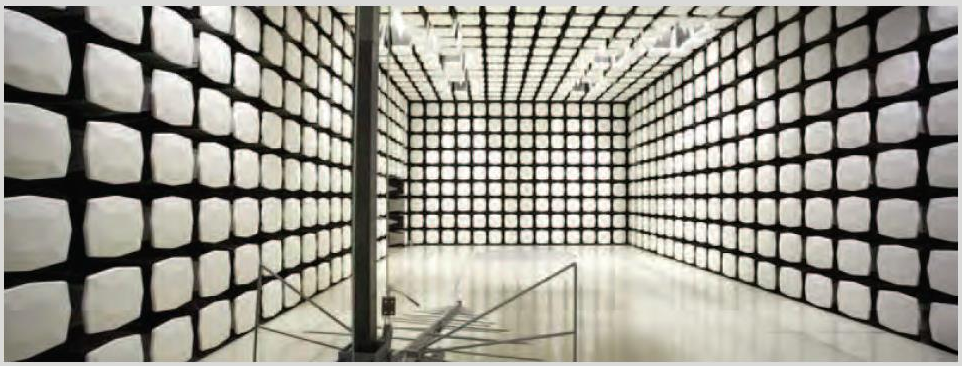
Starkey Laboratories, Inc.

Livio Micro RIC 312

FCC 15.247:2018

Bluetooth Low Energy (DTS) Radio

Report # STAK0145.1



NVLAP LAB CODE: 200881-0

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CERTIFICATE OF TEST

Last Date of Test: October 23, 2018
Starkey Laboratories, Inc.
Model: Livio Micro RIC 312

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2018	ANSI C63.10:2013, KDB 558074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

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

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

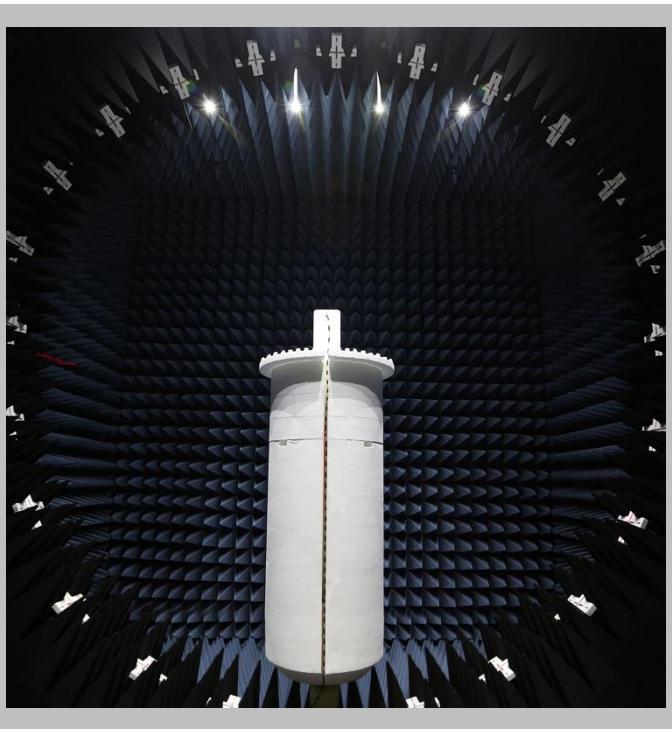
MIC – Recognized by MIC as a CAB for the acceptance of test data.

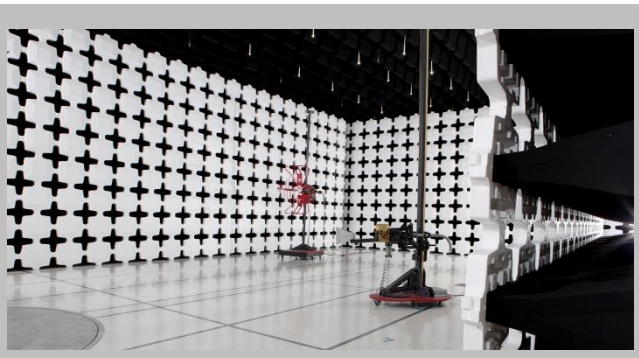
SCOPE

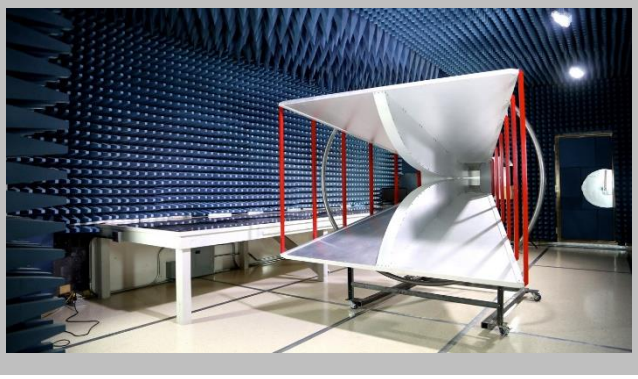
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

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

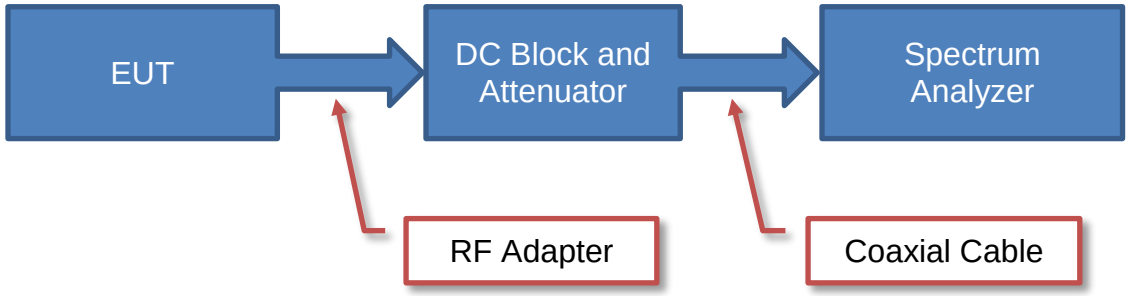
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

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

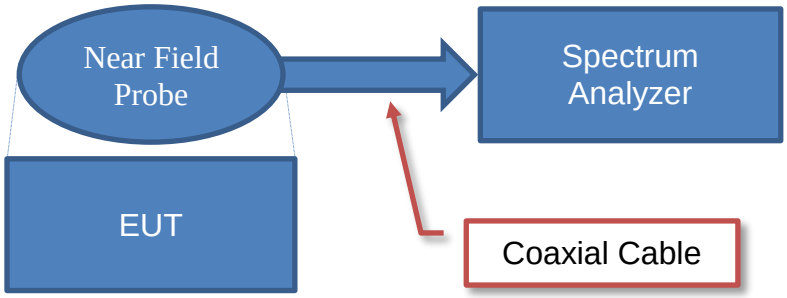
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

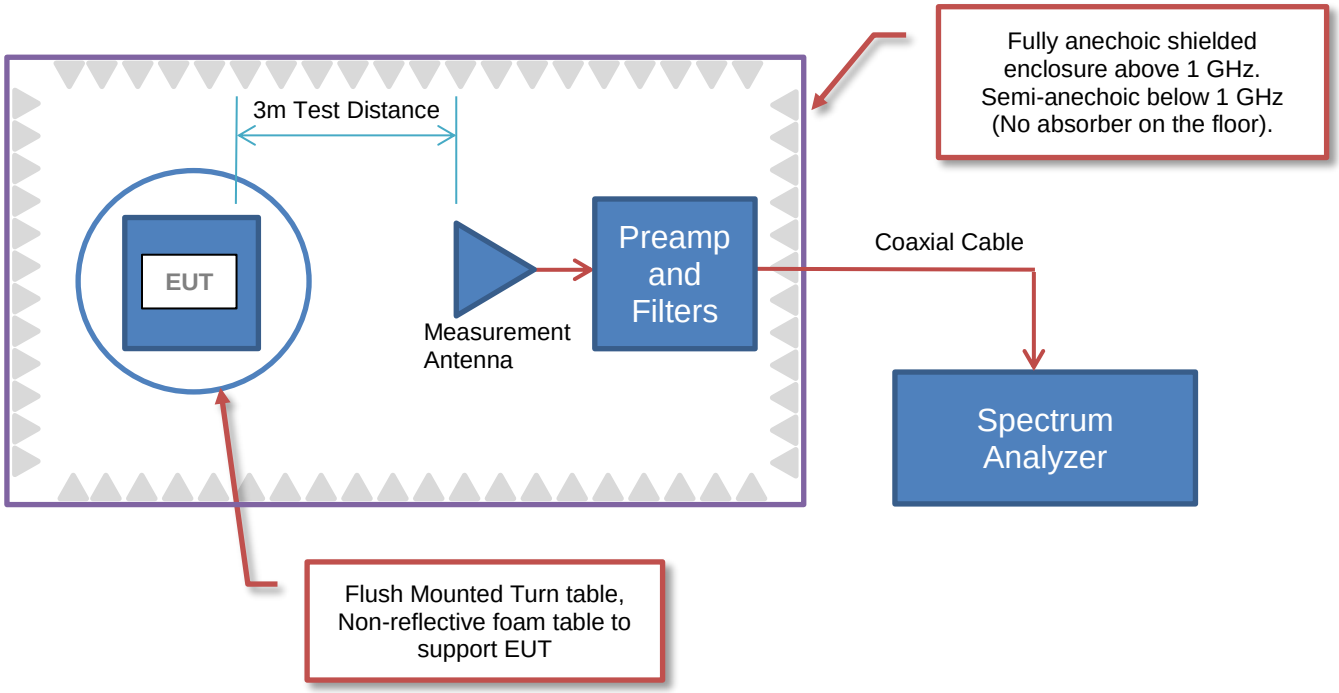
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Starkey Laboratories, Inc.
Address:	6600 Washington Ave. SO.
City, State, Zip:	Eden Prairie, MN 55344
Test Requested By:	Bill Mitchell
Model:	Livio Micro RIC 312
First Date of Test:	October 22, 2018
Last Date of Test:	October 23, 2018
Receipt Date of Samples:	October 19, 2018
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 BLE (non-rechargeable battery-powered).

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

CONFIGURATIONS

Configuration STAK0145- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Livio Micro RIC 312	181416838

Configuration STAK0145- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hearing Aid	Starkey Laboratories, Inc.	Livio Micro RIC 312	181416831

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2018-10-22	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	2018-10-23	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.
3	2018-10-23	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.
4	2018-10-23	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.
5	2018-10-23	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.
6	2018-10-23	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2018-10-23	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.
8	2018-10-23	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2018.07.27

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

MODES OF OPERATION

Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480MHz)

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

STAK0145 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	13-Sep-2018	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	26-Mar-2018	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-12001800-30-10P	PAP	24-Feb-2018	12 mo
Cable	Element	Biconilog Cable	MNX	24-Feb-2018	12 mo
Cable	Element	Standard Gain Cable	MNW	24-Feb-2018	12 mo
Cable	Element	Double Ridge Guide Horn Cables	MNV	24-Feb-2018	12 mo
Antenna - Biconilog	ETS Lindgren	3142D	AXO	15-Dec-2017	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	24-Feb-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	24-Feb-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	24-Feb-2018	12 mo
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	14-Nov-2016	24 mo
Antenna	ETS-Lindgren	3160-08	AJP	NCR	0 mo
Antenna	ETS-Lindgren	3160-07	AJJ	NCR	0 mo
Attenuator	Coaxicom	3910-20	AXY	26-Sep-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGG	26-Sep-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFM	26-Sep-2018	12 mo

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

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 at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

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(dc).

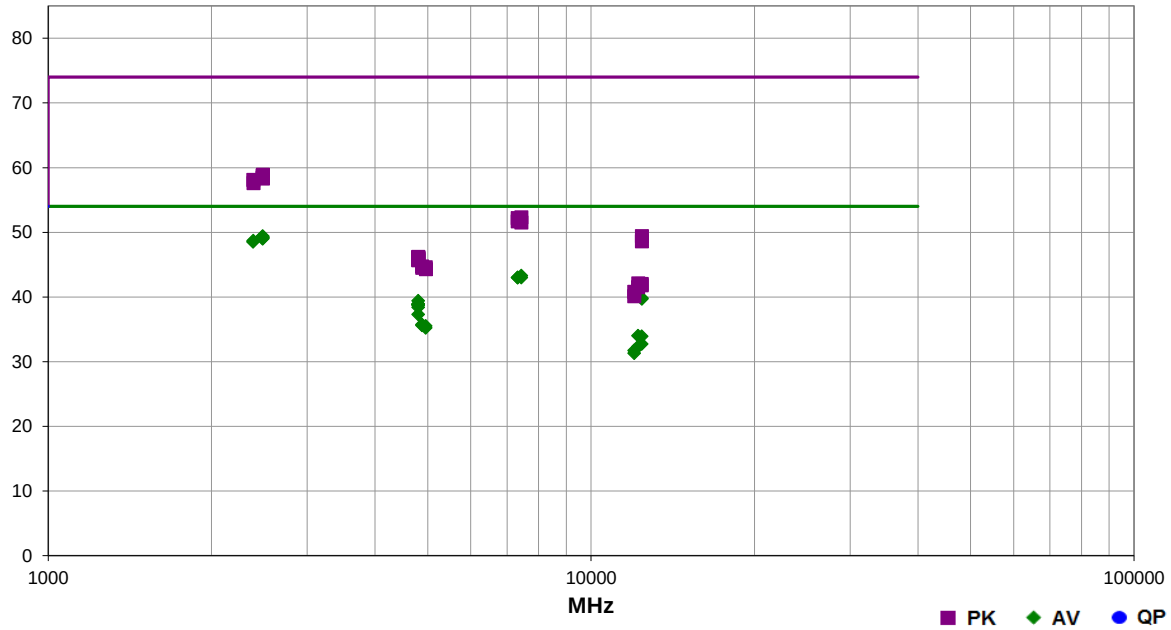
SPURIOUS RADIATED EMISSIONS

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	STAK0145	**Date:**	22-Oct-2018		
Project:	None	**Temperature:**	21.7 °C		
Job Site:	MN09	**Humidity:**	28.2% RH		
Serial Number:	181416838	**Barometric Pres.:**	1019 mbar	**Tested by:**	Dustin Sparks
EUT:	Livio Micro RIC 312				
Configuration:	1				
Customer:	Starkey Laboratories, Inc.				
Attendees:	Charlie Esch				
EUT Power:	Battery				
Operating Mode:	Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480MHz)				
Deviations:	None				
Comments:	Duty cycle correction factor of 2.0 dB added to RMS measurements (based on 62.4% measured duty cycle.)				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	36	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.850	31.6	-4.2	1.0	168.0	2.0	20.0	Horz	AV	0.0	49.4	54.0	-4.6	High ch, EUT vertical
2483.933	31.5	-4.2	1.0	88.0	2.0	20.0	Vert	AV	0.0	49.3	54.0	-4.7	High ch, EUT vertical
2484.700	31.4	-4.2	1.0	178.0	2.0	20.0	Horz	AV	0.0	49.2	54.0	-4.8	High ch, EUT on side
2483.625	31.3	-4.2	1.0	102.0	2.0	20.0	Vert	AV	0.0	49.1	54.0	-4.9	High ch, EUT on side
2484.517	31.3	-4.2	1.0	85.0	2.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	High ch, EUT horizontal
2484.033	31.2	-4.2	1.4	210.0	2.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	High ch, EUT horizontal
2387.367	31.2	-4.5	1.0	202.0	2.0	20.0	Horz	AV	0.0	48.7	54.0	-5.3	Low ch, EUT verrtical
2385.917	31.0	-4.5	1.6	4.0	2.0	20.0	Vert	AV	0.0	48.5	54.0	-5.5	Low ch, EUT verrtical
7440.650	28.8	12.5	1.0	81.0	2.0	0.0	Vert	AV	0.0	43.3	54.0	-10.7	High ch, EUT vertical
7326.758	28.9	12.1	1.0	2.0	2.0	0.0	Horz	AV	0.0	43.0	54.0	-11.0	Mid ch, EUT vertical
7325.208	28.9	12.1	1.0	167.0	2.0	0.0	Vert	AV	0.0	43.0	54.0	-11.0	Mid ch, EUT vertical
7439.033	28.5	12.5	1.0	57.0	2.0	0.0	Horz	AV	0.0	43.0	54.0	-11.0	High ch, EUT vertical
12401.960	25.4	12.4	1.0	52.0	2.0	0.0	Vert	AV	0.0	39.8	54.0	-14.2	High ch, EUT vertical
12401.760	25.3	12.4	1.0	140.0	2.0	0.0	Horz	AV	0.0	39.7	54.0	-14.3	High ch, EUT vertical
4803.875	33.1	4.3	2.2	353.0	2.0	0.0	Horz	AV	0.0	39.4	54.0	-14.6	Low ch, EUT vertical
2486.575	43.1	-4.2	1.0	88.0	0.0	20.0	Vert	PK	0.0	58.9	74.0	-15.1	High ch, EUT vertical
4803.717	32.6	4.3	3.1	356.0	2.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low ch, EUT vertical
4803.742	32.6	4.3	2.7	321.0	2.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low ch, EUT on side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.625	43.0	-4.2	1.0	168.0	0.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High ch, EUT vertical
2485.800	43.0	-4.2	1.4	210.0	0.0	20.0	Vert	PK	0.0	58.8	74.0	-15.2	High ch, EUT horizontal
4803.792	32.5	4.3	4.0	275.0	2.0	0.0	Vert	AV	0.0	38.8	54.0	-15.2	Low ch, EUT horizontal
4803.708	32.5	4.3	2.5	211.0	2.0	0.0	Vert	AV	0.0	38.8	54.0	-15.2	Low ch, EUT vertical
4804.108	32.4	4.3	1.0	170.0	2.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	Low ch, EUT vertical
2483.517	42.7	-4.2	1.0	102.0	0.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	High ch, EUT on side
2485.208	42.6	-4.2	1.0	85.0	0.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	High ch, EUT horizontal
4803.758	32.1	4.3	2.9	178.0	2.0	0.0	Horz	AV	0.0	38.4	54.0	-15.6	Low ch, EUT horizontal
2486.642	42.5	-4.2	1.0	178.0	0.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	High ch, EUT on side
2386.308	42.6	-4.5	1.0	202.0	0.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	Low ch, EUT verrtical
2388.658	42.1	-4.5	1.6	4.0	0.0	20.0	Vert	PK	0.0	57.6	74.0	-16.4	Low ch, EUT verrtical
4803.867	31.0	4.3	1.0	101.0	2.0	0.0	Vert	AV	0.0	37.3	54.0	-16.7	Low ch, EUT on side
4882.567	29.8	3.9	1.0	198.0	2.0	0.0	Horz	AV	0.0	35.7	54.0	-18.3	Mid ch, EUT vertical
4885.042	29.7	3.9	3.2	275.0	2.0	0.0	Vert	AV	0.0	35.6	54.0	-18.4	Mid ch, EUT vertical
4959.792	29.5	4.0	2.5	1.0	2.0	0.0	Vert	AV	0.0	35.5	54.0	-18.5	High ch, EUT vertical
4959.600	29.2	4.0	1.0	25.0	2.0	0.0	Horz	AV	0.0	35.2	54.0	-18.8	High ch, EUT vertical
12208.810	32.1	-0.1	1.7	312.0	2.0	0.0	Horz	AV	0.0	34.0	54.0	-20.0	Mid ch, EUT vertical
12399.020	32.4	-0.5	1.0	184.0	2.0	0.0	Horz	AV	0.0	33.9	54.0	-20.1	High ch, EUT vertical
12398.750	31.2	-0.5	1.0	121.0	2.0	0.0	Vert	AV	0.0	32.7	54.0	-21.3	High ch, EUT vertical
12208.780	30.4	-0.1	1.0	263.0	2.0	0.0	Vert	AV	0.0	32.3	54.0	-21.7	Mid ch, EUT vertical
7439.700	39.8	12.5	1.0	81.0	0.0	0.0	Vert	PK	0.0	52.3	74.0	-21.7	High ch, EUT vertical
7326.667	40.1	12.1	1.0	2.0	0.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	Mid ch, EUT vertical
7325.408	39.6	12.1	1.0	167.0	0.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	Mid ch, EUT vertical
12008.960	31.5	-1.8	1.5	13.0	2.0	0.0	Vert	AV	0.0	31.7	54.0	-22.3	Low ch, EUT vertical
7439.850	39.0	12.5	1.0	57.0	0.0	0.0	Horz	PK	0.0	51.5	74.0	-22.5	High ch, EUT vertical
12008.660	31.1	-1.8	3.5	0.0	2.0	0.0	Horz	AV	0.0	31.3	54.0	-22.7	Low ch, EUT vertical
12401.350	37.0	12.4	1.0	52.0	0.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	High ch, EUT vertical
12402.480	36.2	12.4	1.0	140.0	0.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	High ch, EUT vertical
4803.217	41.9	4.3	1.0	170.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Low ch, EUT vertical
4803.958	41.8	4.3	3.1	356.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Low ch, EUT vertical
4803.458	41.8	4.3	1.0	101.0	0.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	Low ch, EUT on side
4803.925	41.7	4.3	2.7	321.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	Low ch, EUT on side
4804.775	41.6	4.3	4.0	275.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Low ch, EUT horizontal
4804.058	41.6	4.3	2.2	353.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	Low ch, EUT vertical
4803.875	41.4	4.3	2.9	178.0	0.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	Low ch, EUT horizontal
4803.633	41.4	4.3	2.5	211.0	0.0	0.0	Vert	PK	0.0	45.7	74.0	-28.3	Low ch, EUT vertical
4883.000	40.8	3.9	3.2	275.0	0.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	Mid ch, EUT vertical
4960.308	40.6	4.0	2.5	1.0	0.0	0.0	Vert	PK	0.0	44.6	74.0	-29.4	High ch, EUT vertical
4886.417	40.6	3.9	1.0	198.0	0.0	0.0	Horz	PK	0.0	44.5	74.0	-29.5	Mid ch, EUT vertical
4961.750	40.3	4.0	1.0	25.0	0.0	0.0	Horz	PK	0.0	44.3	74.0	-29.7	High ch, EUT vertical
12211.500	42.2	-0.1	1.7	312.0	0.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	Mid ch, EUT vertical
12398.560	42.5	-0.5	1.0	184.0	0.0	0.0	Horz	PK	0.0	42.0	74.0	-32.0	High ch, EUT vertical
12398.920	42.3	-0.5	1.0	121.0	0.0	0.0	Vert	PK	0.0	41.8	74.0	-32.2	High ch, EUT vertical
12210.280	41.6	-0.1	1.0	263.0	0.0	0.0	Vert	PK	0.0	41.5	74.0	-32.5	Mid ch, EUT vertical
12007.730	42.6	-1.8	1.5	13.0	0.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	Low ch, EUT vertical
12011.310	41.8	-1.7	3.5	0.0	0.0	0.0	Horz	PK	0.0	40.1	74.0	-33.9	Low ch, EUT vertical

DUTY CYCLE

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312	Work Order:	STAK0145
Serial Number:	181416831	Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4 °C
Attendees:	Charlie Esch	Humidity:	29.8% RH
Project:	None	Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power: Battery	Job Site: MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

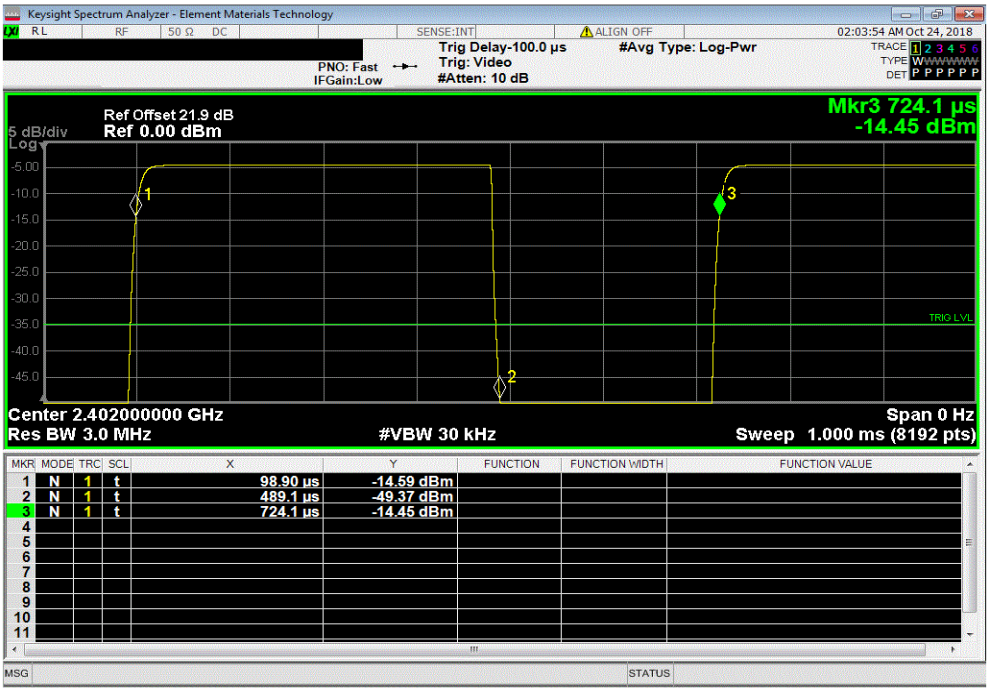
None

Configuration #	2	Signature

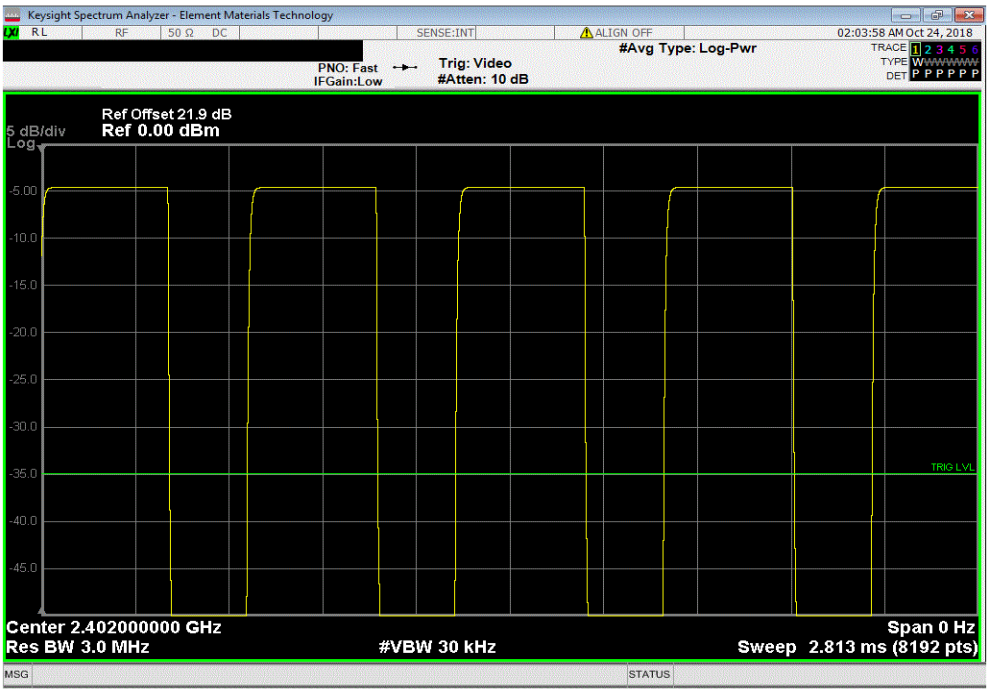
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK Low Channel, 2402 MHz	390.2 us	625.2 us	1	62.4	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	391.7 us	625 us	1	62.7	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	391 us	625.1 us	1	62.5	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

BLE/GFSK Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	390.2 us	625.2 us	1	62.4	N/A	N/A



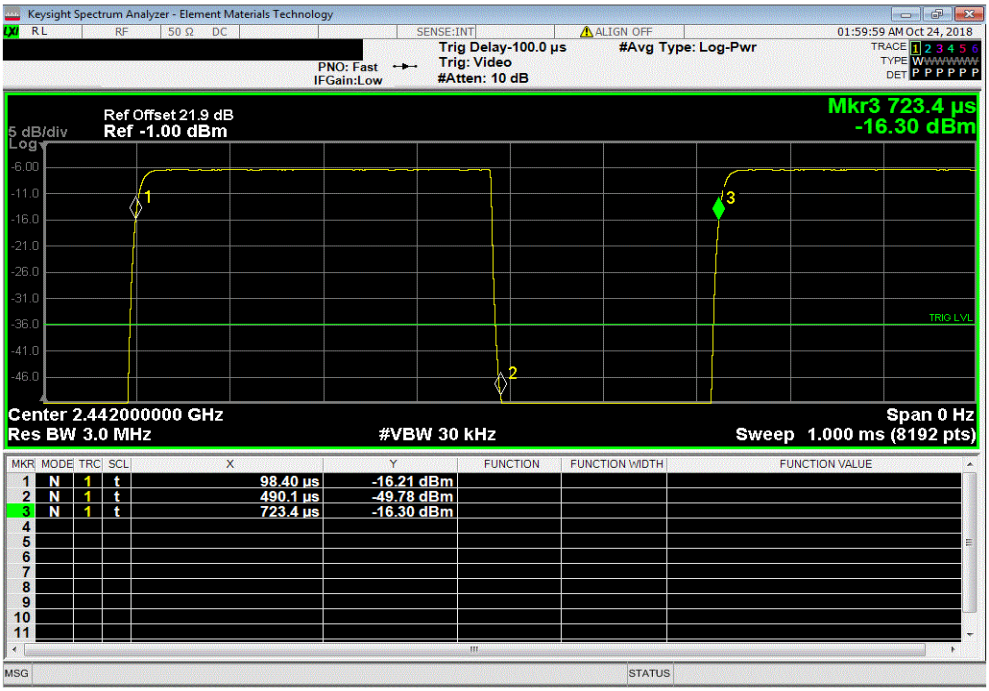
BLE/GFSK Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



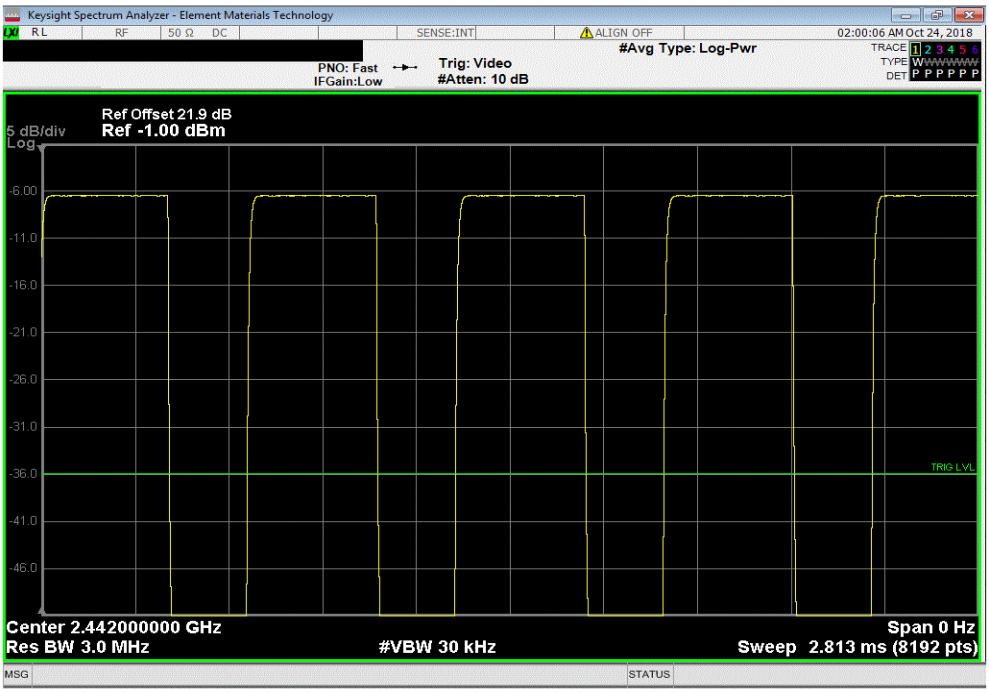
DUTY CYCLE

TbtTx 2018.09.13 XMit 2017.12.13

BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	391.7 us	625 us	1	62.7	N/A	N/A

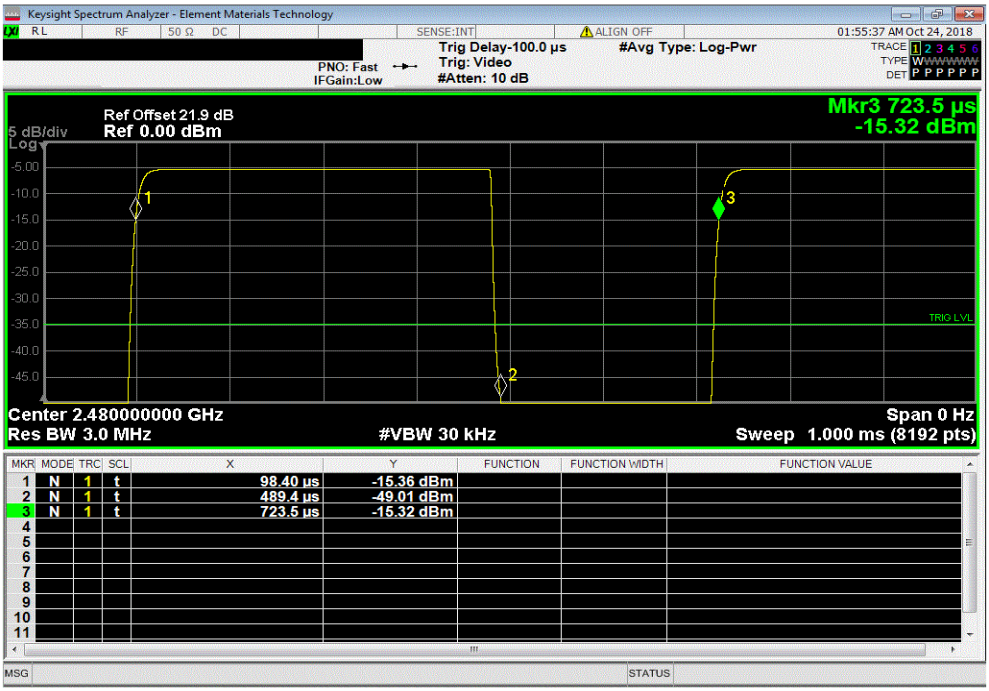


BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

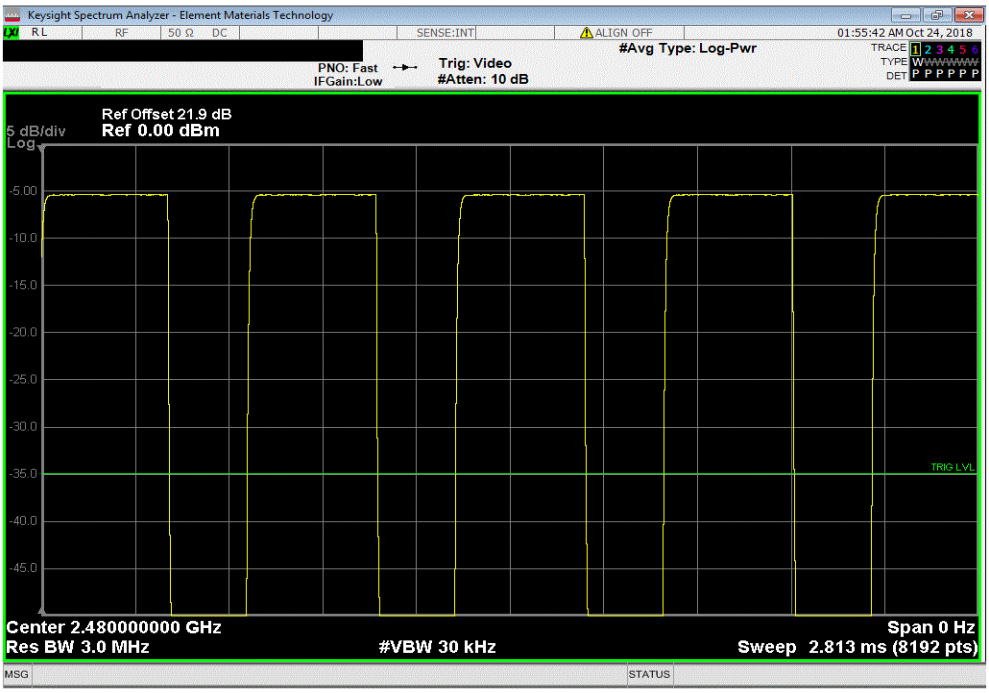


DUTY CYCLE

BLE/GFSK High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	391 us	625.1 us	1	62.5	N/A	N/A



BLE/GFSK High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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.

OCCUPIED BANDWIDTH

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312	Work Order:	STAK0145
Serial Number:	181416831	Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.	Temperature:	22.3 °C
Attendees:	Charlie Esch	Humidity:	30% RH
Project:	None	Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power: Battery	Job Site: MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

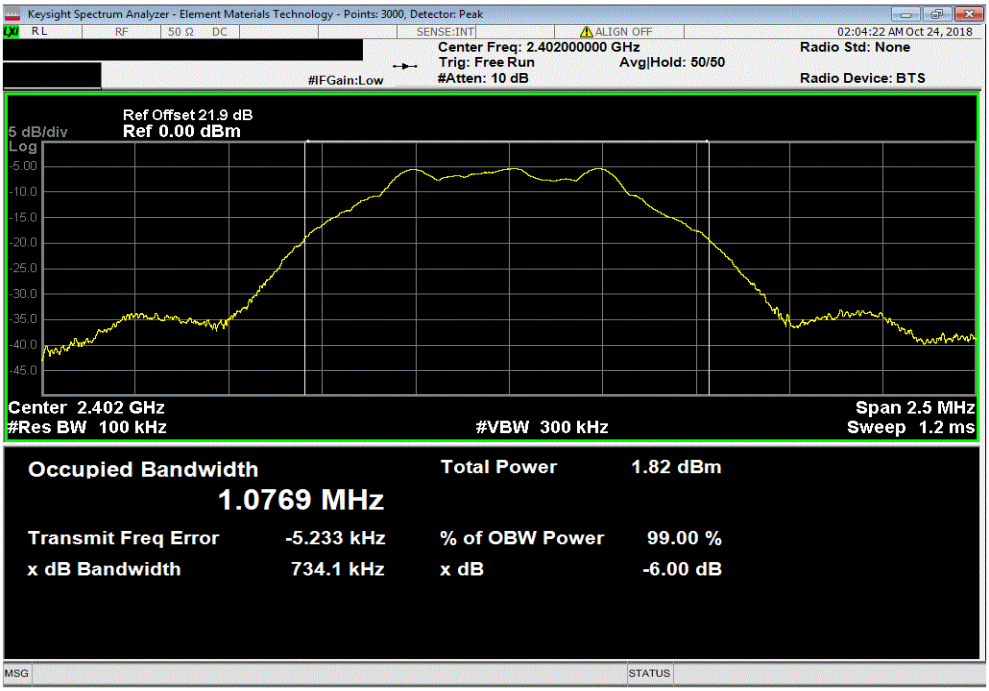
DEVIATIONS FROM TEST STANDARD

None

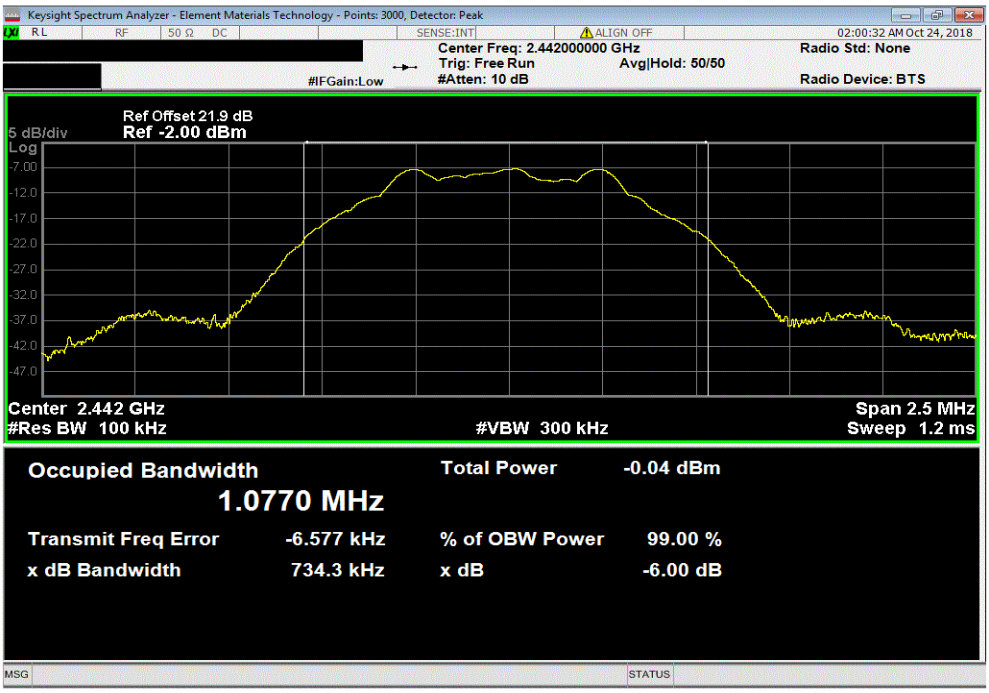
Configuration #	2	Signature

	Value	Limit (≥)	Result
BLE/GFSK Low Channel, 2402 MHz	734.065 kHz	500 kHz	Pass
BLE/GFSK Mid Channel, 2442 MHz	734.275 kHz	500 kHz	Pass
BLE/GFSK High Channel, 2480 MHz	736.027 kHz	500 kHz	Pass

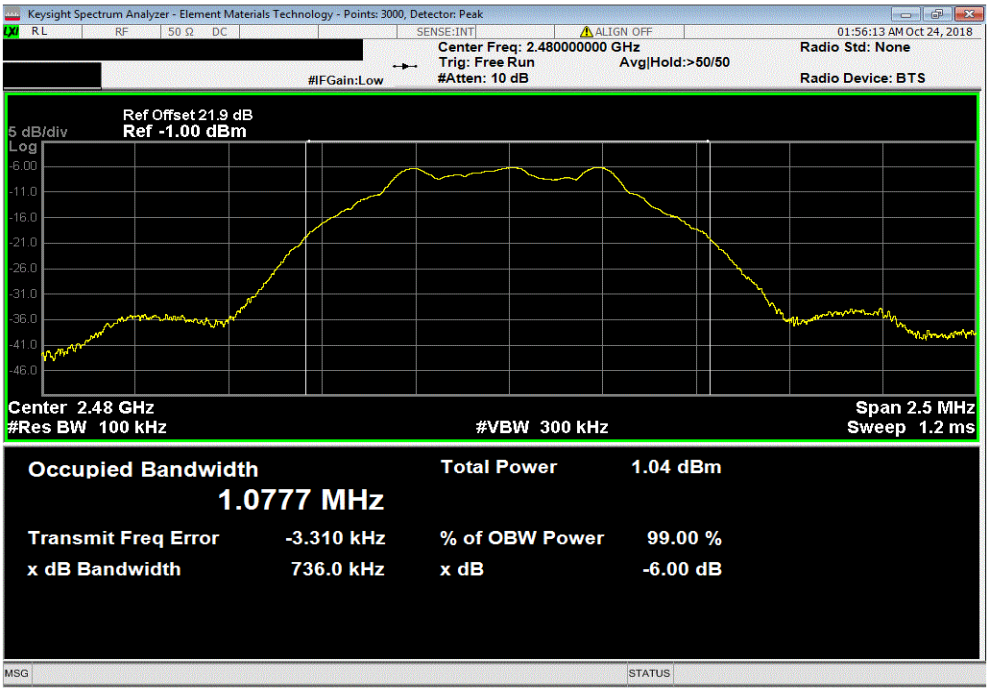
BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				734.065 kHz	500 kHz	Pass



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



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



OUTPUT POWER

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312			Work Order:	STAK0145
Serial Number:	181416831			Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.			Temperature:	22.3 °C
Attendees:	Charlie Esch			Humidity:	30% RH
Project:	None			Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power:	Battery	Job Site:	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

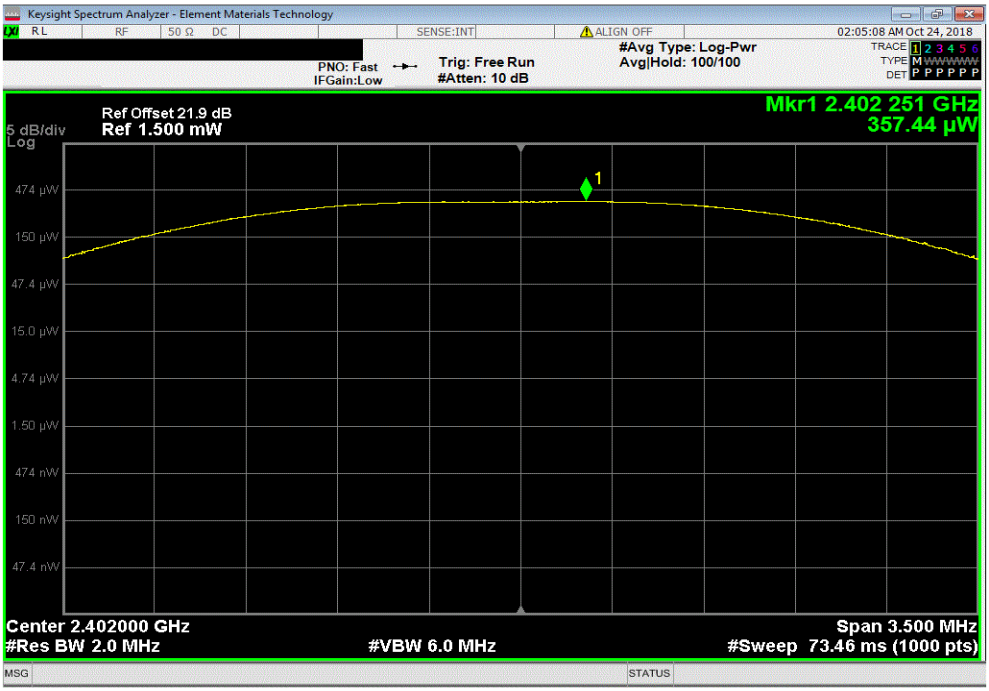
DEVIATIONS FROM TEST STANDARD

None

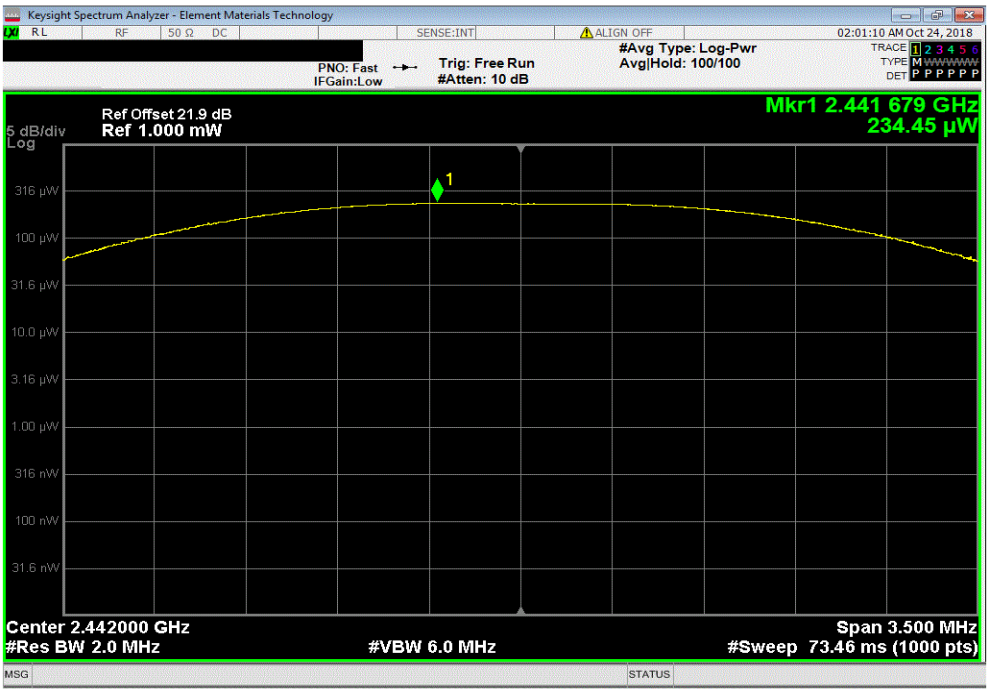
Configuration #	2	Signature

	Value	Limit (<)	Result
BLE/GFSK Low Channel, 2402 MHz	357.44 uW	1 W	Pass
BLE/GFSK Mid Channel, 2442 MHz	234.45 uW	1 W	Pass
BLE/GFSK High Channel, 2480 MHz	301.01 uW	1 W	Pass

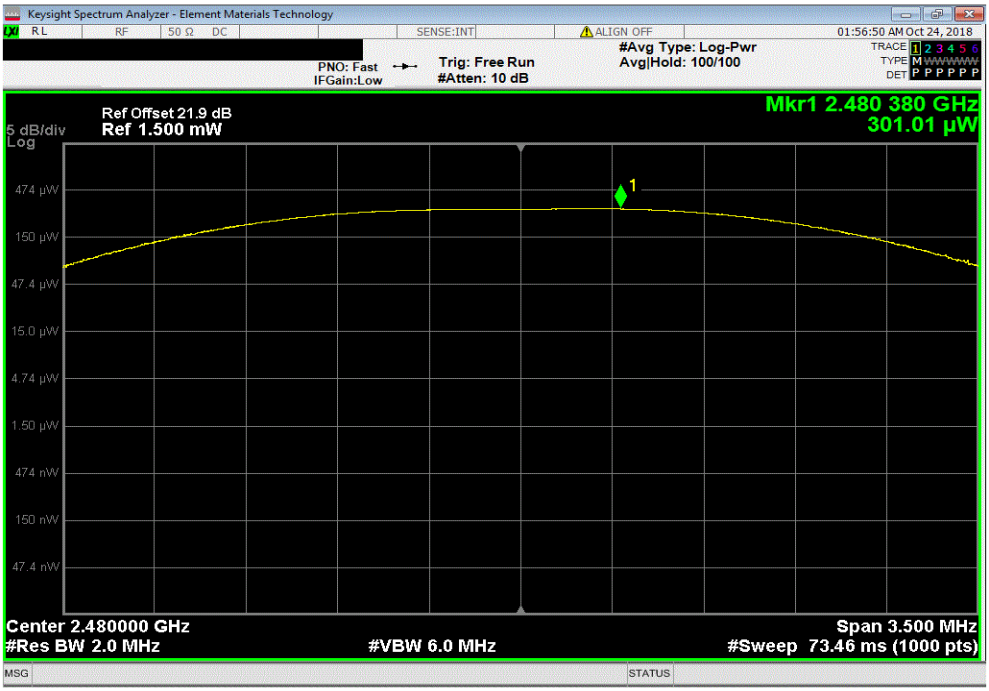
BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				357.44 uW	1 W	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				234.45 uW	1 W	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value	Limit (<)	Result
				301.01 uW	1 W	Pass



EQUIVALENT ISOTROPIC RADIATED POWER

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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. The actual antenna gain of the EUT was added to the conducted output power to derive the EIRP values.

EQUIVALENT ISOTROPIC RADIATED POWER

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	**Livio Micro RIC 312**			**Work Order:**	**STAK0145**
Serial Number:	**181416831**			**Date:**	**23-Oct-18**
Customer:	**Starkey Laboratories, Inc.**			**Temperature:**	**22.3 °C**
Attendees:	**Charlie Esch**			**Humidity:**	**30% RH**
Project:	**None**			**Barometric Pres.:**	**1032 mbar**
Tested by:	**Dustin Sparks**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

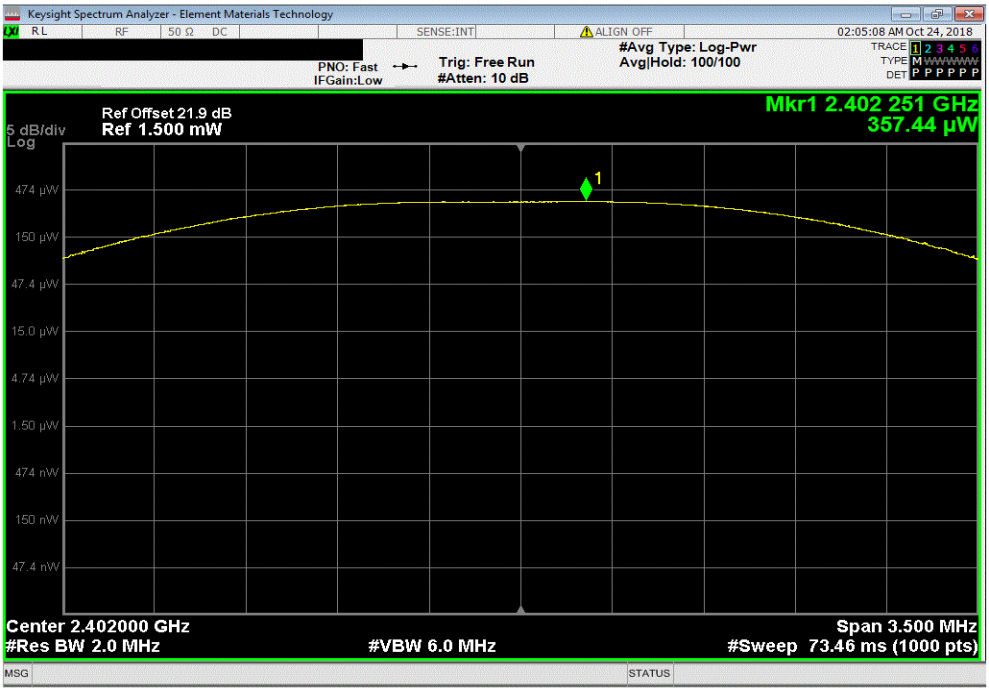
DEVIATIONS FROM TEST STANDARD

None

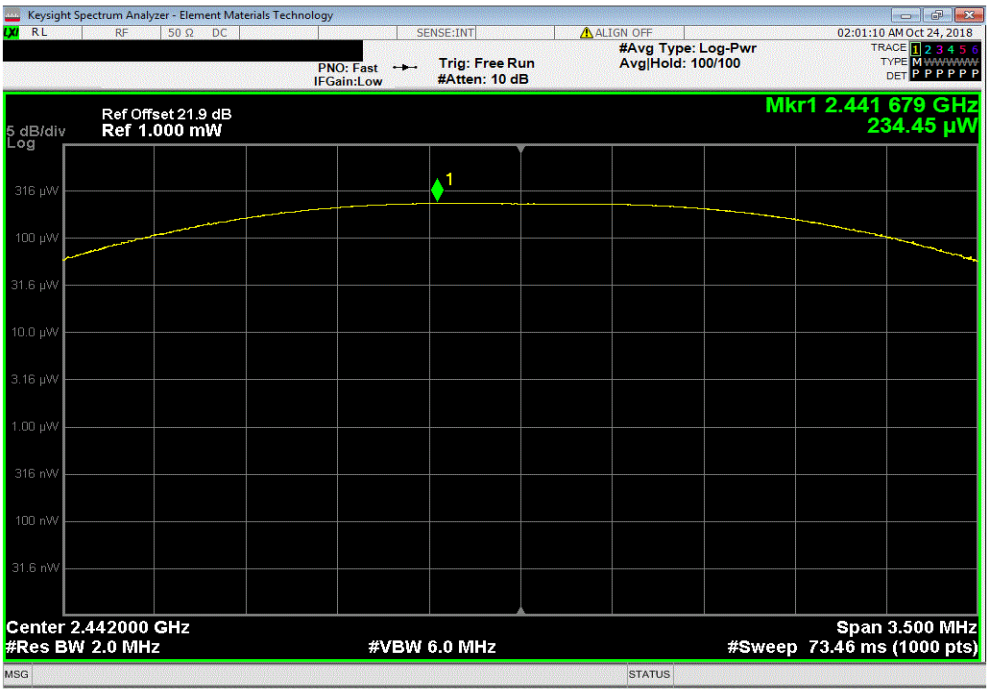
Configuration #	**2**	*Signature*

	Value	Value (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (< dBm)	Result
BLE/GFSK Low Channel, 2402 MHz	357.44 uW	-4.47	-13.51	-17.98	36	Pass
BLE/GFSK Mid Channel, 2442 MHz	234.45 uW	-6.3	-13.51	-19.81	36	Pass
BLE/GFSK High Channel, 2480 MHz	301.01 uW	-5.21	-13.51	-18.72	36	Pass

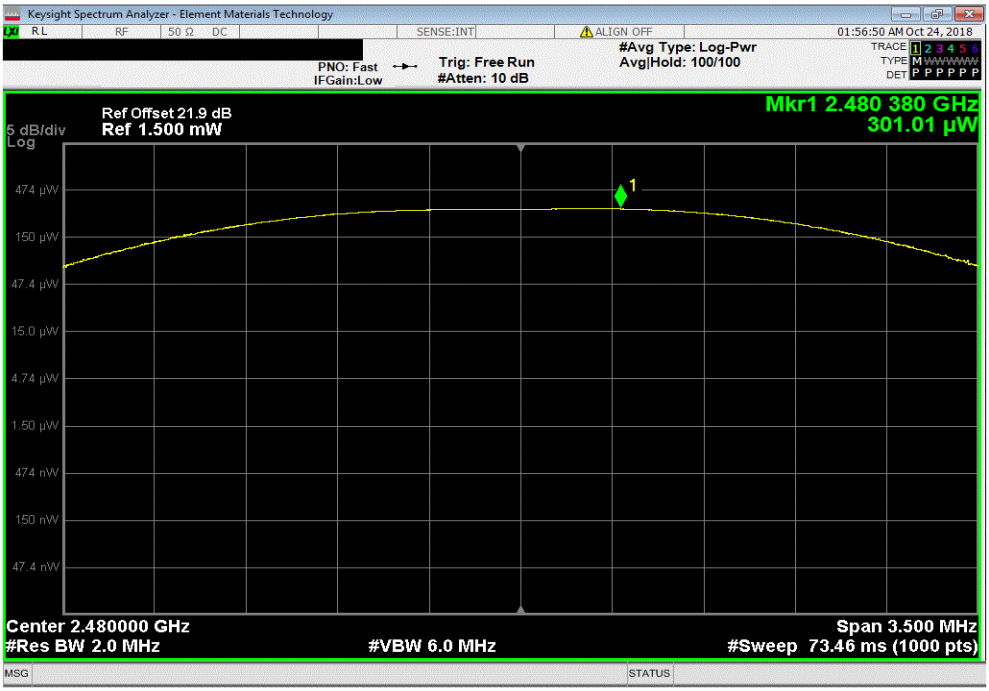
BLE/GFSK Low Channel, 2402 MHz						
	Value	Value (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (< dBm)	Result
	357.44 uW	-4.47	-13.51	-17.98	36	Pass



BLE/GFSK Mid Channel, 2442 MHz						
	Value	Value (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (< dBm)	Result
	234.45 uW	-6.3	-13.51	-19.81	36	Pass



BLE/GFSK High Channel, 2480 MHz						
	Value	Value (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (< dBm)	Result
	301.01 uW	-5.21	-13.51	-18.72	36	Pass



POWER SPECTRAL DENSITY

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312	Work Order:	STAK0145
Serial Number:	181416831	Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4 °C
Attendees:	Charlie Esch	Humidity:	29.8% RH
Project:	None	Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power: Battery	Job Site: MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

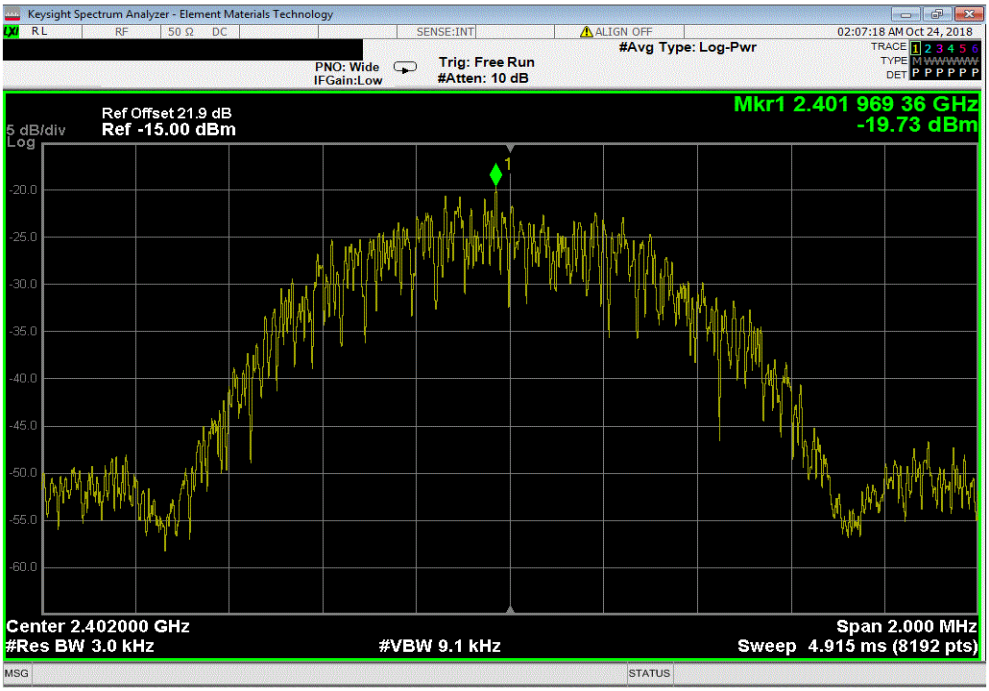
DEVIATIONS FROM TEST STANDARD

None

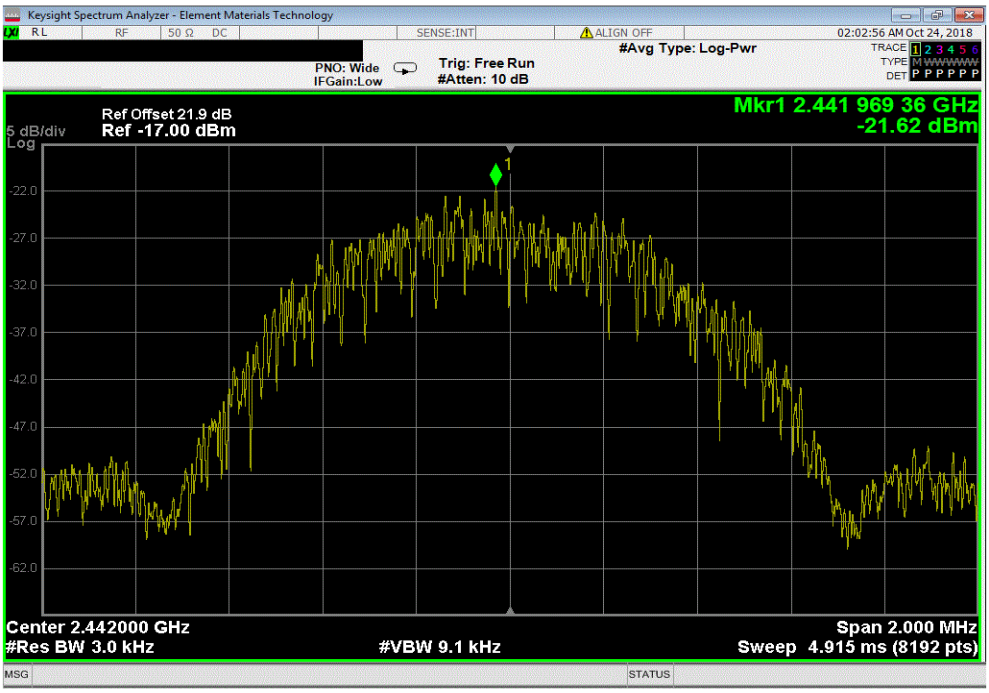
Configuration #	2	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK Low Channel, 2402 MHz	-19.73	8	Pass
BLE/GFSK Mid Channel, 2442 MHz	-21.621	8	Pass
BLE/GFSK High Channel, 2480 MHz	-20.602	8	Pass

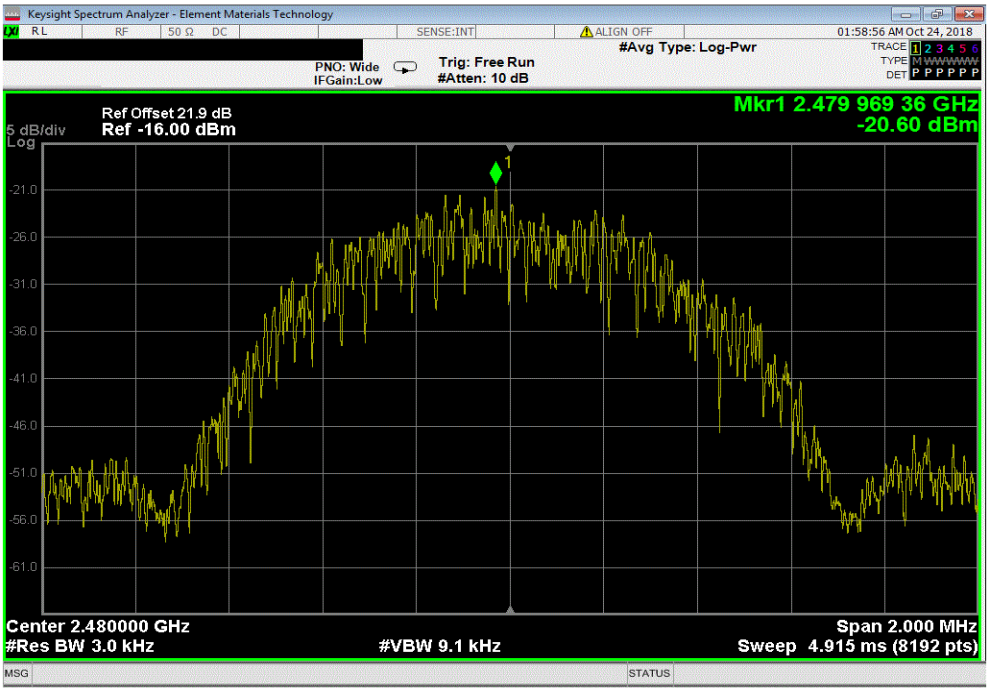
BLE/GFSK Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-19.73	8	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-21.621	8	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-20.602	8	Pass



BAND EDGE COMPLIANCE

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312			Work Order:	STAK0145
Serial Number:	181416831			Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.			Temperature:	22.3 °C
Attendees:	Charlie Esch			Humidity:	30.1% RH
Project:	None			Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power:	Battery	Job Site:	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

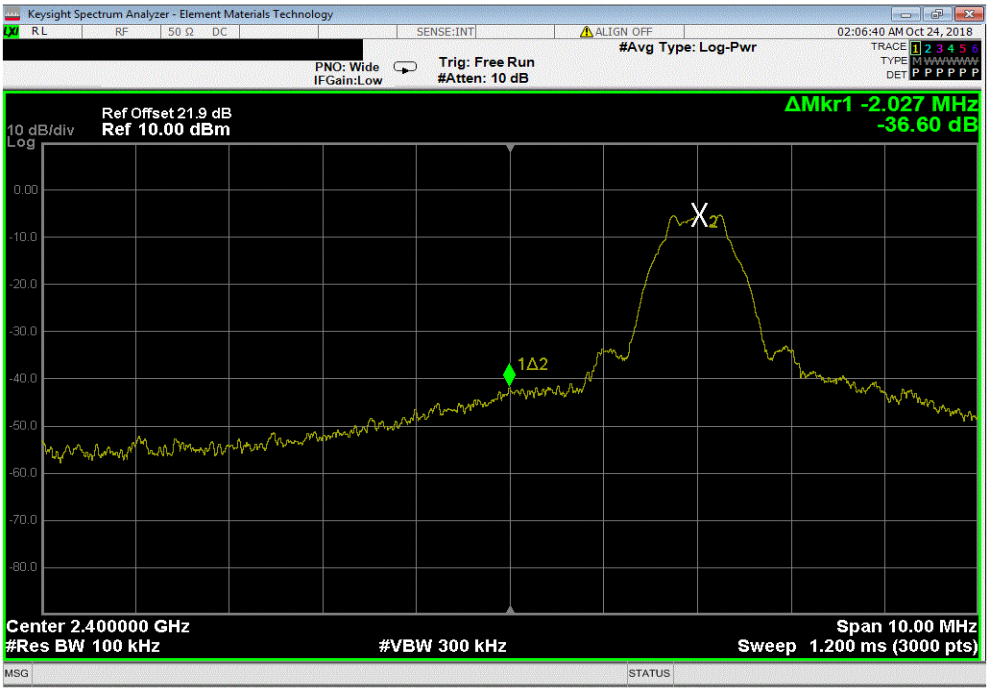
DEVIATIONS FROM TEST STANDARD

None

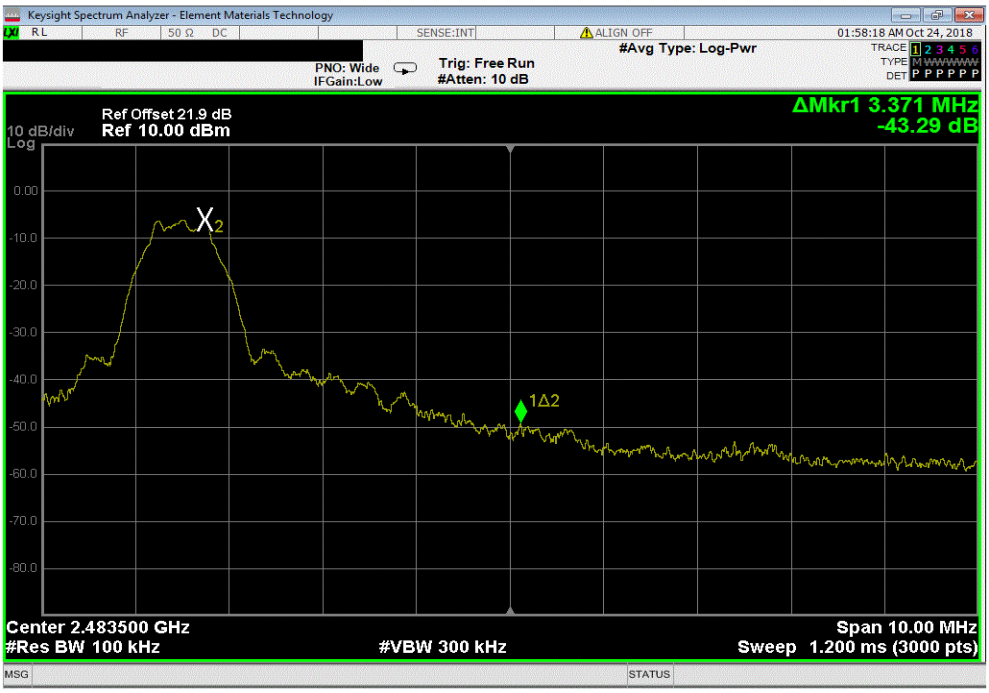
Configuration #	2	Signature

	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	-36.6	-20	Pass
BLE/GFSK High Channel, 2480 MHz	-43.29	-20	Pass

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-36.6	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.29	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2017.12.13

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	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	15-Mar-18	15-Mar-19
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-18	13-Feb-19
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	19-Dec-17	19-Dec-18

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 spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	Livio Micro RIC 312	Work Order:	STAK0145
Serial Number:	181416831	Date:	23-Oct-18
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4 °C
Attendees:	Charlie Esch	Humidity:	29.9% RH
Project:	None	Barometric Pres.:	1032 mbar
Tested by:	Dustin Sparks	Power: Battery	Job Site: MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

None

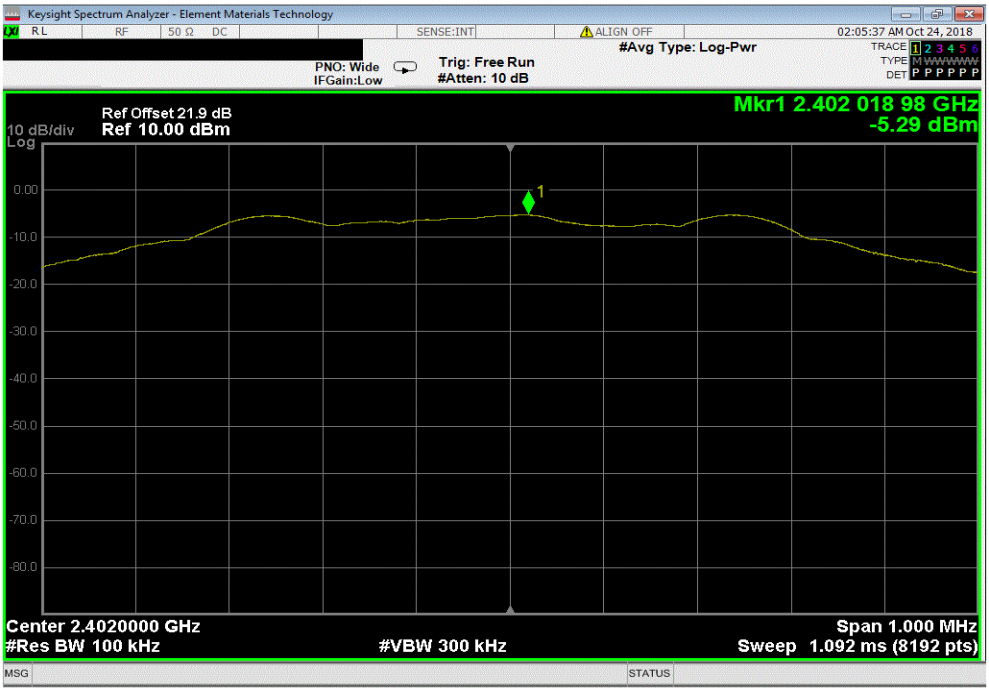
DEVIATIONS FROM TEST STANDARD

None

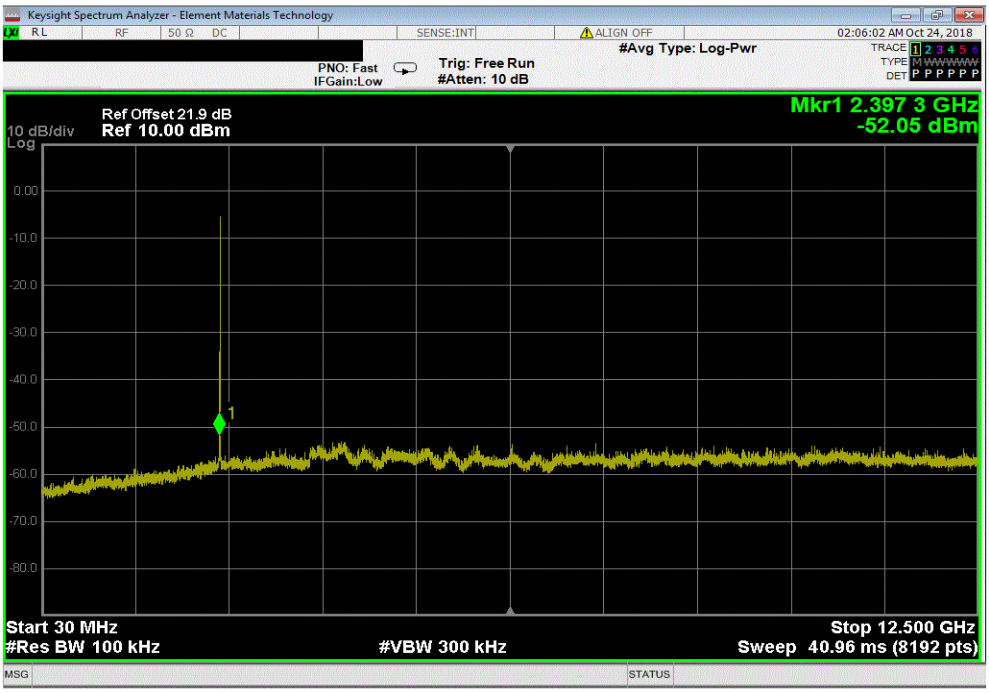
Configuration #	2	Signature

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	Fundamental	2402.02	N/A	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	30 MHz - 12.5 GHz	2397.34	-46.76	-20	Pass
BLE/GFSK Low Channel, 2402 MHz	12.5 GHz - 25 GHz	22881.82	-45.19	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	Fundamental	2442.02	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	3988.25	-45.54	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24427.73	-43.16	-20	Pass
BLE/GFSK High Channel, 2480 MHz	Fundamental	2480.24	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	30 MHz - 12.5 GHz	3995.86	-46.8	-20	Pass
BLE/GFSK High Channel, 2480 MHz	12.5 GHz - 25 GHz	24011.11	-43.67	-20	Pass

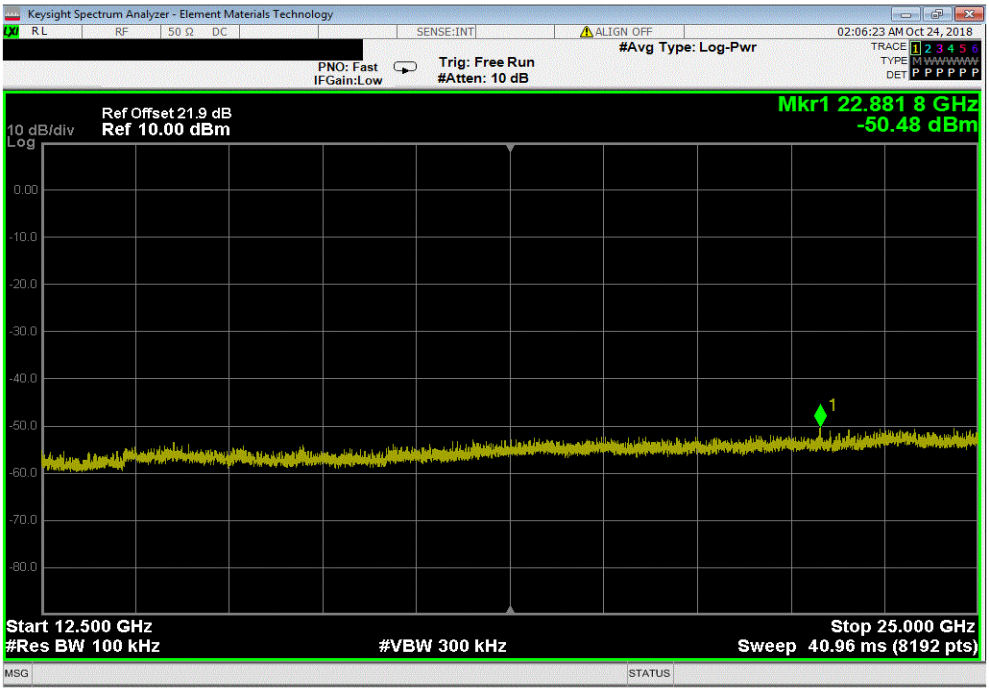
BLE/GFSK Low Channel, 2402 MHz						
	Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental		2402.02	N/A	N/A	N/A



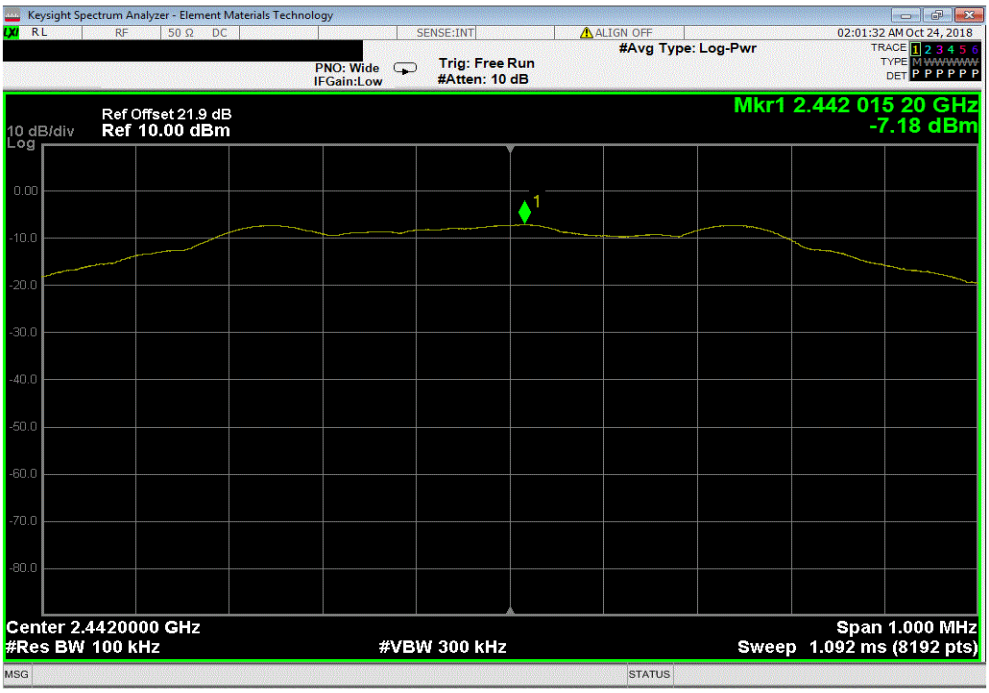
BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	2397.34	-46.76	-20	Pass



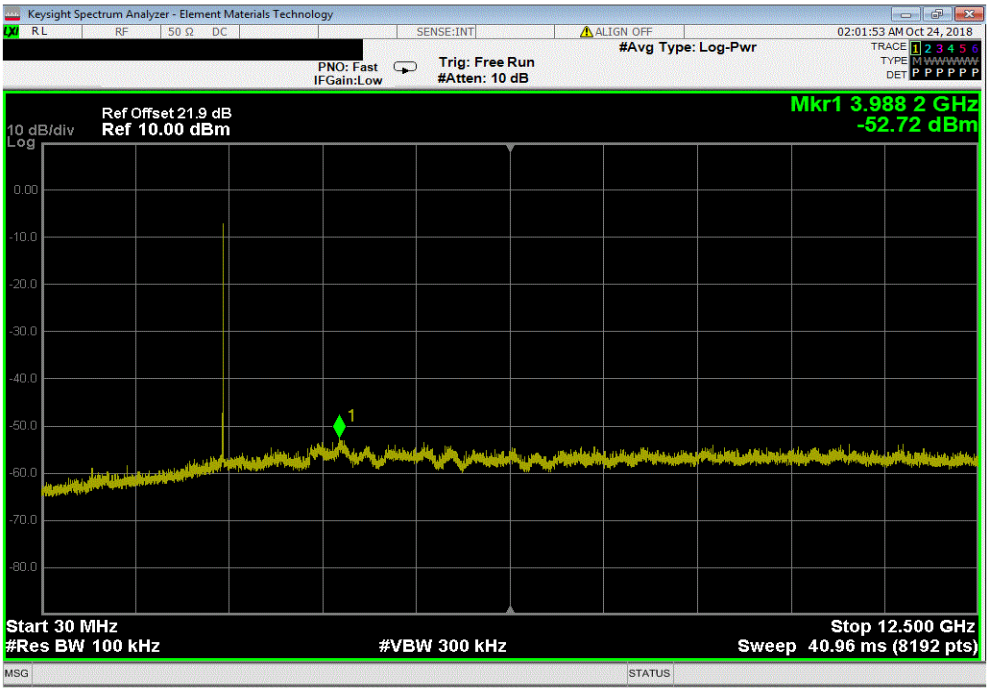
BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	22881.82	-45.19	-20	Pass



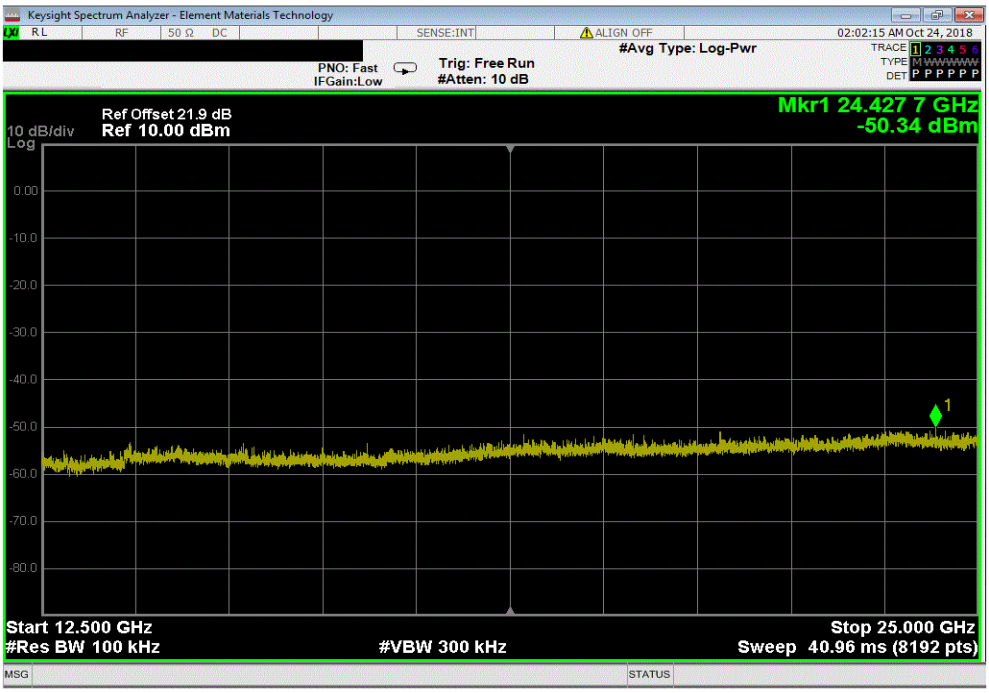
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2442.02	N/A	N/A	N/A



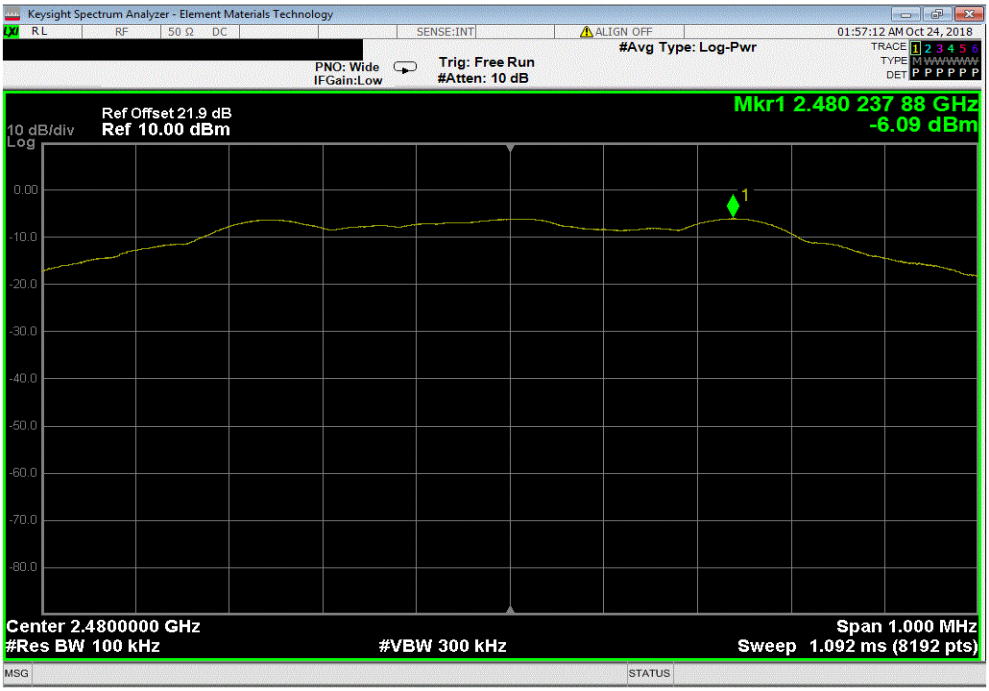
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3988.25	-45.54	-20	Pass



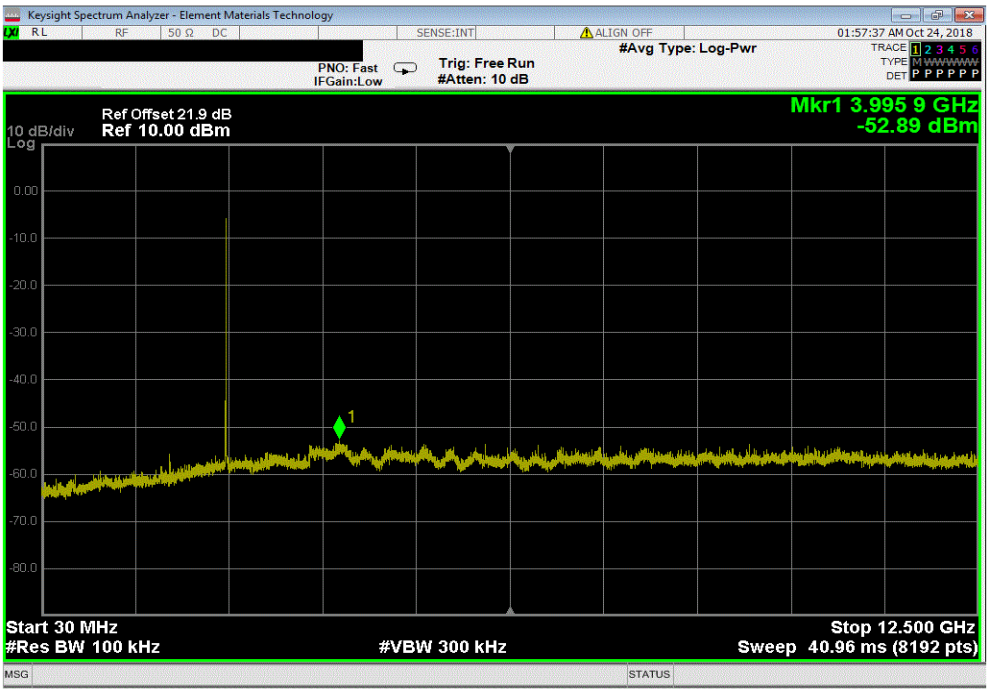
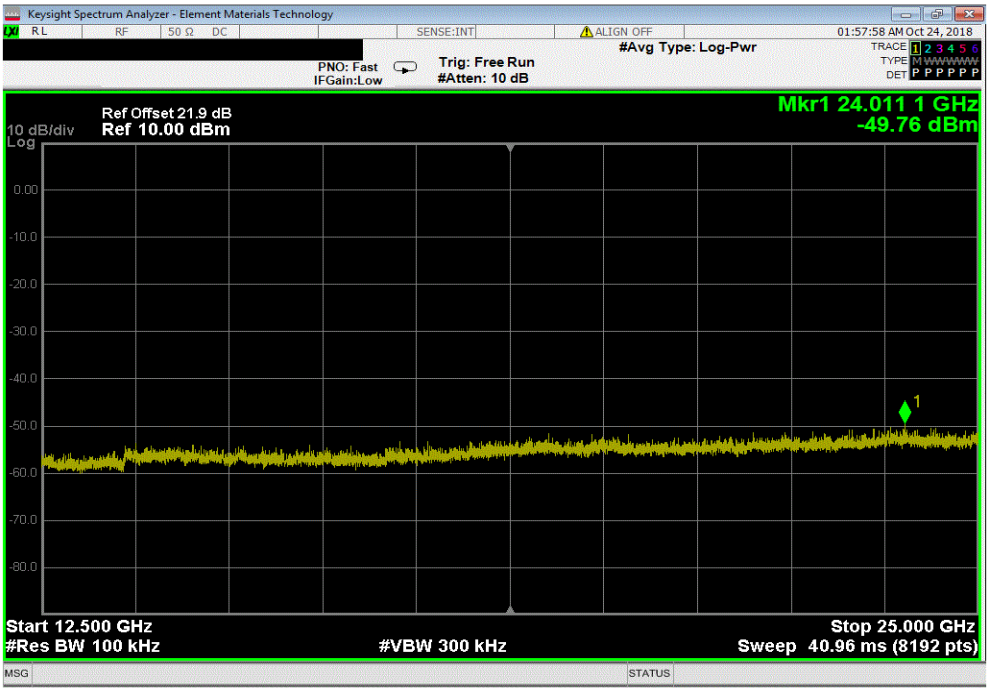
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24427.73	-43.16	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
	Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental		2480.24	N/A	N/A	N/A



BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3995.86	-46.8	-20	Pass



BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24011.11	-43.67	-20	Pass