



Emerson

Bluetooth Radio Module, Model: EMR303

FCC 15.247:2023

RSS-247 Issue 2:2017

Bluetooth LE Radio

Report: EMPM0139.5, Issue Date: December 20, 2023



CERTIFICATE OF TEST



Last Date of Test: October 18, 2023

Emerson
EUT:EMR303

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2023	ANSI C63.10:2013, FCC KDB 558074 v05r02:2019
RSS-247 Issue 2:2017	
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

Results

Test Description	Result	FCC Section(s)	RSS Section(s)	ANSI C63.10 Section(s)	Comments
Band Edge Compliance	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
DTS Bandwidth (6 dB)	Pass	15.247(a)(2), KDB 558074 -8.2	RSS-247 5.2(a)	11.8.2	
Duty Cycle	Evaluated	KDB 558074 -6.0	RSS-Gen 3.2	11.6	The test software provided allows the EUT to operate continuously at 100% Duty Cycle.
Equivalent Isotropic Radiated Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Occupied Bandwidth (99%)	Evaluated	KDB 558074 -2.1	RSS-Gen 6.7	6.9.3	There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	RSS-247 5.4(d, f), RSS-Gen 6.12	11.9.1.1	
Power Spectral Density	Pass	15.247(e), KDB 558074 -8.4	RSS-247 5.2(b)	11.10.2	
Powerline Conducted Emissions	Pass	15.207	RSS-Gen 8.8	6.2	
Spurious Conducted Emissions	Pass	15.247(d), KDB 558074 -8.5	RSS-247 5.5	11.11	
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 - 8.6, 8.7	RSS-247 5.5, RSS-Gen 6.13, 8.10	11.12.1, 11.13.2, 6.5, 6.6	

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:

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FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 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 120 th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY

Measurement Uncertainty

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

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

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

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

TEST SETUP BLOCK DIAGRAMS

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.

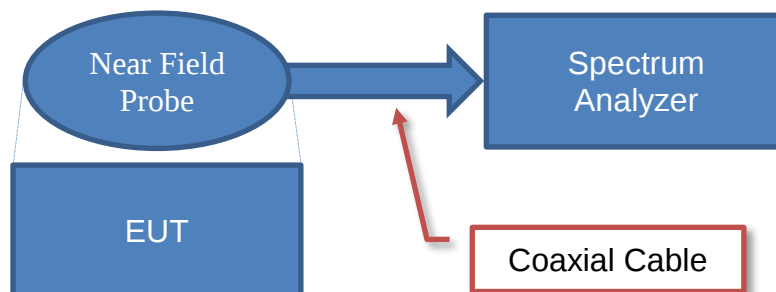
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

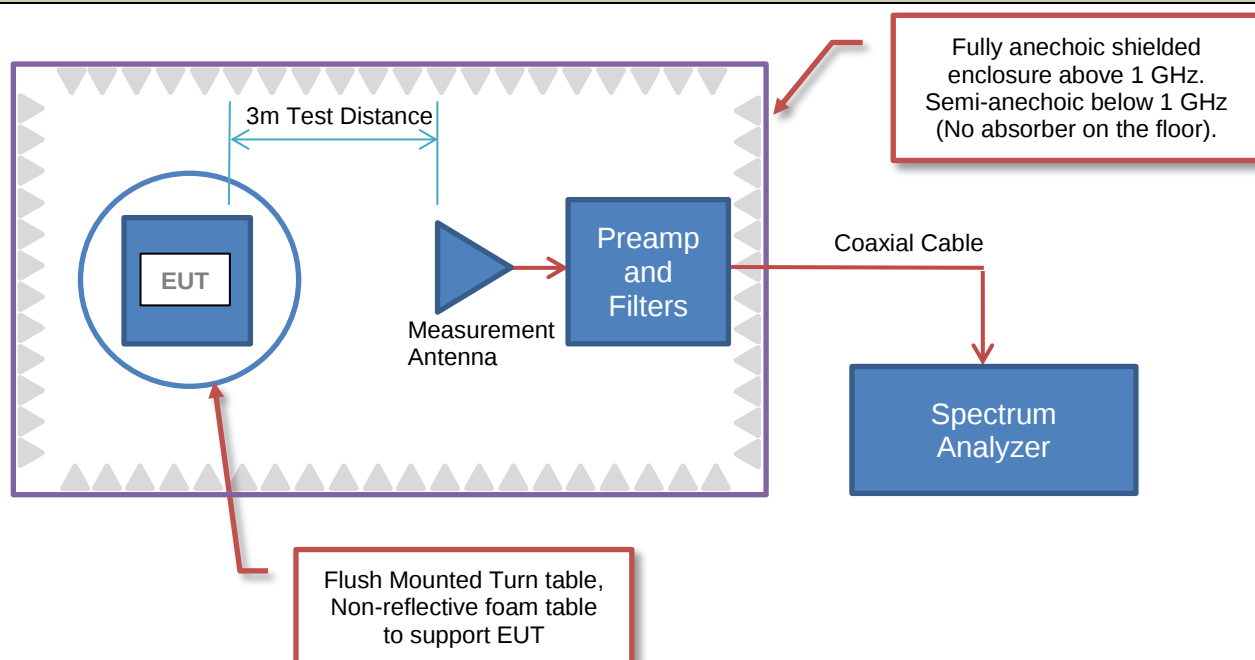


Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



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

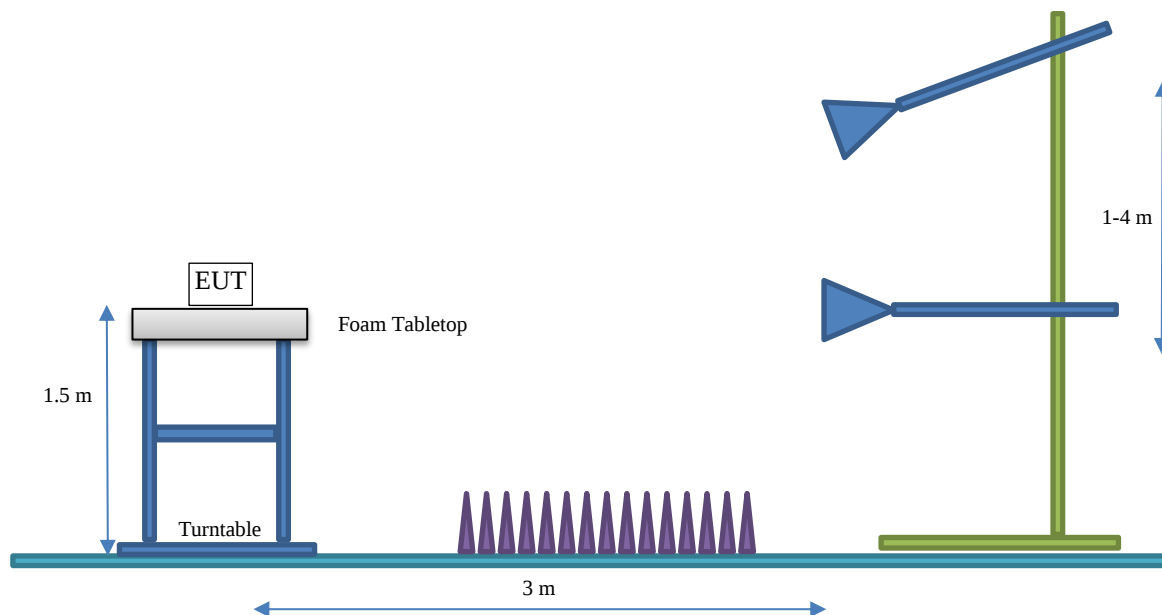
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

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:	Emerson/Micro Motion Inc
Address:	7070 Winchester Circle
City, State, Zip:	Boulder, Colorado 80301, USA
Test Requested By:	Randon Beuc
EUT:	EMR303
First Date of Test:	November 15, 2022
Last Date of Test:	October 18, 2023
Receipt Date of Samples:	November 15, 2022
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Bluetooth low energy module for configuration and status of Emerson industrial automation products. The module is DC powered and contains an on-board, PCB trace antenna for a complete, standalone Bluetooth low energy solution. This module is designed for use in internal Emerson products only and will not be available for purchase by external companies.

Testing Objective:

To demonstrate compliance of the Bluetooth radio to FCC 15.247/RSS-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. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
PCB Trace	Emerson	2400-2485	3

The EUT was tested using the power settings provided by the manufacturer which were based upon:

- ☐ Test software settings
- ☒ Rated power settings

Firmware installed on EUT: Emerson_BLE_HostTest_Rev_143
Test Software: BTool V1.42.18

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting
BLE 1 Mbps, 2 Mbps	DTS	0 or 37	2402	5 dBm
		20 or 18	2442	5 dBm
		39	2480	5 dBm

CONFIGURATIONS



Configuration EMPM0139- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BLE Module	Emerson	EMR303	A2-8

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Breakout Board	Emerson	BLE_APPVAL_TEST REV2	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Precision 7560	USRTC-8J8FQN3
Power Supply (Laptop)	Dell	DA180PM111	None
USB Power Supply (breakout board)	CUI, Inc	SWI10B-5-N-138	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable (power)	Yes	1.9 m	No	USB Supply	Breakout Board
AC Cable (Laptop)	No	0.8 m	No	Power Supply (Laptop)	AC Mains
DC Cable (Laptop)	No	1.6 m	Yes	Power Supply (Laptop)	Laptop
USB Cable (laptop)	Yes	1.7 m	No	Laptop	Breakout Board

Configuration EMPM0139- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BLE Module	Emerson	EMR303	A2-8

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Breakout Board	Emerson	BLE_APPVAL_TEST REV2	None
USB Power Supply (breakout board)	CUI, Inc	SWI10B-5-N-138	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable (power)	Yes	1.9 m	No	USB Supply	Breakout Board

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-11-15	DTS Bandwidth (6 dB)	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	2022-11-15	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.
3	2022-11-15	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.
4	2022-11-15	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.
5	2022-11-15	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.
6	2022-11-15	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.
7	2022-11-17	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.
8	2022-11-21	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.
9	2023-10-18	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

BAND EDGE COMPLIANCE



XMIT 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27

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



TSMTx 2022.06.03.0 XMR 2022.02.07.0

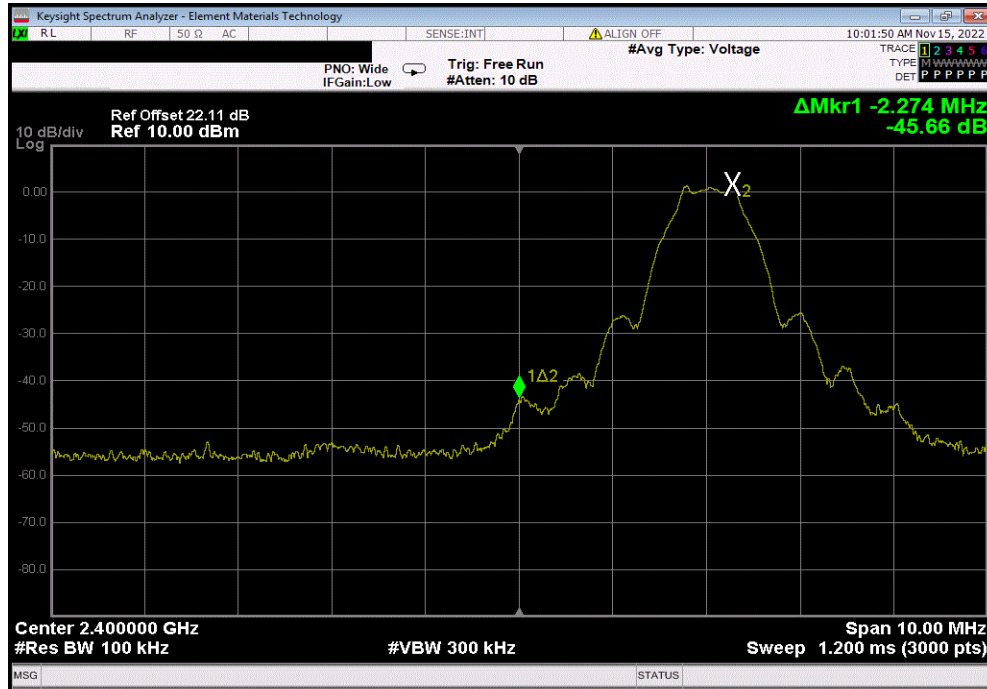
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.7% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-45.66	-20 Pass
	High Channel, 2480 MHz	-54.25	-20 Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	-33.03	-20 Pass
	High Channel, 2480 MHz	-51.84	-20 Pass

BAND EDGE COMPLIANCE

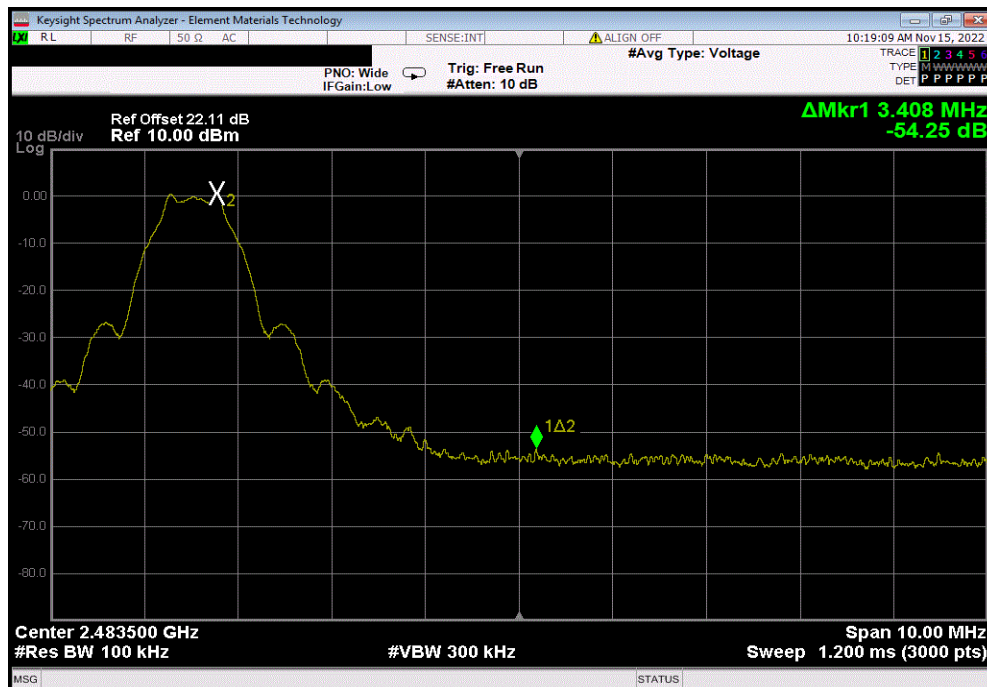


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.66	-20	Pass



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.25	-20	Pass

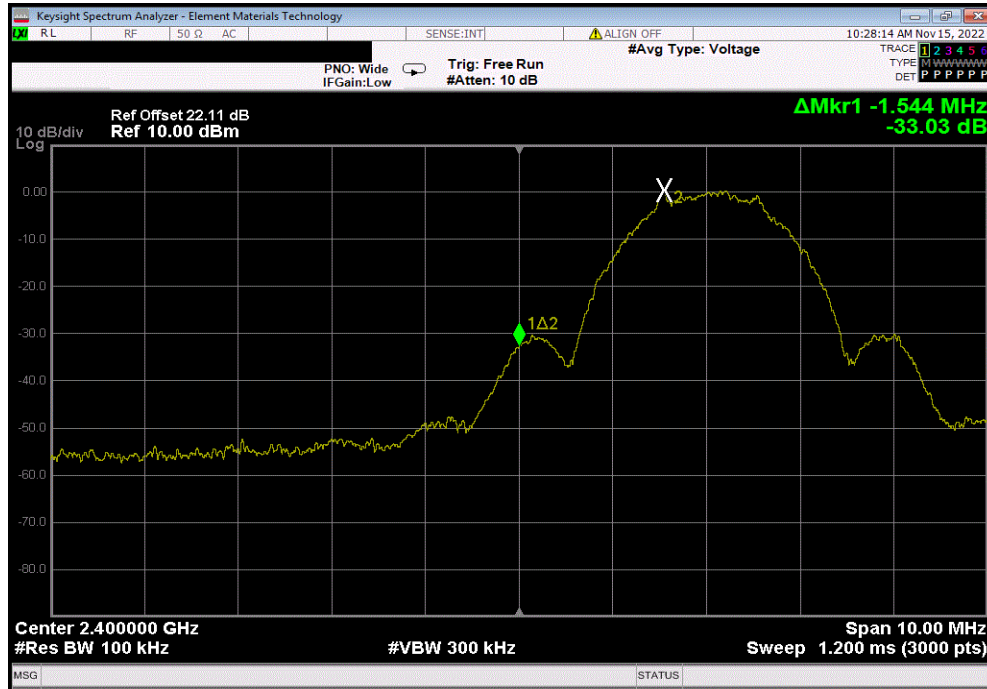


BAND EDGE COMPLIANCE

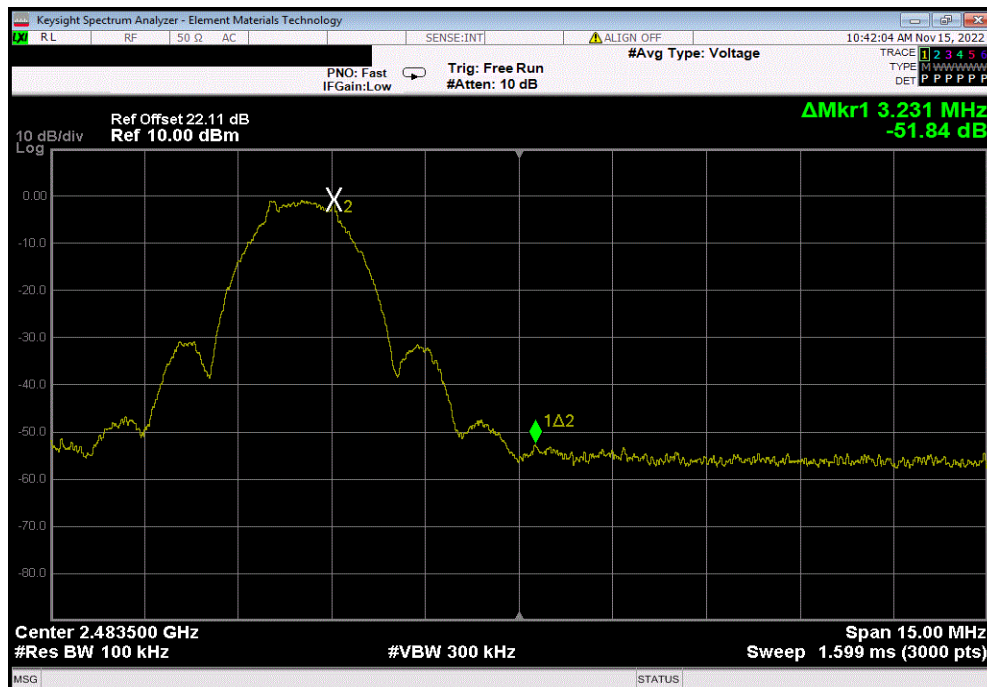


TbTtx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-33.03	-20	Pass



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.84	-20	Pass



DTS BANDWIDTH (6dB)

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	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27

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 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 (6dB)



TSTx 2022.06.03.0 XMR 2022.02.07.0

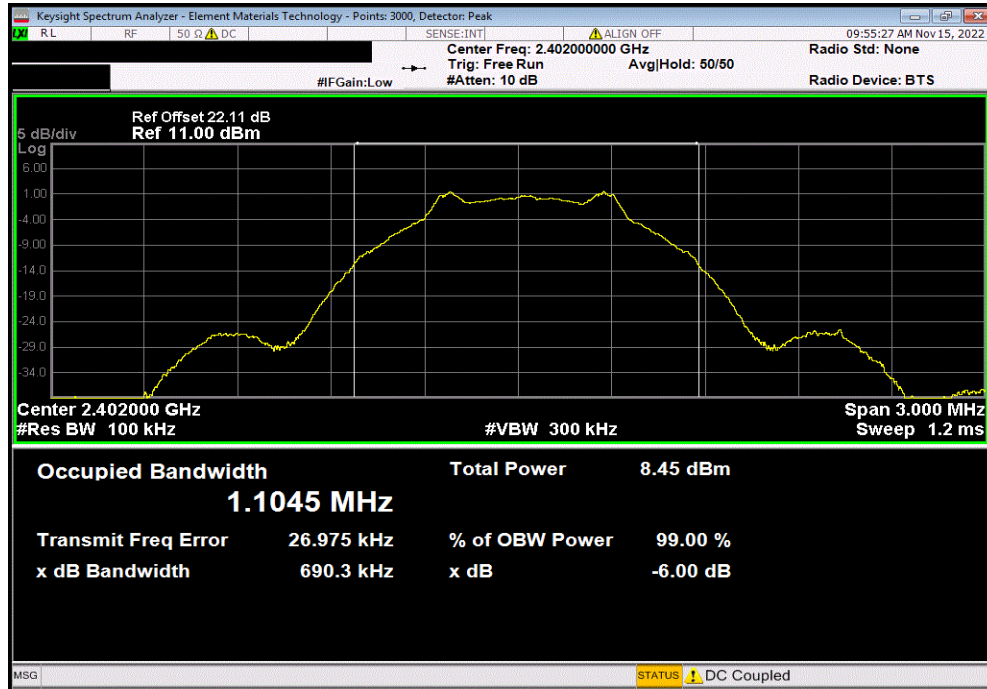
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.7% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Value	Limit (±) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	690.344 kHz	500 kHz Pass
	Mid Channel, 2442 MHz	705.694 kHz	500 kHz Pass
	High Channel, 2480 MHz	691.003 kHz	500 kHz Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	1.408 MHz	500 kHz Pass
	Mid Channel, 2442 MHz	1.4 MHz	500 kHz Pass
	High Channel, 2480 MHz	1.359 MHz	500 kHz Pass

DTS BANDWIDTH (6dB)

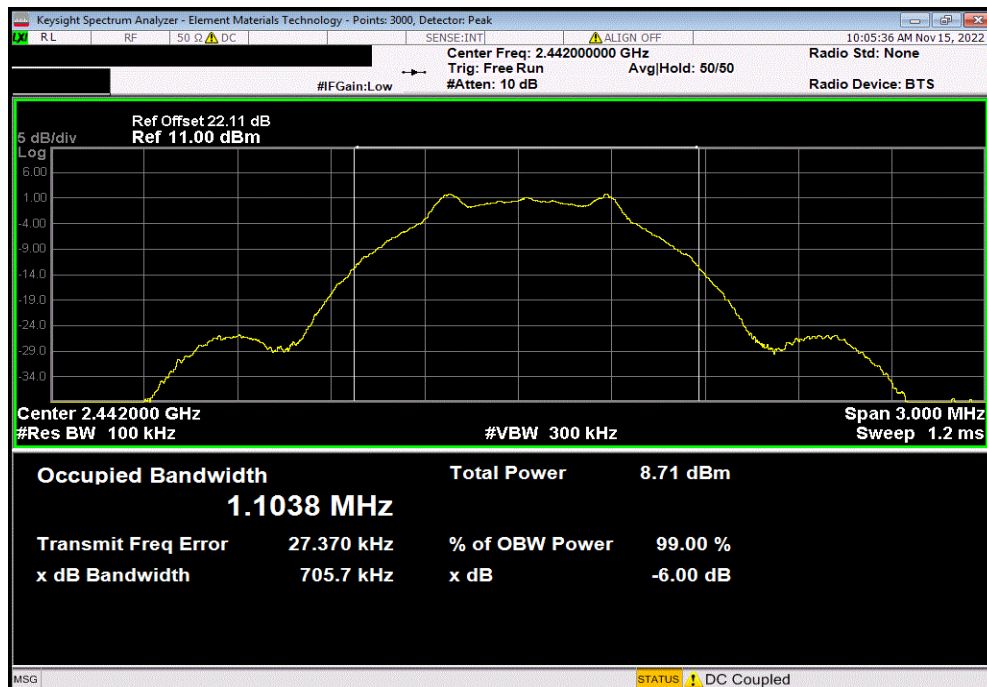


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



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

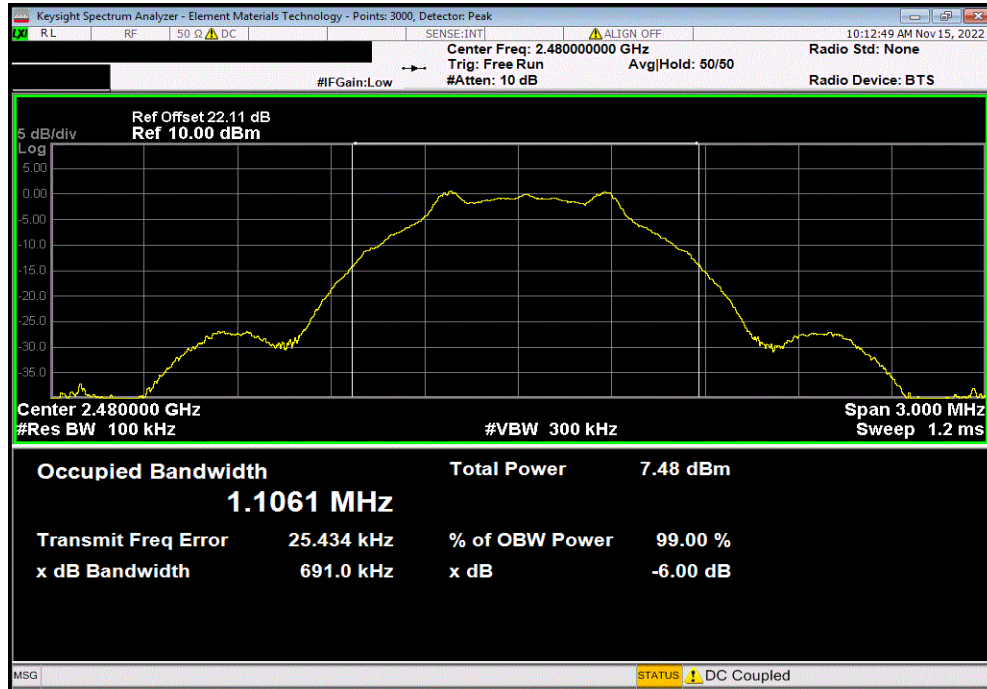


DTS BANDWIDTH (6dB)

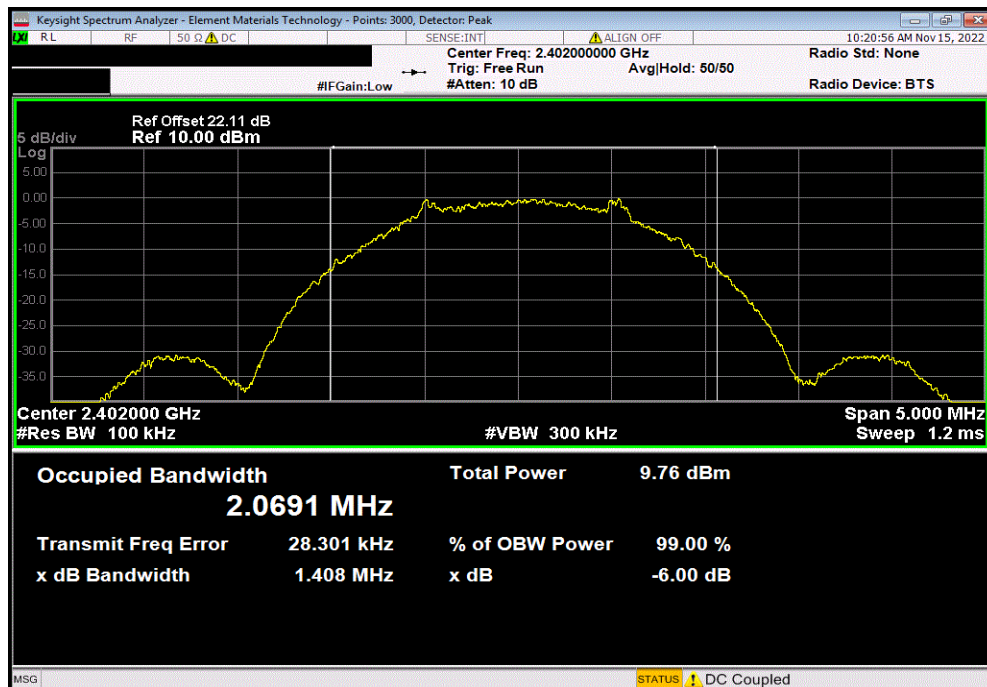


TbTx 2022.06.03.0 XbTx 2022.02.07.0

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



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

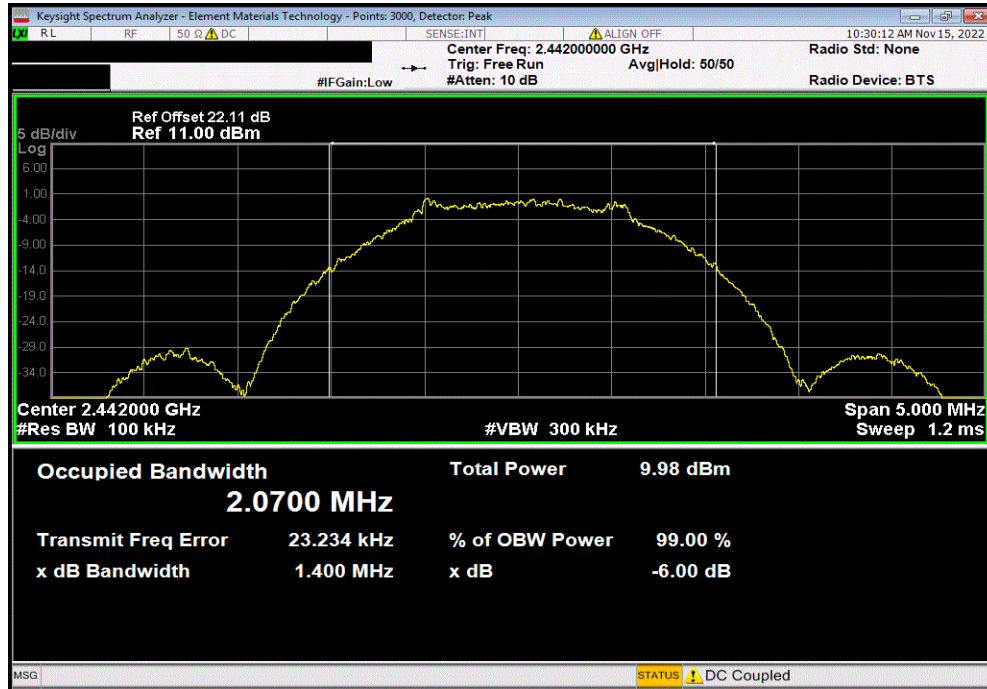


DTS BANDWIDTH (6dB)

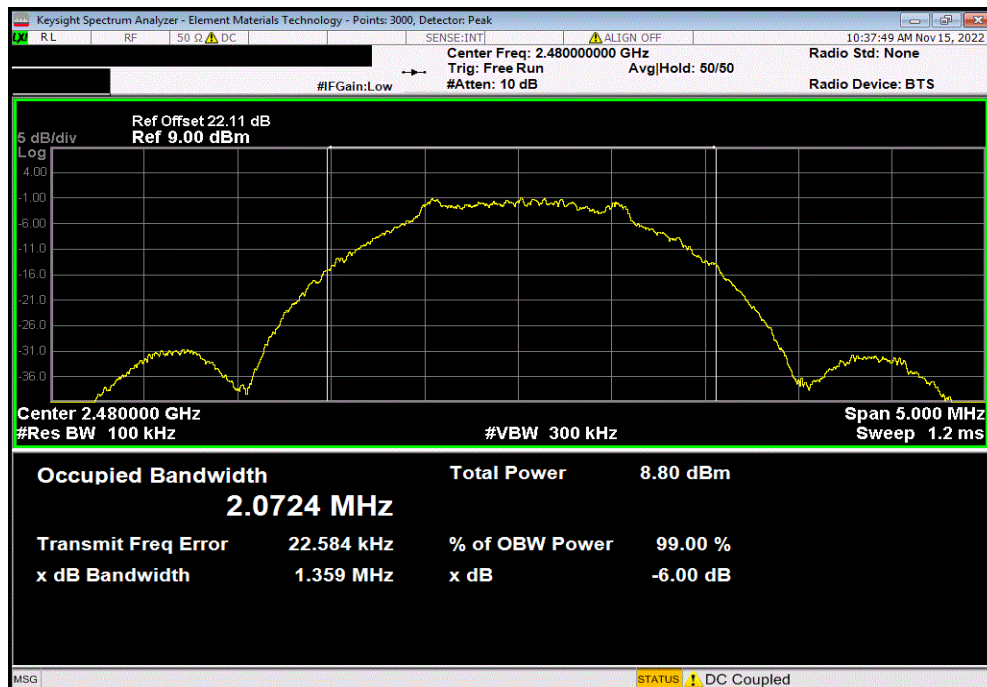


TbTtx 2022.06.03.0 XMI 2022.02.07.0

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



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



DUTY CYCLE



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 test software provided for operation in a fixed, single channel mode allows the EUT to operate continuously at 100% Duty Cycle.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMIT 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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

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

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

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

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TSTx 2022.06.03.0 XMR 2022.02.07.0

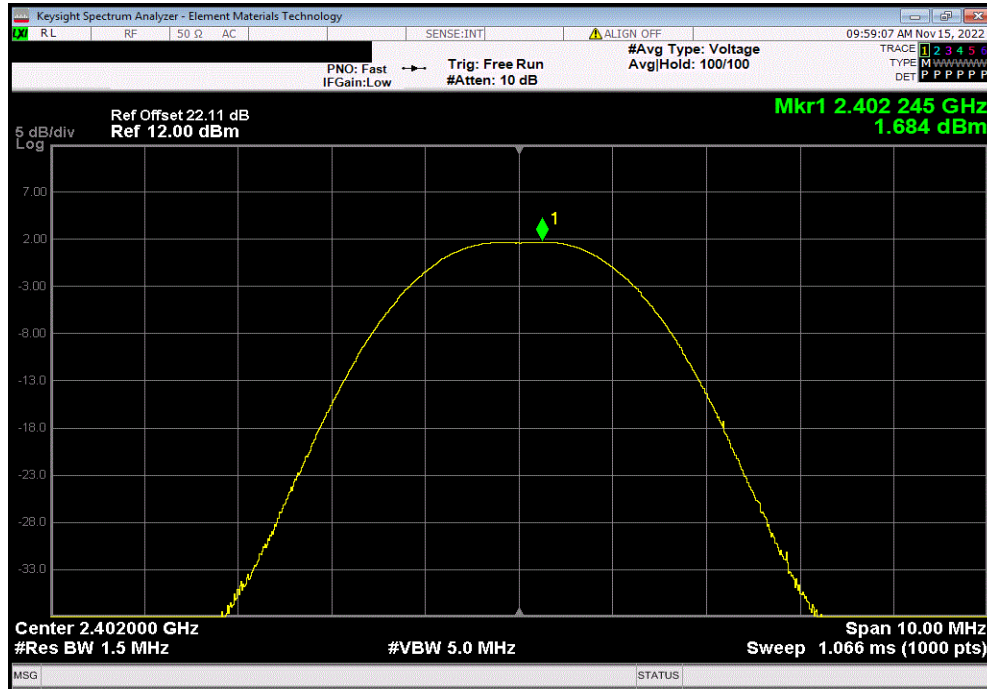
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.7% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	1.684	3
	Mid Channel, 2442 MHz	1.875	3
	High Channel, 2480 MHz	0.693	3
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	1.734	3
	Mid Channel, 2442 MHz	1.895	3
	High Channel, 2480 MHz	0.755	3

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

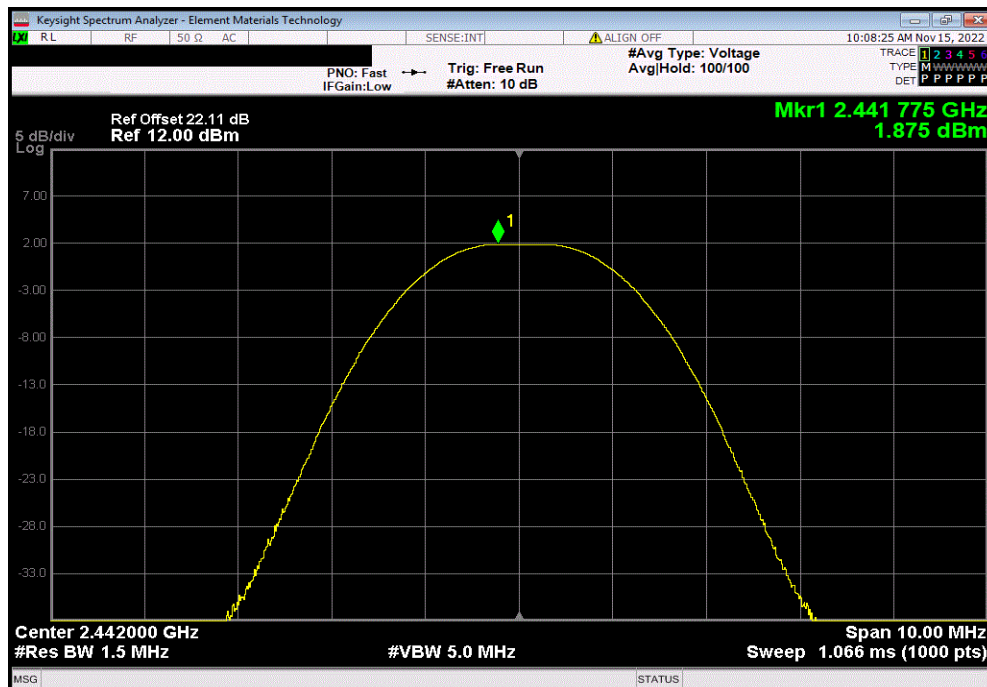


TbTx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.684	3	4.684	36	Pass		



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.875	3	4.875	36	Pass		

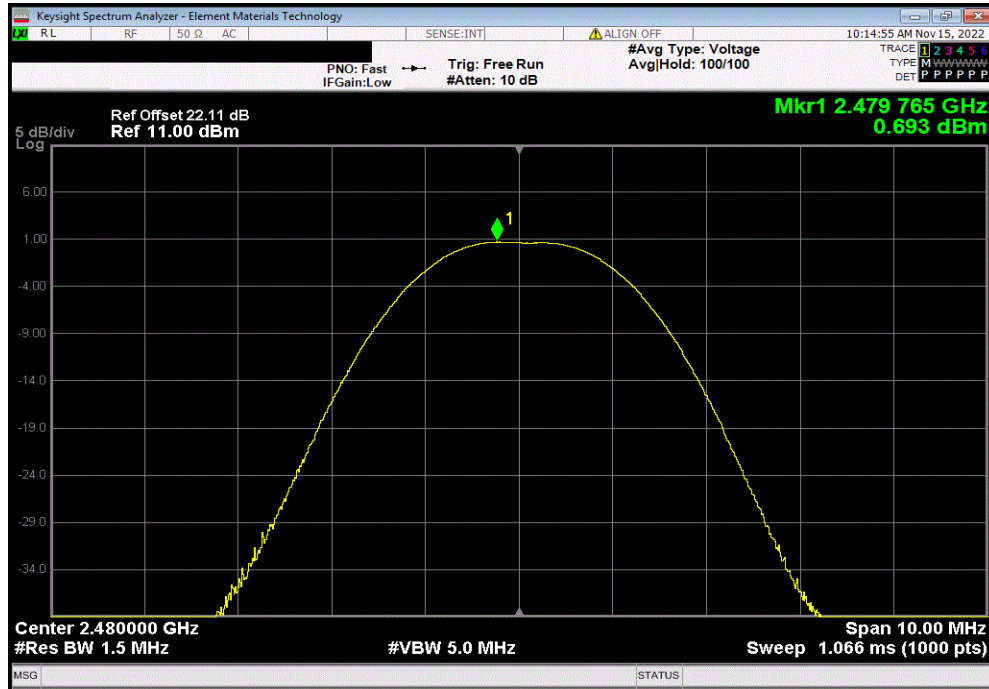


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

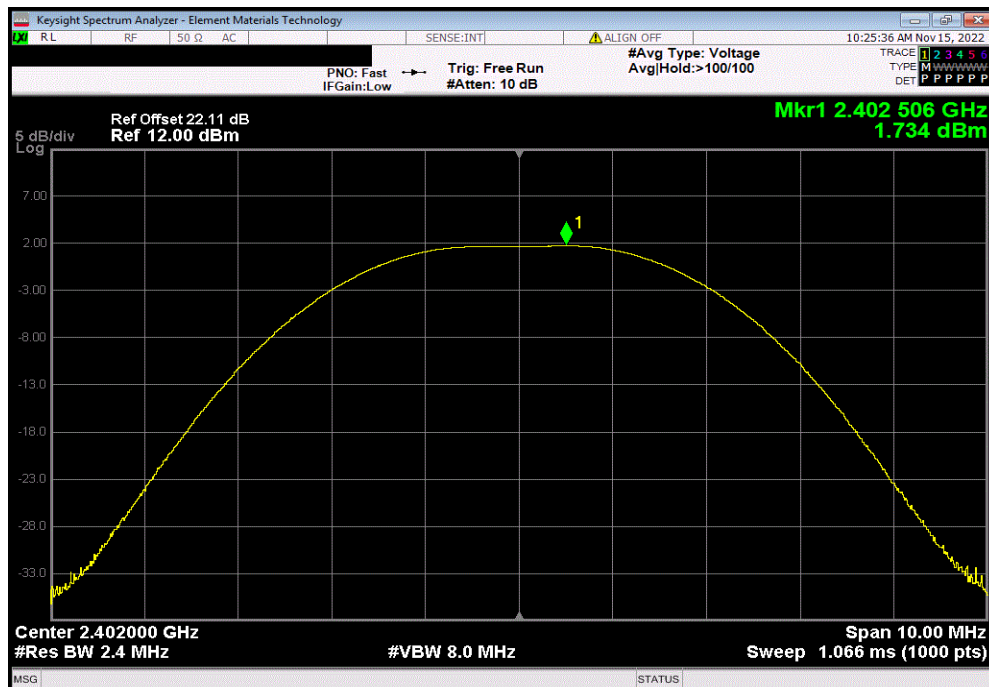


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	0.693	3	3.693	36	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	1.734	3	4.734	36	Pass	

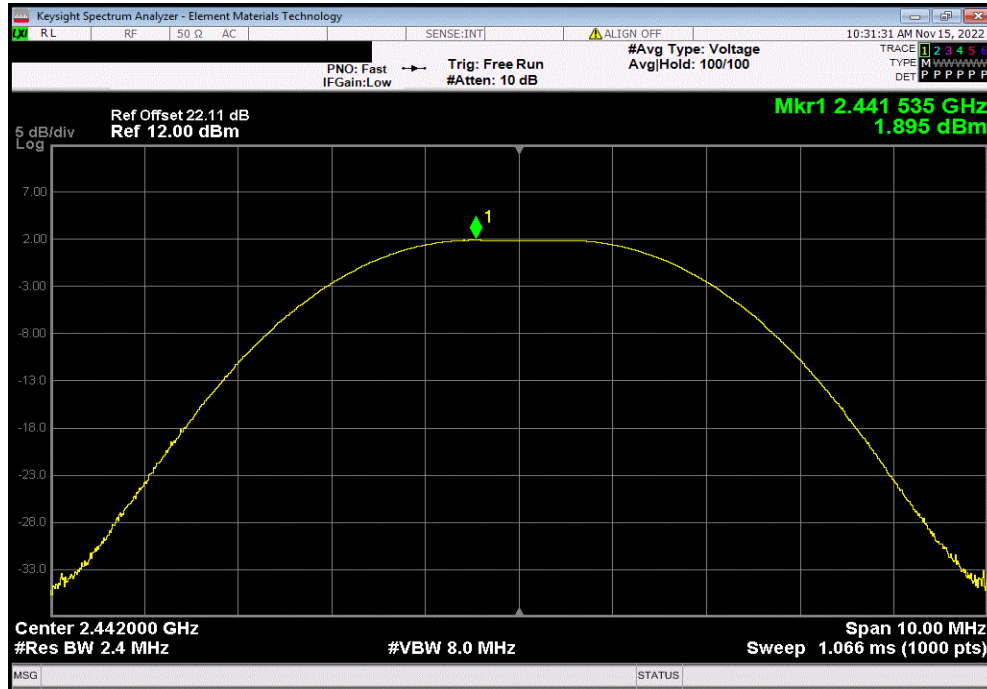


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

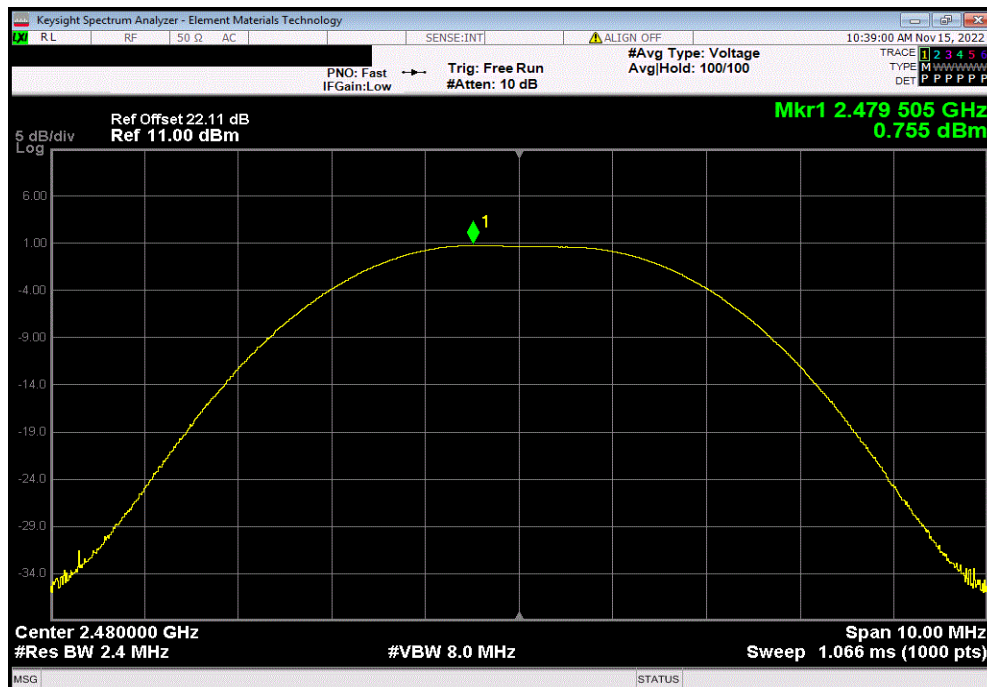


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.895	3	4.895	36	Pass		



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
0.755	3	3.755	36	Pass		



OCCUPIED BANDWIDTH (99%)



XMIT 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	AQI	2023-09-05	2024-09-05
Block - DC	Fairview Microwave	SD3379	ANH	2023-09-05	2024-09-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2023-09-05	2024-09-05
Generator - Signal	Keysight	N5182B	TIK	2022-01-24	2025-01-24
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2023-05-01	2024-05-01

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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%)



TSTx 2022.06.03.0 XMR 2022.02.07.0

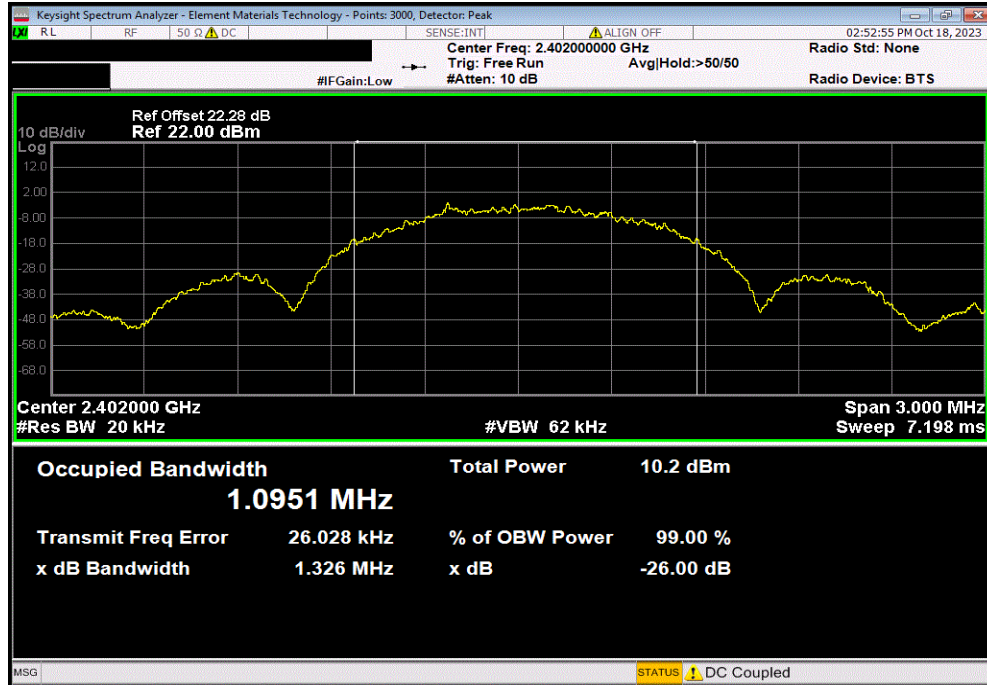
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-5		Date: 18-Oct-23	
Customer: Emerson		Temperature: 22.1 °C	
Attendees: Randy Beuc		Humidity: 40.9% RH	
Project: None		Barometric Pres.: 1003 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2023		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	5	Signature <i>Christopher Heintzelman</i>	
		Value	Limit
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	1.0951 MHz	N/A
	Mid Channel, 2442 MHz	1.1006 MHz	N/A
	High Channel, 2480 MHz	1.0969 MHz	N/A
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	2.067 MHz	N/A
	Mid Channel, 2442 MHz	2.0792 MHz	N/A
	High Channel, 2480 MHz	2.0719 MHz	N/A

OCCUPIED BANDWIDTH (99%)

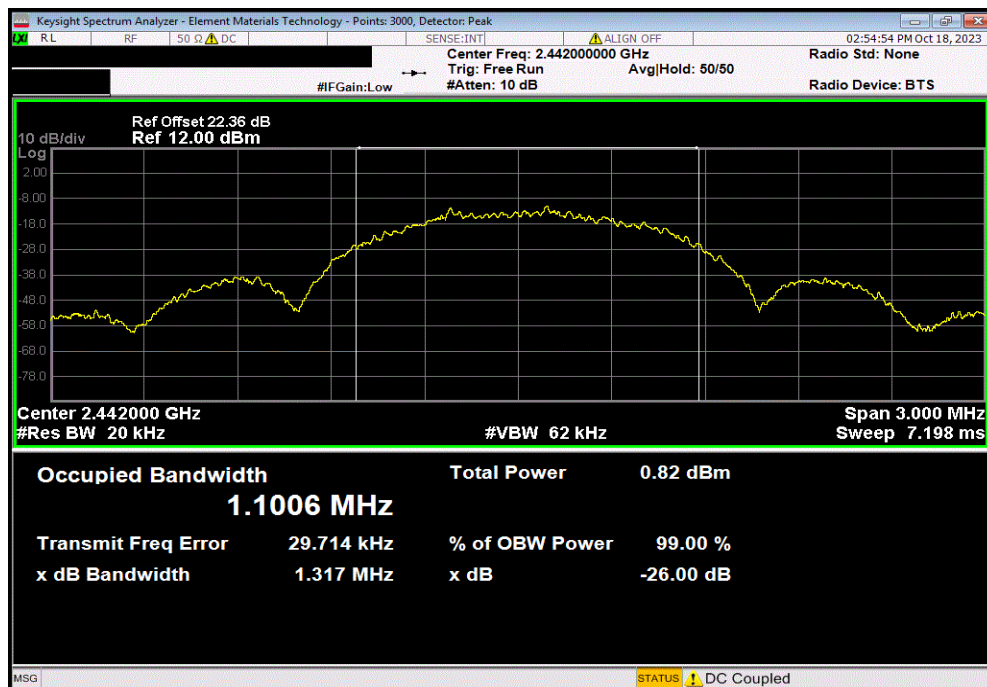


TbTx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value	Limit	Result
				1.0951 MHz	N/A	N/A



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
				Value	Limit	Result
				1.1006 MHz	N/A	N/A

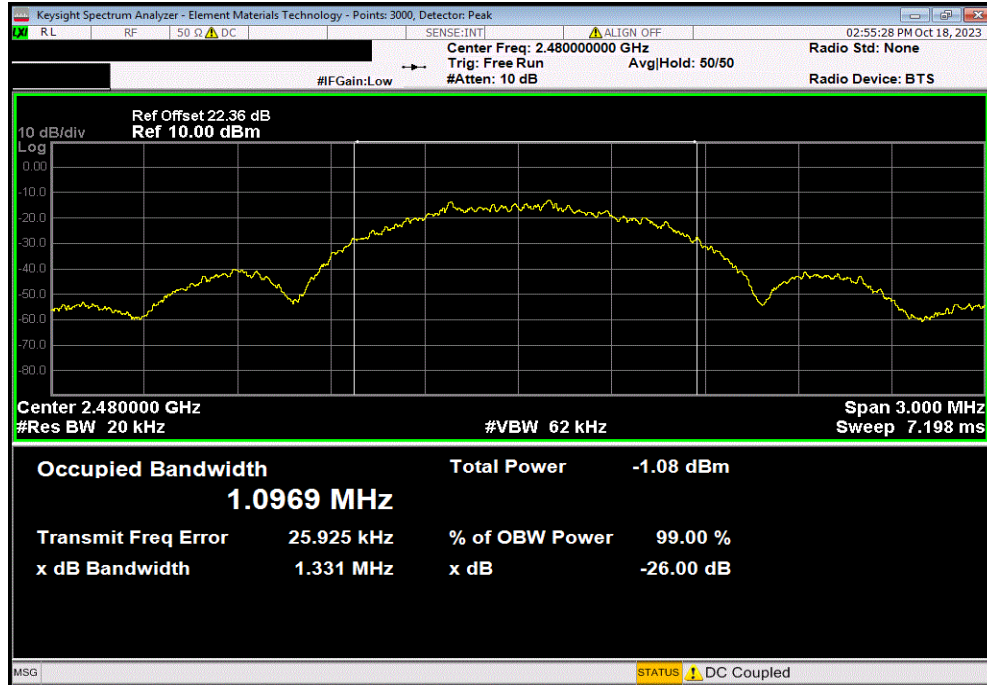


OCCUPIED BANDWIDTH (99%)

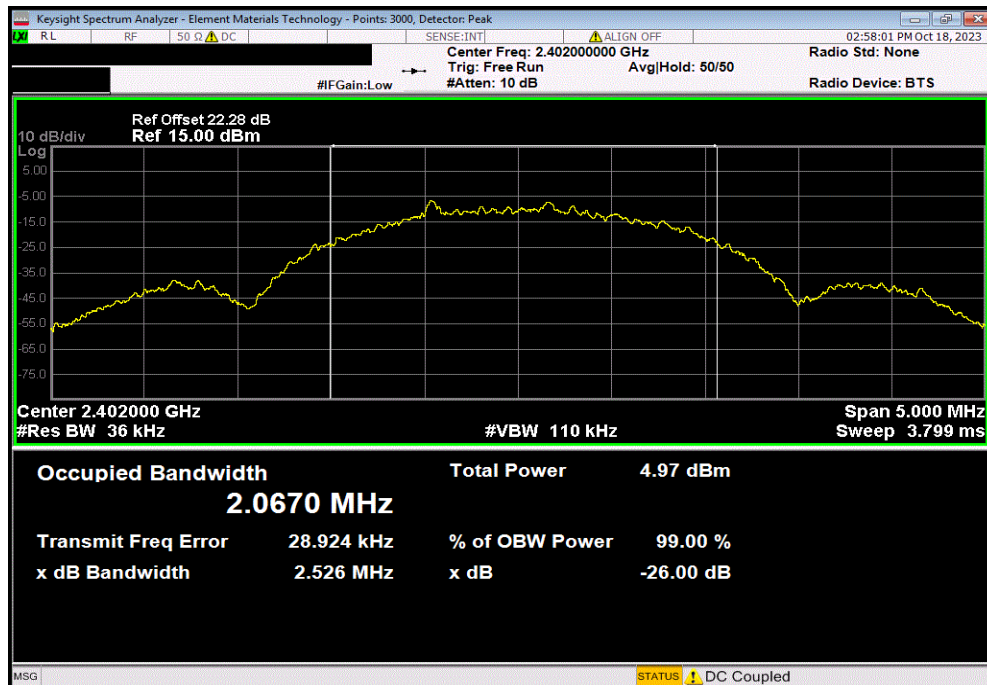


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value	Limit	Result
				1.0969 MHz	N/A	N/A



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

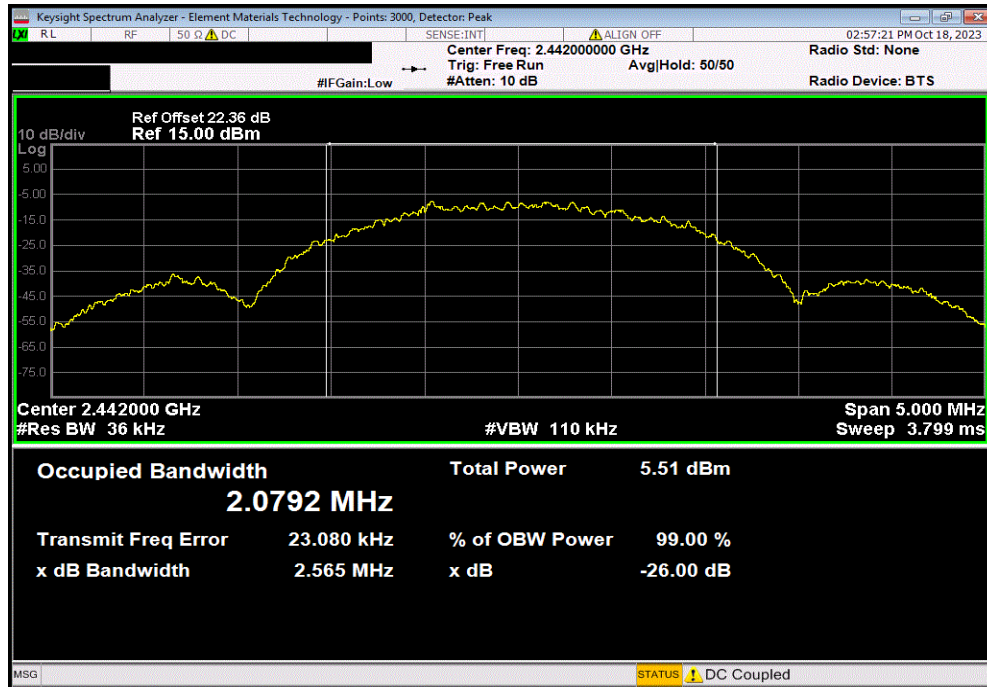


OCCUPIED BANDWIDTH (99%)

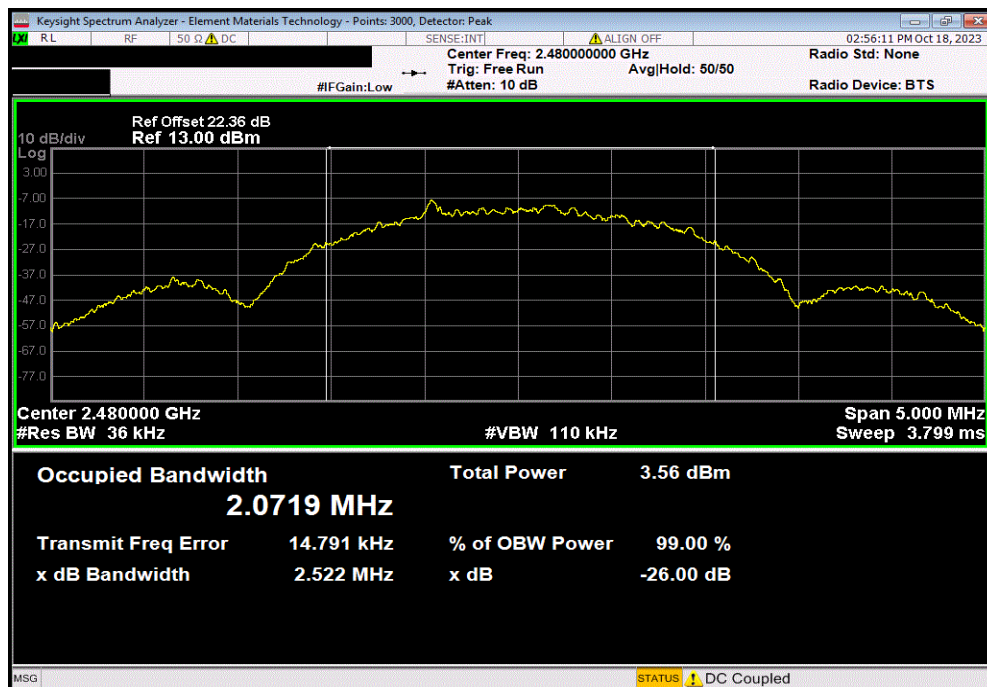


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
				Value	Limit	Result
				2.0792 MHz	N/A	N/A



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Value	Limit	Result
				2.0719 MHz	N/A	N/A



OUTPUT POWER



XMIT 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27

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



TSTx 2022.06.03.0 XMR 2022.02.07.0

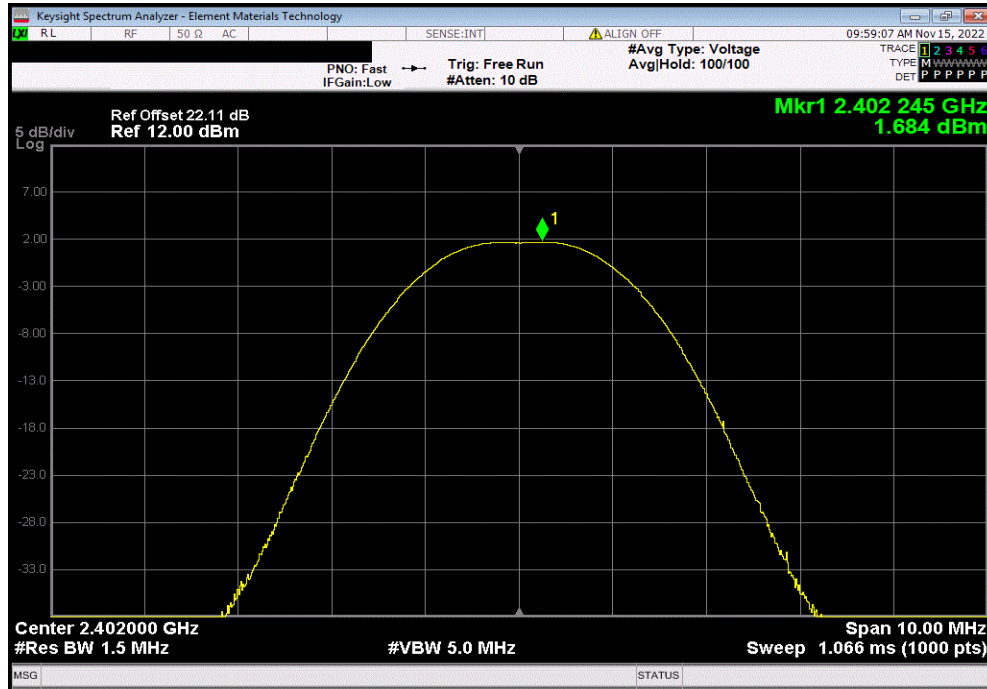
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.8% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		ANSI C63.10:2013	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	1.684	30 Pass
	Mid Channel, 2442 MHz	1.875	30 Pass
	High Channel, 2480 MHz	0.693	30 Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	1.734	30 Pass
	Mid Channel, 2442 MHz	1.895	30 Pass
	High Channel, 2480 MHz	0.755	30 Pass

OUTPUT POWER

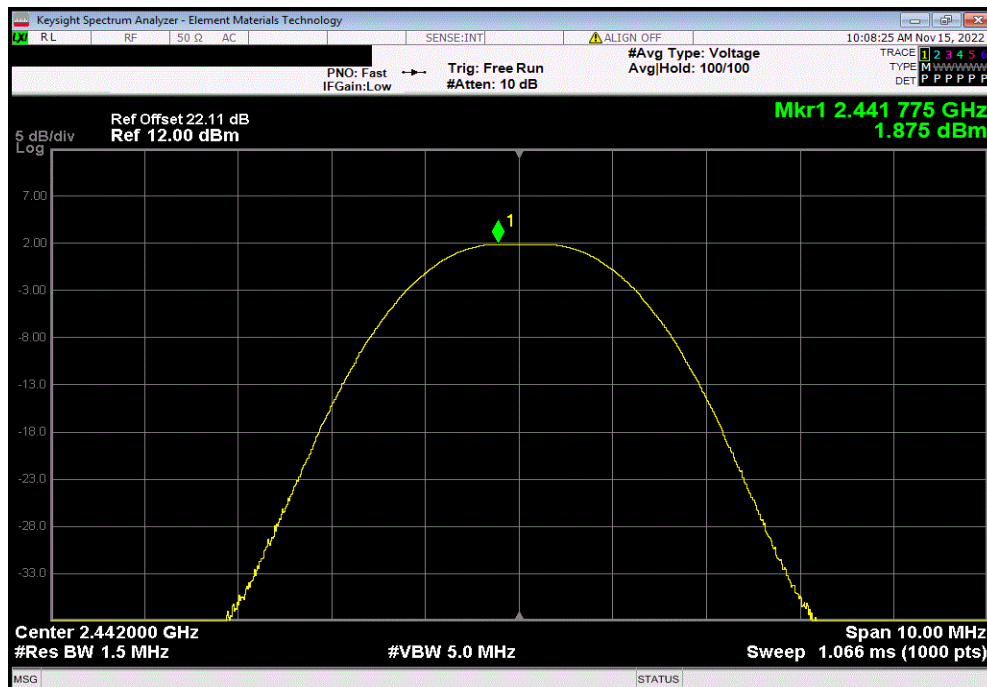


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.684	30	Pass



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.875	30	Pass

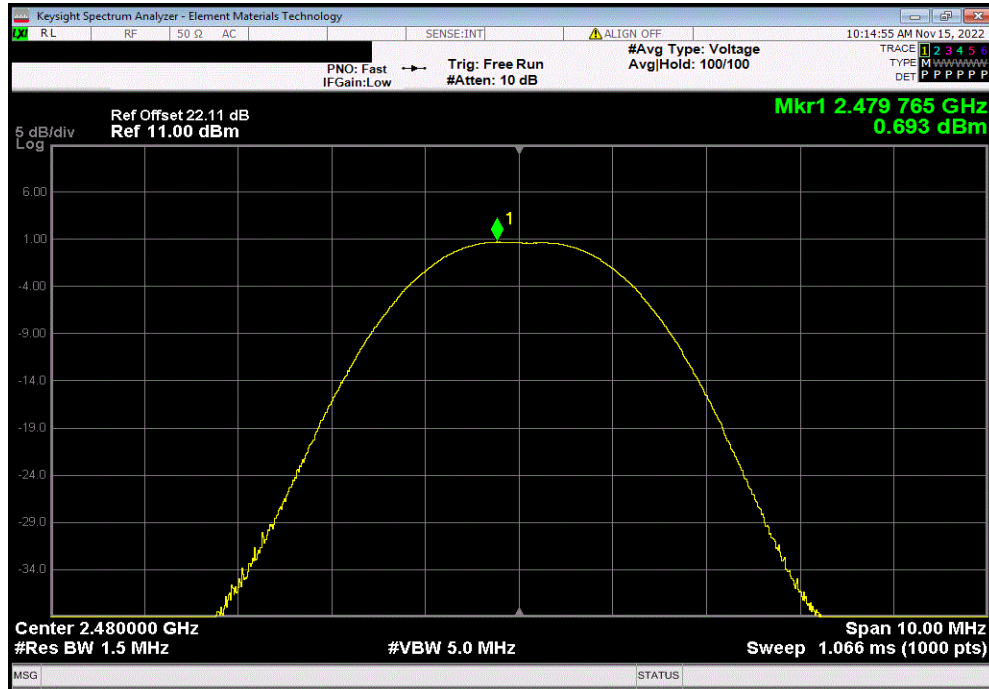


OUTPUT POWER

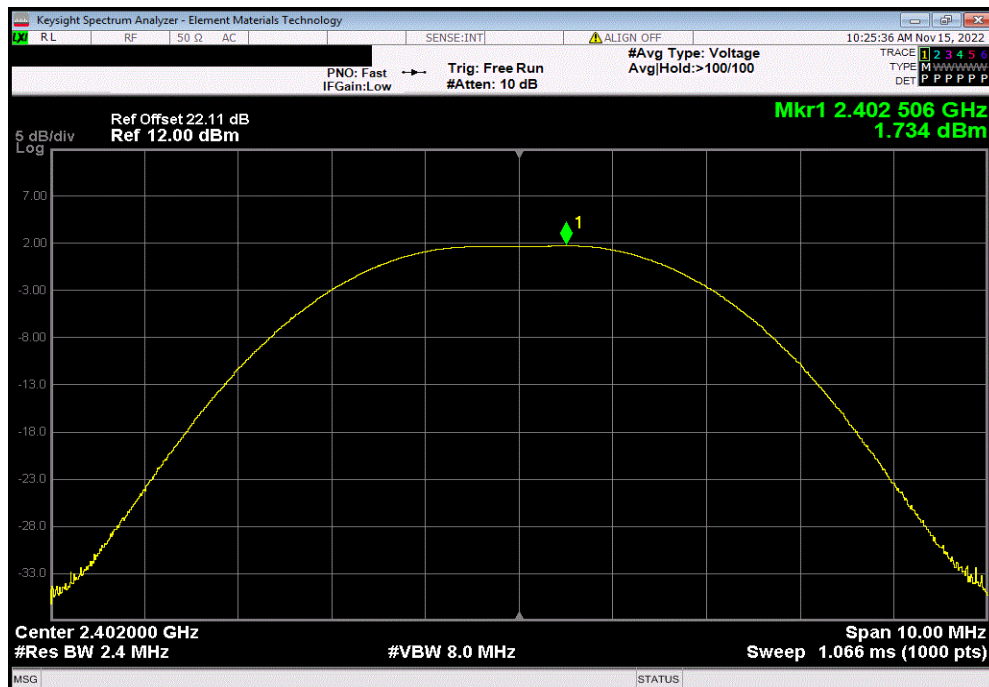


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.693	30	Pass



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.734	30	Pass

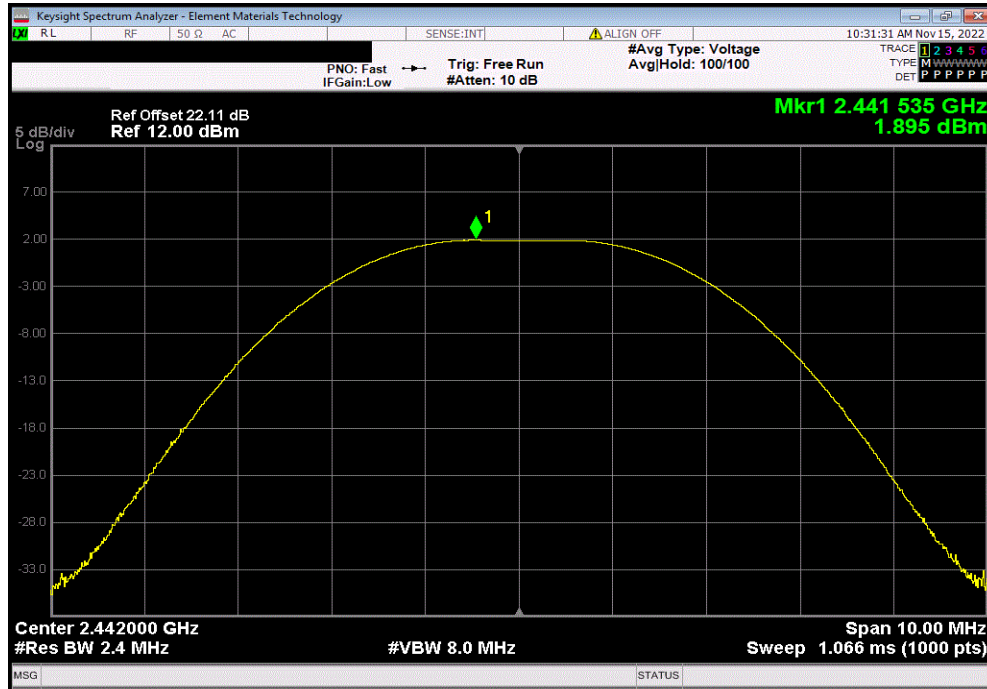


OUTPUT POWER

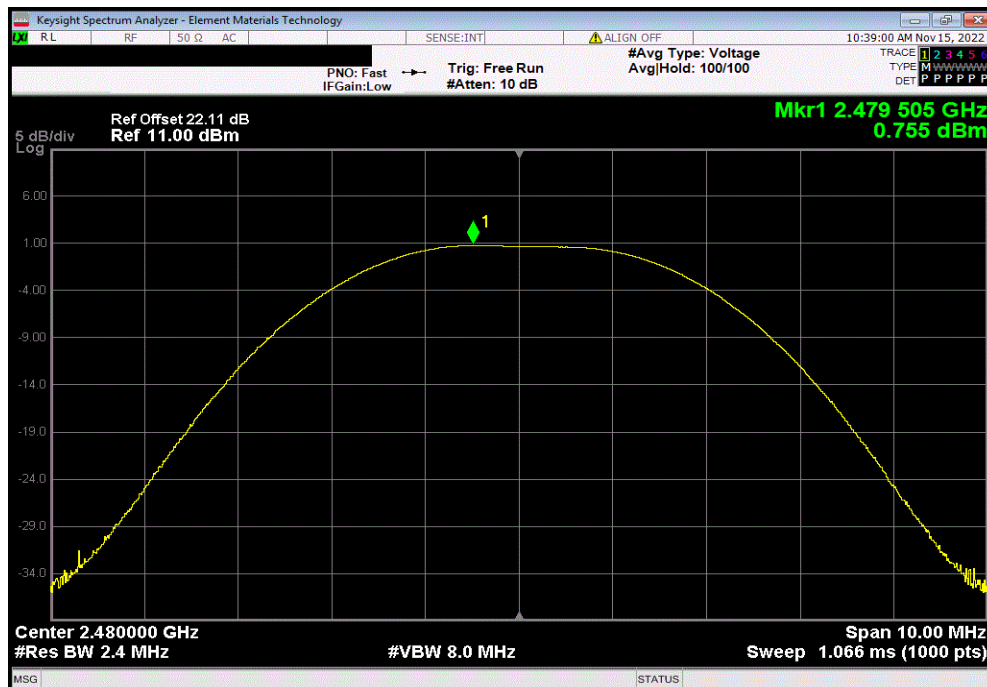


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.895	30	Pass



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.755	30	Pass



POWER SPECTRAL DENSITY



XMR 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10

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



TSMTx 2022.06.03.0 XMt 2022.02.07.0

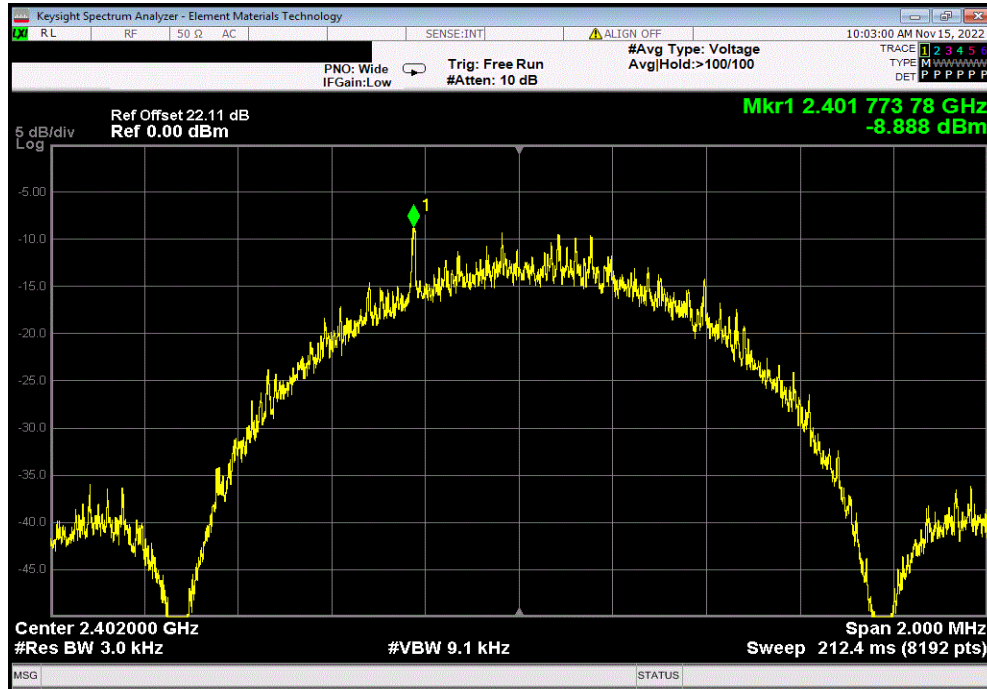
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.8% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
Results			
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz		-8.888	8
Mid Channel, 2442 MHz		-9.134	8
High Channel, 2480 MHz		-9.064	8
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz		-13.433	8
Mid Channel, 2442 MHz		-11.091	8
High Channel, 2480 MHz		-14.083	8

POWER SPECTRAL DENSITY

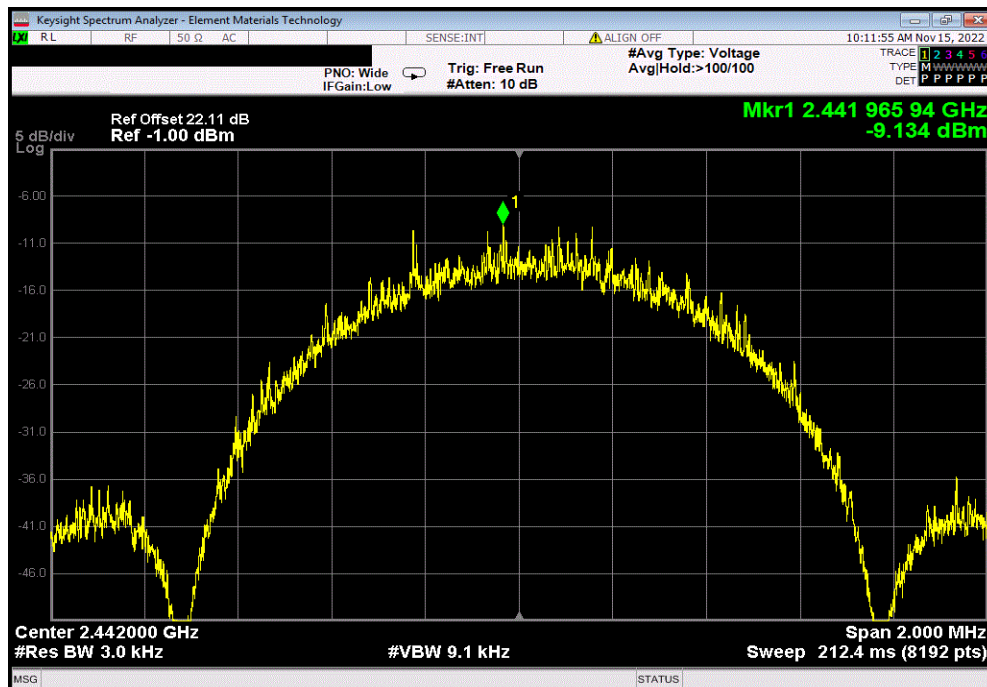


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.888	8	Pass			



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-9.134	8	Pass			

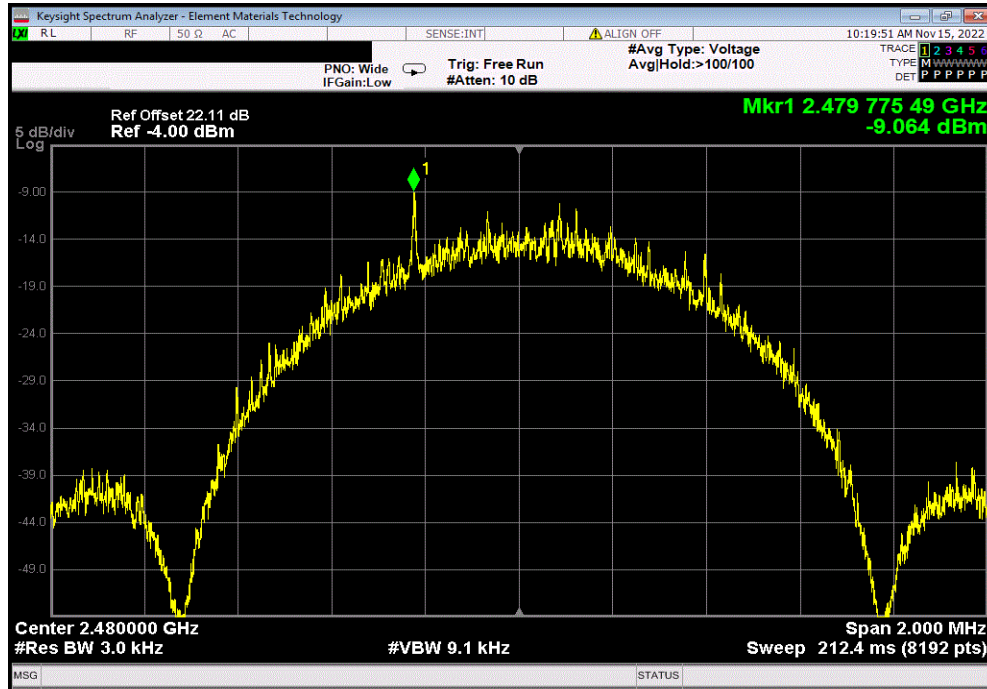


POWER SPECTRAL DENSITY

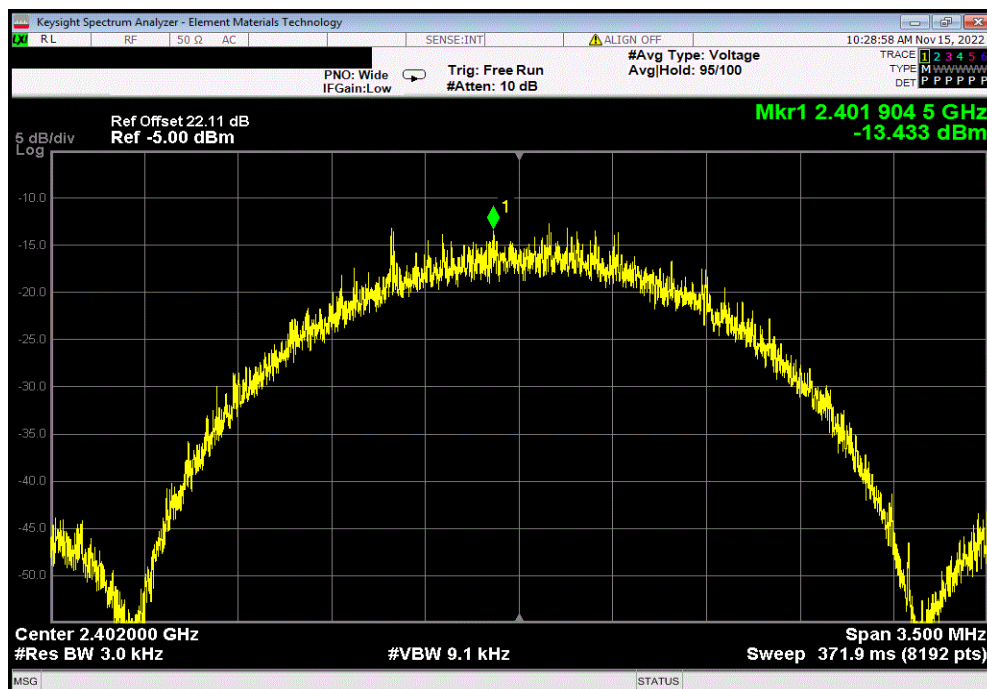


TbTtx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-9.064	8	Pass			



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.433	8	Pass			

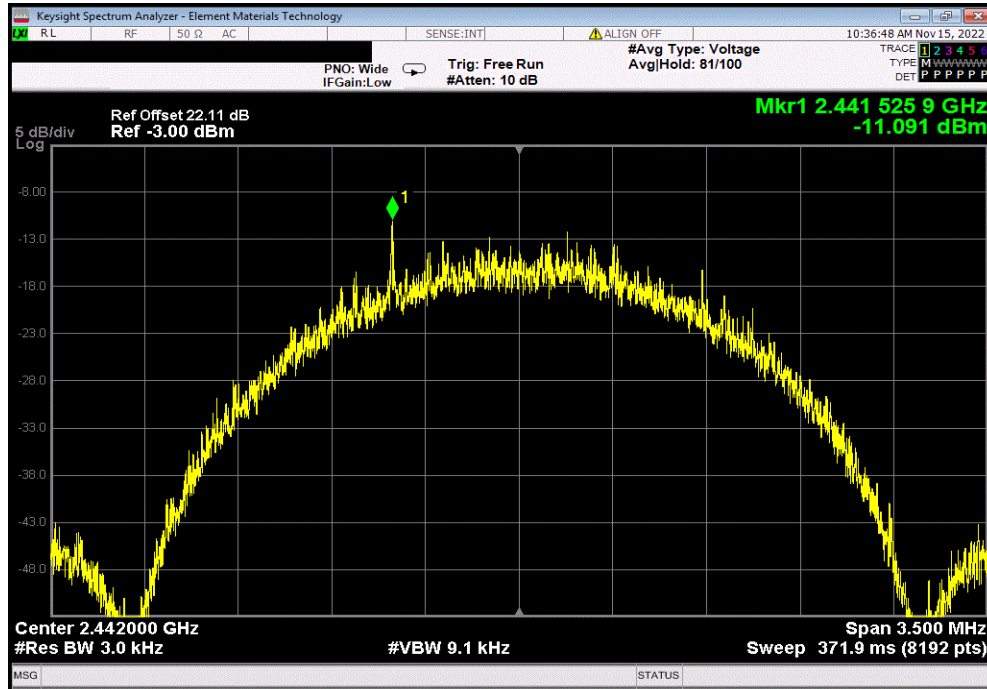


POWER SPECTRAL DENSITY

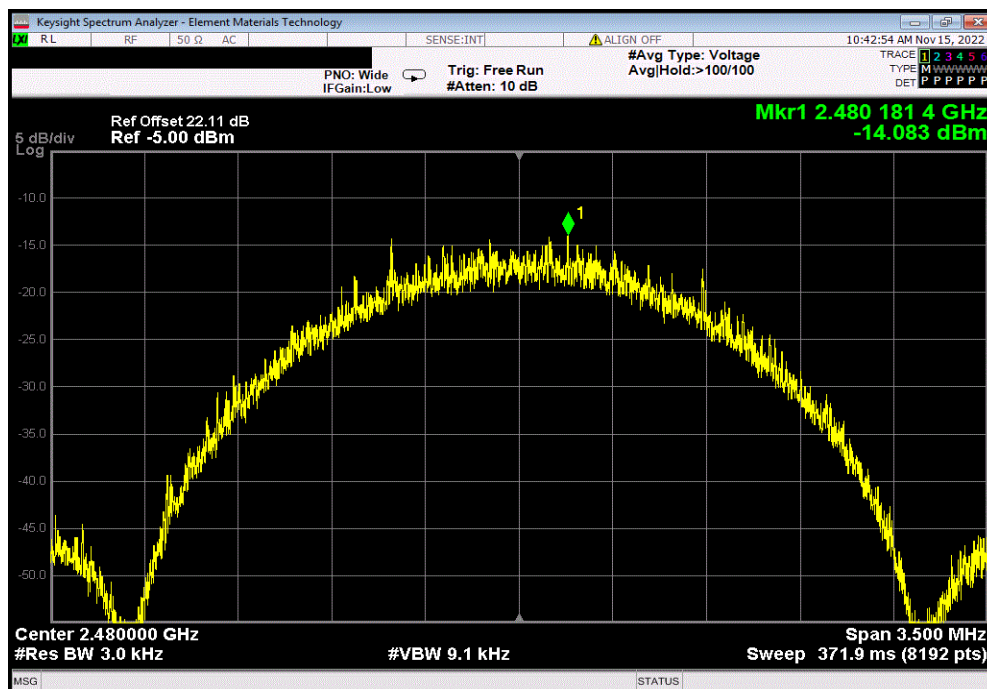


TbTtX 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-11.091	8	Pass			



BLE/GFSK 2 Mbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-14.083	8	Pass			



POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss Instruments	TDEMI 30M	ARS	2022-04-20	2023-04-20
Filter - High Pass	TTE	H97-100K-50-720B	HGN	NCR	NCR
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2022-04-04	2023-04-04
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2022-03-07	2023-03-07

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

EMPM0139-3

MODES INVESTIGATED

Tx - Bluetooth, 1 Mbps, Mid Ch = 2442 MHz

POWERLINE CONDUCTED EMISSIONS

EUT:	EMR303	Work Order:	EMPM0139
Serial Number:	A2-8	Date:	2022-11-21
Customer:	Emerson	Temperature:	20.2°C
Attendees:	Randy Beuc	Relative Humidity:	22.5%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mb
Tested By:	Ko Vorasarn	Job Site:	MN03
Power:	120VAC/60Hz	Configuration:	EMPM0139-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.4:2014
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	1	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

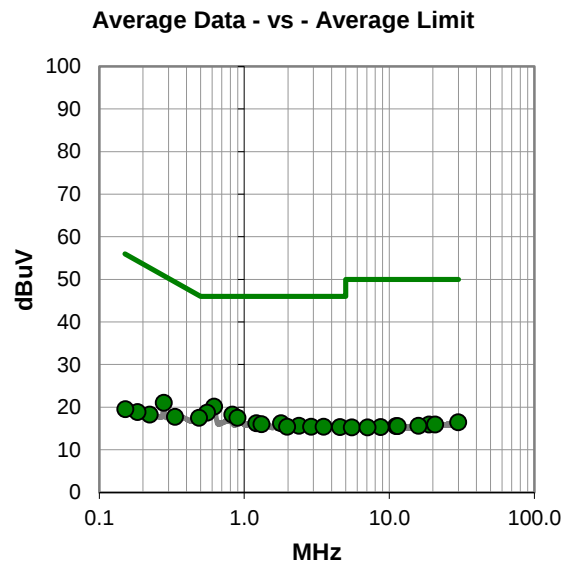
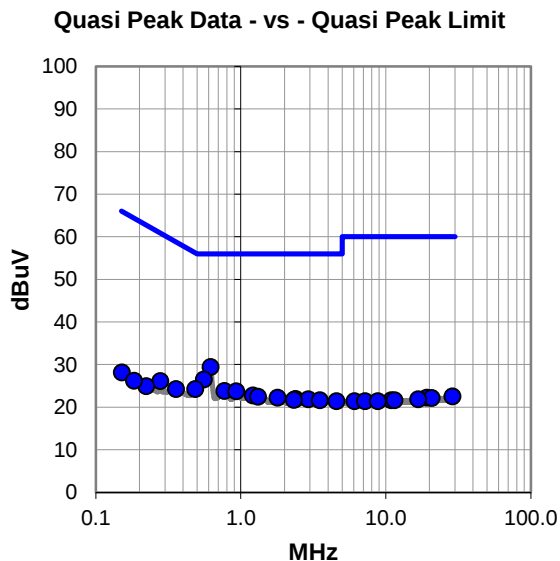
5VDC via 120VAC/60Hz

EUT OPERATING MODES

Tx - Bluetooth, 1 Mbps, Mid Ch = 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #1

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.618	9.1	20.3	29.4	56.0	-26.6
0.556	6.2	20.3	26.5	56.0	-29.5
0.486	3.9	20.3	24.2	56.2	-32.0
0.773	3.6	20.2	23.8	56.0	-32.2
0.933	3.5	20.2	23.7	56.0	-32.3
1.212	2.5	20.2	22.7	56.0	-33.3
1.316	2.2	20.2	22.4	56.0	-33.6
1.795	1.9	20.3	22.2	56.0	-33.8
2.391	1.5	20.4	21.9	56.0	-34.1
2.924	1.4	20.4	21.8	56.0	-34.2
2.326	1.3	20.4	21.7	56.0	-34.3
3.508	1.1	20.5	21.6	56.0	-34.4
0.358	3.9	20.3	24.2	58.8	-34.6
4.576	0.9	20.5	21.4	56.0	-34.6
0.278	5.8	20.3	26.1	60.9	-34.8
28.954	0.0	22.5	22.5	60.0	-37.5
19.218	0.5	21.7	22.2	60.0	-37.8
0.152	7.4	20.7	28.1	65.9	-37.8
0.223	4.5	20.4	24.9	62.7	-37.8
20.759	0.3	21.8	22.1	60.0	-37.9
0.184	5.7	20.5	26.2	64.3	-38.1
16.737	0.2	21.6	21.8	60.0	-38.2
10.944	0.3	21.3	21.6	60.0	-38.4
11.517	0.2	21.4	21.6	60.0	-38.4
6.085	0.7	20.7	21.4	60.0	-38.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.618	-0.2	20.3	20.1	46.0	-25.9
0.554	-1.6	20.3	18.7	46.0	-27.3
0.829	-2.0	20.2	18.2	46.0	-27.8
0.898	-2.7	20.2	17.5	46.0	-28.5
0.489	-2.8	20.3	17.5	46.2	-28.7
1.215	-4.0	20.2	16.2	46.0	-29.8
1.795	-4.1	20.3	16.2	46.0	-29.8
0.278	0.7	20.3	21.0	50.9	-29.9
1.319	-4.2	20.2	16.0	46.0	-30.0
2.391	-4.8	20.4	15.6	46.0	-30.4
1.981	-4.9	20.3	15.4	46.0	-30.6
2.895	-5.0	20.4	15.4	46.0	-30.6
3.534	-5.1	20.5	15.4	46.0	-30.6
4.578	-5.2	20.5	15.3	46.0	-30.7
0.333	-2.6	20.3	17.7	49.4	-31.7
29.885	-6.1	22.5	16.4	50.0	-33.6
18.841	-5.8	21.7	15.9	50.0	-34.1
20.751	-5.9	21.8	15.9	50.0	-34.1
15.896	-6.0	21.6	15.6	50.0	-34.4
0.223	-2.2	20.4	18.2	52.7	-34.5
11.151	-5.9	21.4	15.5	50.0	-34.5
11.467	-5.9	21.4	15.5	50.0	-34.5
8.759	-5.7	21.0	15.3	50.0	-34.7
5.532	-5.4	20.6	15.2	50.0	-34.8
7.083	-5.6	20.8	15.2	50.0	-34.8

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	EMR303	Work Order:	EMPM0139
Serial Number:	A2-8	Date:	2022-11-21
Customer:	Emerson	Temperature:	20.2°C
Attendees:	Randy Beuc	Relative Humidity:	22.5%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mb
Tested By:	Ko Vorasarn	Job Site:	MN03
Power:	120VAC/60Hz	Configuration:	EMPM0139-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.4:2014
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	2	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

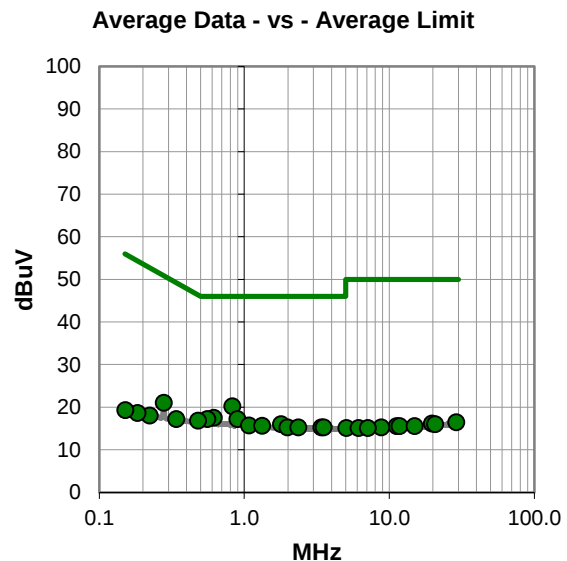
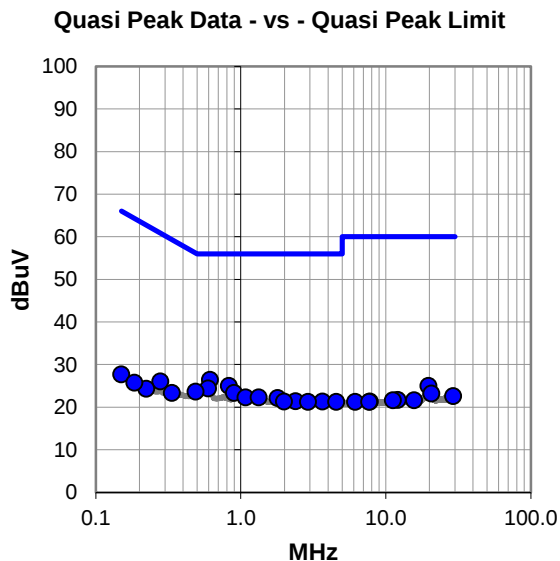
5VDC via 120VAC/60Hz

EUT OPERATING MODES

Tx - Bluetooth, 1 Mbps, Mid Ch = 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.614	6.1	20.3	26.4	56.0	-29.6
0.831	4.8	20.2	25.0	56.0	-31.0
0.596	4.1	20.3	24.4	56.0	-31.6
0.487	3.3	20.3	23.6	56.2	-32.6
0.898	3.1	20.2	23.3	56.0	-32.7
1.081	2.1	20.2	22.3	56.0	-33.7
1.329	2.1	20.2	22.3	56.0	-33.7
1.795	1.8	20.3	22.1	56.0	-33.9
2.385	1.0	20.4	21.4	56.0	-34.6
1.986	1.0	20.3	21.3	56.0	-34.7
3.652	0.8	20.5	21.3	56.0	-34.7
2.915	0.8	20.4	21.2	56.0	-34.8
4.560	0.7	20.5	21.2	56.0	-34.8
0.278	5.7	20.3	26.0	60.9	-34.9
19.723	3.3	21.7	25.0	60.0	-35.0
0.335	3.0	20.3	23.3	59.3	-36.0
20.661	1.4	21.8	23.2	60.0	-36.8
29.107	0.1	22.5	22.6	60.0	-37.4
0.150	7.0	20.7	27.7	66.0	-38.3
12.094	0.3	21.4	21.7	60.0	-38.3
11.229	0.2	21.4	21.6	60.0	-38.4
15.706	0.1	21.5	21.6	60.0	-38.4
0.223	3.9	20.4	24.3	62.7	-38.4
0.185	5.2	20.5	25.7	64.3	-38.6
7.770	0.4	20.9	21.3	60.0	-38.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.831	0.0	20.2	20.2	46.0	-25.8
0.615	-2.8	20.3	17.5	46.0	-28.5
0.557	-3.1	20.3	17.2	46.0	-28.8
0.898	-3.0	20.2	17.2	46.0	-28.8
0.480	-3.5	20.3	16.8	46.3	-29.5
0.278	0.7	20.3	21.0	50.9	-29.9
1.795	-4.3	20.3	16.0	46.0	-30.0
1.079	-4.5	20.2	15.7	46.0	-30.3
1.328	-4.6	20.2	15.6	46.0	-30.4
1.984	-5.1	20.3	15.2	46.0	-30.8
2.365	-5.2	20.4	15.2	46.0	-30.8
3.415	-5.3	20.5	15.2	46.0	-30.8
3.534	-5.3	20.5	15.2	46.0	-30.8
0.341	-3.1	20.3	17.2	49.2	-32.0
29.049	-6.1	22.5	16.4	50.0	-33.6
19.685	-5.6	21.7	16.1	50.0	-33.9
20.747	-5.8	21.8	16.0	50.0	-34.0
11.282	-5.9	21.4	15.5	50.0	-34.5
11.819	-5.9	21.4	15.5	50.0	-34.5
15.021	-6.0	21.5	15.5	50.0	-34.5
0.223	-2.4	20.4	18.0	52.7	-34.7
8.824	-5.8	21.0	15.2	50.0	-34.8
5.065	-5.5	20.6	15.1	50.0	-34.9
6.146	-5.6	20.7	15.1	50.0	-34.9
7.141	-5.7	20.8	15.1	50.0	-34.9

CONCLUSION

Pass



Tested By

SPURIOUS CONDUCTED EMISSIONS



XMIT 2022.02.07.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Attenuator	S.M. Electronics	SA26B-20	TZP	2022-11-06	2023-11-06
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Generator - Signal	Keysight	N5182B	TET	2021-08-27	2024-08-27
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = "Internal" cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

SPURIOUS CONDUCTED EMISSIONS



TSTx 2022.06.03.0 XMR 2022.02.07.0

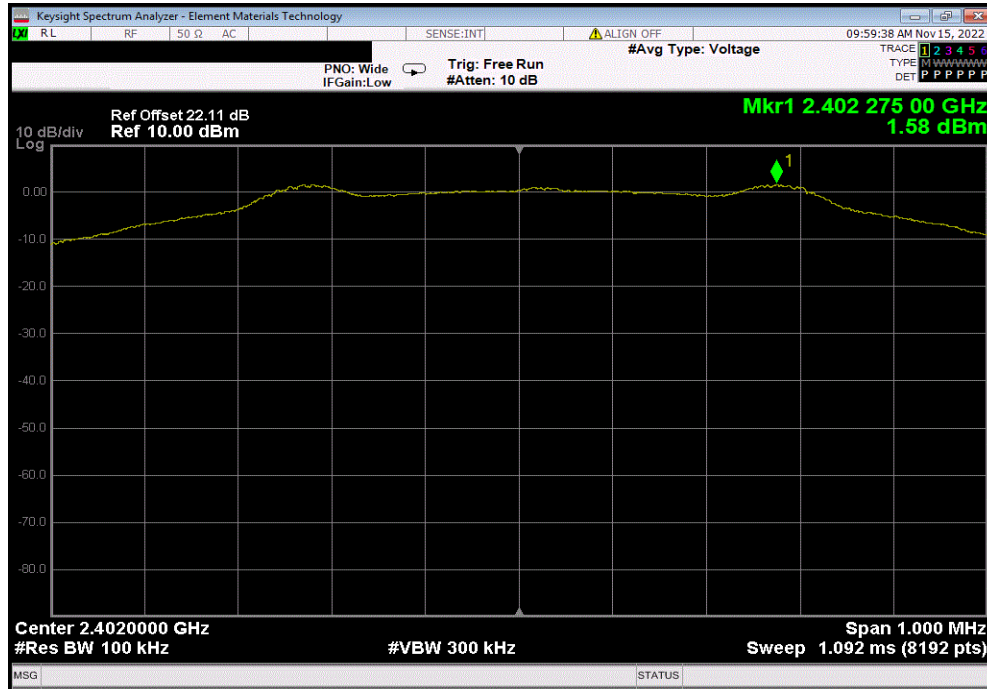
EUT: EMR303		Work Order: EMPM0139	
Serial Number: A2-8		Date: 15-Nov-22	
Customer: Emerson		Temperature: 21.2 °C	
Attendees: Randy Beuc		Humidity: 27.8% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via adapter at 120VAC/60Hz	
Job Site: MN11			
TEST SPECIFICATIONS			
FCC 15.247:2022		ANSI C63.10:2013	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
RSS-Gen Issue 5:2018+A1:2019+A2:2021		ANSI C63.10:2013	
COMMENTS			
Reference Level Offset includes measurement cable, attenuator, DC block, and customer's patch cable. The customer declared the patch cable to be 0.81dB loss.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Frequency Range	Measured Freq (MHz)
			Max Value (dBc)
			Limit ≤ (dBc)
			Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	Fundamental	2402.27
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	3051.97
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24943.54
	Mid Channel, 2442 MHz	Fundamental	2441.78
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	6911.26
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24935.91
	High Channel, 2480 MHz	Fundamental	2479.78
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	7695.3
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	24819.92
BLE/GFSK 2 Mbps			
	Low Channel, 2402 MHz	Fundamental	2402.02
	Low Channel, 2402 MHz	30 MHz - 12.5 GHz	12087.43
	Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24984.74
	Mid Channel, 2442 MHz	Fundamental	2442
	Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	1861.45
	Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24830.61
	High Channel, 2480 MHz	Fundamental	2479.52
	High Channel, 2480 MHz	30 MHz - 12.5 GHz	9307.52
	High Channel, 2480 MHz	12.5 GHz - 25 GHz	24977.11

SPURIOUS CONDUCTED EMISSIONS

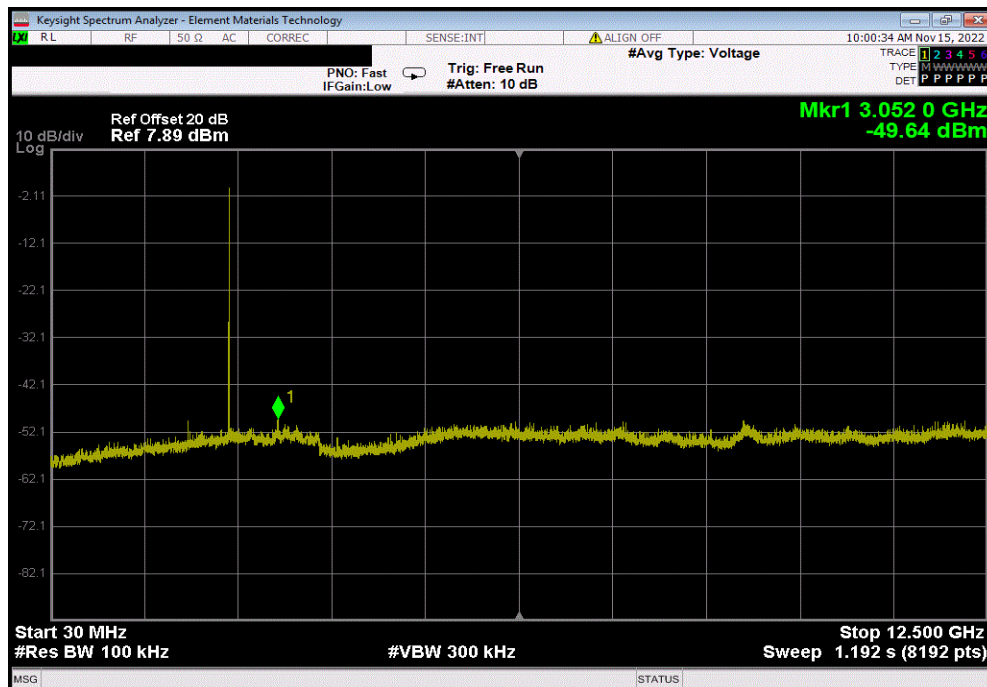


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2402.27	N/A	N/A	N/A		



BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	3051.97	-51.22	-20	Pass		

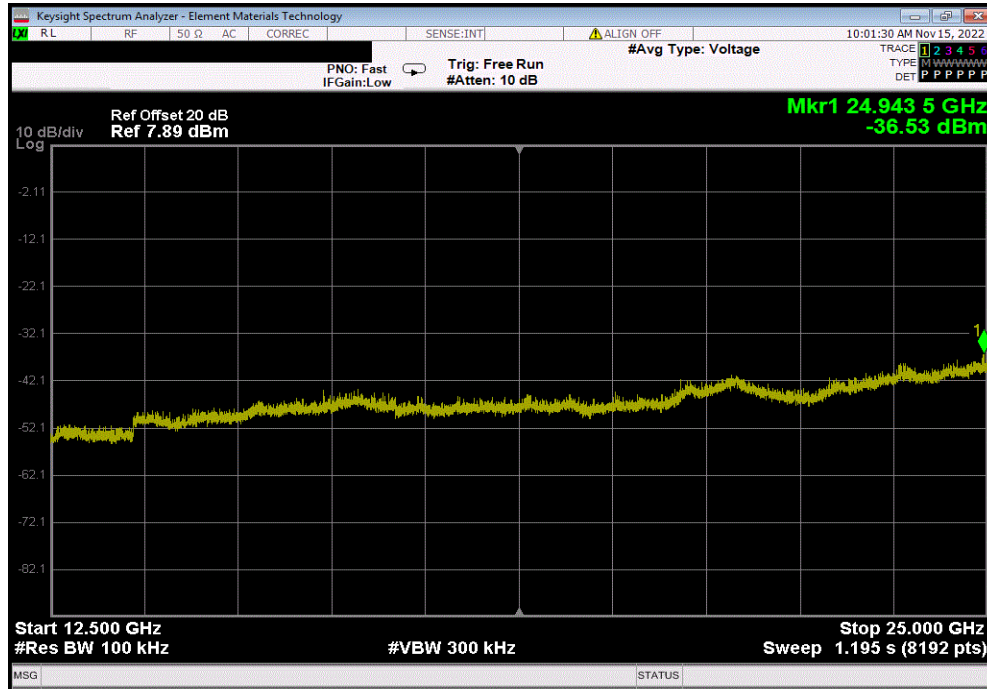


SPURIOUS CONDUCTED EMISSIONS

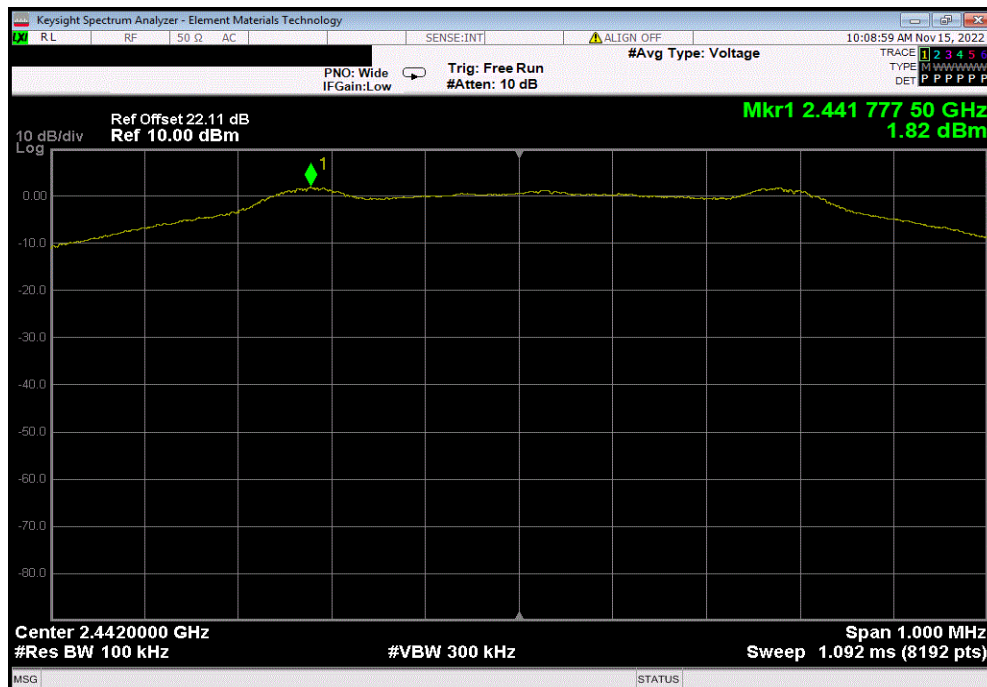


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24943.54	-38.11	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2441.78	N/A	N/A	N/A	

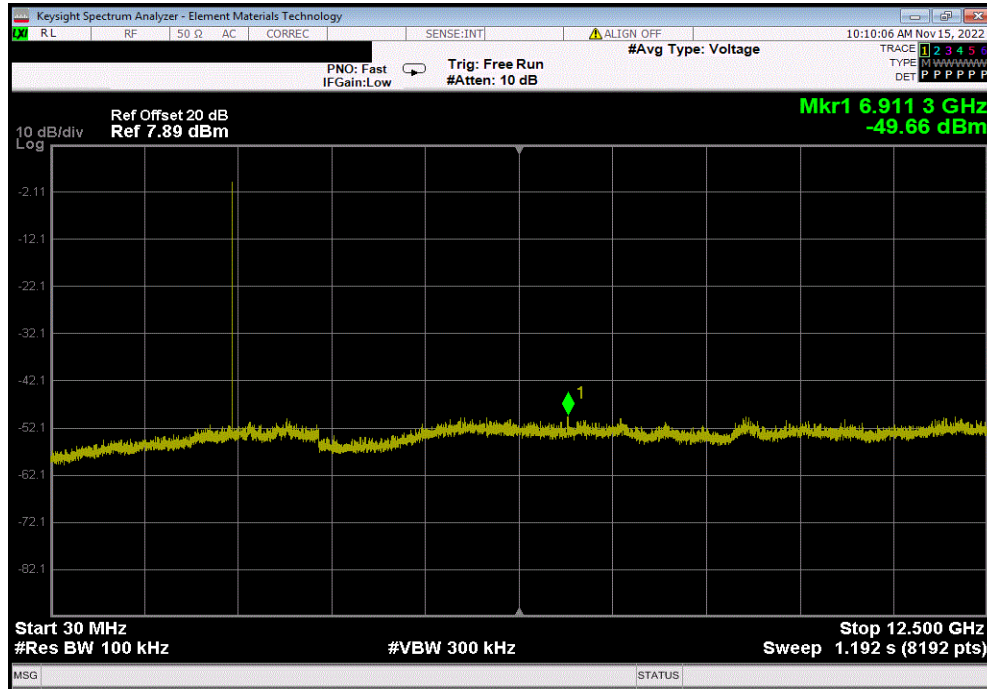


SPURIOUS CONDUCTED EMISSIONS

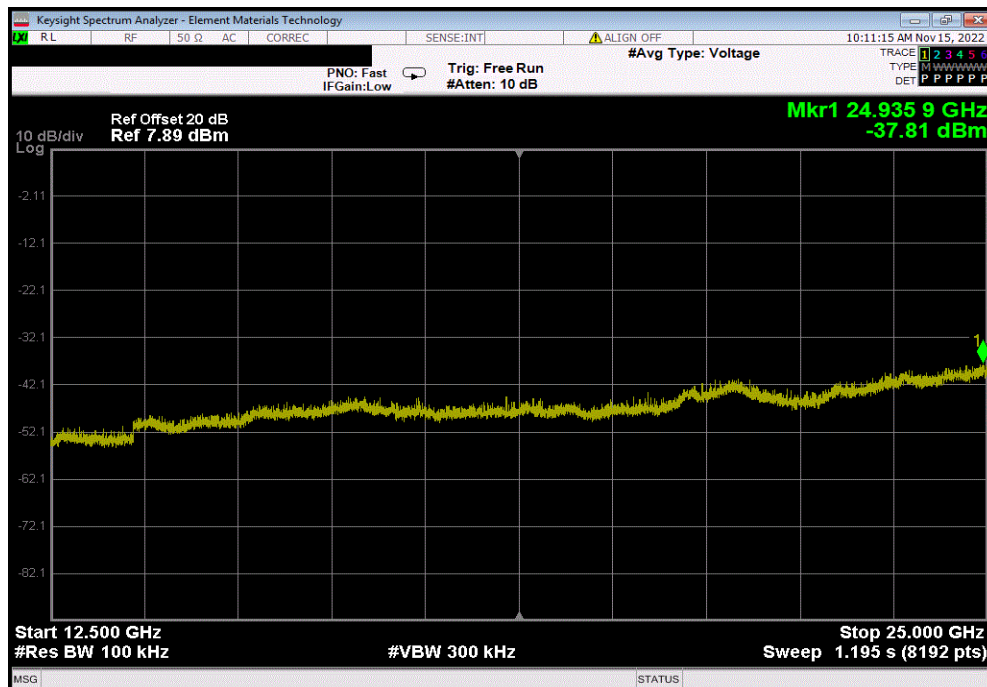


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	6911.26	-51.48	-20	Pass	



BLE/GFSK 1 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24935.91	-39.63	-20	Pass	

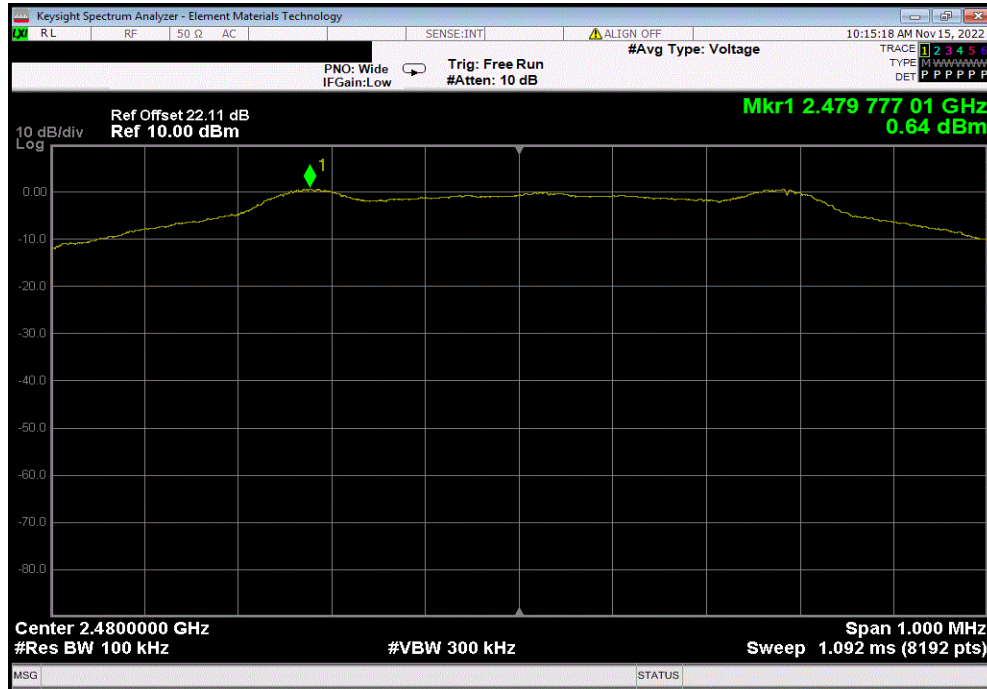


SPURIOUS CONDUCTED EMISSIONS

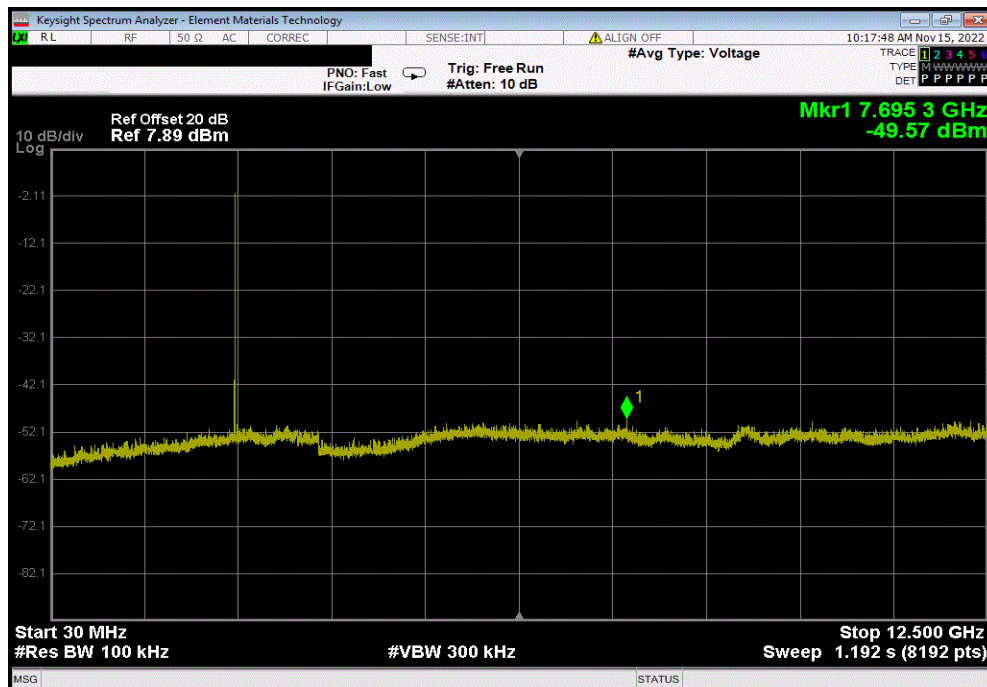


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2479.78	N/A	N/A	N/A		



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	7695.3	-50.21	-20	Pass		

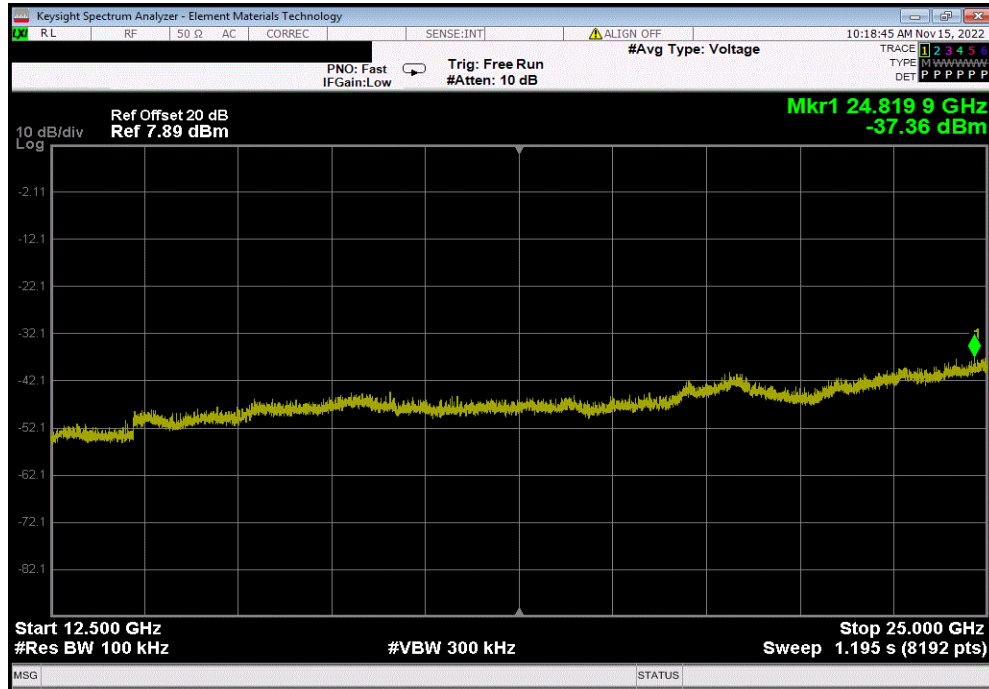


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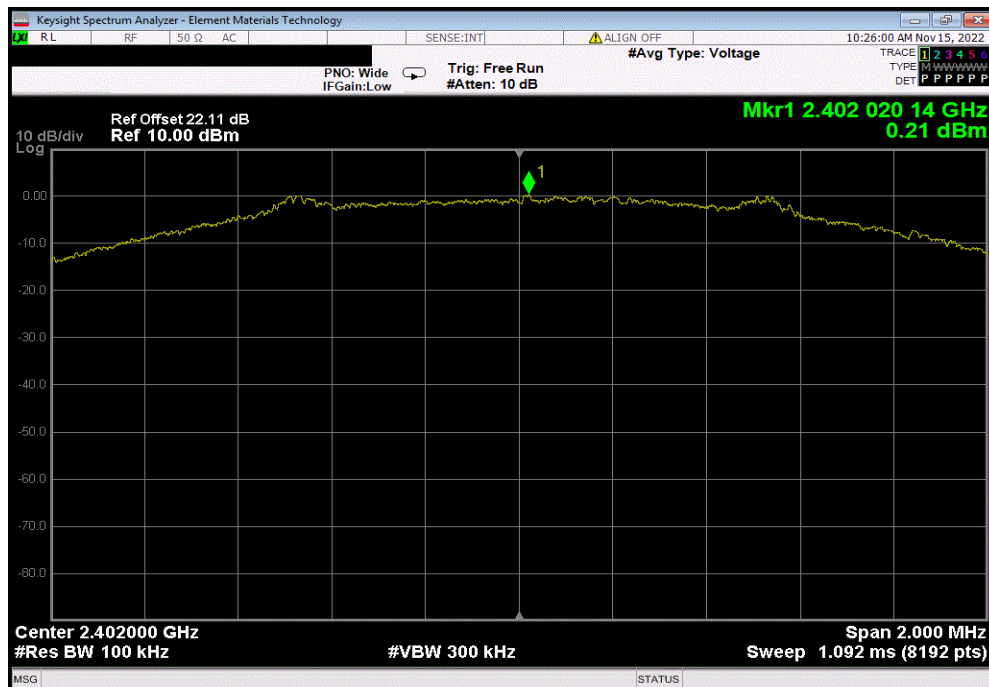


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24819.92	-38	-20	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2402.02	N/A	N/A	N/A	

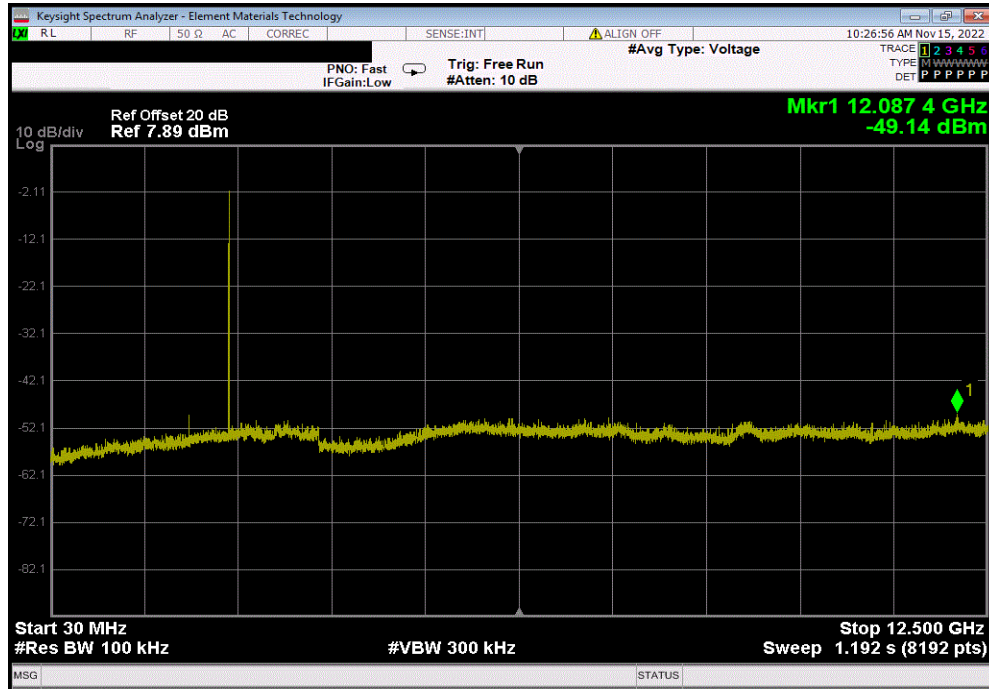


SPURIOUS CONDUCTED EMISSIONS

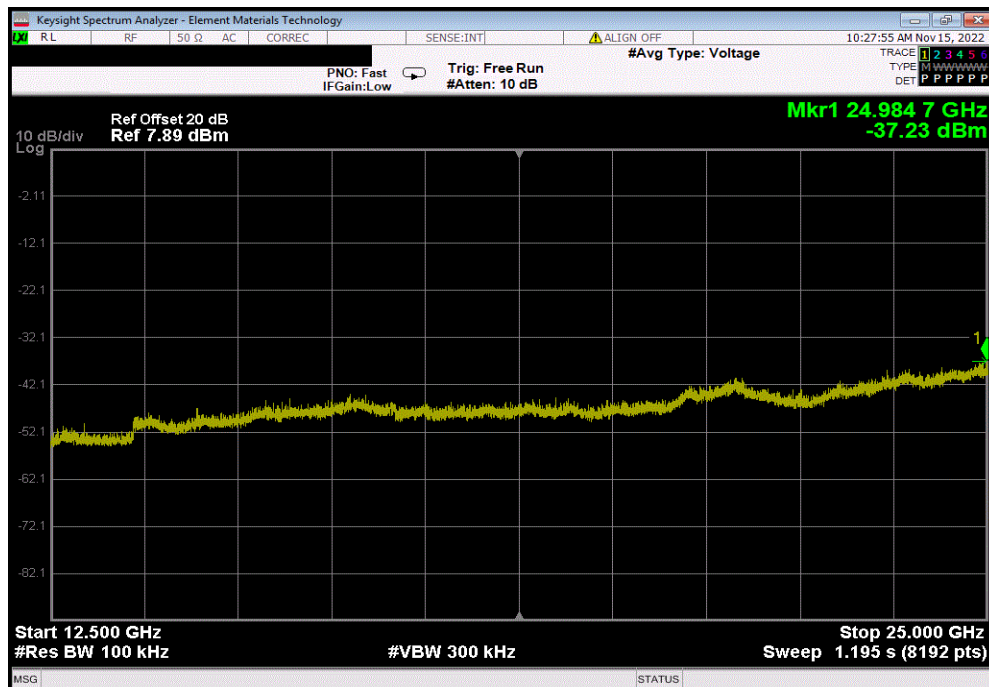


TbTx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12087.43	-49.35	-20	Pass	



BLE/GFSK 2 Mbps, Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24984.74	-37.45	-20	Pass	

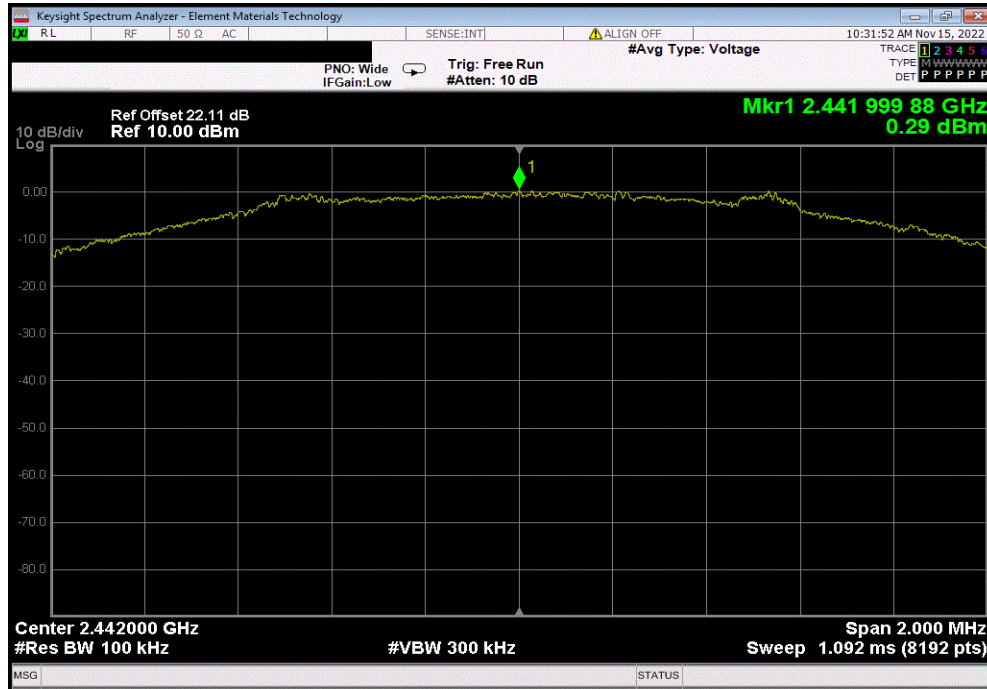


SPURIOUS CONDUCTED EMISSIONS

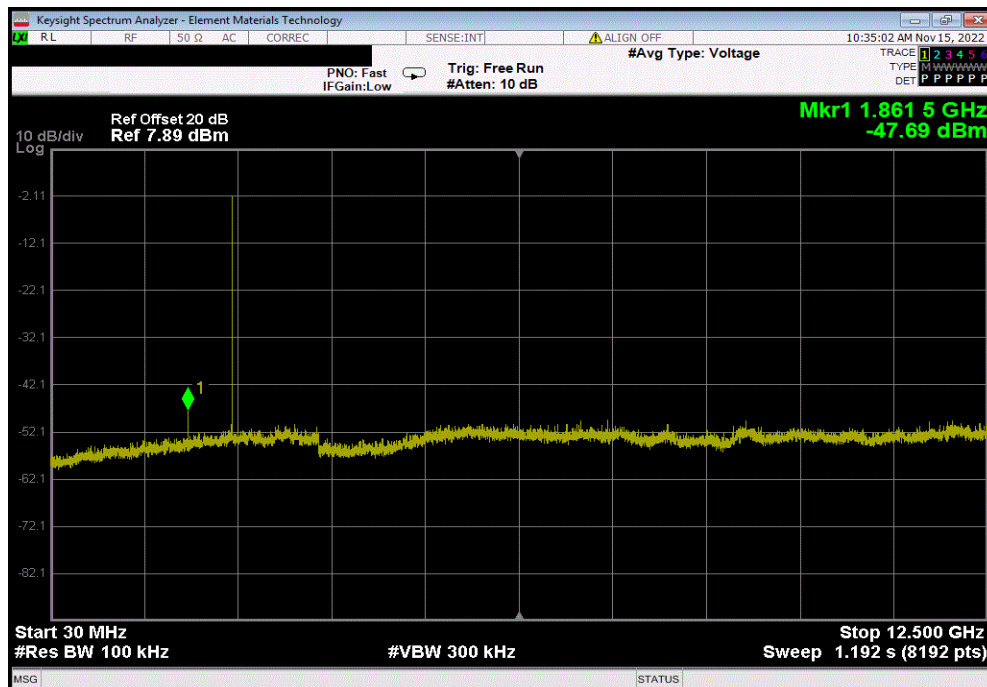


TbTtx 2022.06.03.0 XMt 2022.02.07.0

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



BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	1861.45	-47.98	-20	Pass		

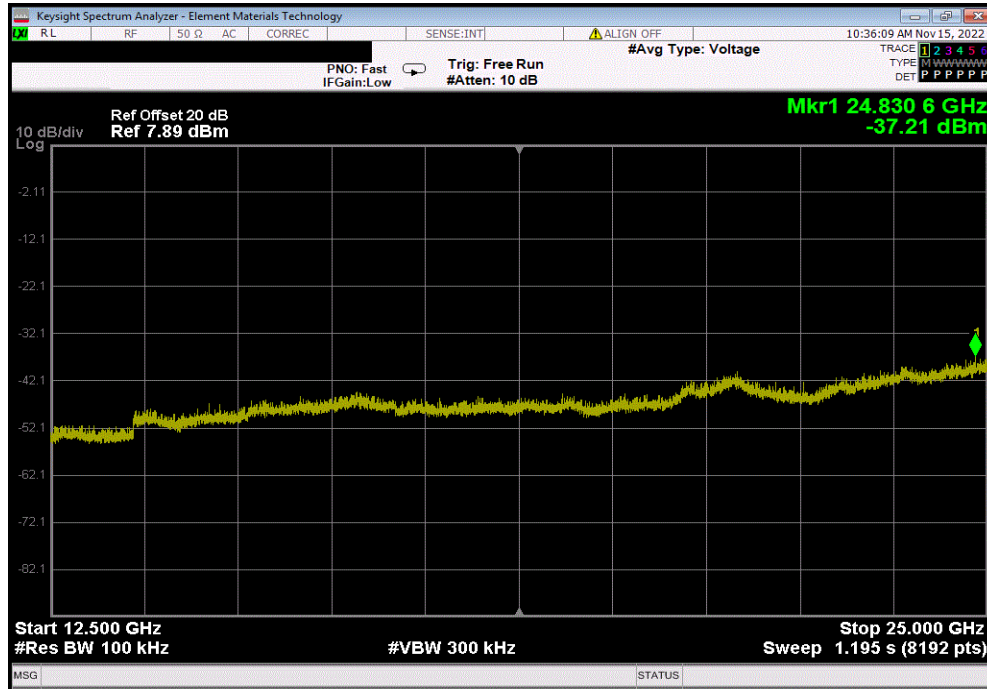


SPURIOUS CONDUCTED EMISSIONS

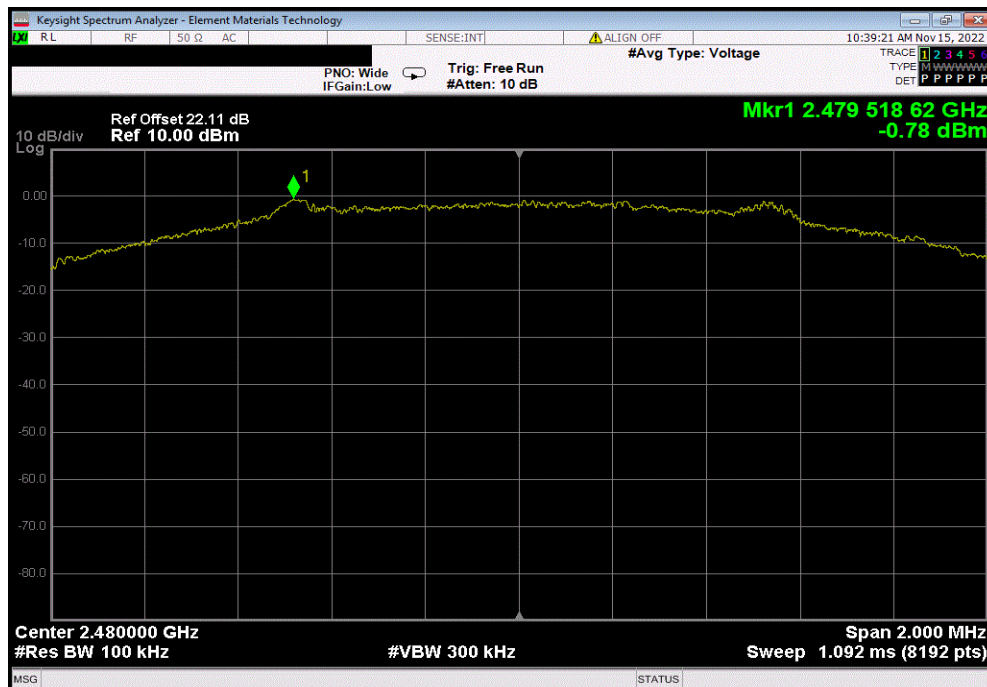


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24830.61	-37.49	-20	Pass	



BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2479.52	N/A	N/A	N/A	

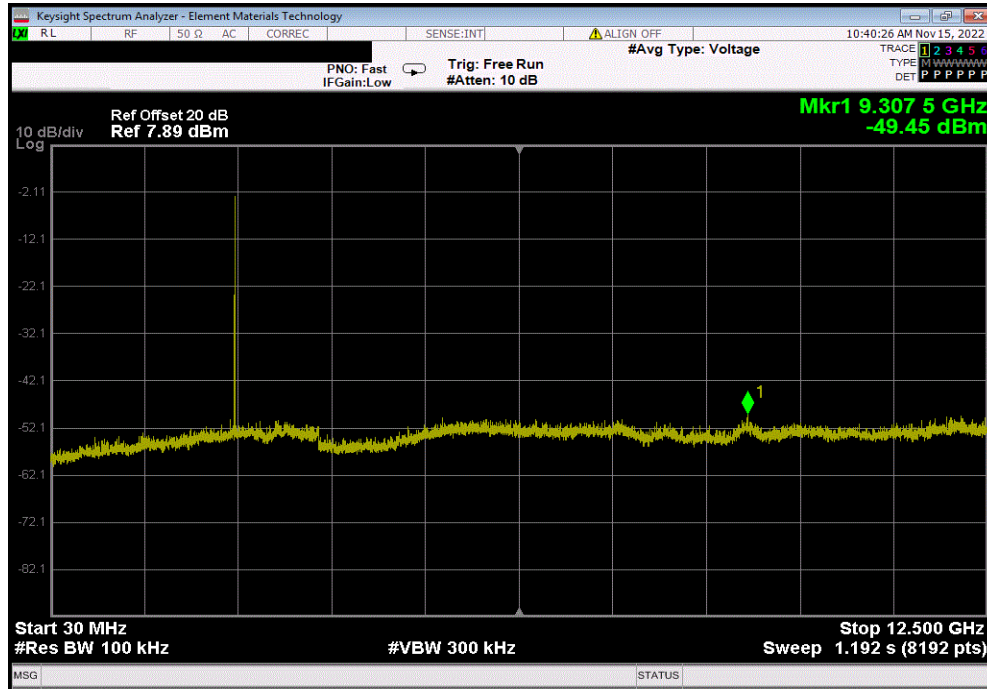


SPURIOUS CONDUCTED EMISSIONS

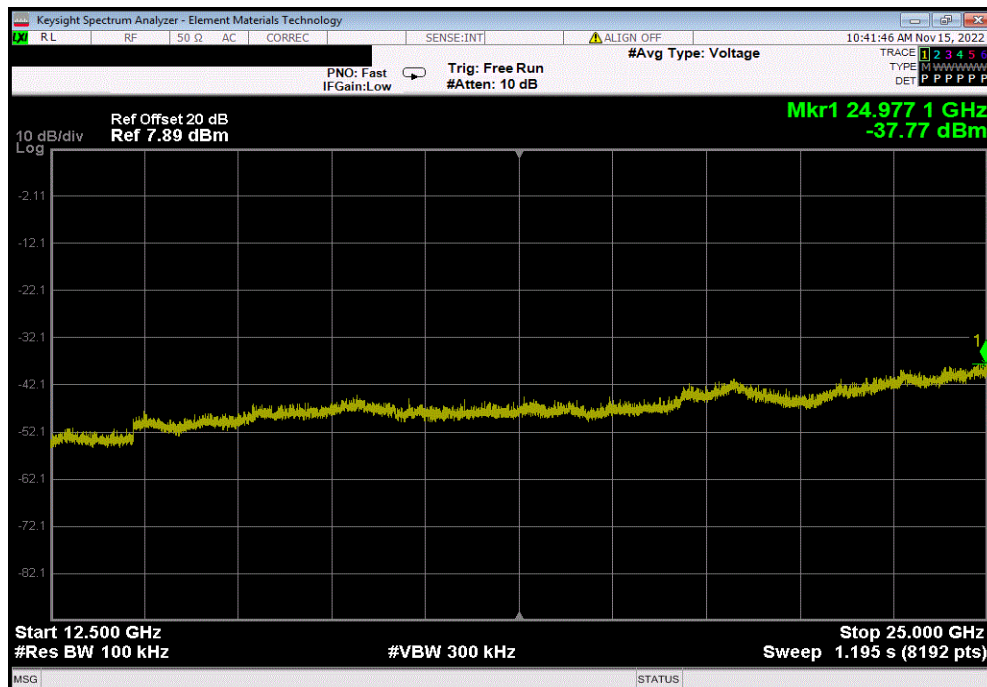


TbTtX 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	9307.52	-48.67	-20	Pass	



BLE/GFSK 2 Mbps, High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24977.11	-36.99	-20	Pass	



SPURIOUS RADIATED EMISSIONS

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 within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	ETS Lindgren	3115	AJQ	2021-01-25	2023-01-25
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2022-01-18	2023-01-18
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2022-01-18	2023-01-18
Attenuator	Fairview Microwave	SA18E-20	TWZ	2022-08-27	2023-08-27
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2022-06-10	2023-06-10
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2022-08-27	2023-08-27
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2022-01-18	2023-01-18
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2022-01-18	2023-01-18
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2022-09-10	2023-09-10
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2022-09-10	2023-09-10
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2022-01-18	2023-01-18
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2021-09-14	2023-09-14
Cable	ESM Cable Corp.	Bilog Cables	MNH	2022-10-08	2023-10-08
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2022-10-08	2023-10-08
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2022-08-27	2023-08-27

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26000 MHz

POWER INVESTIGATED

5VDC via laptop

SPURIOUS RADIATED EMISSIONS

CONFIGURATIONS INVESTIGATED

EMPM0139-3

MODES INVESTIGATED

Transmitting Bluetooth Low, Mid, and High Chs (2402, 2442, and 2480 MHz), 1 and 2 Mbps

SPURIOUS RADIATED EMISSIONS

EUT:	EMR303	Work Order:	EMPM0139
Serial Number:	A2-8	Date:	2022-11-17
Customer:	Emerson	Temperature:	21.3°C
Attendees:	Randy Beuc	Relative Humidity:	25.2%
Customer Project:	None	Bar. Pressure (PMSL):	1020 mb
Tested By:	Chris Patterson	Job Site:	MN05
Power:	5VDC via laptop	Configuration:	EMPM0139-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

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

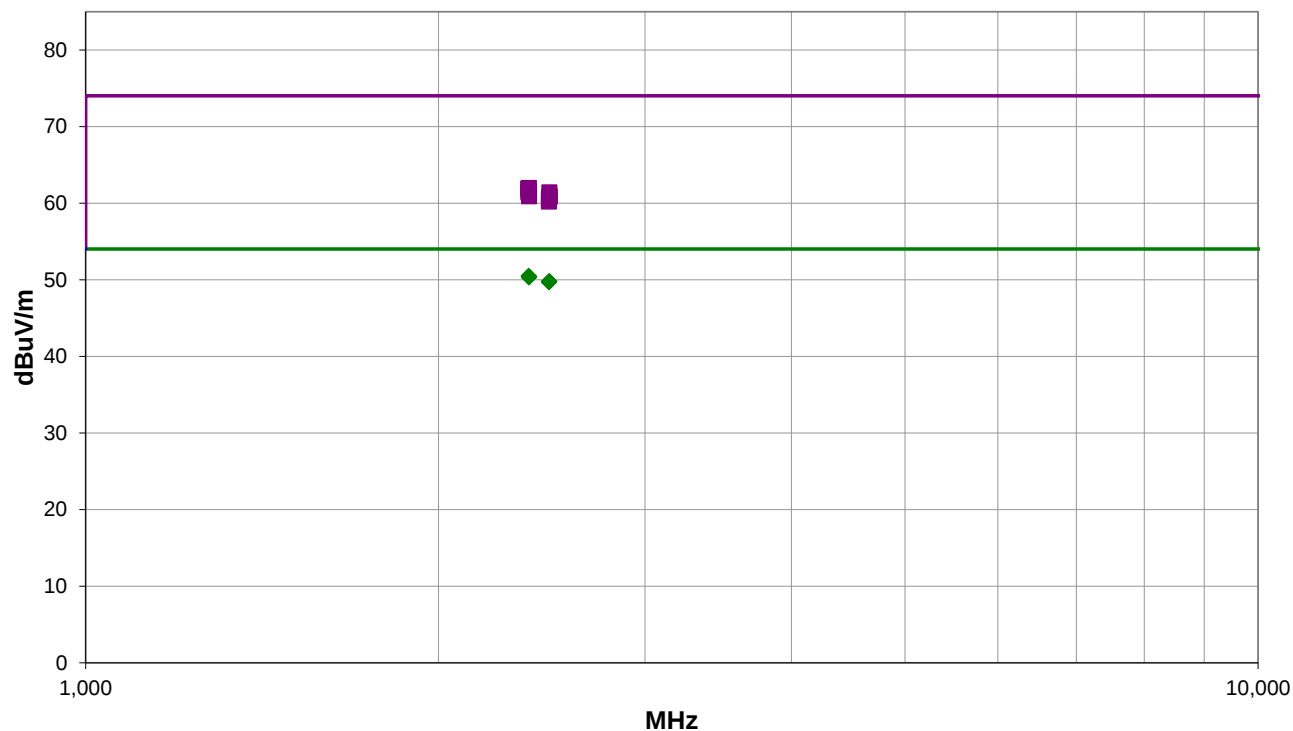
None

EUT OPERATING MODES

Transmitting Bluetooth Low, Mid, and High Chs (2402, 2442, and 2480 MHz), 1 and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 18

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #18

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2387.108	31.9	-1.4	1.5	138.0	3.0	20.0	Vert	AV	0.0	50.5	54.0	-3.5	EUT Horz, Low Ch, 1 Mbps
2389.325	31.9	-1.5	1.5	160.0	3.0	20.0	Horz	AV	0.0	50.4	54.0	-3.6	EUT On Side, Low Ch, 1 Mbps
2389.067	31.9	-1.5	1.5	301.9	3.0	20.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT Vert, Low Ch, 1 Mbps
2389.225	31.9	-1.5	1.21	322.0	3.0	20.0	Horz	AV	0.0	50.4	54.0	-3.6	EUT Horz, Low Ch, 1 Mbps
2389.400	31.9	-1.5	1.5	124.0	3.0	20.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT Horz, Low Ch, 2 Mbps
2389.175	31.8	-1.5	1.5	84.9	3.0	20.0	Vert	AV	0.0	50.3	54.0	-3.7	EUT On Side, Low Ch, 1 Mbps
2389.150	31.8	-1.5	2.35	236.9	3.0	20.0	Horz	AV	0.0	50.3	54.0	-3.7	EUT Vert, Low Ch, 1 Mbps
2485.492	32.0	-2.2	1.5	30.9	3.0	20.0	Horz	AV	0.0	49.8	54.0	-4.2	EUT Horz, High Ch, 1 Mbps
2487.292	32.0	-2.2	1.69	44.0	3.0	20.0	Vert	AV	0.0	49.8	54.0	-4.2	EUT On Side, low Ch 1 Mbps
2484.008	31.9	-2.2	1.5	149.0	3.0	20.0	Vert	AV	0.0	49.7	54.0	-4.3	EUT Horz, High Ch, 1 Mbps
2484.950	31.9	-2.2	1.5	354.9	3.0	20.0	Horz	AV	0.0	49.7	54.0	-4.3	EUT Vert, High Ch, 1 Mbps
2486.442	31.9	-2.2	1.5	149.0	3.0	20.0	Vert	AV	0.0	49.7	54.0	-4.3	EUT Vert, High Ch, 1 Mbps
2484.408	31.9	-2.2	1.28	242.0	3.0	20.0	Horz	AV	0.0	49.7	54.0	-4.3	EUT On Side, low Ch 1 Mbps
2388.058	43.4	-1.4	1.5	124.0	3.0	20.0	Vert	PK	0.0	62.0	74.0	-12.0	EUT Horz, Low Ch, 2 Mbps
2385.158	43.3	-1.4	2.35	236.9	3.0	20.0	Horz	PK	0.0	61.9	74.0	-12.1	EUT Vert, Low Ch, 1 Mbps
2387.717	42.9	-1.4	1.5	84.9	3.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	EUT On Side, Low Ch, 1 Mbps
2387.592	42.9	-1.4	1.5	138.0	3.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	EUT Horz, Low Ch, 1 Mbps
2387.208	42.8	-1.4	1.5	160.0	3.0	20.0	Horz	PK	0.0	61.4	74.0	-12.6	EUT On Side, Low Ch, 1 Mbps
2485.925	43.6	-2.2	1.28	242.0	3.0	20.0	Horz	PK	0.0	61.4	74.0	-12.6	EUT On Side, low Ch 1 Mbps
2387.975	42.7	-1.4	1.5	301.9	3.0	20.0	Vert	PK	0.0	61.3	74.0	-12.7	EUT Vert, Low Ch, 1 Mbps
2389.025	42.4	-1.5	1.21	322.0	3.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	EUT Horz, Low Ch, 1 Mbps
2487.958	43.1	-2.2	1.5	354.9	3.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	EUT Vert, High Ch, 1 Mbps
2485.967	43.0	-2.2	1.5	30.9	3.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT Horz, High Ch, 1 Mbps
2485.417	42.9	-2.2	1.5	149.0	3.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	EUT Horz, High Ch, 1 Mbps
2484.192	42.7	-2.2	1.69	44.0	3.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	EUT On Side, low Ch 1 Mbps
2484.467	42.4	-2.2	1.5	149.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT Vert, High Ch, 1 Mbps

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

EUT:	EMR303	Work Order:	EMPM0139
Serial Number:	A2-8	Date:	2022-11-16
Customer:	Emerson	Temperature:	21.6°C
Attendees:	Randy Beuc	Relative Humidity:	29.7%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mb
Tested By:	Christopher Heintzelman	Job Site:	MN05
Power:	5VDC via laptop	Configuration:	EMPM0139-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

TEST PARAMETERS

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

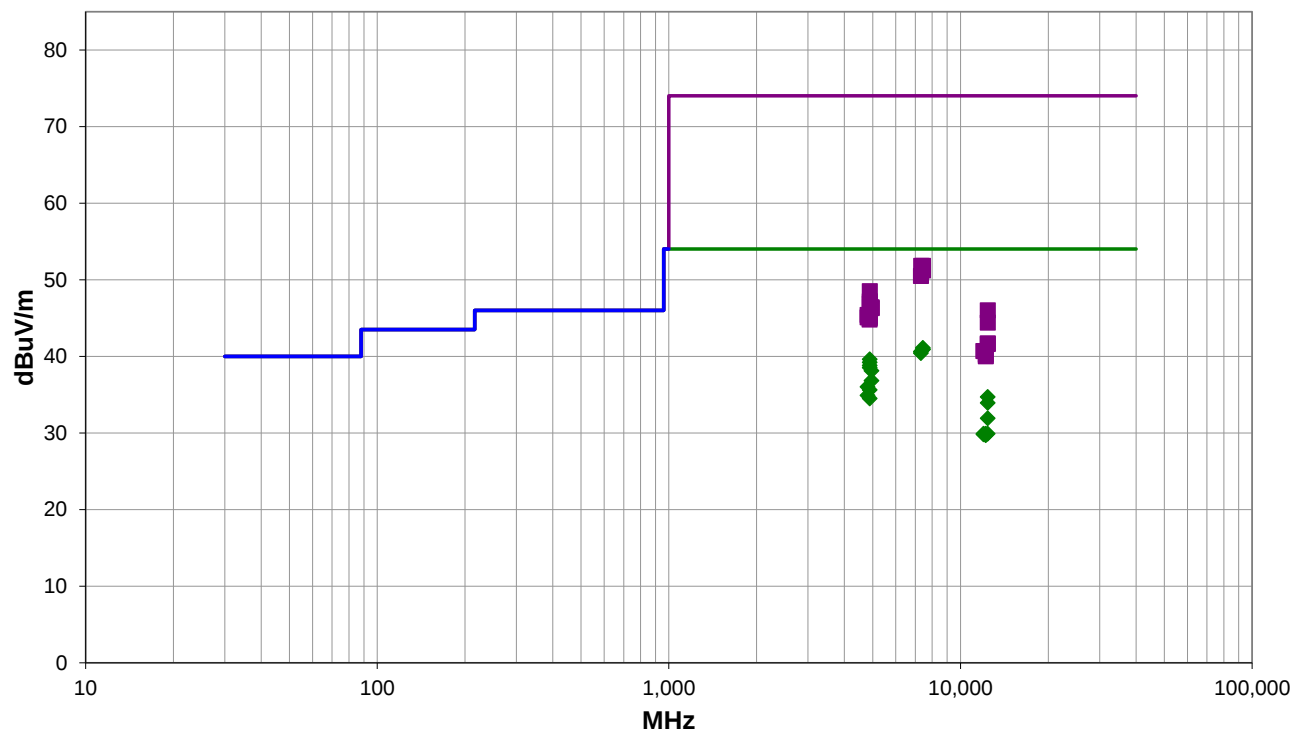
None

EUT OPERATING MODES

Transmitting Bluetooth Low, Mid, and High Chs (2402, 2442, and 2480 MHz), 1 and 2 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 12

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #12

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7437.858	29.3	11.8	1.5	145.0	3.0	0.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT Horz, High Ch, 2 Mbps
7438.375	29.1	11.8	1.5	149.9	3.0	0.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT Horz, High Ch, 1 Mbps
7438.033	29.1	11.8	1.5	340.0	3.0	0.0	Horz	AV	0.0	40.9	54.0	-13.1	EUT Vert, High Ch, 1 Mbps
7325.700	29.3	11.3	1.5	132.9	3.0	0.0	Vert	AV	0.0	40.6	54.0	-13.4	EUT Horz, Mid Ch, 1 Mbps
7324.750	29.1	11.3	1.5	332.0	3.0	0.0	Horz	AV	0.0	40.4	54.0	-13.6	EUT Vert, Mid Ch, 1 Mbps
4883.958	35.5	4.1	2.4	246.0	3.0	0.0	Vert	AV	0.0	39.6	54.0	-14.4	EUT Horz, Mid Ch, 1 Mbps
4883.992	35.1	4.1	2.3	1.0	3.0	0.0	Horz	AV	0.0	39.2	54.0	-14.8	EUT Vert, Mid Ch, 1 Mbps
4884.008	34.7	4.1	1.0	85.9	3.0	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT On Side, Mid Ch, 1 Mbps
4883.858	34.4	4.1	1.5	48.0	3.0	0.0	Horz	AV	0.0	38.5	54.0	-15.5	EUT On Side, Mid Ch, 1 Mbps
4959.983	33.6	4.5	2.2	45.0	3.0	0.0	Horz	AV	0.0	38.1	54.0	-15.9	EUT Vert, High Ch, 1 Mbps
4960.075	32.3	4.5	2.6	137.0	3.0	0.0	Vert	AV	0.0	36.8	54.0	-17.2	EUT Horz, High Ch, 1 Mbps
4804.200	32.3	3.7	2.9	59.9	3.0	0.0	Vert	AV	0.0	36.0	54.0	-18.0	EUT Horz, Low Ch, 1 Mbps
4883.858	31.5	4.1	2.6	28.2	3.0	0.0	Horz	AV	0.0	35.6	54.0	-18.4	EUT Horz, Mid Ch, 1 Mbps
4804.250	31.2	3.7	1.2	171.0	3.0	0.0	Horz	AV	0.0	34.9	54.0	-19.1	EUT Vert, Low Ch, 1 Mbps
12401.010	29.2	5.5	2.3	92.9	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	EUT Horz, High Ch, 1 Mbps
4884.392	30.4	4.1	1.6	117.9	3.0	0.0	Vert	AV	0.0	34.5	54.0	-19.5	EUT Vert, Mid Ch, 1 Mbps
12400.220	28.4	5.5	2.8	99.9	3.0	0.0	Horz	AV	0.0	33.9	54.0	-20.1	EUT Vert, High Ch, 1 Mbps
12398.980	31.0	0.9	1.8	238.0	3.0	0.0	Horz	AV	0.0	31.9	54.0	-22.1	EUT Vert, High Ch, 1 Mbps
7326.925	40.5	11.3	1.5	132.9	3.0	0.0	Vert	PK	0.0	51.8	74.0	-22.2	EUT Horz, Mid Ch, 1 Mbps
7441.183	40.0	11.8	1.5	340.0	3.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT Vert, High Ch, 1 Mbps
7439.408	39.6	11.8	1.5	145.0	3.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horz, High Ch, 2 Mbps
7440.067	39.4	11.8	1.5	149.9	3.0	0.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT Horz, High Ch, 1 Mbps
7323.658	39.2	11.3	1.5	332.0	3.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	EUT Vert, Mid Ch, 1 Mbps
12399.010	29.0	0.9	1.5	106.0	3.0	0.0	Vert	AV	0.0	29.9	54.0	-24.1	EUT Horz, High Ch, 1 Mbps
12207.750	28.6	1.3	1.5	77.0	3.0	0.0	Vert	AV	0.0	29.9	54.0	-24.1	EUT Horz, Mid Ch, 1 Mbps
12011.430	29.4	0.5	1.5	127.0	3.0	0.0	Vert	AV	0.0	29.9	54.0	-24.1	EUT Horz, Low Ch, 1 Mbps
12011.430	29.3	0.5	1.5	185.9	3.0	0.0	Horz	AV	0.0	29.8	54.0	-24.2	EUT Vert, Low Ch, 1 Mbps
12208.910	28.4	1.3	2.2	145.9	3.0	0.0	Horz	AV	0.0	29.7	54.0	-24.3	EUT Vert, Mid Ch, 1 Mbps
4883.542	44.4	4.1	2.4	246.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT Horz, Mid Ch, 1 Mbps
4884.717	43.1	4.1	2.3	1.0	3.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	EUT Vert, Mid Ch, 1 Mbps
4884.242	42.8	4.1	1.0	85.9	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	EUT On Side, Mid Ch, 1 Mbps
4883.408	42.4	4.1	1.5	48.0	3.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	EUT On Side, Mid Ch, 1 Mbps
4959.933	41.9	4.5	2.6	137.0	3.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	EUT Horz, High Ch, 1 Mbps
4960.167	41.8	4.5	2.2	45.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	EUT Vert, High Ch, 1 Mbps
12400.960	40.5	5.5	2.3	92.9	3.0	0.0	Vert	PK	0.0	46.0	74.0	-28.0	EUT Horz, High Ch, 1 Mbps
4803.383	41.7	3.7	2.9	59.9	3.0	0.0	Vert	PK	0.0	45.4	74.0	-28.6	EUT Horz, Low Ch, 1 Mbps
4884.758	41.1	4.1	2.6	12.9	3.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	EUT Horz, Mid Ch, 1 Mbps
4804.642	41.4	3.7	1.2	171.0	3.0	0.0	Horz	PK	0.0	45.1	74.0	-28.9	EUT Vert, Low Ch, 1 Mbps
4884.800	40.9	4.1	1.6	117.9	3.0	0.0	Vert	PK	0.0	45.0	74.0	-29.0	EUT Vert, Mid Ch, 1 Mbps
4882.625	40.7	4.1	2.6	28.2	3.0	0.0	Horz	PK	0.0	44.8	74.0	-29.2	EUT Horz, Mid Ch, 1 Mbps
12400.970	38.9	5.5	2.8	99.9	3.0	0.0	Horz	PK	0.0	44.4	74.0	-29.6	EUT Vert, High Ch, 1 Mbps
12399.080	40.8	0.9	1.5	106.0	3.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	EUT Horz, High Ch, 1 Mbps

SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12398.980	40.7	0.9	1.8	238.0	3.0	0.0	Horz	PK	0.0	41.6	74.0	-32.4	EUT Vert, High Ch, 1 Mbps
12009.680	40.1	0.6	1.5	185.9	3.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	EUT Vert, Low Ch, 1 Mbps
12011.900	40.2	0.5	1.5	127.0	3.0	0.0	Vert	PK	0.0	40.7	74.0	-33.3	EUT Horz, Low Ch, 1 Mbps
12209.140	38.9	1.3	2.2	145.9	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	EUT Vert, Mid Ch, 1 Mbps
12207.800	38.7	1.3	1.5	77.0	3.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT Horz, Mid Ch, 1 Mbps

CONCLUSION

Pass



Tested By

End of Test Report