element

Quext

Radio Thermostat

FCC 15.247:2022
Bluetooth LE DTS

Report: F3EN0068.1, Issue Date: June 16, 2022

ilac-MRA

A2LA
ACCREDITED
CERT #3310.03

CERTIFICATE OF TEST

Last Date of Test: February 10, 2022
Quext
EUT: Radio Thermostat

Radio Equipment Testing

Standards

Specification	Method
FCC 15.209:2022 FCC 15.247:2022	ANSI C63.10:2013, KDB 558074

Results

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

Deviations From Test Standards

None

Approved By:

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

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

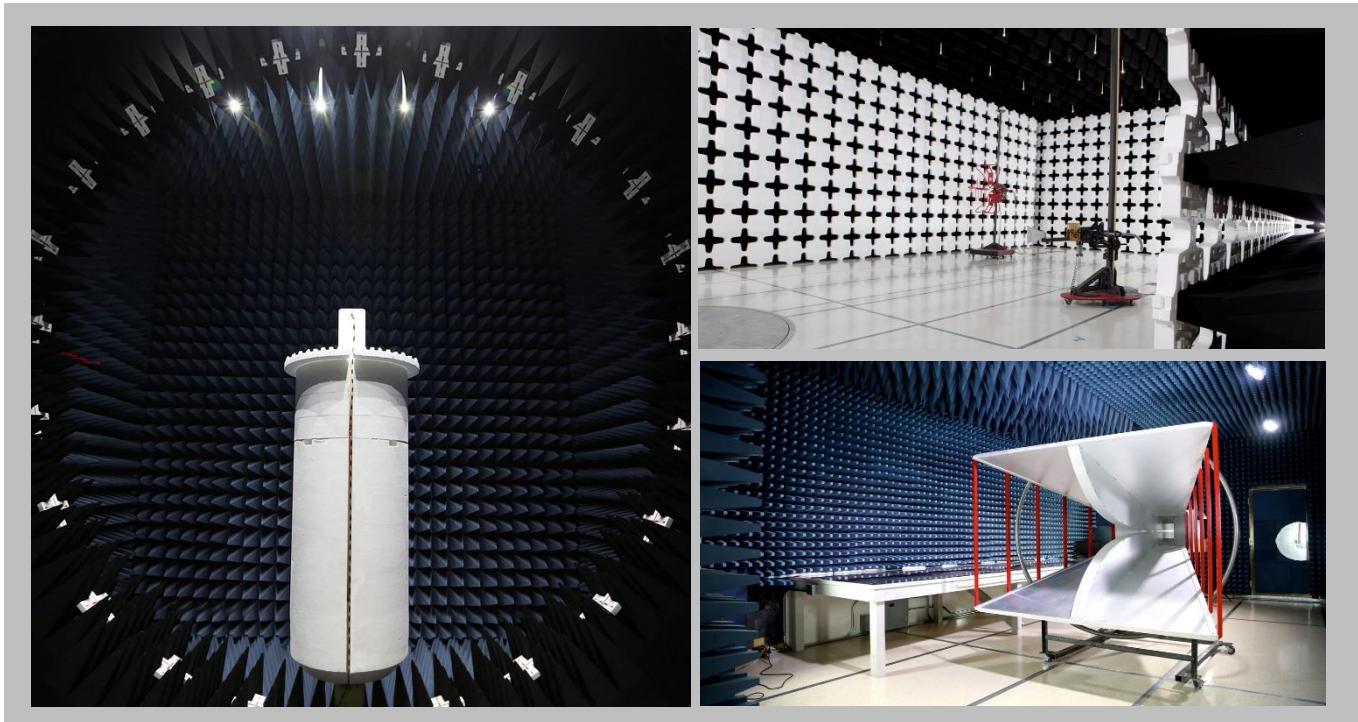| California | Minnesota | Oregon | Texas | Washington |

FACILITIES

California	**Minnesota**	**Oregon**	**Texas**	**Washington**
Labs OC01-17	Labs MN01-11	Labs EV01-12	Labs TX01-09	Labs NC01-05
41 Tesla	9349 W Broadway Ave.	6775 NE Evergreen Pkwy #400	3801 E Plano Pkwy	19201 120th Ave NE
Irvine, CA 92618	Brooklyn Park, MN 55445	Hillsboro, OR 97124	Plano, TX 75074	Bothell, WA 98011
(949) 861-8918	(612)-638-5136	(503) 844-4066	(469) 304-5255	(425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157

MEASUREMENT UNCERTAINTY

Measurement Uncertainty

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

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

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

| Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	3.1 dB	-3.1 dB

TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.
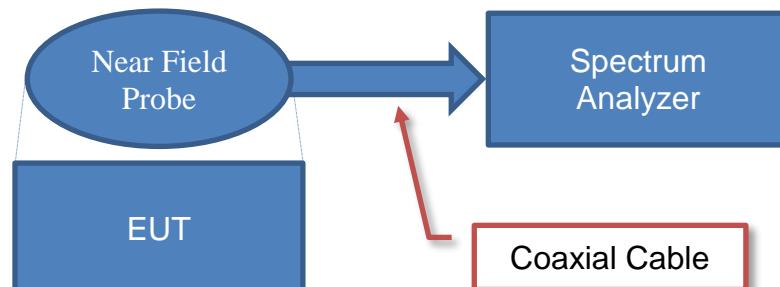
Antenna Port Conducted Measurements
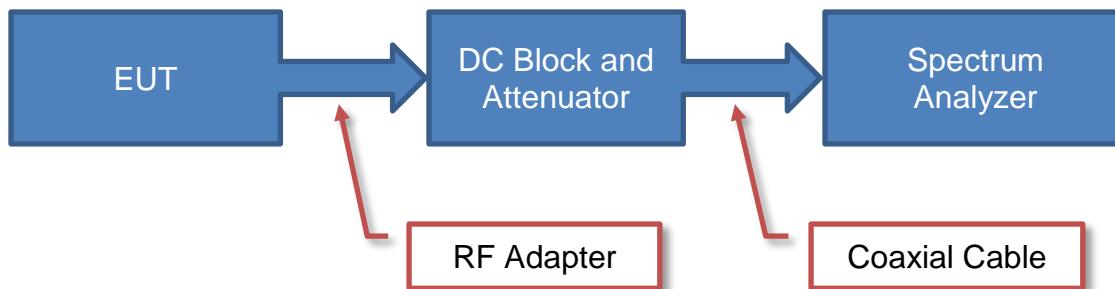
Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements

3m Test Distance

EUT

Measurement Antenna

Preamp and Filters

Coaxial Cable

Spectrum Analyzer

Fully anechoic shielded enclosure above 1 GHz. Semi-anechoic below 1 GHz (No absorber on the floor).

Flush Mounted Turn table, Non-reflective foam table to support EUT
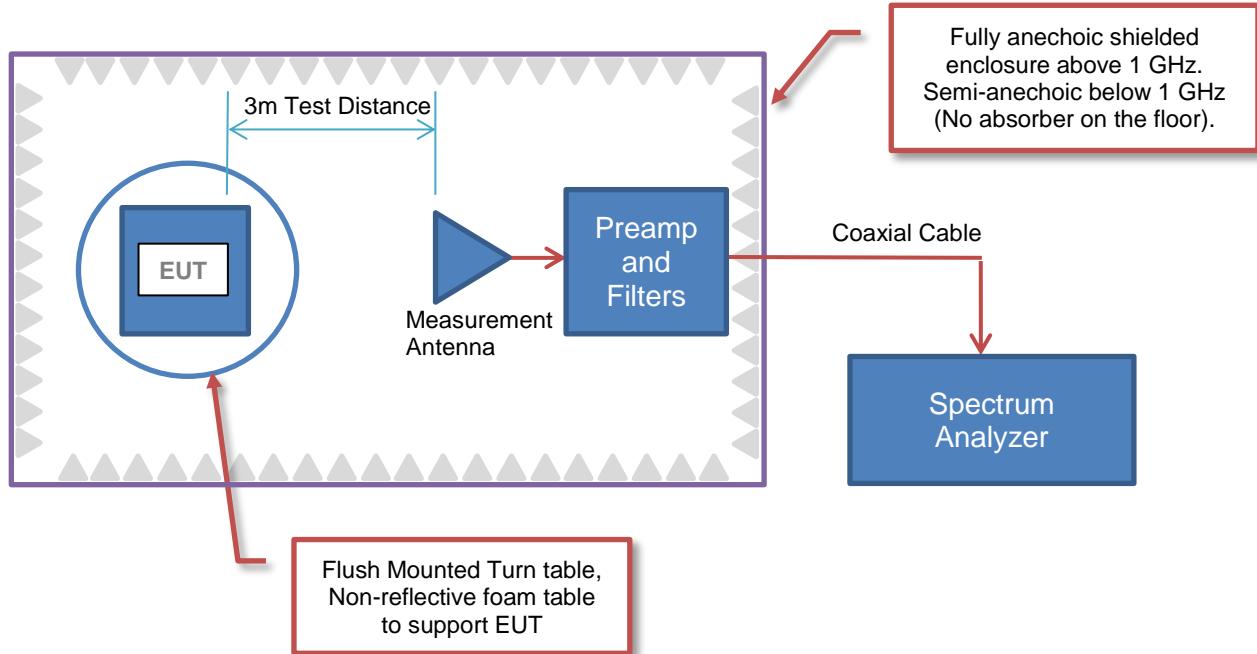
Sample Calculation (logarithmic units)

Radiated Emissions:

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

Conducted Emissions:

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

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.
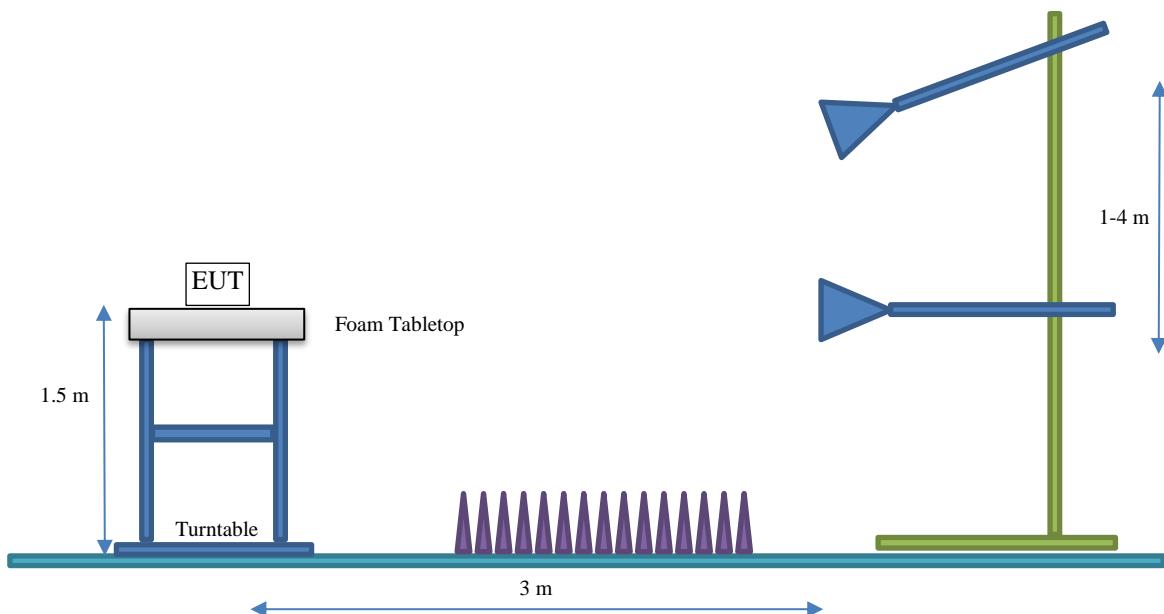
PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Quext
Address:	5214 68th St, Ste 201
City, State, Zip:	Lubbock, TX 79424
Test Requested By:	Tray Johnson
EUT:	Radio Thermostat
First Date of Test:	December 8, 2021
Last Date of Test:	February 10, 2022
Receipt Date of Samples:	December 3, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
This is a physically and radio-controlled thermostat. It contains a LoRa radio (500kHz DTS and 125kHz Hybrid), a Z-wave radio and a Bluetooth Low Energy/Zigbee radio. The Bluetooth and Zigbee radio technologies share one antenna type and one antenna port.

Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Surface mount Ceramic Chip	Unictron Technologies Corp.	2400 - 2500	-0.3

The EUT was tested using the power settings provided by the manufacturer:

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting
BLE 125 kbps, 500 kbps, 1 Mbps, 2 Mbps	DTS	0	2402	8 dBm
		20	2440	7 dBm
		39	2480	8 dBm

CONFIGURATIONS

Configuration F3EN0068- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Thermostat	Quext	Quext 1	DUT4

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/AC Transformer	None	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
24VAC Cable	No	1.4m	No	Radio Thermostat	AC/AC Transformer
120VAC Cable	No	1.0m	No	AC/AC Transformer	AC Mains

CONFIGURATIONS

Configuration F3EN0068- 3

Software/Firmware Running During Test	
Description	**Version**
Tera Term	1.0.0.26

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Thermostat	Quext	Quext 1	DUT1

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Lenovo	T450	None
AC/DC Adapter (Laptop)	Lenovo	SK90200325	None
AC/AC Transformer	None	None	None
Mouse (Laptop)	Logitech	810-004116	1829HS0566P8

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB to IO Cable	No	1.2m	No	Radio Thermostat	Laptop
DC Cable	Yes	2.1m	No	Laptop	AC/DC Adapter (Laptop)
AC Cable	No	1.5m	No	AC Mains	AC/DC Adapter (Laptop)
24VAC Cable	No	1.4m	No	Radio Thermostat	AC/AC Transformer
120VAC Cable	No	1.0m	No	AC/AC Transformer	AC Mains / Not Energized
USB Mouse Cable	Yes	1.5m	No	Laptop	Mouse (Laptop)

CONFIGURATIONS

Configuration F3EN0068- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Thermostat	Quext	Quext 1	DUT 11

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/AC Transformer	None	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
24VACCable	No	1.4m	No	Radio Thermostat	AC/AC Transformer
120VAC Cable	No	1.0m	No	AC/AC Transformer	AC Mains / Not Energized

MODITICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-12-08	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-01-06	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2022-02-08	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.
4	2022-02-10	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-02-10	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.
6	2022-02-10	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2022-02-10	Equivalent Isotropic Radiated power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2022-02-10	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
9	2022-02-10	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
10	2022-02-10	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

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
Receiver	Gauss Instruments	TDEMI 30M	ARL	2021-03-23	2022-03-23
LISN	Solar Electronics	9252-50-R-24-BNC	LJK	2021-08-06	2022-08-06
Power Source/Analyzer	Hewlett Packard	6841A	THC	NCR	NCR
Cable - Conducted Cable Assembly	Northwest EMC	TXA, HFC, TQU	TXAA	2021-01-26	2022-01-26

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.1 dB	-3.1 dB

CONFIGURATIONS INVESTIGATED

F3EN0068-2

MODES INVESTIGATED

Thermostat On, BLE Radio enabled, 1 Mbps modulation, mid-channel, all other radios disabled

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Thermostat		Work Order:	F3EN0068
Serial Number:	DUT4		Date:	2022-01-06
Customer:	Quext		Temperature:	23°C
Attendees:	None		Relative Humidity:	22.6%
Customer Project:	None		Bar. Pressure (PMSL):	1025 mb
Tested By:	Travis Glasser		Job Site:	TX01
Power:	110VAC/60Hz		Configuration:	F3EN0068-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

| Run #:	19	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

EUT OPERATING MODES

Thermostat On, BLE Radio enabled, 1 Mbps modulation, mid-channel, all other radios disabled

DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit

Average Data - vs - Average Limit

POWERLINE CONDUCTED EMISSIONS

WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.12.10.0
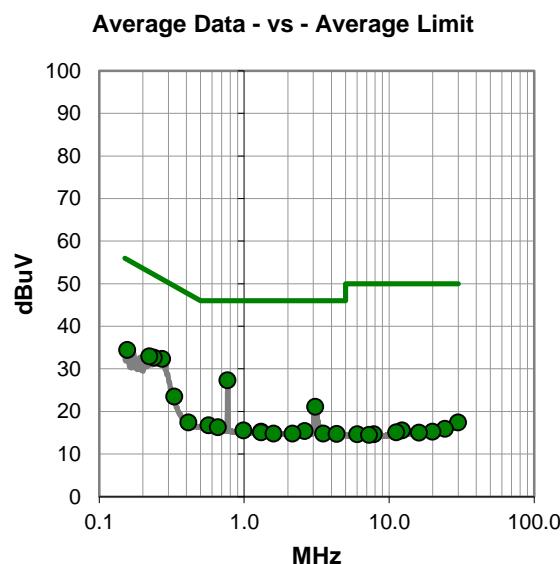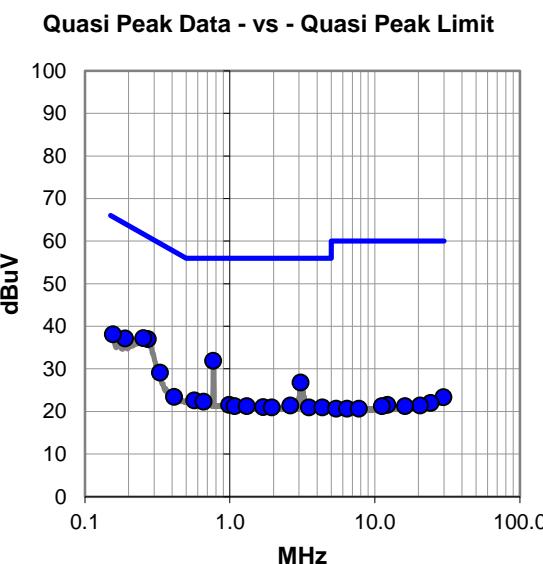
RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.769	11.7	20.2	31.9	56.0	-24.1
0.272	16.6	20.4	37.0	61.1	-24.1
0.254	16.8	20.4	37.2	61.6	-24.4
0.190	16.7	20.4	37.1	64.1	-27.0
0.156	17.7	20.4	38.1	65.7	-27.6
3.081	6.5	20.3	26.8	56.0	-29.2
0.330	8.9	20.2	29.1	59.5	-30.4
0.570	2.4	20.2	22.6	56.0	-33.4
0.660	2.1	20.2	22.3	56.0	-33.7
0.412	3.2	20.2	23.4	57.6	-34.2
0.989	1.3	20.2	21.5	56.0	-34.5
2.617	1.1	20.3	21.4	56.0	-34.6
1.079	1.0	20.2	21.2	56.0	-34.8
1.311	0.9	20.3	21.2	56.0	-34.8
1.702	0.7	20.3	21.0	56.0	-35.0
1.943	0.6	20.3	20.9	56.0	-35.1
3.510	0.6	20.3	20.9	56.0	-35.1
4.346	0.6	20.3	20.9	56.0	-35.1
29.854	0.7	22.6	23.3	60.0	-36.7
24.329	-0.2	22.2	22.0	60.0	-38.0
12.207	0.5	21.0	21.5	60.0	-38.5
20.503	-0.2	21.6	21.4	60.0	-38.6
11.217	0.3	20.9	21.2	60.0	-38.8
16.195	-0.2	21.4	21.2	60.0	-38.8
5.423	0.2	20.4	20.6	60.0	-39.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.769	7.1	20.2	27.3	46.0	-18.7
0.272	11.9	20.4	32.3	51.1	-18.8
0.238	12.2	20.4	32.6	52.1	-19.5
0.222	12.5	20.4	32.9	52.8	-19.9
0.156	14.0	20.4	34.4	55.7	-21.3
3.098	0.8	20.3	21.1	46.0	-24.9
0.330	3.3	20.2	23.5	49.5	-26.0
0.570	-3.5	20.2	16.7	46.0	-29.3
0.660	-3.9	20.2	16.3	46.0	-29.7
0.412	-2.8	20.2	17.4	47.6	-30.2
0.991	-4.7	20.2	15.5	46.0	-30.5
2.614	-4.9	20.3	15.4	46.0	-30.6
1.310	-5.1	20.3	15.2	46.0	-30.8
1.311	-5.2	20.3	15.1	46.0	-30.9
1.596	-5.5	20.3	14.8	46.0	-31.2
2.155	-5.5	20.3	14.8	46.0	-31.2
3.510	-5.5	20.3	14.8	46.0	-31.2
4.349	-5.6	20.3	14.7	46.0	-31.3
29.937	-5.2	22.6	17.4	50.0	-32.6
24.244	-6.3	22.2	15.9	50.0	-34.1
12.288	-5.5	21.0	15.5	50.0	-34.5
19.949	-6.4	21.6	15.2	50.0	-34.8
11.215	-5.8	20.9	15.1	50.0	-34.9
16.079	-6.4	21.4	15.0	50.0	-35.0
6.034	-5.8	20.4	14.6	50.0	-35.4

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Thermostat		Work Order:	F3EN0068
Serial Number:	DUT4		Date:	2022-01-06
Customer:	Quext		Temperature:	23°C
Attendees:	None		Relative Humidity:	22.6%
Customer Project:	None		Bar. Pressure (PMSL):	1025 mb
Tested By:	Travis Glasser		Job Site:	TX01
Power:	110VAC/60Hz		Configuration:	F3EN0068-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	20	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

EUT OPERATING MODES

Thermostat On, BLE Radio enabled, 1 Mbps modulation, mid-channel, all other radios disabled

DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit

Average Data - vs - Average Limit
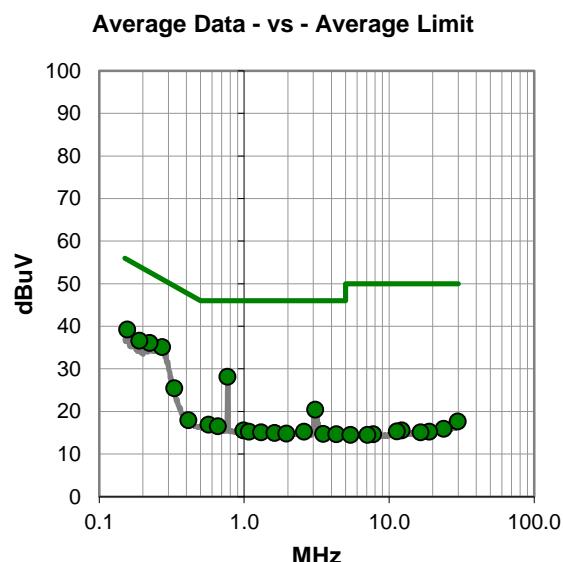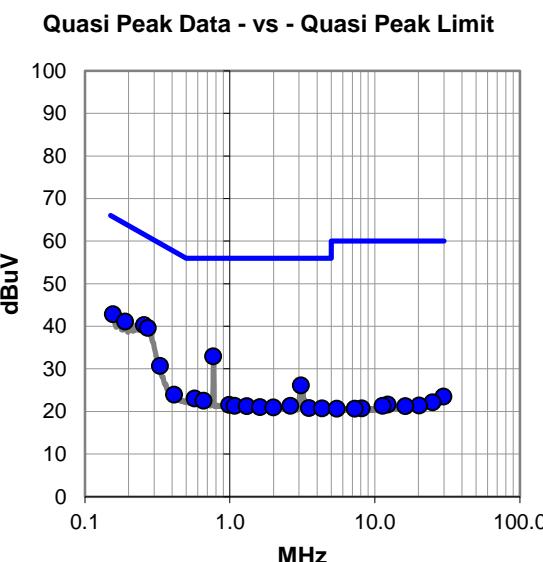
POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #20

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.255	19.9	20.4	40.3	61.6	-21.3
0.272	19.2	20.4	39.6	61.1	-21.5
0.156	22.4	20.4	42.8	65.7	-22.9
0.190	20.7	20.4	41.1	64.1	-23.0
0.769	12.7	20.2	32.9	56.0	-23.1
0.330	10.5	20.2	30.7	59.5	-28.8
3.090	5.8	20.3	26.1	56.0	-29.9
0.571	2.8	20.2	23.0	56.0	-33.0
0.660	2.3	20.2	22.5	56.0	-33.5
0.412	3.7	20.2	23.9	57.6	-33.7
0.989	1.3	20.2	21.5	56.0	-34.5
1.081	1.1	20.2	21.3	56.0	-34.7
2.610	1.0	20.3	21.3	56.0	-34.7
1.311	0.9	20.3	21.2	56.0	-34.8
1.615	0.7	20.3	21.0	56.0	-35.0
1.998	0.6	20.3	20.9	56.0	-35.1
3.508	0.5	20.3	20.8	56.0	-35.2
4.323	0.4	20.3	20.7	56.0	-35.3
29.854	0.9	22.6	23.5	60.0	-36.5
24.996	-0.1	22.2	22.1	60.0	-37.9
12.288	0.6	21.0	21.6	60.0	-38.4
20.228	-0.2	21.6	21.4	60.0	-38.6
11.298	0.4	20.9	21.3	60.0	-38.7
16.232	-0.2	21.4	21.2	60.0	-38.8
8.130	0.1	20.6	20.7	60.0	-39.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.272	14.7	20.4	35.1	51.1	-16.0
0.156	18.8	20.4	39.2	55.7	-16.5
0.223	15.7	20.4	36.1	52.7	-16.6
0.190	16.2	20.4	36.6	54.1	-17.5
0.769	7.9	20.2	28.1	46.0	-17.9
0.330	5.2	20.2	25.4	49.5	-24.1
3.098	0.1	20.3	20.4	46.0	-25.6
0.570	-3.3	20.2	16.9	46.0	-29.1
0.660	-3.7	20.2	16.5	46.0	-29.5
0.412	-2.3	20.2	17.9	47.6	-29.7
0.989	-4.7	20.2	15.5	46.0	-30.5
1.079	-5.0	20.2	15.2	46.0	-30.8
2.596	-5.1	20.3	15.2	46.0	-30.8
1.311	-5.2	20.3	15.1	46.0	-30.9
1.622	-5.4	20.3	14.9	46.0	-31.1
1.954	-5.5	20.3	14.8	46.0	-31.2
3.510	-5.6	20.3	14.7	46.0	-31.3
4.335	-5.7	20.3	14.6	46.0	-31.4
29.856	-5.0	22.6	17.6	50.0	-32.4
23.751	-6.2	22.1	15.9	50.0	-34.1
12.205	-5.5	21.0	15.5	50.0	-34.5
11.298	-5.6	20.9	15.3	50.0	-34.7
18.978	-6.3	21.5	15.2	50.0	-34.8
16.519	-6.3	21.4	15.1	50.0	-34.9
7.781	-6.0	20.6	14.6	50.0	-35.4

CONCLUSION
Pass

Tested By

DUTY CYCLE

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
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15

TEST DESCRIPTION

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

EUT: Radio Thermostat	**Work Order:** F3EN0068	
Serial Number: DUT 1	**Date:** 10-Feb-22	
Customer: Quext	**Temperature:** 21.2 °C	
Attendees: None	**Humidity:** 24.1% RH	
Project: None	**Barometric Pres.:** 1021 mbar	
Tested by: Brandon Hobbs	**Power:** 110VAC/60Hz	**Job Site:** TX09

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

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
None

Configuration #	3	Signature

	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK 125 kbps						
Low Channel, 2402 MHz	747.65 us	1.25 ms	1	59.8	N/A	N/A
Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz	745.39 us	1.251 ms	1	59.6	N/A	N/A
Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz	747.52 us	1.25 ms	1	59.8	N/A	N/A
High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 500 kbps						
Low Channel, 2402 MHz	499.01 us	1.249 ms	1	40	N/A	N/A
Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz	493.69 us	1.249 ms	1	39.5	N/A	N/A
Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz	494.35 us	1.25 ms	1	39.5	N/A	N/A
High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 1 Mbps						
Low Channel, 2402 MHz	96.609 us	625 us	1	15.5	N/A	N/A
Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz	96.663 us	625.1 us	1	15.5	N/A	N/A
Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz	97.325 us	625 us	1	15.6	N/A	N/A
High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK 2 Mbps						
Low Channel, 2402 MHz	59.292 us	625.1 us	1	9.5	N/A	N/A
Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz	58.475 us	625.1 us	1	9.4	N/A	N/A
Mid Channel, 2440 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz	58.858 us	625.1 us	1	9.4	N/A	N/A
High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

BLE/GFSK 125 kbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
747.65 us	1.25 ms	1	59.8	N/A	N/A

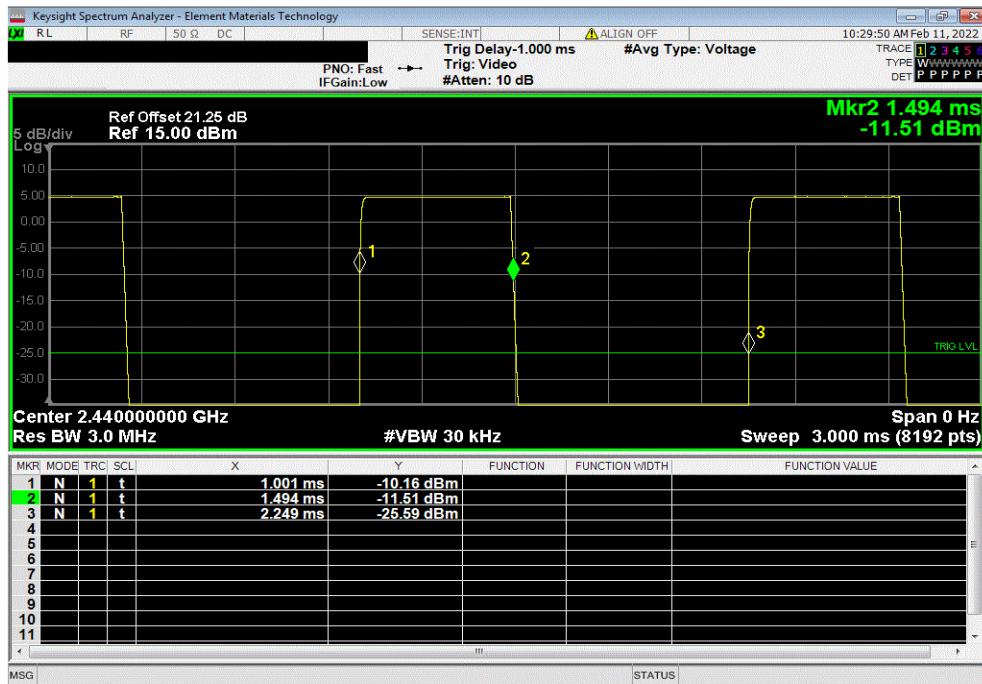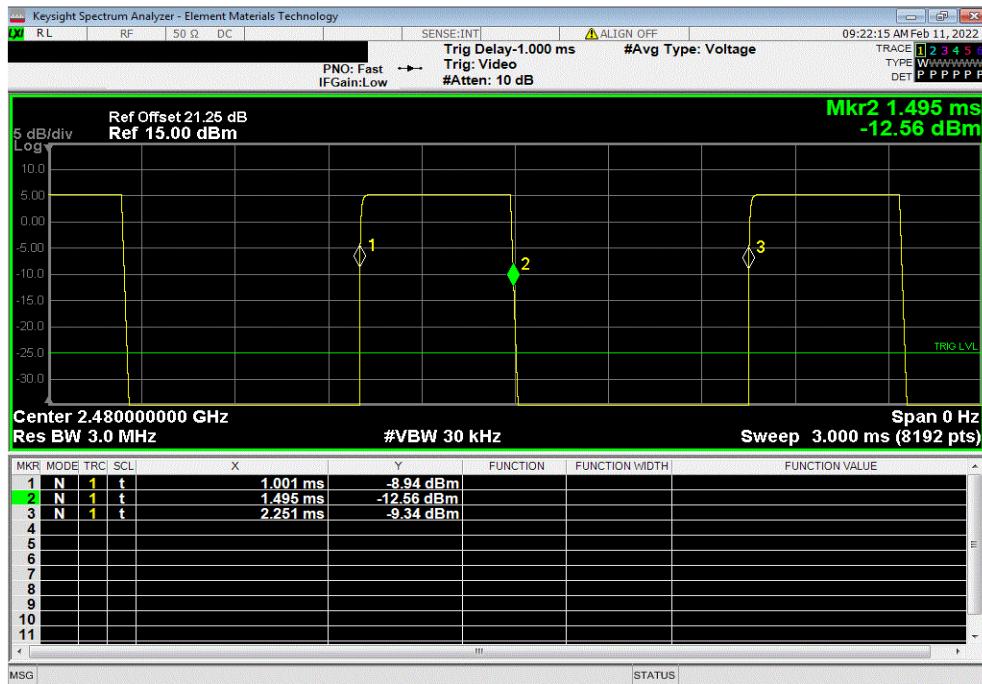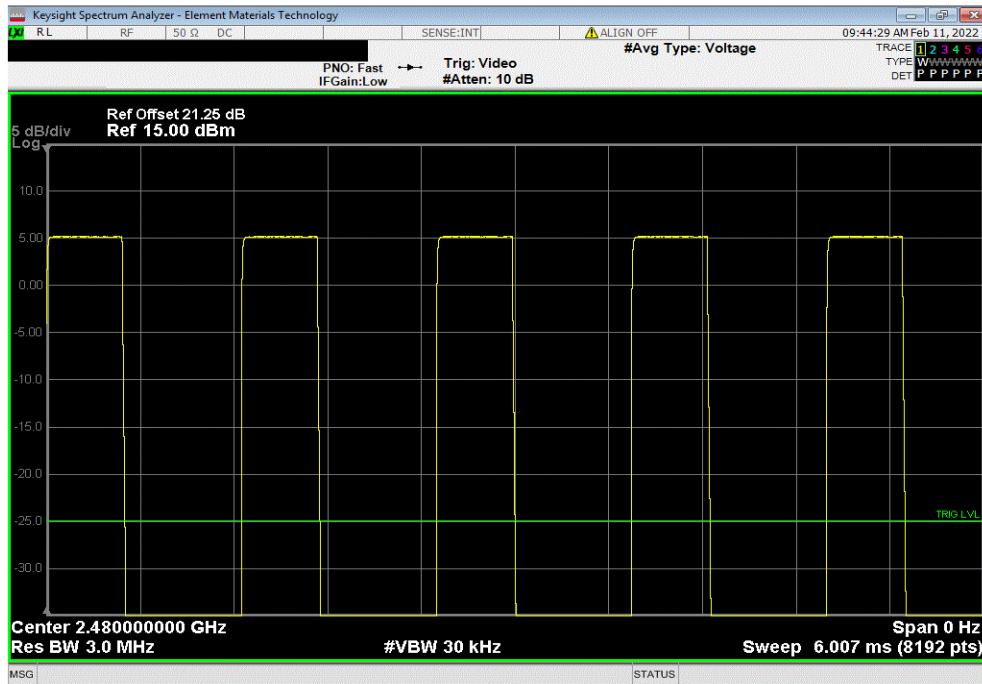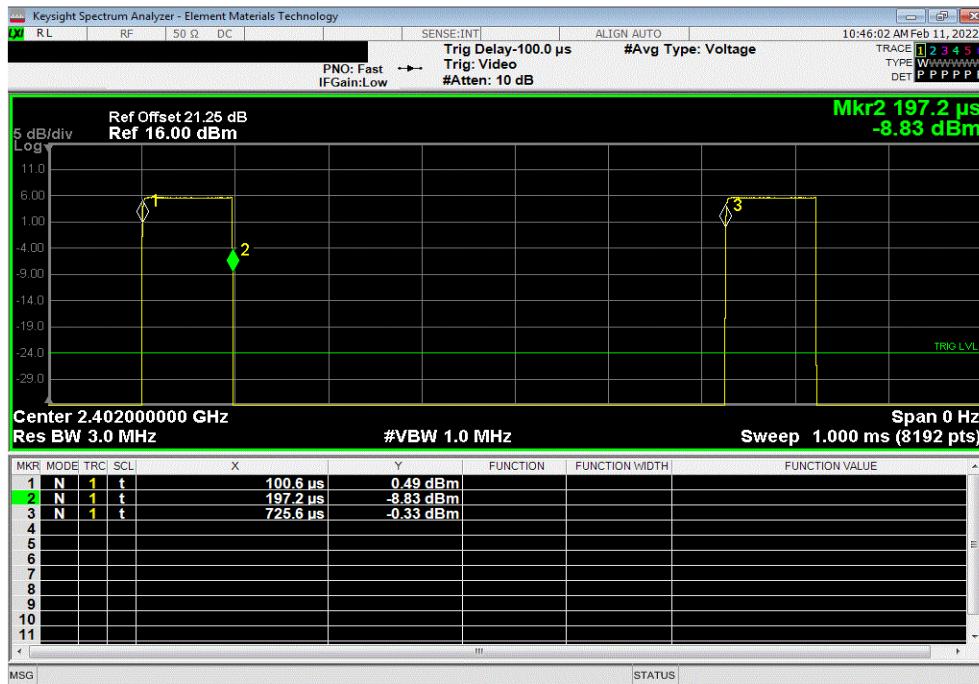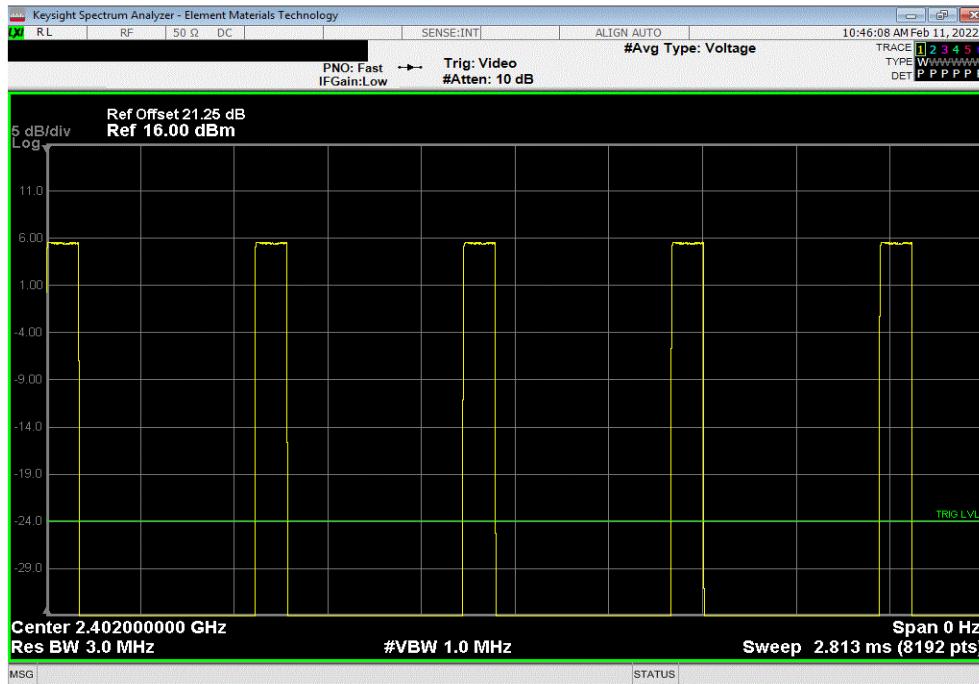| BLE/GFSK 125 kbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A
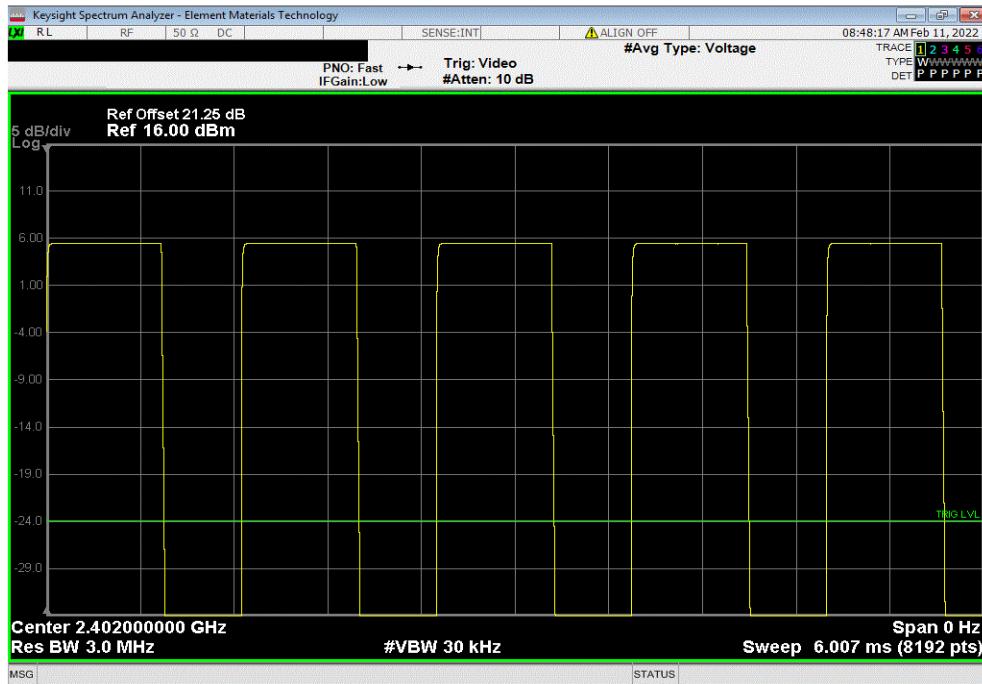
DUTY CYCLE
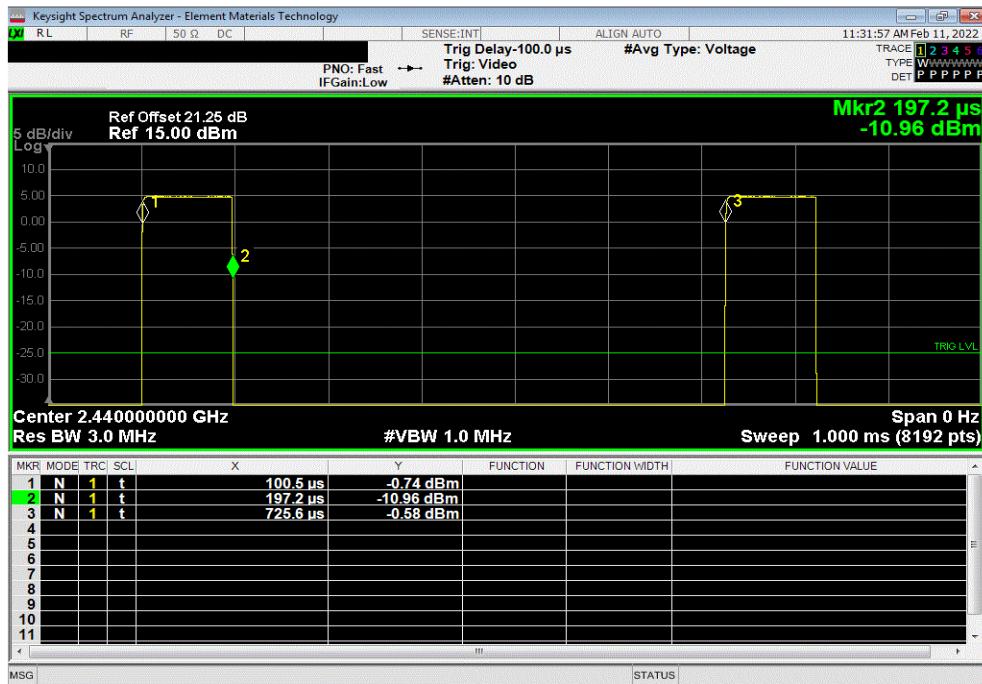
BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
745.39 us	1.251 ms	1	59.6	N/A	N/A

BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A
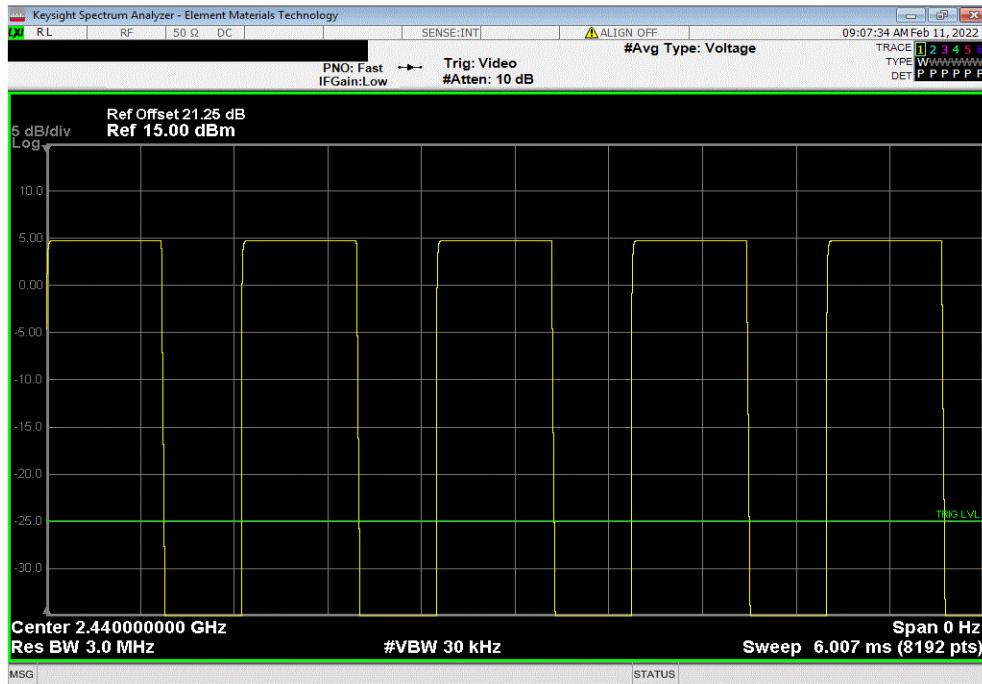
DUTY CYCLE
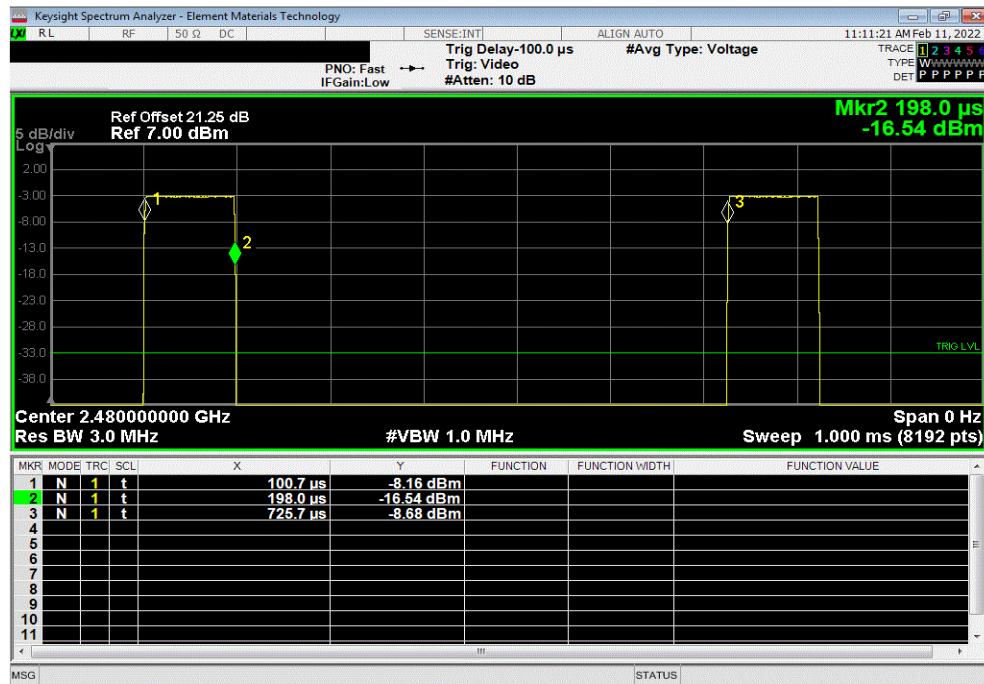
BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
747.52 us	1.25 ms	1	59.8	N/A	N/A

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A
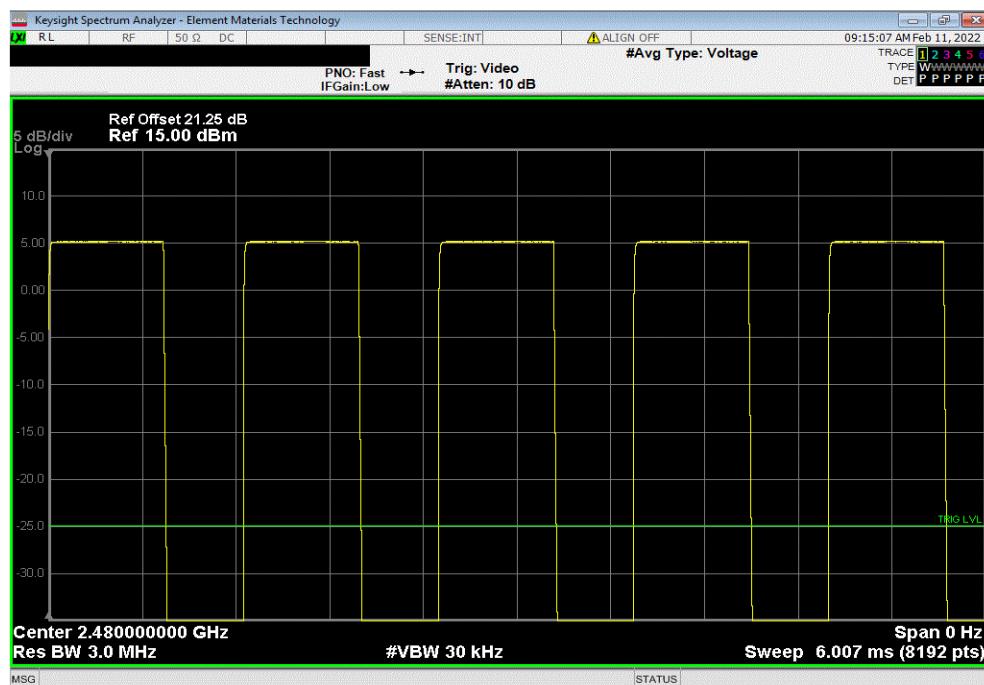
DUTY CYCLE

BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
499.01 us	1.249 ms	1	40	N/A	N/A

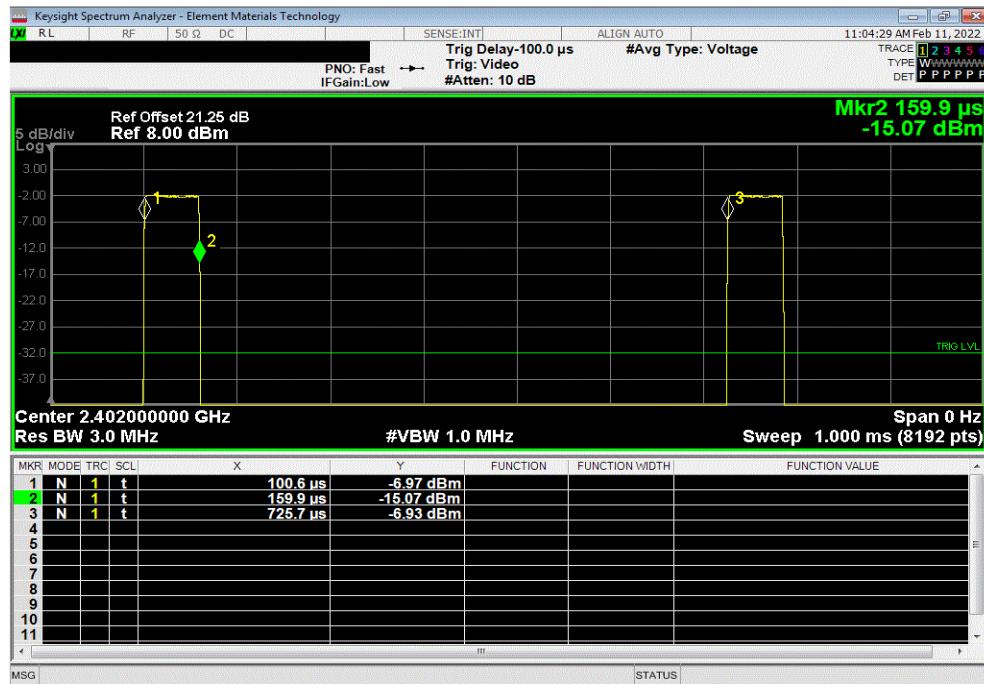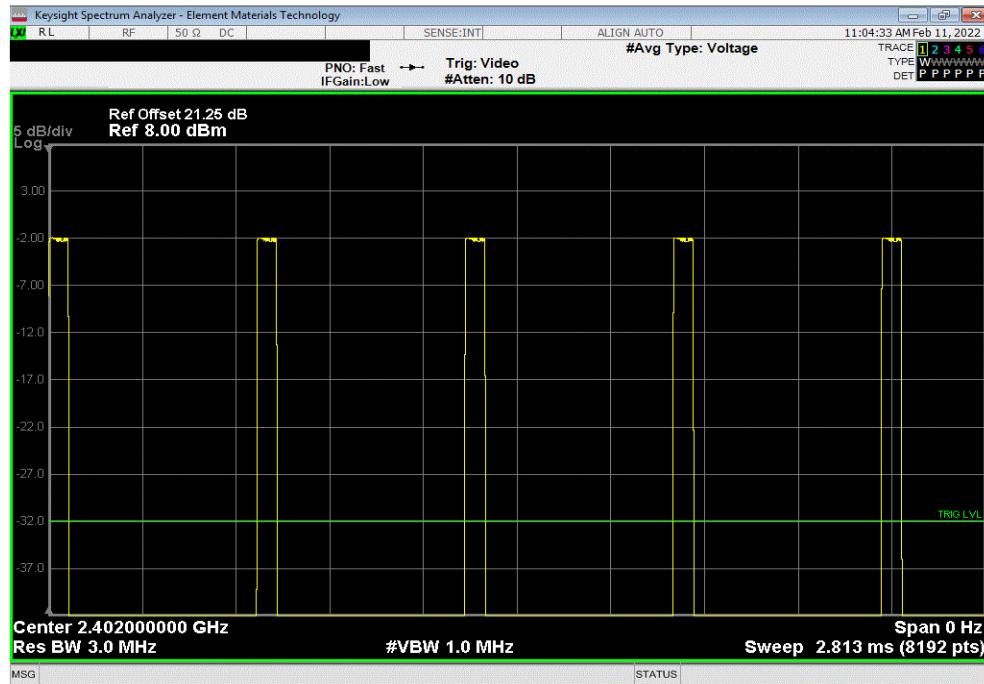| BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A
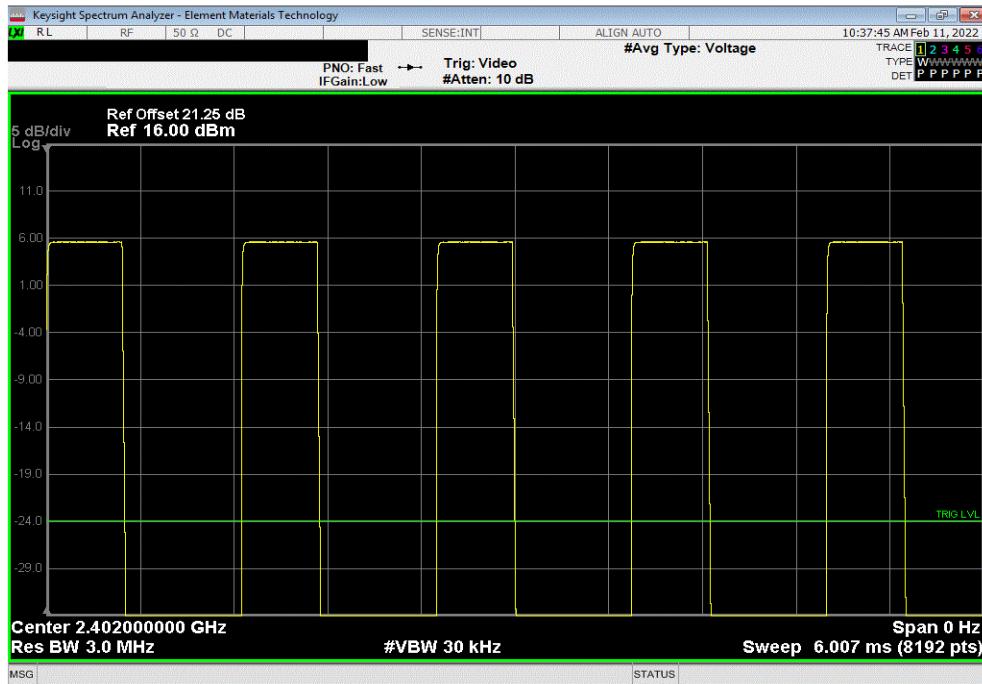
DUTY CYCLE

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
493.69 us	1.249 ms	1	39.5	N/A	N/A

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A
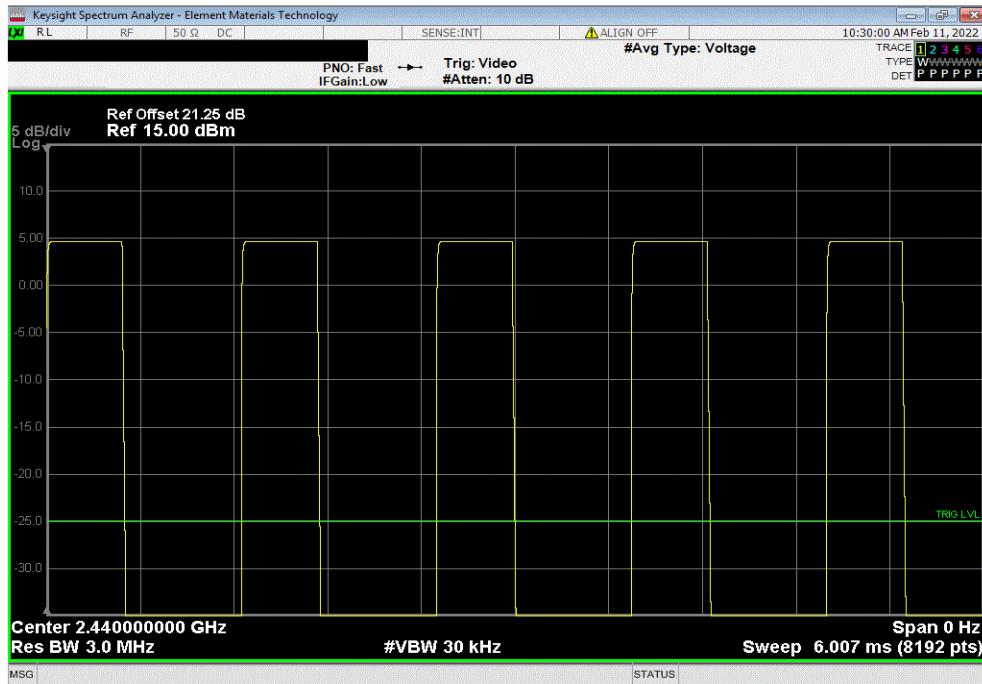
DUTY CYCLE
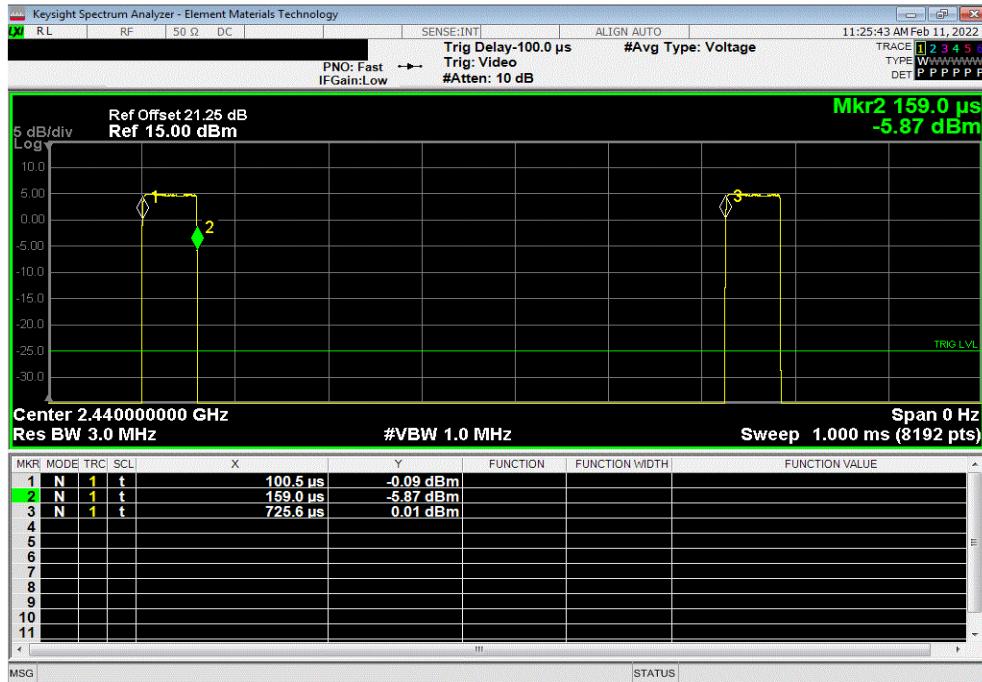
BLE/GFSK 500 kbps, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	494.35 us	1.25 ms	1	39.5	N/A	N/A

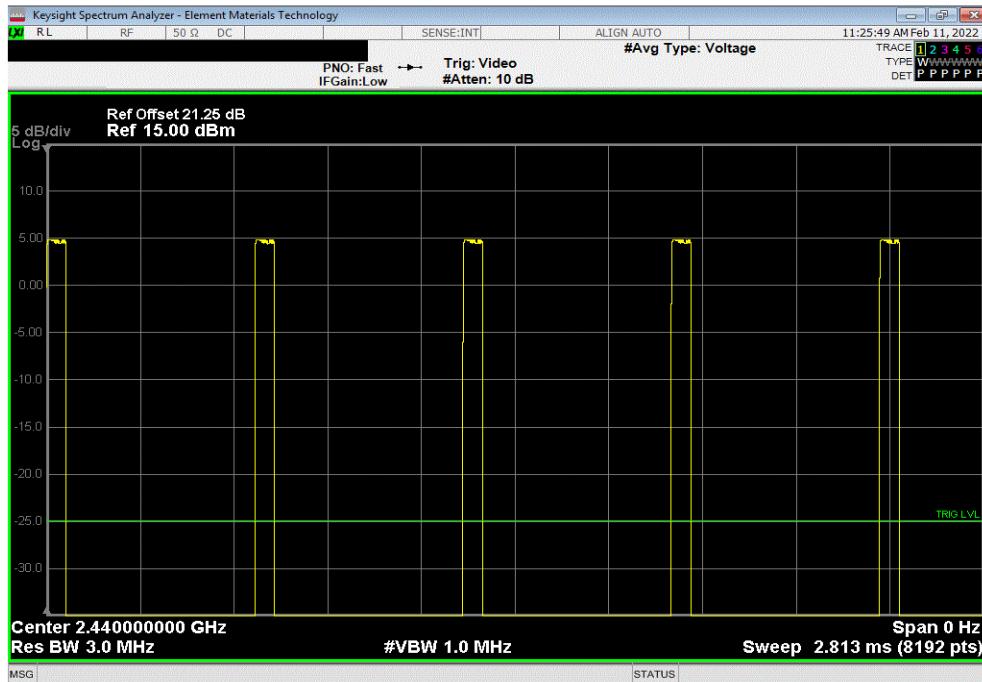| BLE/GFSK 500 kbps, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
96.609 us	625 us	1	15.5	N/A	N/A

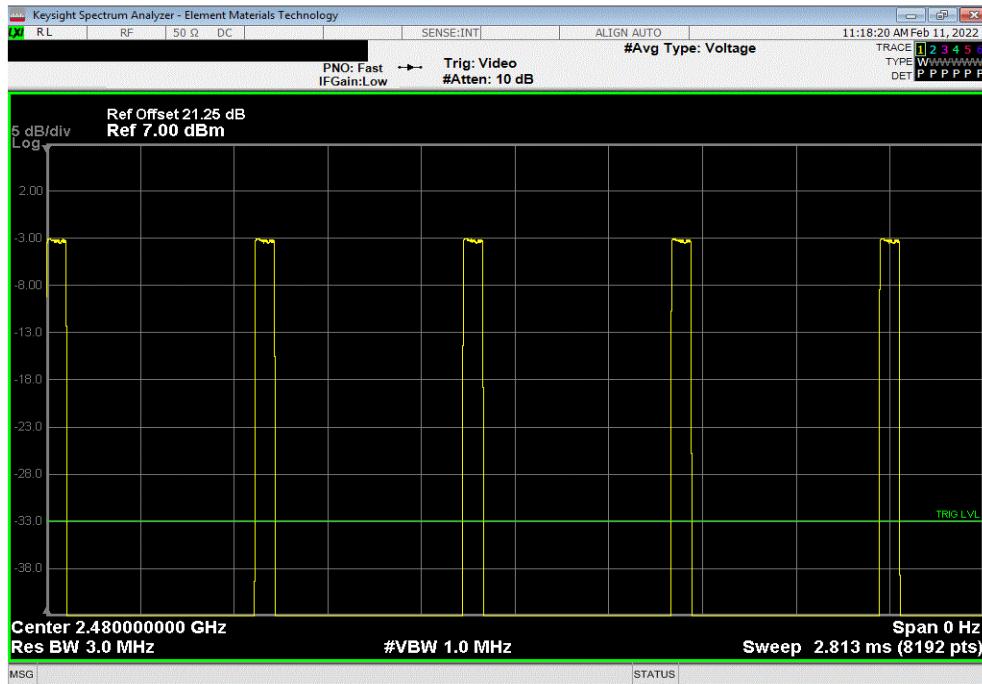| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

			BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz			
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	96.663 us	625.1 us	1	15.5	N/A	N/A

			BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz			
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A
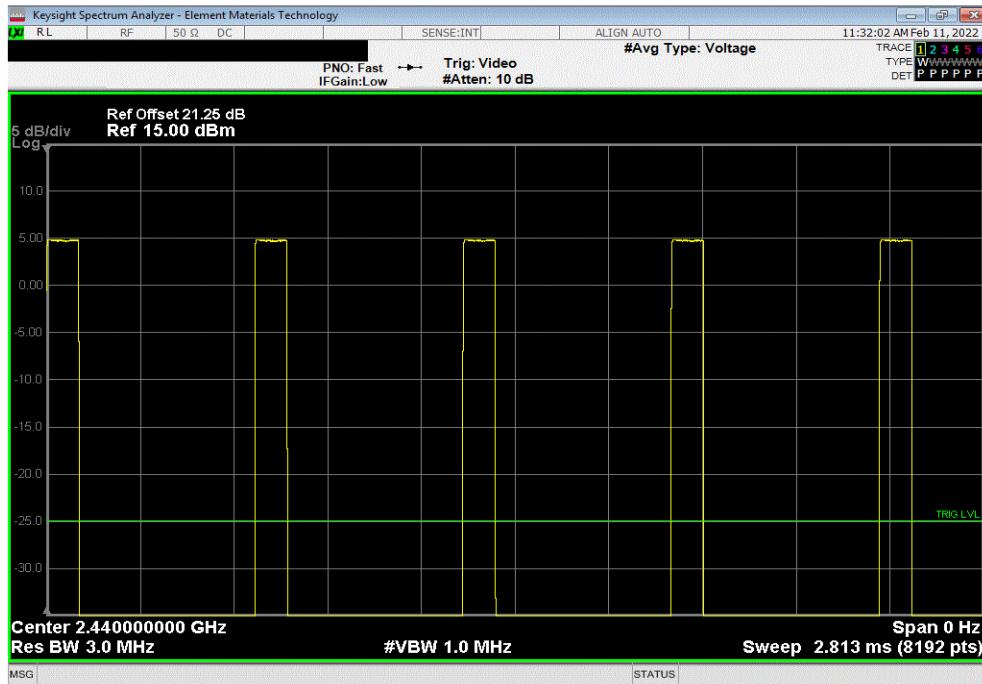
DUTY CYCLE

BLE/GFSK 1 Mbps, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
97.325 us	625 us	1	15.6	N/A	N/A

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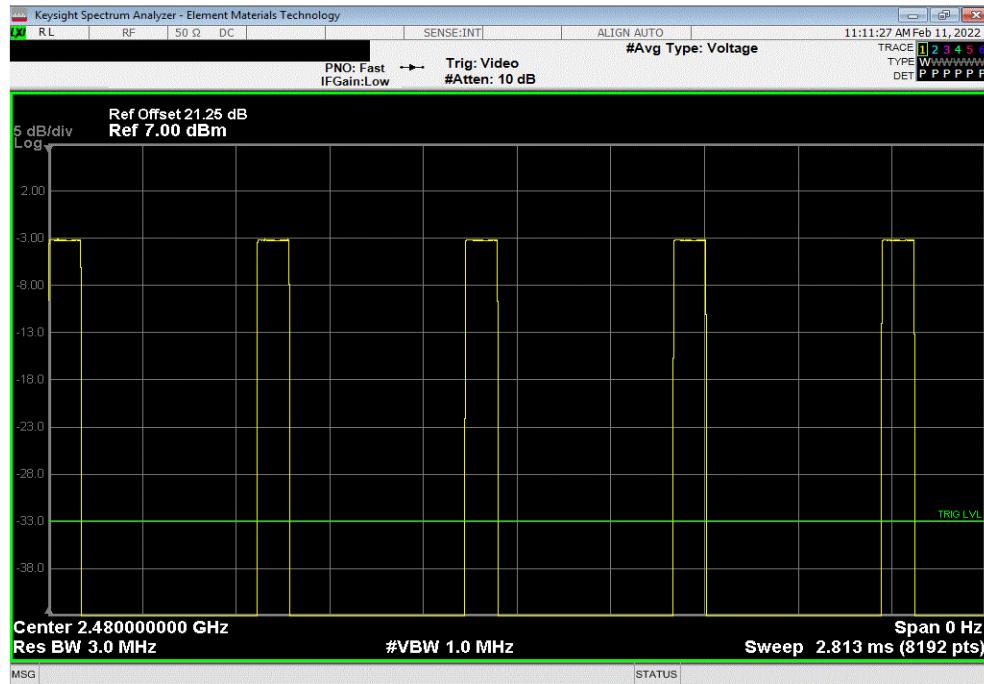
DUTY CYCLE

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
59.292 us	625.1 us	1	9.5	N/A	N/A

BLE/GFSK 2 Mbps, 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

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz					
		Number of	**Value**	**Limit**	
Pulse Width	**Period**	**Pulses**	**(%)**	**(%)**	**Results**
58.475 us	625.1 us	1	9.4	N/A	N/A

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz					
		Number of	**Value**	**Limit**	
Pulse Width	**Period**	**Pulses**	**(%)**	**(%)**	**Results**
N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
58.858 us	625.1 us	1	9.4	N/A	N/A

BLE/GFSK 2 Mbps, 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 99%

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
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15

TEST DESCRIPTION

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

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

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

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

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

OCCUPIED BANDWIDTH 99%

EUT: Radio Thermostat		**Work Order:** F3EN0068	
Serial Number: DUT 1		**Date:** 10-Feb-22	
Customer: Quext		**Temperature:** 21.3 °C	
Attendees: None		**Humidity:** 24% RH	
Project: None		**Barometric Pres.:** 1021 mbar	
Tested by: Brandon Hobbs	**Power:** 110VAC/60Hz	**Job Site:** TX09	

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

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
None

Configuration #	**3**	*Signature*

	Value	Limit	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	1.026 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.027 MHz	N/A	N/A
High Channel, 2480 MHz	1.027 MHz	N/A	N/A
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	1.015 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.021 MHz	N/A	N/A
High Channel, 2480 MHz	1.015 MHz	N/A	N/A
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	1.038 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.034 MHz	N/A	N/A
High Channel, 2480 MHz	1.044 MHz	N/A	N/A
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	2.024 MHz	N/A	N/A
Mid Channel, 2440 MHz	2.046 MHz	N/A	N/A
High Channel, 2480 MHz	2.047 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

				Value	Limit	Result
BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
				1.026 MHz	N/A	N/A

				Value	Limit	Result
BLE/GFSK 125 kbps, Mid Channel, 2440 MHz						
				1.027 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

				Value	Limit	Result
BLE/GFSK 125 kbps, High Channel, 2480 MHz						
				1.027 MHz	N/A	N/A

				Value	Limit	Result
BLE/GFSK 500 kbps, Low Channel, 2402 MHz						
				1.015 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

				Value	Limit	Result
BLE/GFSK 500 kbps, Mid Channel, 2440 MHz						
				1.021 MHz	N/A	N/A

				Value	Limit	Result
BLE/GFSK 500 kbps, High Channel, 2480 MHz						
				1.015 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

					Value	Limit	Result
BLE/GFSK 1 Mbps, Low Channel, 2402 MHz							
					1.038 MHz	N/A	N/A

					Value	Limit	Result
BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz							
					1.034 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

				Value	Limit	Result
BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				1.044 MHz	N/A	N/A

				Value	Limit	Result
BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				2.024 MHz	N/A	N/A

OCCUPIED BANDWIDTH 99%

				Value	Limit	Result
BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
				2.046 MHz	N/A	N/A

				Value	Limit	Result
BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				2.047 MHz	N/A	N/A

DTS BANDWIDTH

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

TEST DESCRIPTION

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

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

DTS BANDWIDTH

EUT: Radio Thermostat		**Work Order:** F3EN0068	
Serial Number: DUT 1		**Date:** 10-Feb-22	
Customer: Quext		**Temperature:** 22 °C	
Attendees: None		**Humidity:** 23.4% RH	
Project: None		**Barometric Pres.:** 1021 mbar	
Tested by: Brandon Hobbs	**Power:** 110VAC/60Hz	**Job Site:** TX09	

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

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
None

Configuration #	**3**	*Signature*

	Value	Limit (≥)	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	619.27 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	615.093 kHz	500 kHz	Pass
High Channel, 2480 MHz	615.482 kHz	500 kHz	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	683.117 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	676.264 kHz	500 kHz	Pass
High Channel, 2480 MHz	678.839 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	556.907 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	627.494 kHz	500 kHz	Pass
High Channel, 2480 MHz	630.008 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	859.079 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	863.36 kHz	500 kHz	Pass
High Channel, 2480 MHz	855.829 kHz	500 kHz	Pass

DTS BANDWIDTH

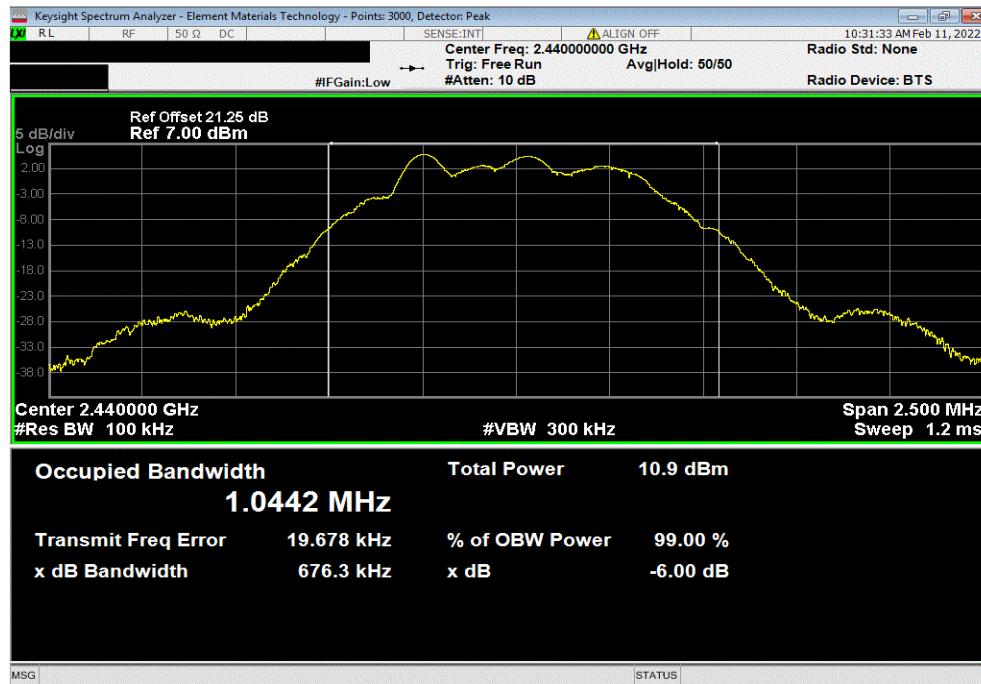| BLE/GFSK 125 kbps, Low Channel, 2402 MHz			
	Value	Limit (≥)	Result
	619.27 kHz	500 kHz	Pass
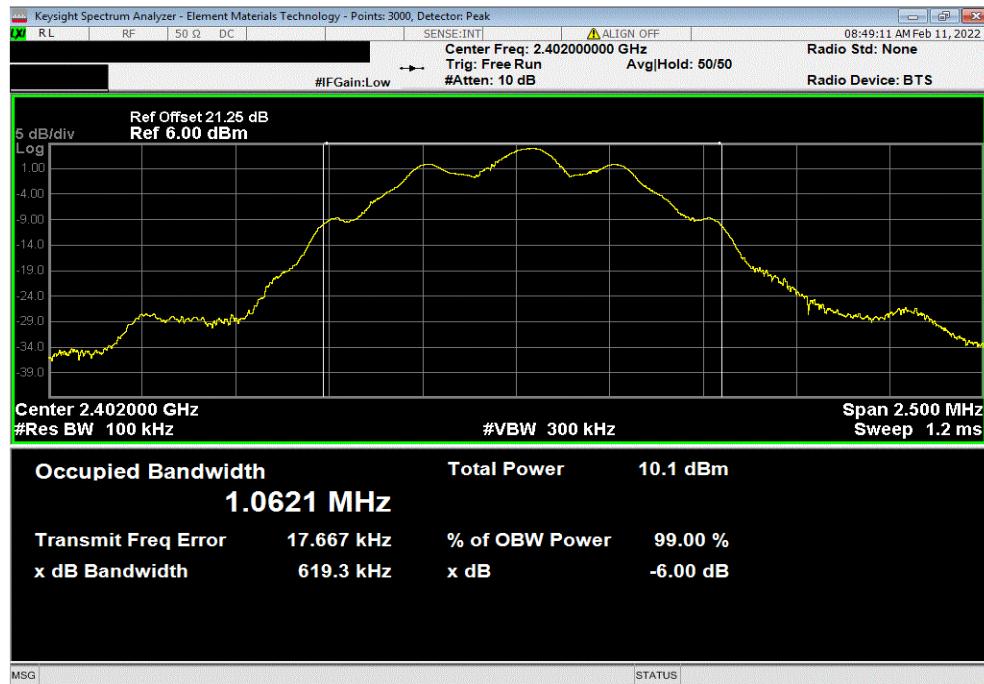
BLE/GFSK 125 kbps, Mid Channel, 2440 MHz			
	Value	Limit (≥)	Result
	615.093 kHz	500 kHz	Pass
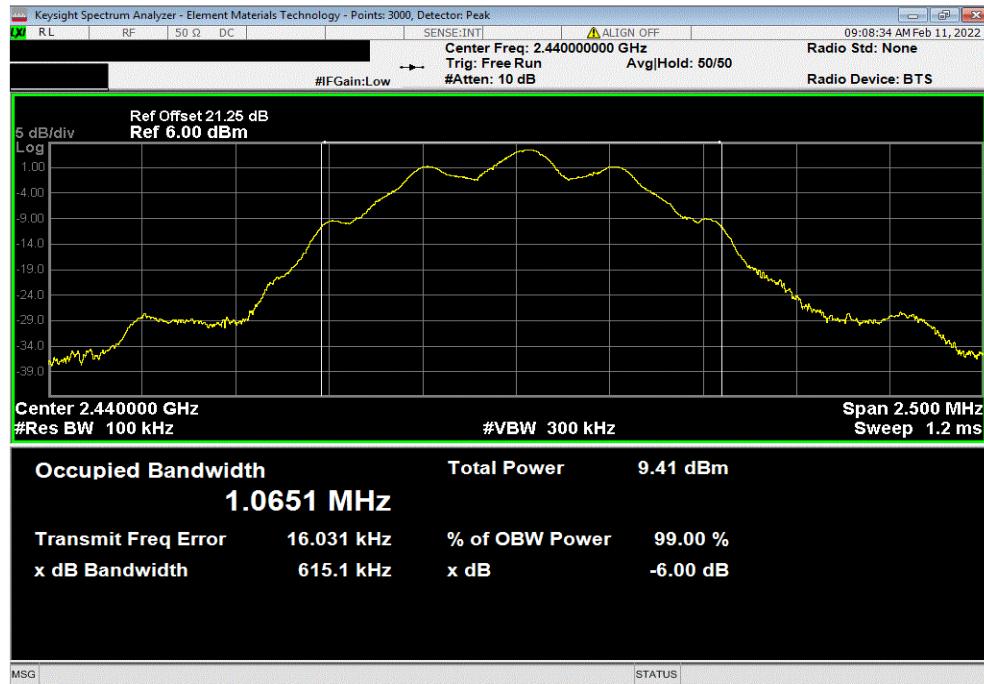
DTS BANDWIDTH

BLE/GFSK 125 kbps, High Channel, 2480 MHz				
		Value	Limit (≥)	Result
		615.482 kHz	500 kHz	Pass
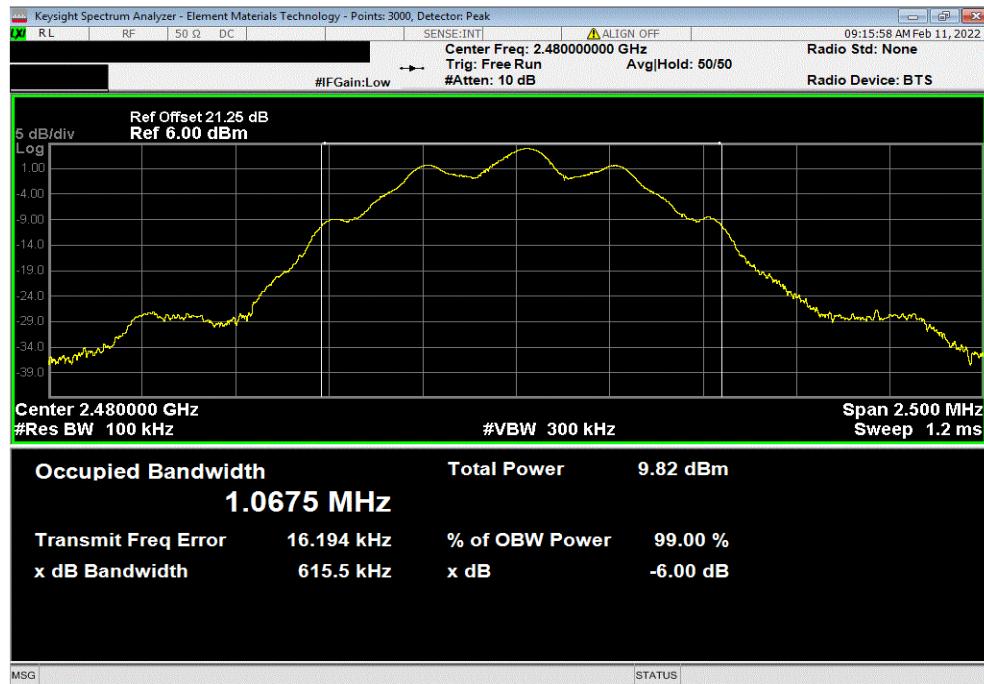
BLE/GFSK 500 kbps, Low Channel, 2402 MHz				
		Value	Limit (≥)	Result
		683.117 kHz	500 kHz	Pass
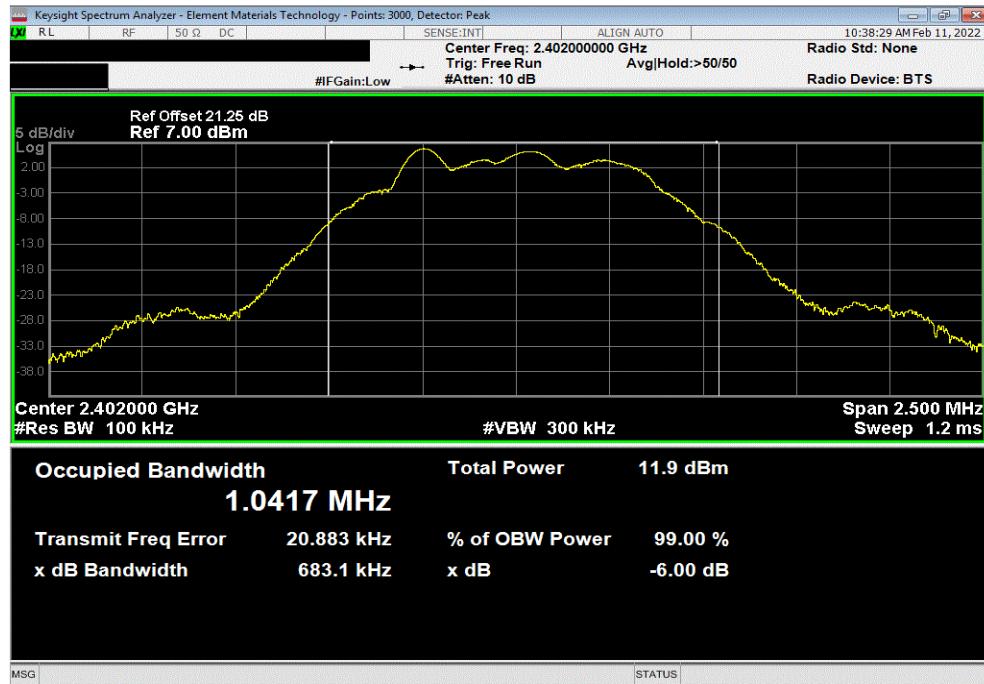
DTS BANDWIDTH

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz			
	Value	Limit (≥)	Result
	676.264 kHz	500 kHz	Pass

BLE/GFSK 500 kbps, High Channel, 2480 MHz			
	Value	Limit (≥)	Result
	678.839 kHz	500 kHz	Pass
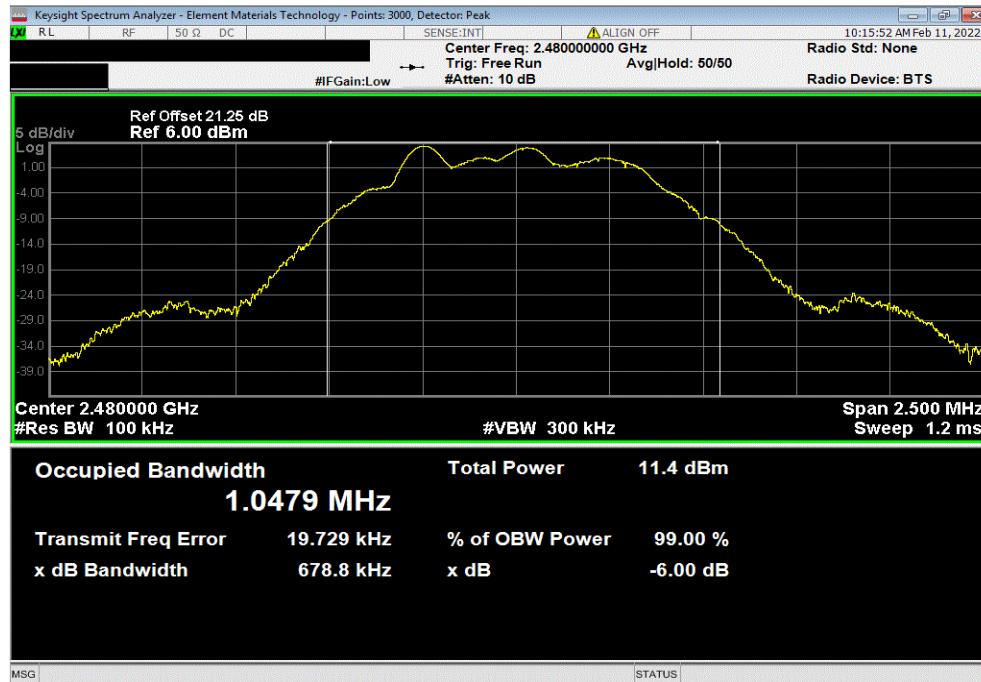
DTS BANDWIDTH

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz				
		Value	Limit (≥)	Result
		556.907 kHz	500 kHz	Pass
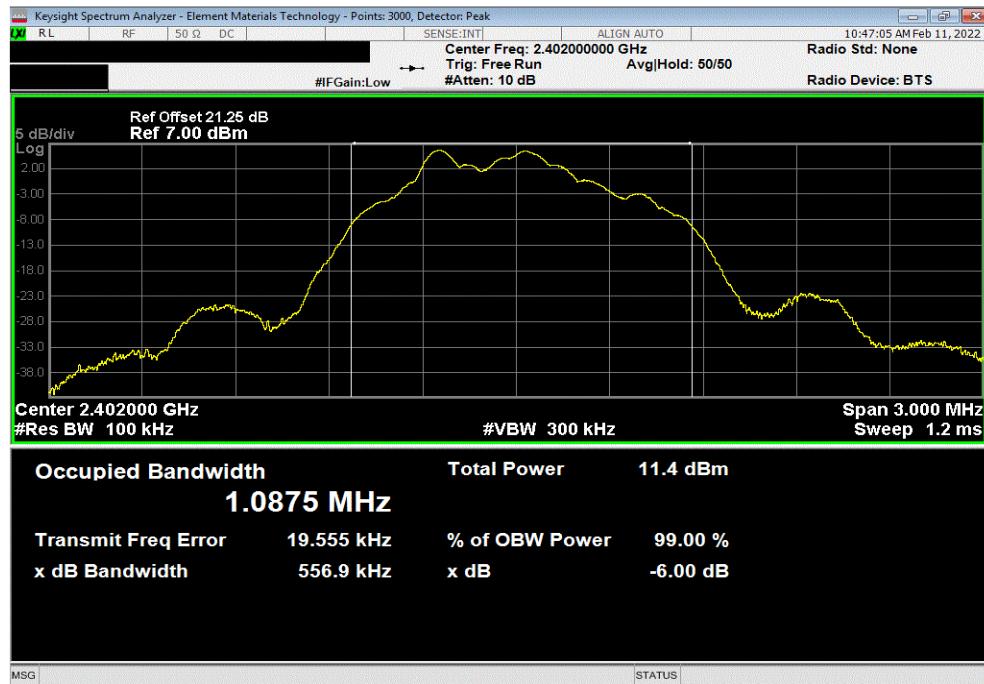
BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz				
		Value	Limit (≥)	Result
		627.494 kHz	500 kHz	Pass
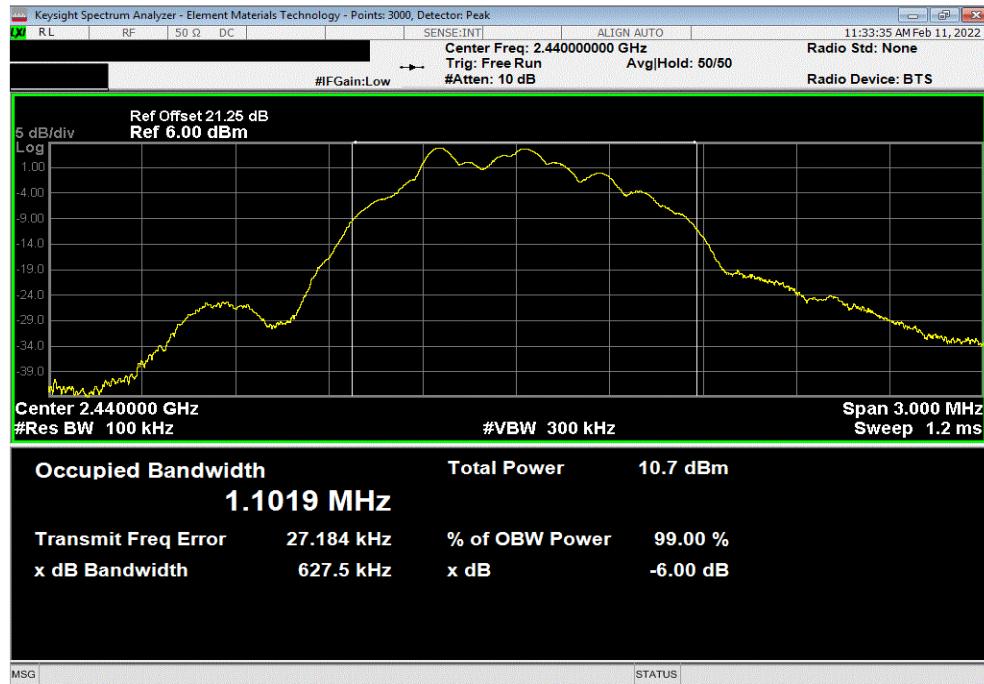
DTS BANDWIDTH

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				630.008 kHz	500 kHz	Pass
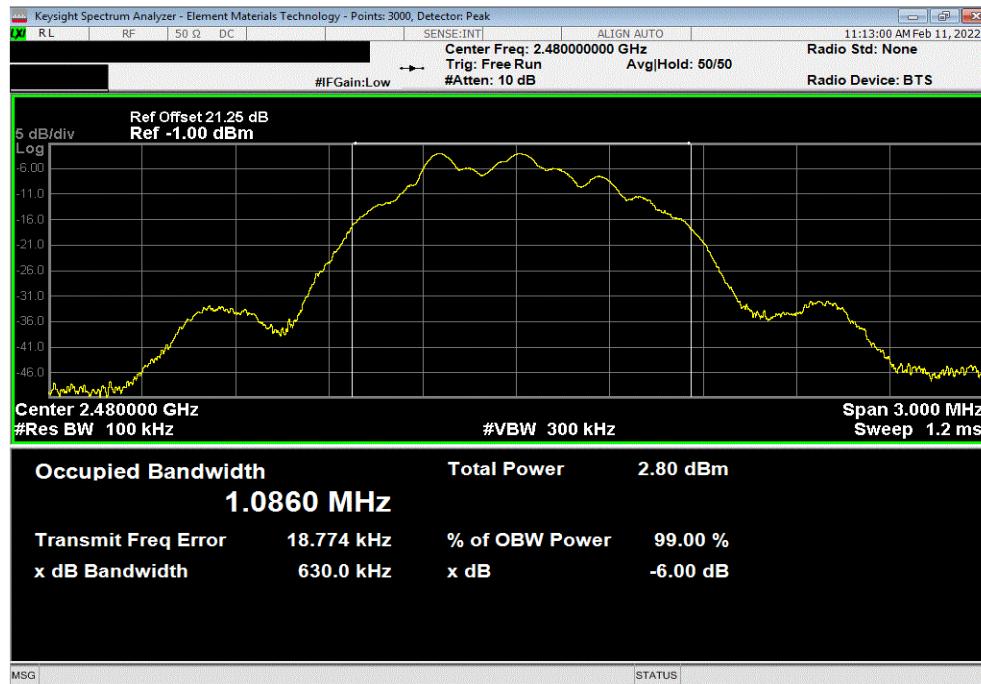
BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				859.079 kHz	500 kHz	Pass
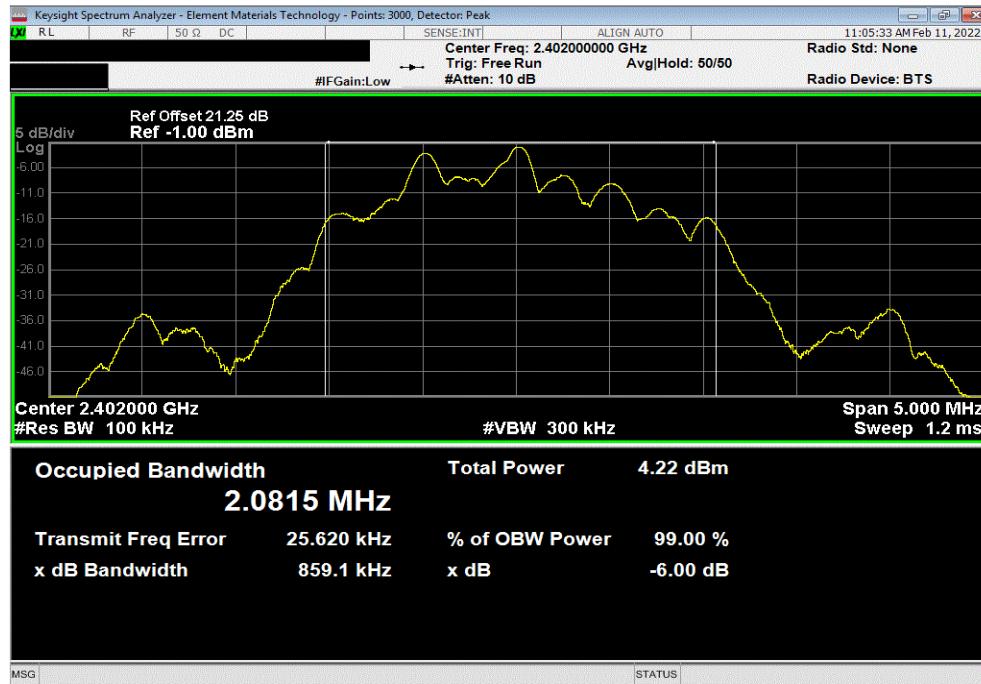
DTS BANDWIDTH

					Limit		
					BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz		
				Value	(≥)	Result	
				863.36 kHz	500 kHz	Pass	
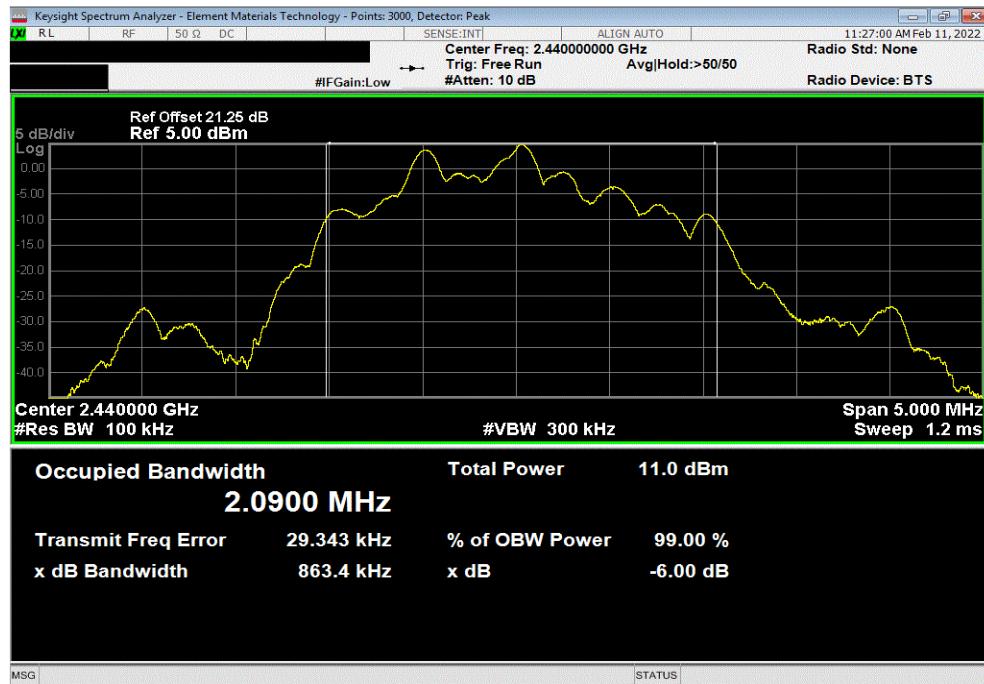
					Limit		
					BLE/GFSK 2 Mbps, High Channel, 2480 MHz		
				Value	(≥)	Result	
				855.829 kHz	500 kHz	Pass	

OUTPUT POWER

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
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Cable	UtiFlex Micro-Coax	UFD1150A-1-0720-200200	TXJ	2021-09-13	2022-09-13
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15

TEST DESCRIPTION

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

EUT: Radio Thermostat	**Work Order:** F3EN0068
Serial Number: DUT 1	**Date:** 10-Feb-22
Customer: Quext	**Temperature:** 22.1 °C
Attendees: None	**Humidity:** 23.3% RH
Project: None	**Barometric Pres.:** 1021 mbar
Tested by: Brandon Hobbs **Power:** 110VAC/60Hz	**Job Site:** TX09

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

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

Configuration #	3	Signature

	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	5.55	30	Pass
Mid Channel, 2440 MHz	4.872	30	Pass
High Channel, 2480 MHz	5.297	30	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	5.695	30	Pass
Mid Channel, 2440 MHz	4.767	30	Pass
High Channel, 2480 MHz	5.262	30	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	5.546	30	Pass
Mid Channel, 2440 MHz	4.85	30	Pass
High Channel, 2480 MHz	5.61	30	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	5.93	30	Pass
Mid Channel, 2440 MHz	4.823	30	Pass
High Channel, 2480 MHz	5.62	30	Pass

OUTPUT POWER

BLE/GFSK 125 kbps, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				5.55	30	Pass
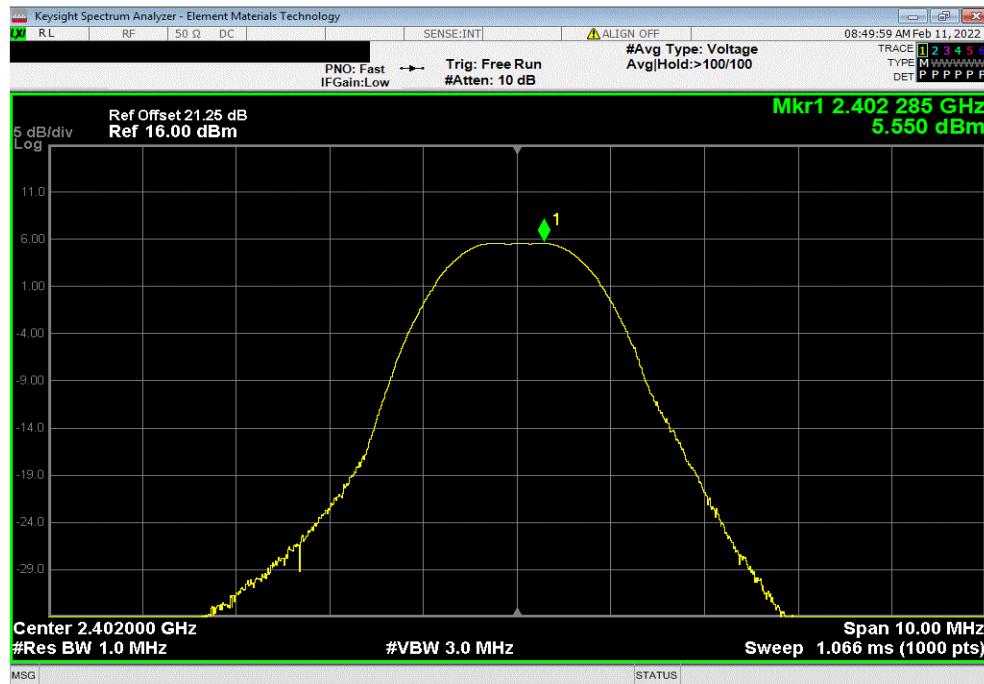
BLE/GFSK 125 kbps, Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				4.872	30	Pass
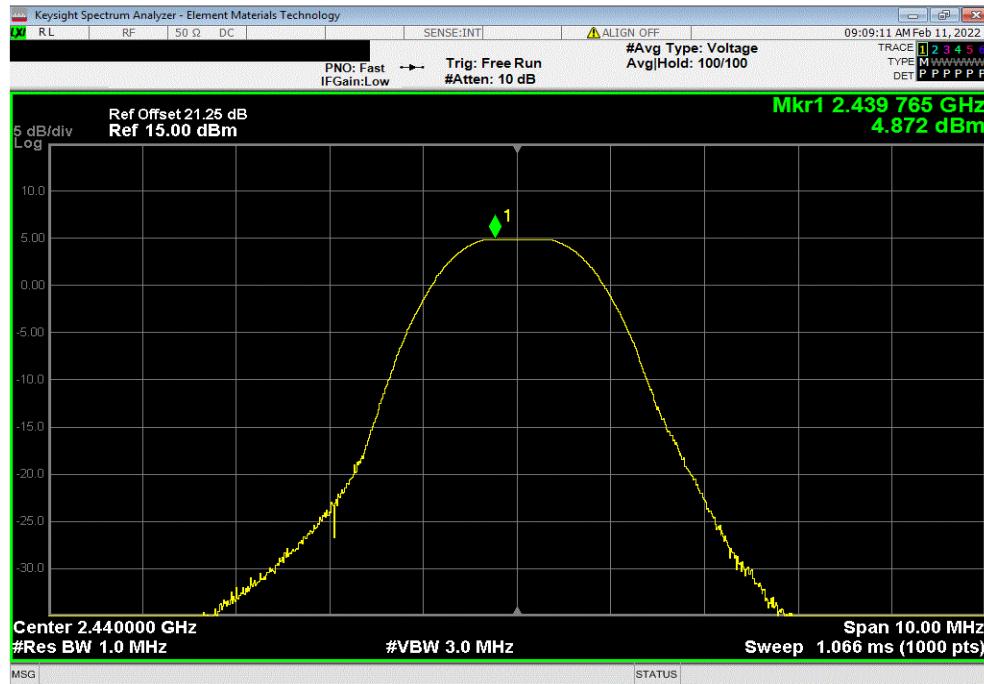
OUTPUT POWER

BLE/GFSK 125 kbps, High Channel, 2480 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	5.297	30	Pass
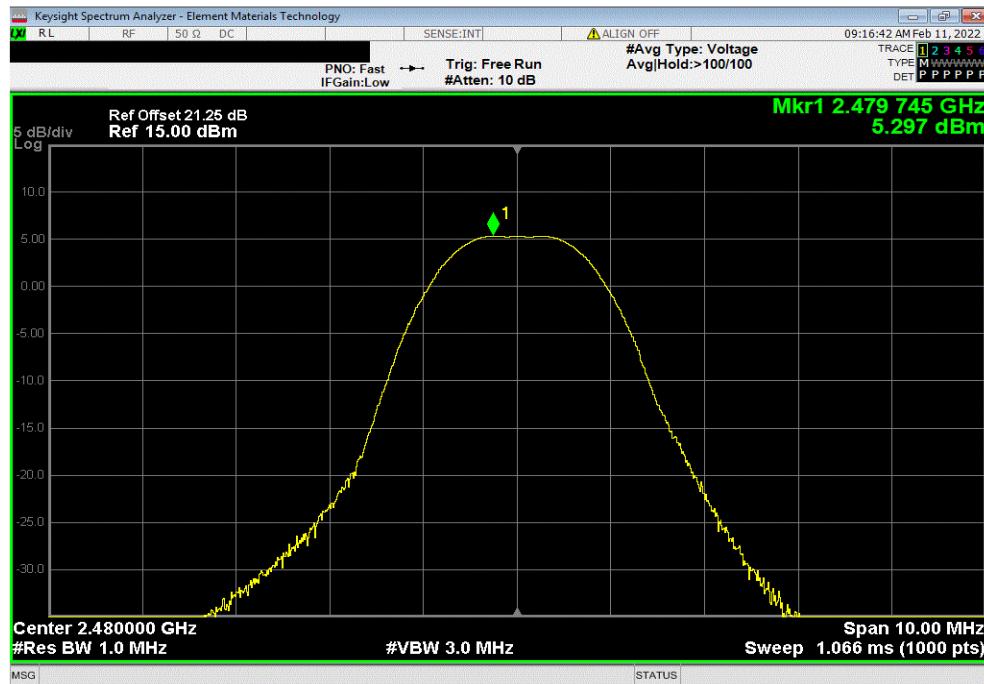
BLE/GFSK 500 kbps, Low Channel, 2402 MHz			
	Out Pwr (dBm)	Limit (dBm)	Result
	5.695	30	Pass
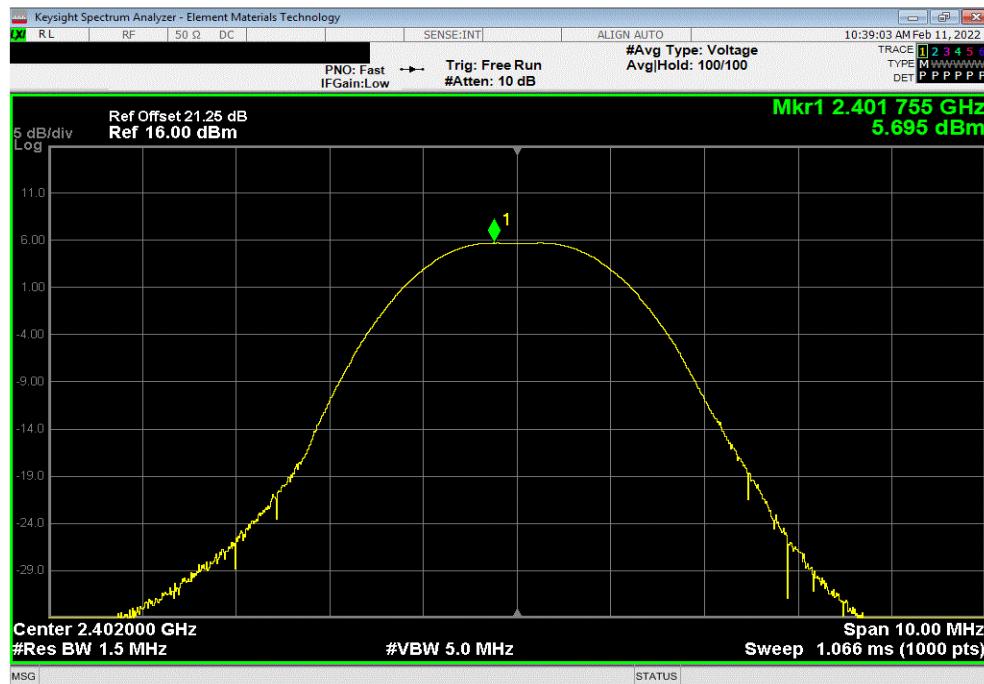
OUTPUT POWER

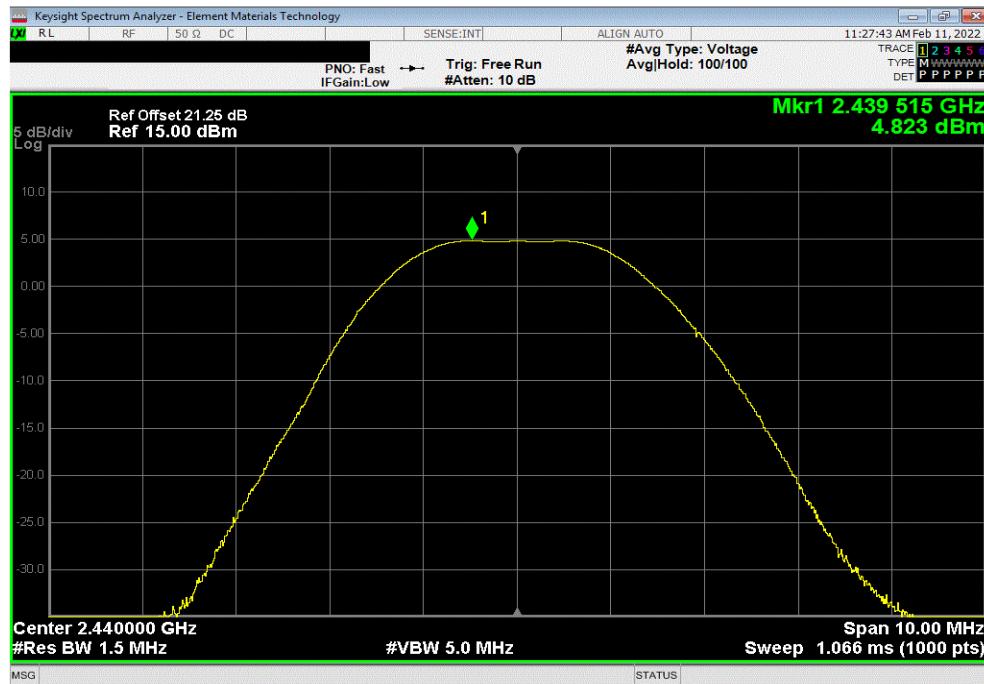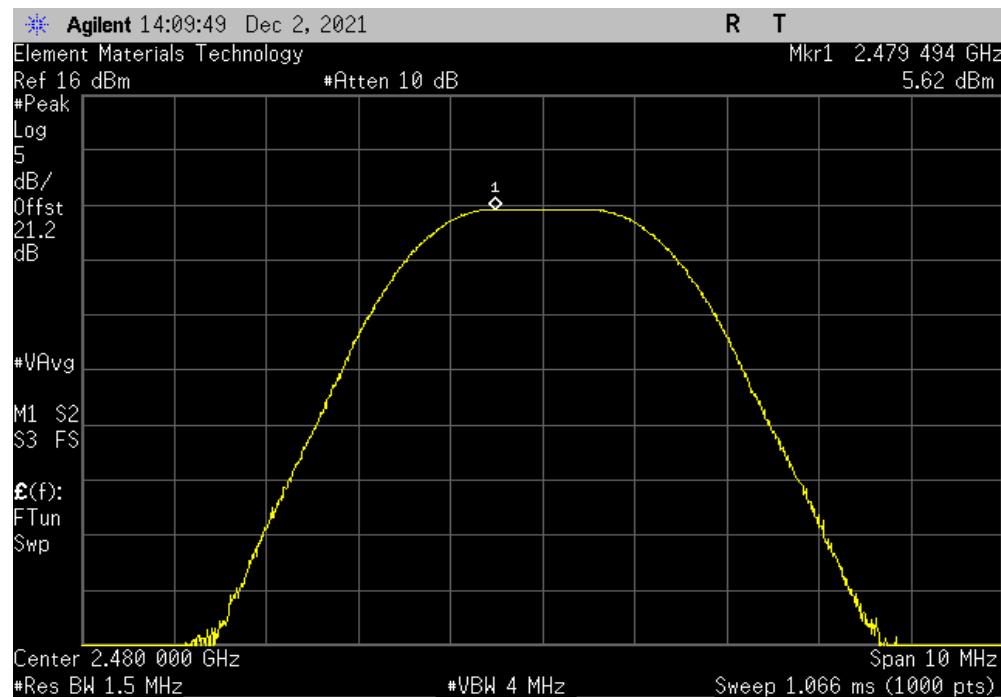| BLE/GFSK 500 kbps, Mid Channel, 2440 MHz							
				Out Pwr (dBm)	Limit (dBm)	Result	
				4.767	30	Pass	
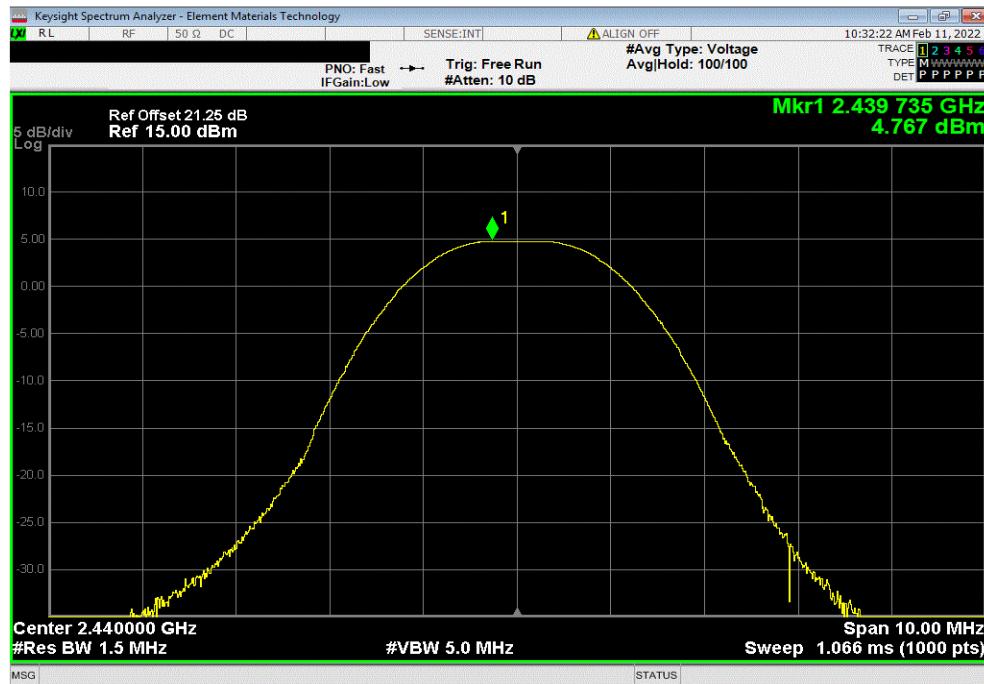
BLE/GFSK 500 kbps, High Channel, 2480 MHz							
				Out Pwr (dBm)	Limit (dBm)	Result	
				5.262	30	Pass	
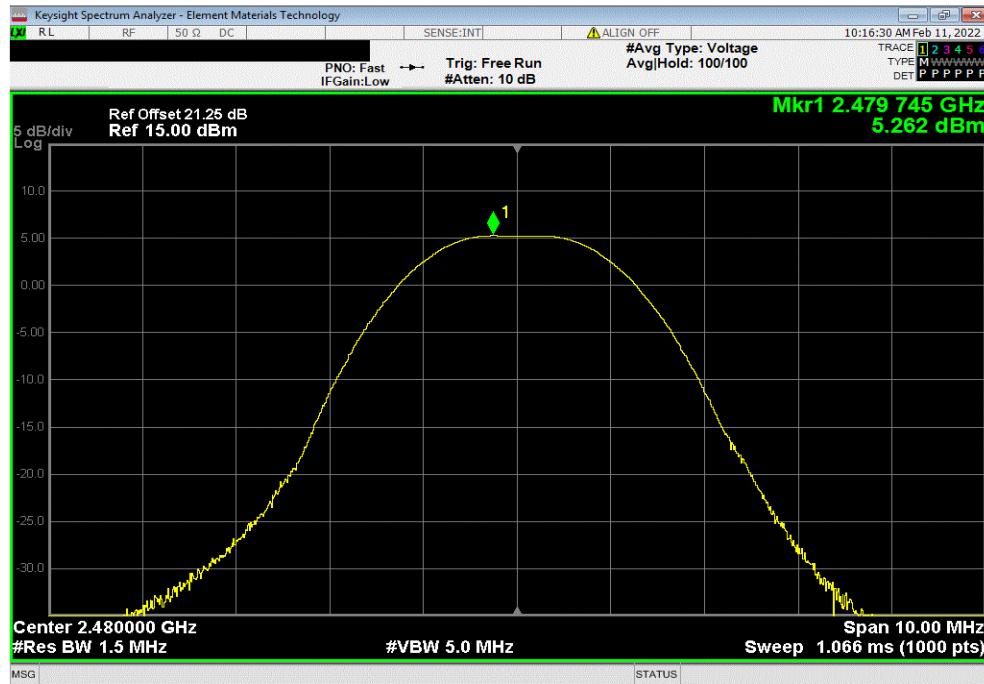
OUTPUT POWER

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz				Out Pwr (dBm)	Limit (dBm)	Result
				5.546	30	Pass
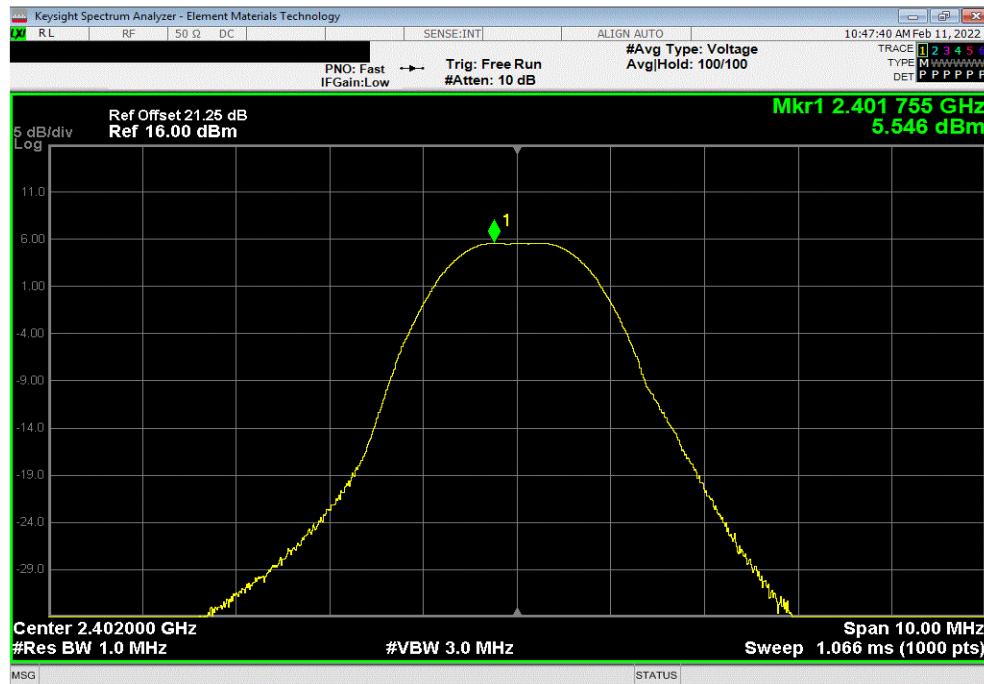
BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz				Out Pwr (dBm)	Limit (dBm)	Result
				4.85	30	Pass
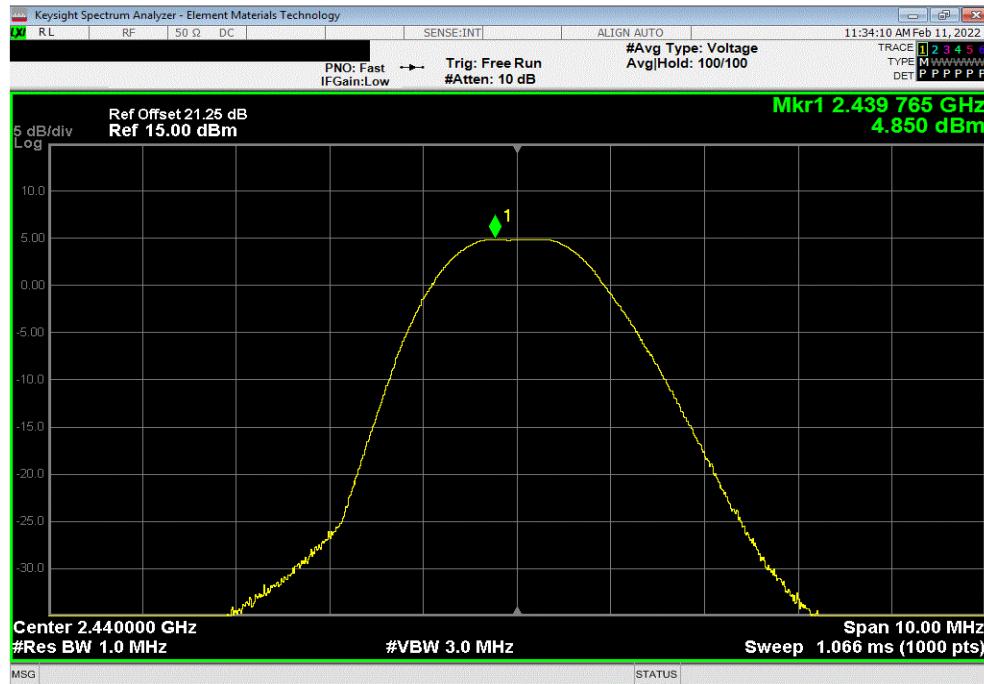
OUTPUT POWER

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				5.61	30	Pass
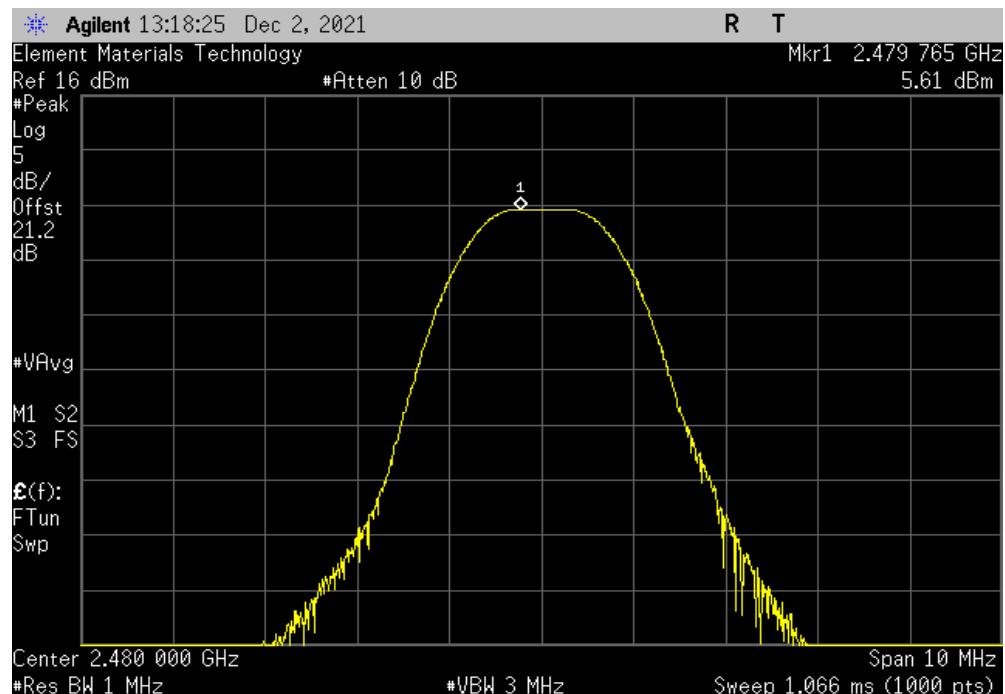
BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				5.93	30	Pass
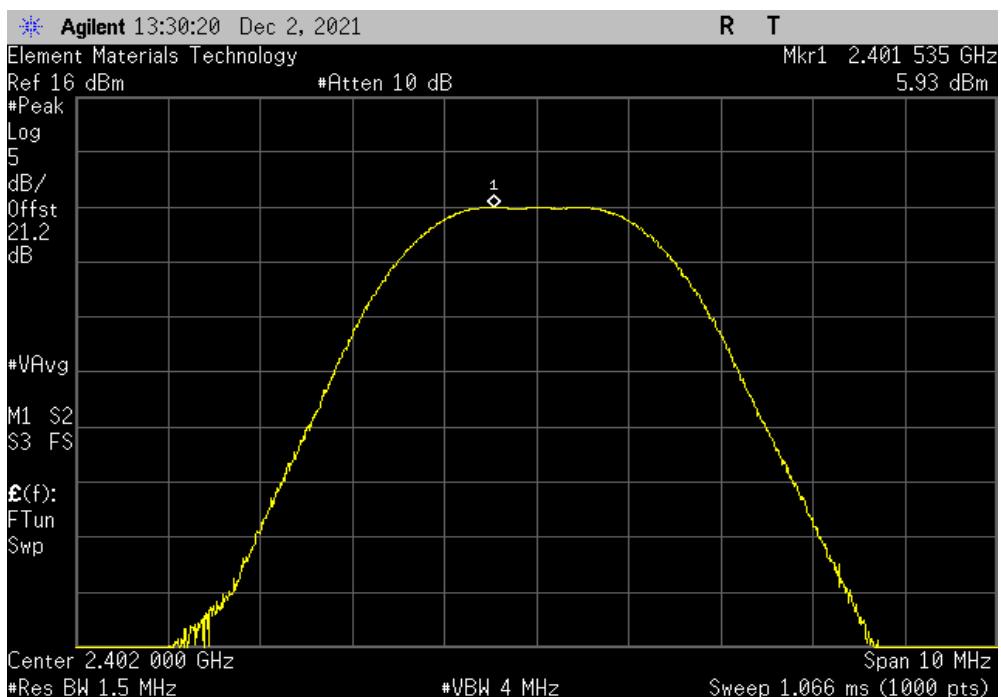
OUTPUT POWER

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz					
			Out Pwr (dBm)	Limit (dBm)	Result
			4.823	30	Pass

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
			Out Pwr (dBm)	Limit (dBm)	Result
			5.62	30	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	Fairview Microwave	SA18E 1913	TZV	2021-09-15	2022-09-15
Block - DC	Fairview Microwave	SD3379	AMM	2021-09-14	2022-09-14
Cable	UtiFlex Micro-Coax	01150A-1-0720-200	TXJ	2021-09-13	2022-09-13
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

|			
EUT: Radio Thermostat		**Work Order:** F3EN0068	
Serial Number: DUT 1		**Date:** 10-Feb-22	
Customer: Quext		**Temperature:** 21.5 °C	
Attendees: None		**Humidity:** 23.8% RH	
Project: None		**Barometric Pres.:** 1021 mbar	
Tested by: Brandon Hobbs	**Power:** 110VAC/60Hz	**Job Site:** TX09	

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

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

Configuration #	**3**		*Signature*					

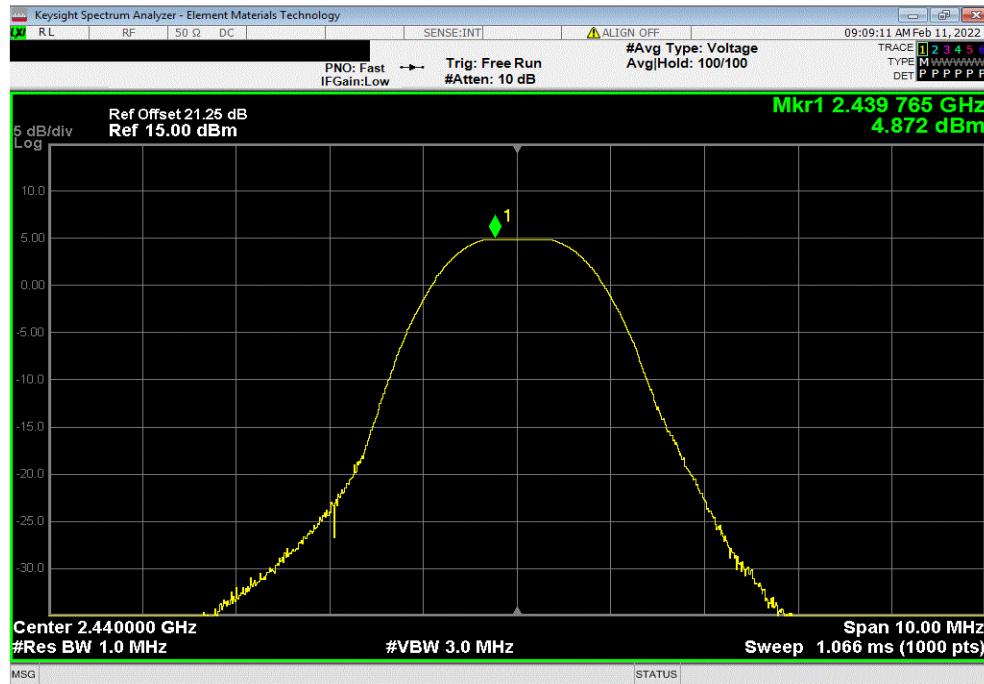|	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 125 kbps					
Low Channel, 2402 MHz	5.550	-0.3	5.25	36	Pass
Mid Channel, 2440 MHz	4.872	-0.3	4.57	36	Pass
High Channel, 2480 MHz	5.297	-0.3	5.00	36	Pass
BLE/GFSK 500 kbps					
Low Channel, 2402 MHz	5.695	-0.3	5.40	36	Pass
Mid Channel, 2440 MHz	4.767	-0.3	4.47	36	Pass
High Channel, 2480 MHz	5.262	-0.3	4.96	36	Pass
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	5.546	-0.3	5.25	36	Pass
Mid Channel, 2440 MHz	4.850	-0.3	4.55	36	Pass
High Channel, 2480 MHz	5.610	-0.3	5.31	36	Pass
BLE/GFSK 2 Mbps					
Low Channel, 2402 MHz	5.930	-0.3	5.63	36	Pass
Mid Channel, 2440 MHz	4.823	-0.3	4.52	36	Pass
High Channel, 2480 MHz	5.620	-0.3	5.32	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 125 kbps, Low Channel, 2402 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.55	-0.3	5.25	36	Pass
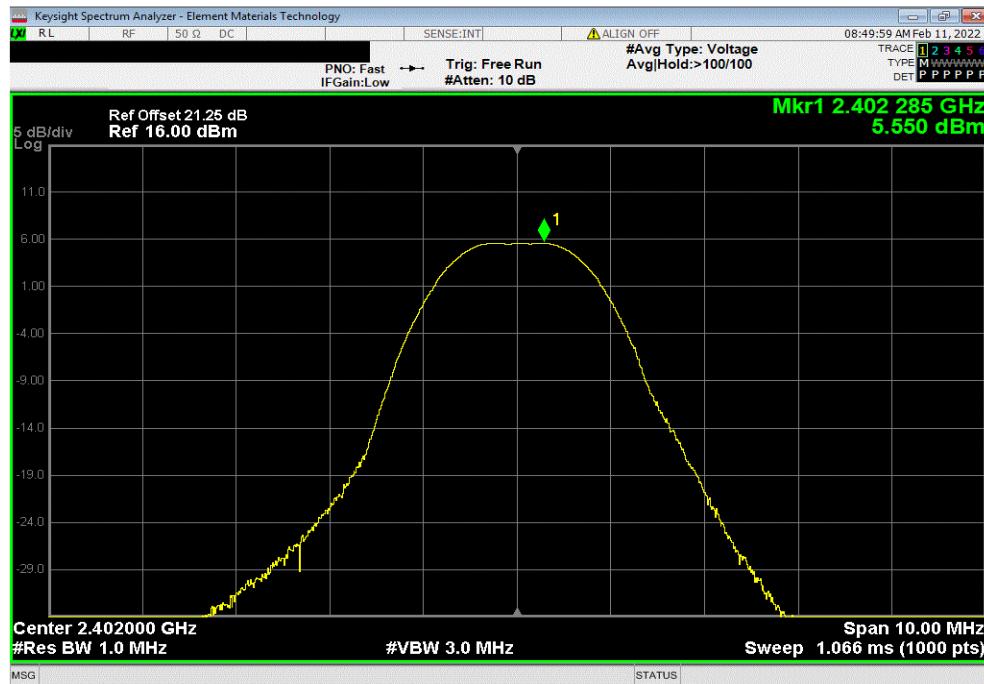
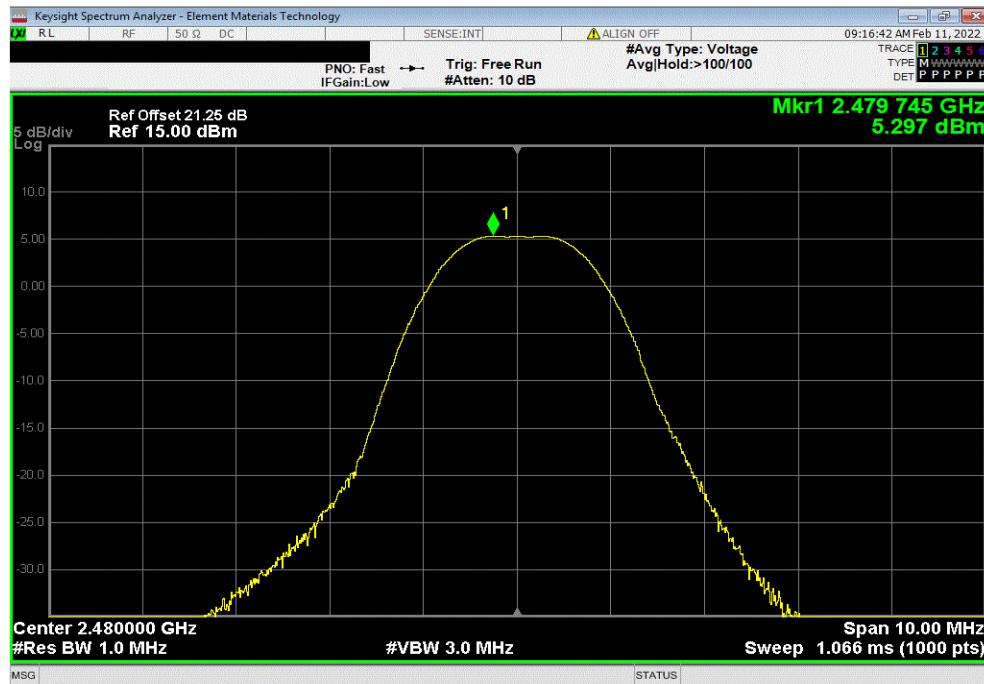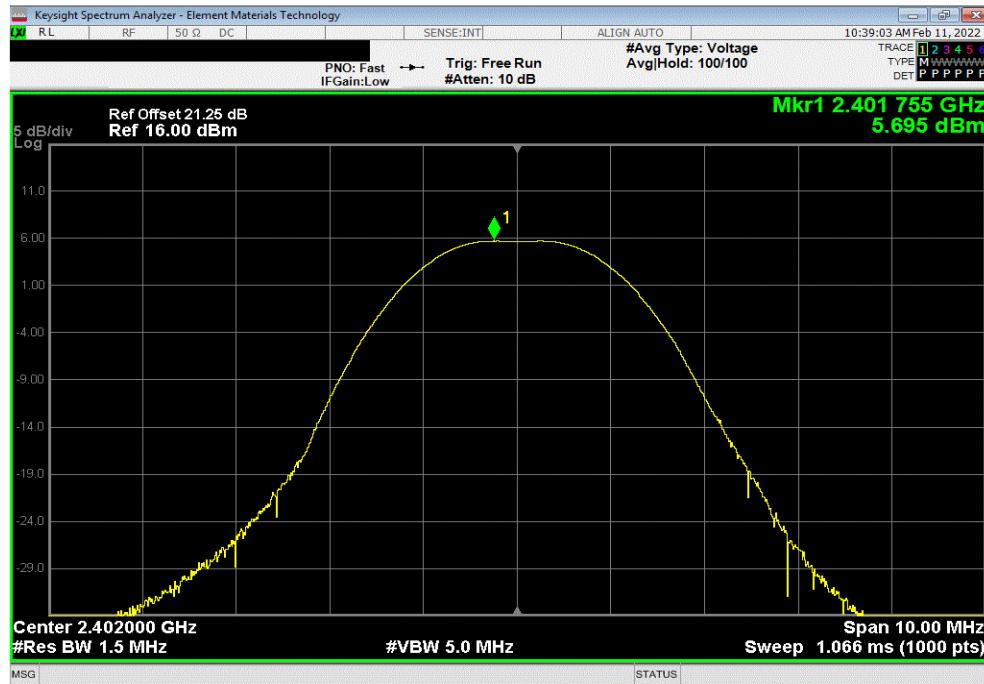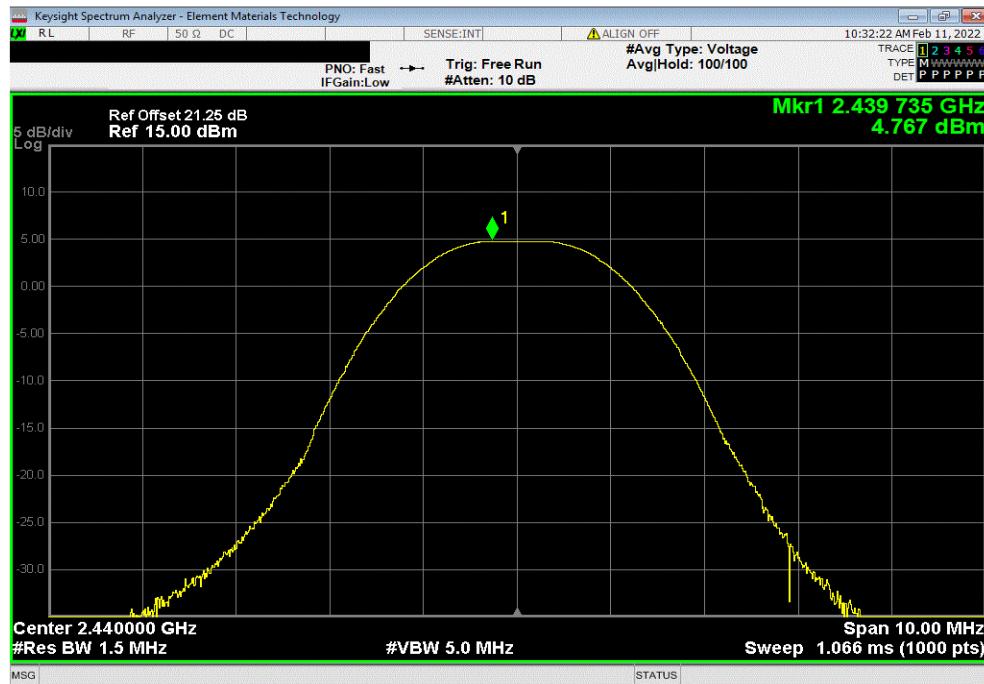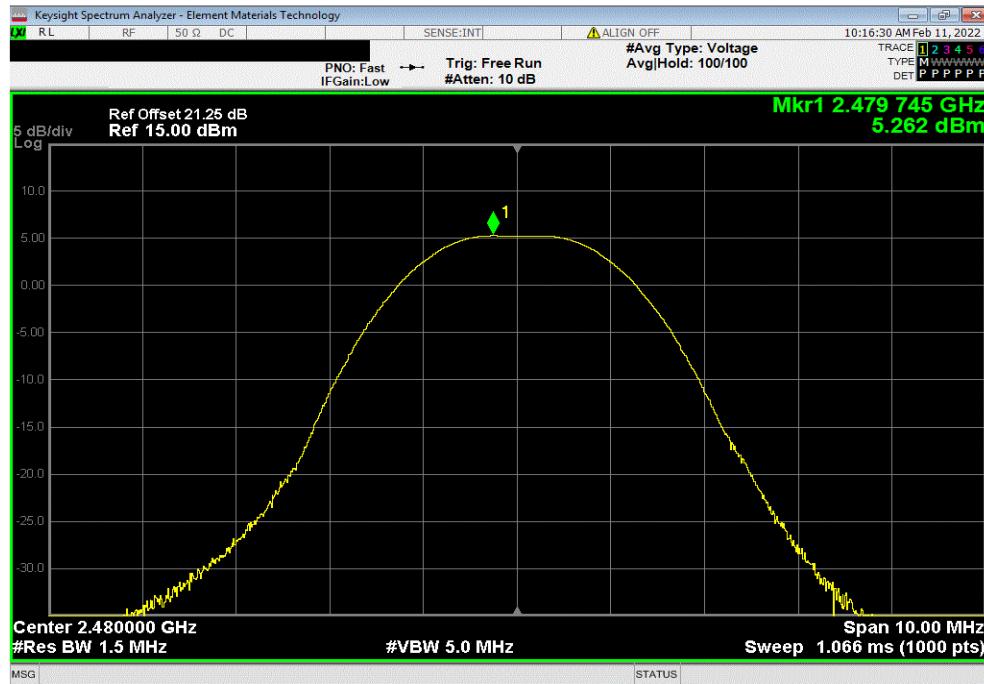| BLE/GFSK 125 kbps, Mid Channel, 2440 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	4.872	-0.3	4.572	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 125 kbps, High Channel, 2480 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.297	-0.3	4.997	36	Pass

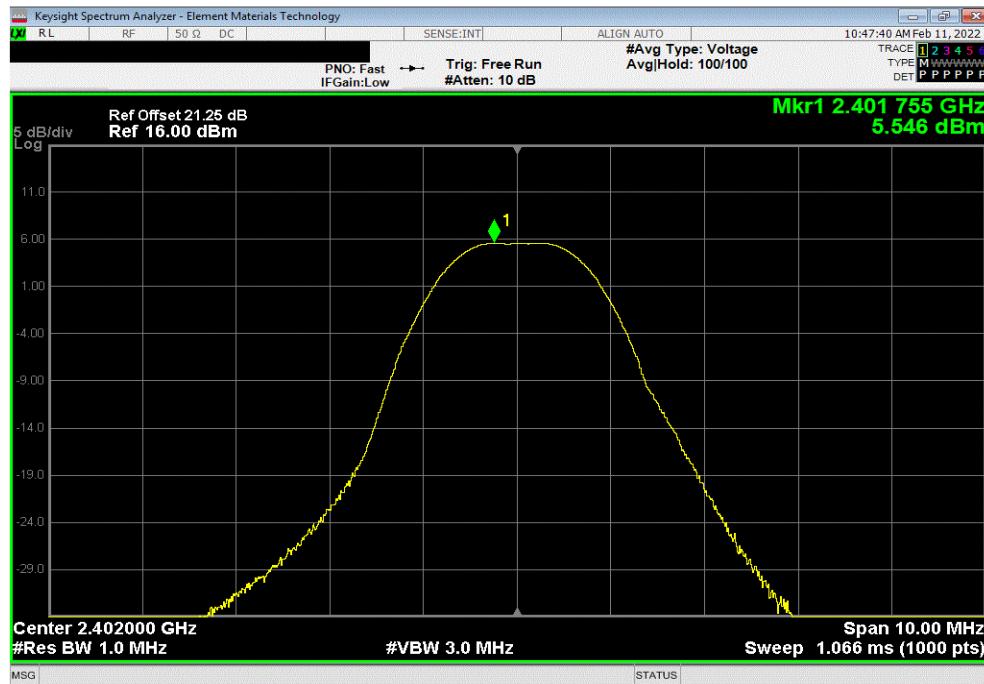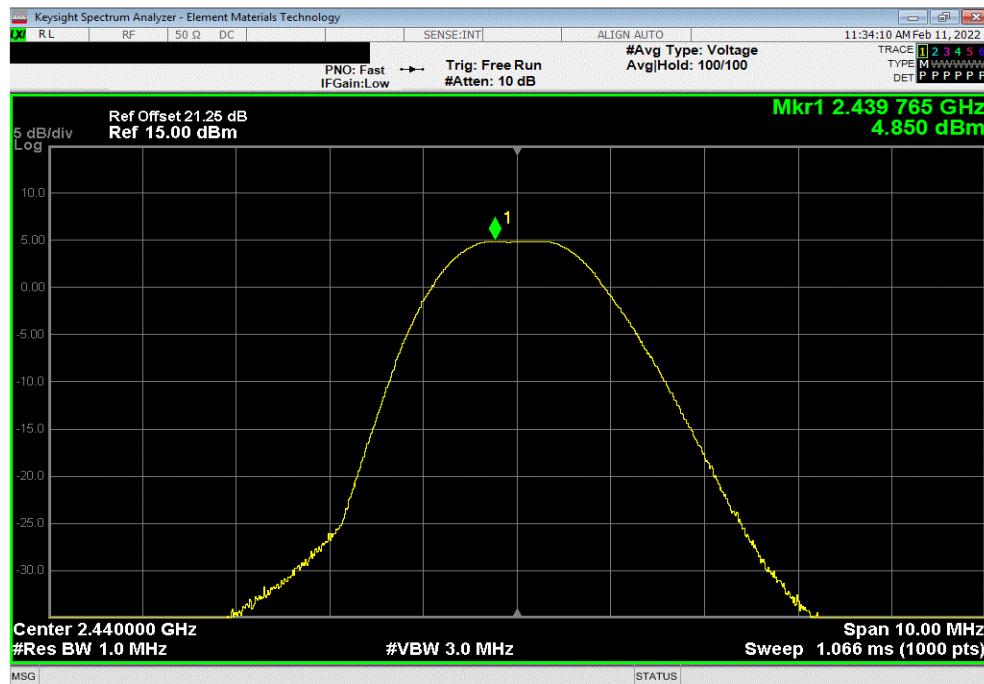| BLE/GFSK 500 kbps, Low Channel, 2402 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.695	-0.3	5.395	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 500 kbps, Mid Channel, 2440 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	4.767	-0.3	4.467	36	Pass

BLE/GFSK 500 kbps, High Channel, 2480 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.262	-0.3	4.962	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

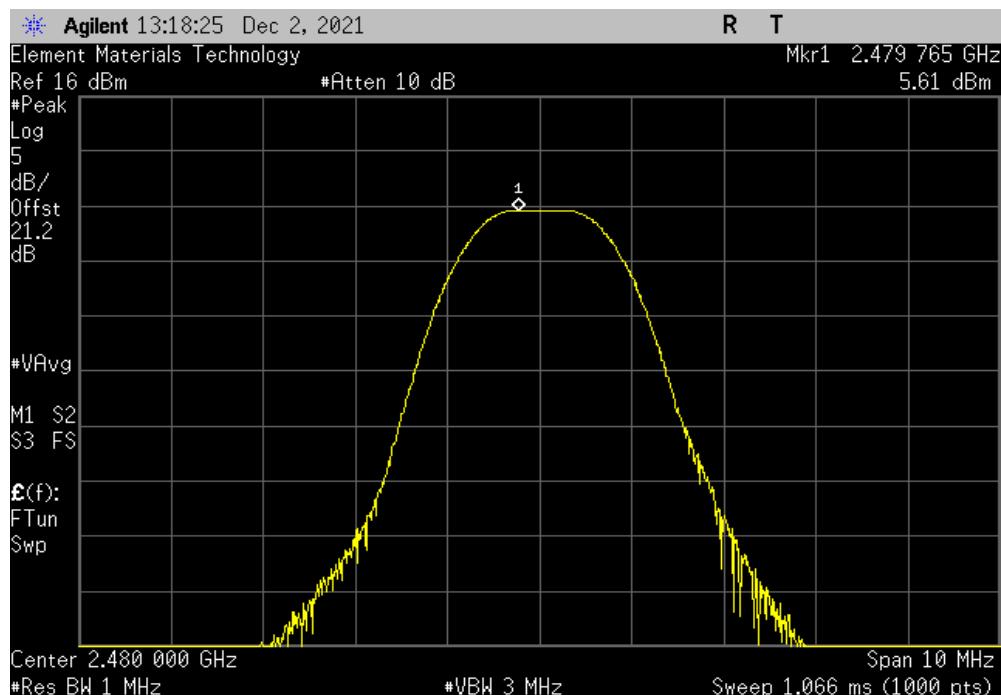| BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		5.546	-0.3	5.246	36	Pass

BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		4.85	-0.3	4.55	36	Pass

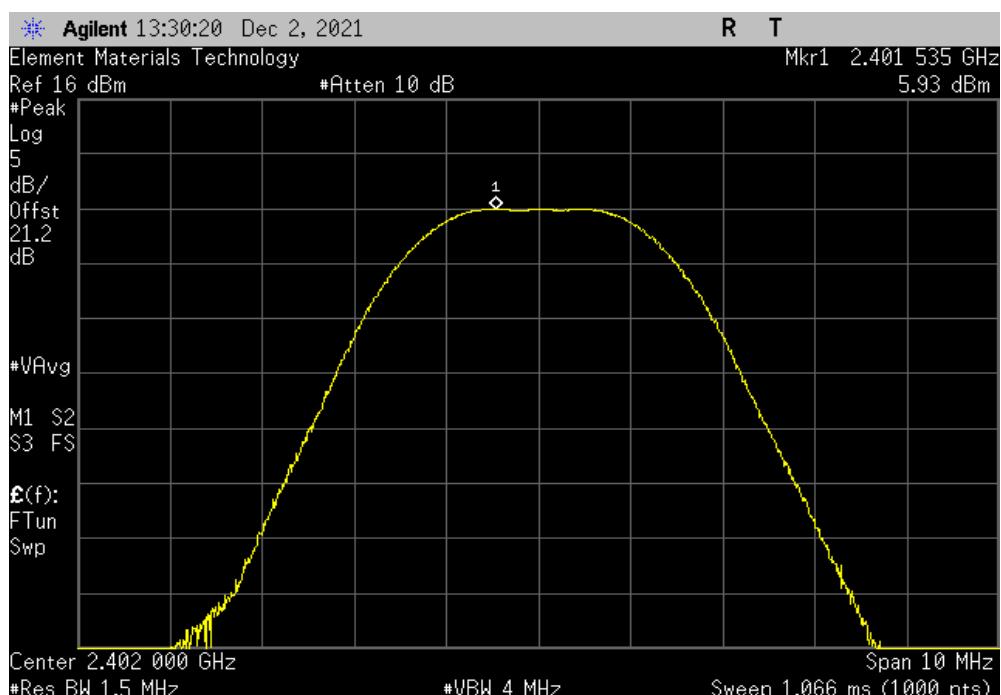# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 1 Mbps, High Channel, 2480 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.61	-0.3	5.31	36	Pass

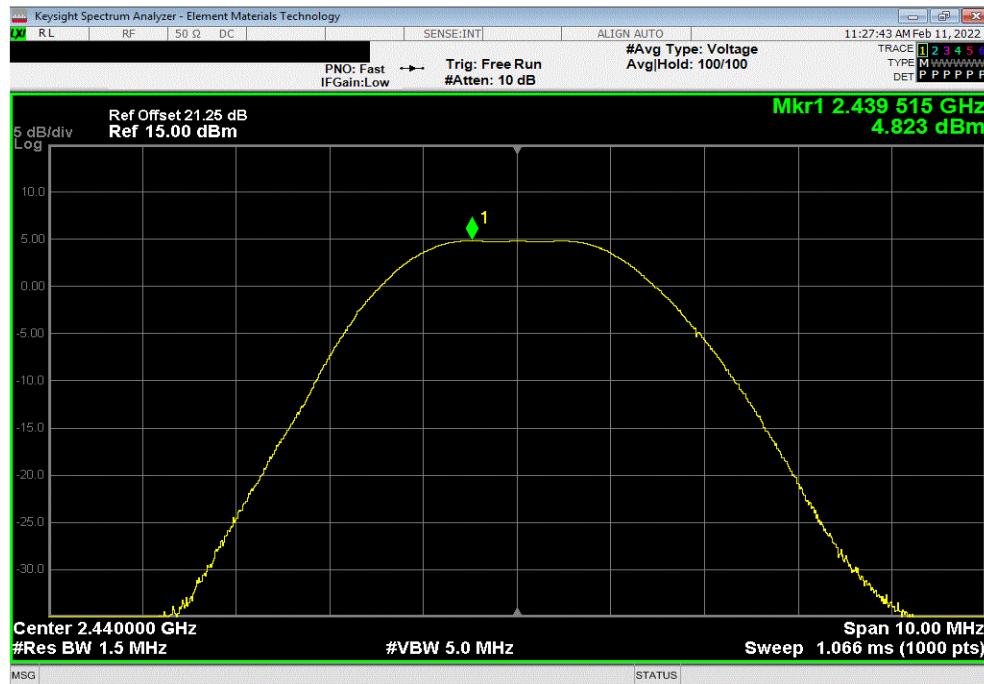| BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.93	-0.3	5.63	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	4.823	-0.3	4.523	36	Pass

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
	5.62	-0.3	5.32	36	Pass