0	-23.7	EUT vert, Low ch, 1 Mbps
12401.700	36.4	13.9	1.7	55.0		0.0	Vert	PK	0.0	50.3	74.0	-23.7	EUT vert, High ch, 1 Mbps
12207.680	28.7	-0.5	1.5	25.0	2.0	0.0	Vert	AV	0.0	30.2	54.0	-23.8	EUT vert, Mid ch, 1 Mbps
12208.000	28.7	-0.5	1.5	214.0	2.0	0.0	Horz	AV	0.0	30.2	54.0	-23.8	EUT vert, Mid ch, 1 Mbps
12010.190	29.7	-1.5	1.5	181.0	2.0	0.0	Vert	AV	0.0	30.2	54.0	-23.8	EUT vert, Low ch, 1 Mbps
12400.010	36.2	13.9	1.5	122.0		0.0	Horz	PK	0.0	50.1	74.0	-23.9	EUT vert, High ch, 1 Mbps
12399.600	28.6	-0.7	2.1	12.0	2.0	0.0	Vert	AV	0.0	29.9	54.0	-24.1	EUT vert, High ch, 1 Mbps
4804.592	43.9	4.9	1.5	331.0		0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT vert, Low ch, 1 Mbps
4883.242	41.9	4.7	1.5	40.0		0.0	Vert	PK	0.0	46.6	74.0	-27.4	EUT vert, Mid ch, 1 Mbps
4803.342	41.7	4.9	1.5	277.0		0.0	Horz	PK	0.0	46.6	74.0	-27.4	EUT vert, Low ch, 1 Mbps
4960.583	41.0	4.7	1.5	38.0		0.0	Vert	PK	0.0	45.7	74.0	-28.3	EUT vert, High ch, 1 Mbps
4885.550	40.3	4.7	1.5	17.0		0.0	Horz	PK	0.0	45.0	74.0	-29.0	EUT vert, Mid ch, 1 Mbps
4960.167	39.5	4.7	1.5	284.0		0.0	Horz	PK	0.0	44.2	74.0	-29.8	EUT vert, High ch, 1 Mbps
12399.330	42.6	-0.7	3.4	350.0		0.0	Horz	PK	0.0	41.9	74.0	-32.1	EUT vert, High ch, 1 Mbps
12397.730	40.7	-0.7	2.1	12.0		0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT vert, High ch, 1 Mbps
12010.440	41.2	-1.5	1.0	266.0		0.0	Horz	PK	0.0	39.7	74.0	-34.3	EUT vert, Low ch, 1 Mbps
12008.140	40.7	-1.5	1.5	181.0		0.0	Vert	PK	0.0	39.2	74.0	-34.8	EUT vert, Low ch, 1 Mbps

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12209.310	39.5	-0.5	1.5	25.0		0.0	Vert	PK	0.0	39.0	74.0	-35.0	EUT vert, Mid ch, 1 Mbps
12207.930	39.4	-0.5	1.5	214.0		0.0	Horz	PK	0.0	38.9	74.0	-35.1	EUT vert, Mid ch, 1 Mbps

CONCLUSION
Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

TEST DESCRIPTION

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

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

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10:2013). 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.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*log(1/dc).

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2021-05-21	2022-05-21
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2020-09-03	2022-09-03
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2021-02-01	2022-02-01
Antenna - Biconilog	Teseq	CBL 6141B	AYD	2020-02-05	2022-02-05
Cable	Element	Double Ridge Guide Horn Cables	MNV	2021-02-01	2022-02-01
Cable	Element	Standard Gain Cable	MNW	2021-02-01	2022-02-01
Cable	Element	Biconilog Cable	MNX	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-12001800-30-10P	PAP	2021-02-01	2022-02-01
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2021-09-09	2022-09-09
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2021-09-09	2022-09-09
Attenuator	Coaxicom	3910-20	AXY	2021-09-10	2022-09-10
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2021-09-10	2022-09-10

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

STAK0250-1

MODES INVESTIGATED

Transmitting Bluetooth Low Energy on Low and High channel (2402 and 2480 MHz), 2 Mbps, Power setting 2
Transmitting Bluetooth Low Energy on Low, Mid, and High channel (2402, 2442, and 2480 MHz), 2 Mbps, Power setting 2

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	Genesis 24 MRIC R	Work Order:	STAK0250
Serial Number:	211772493	Date:	2021-10-11
Customer:	Starkey Laboratories, Inc.	Temperature:	21.5°C
Attendees:	John Quach	Relative Humidity:	47.3%
Customer Project:	None	Bar. Pressure:	1007 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	STAK0250-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	31	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

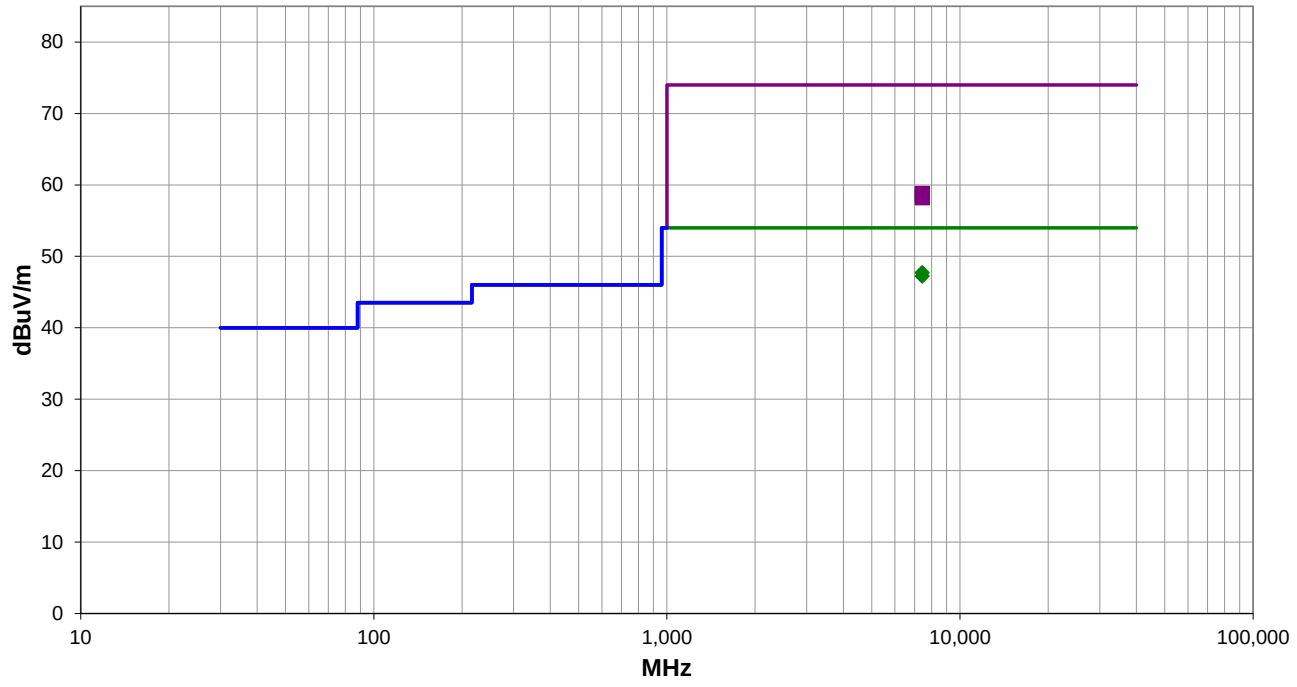
Test mode is 7% at 2 Mbps. EUT will be protocol limited in the field at 5.28% duty cycle. Using the formula 10*log(duty cycle), an upward correction of 11.6dB and a downward correction of 12.77dB was applied for a net DCCF of -1.2dB.

EUT OPERATING MODES

Transmitting Bluetooth Low Energy on Low, Mid, and High channel (2402, 2442, and 2480 MHz), 2 Mbps, Power setting 2

DEVIATIONS FROM TEST STANDARD

None



Run #: 31 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #31

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7438.625	35.2	13.7	2.6	341.0	-1.2	0.0	Horz	AV	0.0	47.7	54.0	-6.3	EUT On Side, High Ch, 2 Mbps
7438.617	34.7	13.7	1.5	79.0	-1.2	0.0	Vert	AV	0.0	47.2	54.0	-6.8	EUT Vert, High Ch, 2 Mbps
7438.300	45.1	13.7	2.6	341.0	0.0	0.0	Horz	PK	0.0	58.8	74.0	-15.2	EUT On Side, High Ch, 2 Mbps
7441.633	44.5	13.7	1.5	79.0	0.0	0.0	Vert	PK	0.0	58.2	74.0	-15.8	EUT Vert, High Ch, 2 Mbps

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	Genesis 24 MRIC R	Work Order:	STAK0250
Serial Number:	211772493	Date:	2021-10-11
Customer:	Starkey Laboratories, Inc.	Temperature:	21.3°C
Attendees:	John Quach	Relative Humidity:	49.9%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	STAK0250-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	38	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

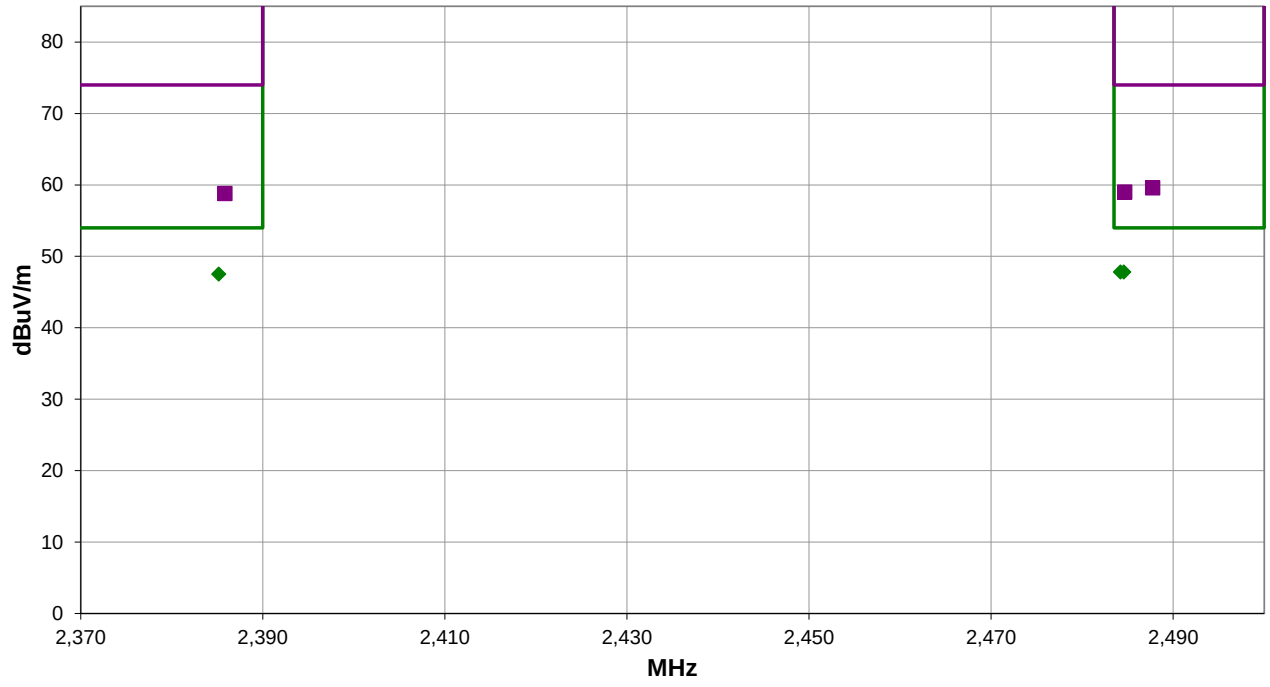
Test mode is 7% duty cycle for 2Mbps. EUT will be protocol limited in the field at 5.28% duty cycle. Band edge measurements were noise floor so no DCCF was applied.

EUT OPERATING MODES

Transmitting Bluetooth Low Energy on Low and High channel (2402 and 2480 MHz), 2 Mbps, Power setting 2

DEVIATIONS FROM TEST STANDARD

None



Run #: 38 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #38

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.575	31.0	-3.2	1.5	100.0	3.0	20.0	Horz	AV	0.0	47.8	54.0	-6.2	EUT Vert, High Ch, 2 Mbps
2484.208	31.0	-3.2	2.8	292.0	3.0	20.0	Vert	AV	0.0	47.8	54.0	-6.2	EUT Vert, High Ch, 2 Mbps
2385.158	31.0	-3.5	1.86	350.0	3.0	20.0	Horz	AV	0.0	47.5	54.0	-6.5	EUT Vert, Low Ch, 2 Mbps
2487.742	42.8	-3.2	2.8	292.0	3.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4	EUT Vert, High Ch, 2 Mbps
2484.667	42.2	-3.2	1.5	100.0	3.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	EUT Vert, High Ch, 2 Mbps
2385.833	42.3	-3.5	1.86	350.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	EUT Vert, Low Ch, 2 Mbps

CONCLUSION

Pass

Tested By

End of Test Report