



Starkey Laboratories, Inc.

TV Streaming Device

FCC 15.247:2018

Bluetooth LE (DTS)

Report # STAK0127.1



NVLAP LAB CODE: 200881-0



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CERTIFICATE OF TEST



Last Date of Test: May 8, 2018
Starkey Laboratories, Inc.
Model: TV Streaming Device

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2018	ANSI C63.10:2013
FCC 15.247:2018	ANSI C63.10:2013, KDB 558074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6, 11.12.1, 11.13.2	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	
11.10.2	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.

REVISION HISTORY



Revision Number		Description	Date	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:

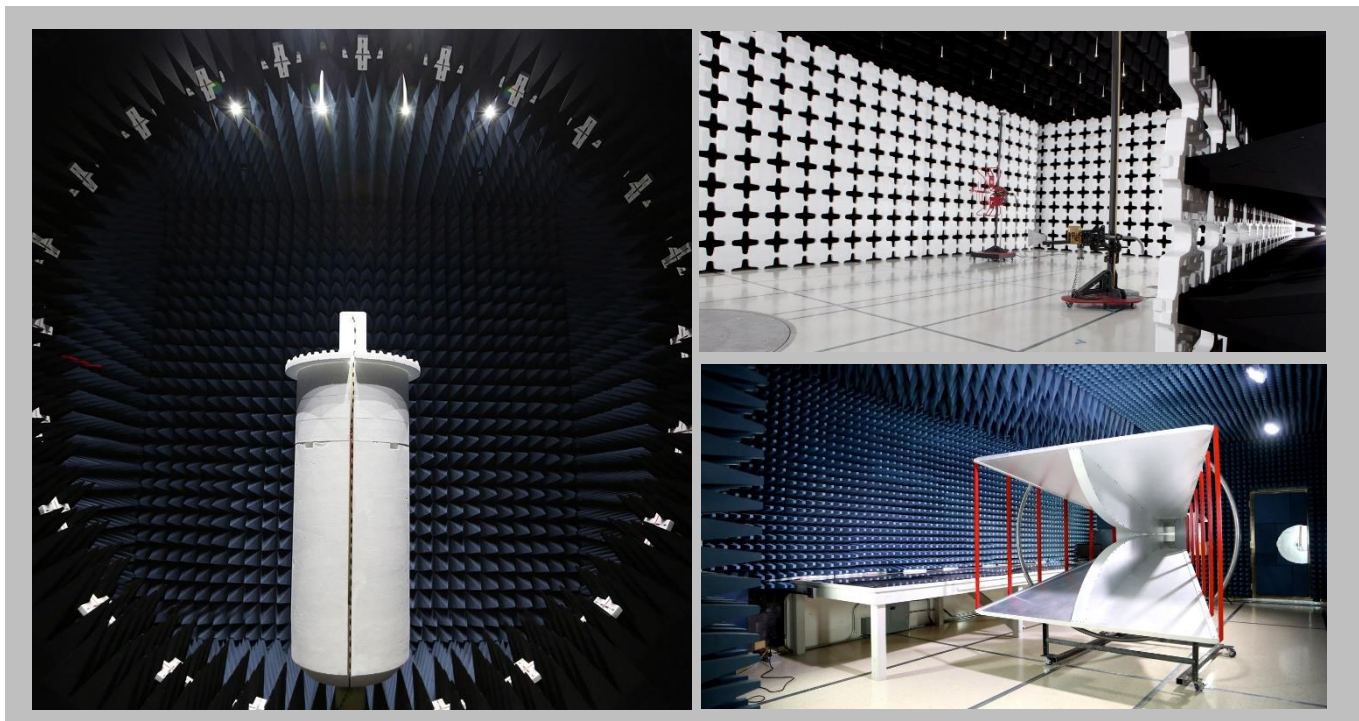
<http://portlandcustomer.element.com/ts/scope/scope.htm>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th 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/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

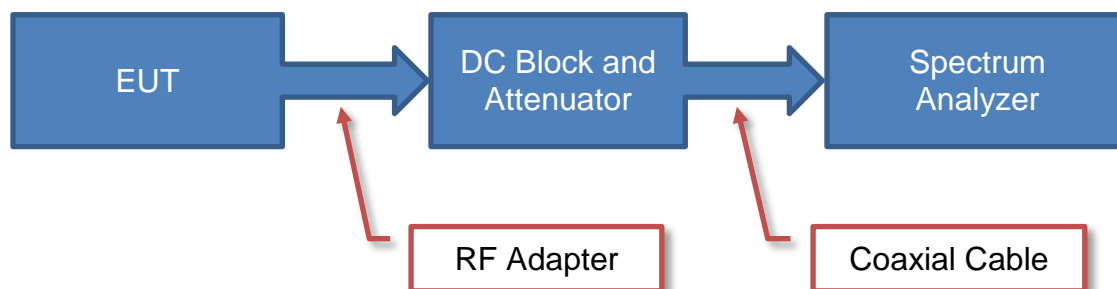
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

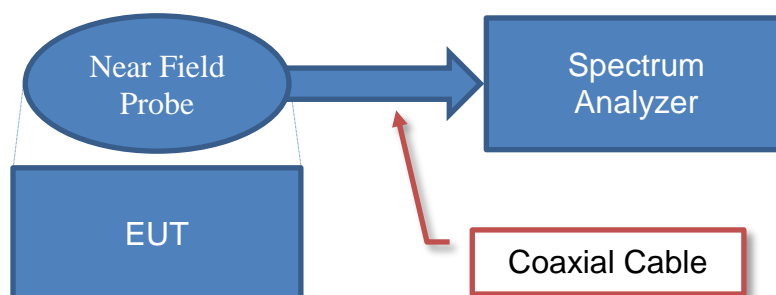
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

Test Setup Block Diagrams

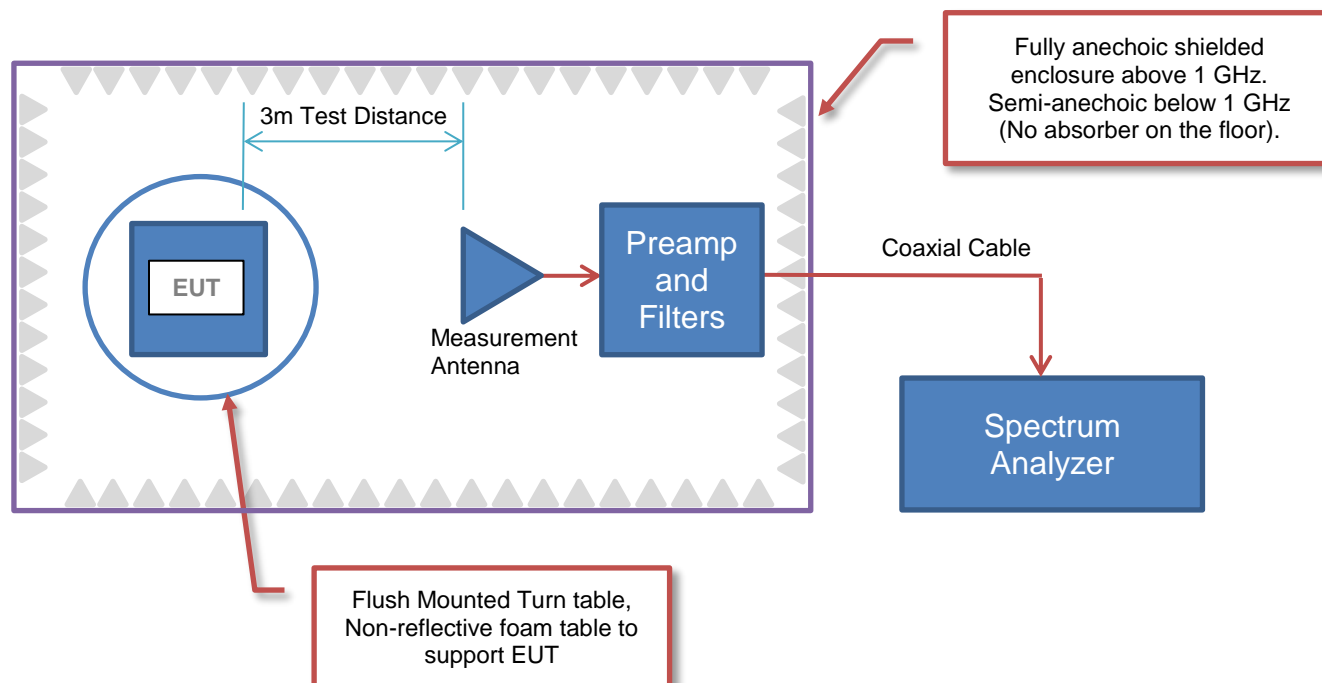
Antenna Port Conducted Measurements



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:	TV Streaming Device
First Date of Test:	April 12, 2018
Last Date of Test:	May 8, 2018
Receipt Date of Samples:	April 12, 2018
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
TV streaming device for the 2.4 GHz hearing aids using BLE
Testing Objective:
To demonstrate compliance of the Bluetooth low energy radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration STAK0114- 6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
TV Streaming Device 2 (High Power)	Starkey Hearing Technologies	800	180200049

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude E6420	2GK1DS1
DC Power Supply	Agilent	U8002A	TPZ

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power Cable (DC Power Supply)	No	1.8m	No	DC Power Supply	AC Mains
DC Leads	No	0.6m	No	DC Power Supply	USB Cable (Exposed Power Leads)
USB Cable (Exposed Power Leads)	No	1.8m	No	Laptop	TV Streaming Device

Configuration STAK0127- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
TV Streaming Device	Starkey Laboratories, Inc.	800	180200054

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude E6420	2GK1DS1
Power Supply (Laptop)	Dell	DA130PE1-00	CN-0JU012-48661-08A-1HHP-A04

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power Cable (Laptop)	No	0.9m	No	Power Supply (Laptop)	AC Mains
DC Cable (Laptop)	No	1.8m	Yes	Laptop	Power Supply (Laptop)
USB Cable (TV Streaming Device)	No	1.5m	No	TV Streaming Device	Laptop

CONFIGURATIONS



Configuration STAK0127- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
TV Streaming Device	Starkey Laboratories, Inc.	800	180200160

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude E6420	2GK1DS1
Power Supply (Laptop)	Dell	DA130PE1-00	CN-0JU012-48661-08A-1HHP-A04

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power Cable (Laptop)	No	0.9m	No	Power Supply (Laptop)	AC Mains
DC Cable (Laptop)	No	1.8m	Yes	Laptop	Power Supply (Laptop)
USB Cable (TV Streaming Device)	No	1.5m	No	TV Streaming Device	Laptop

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/12/2018	Powerline Conducted Emissions	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 following the test.
2	5/4/2018	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.
3	5/8/2018	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.
4	5/8/2018	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.
5	5/8/2018	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.
6	5/8/2018	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	5/8/2018	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	5/8/2018	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS



TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	6/4/2017	6/4/2018
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	3/14/2018	3/14/2019
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/15/2018	3/15/2019
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

STAK0114-6

MODES INVESTIGATED

Transmitting BLE, mid channel (2442 MHz)

POWERLINE CONDUCTED EMISSIONS



EUT:	TV Streaming Device	Work Order:	STAK0114
Serial Number:	180200049	Date:	04/12/2018
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4°C
Attendees:	Charlie Esch	Relative Humidity:	23.1%
Customer Project:	None	Bar. Pressure:	1008 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	STAK0114-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2018	ANSI C63.10:2013

TEST PARAMETERS

Run #:	10	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

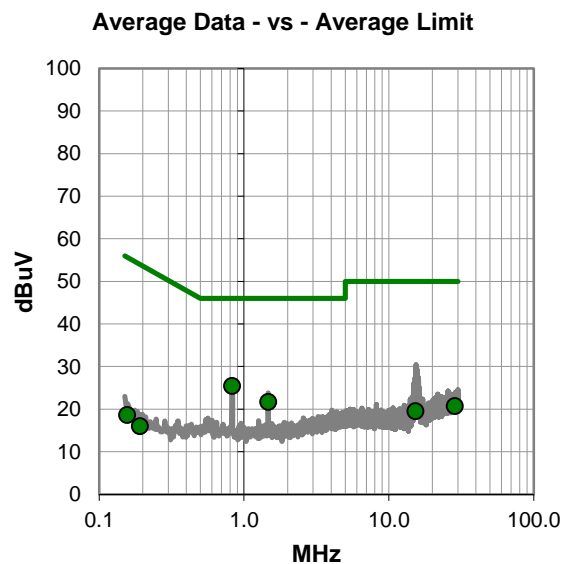
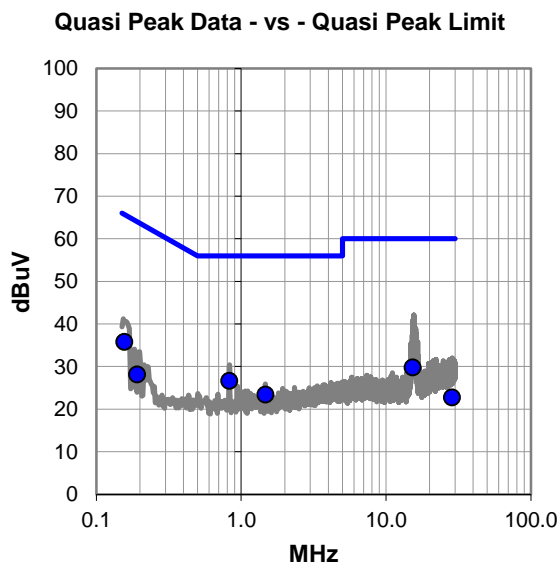
EUT powered by 5VDC USB connection using a DC power supply.

EUT OPERATING MODES

Transmitting BLE, mid channel (2442 MHz)

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.829	6.1	20.5	26.6	56.0	-29.4
0.156	15.1	20.7	35.8	65.7	-29.9
15.306	8.1	21.7	29.8	60.0	-30.2
1.470	2.9	20.5	23.4	56.0	-32.6
0.191	7.5	20.6	28.1	64.0	-35.9
28.605	-1.1	23.8	22.7	60.0	-37.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.829	4.9	20.5	25.4	46.0	-20.6
1.470	1.2	20.5	21.7	46.0	-24.3
28.605	-3.1	23.8	20.7	50.0	-29.3
15.306	-2.2	21.7	19.5	50.0	-30.5
0.156	-2.1	20.7	18.6	55.7	-37.1
0.191	-4.6	20.6	16.0	54.0	-38.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	TV Streaming Device	Work Order:	STAK0114
Serial Number:	180200049	Date:	04/12/2018
Customer:	Starkey Laboratories, Inc.	Temperature:	22.4°C
Attendees:	Charlie Esch	Relative Humidity:	23.1%
Customer Project:	None	Bar. Pressure:	1008 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	STAK0114-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2018	ANSI C63.10:2013

TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

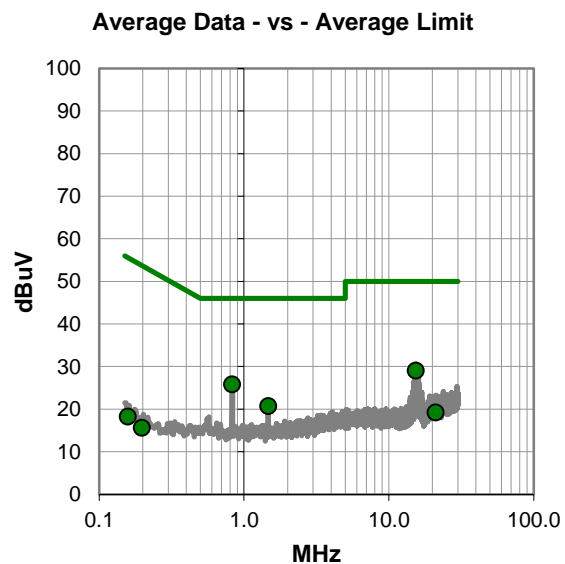
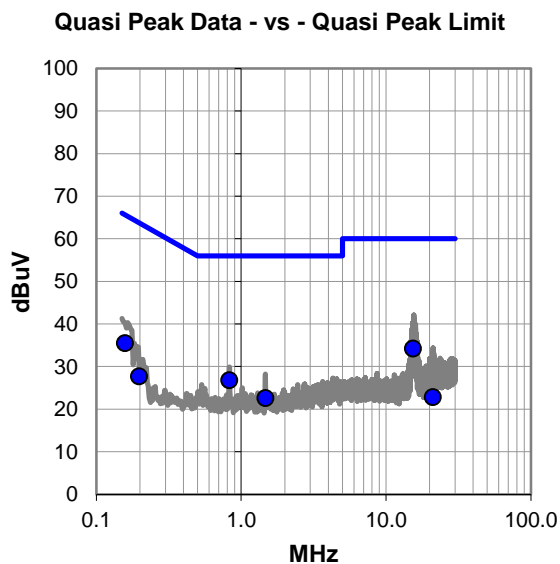
EUT powered by 5VDC USB connection using a DC power supply.

EUT OPERATING MODES

Transmitting BLE, mid channel (2442 MHz)

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #11

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
15.353	12.5	21.7	34.2	60.0	-25.8
0.830	6.3	20.5	26.8	56.0	-29.2
0.158	14.8	20.7	35.5	65.6	-30.1
1.470	2.1	20.5	22.6	56.0	-33.4
0.198	7.1	20.6	27.7	63.7	-36.0
21.103	0.2	22.6	22.8	60.0	-37.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.830	5.3	20.5	25.8	46.0	-20.2
15.353	7.3	21.7	29.0	50.0	-21.0
1.470	0.2	20.5	20.7	46.0	-25.3
21.103	-3.4	22.6	19.2	50.0	-30.8
0.158	-2.5	20.7	18.2	55.6	-37.4
0.198	-5.0	20.6	15.6	53.7	-38.1

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2018.05.04

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 (1 Mbps) at low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz); transmitting GFSK (2 Mbps) at low channel (2402 MHz), mid channel (2442 MHz) and high channel (2476 MHz).

POWER SETTINGS INVESTIGATED

5VDC

CONFIGURATIONS INVESTIGATED

STAK0127 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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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
Filter - High Pass	Micro-Tronics	HPM50111	LFN	20-Sep-2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	20-Sep-2017	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	20-Sep-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	12-Sep-2017	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12-Jul-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	13-Feb-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	13-Feb-2018	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	21-Nov-2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	23-Jun-2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	9-Nov-2017	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	9-Nov-2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2-Aug-2017	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 $10 \cdot \text{LOG}(\text{dc})$.

SPURIOUS RADIATED EMISSIONS



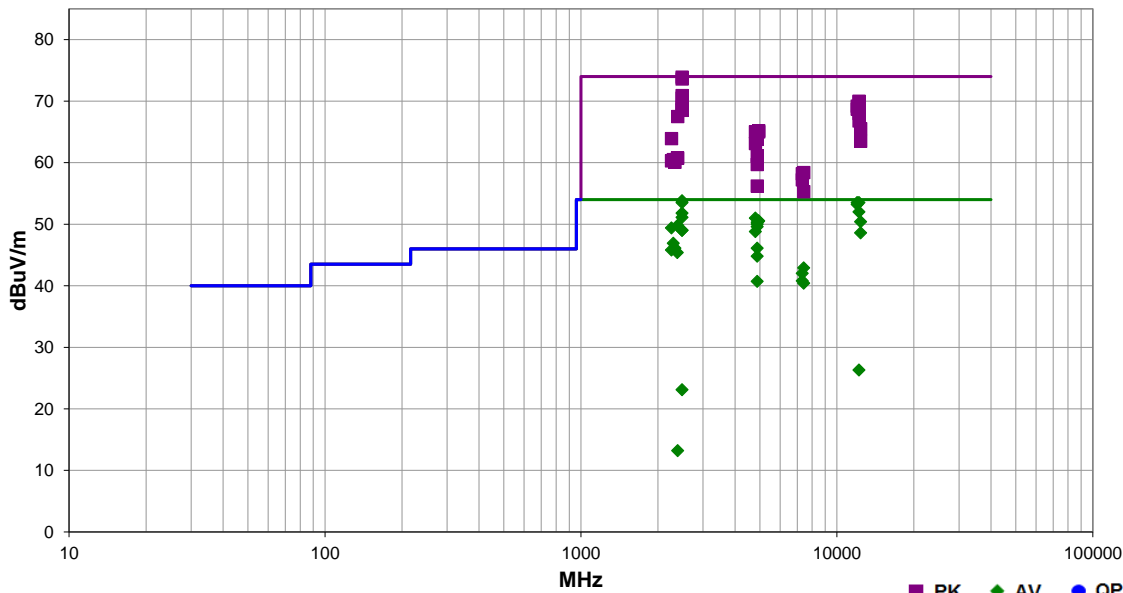
EmiR5 2018.03.06.1

PSA-ESCI 2018.05.04

Work Order:	STAK0127	Date:	4-May-2018	
Project:	None	Temperature:	23.2 °C	
Job Site:	MN05	Humidity:	29.8% RH	
Serial Number:	180200054	Barometric Pres.:	1013 mbar	
		Tested by: Dustin Sparks, Chris Patterson		
EUT:	TV Streaming Device			
Configuration:	1			
Customer:	Starkey Laboratories, Inc.			
Attendees:	Charlie Esch			
EUT Power:	5VDC			
Operating Mode:	Transmitting BLE (1 Mbps) at low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz); transmitting GFSK (2 Mbps) at low channel (2402 MHz), mid channel (2442 MHz) and high channel (2476 MHz).			
Deviations:	None			
Comments:	Duty cycle correction factor includes the upward correction in ANSI C63.10:2013 Section 11.12.2.5.2 (10 * log[1/x]) and the downward correction to the declared operating duty cycle in the customer's theory of operation (20 * log[x]; 2 Mbps GFSK duty cycle is 30% and 1 Mbps BLE duty cycle is 1%.)			

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

Run #	14	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Upward Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Downward Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.992	58.1	-4.2	1.0	4.1		20.0	Vert	PK	0.0	73.9	74.0	-0.1	EUT On Side, High Ch., 2 Mbps
2483.500	41.0	-4.2	1.0	117.0	7.5	20.0	Horz	AV	-10.5	53.8	54.0	-0.2	EUT On Side, High Ch., 2 Mbps
2484.075	57.8	-4.2	1.0	117.0		20.0	Horz	PK	0.0	73.6	74.0	-0.4	EUT Vertical, High Ch., 2 Mbps
12207.500	57.2	-1.1	1.7	107.0	7.9	0.0	Horz	AV	-10.5	53.5	54.0	-0.5	EUT On Side, Mid Ch., 2 Mbps
12007.530	57.9	-1.4	1.7	101.1	7.5	0.0	Vert	AV	-10.5	53.5	54.0	-0.5	EUT Vert, Low Ch., 2 mbps
2483.733	40.7	-4.2	1.0	4.1	7.5	20.0	Vert	AV	-10.5	53.5	54.0	-0.5	EUT On Side, High Ch., 2 Mbps
12007.510	57.6	-1.4	1.8	104.0	7.5	0.0	Horz	AV	-10.5	53.2	54.0	-0.8	EUT On Side, Low Ch., 2 Mbps
12207.520	55.7	-1.1	1.0	111.0	7.9	0.0	Vert	AV	-10.5	52.0	54.0	-2.0	EUT Vert, Mid Ch., 2 mbps
2483.500	38.9	-4.2	1.0	51.1	7.6	20.0	Horz	AV	-10.5	51.8	54.0	-2.2	EUT Horizontal, High Ch., 2 Mbps
2483.633	37.9	-4.2	1.0	34.1	7.9	20.0	Vert	AV	-10.5	51.1	54.0	-2.9	EUT Vertical, High Ch., 2 Mbps
4803.108	48.6	5.0	1.0	153.0	7.9	0.0	Vert	AV	-10.5	51.0	54.0	-3.0	EUT Vert, Low Ch., 2 mbps
2484.442	55.1	-4.2	1.0	34.1		20.0	Vert	PK	0.0	70.9	74.0	-3.1	EUT Vertical, High Ch., 2 Mbps
4951.067	47.5	5.6	3.2	126.0	7.9	0.0	Horz	AV	-10.5	50.5	54.0	-3.5	EUT On Side, High Ch., 2 mbps
4951.100	47.9	5.6	1.0	140.0	7.5	0.0	Vert	AV	-10.5	50.5	54.0	-3.5	EUT Vert, High Ch., 2 Mbps
2483.883	54.7	-4.2	1.0	51.1		20.0	Horz	PK	0.0	70.5	74.0	-3.5	EUT Horizontal, High Ch., 2 Mbps
12377.510	53.5	-0.5	1.7	91.1	7.9	0.0	Vert	AV	-10.5	50.4	54.0	-3.6	EUT Vert, High Ch., 2 mbps
4883.133	47.9	5.4	1.0	133.0	7.5	0.0	Vert	AV	-10.5	50.3	54.0	-3.7	EUT Vert, Mid Ch., 2 mbps
4883.025	47.2	5.4	2.6	69.1	7.9	0.0	Horz	AV	-10.5	50.0	54.0	-4.0	EUT On Side, Mid Ch., 2 mbps
12208.480	71.1	-1.1	1.6	104.0		0.0	Horz	PK	0.0	70.0	74.0	-4.0	EUT On Side, Mid Ch., 1 Mbps
12208.450	71.0	-1.1	1.6	104.0		0.0	Horz	PK	0.0	69.9	74.0	-4.1	EUT On Side, Mid Ch., 1 Mbps
2390.000	36.4	-4.0	1.0	5.1	7.9	20.0	Vert	AV	-10.5	49.8	54.0	-4.2	EUT Vert, Low Ch., 2 mbps
4882.975	46.8	5.4	1.0	49.0	7.9	0.0	Vert	AV	-10.5	49.6	54.0	-4.4	EUT Horz, Mid Ch., 2 mbps

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Upward Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Downward Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2257.892	35.7	-3.3	1.2	34.1	7.5	20.0	Vert	AV	-10.5	49.4	54.0	-4.6	EUT Vert, Low Ch., 2 mbps
12012.380	70.6	-1.4	1.7	101.1		0.0	Vert	PK	0.0	69.2	74.0	-4.8	EUT Vert, Low Ch., 2 mbps
2483.583	36.2	-4.2	3.6	258.9	7.5	20.0	Horz	AV	-10.5	49.0	54.0	-5.0	EUT Vertical, High Ch., 2 Mbps
2483.558	36.2	-4.2	3.3	164.0	7.5	20.0	Vert	AV	-10.5	49.0	54.0	-5.0	EUT Horizontal, High Ch., 2 Mbps
2484.333	53.2	-4.2	3.6	258.9		20.0	Horz	PK	0.0	69.0	74.0	-5.0	EUT On Side, High Ch., 2 Mbps
4803.100	46.4	5.0	1.0	155.1	7.9	0.0	Horz	AV	-10.5	48.8	54.0	-5.2	EUT On Side, Low Ch., 2 mbps
12012.410	70.1	-1.4	1.8	104.0		0.0	Horz	PK	0.0	68.7	74.0	-5.3	EUT On Side, Low Ch., 2 Mbps
2483.500	52.9	-4.2	3.5	266.0		20.0	Horz	PK	0.0	68.7	74.0	-5.3	EUT On Side, High Ch., 1 Mbps
12377.520	51.7	-0.5	1.3	108.0	7.9	0.0	Horz	AV	-10.5	48.6	54.0	-5.4	EUT On Side, High Ch., 2 Mbps
2483.783	52.7	-4.2	3.3	164.0		20.0	Vert	PK	0.0	68.5	74.0	-5.5	EUT Horizontal, High Ch., 2 Mbps
12209.840	69.1	-1.1	1.7	107.0		0.0	Horz	PK	0.0	68.0	74.0	-6.0	EUT On Side, Mid Ch., 2 Mbps
2388.967	51.5	-4.0	1.0	5.1		20.0	Vert	PK	0.0	67.5	74.0	-6.5	EUT Vert, Low Ch., 2 mbps
2297.900	33.0	-3.5	2.8	105.1	7.9	20.0	Horz	AV	-10.5	46.9	54.0	-7.1	EUT On Side, Mid Ch., 2 Mbps
12209.780	67.9	-1.1	1.0	111.0		0.0	Vert	PK	0.0	66.8	74.0	-7.2	EUT Vert, Mid Ch., 2 mbps
4883.008	43.7	5.4	1.0	272.9	7.5	0.0	Horz	AV	-10.5	46.1	54.0	-7.9	EUT Horz, Mid Ch., 2 mbps
2331.867	32.3	-3.6	1.0	245.0	7.9	20.0	Horz	AV	-10.5	46.1	54.0	-7.9	EUT On Side, High Ch., 2 Mbps
2257.900	32.1	-3.3	1.2	136.0	7.5	20.0	Horz	AV	-10.5	45.8	54.0	-8.2	EUT On Side, Low Ch. 2 mbps
12379.730	66.0	-0.5	1.7	91.1		0.0	Vert	PK	0.0	65.5	74.0	-8.5	EUT Vert, High Ch., 2 mbps
2381.283	32.3	-3.9	1.0	220.1	7.5	20.0	Horz	AV	-10.5	45.4	54.0	-8.6	EUT On Side, Low Ch. 2 mbps
4952.933	59.6	5.6	1.0	140.0		0.0	Vert	PK	0.0	65.2	74.0	-8.8	EUT Vert, High Ch., 2 Mbps
4802.875	60.0	5.0	1.0	153.0		0.0	Vert	PK	0.0	65.0	74.0	-9.0	EUT Vert, Low Ch., 2 mbps
4952.925	59.4	5.6	3.2	126.0		0.0	Horz	PK	0.0	65.0	74.0	-9.0	EUT On Side, High Ch., 2 mbps
4882.892	59.5	5.4	1.0	133.0		0.0	Vert	PK	0.0	64.9	74.0	-9.1	EUT Vert, Mid Ch., 2 mbps
4883.133	42.3	5.4	2.0	135.0	7.6	0.0	Horz	AV	-10.5	44.8	54.0	-9.2	EUT Vert, Mid Ch., 2 mbps
4884.942	59.1	5.4	2.6	69.1		0.0	Horz	PK	0.0	64.5	74.0	-9.5	EUT On Side, Mid Ch., 2 mbps
2257.925	47.2	-3.3	1.2	34.1		20.0	Vert	PK	0.0	63.9	74.0	-10.1	EUT Vert, Low Ch., 2 mbps
4884.025	58.4	5.4	1.0	49.0		0.0	Vert	PK	0.0	63.8	74.0	-10.2	EUT Horz, Mid Ch., 2 mbps
12379.780	64.0	-0.5	1.3	108.0		0.0	Horz	PK	0.0	63.5	74.0	-10.5	EUT On Side, High Ch., 2 Mbps
4802.875	58.1	5.0	1.0	155.1		0.0	Horz	PK	0.0	63.1	74.0	-10.9	EUT On Side, Low Ch., 2 mbps
7426.467	34.7	10.8	2.1	160.1	7.9	0.0	Horz	AV	-10.5	42.9	54.0	-11.1	EUT On Side, High Ch., 2 mbps
7324.575	34.1	10.5	2.3	153.0	7.9	0.0	Horz	AV	-10.5	42.0	54.0	-12.0	EUT On Side, Mid Ch., 2 mbps
4882.858	55.7	5.4	1.0	272.9		0.0	Horz	PK	0.0	61.1	74.0	-12.9	EUT Horz, Mid Ch., 2 mbps
7324.542	33.3	10.5	1.0	73.1	7.5	0.0	Vert	AV	-10.5	40.8	54.0	-13.2	EUT Vert, Mid Ch., 2 mbps
2385.517	44.8	-4.0	1.0	220.1		20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT On Side, Low Ch. 2 mbps
4883.042	38.2	5.4	1.0	113.1	7.6	0.0	Vert	AV	-10.5	40.7	54.0	-13.3	EUT On Side, Mid Ch., 2 mbps
2385.492	44.7	-4.0	1.0	158.0		20.0	Horz	PK	0.0	60.7	74.0	-13.3	EUT On Side, Low Ch., 1 Mbps
2297.817	44.0	-3.5	2.8	105.1		20.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT On Side, Mid Ch., 2 Mbps
7426.492	32.2	10.8	1.0	149.1	7.9	0.0	Vert	AV	-10.5	40.4	54.0	-13.6	EUT Vert, High Ch., 2 Mbps
2257.617	43.6	-3.3	1.2	136.0		20.0	Horz	PK	0.0	60.3	74.0	-13.7	EUT On Side, Low Ch. 2 mbps
2331.183	43.7	-3.6	1.0	245.0		20.0	Horz	PK	0.0	60.1	74.0	-13.9	EUT On Side, High Ch., 2 Mbps
4882.900	54.3	5.4	2.0	135.0		0.0	Horz	PK	0.0	59.7	74.0	-14.3	EUT Vert, Mid Ch., 2 mbps
7426.517	47.6	10.8	2.1	160.1		0.0	Horz	PK	0.0	58.4	74.0	-15.6	EUT On Side, High Ch., 2 mbps
7325.617	47.7	10.5	2.3	153.0		0.0	Horz	PK	0.0	58.2	74.0	-15.8	EUT On Side, Mid Ch., 2 mbps
7324.367	46.7	10.5	1.0	73.1		0.0	Vert	PK	0.0	57.2	74.0	-16.8	EUT Vert, Mid Ch., 2 mbps
4882.867	50.8	5.4	1.0	113.1		0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT On Side, Mid Ch., 2 mbps
7429.350	44.4	10.9	1.0	149.1		0.0	Vert	PK	0.0	55.3	74.0	-18.7	EUT Vert, High Ch., 2 Mbps
12208.610	62.5	-1.1	1.6	104.0	4.9	0.0	Horz	AV	-40.0	26.3	54.0	-27.7	EUT On Side, Mid Ch., 1 Mbps
2483.508	38.9	-4.2	3.5	266.0	4.9	20.0	Horz	AV	-40.0	23.1	54.0	-30.9	EUT On Side, High Ch., 1 Mbps
2389.508	32.3	-4.0	1.0	158.0	7.9	20.0	Horz	AV	-40.0	13.2	54.0	-40.8	EUT On Side, Low Ch., 1 Mbps

DUTY CYCLE



XMI 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	12-Sep-17	12-Sep-18
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



TbTfx 2017.12.14 XMit 2017.12.13

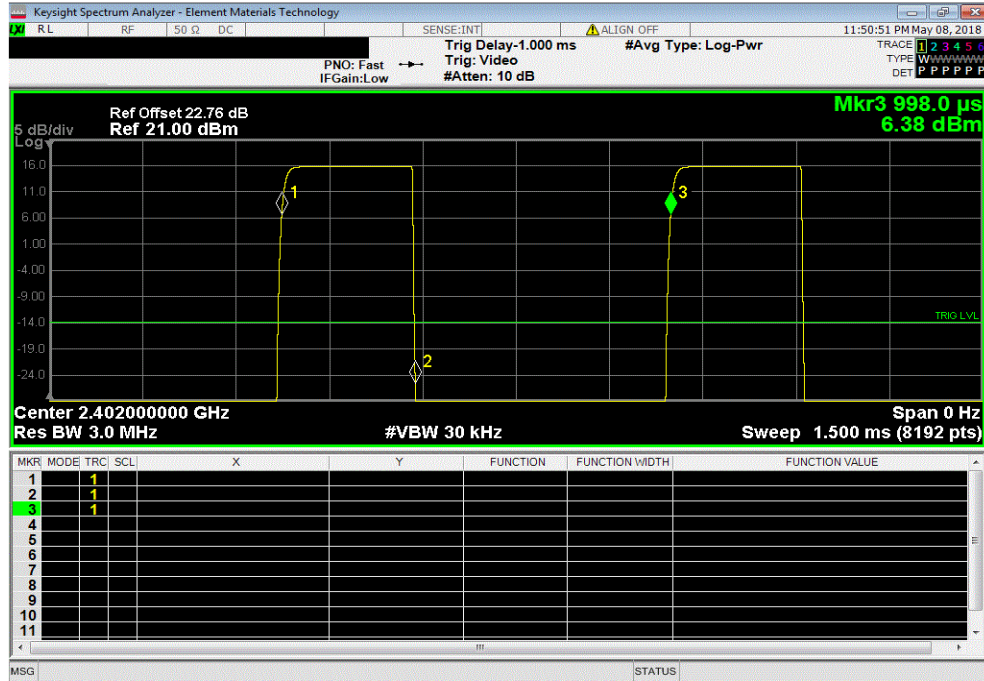
EUT: TV Streaming Device		Work Order: STAK0127	
Serial Number: 180200160		Date: 8-May-18	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4 °C	
Attendees: Charlie Esch		Humidity: 33.8% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Dustin Sparks		Power: 110VAC/60Hz	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2018		ANSI C63.10:2013	
COMMENTS			
U.FL to SMA adapter cable included in measurement cable offset.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Dustin Sparks</i>	
	Pulse Width	Period	Number of Pulses
			Value (%)
			Limit (%)
			Results
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz	214.6 us	624.9 us	1
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz	N/A	N/A	5
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz	214.9 us	625.1 us	1
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz	N/A	N/A	5
BLE/GFSK High Channel, 1 Mbps, 2480 MHz	214.7 us	624.9 us	1
BLE/GFSK High Channel, 1 Mbps, 2480 MHz	N/A	N/A	5
GFSK Low Channel, 2 Mbps, 2402 MHz	108.9 us	625.1 us	1
GFSK Low Channel, 2 Mbps, 2402 MHz	N/A	N/A	5
GFSK Mid Channel, 2 Mbps, 2442 MHz	109.2 us	625 us	1
GFSK Mid Channel, 2 Mbps, 2442 MHz	N/A	N/A	5
GFSK High Channel, 2 Mbps, 2476 MHz	109.3 us	625.2 us	1
GFSK High Channel, 2 Mbps, 2476 MHz	N/A	N/A	5

DUTY CYCLE

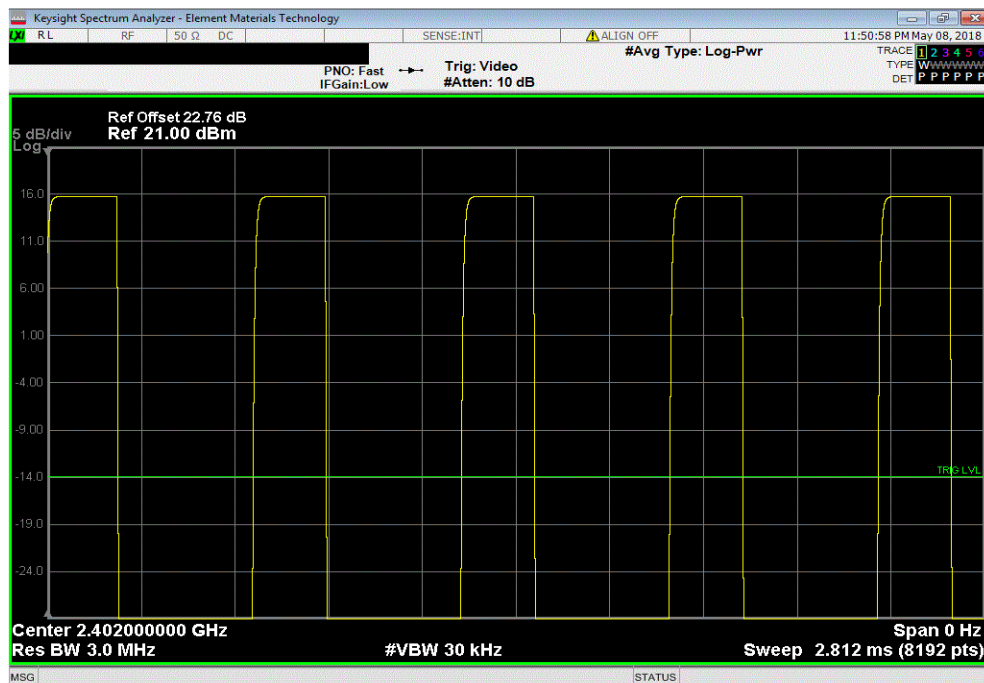


TbTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
214.6 μ s	624.9 μ s	1	34.3	N/A	N/A	



BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

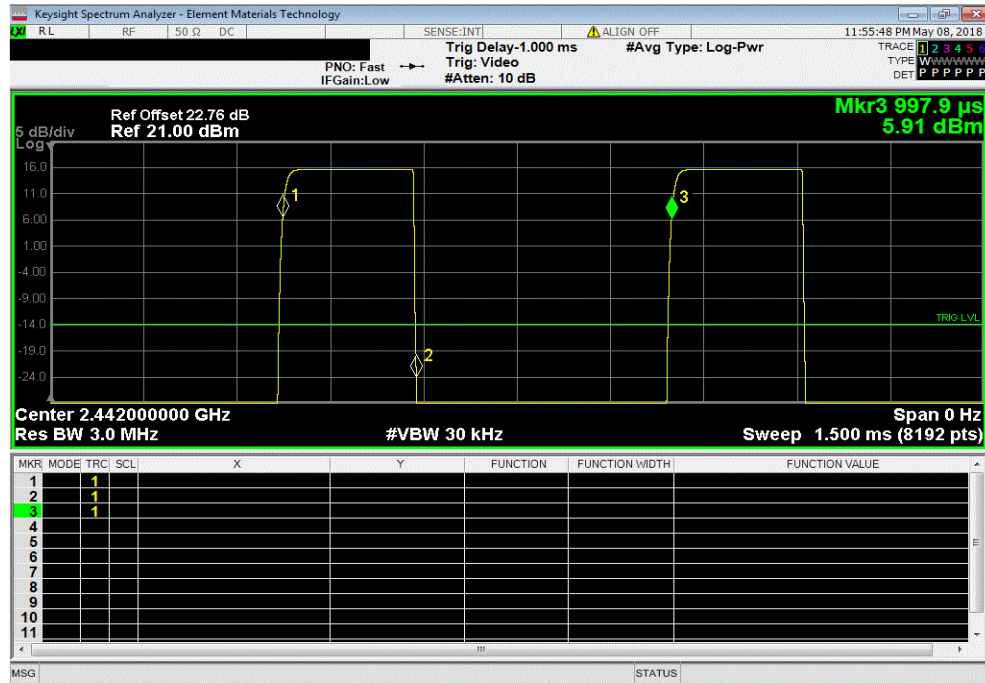


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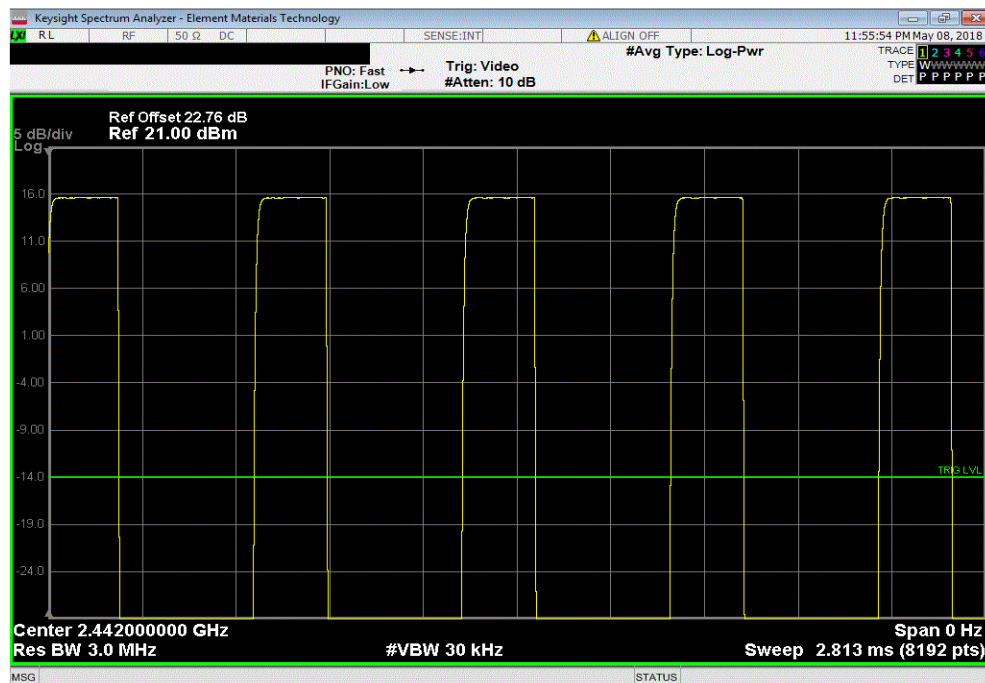


TbTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
214.9 us	625.1 us	1	34.4	N/A	N/A	



BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

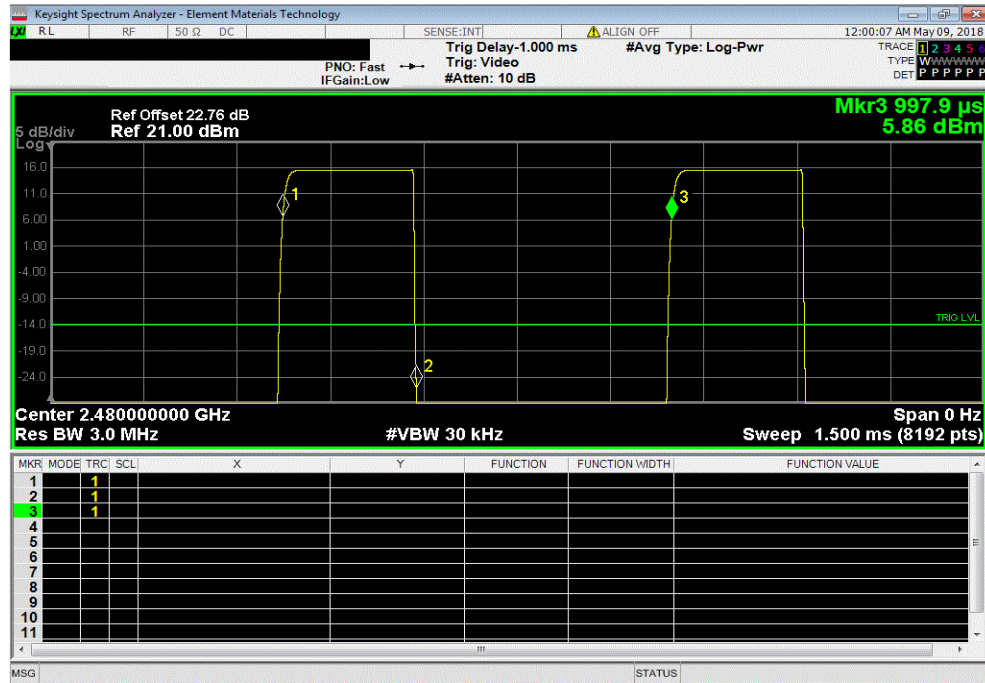


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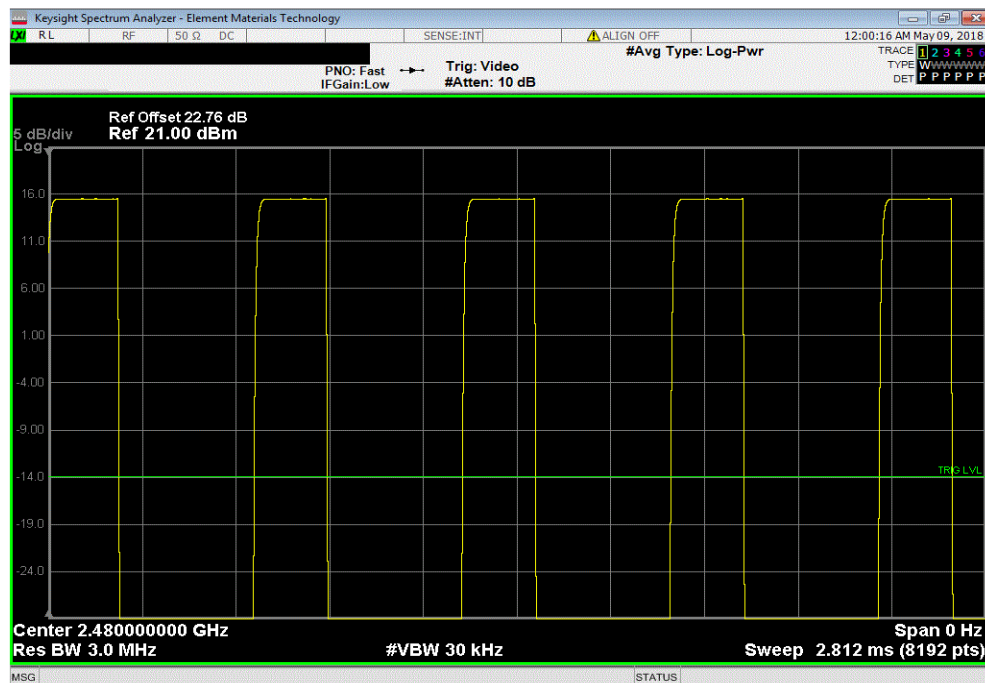


TbTx 2017.12.14 XMI 2017.12.13

BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
214.7 us	624.9 us	1	34.4	N/A	N/A	



BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

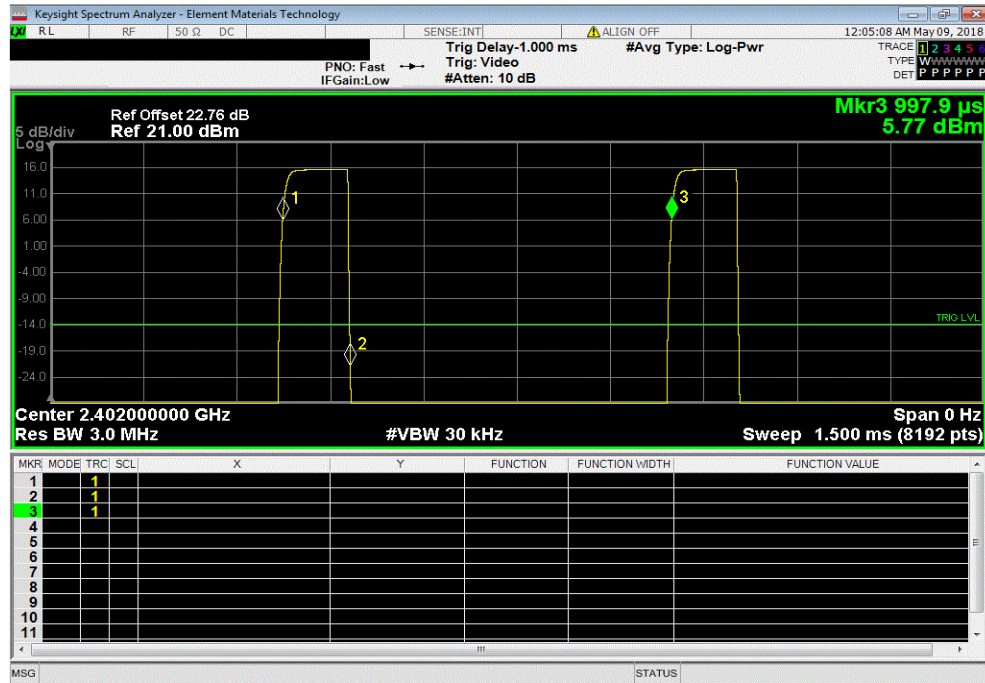


DUTY CYCLE

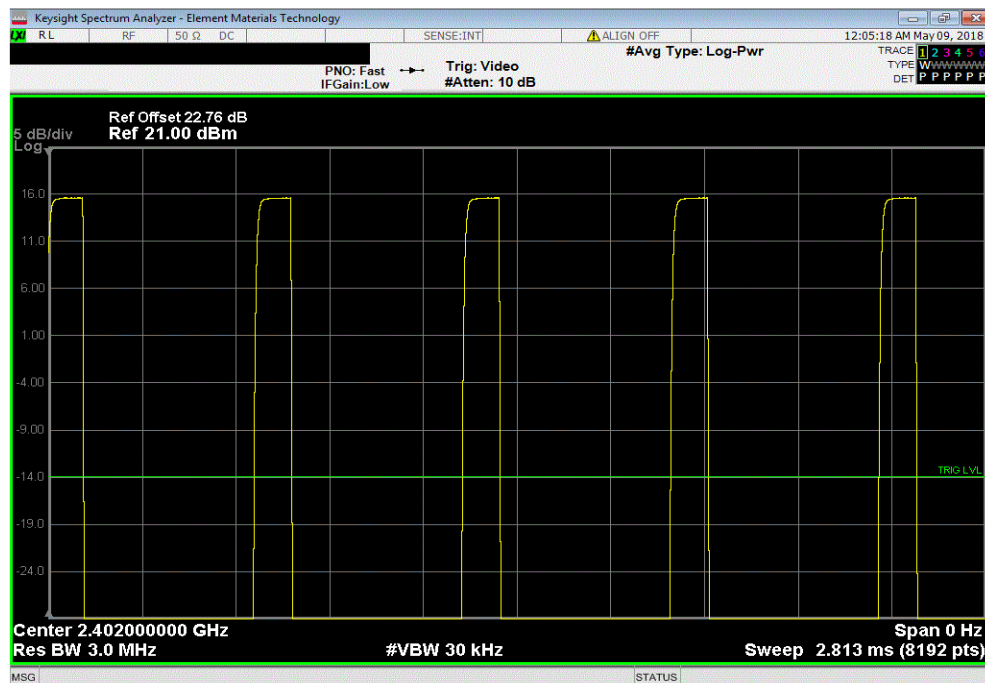


TbTx 2017.12.14 XMt 2017.12.13

GFSK Low Channel, 2 Mbps, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
108.9 us	625.1 us	1	17.4	N/A	N/A	



GFSK Low Channel, 2 Mbps, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

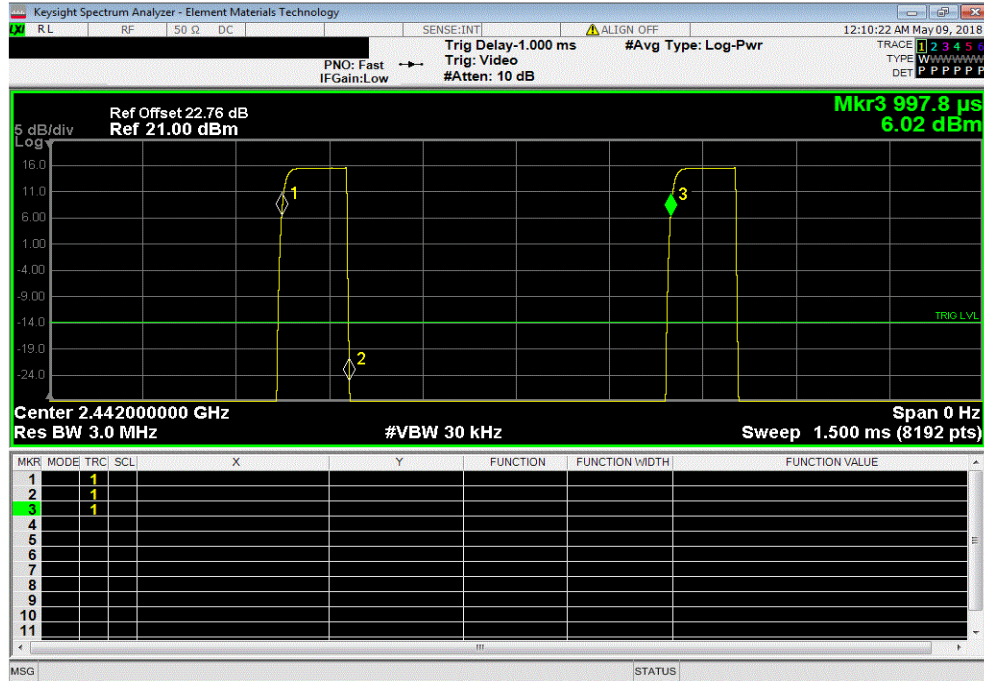


DUTY CYCLE

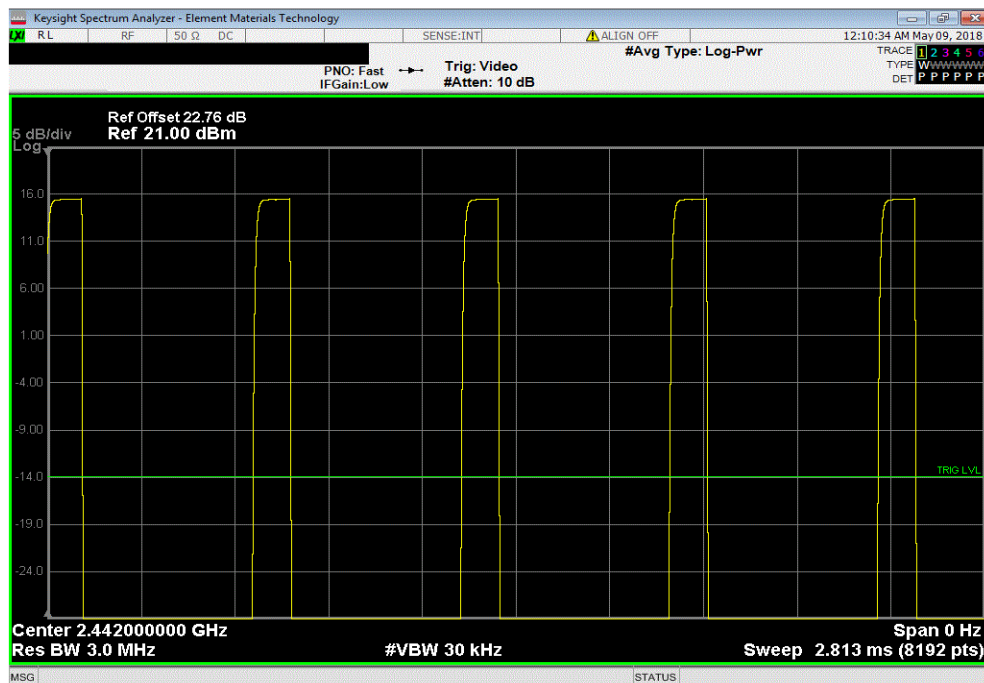


TbTx 2017.12.14 XMI 2017.12.13

GFSK Mid Channel, 2 Mbps, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
109.2 us	625 us	1	17.5	N/A	N/A	



GFSK Mid Channel, 2 Mbps, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

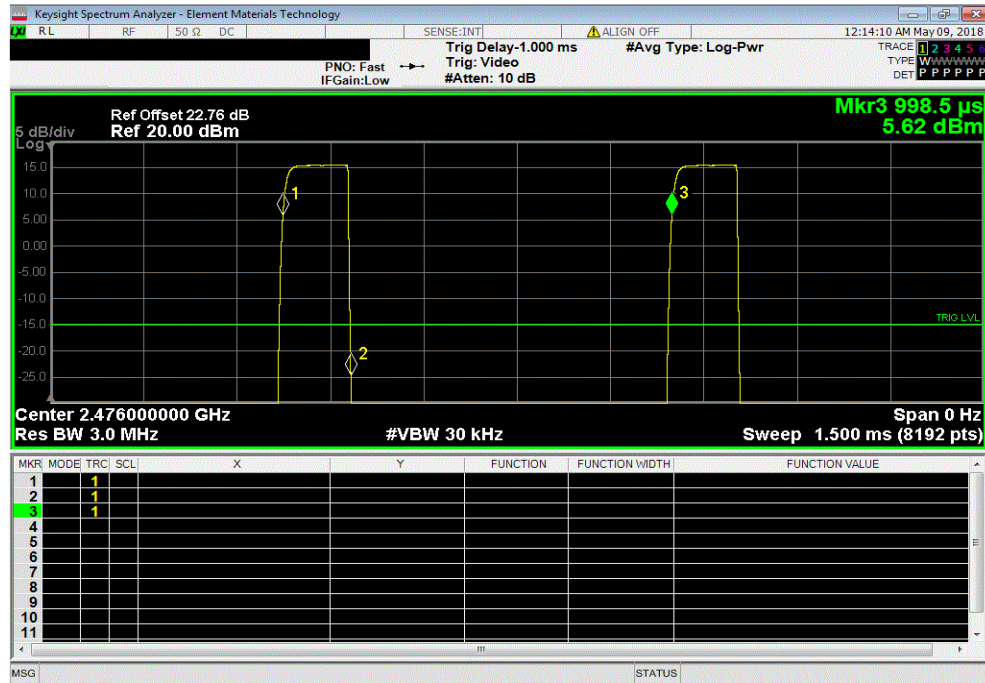


DUTY CYCLE

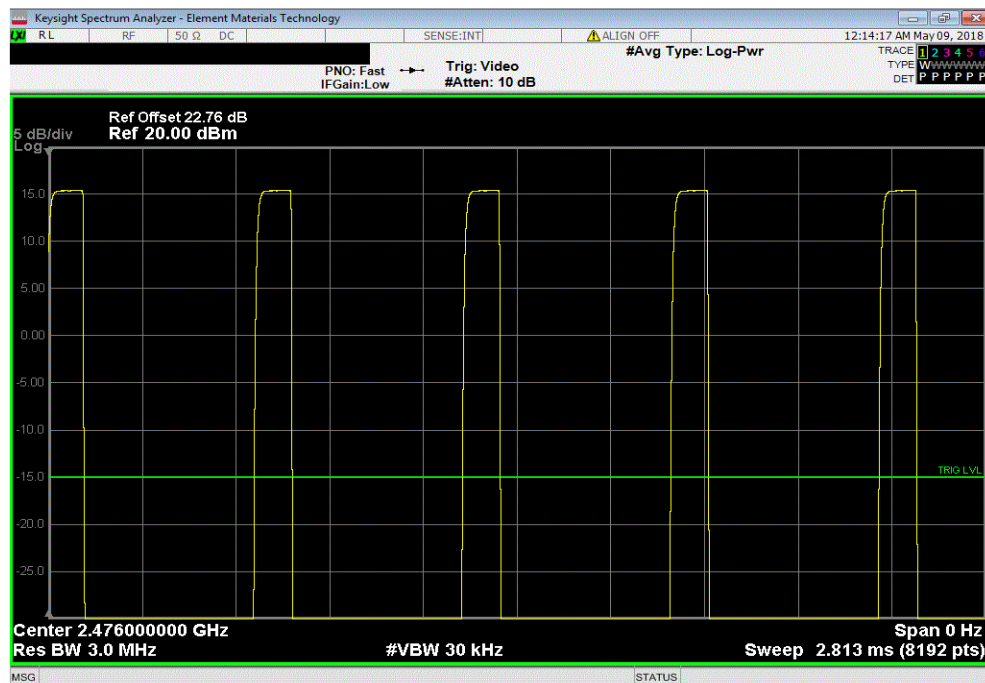


TbTx 2017.12.14 XMI 2017.12.13

GFSK High Channel, 2 Mbps, 2476 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
109.3 us	625.2 us	1	17.5	N/A	N/A	



GFSK High Channel, 2 Mbps, 2476 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	12-Sep-17	12-Sep-18
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 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



TotTx 2017.12.14 XMit 2017.12.13

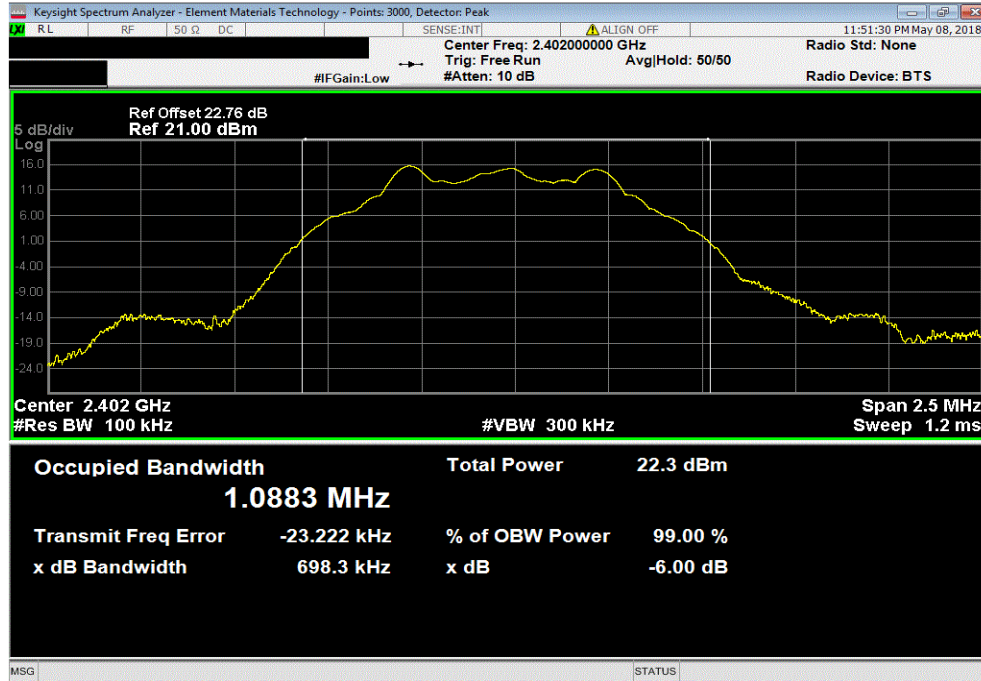
EUT: TV Streaming Device		Work Order: STAK0127	
Serial Number: 180200160		Date: 8-May-18	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4 °C	
Attendees: Charlie Esch		Humidity: 33.7% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Dustin Sparks		Job Site: MN08	
Power: 110VAC/60Hz			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2018		ANSI C63.10:2013	
COMMENTS			
U.FL to SMA adapter cable included in measurement cable offset.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Dustin Sparks</i>	
		Value	Limit (±) Result
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		698.252 kHz	500 kHz Pass
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz		677.106 kHz	500 kHz Pass
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		678.913 kHz	500 kHz Pass
GFSK Low Channel, 2 Mbps, 2402 MHz		1.209 MHz	500 kHz Pass
GFSK Mid Channel, 2 Mbps, 2442 MHz		1.207 MHz	500 kHz Pass
GFSK High Channel, 2 Mbps, 2476 MHz		1.207 MHz	500 kHz Pass

OCCUPIED BANDWIDTH

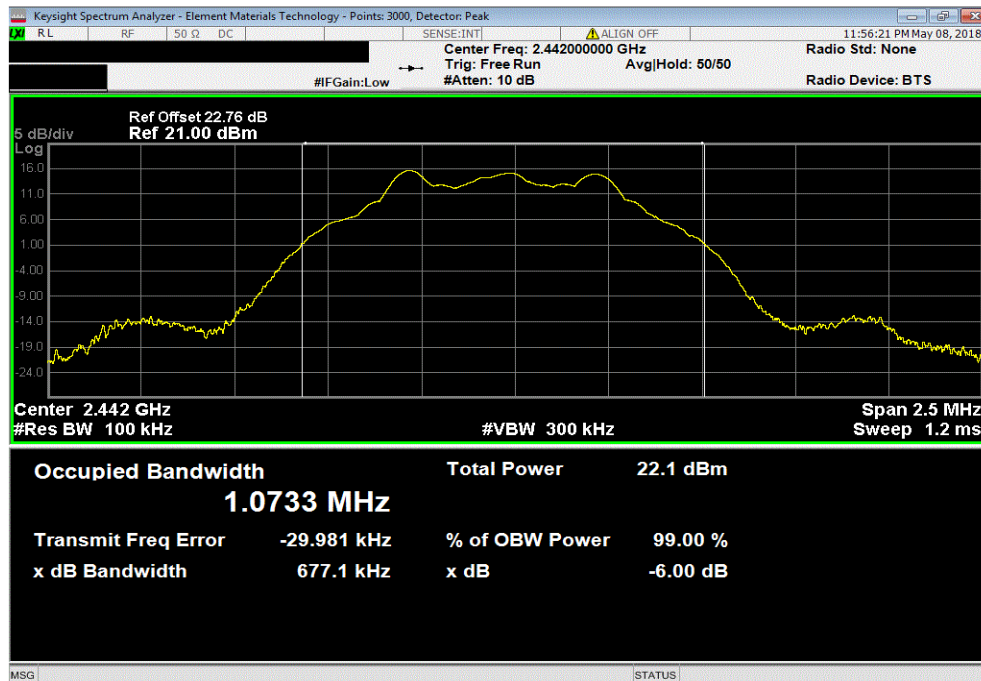


TMTx 2017.12.14 XMI 2017.12.13

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



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

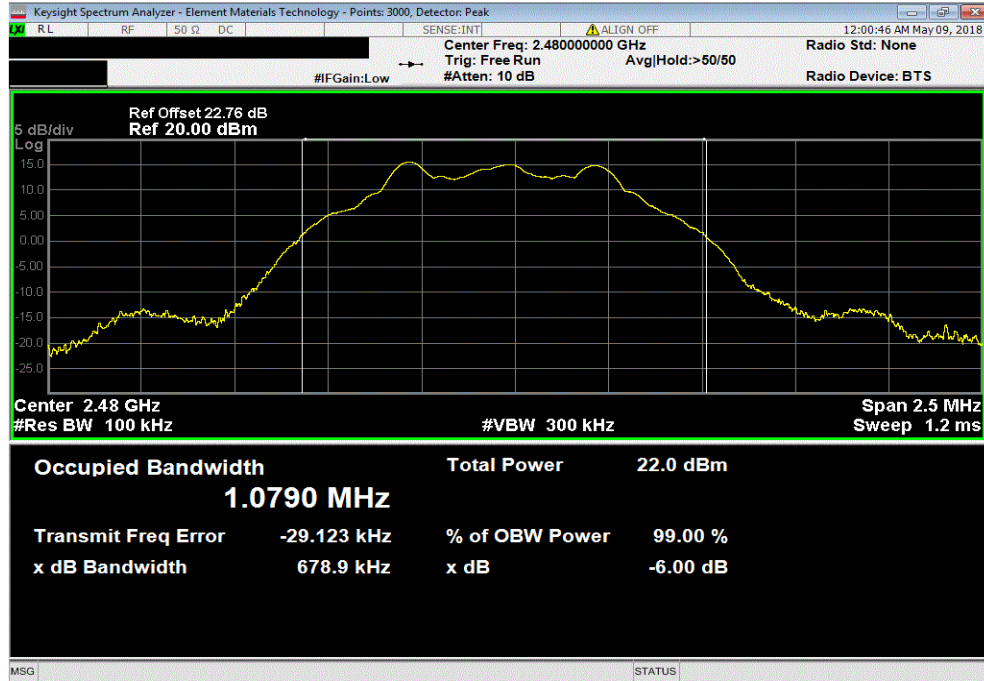


OCCUPIED BANDWIDTH

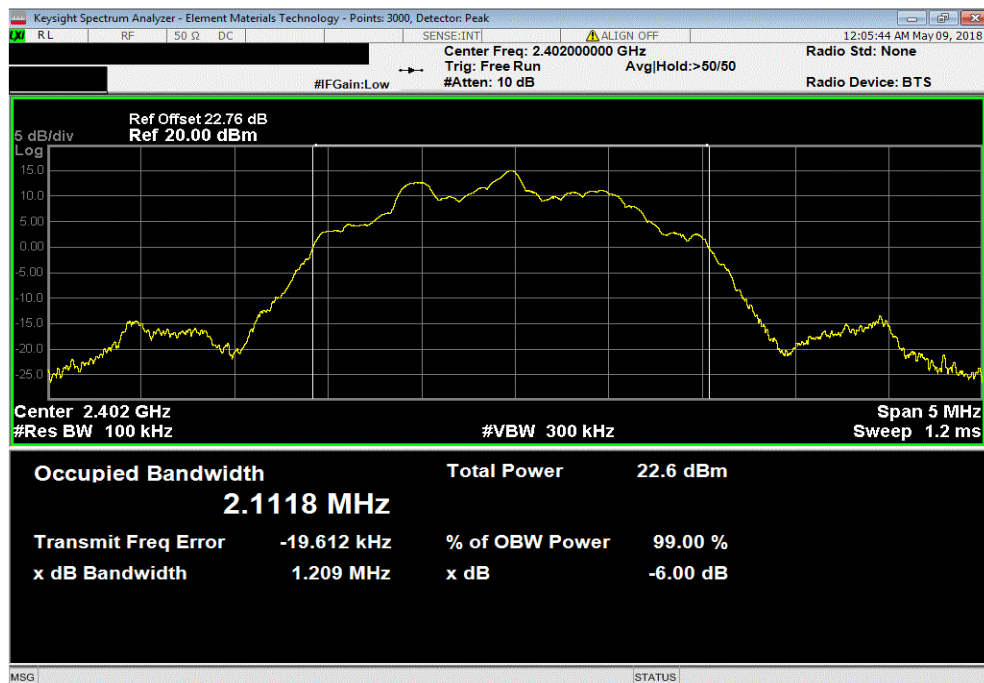


TMTx 2017.12.14 XMI 2017.12.13

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



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

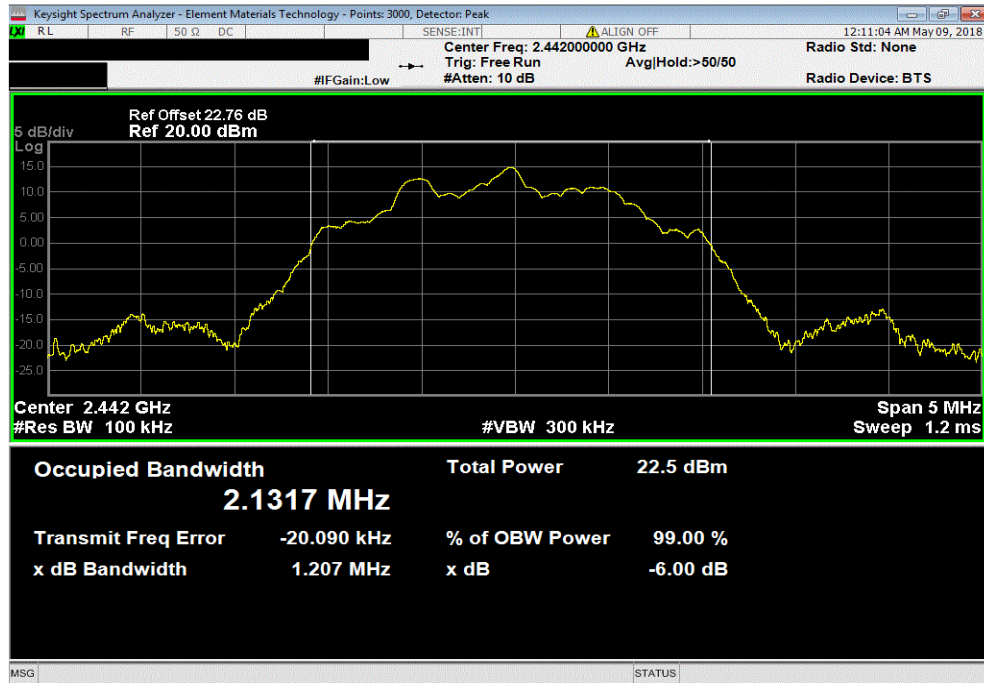


OCCUPIED BANDWIDTH

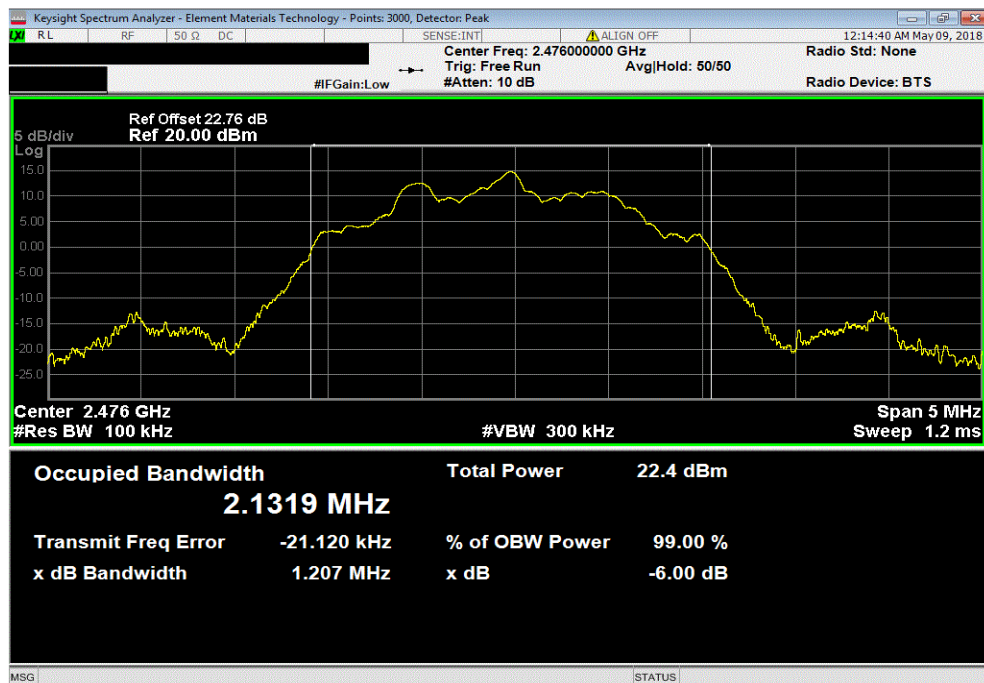


TMTx 2017.12.14 XMI 2017.12.13

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



GFSK High Channel, 2 Mbps, 2476 MHz						
				Value	Limit (≥)	Result
				1.207 MHz	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	12-Sep-17	12-Sep-18
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.

De Facto EIRP Limit: The EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER



TbTx 2017.12.14

XMM 2017.12.13

EUT: TV Streaming Device		Work Order: STAK0127	
Serial Number: 180200160		Date: 8-May-18	
Customer: Starkey Laboratories, Inc.		Temperature: 23.5 °C	
Attendees: Charlie Esch		Humidity: 33.6% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Dustin Sparks		Job Site: MN08	
Power: 110VAC/60Hz			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2018		ANSI C63.10:2013	
COMMENTS			
U.FL to SMA adapter cable included in measurement cable offset.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Dustin Sparks</i>	

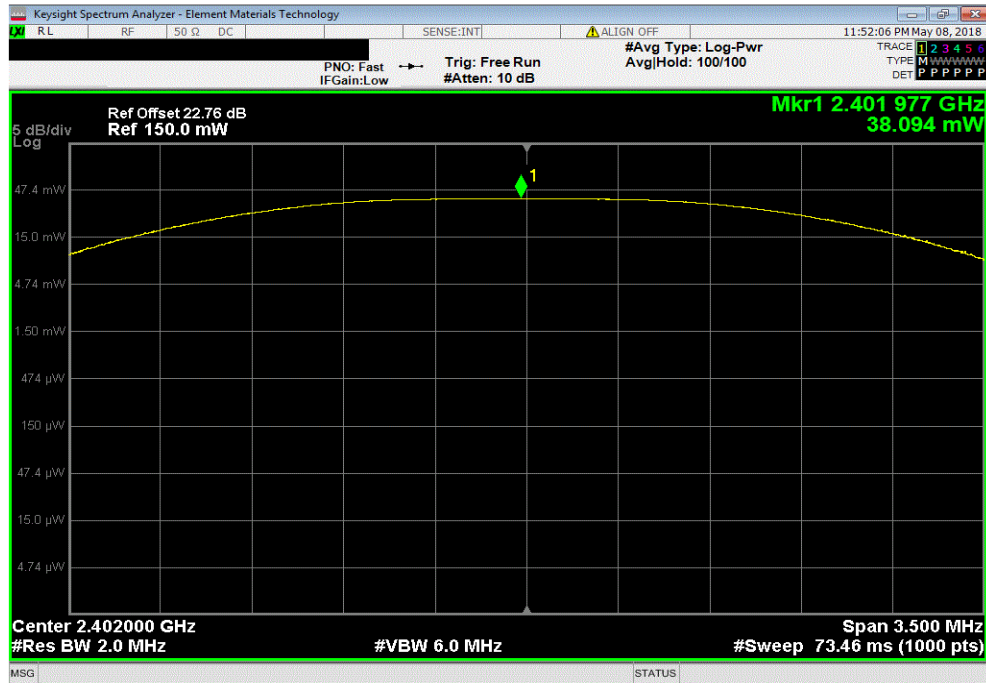
	Value	Limit (<)	Result
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz	38.094 mW	1 W	Pass
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz	37.160 mW	1 W	Pass
BLE/GFSK High Channel, 1 Mbps, 2480 MHz	36.263 mW	1 W	Pass
GFSK Low Channel, 2 Mbps, 2402 MHz	38.560 mW	1 W	Pass
GFSK Mid Channel, 2 Mbps, 2442 MHz	37.628 mW	1 W	Pass
GFSK High Channel, 2 Mbps, 2476 MHz	36.858 mW	1 W	Pass

OUTPUT POWER

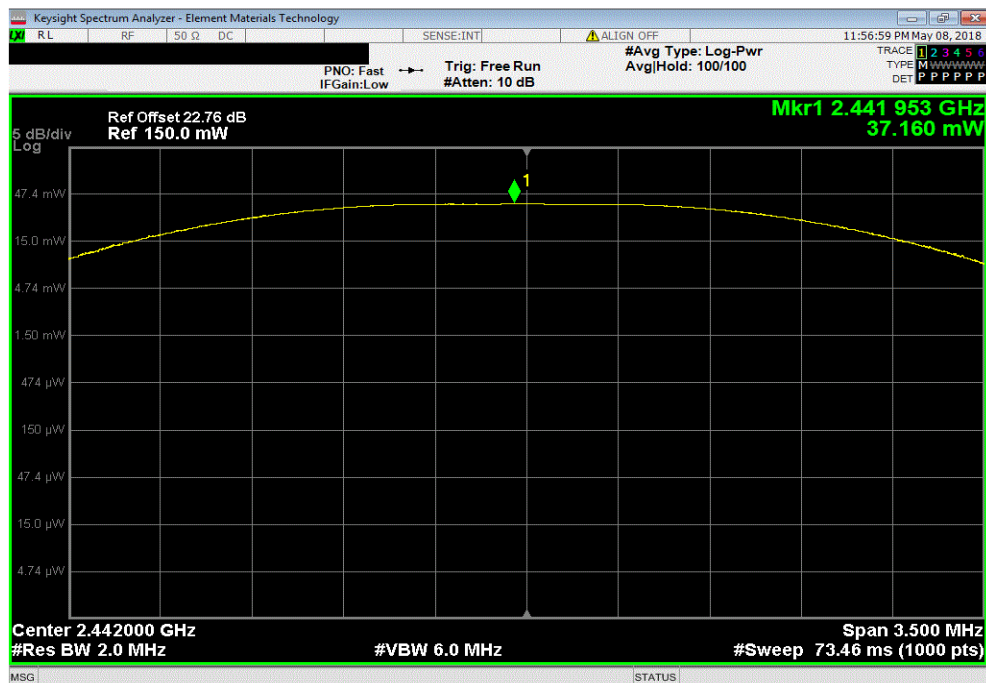


TbTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
				Value	Limit (<)	Result
				38.094 mW	1 W	Pass



BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz						
				Value	Limit (<)	Result
				37.160 mW	1 W	Pass

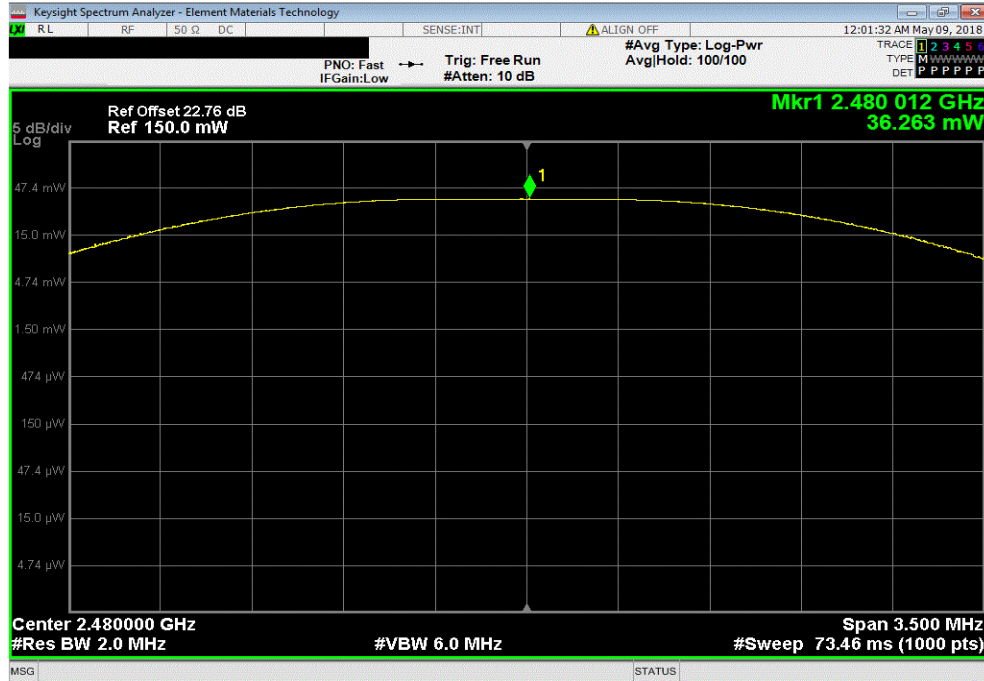


OUTPUT POWER

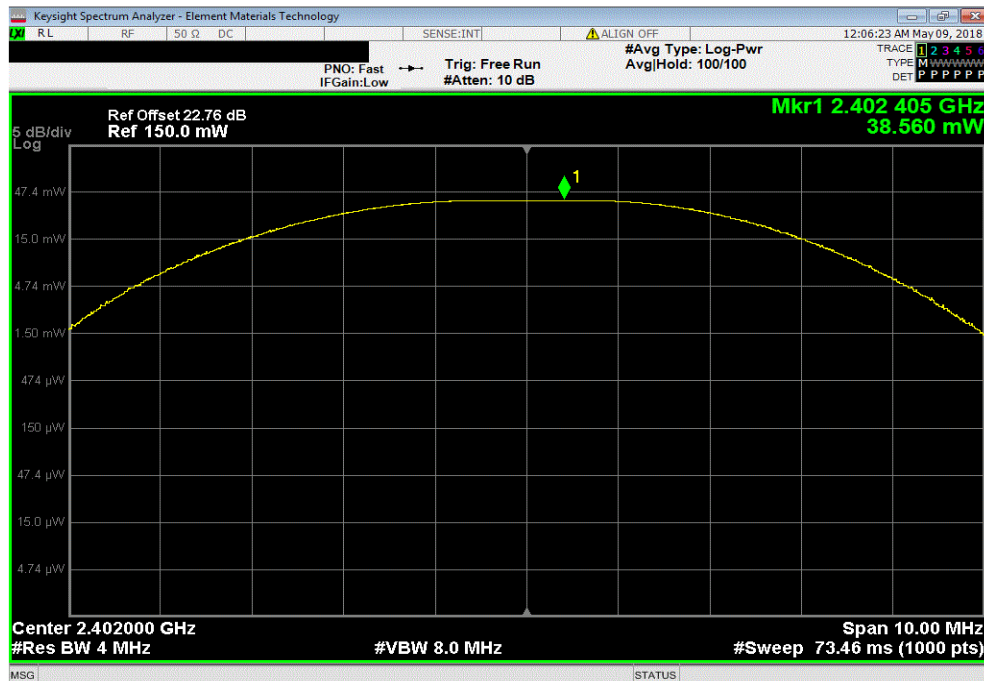


TbTx 2017.12.14 XMI 2017.12.13

BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
				Value	Limit (<)	Result
				36.263 mW	1 W	Pass



GFSK Low Channel, 2 Mbps, 2402 MHz						
				Value	Limit (<)	Result
				38.560 mW	1 W	Pass

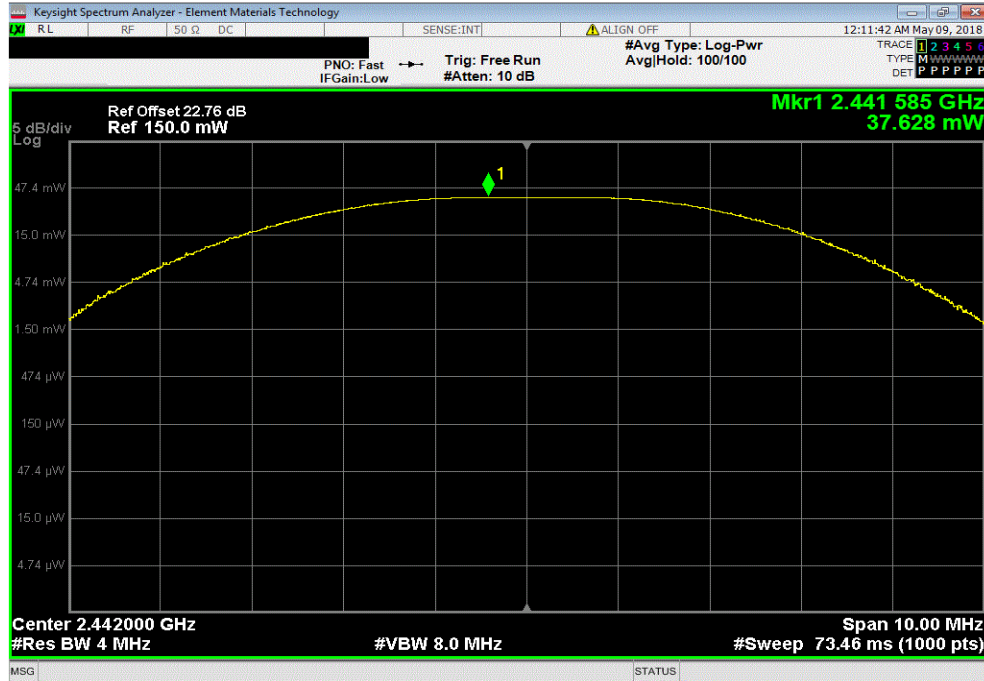


OUTPUT POWER

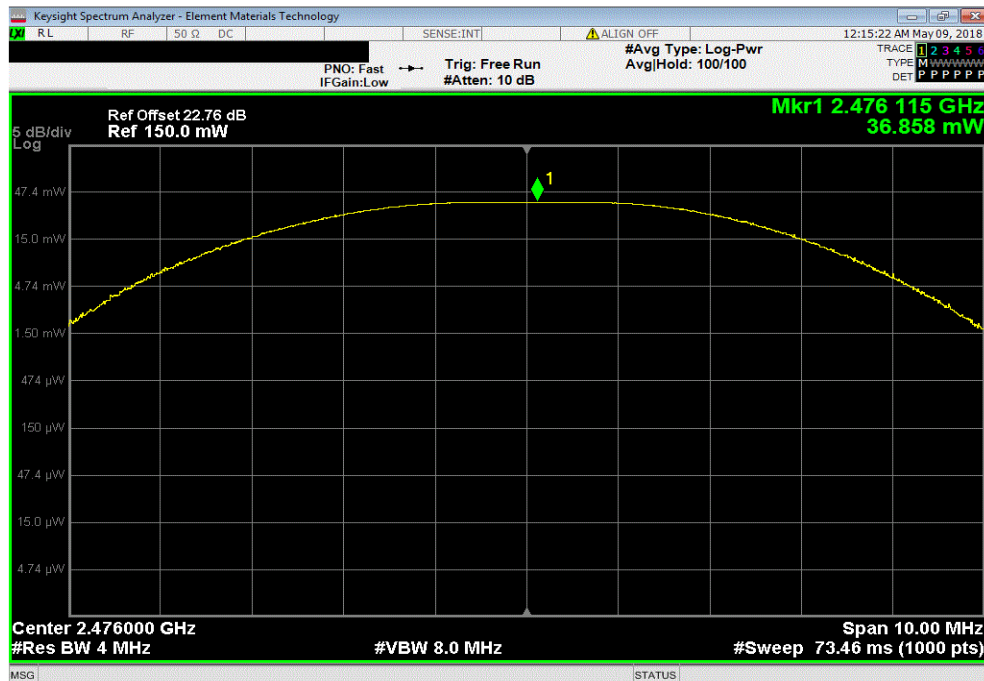


TbTx 2017.12.14 XMI 2017.12.13

GFSK Mid Channel, 2 Mbps, 2442 MHz						
				Value	Limit (<)	Result
				37.628 mW	1 W	Pass



GFSK High Channel, 2 Mbps, 2476 MHz						
				Value	Limit (<)	Result
				36.858 mW	1 W	Pass



POWER SPECTRAL DENSITY



XMI 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	12-Sep-17	12-Sep-18
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



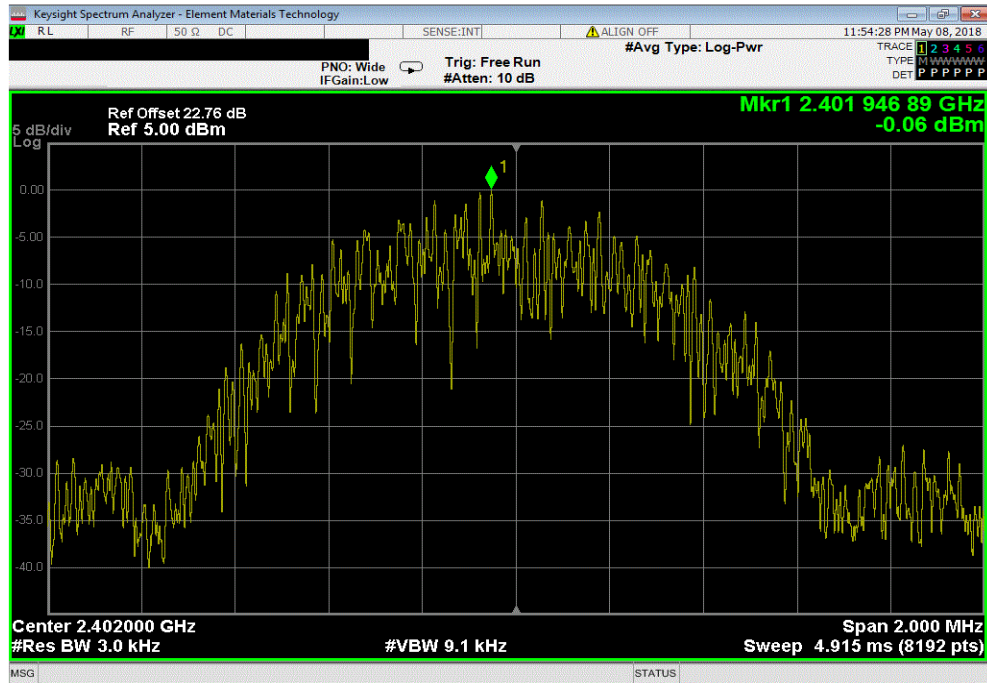
EUT: TV Streaming Device		Work Order: STAK0127	
Serial Number: 180200160		Date: 8-May-18	
Customer: Starkey Laboratories, Inc.		Temperature: 23.5 °C	
Attendees: Charlie Esch		Humidity: 33.2% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Dustin Sparks		Power: 110VAC/60Hz	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2018		ANSI C63.10:2013	
COMMENTS			
U.FL to SMA adapter cable included in measurement cable offset.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Dustin Sparks</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		-0.065	8
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz		-0.147	8
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		-0.248	8
GFSK Low Channel, 2 Mbps, 2402 MHz		-3.616	8
GFSK Mid Channel, 2 Mbps, 2442 MHz		-3.867	8
GFSK High Channel, 2 Mbps, 2476 MHz		-3.863	8
			Results
			Pass
			Pass
			Pass
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

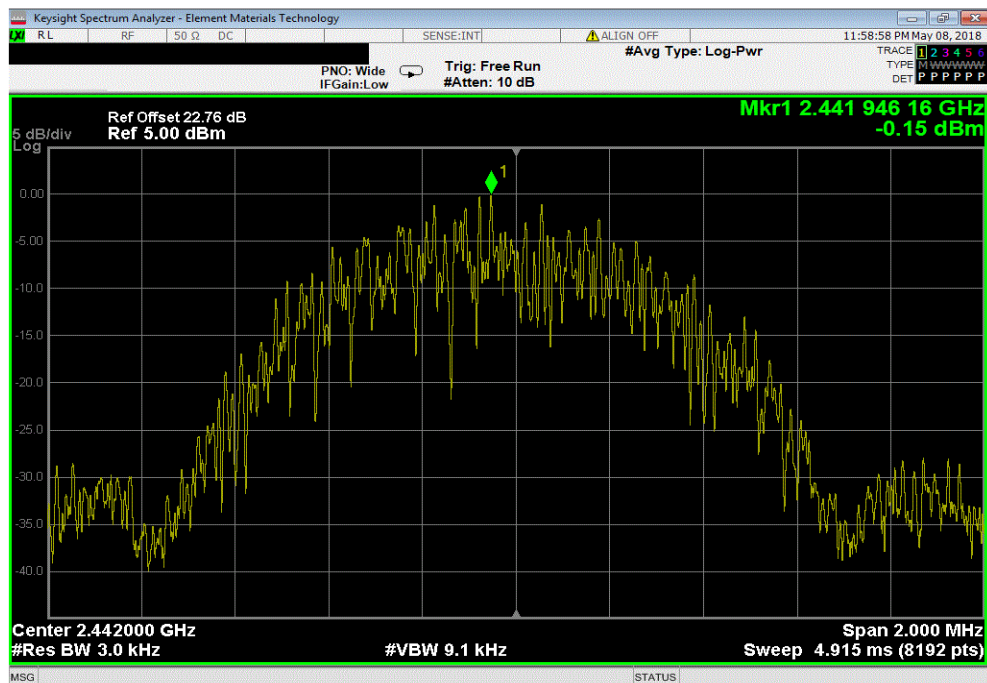


TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.065	8	Pass			



BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-0.147	8	Pass			

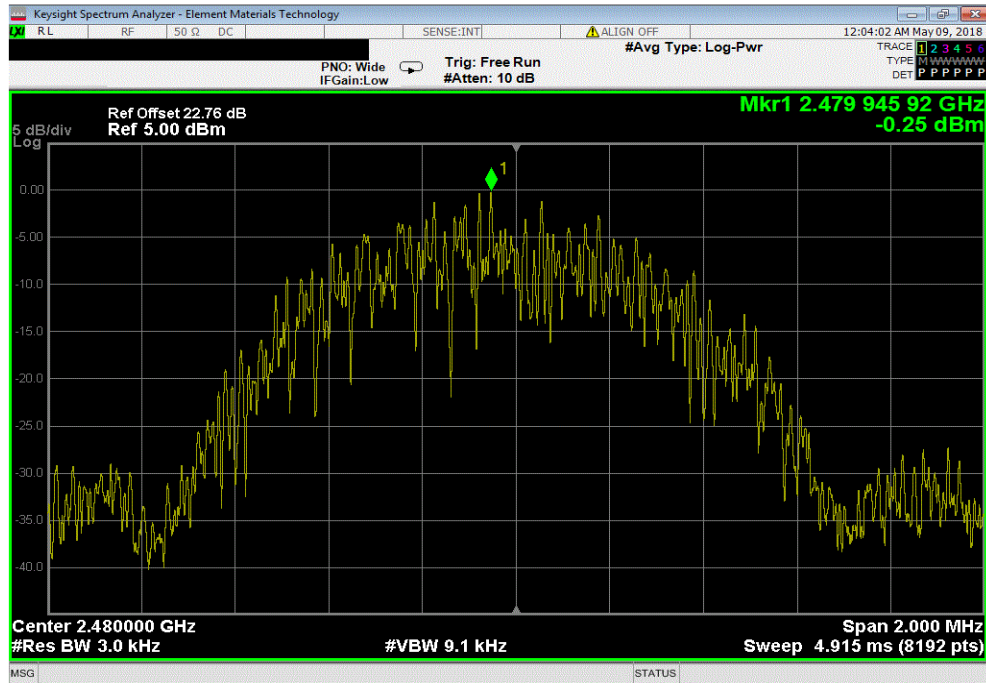


POWER SPECTRAL DENSITY

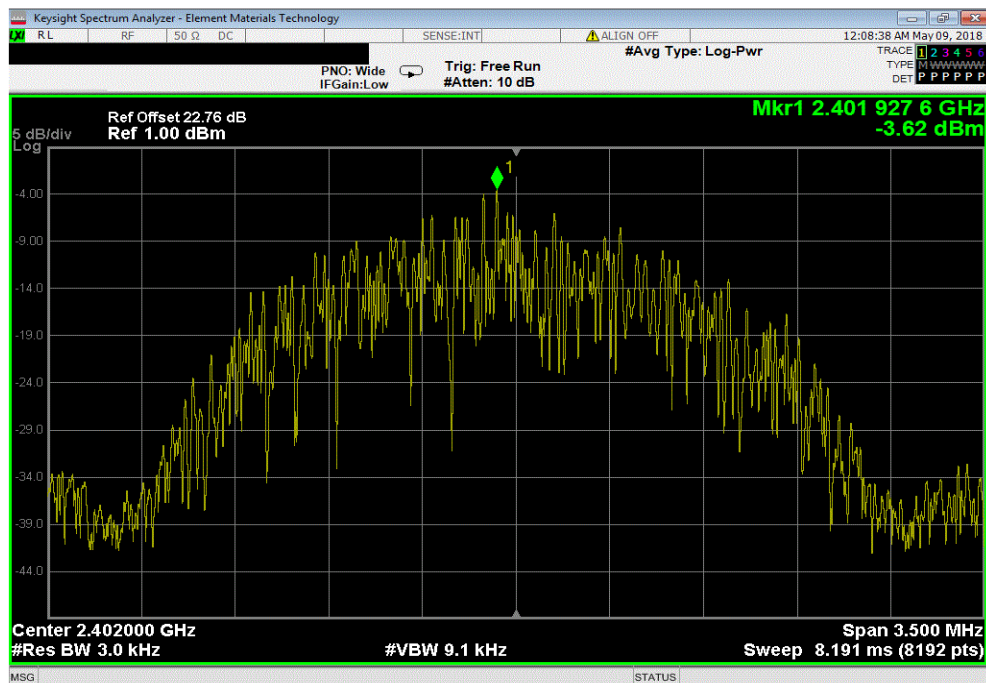


TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-0.248	8	Pass			



GFSK Low Channel, 2 Mbps, 2402 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-3.616	8	Pass			

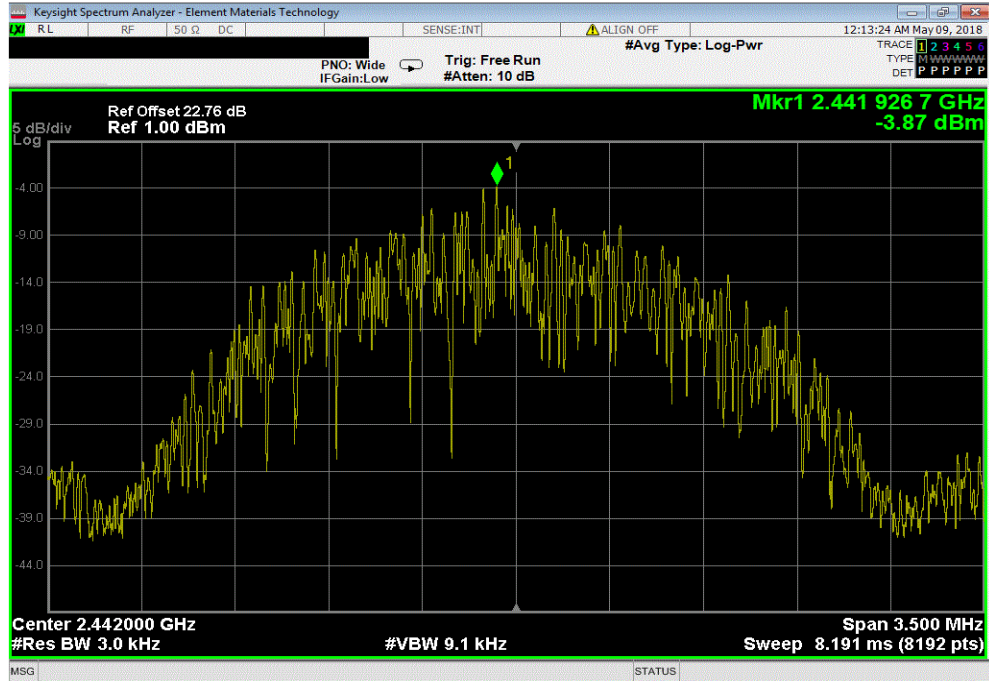


POWER SPECTRAL DENSITY

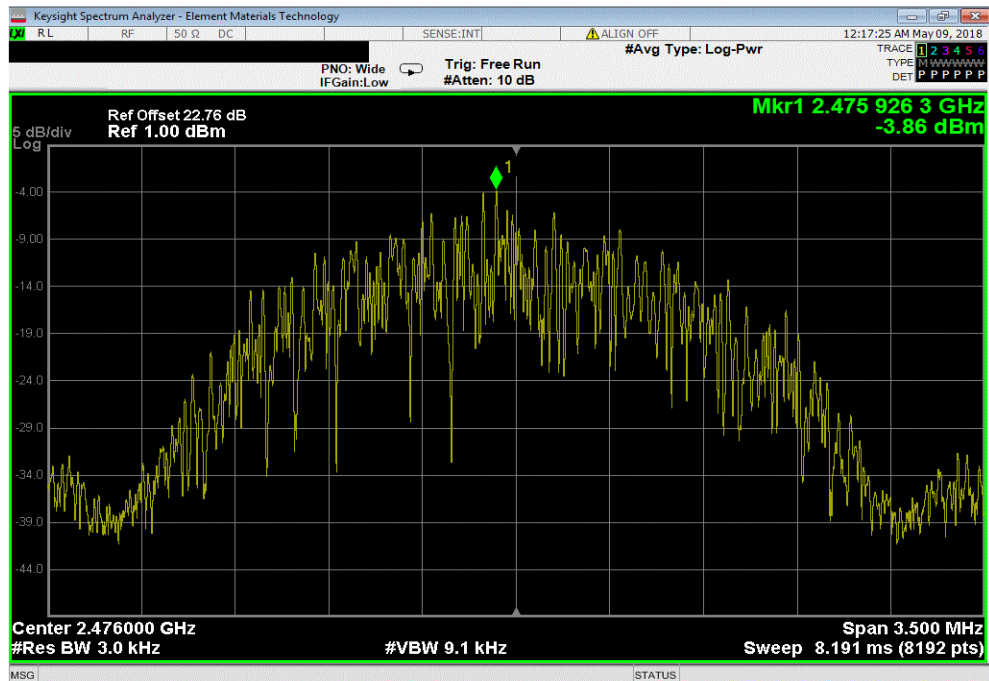


TMTx 2017.12.14 XMI 2017.12.13

GFSK Mid Channel, 2 Mbps, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-3.867	8	Pass			



GFSK High Channel, 2 Mbps, 2476 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-3.863	8	Pass			



BAND EDGE COMPLIANCE



XMI 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	12-Sep-17	12-Sep-18
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



TbTx 2017.12.14 XMn 2017.12.13

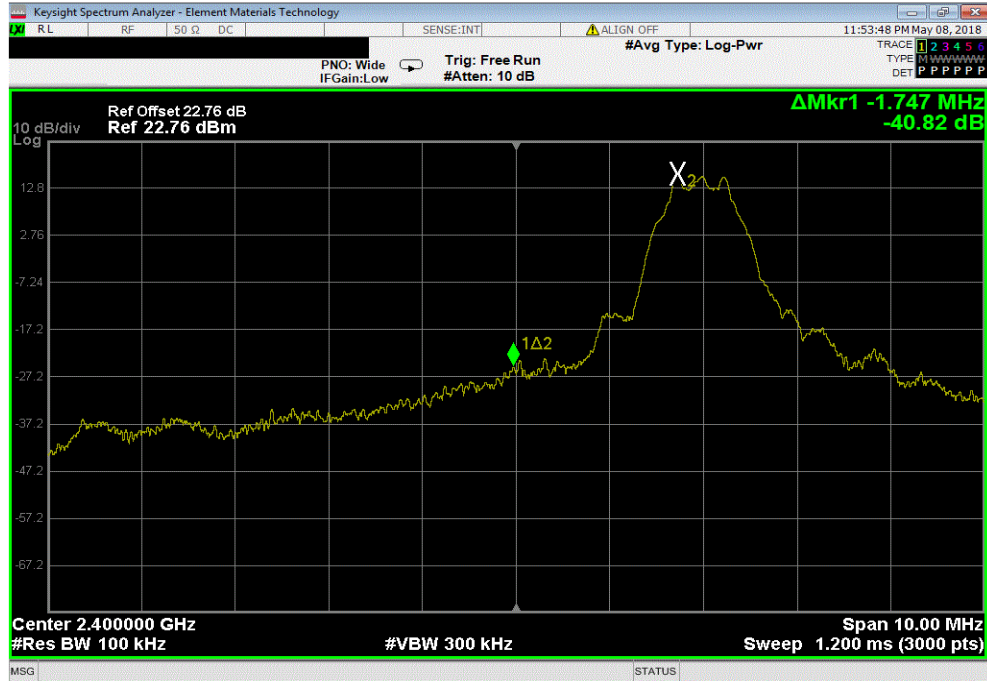
EUT: TV Streaming Device		Work Order: STAK0127	
Serial Number: 180200160		Date: 8-May-18	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4 °C	
Attendees: Charlie Esch		Humidity: 34% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Dustin Sparks		Job Site: MN08	
Power: 110VAC/60Hz			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2018		ANSI C63.10:2013	
COMMENTS			
U.FL to SMA adapter cable included in measurement cable offset.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature <i>Dustin Sparks</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		-40.82	-20 Pass
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		-45.21	-20 Pass
GFSK Low Channel, 2 Mbps, 2402 MHz		-29.6	-20 Pass
GFSK High Channel, 2 Mbps, 2476 MHz		-47.79	-20 Pass

BAND EDGE COMPLIANCE



TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-40.82	-20	Pass



BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.21	-20	Pass

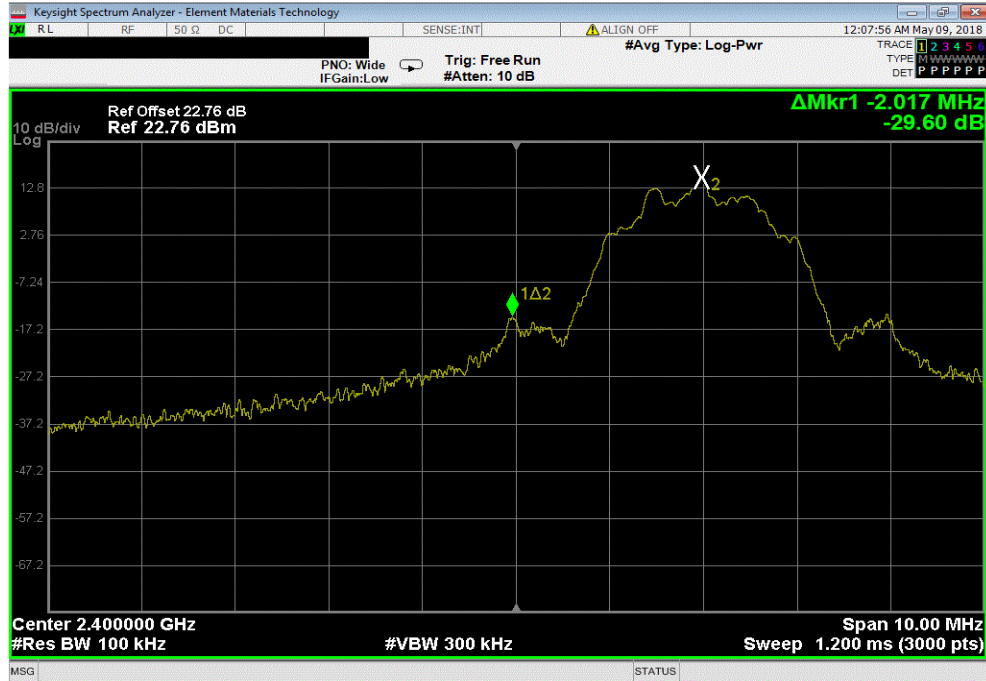


BAND EDGE COMPLIANCE

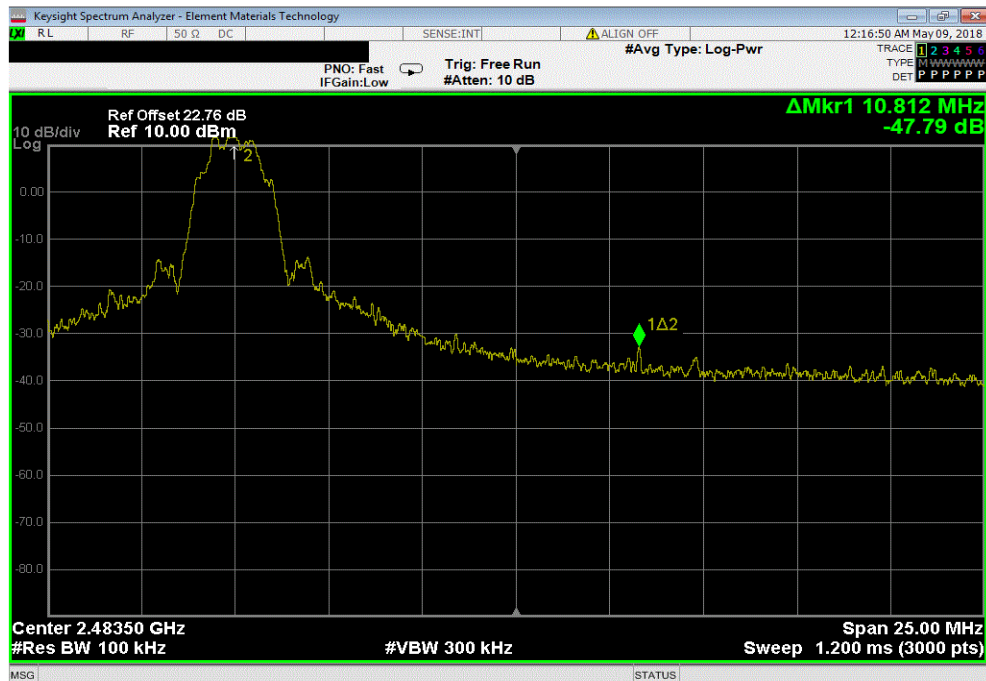


TbTx 2017.12.14 XMI 2017.12.13

GFSK Low Channel, 2 Mbps, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-29.6	-20	Pass



GFSK High Channel, 2 Mbps, 2476 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-47.79	-20	Pass



SPURIOUS CONDUCTED EMISSIONS



XMI 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	12-Sep-17	12-Sep-18
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



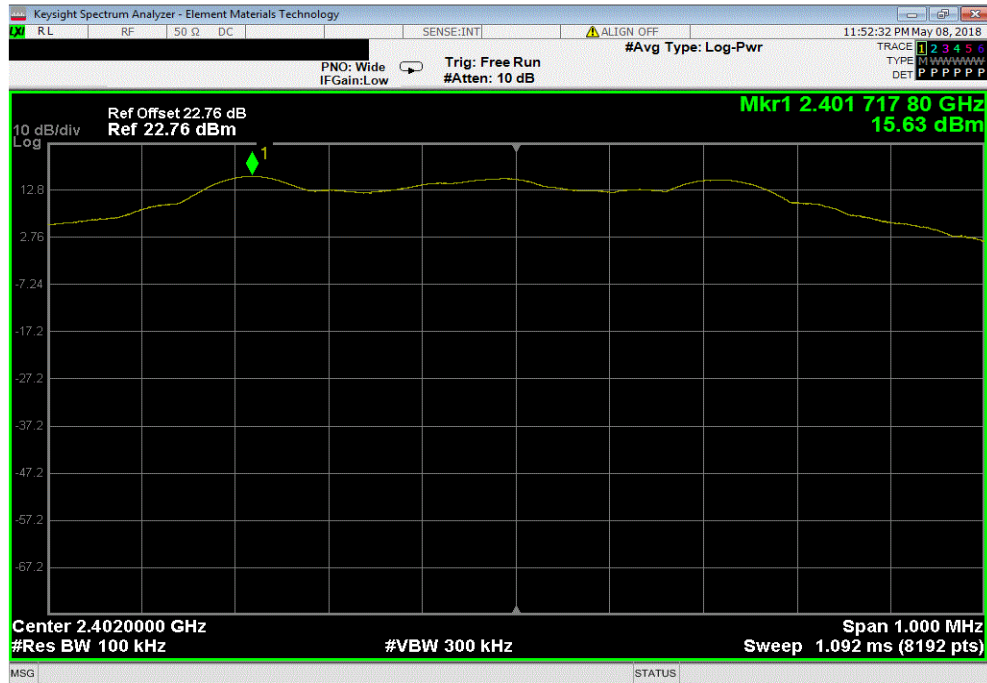
EUT: TV Streaming Device		Work Order: STAK0127		
Serial Number: 180200160		Date: 8-May-18		
Customer: Starkey Laboratories, Inc.		Temperature: 23.4 °C		
Attendees: Charlie Esch		Humidity: 33.9% RH		
Project: None		Barometric Pres.: 1019 mbar		
Tested by: Dustin Sparks		Power: 110VAC/60Hz		
		Job Site: MN08		
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2018		ANSI C63.10:2013		
COMMENTS				
U.FL to SMA adapter cable included in measurement cable offset.				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	2	Signature <i>Dustin Sparks</i>		
		Frequency Range	Max Value (dBc)	
			Limit ≤ (dBc)	
			Result	
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		Fundamental	N/A	N/A
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		30 MHz - 12.5 GHz	-42.58	-20
BLE/GFSK Low Channel, 1 Mbps, 2402 MHz		12.5 GHz - 25 GHz	-64.82	-20
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz		Fundamental	N/A	N/A
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz		30 MHz - 12.5 GHz	-41.25	-20
BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz		12.5 GHz - 25 GHz	-64.78	-20
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		Fundamental	N/A	N/A
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		30 MHz - 12.5 GHz	-42.72	-20
BLE/GFSK High Channel, 1 Mbps, 2480 MHz		12.5 GHz - 25 GHz	-65.13	-20
GFSK Low Channel, 2 Mbps, 2402 MHz		Fundamental	N/A	N/A
GFSK Low Channel, 2 Mbps, 2402 MHz		30 MHz - 12.5 GHz	-43.98	-20
GFSK Low Channel, 2 Mbps, 2402 MHz		12.5 GHz - 25 GHz	-63.83	-20
GFSK Mid Channel, 2 Mbps, 2442 MHz		Fundamental	N/A	N/A
GFSK Mid Channel, 2 Mbps, 2442 MHz		30 MHz - 12.5 GHz	-41.46	-20
GFSK Mid Channel, 2 Mbps, 2442 MHz		12.5 GHz - 25 GHz	-63.82	-20
GFSK High Channel, 2 Mbps, 2476 MHz		Fundamental	N/A	N/A
GFSK High Channel, 2 Mbps, 2476 MHz		30 MHz - 12.5 GHz	-43.21	-20
GFSK High Channel, 2 Mbps, 2476 MHz		12.5 GHz - 25 GHz	-63.89	-20

SPURIOUS CONDUCTED EMISSIONS

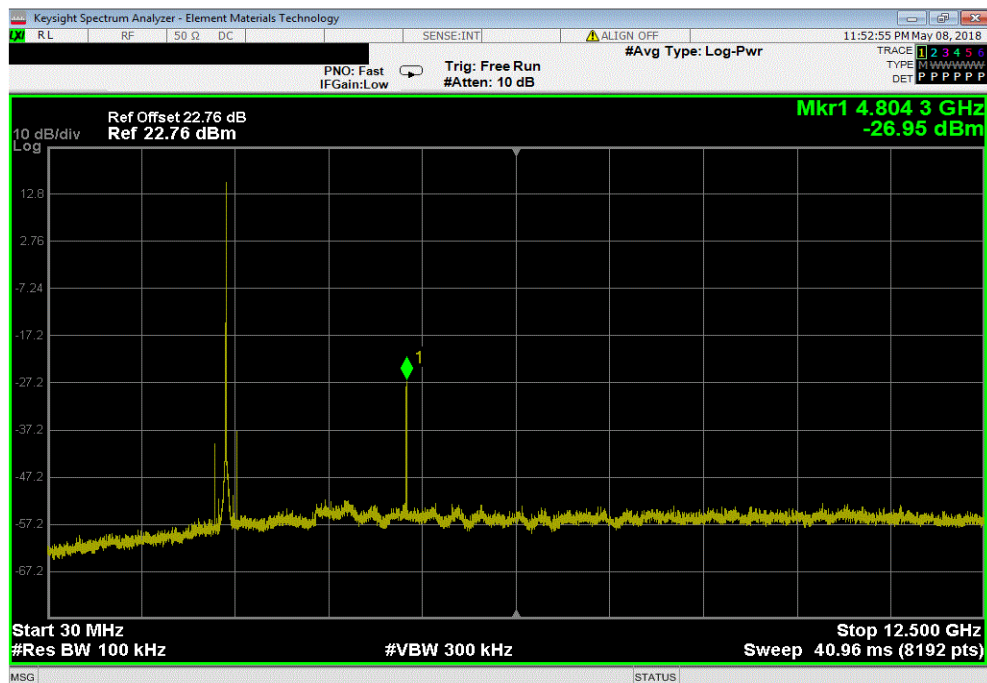


TMTx 2017.12.14 XMI 2017.12.13

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



BLE/GFSK Low Channel, 1 Mbps, 2402 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz		-42.58	-20	Pass		

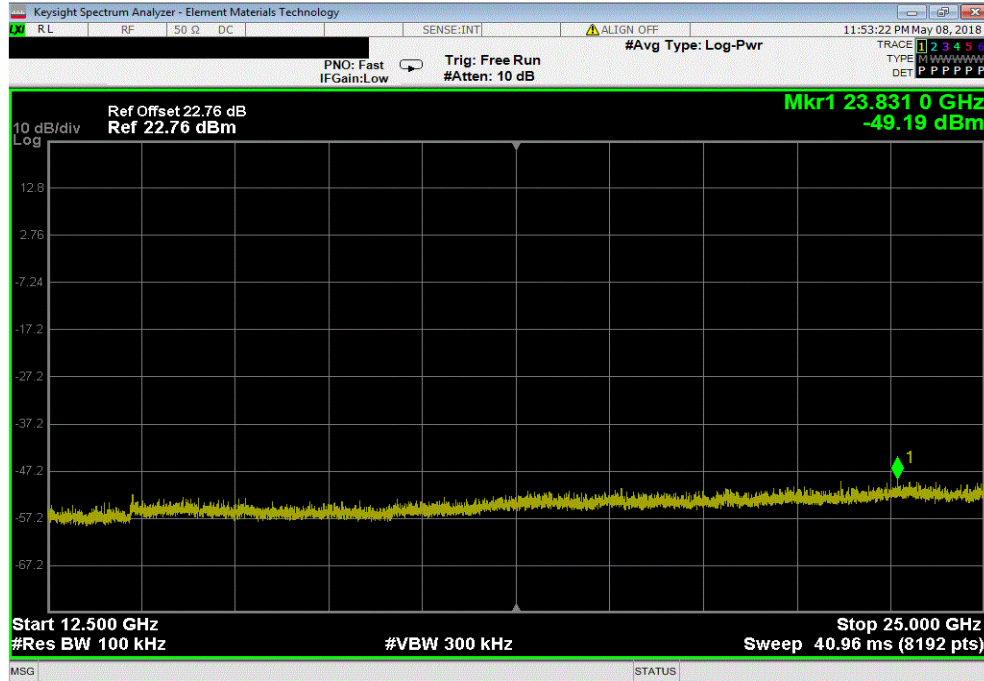


SPURIOUS CONDUCTED EMISSIONS

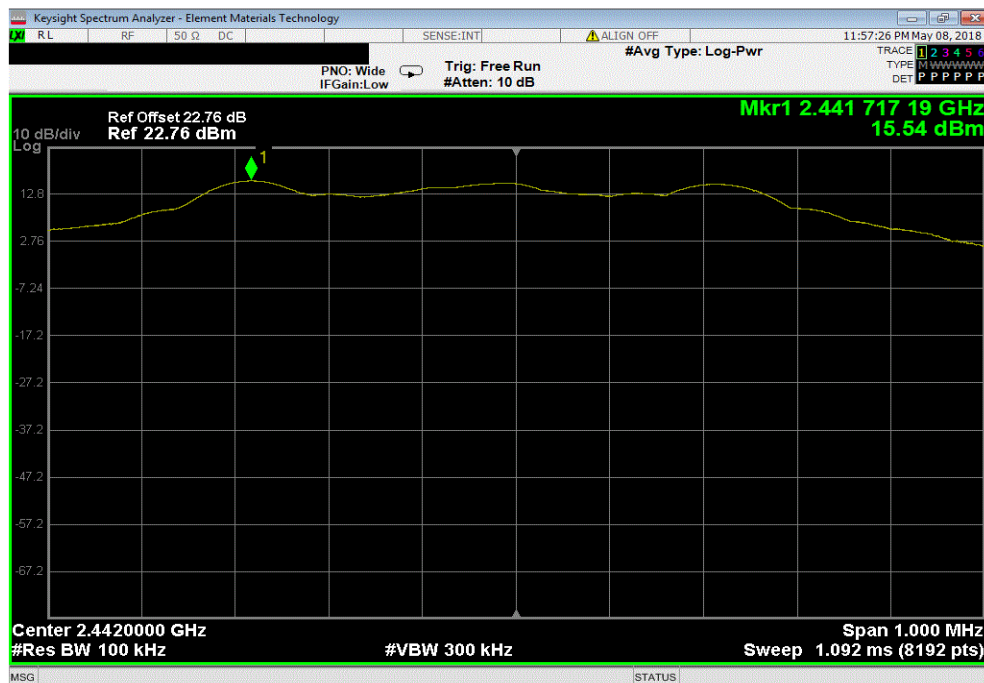


TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Low Channel, 1 Mbps, 2402 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-64.82	-20	Pass	



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

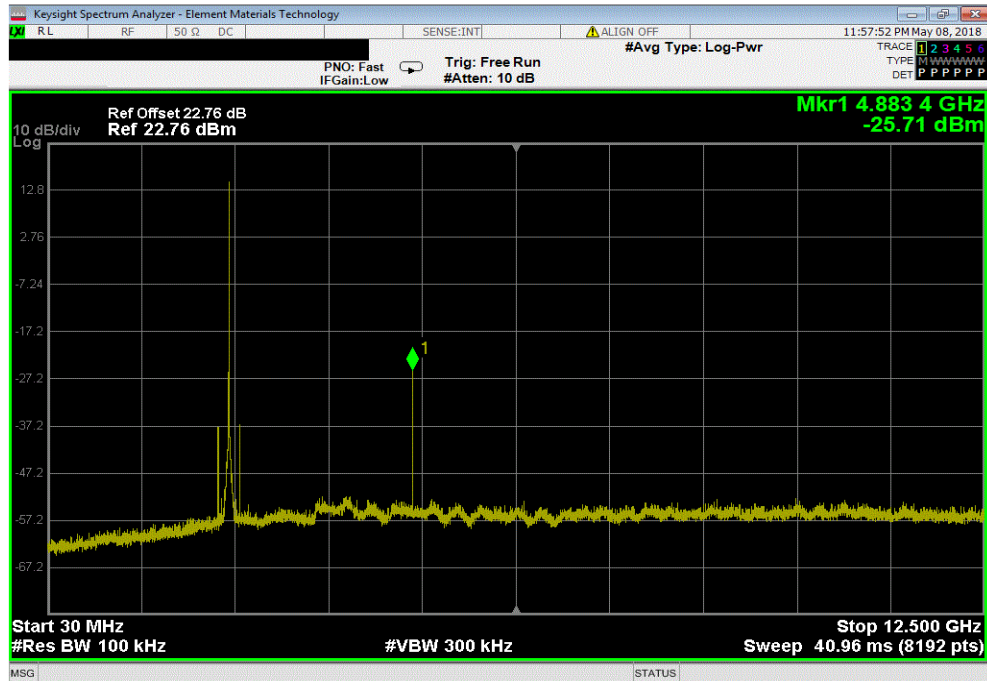


SPURIOUS CONDUCTED EMISSIONS

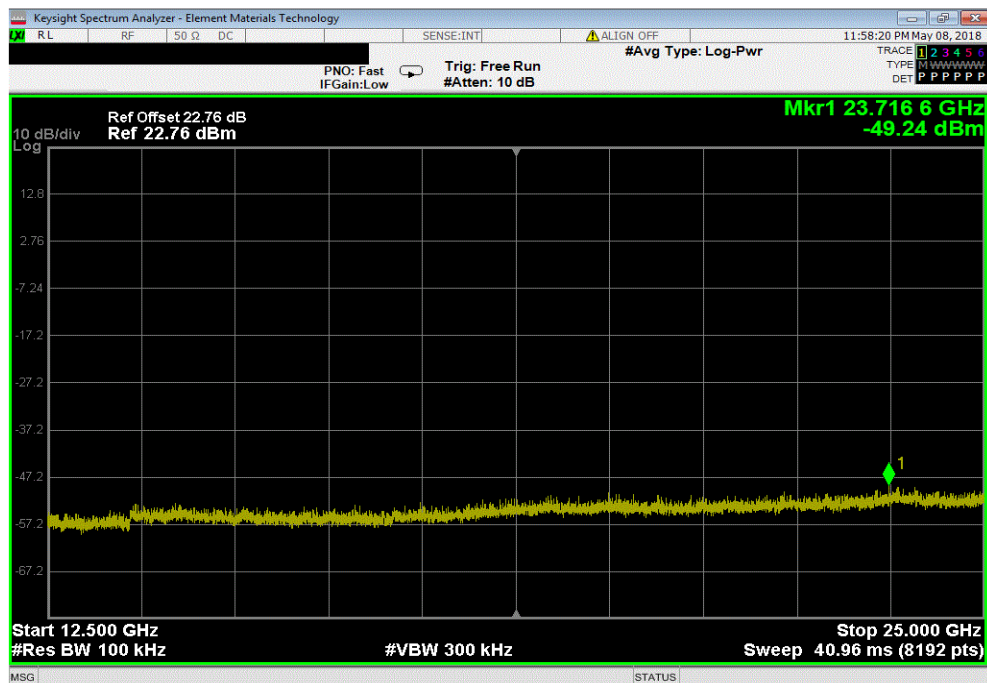


TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-41.25	-20	Pass	



BLE/GFSK Mid Channel, 1 Mbps, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-64.78	-20	Pass	

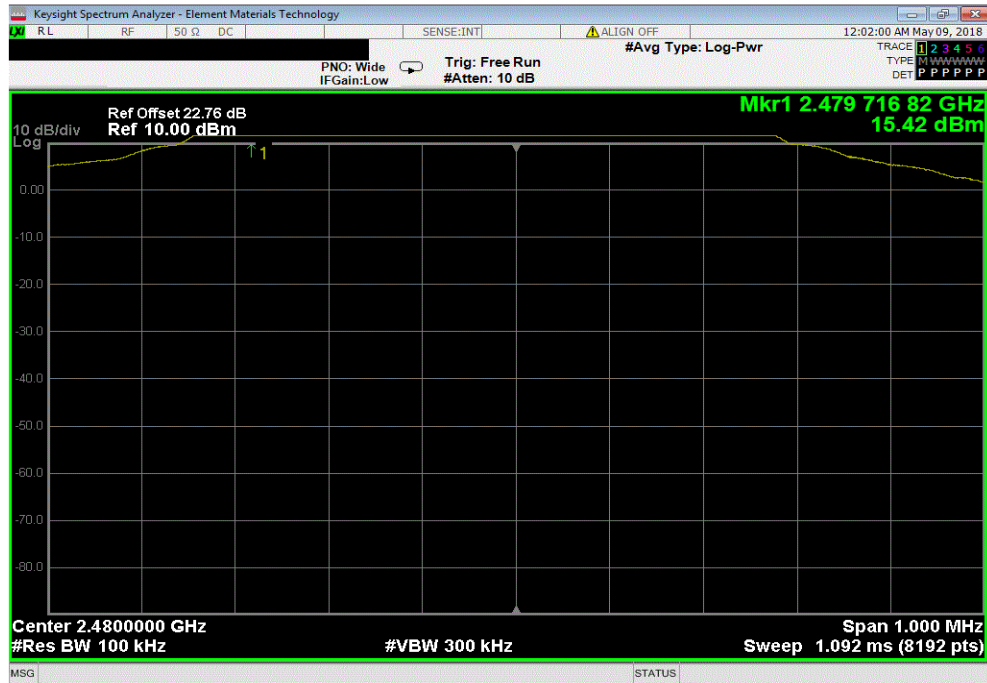


SPURIOUS CONDUCTED EMISSIONS

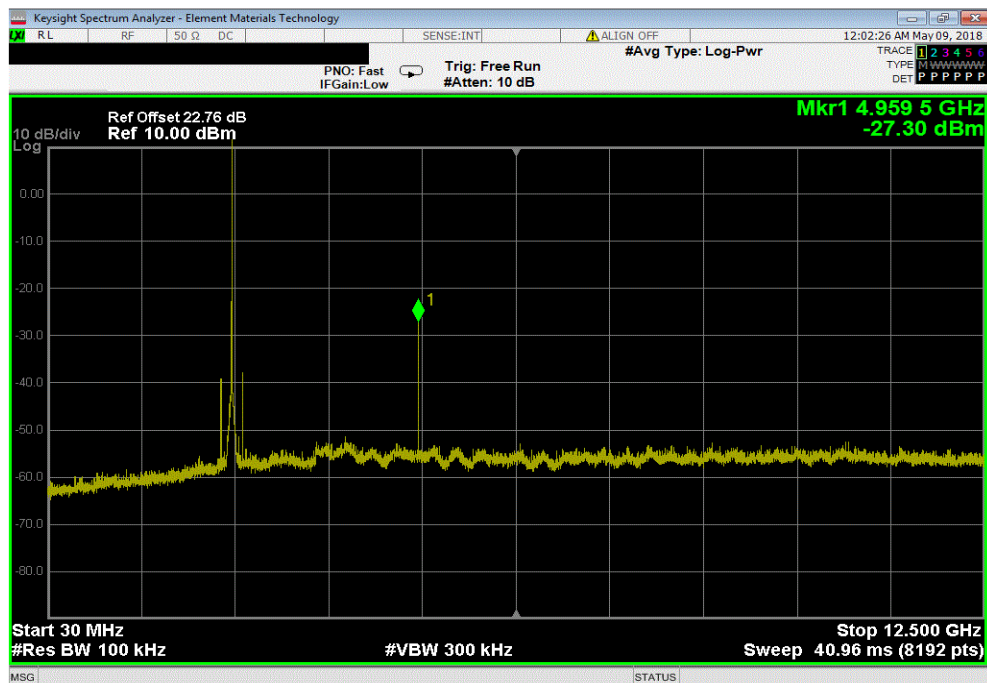


TMTx 2017.12.14 XMI 2017.12.13

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



BLE/GFSK High Channel, 1 Mbps, 2480 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz		-42.72	-20	Pass		

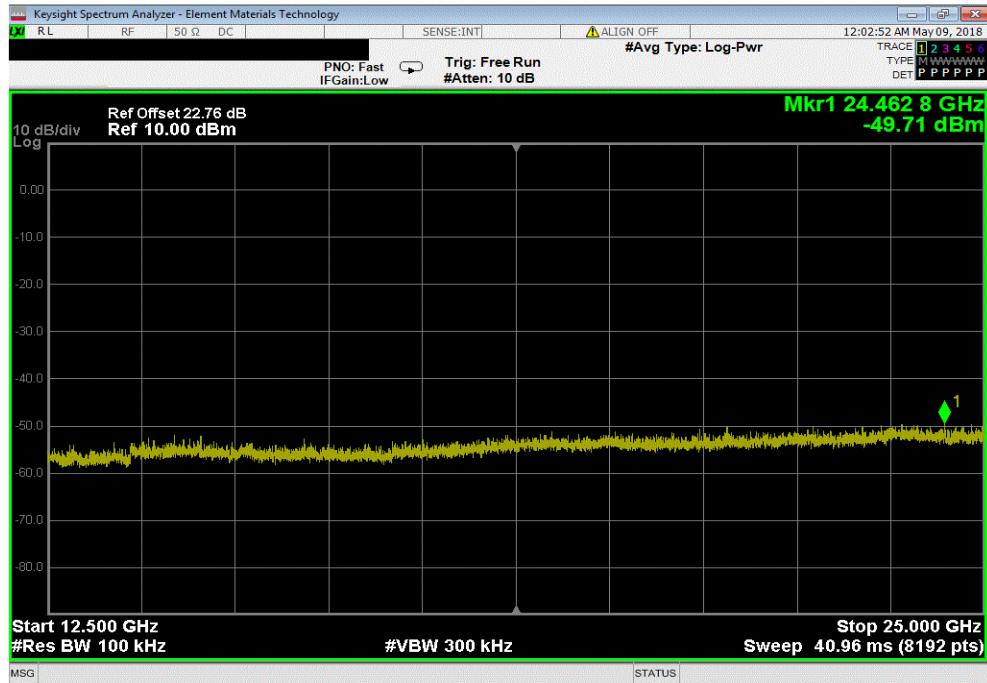


SPURIOUS CONDUCTED EMISSIONS

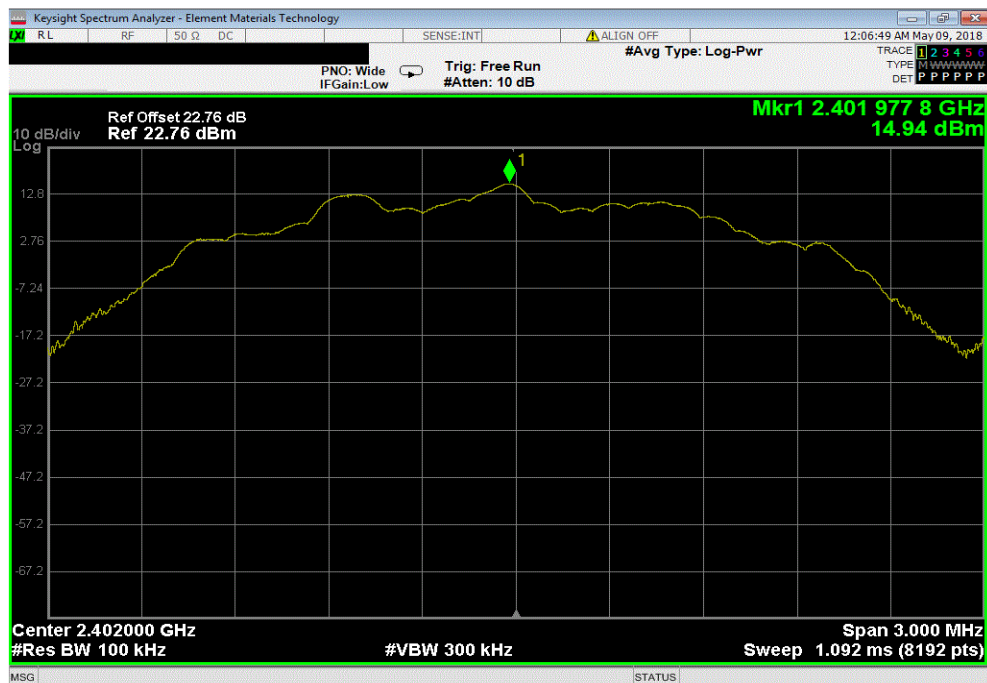


TMTx 2017.12.14 XMI 2017.12.13

BLE/GFSK High Channel, 1 Mbps, 2480 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-65.13	-20	Pass	



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

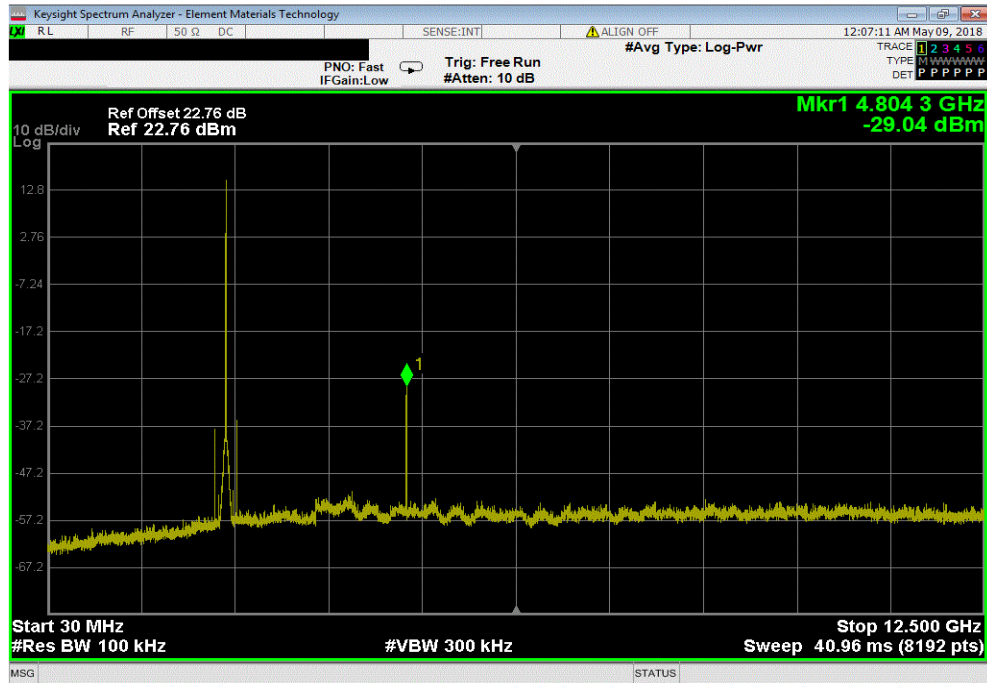


SPURIOUS CONDUCTED EMISSIONS

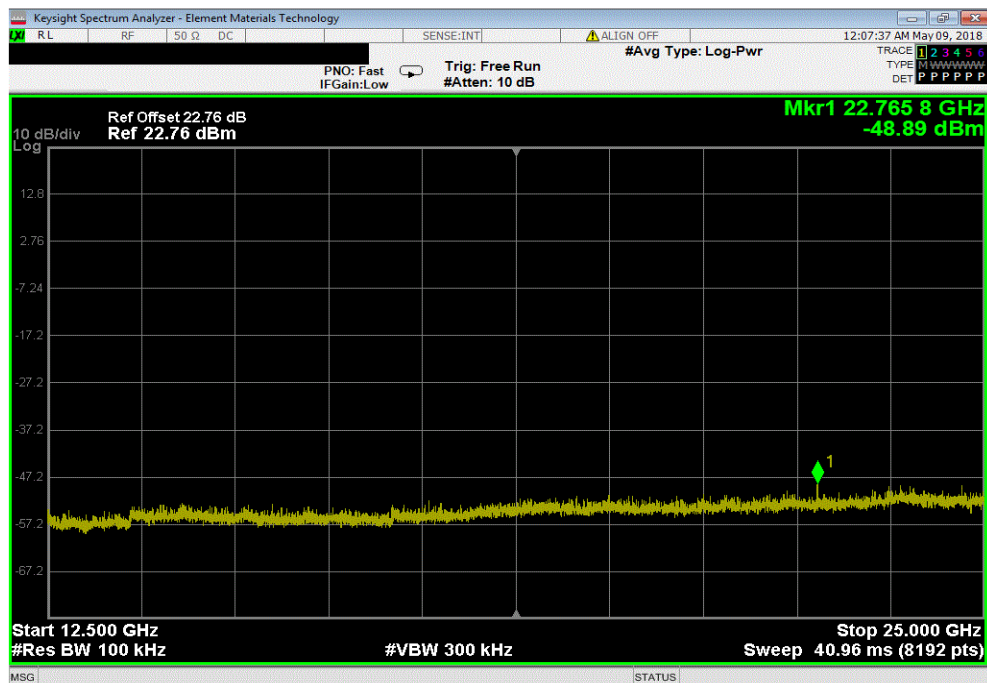


TMTx 2017.12.14 XMI 2017.12.13

GFSK Low Channel, 2 Mbps, 2402 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-43.98	-20	Pass	



GFSK Low Channel, 2 Mbps, 2402 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-63.83	-20	Pass	

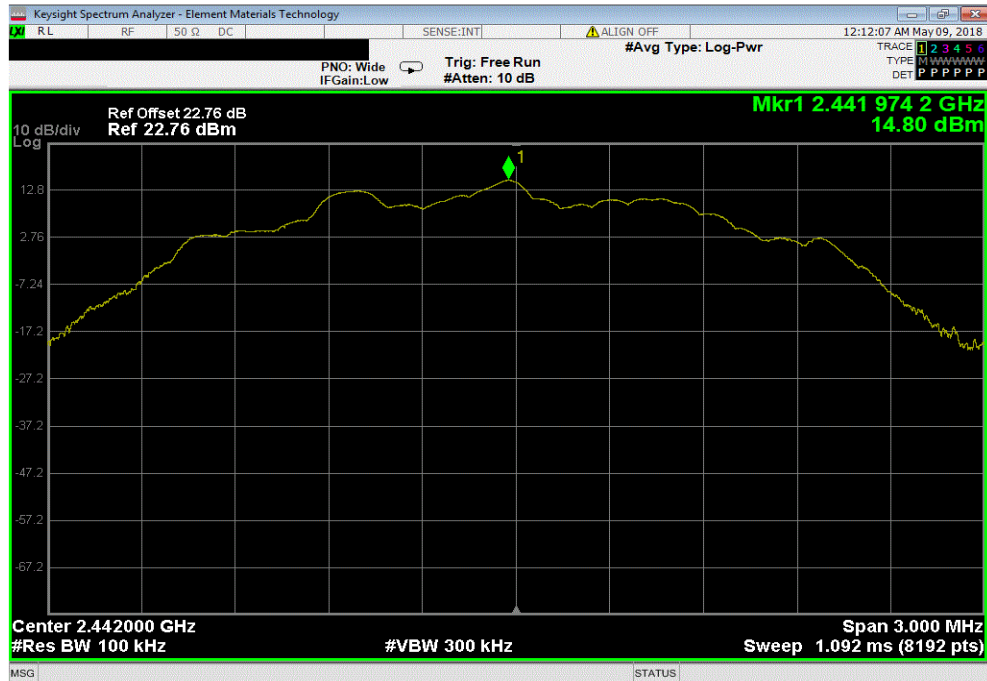


SPURIOUS CONDUCTED EMISSIONS

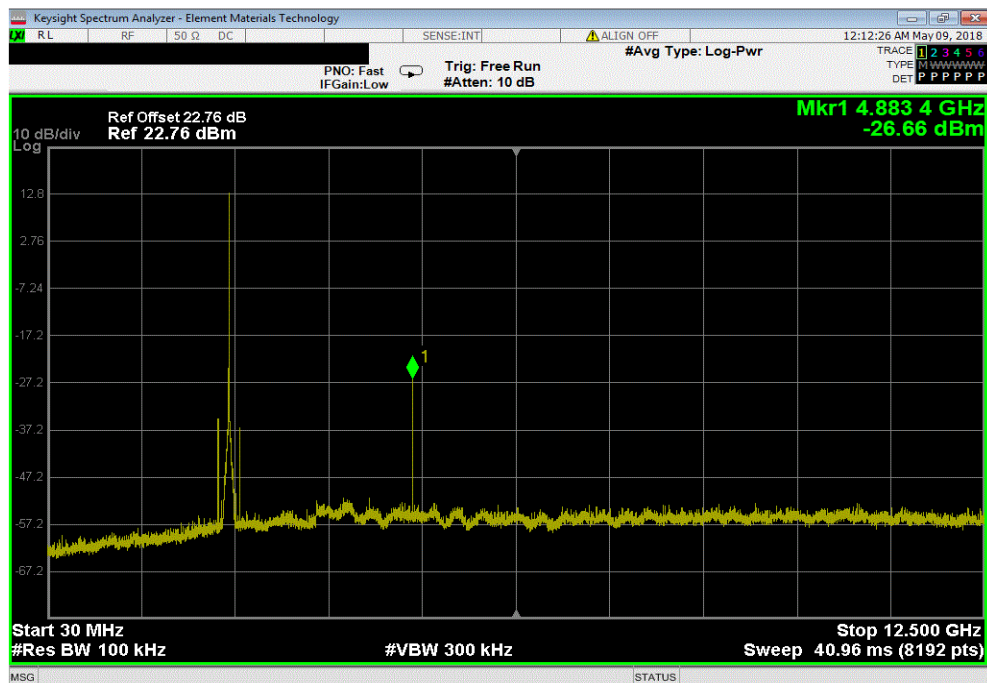


TbTx 2017.12.14 XMI 2017.12.13

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



GFSK Mid Channel, 2 Mbps, 2442 MHz						
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz		-41.46	-20	Pass		

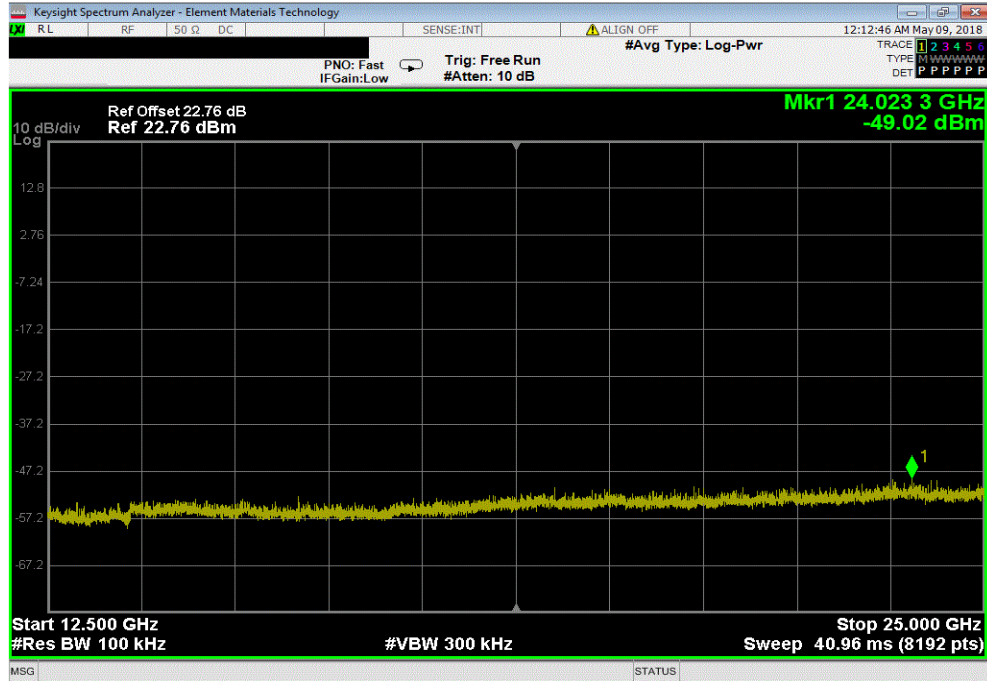


SPURIOUS CONDUCTED EMISSIONS

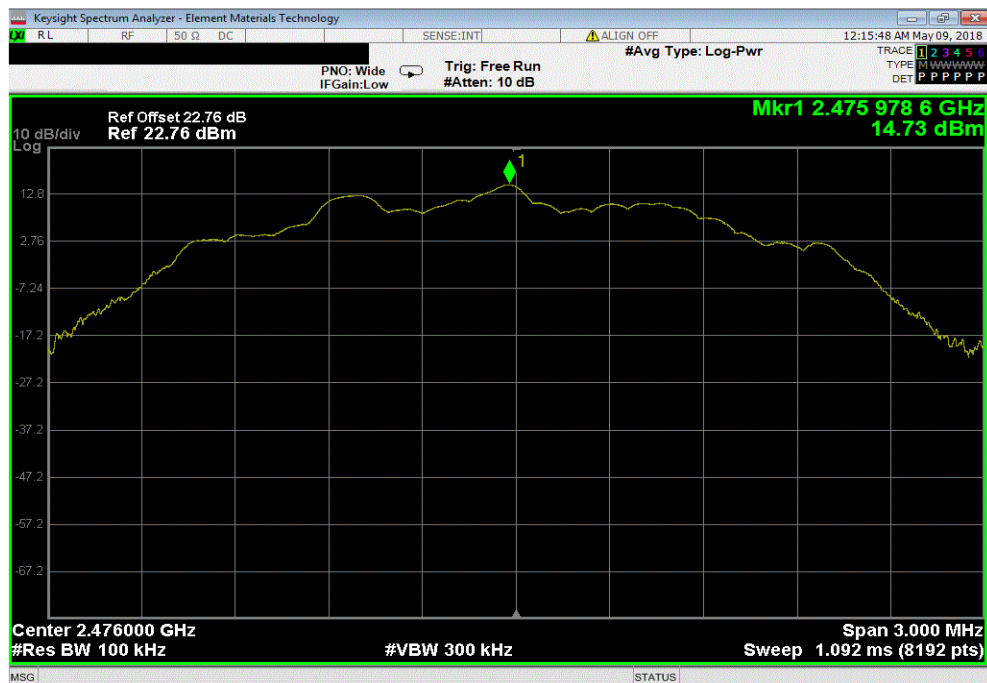


TMTx 2017.12.14 XMI 2017.12.13

GFSK Mid Channel, 2 Mbps, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-63.82	-20	Pass	



GFSK High Channel, 2 Mbps, 2476 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

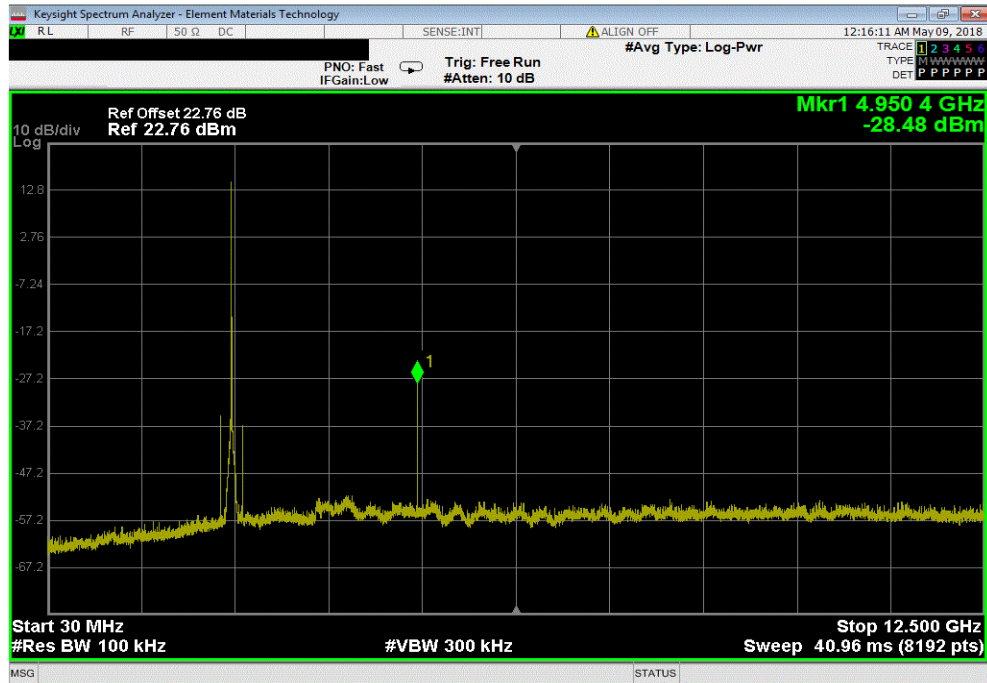


SPURIOUS CONDUCTED EMISSIONS



TMTx 2017.12.14 XMI 2017.12.13

GFSK High Channel, 2 Mbps, 2476 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-43.21	-20	Pass	



GFSK High Channel, 2 Mbps, 2476 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-63.89	-20	Pass	

