METER Group, Inc USA

H310 Sensor Station - Powered by Solar + li ion battery

FCC 15.247:2020

Bluetooth Low Energy (DTS) Radio

Report # MEGR0001.1

NVLAP LAB CODE: 200630-0

CERTIFICATE OF TEST

Last Date of Test: January 20, 2020
METER Group, Inc USA
EUT: H310 Sensor Station - Powered by Solar + li ion battery

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2020	ANSI C63.10:2013, KDB 558074

Results

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

Deviations From Test Standards

None

Approved By:

Kyle Holgate, 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

element
2018.07.17

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

ACCREDITATIONS AND AUTHORIZATIONS

element
2019.03.08

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) and as a CAB for the acceptance of test data.

European Union

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

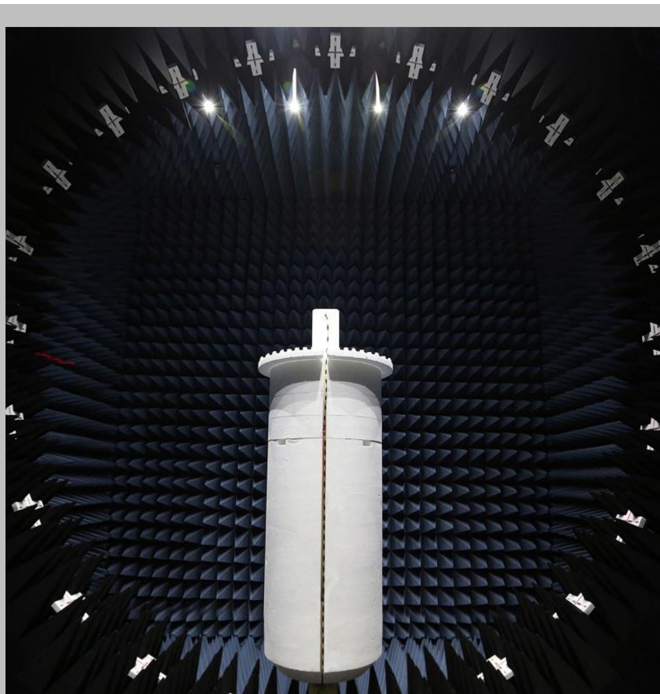
MIC – Recognized by MIC as a CAB for the acceptance of test data.

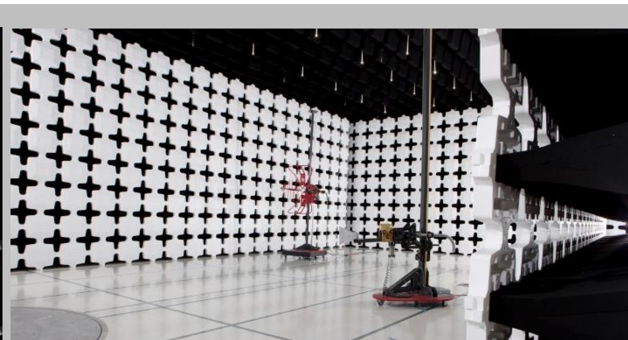
SCOPE

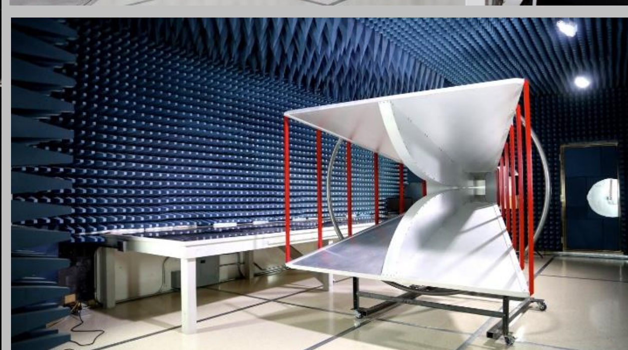
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California 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	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 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	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	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

TMU.2015.07.10

Measurement Uncertainty

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

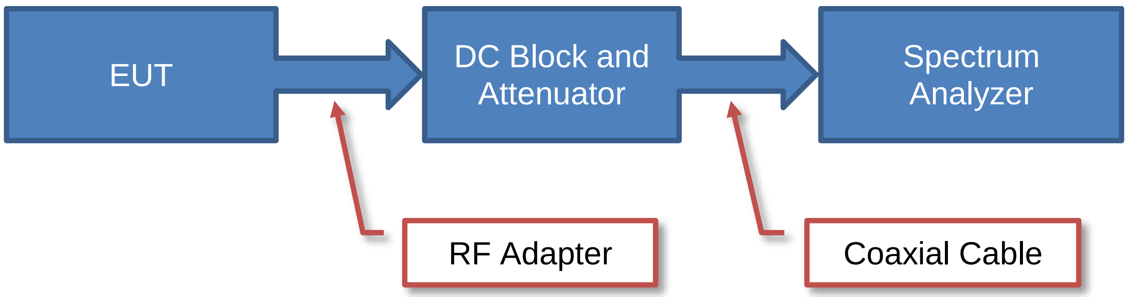
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

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

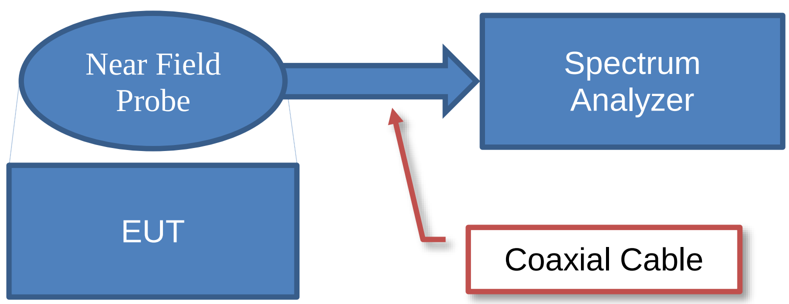
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field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

Test Setup Block Diagrams

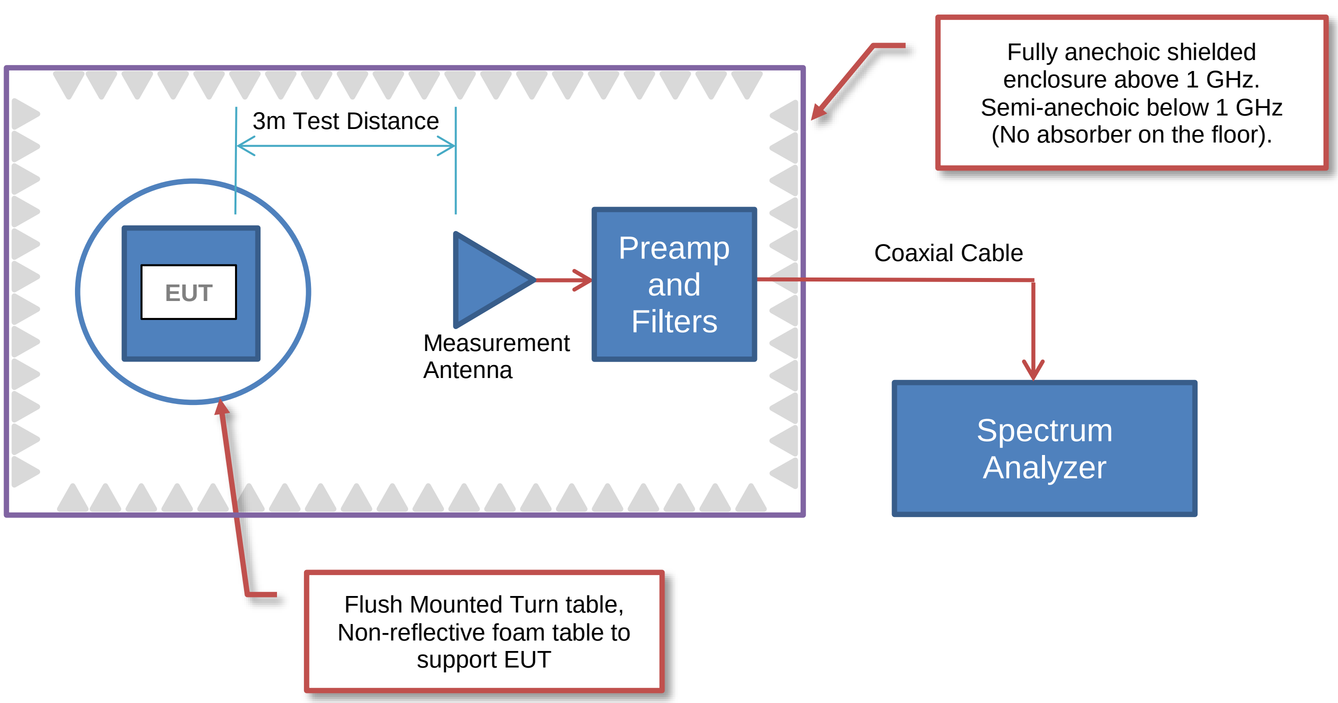
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	METER Group, Inc USA
Address:	2365 NE Hopkins Ct.
City, State, Zip:	Pullman, WA 99163
Test Requested By:	Michael Wadsworth
EUT:	H310 Sensor Station - Powered by Solar + li ion battery
First Date of Test:	January 16, 2020
Last Date of Test:	January 20, 2020
Receipt Date of Samples:	January 16, 2020
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Sensor Station

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

CONFIGURATIONS

2018-07-17

Configuration MEGR0001- 1

Software/Firmware Running during test	
Description	**Version**
CMD	1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sensor Station	METER Group, Inc USA	H310	H3100000360

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	E5430	9Q2FJX1

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Unknown	1.5m	No	Laptop	Senor Station

Configuration MEGR0001- 2

Software/Firmware Running during test	
Description	**Version**
CMD	1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sensor Station	METER Group, Inc USA	H310	H3100000360
Sensor	METER Group, Inc USA	None	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	E5430	9Q2FJX1
AC/DC Adapter	POWER ADAPTER	PT-WC-05	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Unknown	1.5m	No	Laptop	Senor Station

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-01-16	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.
2	2020-01-16	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.
3	2020-01-16	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.
4	2020-01-16	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.
5	2020-01-16	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.
6	2020-01-16	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.
7	2020-01-16	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2020-01-20	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2019.05.10

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

Continuous Tx BLE, GFSK, Power Level 7 (Full Power)

CHANNELS OF OPERATION

Low Ch. 38, 2402 MHz

Mid Ch. 19, 2442 MHz

High Ch. 40, 2480 MHz

POWER SETTINGS INVESTIGATED

Battery

5VDC via 110VAC/60Hz

CONFIGURATIONS INVESTIGATED

MEGR0001 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	24-Mar-2019	12 mo
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	EVY	31-Jul-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	31-Jul-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	19-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	19-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	3-Jul-2019	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	19-Nov-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	18-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	18-Nov-2019	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	7-Feb-2018	24 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	18-Nov-2019	12 mo
Attenuator	Coaxicom	3910-20	AXZ	15-Feb-2019	12 mo
Cable	N/A	Bilog Cables	EVA	18-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	18-Nov-2019	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	2-Oct-2018	24 mo

TEST DESCRIPTION

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

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

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

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

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

SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.15.1 PSA-ESCI 2019.05.10

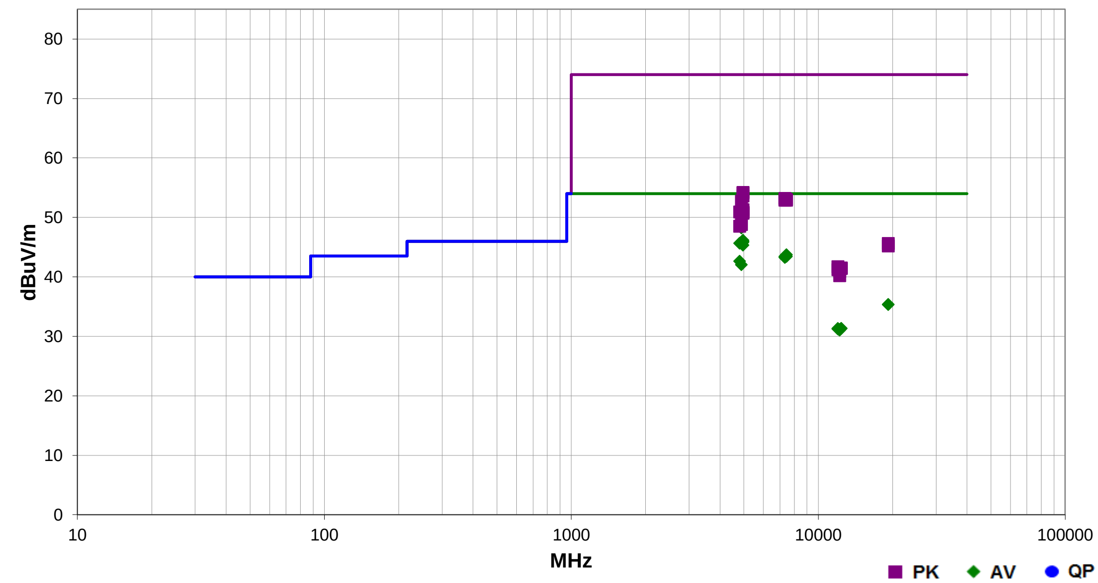
Work Order:	MEGR0001	**Date:**	20-Jan-2020
Project:	None	**Temperature:**	21.7 °C
Job Site:	EV01	**Humidity:**	38.7% RH
Serial Number:	H3100000360	**Barometric Pres.:**	1018 mbar

Tested by: Brandon Hobbs

EUT:	H310 Sensor Station - Powered by Solar + li ion battery
Configuration:	2
Customer:	METER Group, Inc USA
Attendees:	None
EUT Power:	5VDC via 110VAC/60Hz
Operating Mode:	Continuous Tx BLE, GFSK, Power Level 7 (Full Power),Please reference the data comments for EUT orientation, channel and any alternate power sources.
Deviations:	None
Comments:	Duty cycle correction factor (DCCF) of 0.73 dB added to RMS average points based on the formula 10 * log(1/0.846), where 0.846 is the duty cycle during test. With sensor in Sensor Station.

Test Specifications	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4960.083	43.4	6.5	1.0	126.0	0.7	0.0	Horz	AV	0.0	50.6	54.0	-3.4	EUT Horz, High Ch 2480 MHz, 5VDC
4959.933	43.0	6.5	2.6	12.0	0.7	0.0	Vert	AV	0.0	50.2	54.0	-3.8	EUT On Side, High Ch 2480 MHz, 5VDC
4959.992	43.0	6.5	1.0	216.0	0.7	0.0	Horz	AV	0.0	50.2	54.0	-3.8	EUT Horz, High Ch 2480 MHz, Battery
4884.142	41.1	6.4	1.2	221.0	0.7	0.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT Horz, Mid Ch 2442 MHz, 5VDC
4959.983	38.9	6.5	1.1	353.0	0.7	0.0	Vert	AV	0.0	46.1	54.0	-7.9	EUT Horz, High Ch 2480 MHz, 5VDC
4959.950	38.7	6.5	1.5	4.0	0.7	0.0	Horz	AV	0.0	45.9	54.0	-8.1	EUT On Side, High Ch 2480 MHz, 5VDC
4960.075	38.7	6.5	2.1	262.0	0.7	0.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT On Side, High Ch 2480 MHz, Battery
4960.050	38.6	6.5	3.0	115.0	0.7	0.0	Horz	AV	0.0	45.8	54.0	-8.2	EUT Vert, High Ch 2480 MHz, 5VDC
4803.925	39.5	5.4	2.0	25.0	0.7	0.0	Horz	AV	0.0	45.6	54.0	-8.4	EUT Horz, Low Ch 2402 MHz, 5VDC
4960.025	38.1	6.5	1.2	303.0	0.7	0.0	Vert	AV	0.0	45.3	54.0	-8.7	EUT Vert, High Ch 2480 MHz, 5VDC
7440.242	28.4	14.6	3.7	97.0	0.7	0.0	Vert	AV	0.0	43.7	54.0	-10.3	EUT On Side, High Ch 2480 MHz, 5VDC
7441.550	28.1	14.6	1.5	229.0	0.7	0.0	Horz	AV	0.0	43.4	54.0	-10.6	EUT Horz, High Ch 2480 MHz, 5VDC
7325.767	28.5	14.2	1.5	188.0	0.7	0.0	Horz	AV	0.0	43.4	54.0	-10.6	EUT Horz, Mid Ch 2442 MHz, 5VDC
7324.942	28.4	14.1	1.5	67.0	0.7	0.0	Vert	AV	0.0	43.2	54.0	-10.8	EUT On Side, Mid Ch 2442 MHz, 5VDC
4803.933	36.5	5.4	3.5	283.0	0.7	0.0	Vert	AV	0.0	42.6	54.0	-11.4	EUT On Side, Low Ch 2402 MHz, 5VDC
4883.858	34.9	6.4	1.5	212.0	0.7	0.0	Vert	AV	0.0	42.0	54.0	-12.0	EUT On Side, Mid Ch 2442 MHz, 5VDC
19216.910	32.5	2.1	1.2	360.0	0.7	0.0	Horz	AV	0.0	35.3	54.0	-18.7	EUT Horz, Low 2402 MHz, 5VDC
19215.280	32.5	2.1	1.2	304.0	0.7	0.0	Vert	AV	0.0	35.3	54.0	-18.7	EUT On Side, Low 2402 MHz, 5VDC
4960.267	47.7	6.5	1.0	126.0	0.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	EUT Horz, High Ch 2480 MHz, 5VDC
4959.475	47.6	6.5	2.6	12.0	0.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	EUT On Side, High Ch 2480 MHz, 5VDC
4959.567	47.1	6.5	1.0	216.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	EUT Horz, High Ch 2480 MHz, Battery
7325.525	39.0	14.2	1.5	188.0	0.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	EUT Horz, Mid Ch 2442 MHz, 5VDC
7440.533	38.4	14.6	3.7	97.0	0.0	0.0	Vert	PK	0.0	53.0	74.0	-21.0	EUT On Side, High Ch 2480 MHz, 5VDC
7440.583	38.3	14.6	1.5	229.0	0.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	EUT Horz, High Ch 2480 MHz, 5VDC
7325.742	38.7	14.2	1.5	67.0	0.0	0.0	Vert	PK	0.0	52.9	74.0	-21.1	EUT On Side, Mid Ch 2442 MHz, 5VDC
4883.667	46.3	6.4	1.2	221.0	0.0	0.0	Horz	PK	0.0	52.7	74.0	-21.3	EUT Horz, Mid Ch 2442 MHz, 5VDC
12008.420	29.6	1.0	1.5	132.0	0.7	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT On Side, Low Ch 2402 MHz, 5VDC

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12397.500	29.5	1.1	1.3	241.0	0.7	0.0	Horz	AV	0.0	31.3	54.0	-22.7	EUT Horz, High Ch 2480 MHz, 5VDC
12397.590	29.5	1.1	1.5	5.0	0.7	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT On Side, High Ch 2480 MHz, 5VDC
4959.575	44.8	6.5	1.1	353.0	0.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	EUT Horz, High Ch 2480 MHz, 5VDC
12008.780	29.5	1.0	1.4	280.0	0.7	0.0	Horz	AV	0.0	31.2	54.0	-22.8	EUT Horz, Low Ch 2402 MHz, 5VDC
12207.880	29.6	0.8	1.5	229.0	0.7	0.0	Horz	AV	0.0	31.1	54.0	-22.9	EUT Horz, Mid Ch 2442 MHz, 5VDC
12208.230	29.5	0.8	1.9	292.0	0.7	0.0	Vert	AV	0.0	31.0	54.0	-23.0	EUT On Side, Mid Ch 2442 MHz, 5VDC
4959.792	44.4	6.5	3.0	115.0	0.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Vert, High Ch 2480 MHz, 5VDC
4959.767	44.4	6.5	2.1	262.0	0.0	0.0	Vert	PK	0.0	50.9	74.0	-23.1	EUT On Side, High Ch 2480 MHz, Battery
4804.192	45.4	5.5	2.0	25.0	0.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz, Low Ch 2402 MHz, 5VDC
4960.217	44.3	6.5	1.5	4.0	0.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT On Side, High Ch 2480 MHz, 5VDC
4959.942	44.2	6.5	1.2	303.0	0.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	EUT Vert, High Ch 2480 MHz, 5VDC
4884.175	42.4	6.4	1.5	212.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT On Side, Mid Ch 2442 MHz, 5VDC
4804.183	43.0	5.5	3.5	283.0	0.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT On Side, Low Ch 2402 MHz, 5VDC
19217.600	43.5	2.1	1.2	360.0	0.0	0.0	Horz	PK	0.0	45.6	74.0	-28.4	EUT Horz, Low 2402 MHz, 5VDC
19215.130	43.1	2.1	1.2	304.0	0.0	0.0	Vert	PK	0.0	45.2	74.0	-28.8	EUT On Side, Low 2402 MHz, 5VDC
12008.050	40.7	1.0	1.5	132.0	0.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	EUT On Side, Low Ch 2402 MHz, 5VDC
12397.600	40.4	1.1	1.5	5.0	0.0	0.0	Vert	PK	0.0	41.5	74.0	-32.5	EUT On Side, High Ch 2480 MHz, 5VDC
12398.150	40.3	1.1	1.3	241.0	0.0	0.0	Horz	PK	0.0	41.4	74.0	-32.6	EUT Horz, High Ch 2480 MHz, 5VDC
12011.600	40.2	1.0	1.4	280.0	0.0	0.0	Horz	PK	0.0	41.2	74.0	-32.8	EUT Horz, Low Ch 2402 MHz, 5VDC
12208.630	40.1	0.8	1.5	229.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	EUT Horz, Mid Ch 2442 MHz, 5VDC
12212.100	39.4	0.8	1.9	292.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	EUT On Side, Mid Ch 2442 MHz, 5VDC

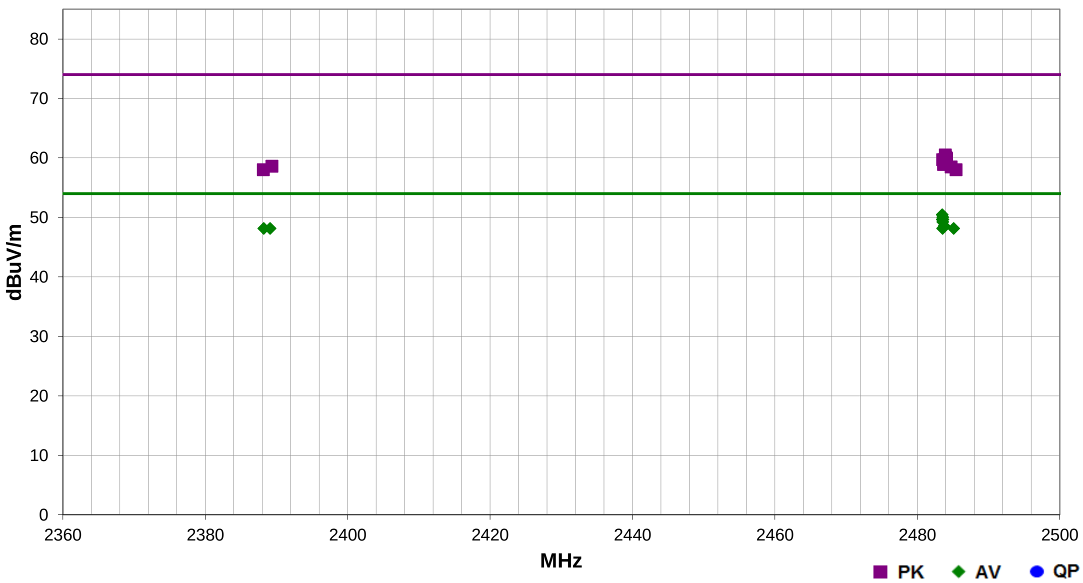
SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.15.1 PSA-ESCI 2019.05.10

Work Order:	MEGR0001	**Date:**	20-Jan-2020	
Project:	None	**Temperature:**	21.7 °C	
Job Site:	EV01	**Humidity:**	38.7% RH	
Serial Number:	H3100000360	**Barometric Pres.:**	1018 mbar	**Tested by:** Brandon Hobbs
EUT:	H310 Sensor Station - Powered by Solar + li ion battery			
Configuration:	2			
Customer:	METER Group, Inc USA			
Attendees:	None			
EUT Power:	5VDC via 110VAC/60Hz			
Operating Mode:	Continuous Tx BLE, GFSK, Power Level 7 (Full Power),Please reference the data comments for EUT orientation, channel and any alternate power sources.			
Deviations:	None			
Comments:	Duty cycle correction factor (DCCF) of 0.73 dB added to RMS average points based on the formula 10 * log(1/0.846), where 0.846 is the duty cycle during test. With sensor in sensor station.			

Test Specifications	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

Run #	14	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.513	33.5	-3.8	2.9	238.0	0.7	20.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT Horz, High Ch 2480 MHz, 5VDC
2483.597	33.1	-3.8	1.0	172.0	0.7	20.0	Horz	AV	0.0	50.0	54.0	-4.0	EUT On Side, High Ch 2480 MHz, Battery
2483.610	32.7	-3.8	1.2	37.0	0.7	20.0	Horz	AV	0.0	49.6	54.0	-4.4	EUT On Side, High Ch 2480 MHz, 5VDC
2483.520	32.7	-3.8	1.5	58.0	0.7	20.0	Horz	AV	0.0	49.6	54.0	-4.4	EUT Vert, High Ch 2480 MHz, 5VDC
2483.580	32.3	-3.8	1.5	85.0	0.7	20.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT Horz, High Ch 2480 MHz, Battery
2483.787	31.6	-3.8	1.5	309.0	0.7	20.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT Horz, High Ch 2480 MHz, 5VDC
2483.553	31.2	-3.8	1.5	326.0	0.7	20.0	Vert	AV	0.0	48.1	54.0	-5.9	EUT On Side, High Ch 2480 MHz, 5VDC
2485.123	31.1	-3.7	1.5	239.0	0.7	20.0	Vert	AV	0.0	48.1	54.0	-5.9	EUT Vert, High Ch 2480 MHz, 5VDC
2388.207	31.4	-4.0	1.6	219.0	0.7	20.0	Horz	AV	0.0	48.1	54.0	-5.9	EUT On Side, Low Ch 2402 MHz, 5VDC
2389.093	31.4	-4.0	1.9	228.0	0.7	20.0	Vert	AV	0.0	48.1	54.0	-5.9	EUT Horz, Low Ch 2402 MHz, 5VDC
2483.933	44.3	-3.8	1.5	58.0	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT Vert, High Ch 2480 MHz, 5VDC
2483.997	43.9	-3.8	2.9	238.0	0.0	20.0	Vert	PK	0.0	60.1	74.0	-13.9	EUT Horz, High Ch 2480 MHz, 5VDC
2484.093	43.7	-3.8	1.2	37.0	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT On Side, High Ch 2480 MHz, 5VDC
2483.783	43.5	-3.8	1.5	85.0	0.0	20.0	Vert	PK	0.0	59.7	74.0	-14.3	EUT Horz, High Ch 2480 MHz, Battery
2483.567	43.5	-3.8	1.0	172.0	0.0	20.0	Horz	PK	0.0	59.7	74.0	-14.3	EUT On Side, High Ch 2480 MHz, Battery
2483.687	42.7	-3.8	1.5	309.0	0.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT Horz, High Ch 2480 MHz, 5VDC
2389.347	42.6	-4.0	1.6	219.0	0.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT On Side, Low Ch 2402 MHz, 5VDC
2484.743	42.2	-3.7	1.5	326.0	0.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT On Side, High Ch 2480 MHz, 5VDC
2485.440	41.7	-3.7	1.5	239.0	0.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT Vert, High Ch 2480 MHz, 5VDC
2388.137	42.0	-4.0	1.9	228.0	0.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT Horz, Low Ch 2402 MHz, 5VDC

DUTY CYCLE

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	**H310 Sensor Station - Powered by Solar + li ion battery**	**Work Order:**	**MEGR0001**
Serial Number:	**H3100000360**	**Date:**	**16-Jan-20**
Customer:	**METER Group, Inc USA**	**Temperature:**	**19.4 °C**
Attendees:	**Daniel Winder, Ramakrishna Eepuri**	**Humidity:**	**38.1% RH**
Project:	**None**	**Barometric Pres.:**	**1009 mbar**
Tested by:	**Brandon Hobbs** **Power:** **Battery**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

DEVIATIONS FROM TEST STANDARD

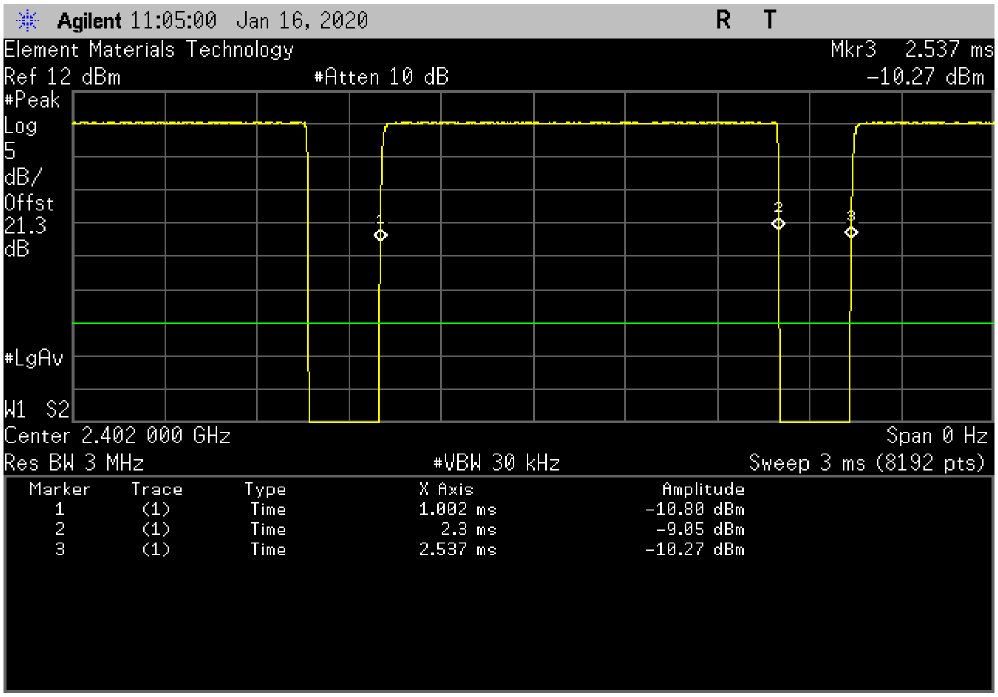
None

Configuration #	**1**	*Signature*

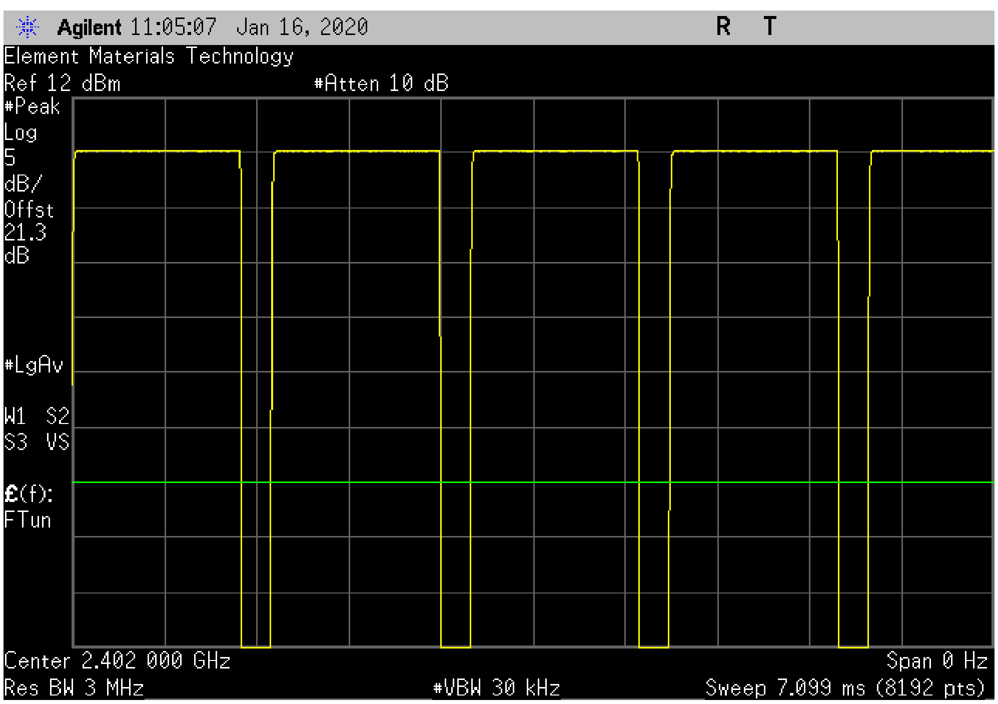
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE/GFSK Low Channel, 2402 MHz	1.298 ms	1.534 ms	1	84.6	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	1.25 ms	1.485 ms	1	84.2	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	1.298 ms	1.534 ms	1	84.6	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

BLE/GFSK Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.298 ms	1.534 ms	1	84.6	N/A	N/A

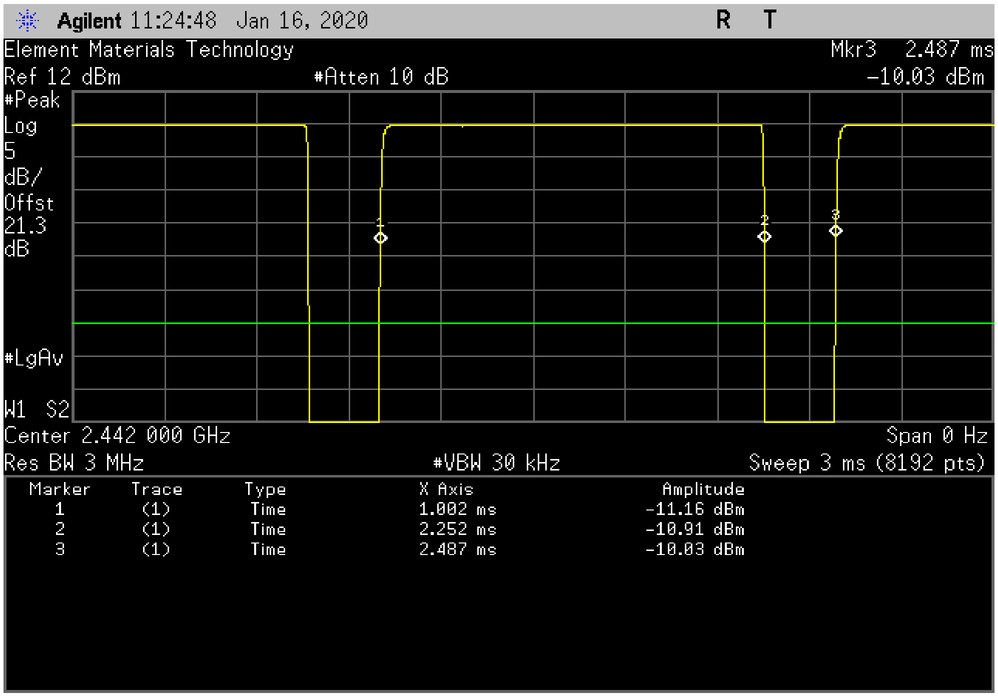


BLE/GFSK Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

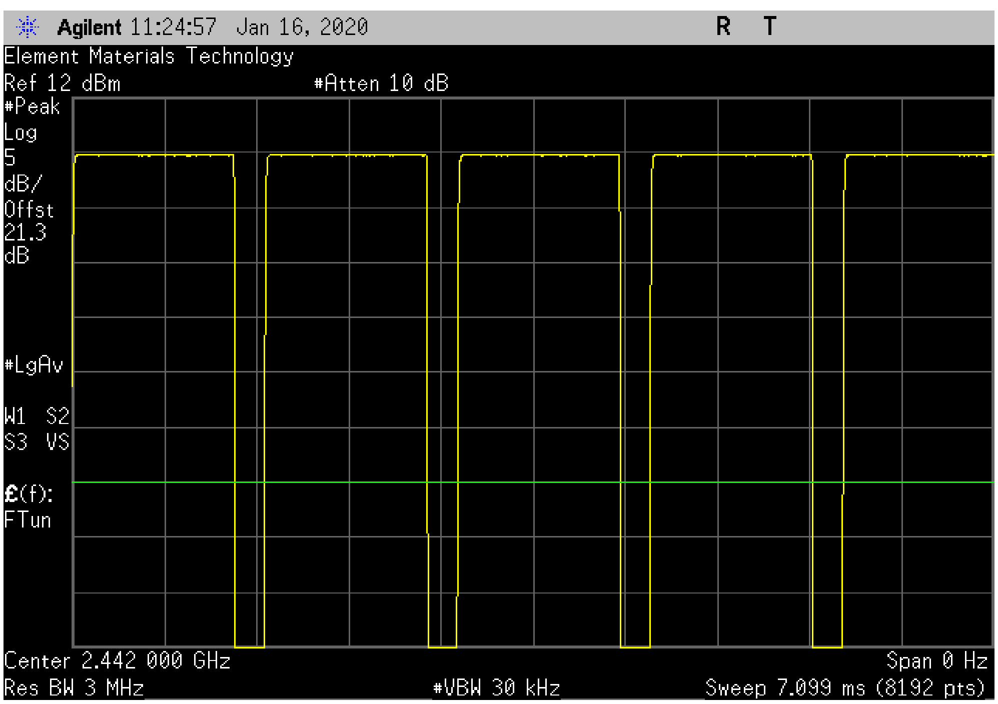


DUTY CYCLE

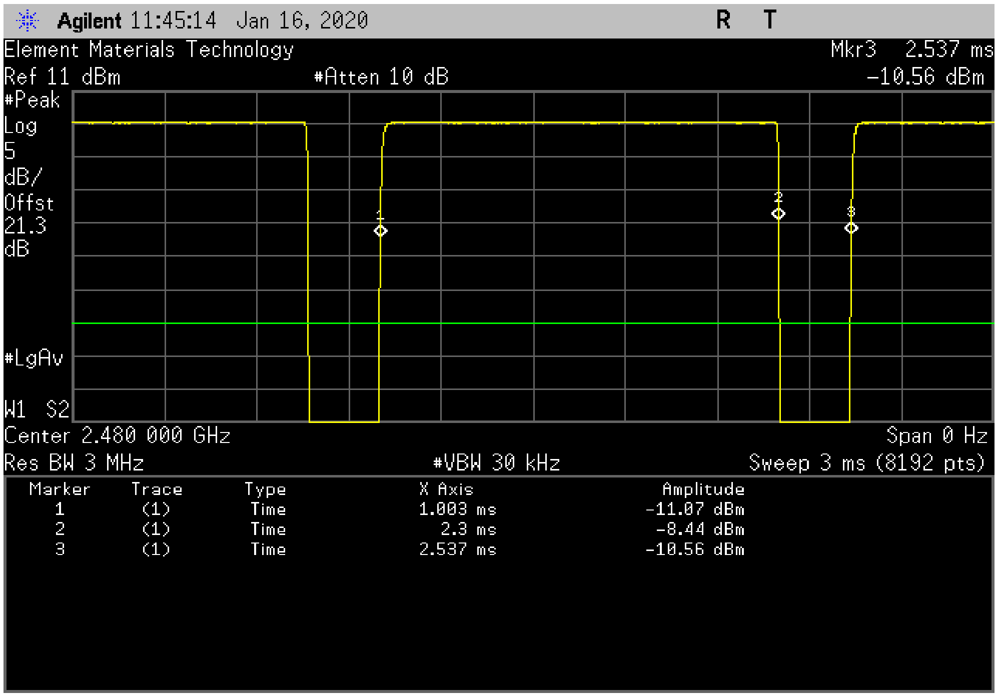
BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.25 ms	1.485 ms	1	84.2	N/A	N/A



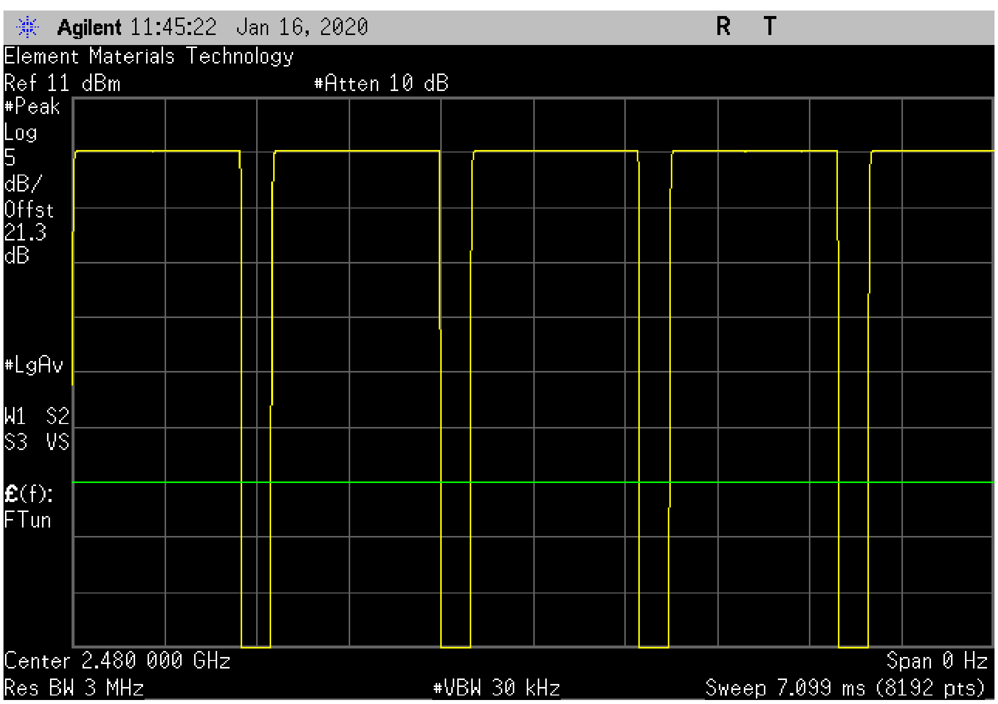
BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



BLE/GFSK High Channel, 2480 MHz							
		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
		1.298 ms	1.534 ms	1	84.6	N/A	N/A



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



OCCUPIED BANDWIDTH

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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

element

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	**H310 Sensor Station - Powered by Solar + li ion battery**			**Work Order:**	**MEGR0001**
Serial Number:	**H3100000360**			**Date:**	**16-Jan-20**
Customer:	**METER Group, Inc USA**			**Temperature:**	**19.5 °C**
Attendees:	**Daniel Winder, Ramakrishna Eepuri**			**Humidity:**	**38% RH**
Project:	**None**			**Barometric Pres.:**	**1008 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**Battery**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

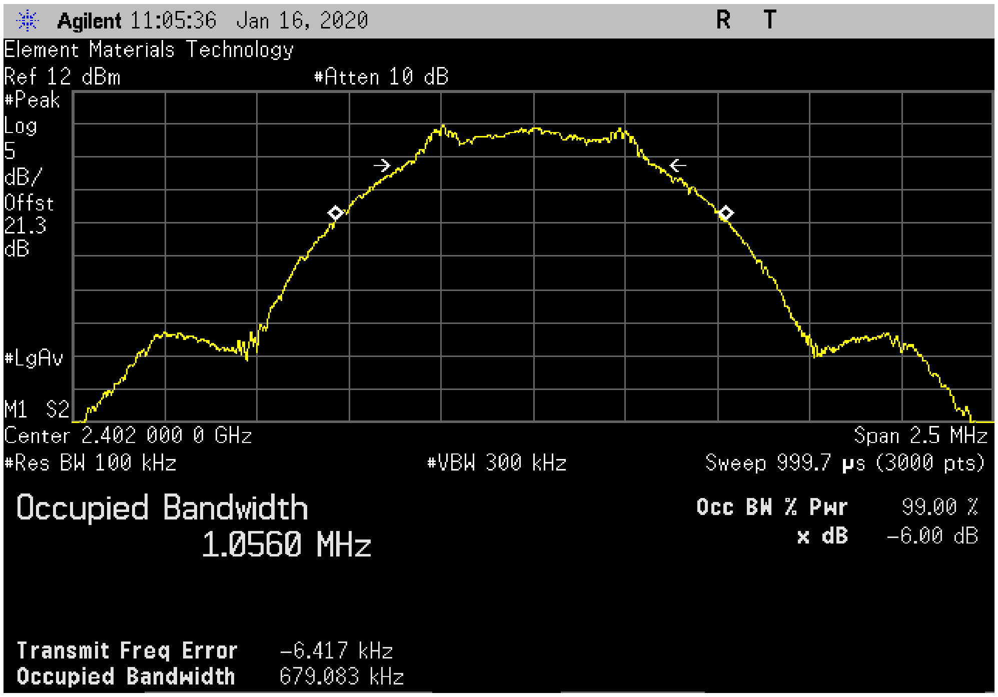
DEVIATIONS FROM TEST STANDARD

None

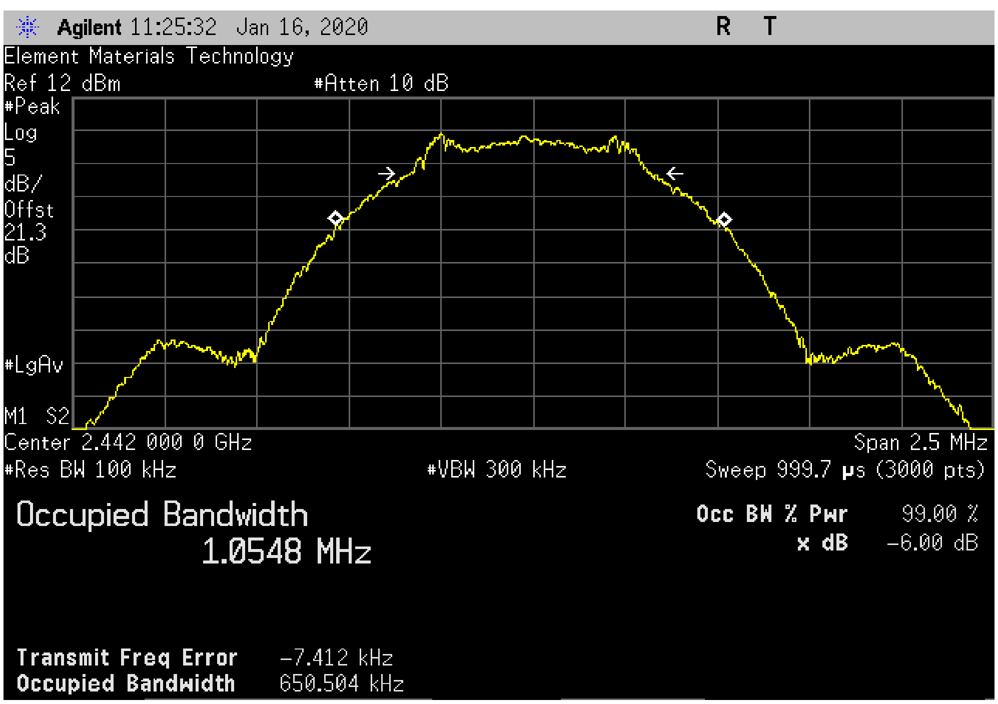
Configuration #	**1**	*Signature*

	Value	Limit (≥)	Result
BLE/GFSK Low Channel, 2402 MHz	679.083 kHz	500 kHz	Pass
BLE/GFSK Mid Channel, 2442 MHz	650.504 kHz	500 kHz	Pass
BLE/GFSK High Channel, 2480 MHz	656.081 kHz	500 kHz	Pass

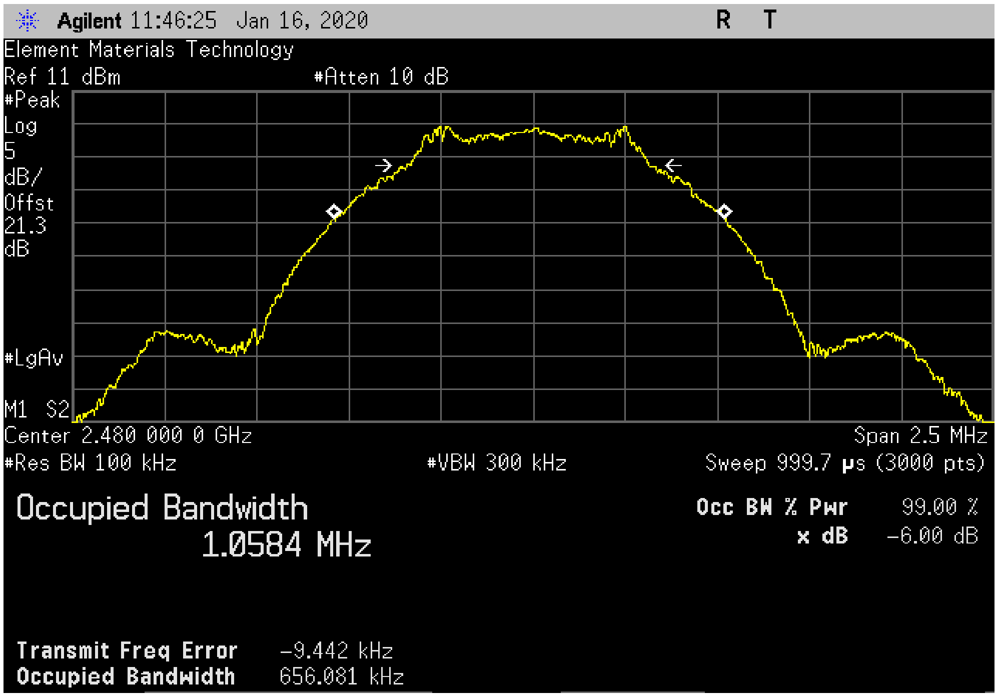
BLE/GFSK Low Channel, 2402 MHz		
Value	Limit (≥)	Result
679.083 kHz	500 kHz	Pass



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



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



OUTPUT POWER

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

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

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

OUTPUT POWER

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	H310 Sensor Station - Powered by Solar + li ion battery			Work Order:	MEGR0001
Serial Number:	H3100000360			Date:	16-Jan-20
Customer:	METER Group, Inc USA			Temperature:	19.5 °C
Attendees:	Daniel Winder, Ramakrishna Eepuri			Humidity:	38.1% RH
Project:	None			Barometric Pres.:	1008 mbar
Tested by:	Brandon Hobbs	Power:	Battery	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

DEVIATIONS FROM TEST STANDARD

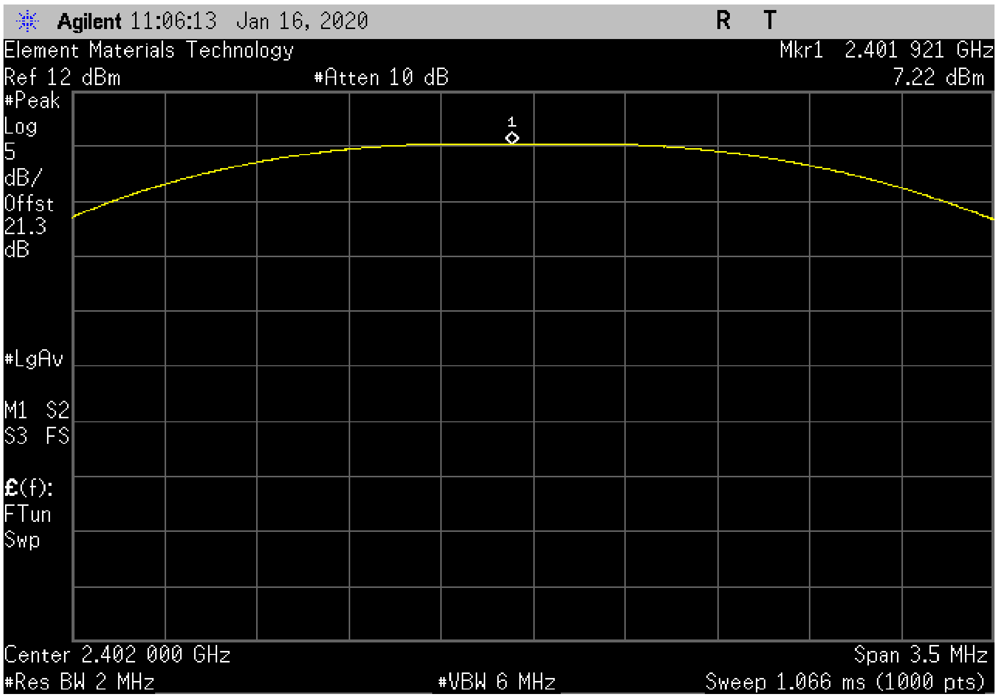
None

Configuration #	1	*Signature*

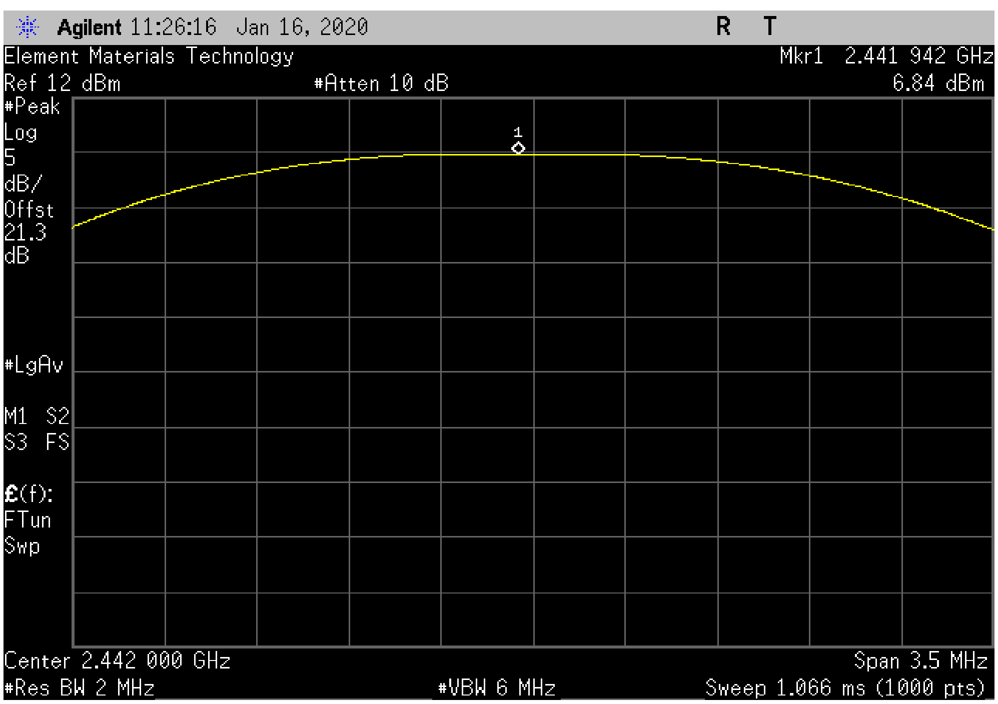
	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK Low Channel, 2402 MHz	7.221	30	Pass
BLE/GFSK Mid Channel, 2442 MHz	6.842	30	Pass
BLE/GFSK High Channel, 2480 MHz	6.255	30	Pass

OUTPUT POWER

BLE/GFSK Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				7.221	30	Pass

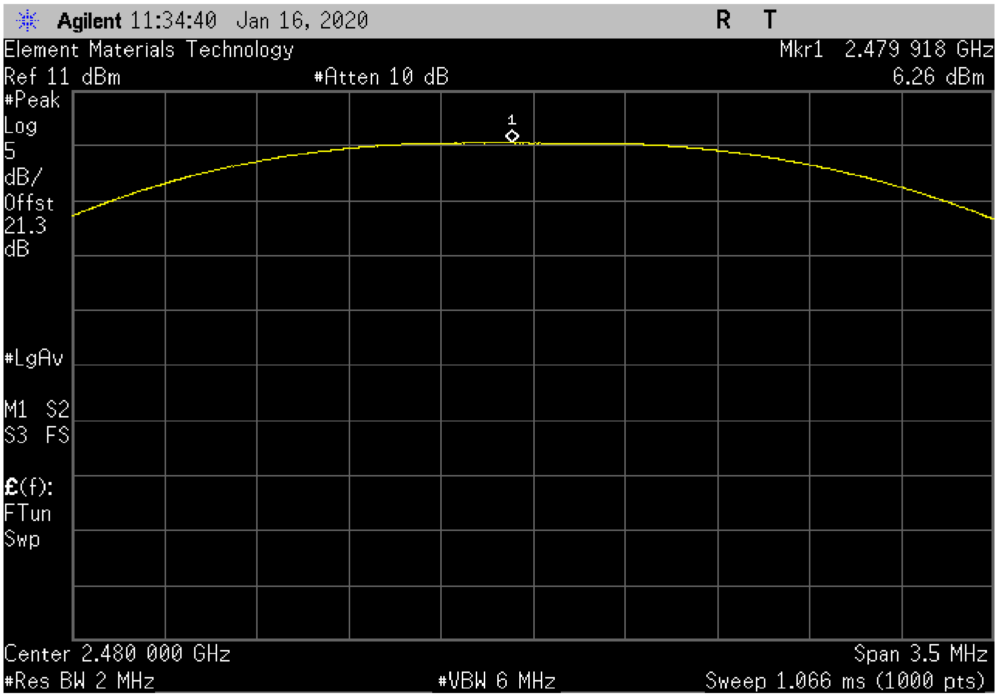


BLE/GFSK Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.842	30	Pass



OUTPUT POWER

BLE/GFSK High Channel, 2480 MHz							
					Out Pwr (dBm)	Limit (dBm)	Result
					6.255	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2019.09.05

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
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

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

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

The antenna gain was then added to the measured value to calculate the EIRP.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	H310 Sensor Station - Powered by Solar + li ion battery	Work Order:	MEGR0001
Serial Number:	H3100000360	Date:	16-Jan-20
Customer:	METER Group, Inc USA	Temperature:	19.5 °C
Attendees:	Daniel Winder, Ramakrishna Eepuri	Humidity:	38% RH
Project:	None	Barometric Pres.:	1008 mbar
Tested by:	Brandon Hobbs Power: Battery	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

DEVIATIONS FROM TEST STANDARD

None

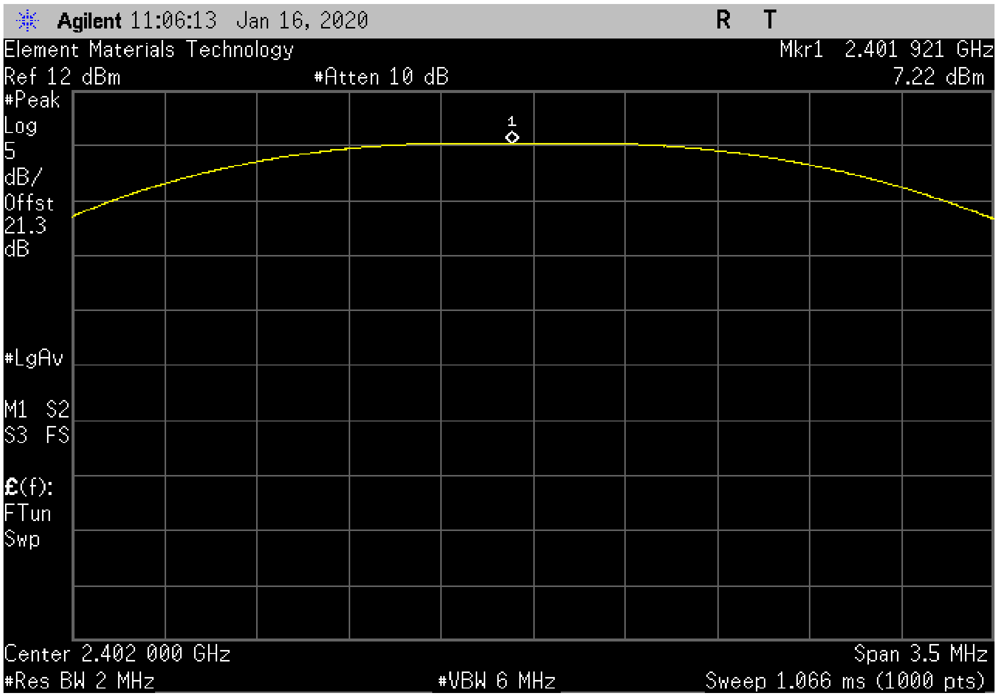
Configuration #	1	*Signature*

	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK Low Channel, 2402 MHz	7.221	4.15	11.371	36	Pass
BLE/GFSK Mid Channel, 2442 MHz	6.842	4.15	10.992	36	Pass
BLE/GFSK High Channel, 2480 MHz	6.255	4.15	10.405	36	Pass

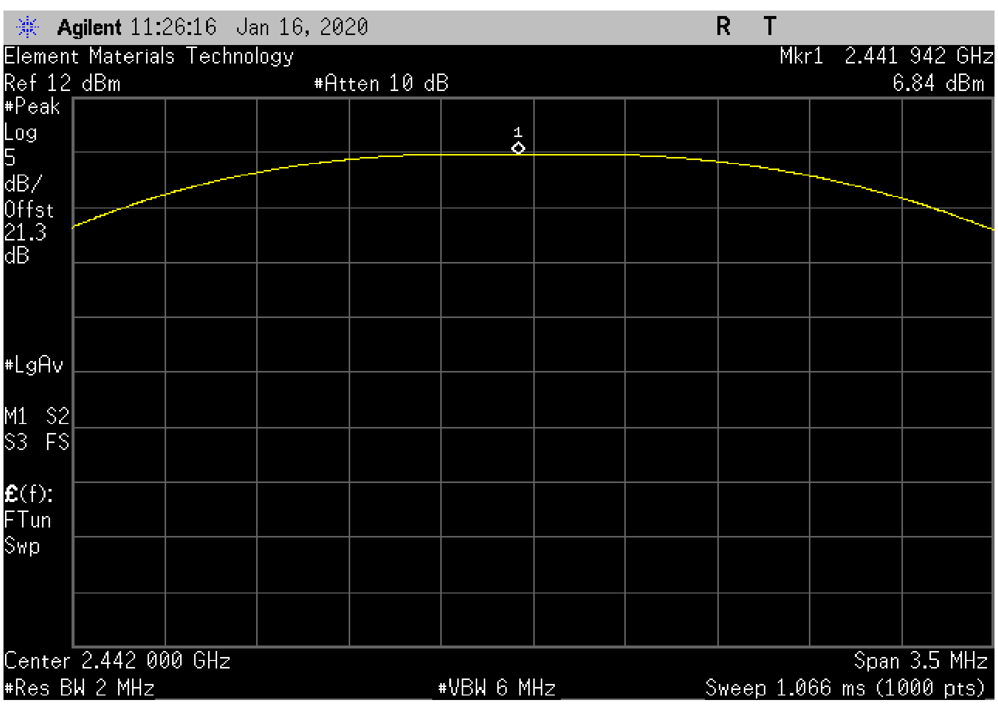
EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2019.08.30.0 XMit 2019.09.05

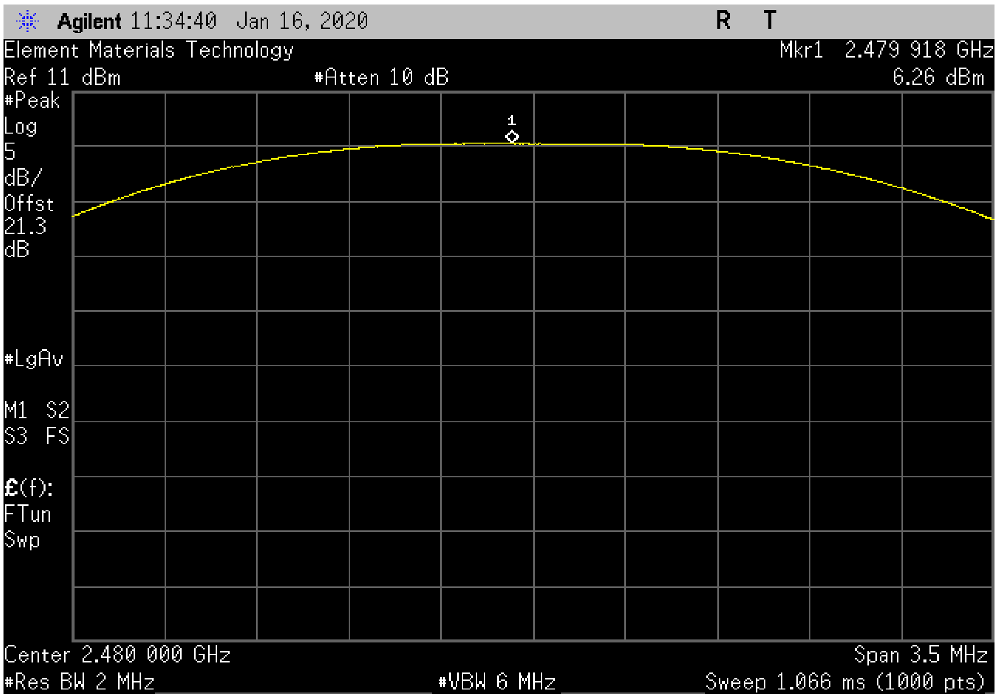
BLE/GFSK Low Channel, 2402 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		7.221	4.15	11.371	36	Pass



BLE/GFSK Mid Channel, 2442 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		6.842	4.15	10.992	36	Pass



BLE/GFSK High Channel, 2480 MHz						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		6.255	4.15	10.405	36	Pass



POWER SPECTRAL DENSITY

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

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

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

POWER SPECTRAL DENSITY

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	H310 Sensor Station - Powered by Solar + li ion battery			Work Order:	MEGR0001
Serial Number:	H3100000360			Date:	16-Jan-20
Customer:	METER Group, Inc USA			Temperature:	19.5 °C
Attendees:	Daniel Winder, Ramakrishna Eepuri			Humidity:	38.1% RH
Project:	None			Barometric Pres.:	1009 mbar
Tested by:	Brandon Hobbs	Power:	Battery	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

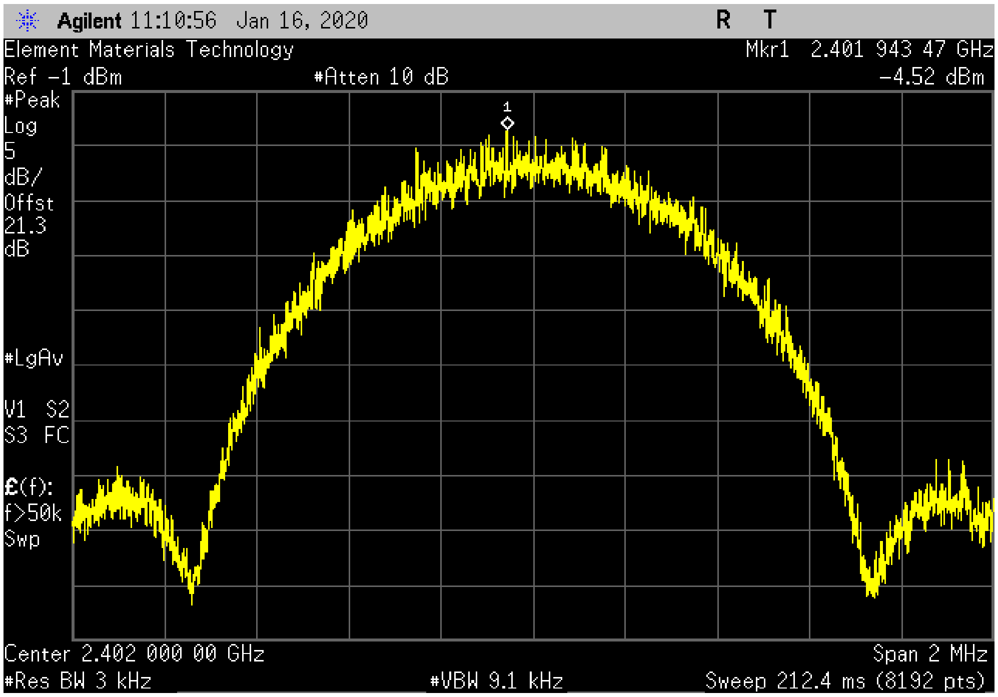
DEVIATIONS FROM TEST STANDARD

None

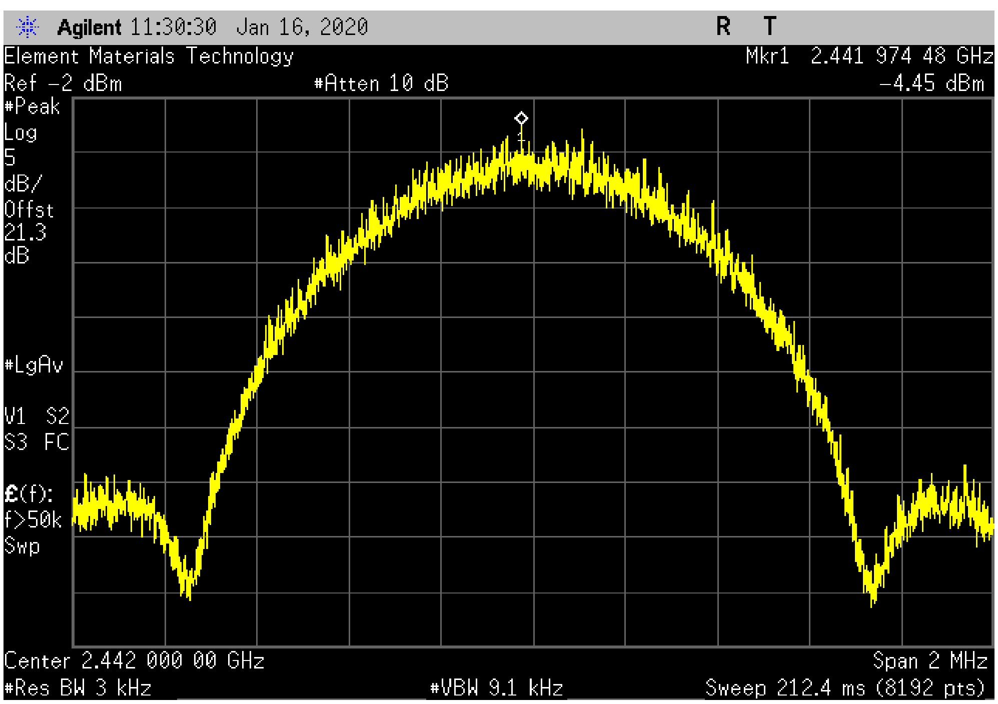
Configuration #	1	*Signature*

	Value dBm/3kHz	Limit < dBm/3kHz	Results
BLE/GFSK Low Channel, 2402 MHz	-4.516	8	Pass
BLE/GFSK Mid Channel, 2442 MHz	-4.446	8	Pass
BLE/GFSK High Channel, 2480 MHz	-5.725	8	Pass

BLE/GFSK Low Channel, 2402 MHz							
					Value dBm/3kHz	Limit < dBm/3kHz	Results
					-4.516	8	Pass



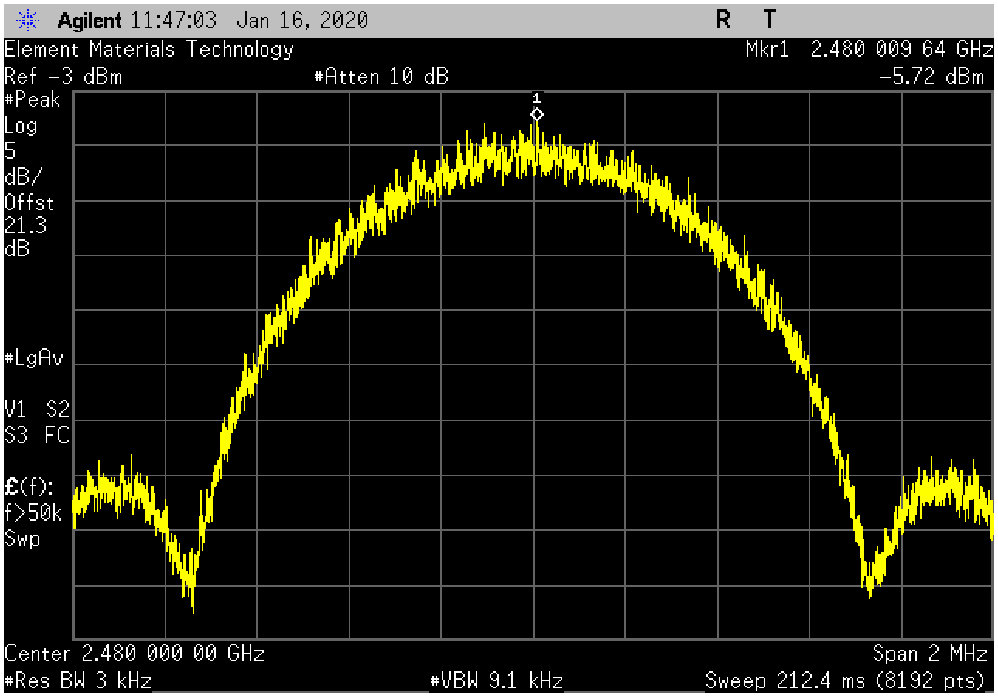
BLE/GFSK Mid Channel, 2442 MHz							
					Value dBm/3kHz	Limit < dBm/3kHz	Results
					-4.446	8	Pass



POWER SPECTRAL DENSITY

TbtTx 2019.08.30.0 XMit 2019.09.05

BLE/GFSK High Channel, 2480 MHz		
Value dBm/3kHz	Limit < dBm/3kHz	Results
-5.725	8	Pass



BAND EDGE COMPLIANCE

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	H310 Sensor Station - Powered by Solar + li ion battery			Work Order:	MEGR0001
Serial Number:	H3100000360			Date:	16-Jan-20
Customer:	METER Group, Inc USA			Temperature:	19.6 °C
Attendees:	Daniel Winder, Ramakrishna Eepuri			Humidity:	37.7% RH
Project:	None			Barometric Pres.:	1009 mbar
Tested by:	Brandon Hobbs	Power:	Battery	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

DEVIATIONS FROM TEST STANDARD

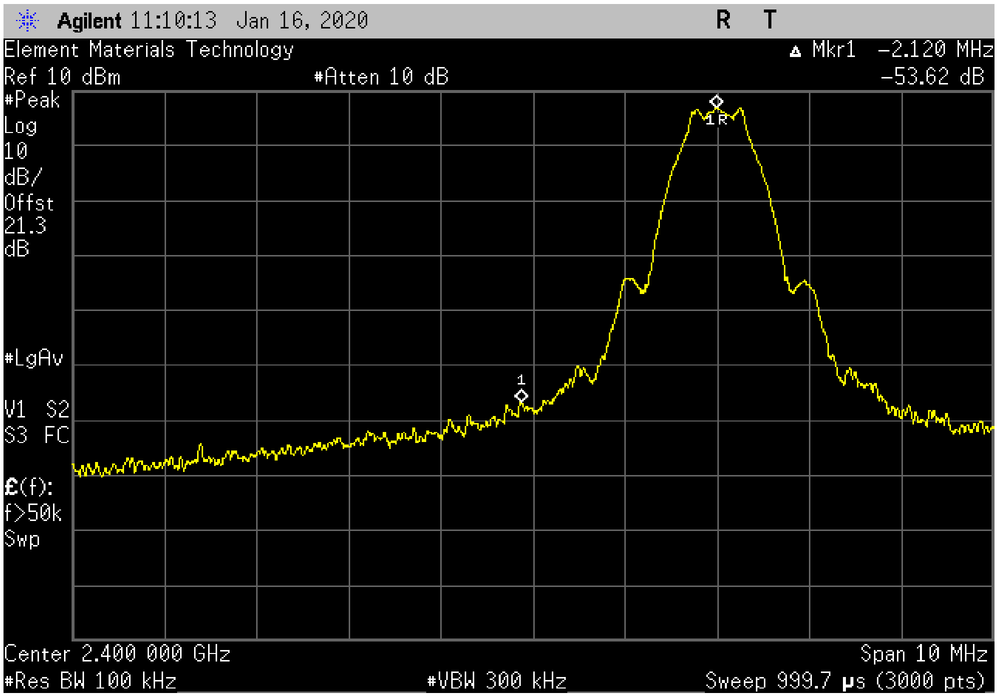
None

Configuration #	1	*Signature*

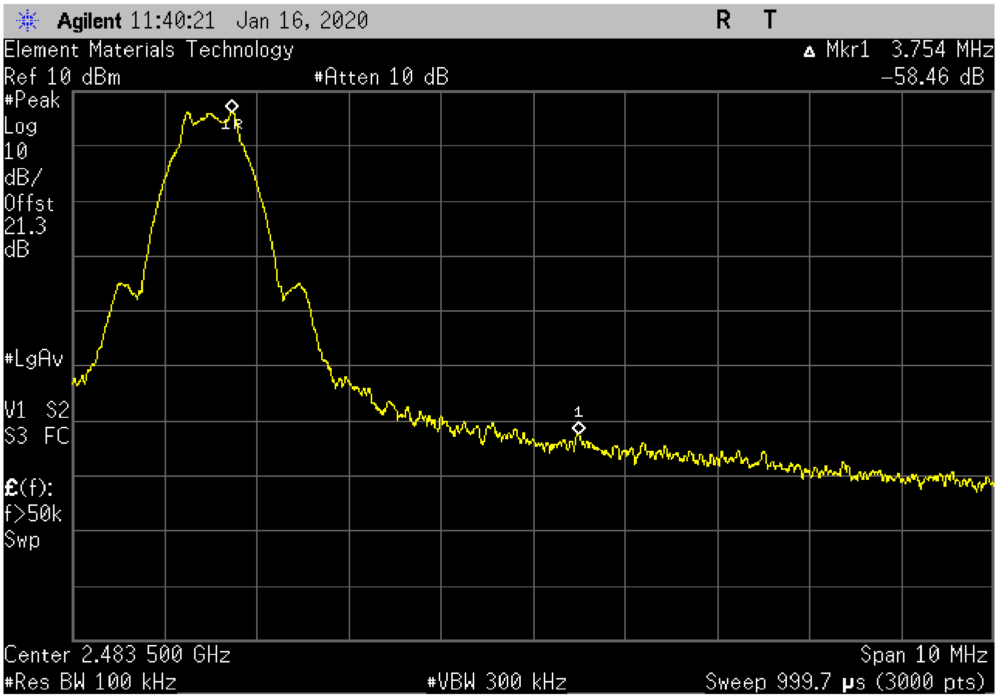
	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	-53.62	-20	Pass
BLE/GFSK High Channel, 2480 MHz	-58.46	-20	Pass

BAND EDGE COMPLIANCE

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.62	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-58.46	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2019.09.05

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
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	H310 Sensor Station - Powered by Solar + li ion battery	Work Order:	MEGR0001
Serial Number:	H3100000360	Date:	16-Jan-20
Customer:	METER Group, Inc USA	Temperature:	19.5 °C
Attendees:	Daniel Winder, Ramakrishna Eepuri	Humidity:	38.1% RH
Project:	None	Barometric Pres.:	1009 mbar
Tested by:	Brandon Hobbs Power: Battery	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2020	ANSI C63.10:2013

COMMENTS

all losses were accounted for in the measurement path.

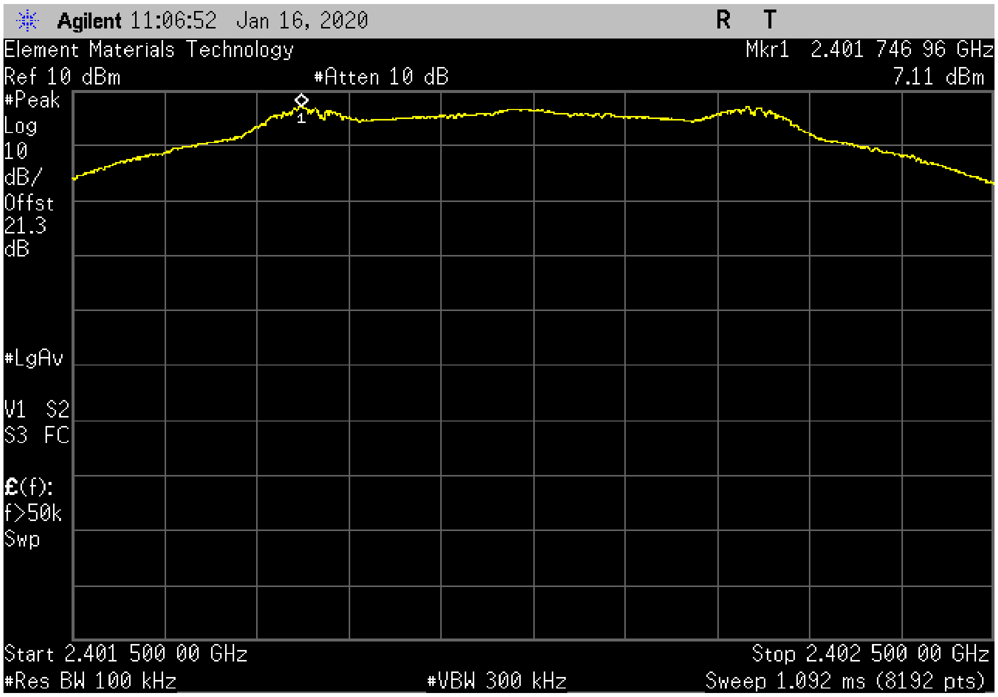
DEVIATIONS FROM TEST STANDARD

None

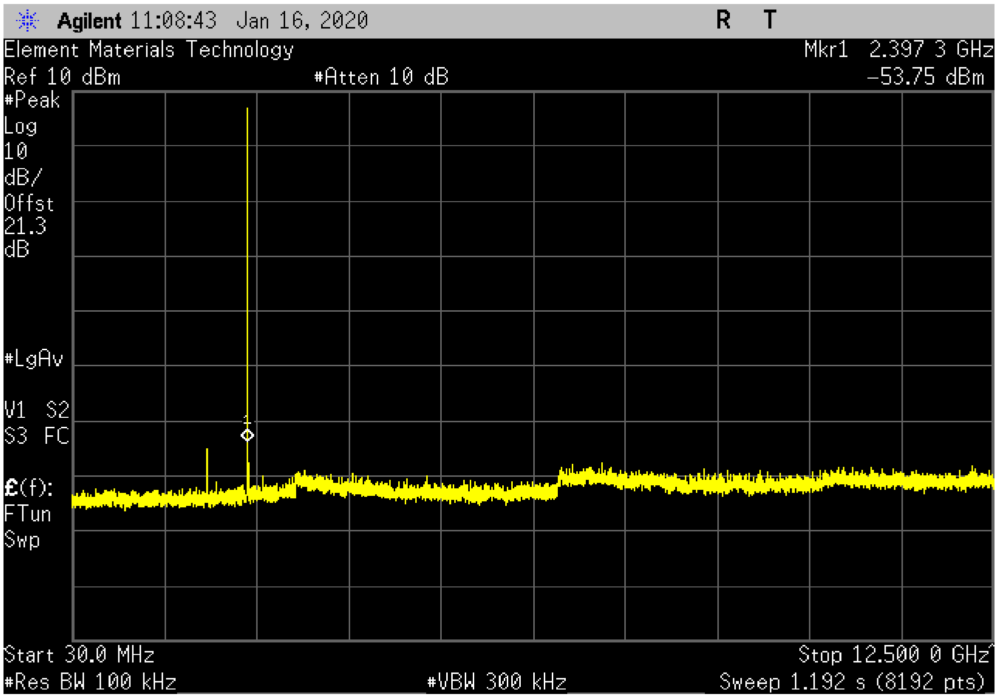
Configuration #	1	*Signature*

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	Fundamental	2401.75	N/A	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	30 MHz - 12.5 GHz	2397.3	-60.86	-20	Pass
BLE/GFSK Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24685.6	-61.51	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	Fundamental	2441.75	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	7326.9	-63.53	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	20894.9	-60.74	-20	Pass
BLE/GFSK High Channel, 2480 MHz	Fundamental	2480.23	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	30 MHz - 12.5 GHz	7369.5	-64.06	-20	Pass
BLE/GFSK High Channel, 2480 MHz	12.5 GHz - 25 GHz	24583.4	-60.57	-20	Pass

BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2401.75	N/A	N/A	N/A

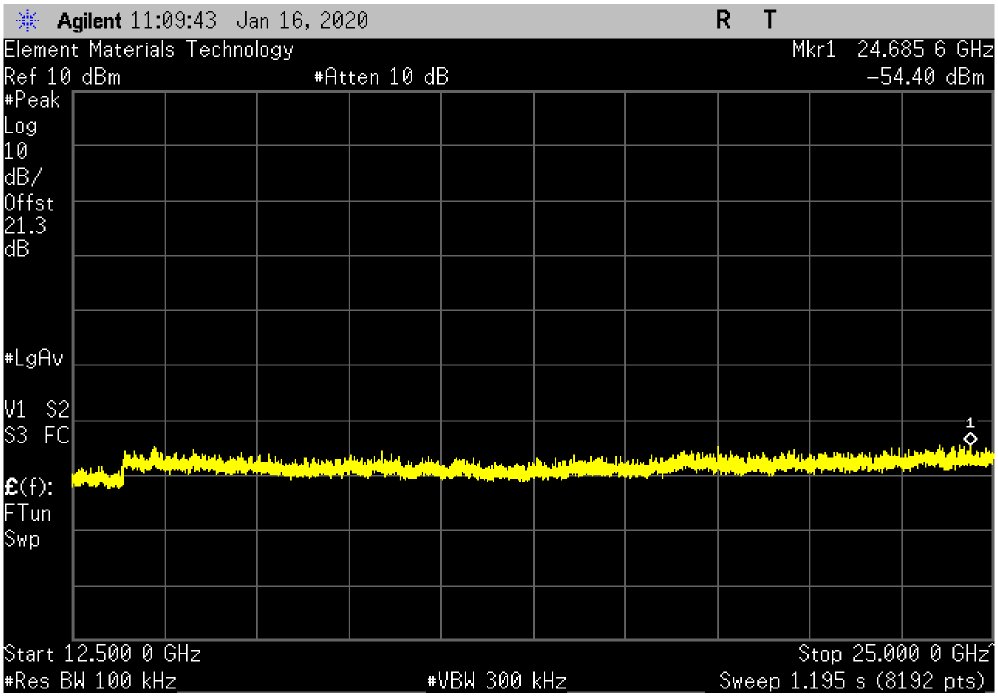


BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	2397.3	-60.86	-20	Pass

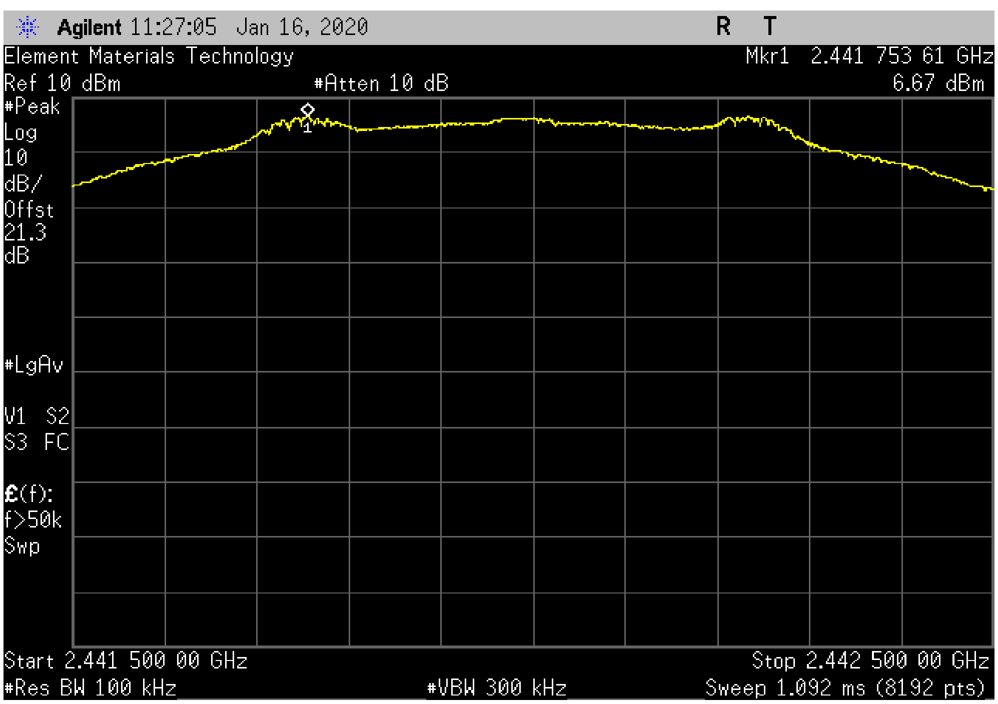


TbtTx 2019.08.30.0 XMit 2019.09.05

BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24685.6	-61.51	-20	Pass



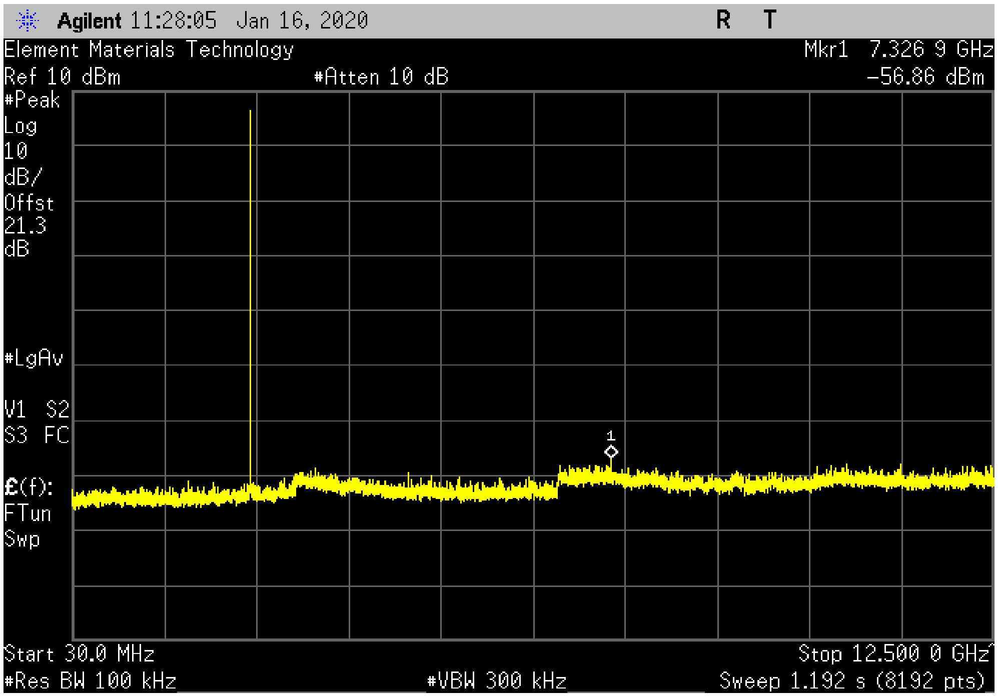
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2441.75	N/A	N/A	N/A



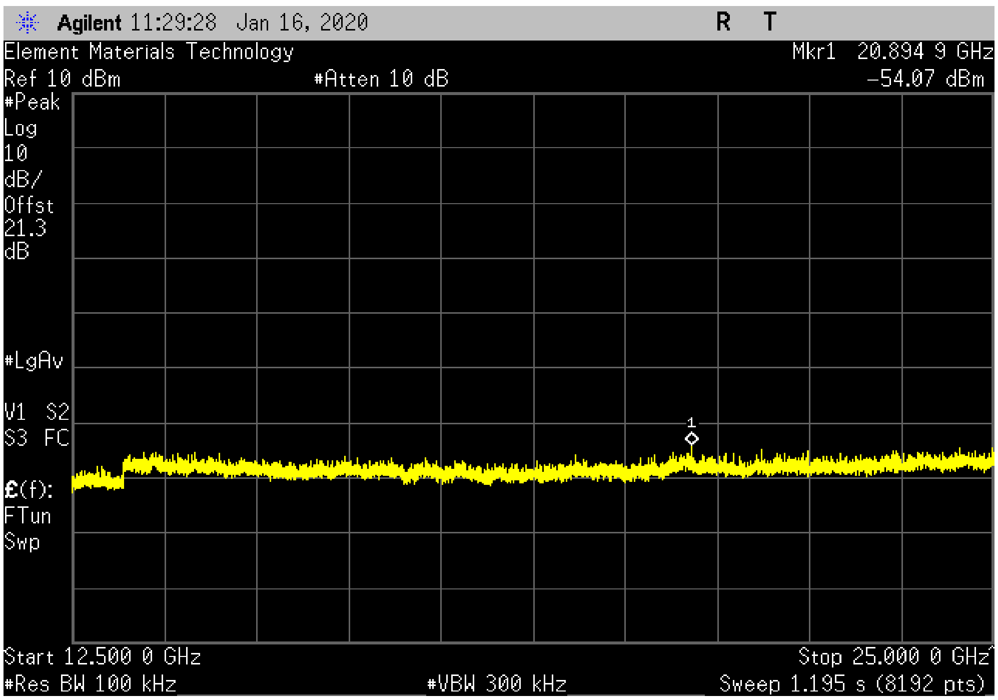
SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2019.09.05

BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7326.9	-63.53	-20	Pass

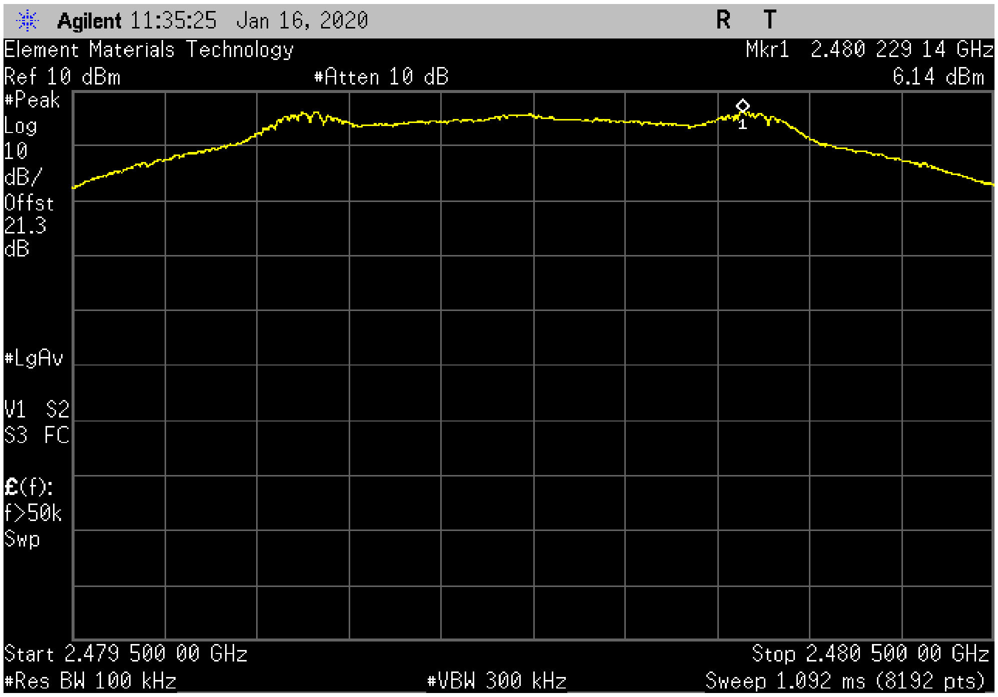


BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	20894.9	-60.74	-20	Pass

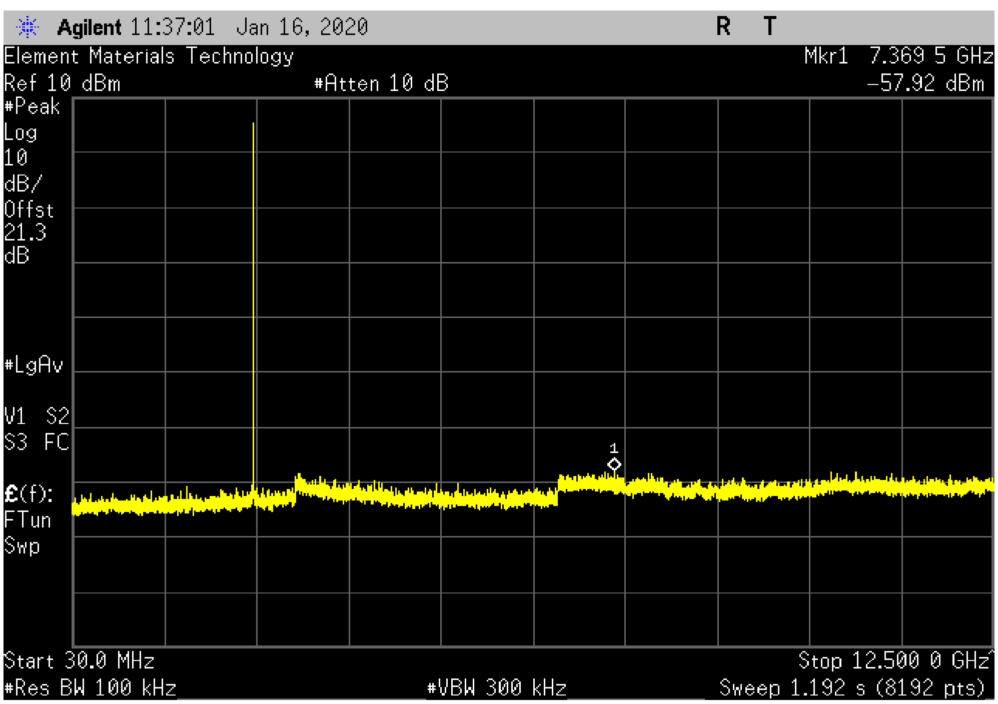


SPURIOUS CONDUCTED EMISSIONS

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



BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	7369.5	-64.06	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2019.09.05

BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24583.4	-60.57	-20	Pass