



Emerson Automation Solutions

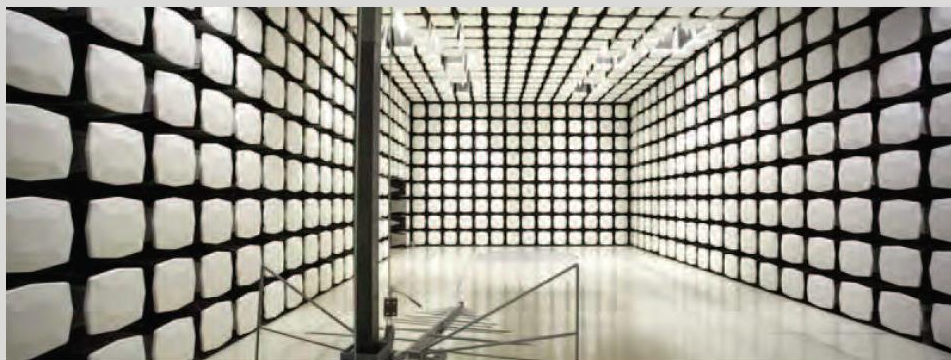
**Rosemount 3051T
Rosemount 3051HT
Rosemount 3051C
Rosemount 3051CF
Rosemount 3051L**

FCC 15.247:2023

RSS-247 Issue 2:2017

Bluetooth Low Energy Radio

Report: EMAU0007.1 Rev. 1, Issue Date: June 12, 2023



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CERTIFICATE OF TEST



Last Date of Test: February 27, 2023
Emerson Automation Solutions
EUT: Rosemount 3051T;
Rosemount 3051HT;
Rosemount 3051C;
Rosemount 3051CF;
Rosemount 3051L

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2023	ANSI C63.10:2013, FCC KDB 558074 v05r02:2019
FCC 15.207:2022	
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	N/A	KDB 558074 -6.0	RSS-Gen 3.2	11.6	Operates at 100%.
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%)	Pass	KDB 558074 -2.1	RSS-Gen 6.7	6.9.3	
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

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.

CERTIFICATE OF TEST

Approved By:



Johnny Candelas, Operations Manager

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REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Added new Spurious Radiated Emissions – Spot Checks	2023-02-28	68-81
	Updated test dates.	2023-02-28	2, 11, 17
	Added configurations EMAU0008-1, EMAU0008-2, EMAU0008-3	2023-02-28	15, 16
	Added additional mode names to cover, CoT, and Product Description pages.	2023-06-12	1, 2, 11
	Updated standard year to 2023 and added 3051L and 3051CF.	2023-06-12	2
	Added 3051T data.	2023-06-12	83-86

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

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

[California](#)

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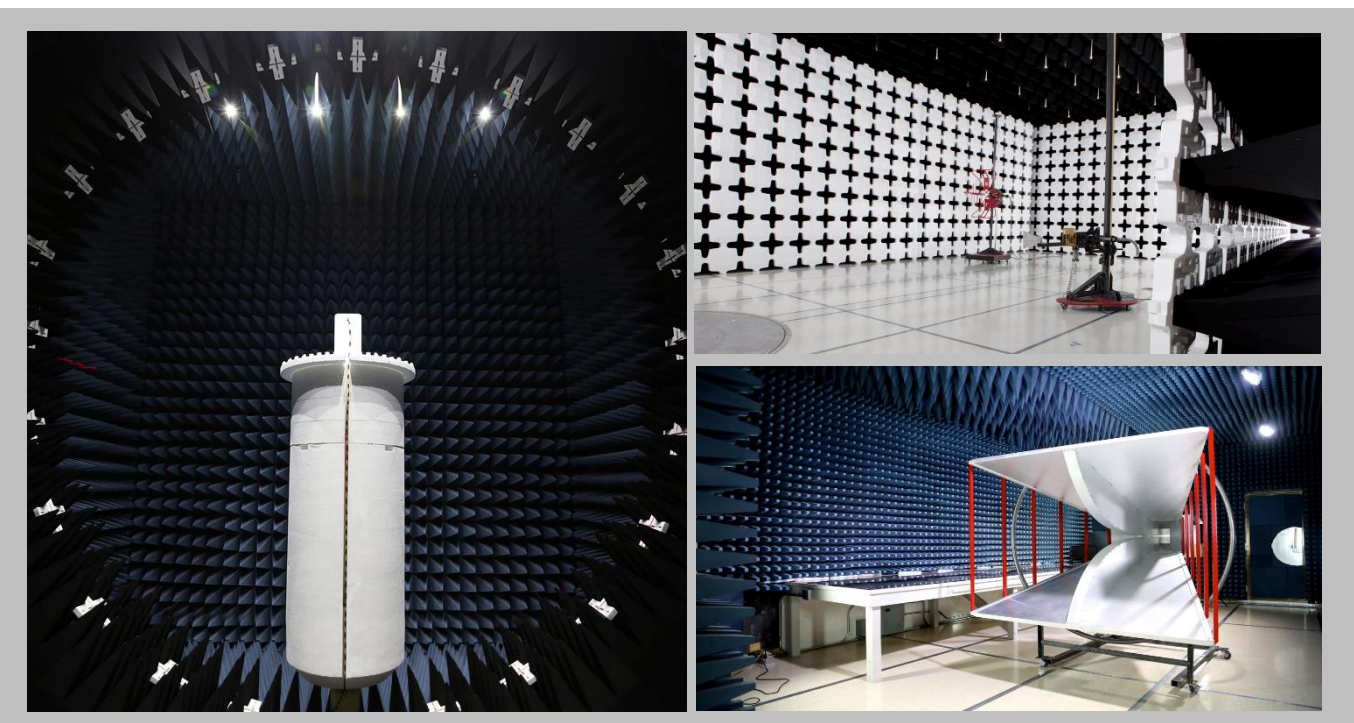
[Texas](#)

[Washington](#)

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

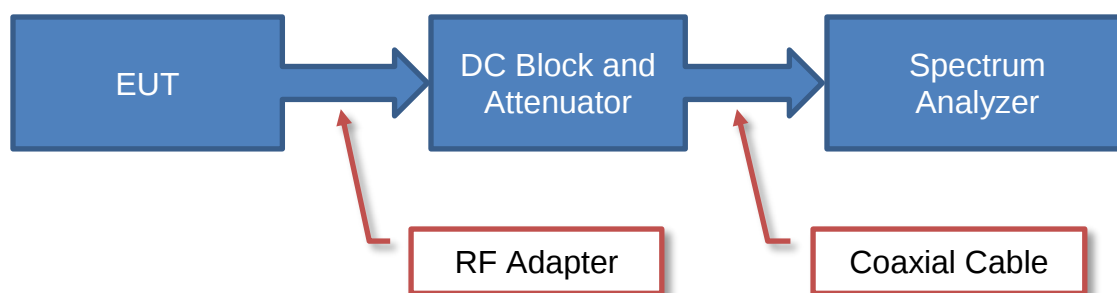
TEST SETUP BLOCK DIAGRAMS

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.

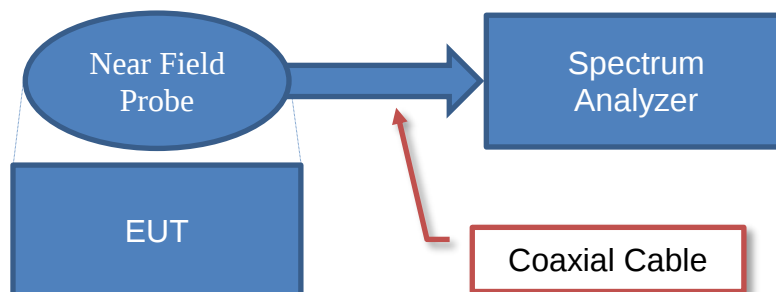
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

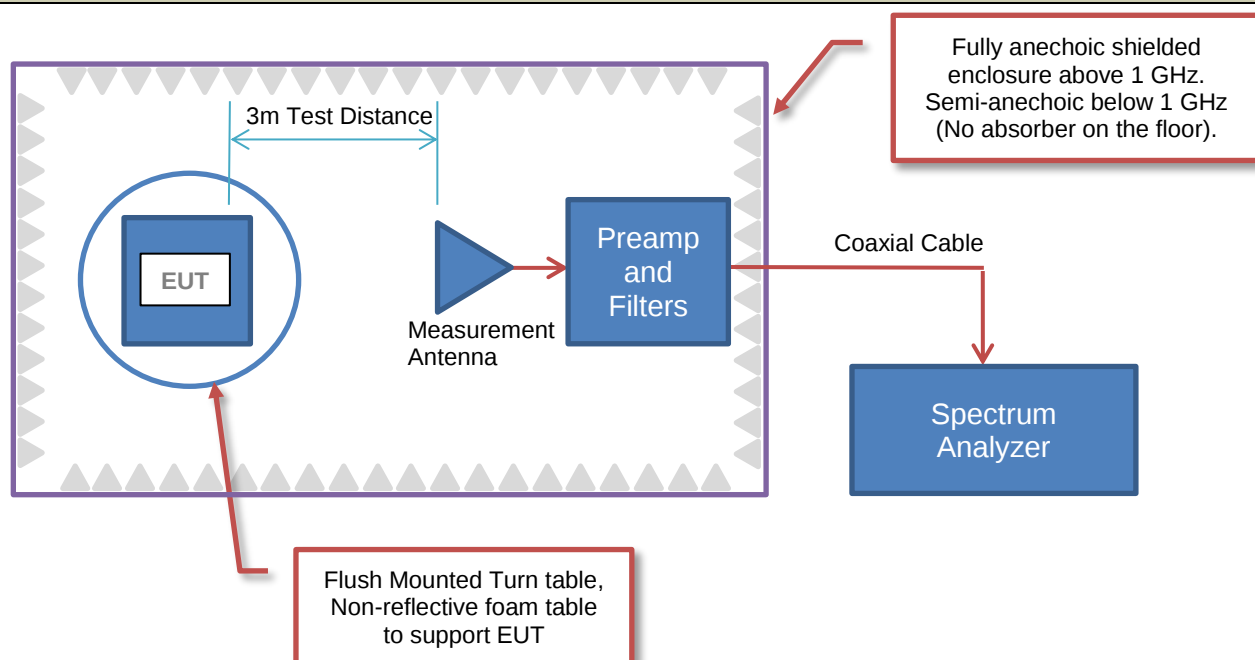


Sample Calculation (logarithmic units)

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

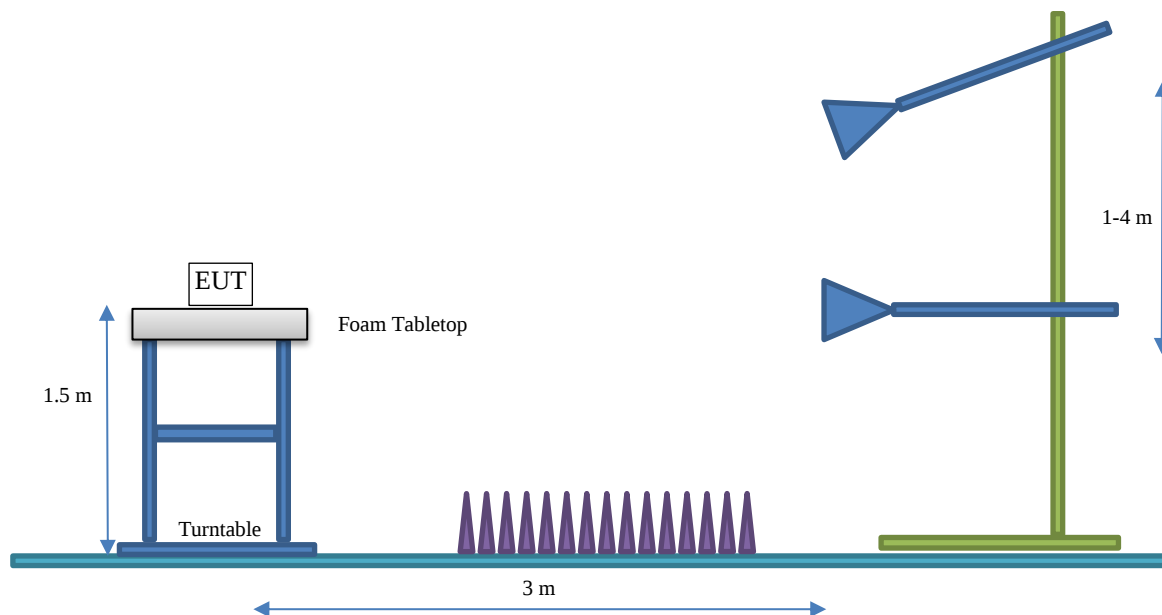
Radiated Power (ERP/EIRP) – Substitution Method:

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 Automation Solutions
Address:	6021 Innovation Blvd
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Randy Beuc
EUT:	Rosemount 3051T Rosemount 3051HT Rosemount 3051C Rosemount 3051CF Rosemount 3051L
First Date of Test:	October 5, 2022
Last Date of Test:	February 28, 2023
Receipt Date of Samples:	October 5, 2022
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
4-20mA wired HART pressure transmitter with 2.4 GHz Bluetooth Low Energy as a service port for wireless device configuration and calibration. 2-wire power; BLE is powered over 4-20mA circuit
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 antenna	Emerson Automation Solutions	2400-2500	3.50

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

- ☐ Test software settings Test software/firmware installed on EUT: *Emerson_BLE_HostTest_rev_130*
☒ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

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

CONFIGURATIONS



Configuration EMAU0007- 1

Software/Firmware Running During Test	
Description	Version
Test Firmware	Emerson BLE HostTest rev 130
BTool (TI control software)	1.42.18

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3051 Pressure Transmitter with BLE	Emerson Automation Solutions	3051 Pressure Transmitter with BLE	178

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Element Test Laptop	Acer	Aspire One	LUSAL0B1370114F42B1601
Laptop DC Supply	Delta Electronics	ADT-40TH A	None
Variable DC Supply	Agilent	E3620A	MY40005637

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cables (+,-)	No	0.6 m	No	Variable DC Supply	3051 Pressure Transmitter
AC Cable (Variable DC Supply)	No	1.6 m	No	AC Mains	Variable DC Supply
DC Cable (Laptop)	No	2.2 m	No	Laptop DC Supply	Laptop
USB Cable	Yes	1.5 m	No	Laptop	3051 Pressure Transmitter

Configuration EMAU0007- 3

Software/Firmware Running During Test	
Description	Version
Test Firmware	Emerson BLE HostTest rev 130
BTool (TI control software)	1.42.18

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3051 Pressure Transmitter with BLE	Emerson Automation Solutions	3051 Pressure Transmitter with BLE	178

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Multimeter	Fluke	787 Process Meter	E3-56255

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Communications Cable	Yes	> 3 m	No	3051 Pressure Sensor	DC Cable Leads
DC Cable leads	No	0.8 m	No	Communications Cable	Fluke Meter/DC Mains

CONFIGURATIONS



Configuration EMAU0007- 4

Software/Firmware Running During Test					
Description		Version			
Test Firmware		Emerson_BLE_HostTest_rev_130			
BTool (TI control software)		1.42.18			
EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
3051HT	Emerson Automation Solutions	3051HT	0043355		
Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
Variable DC Supply	Agilent	E3620A	MY40005637		
Multimeter	Fluke	787 Process Meter	E3-56255		
Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (Variable DC Supply)	No	1.6 m	No	AC Mains	Variable DC Supply
Communications Cable	Yes	> 3 m	No	3051 Pressure Sensor	DC Cable Leads
DC Cable leads	No	0.8 m	No	Communications Cable	Fluke Meter/DC Mains

Configuration EMAU0007- 5

Software/Firmware Running During Test					
Description		Version			
Test Firmware		Emerson_BLE_HostTest_rev_130			
BTool (TI control software)		1.42.18			
EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
3051T	Emerson Automation Solutions	3051T	DUT1		
Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
Variable DC Supply	Agilent	E3620A	MY40005637		
Multimeter	Fluke	787 Process Meter	E3-56255		
Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (Variable DC Supply)	No	1.6 m	No	AC Mains	Variable DC Supply
Communications Cable	Yes	> 3 m	No	3051 Pressure Sensor	DC Cable Leads
DC Cable leads	No	0.8 m	No	Communications Cable	Fluke Meter/DC Mains

CONFIGURATIONS



Configuration EMAU0008- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3051C	Emerson	3051C	20765675

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Variable DC Supply	Agilent	E3647A	MY40002722

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	2.6 m	No	DC Supply	EUT (various)
AC Cable (DC Supply)	No	1.6 m	No	DC supply	AC Mains

Configuration EMAU0008- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3051L	Emerson	3051L	18761351

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Variable DC Supply	Agilent	E3647A	MY40002722

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	2.6 m	No	DC Supply	EUT (various)
AC Cable (DC Supply)	No	1.6 m	No	DC supply	AC Mains

CONFIGURATIONS



Configuration EMAU0008- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3051CF	Emerson	3051CF	20671037

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Variable DC Supply	Agilent	E3647A	MY40002722

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	2.6 m	No	DC Supply	EUT (various)
AC Cable (DC Supply)	No	1.6 m	No	DC supply	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-10-05	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.
2	2022-10-05	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.
3	2022-10-05	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.
4	2022-10-05	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.
5	2022-10-05	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2022-10-05	Occupied Bandwidth (99%)	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	2022-10-05	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	2022-10-06	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
9	2022-10-07	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.
10	2022-10-10	Spurious Radiated Emissions - 3051T Spot Checks	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
11	2023-02-27	Spurious Radiated Emissions – Spot Checks	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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
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

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



TSTx 2022.06.03.0 XMR 2022.02.07.0

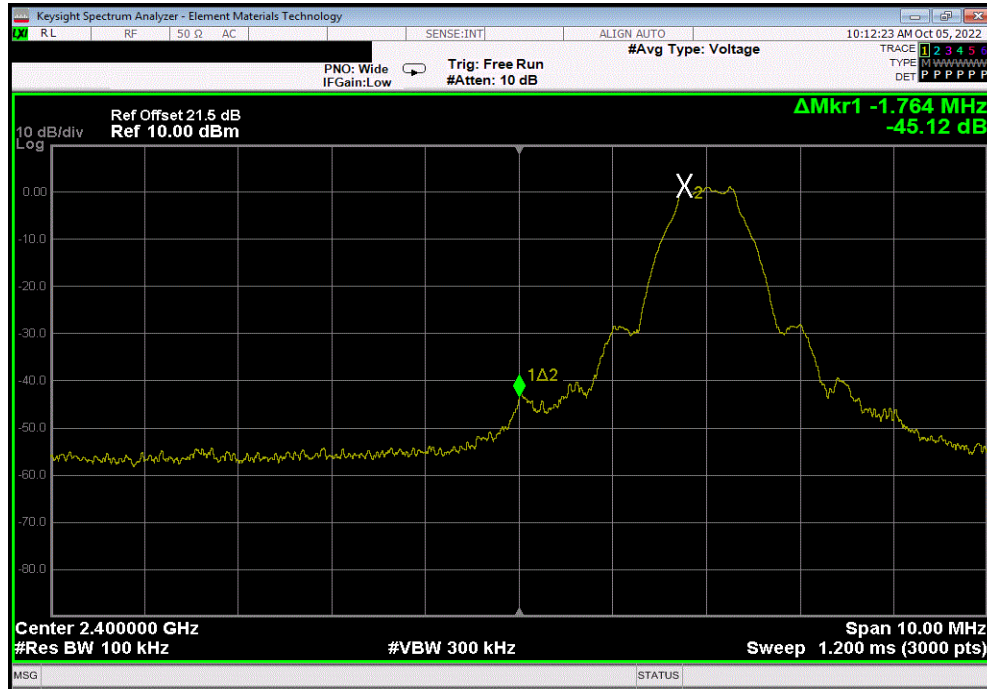
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47.4% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS		ANSI C63.10:2013	
Reference level offset includes measurement cable, attenuator, and DC block.			
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		-45.12	-20 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-54.21	-20 Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		-31.84	-20 Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz		-50.89	-20 Pass

BAND EDGE COMPLIANCE

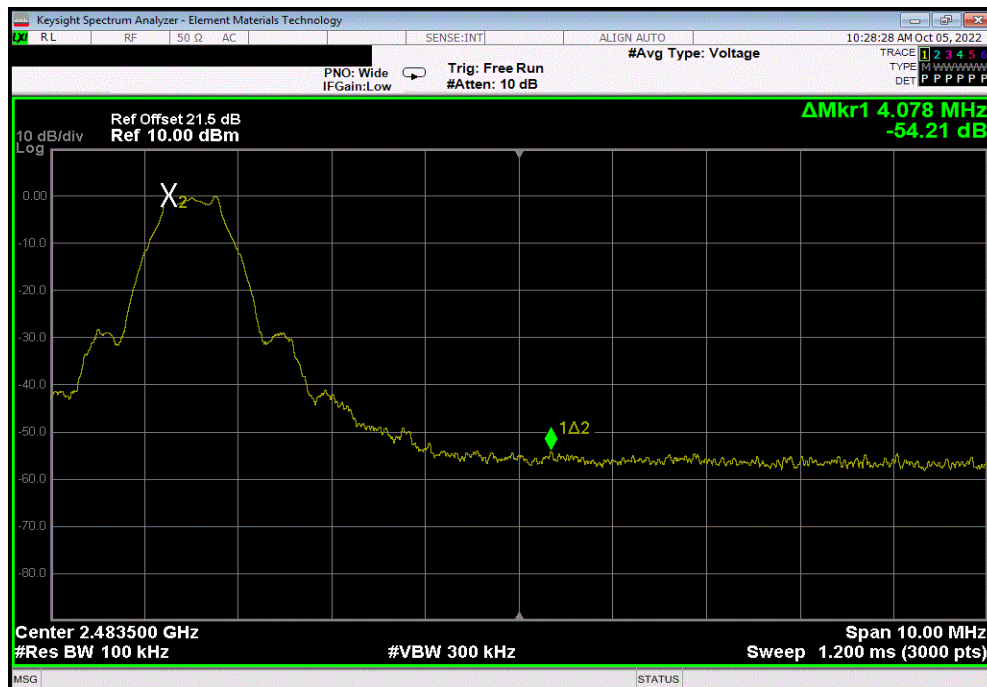


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.12	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.21	-20	Pass

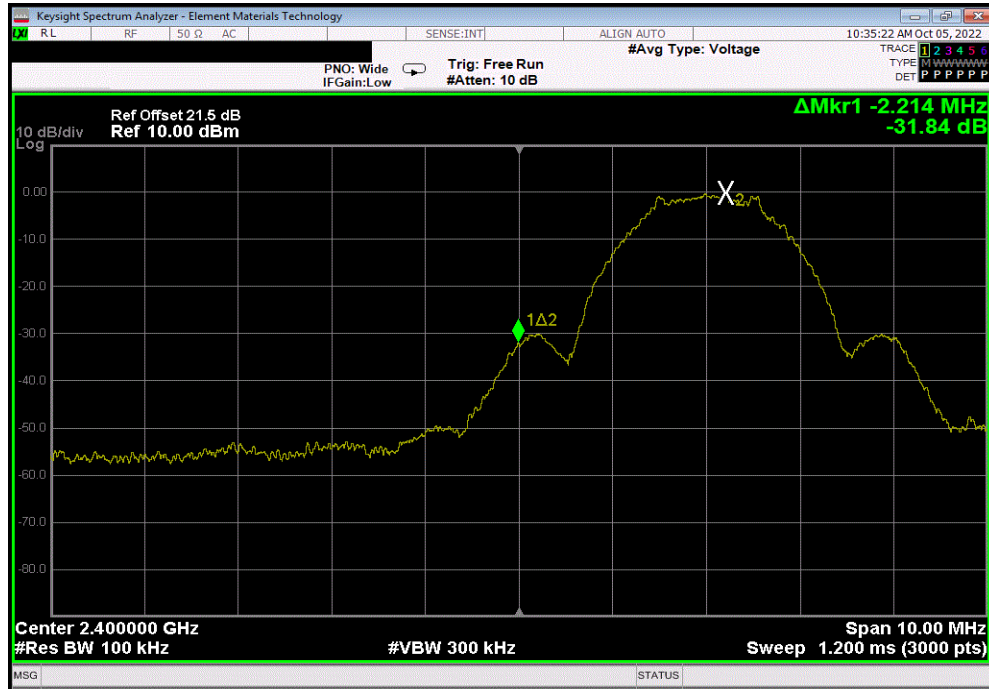


BAND EDGE COMPLIANCE



TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-31.84	-20	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.89	-20	Pass



DTS BANDWIDTH



XMIT 2022.02.07.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
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

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



TSTx 2022.06.03.0 XMR 2022.02.07.0

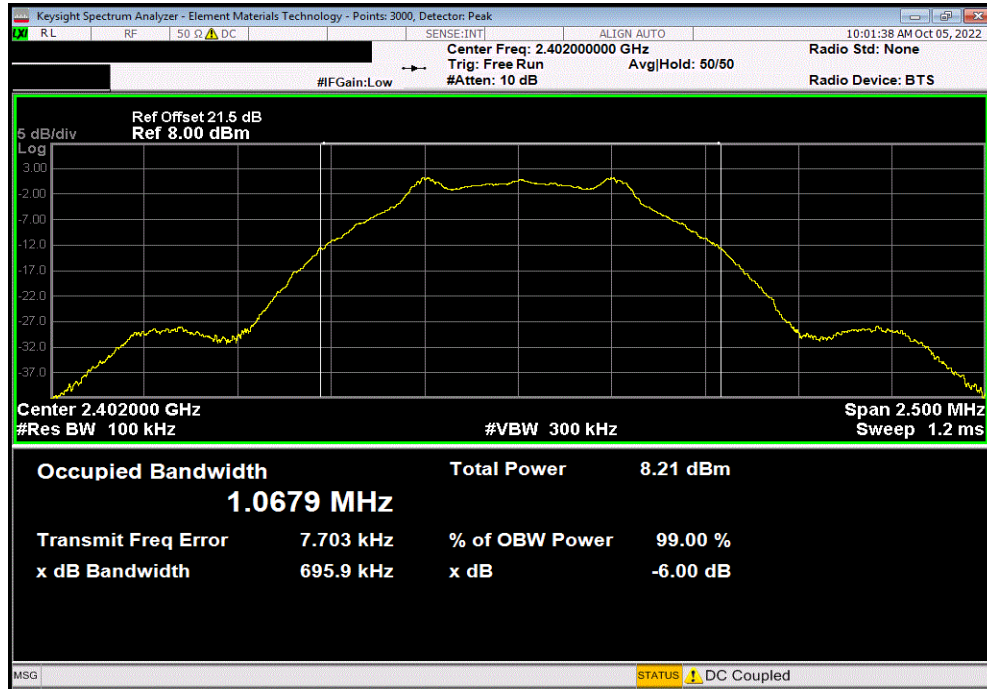
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47.3% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS		ANSI C63.10:2013	
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Chris Heintzelman</i>	
		Value	Limit (±) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		695.9 kHz	500 kHz Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		699.084 kHz	500 kHz Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		689.683 kHz	500 kHz Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		1.439 MHz	500 kHz Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		1.425 MHz	500 kHz Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz		1.376 MHz	500 kHz Pass

DTS BANDWIDTH

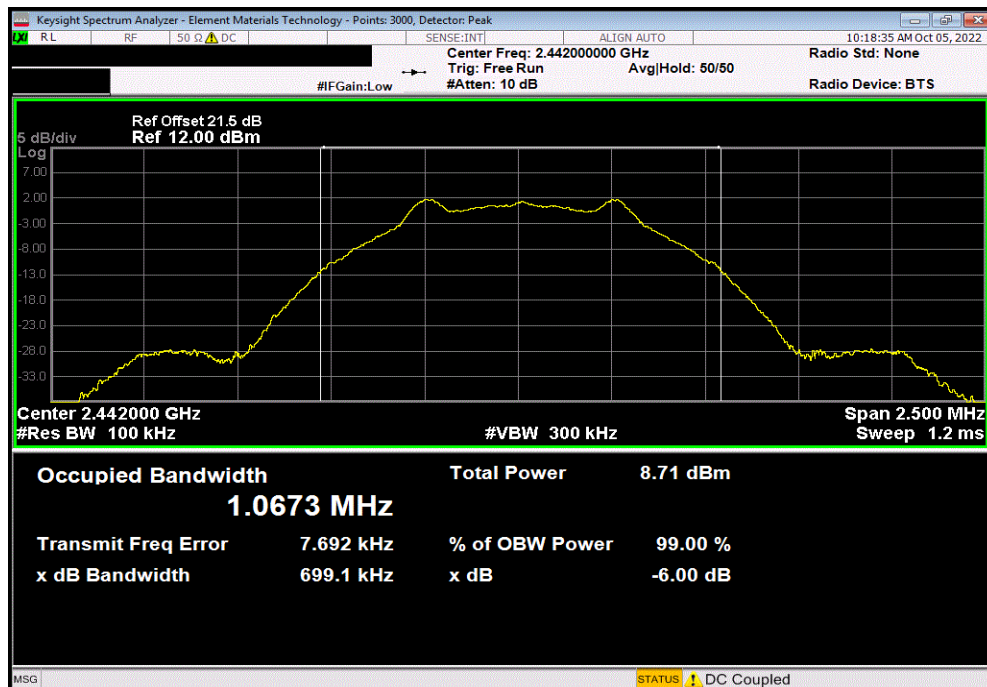


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



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

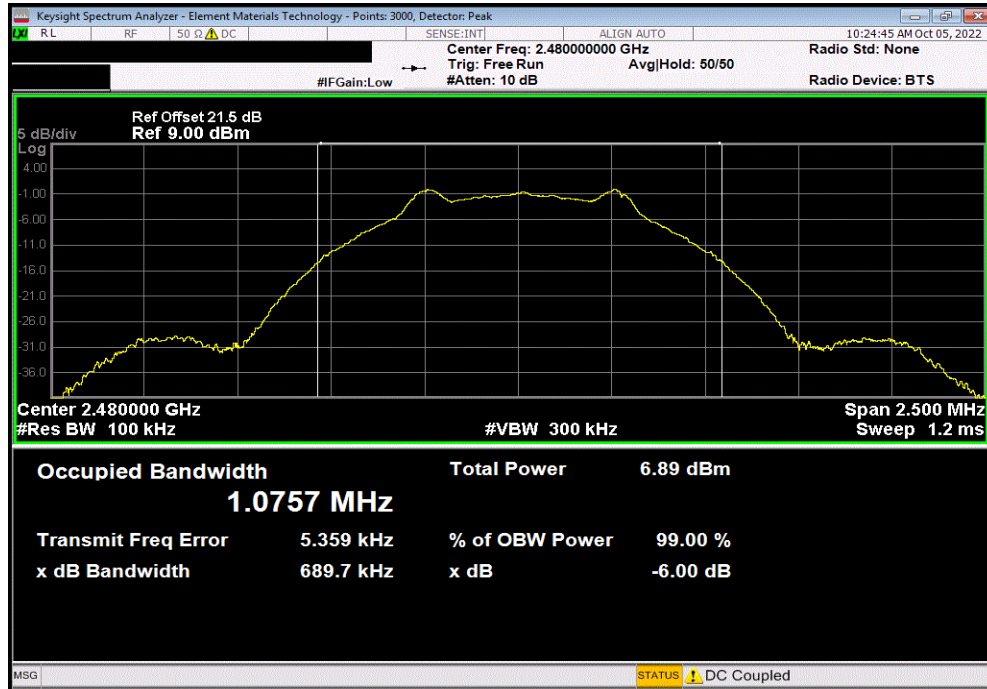


DTS BANDWIDTH

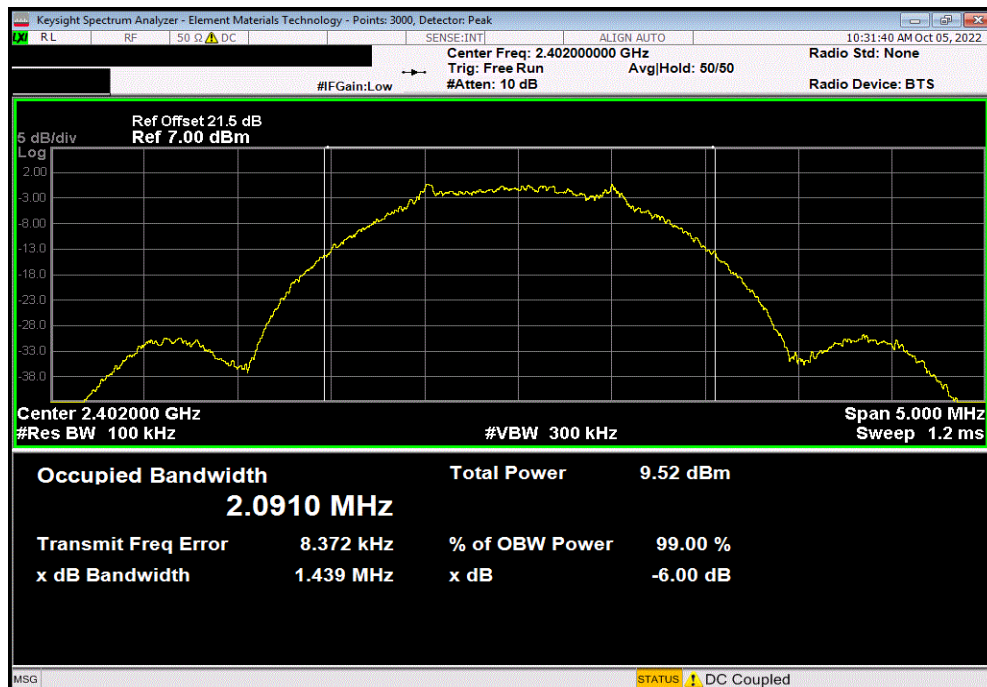


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



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

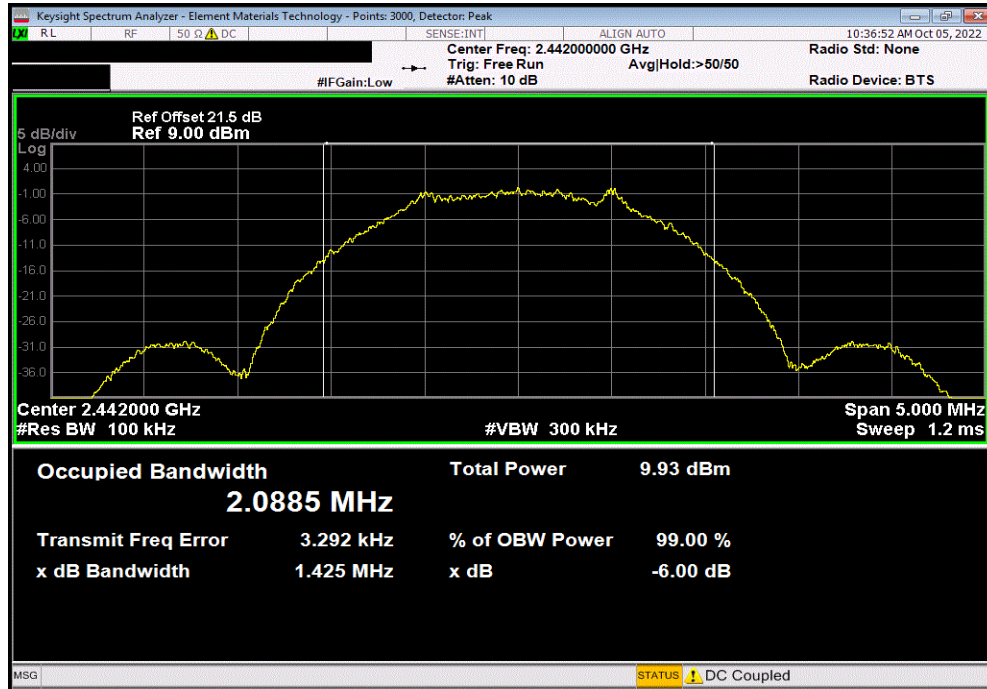


DTS BANDWIDTH

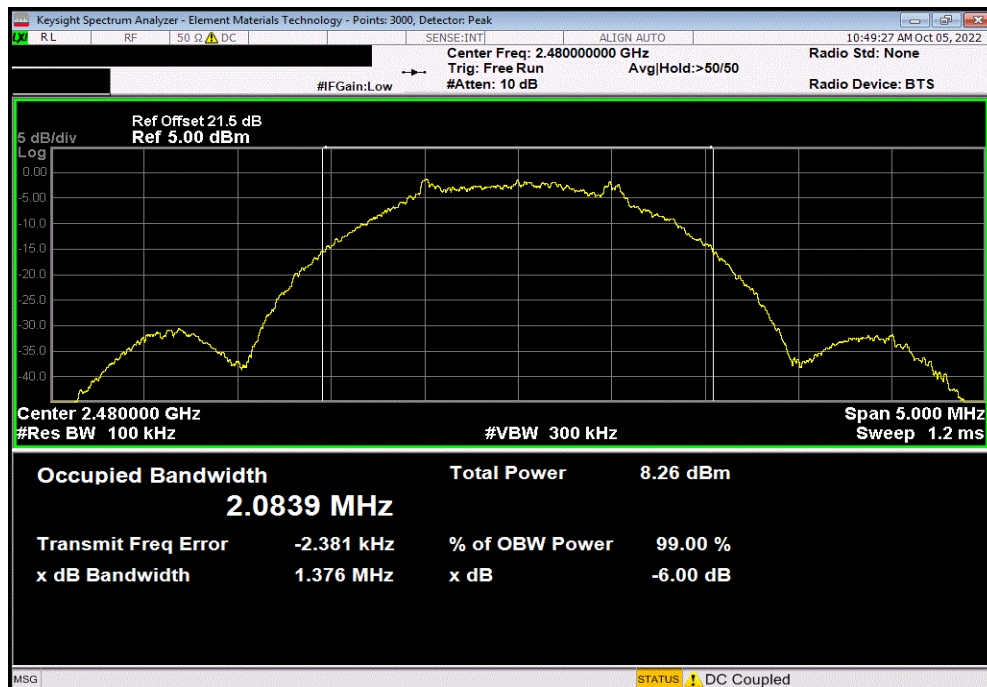


TbTx 2022.06.03.0 XbTx 2022.02.07.0

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



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



DUTY CYCLE



TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. 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.

The EUT operates 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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
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

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

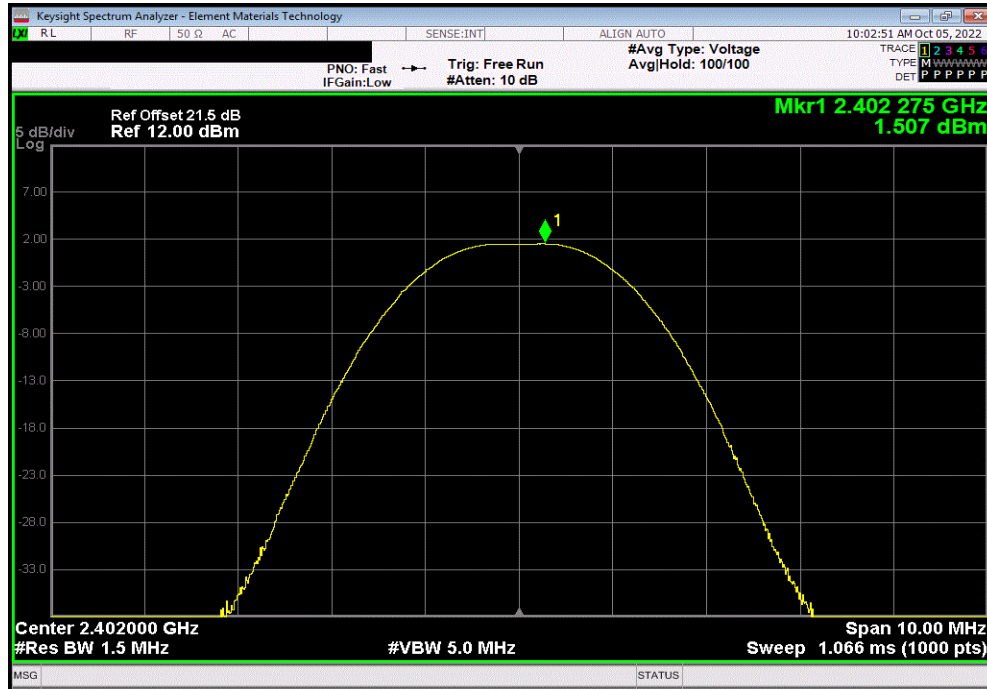
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS		ANSI C63.10:2013	
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		1.507	3.5
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		1.937	3.5
BLE/GFSK 1 Mbps High Channel, 2480 MHz		0.222	3.5
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		1.557	3.5
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		1.966	3.5
BLE/GFSK 2 Mbps High Channel, 2480 MHz		0.312	3.5
		EIRP (dBm)	EIRP Limit (dBm)
		5.007	36
		5.437	36
		3.722	36
		5.057	36
		5.466	36
		3.812	36
			Result
			Pass
			Pass
			Pass
			Pass
			Pass
			Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

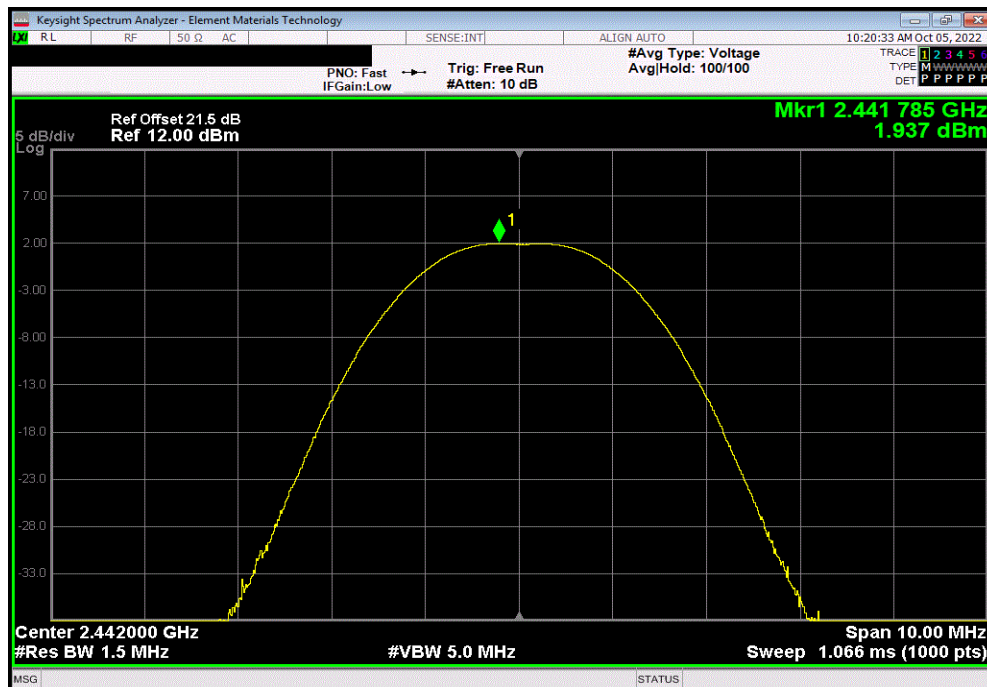


TbTtx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.507	3.5	5.007	36	Pass		



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.937	3.5	5.437	36	Pass		

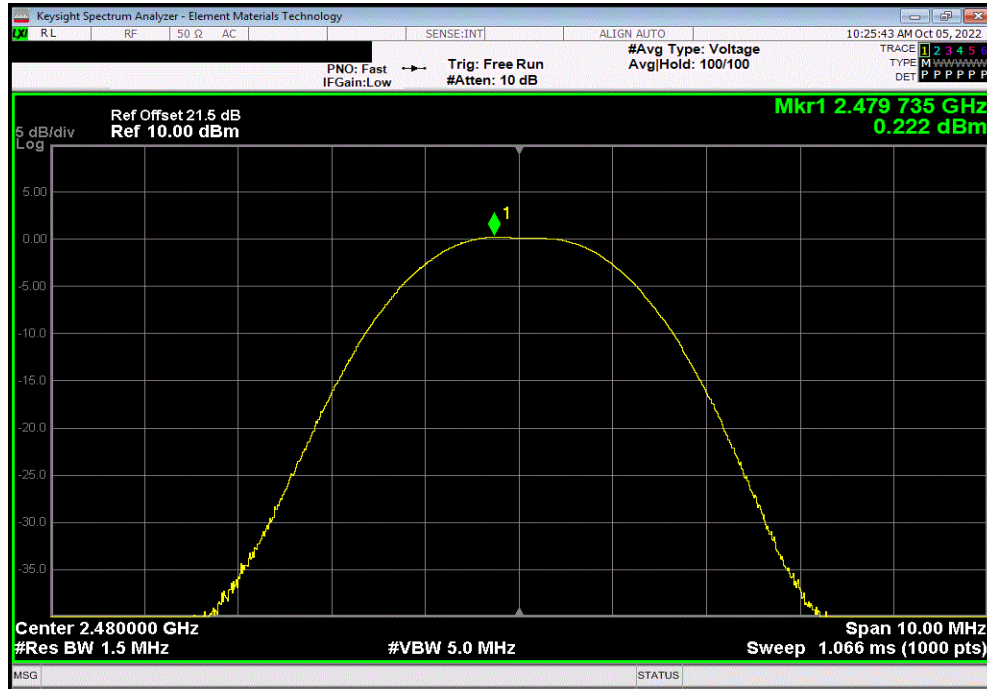


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

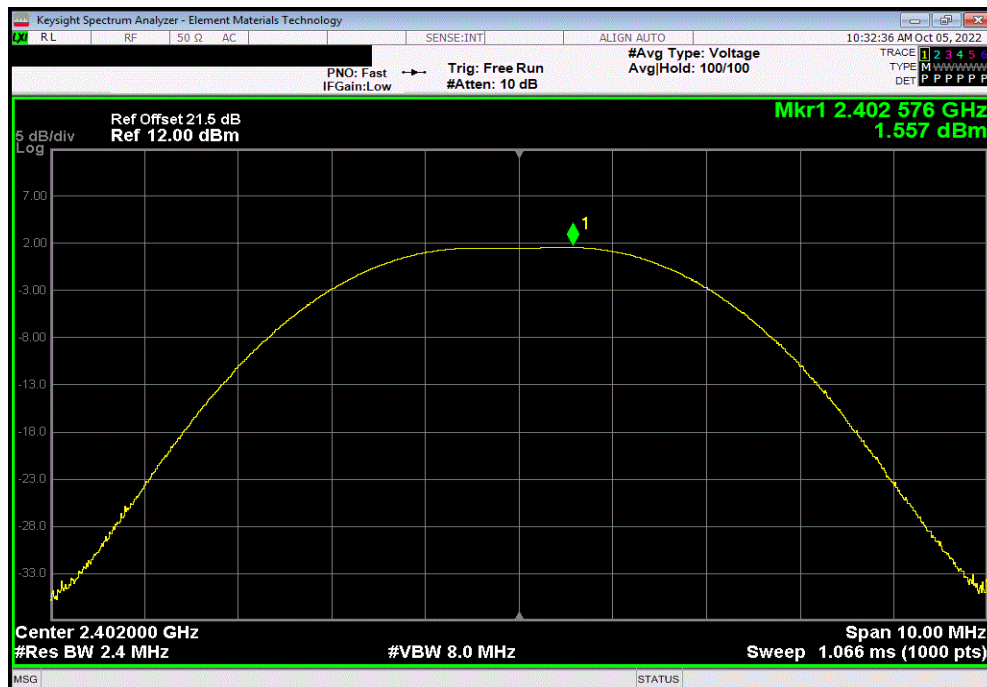


TbTx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	0.222	3.5	3.722	36	Pass	



BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	1.557	3.5	5.057	36	Pass	

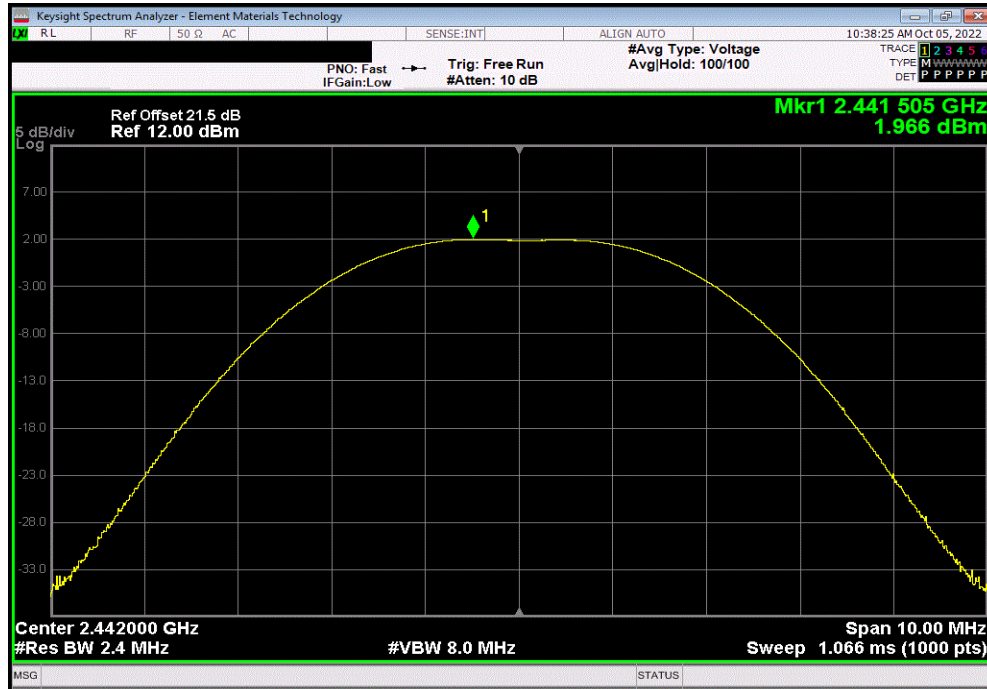


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

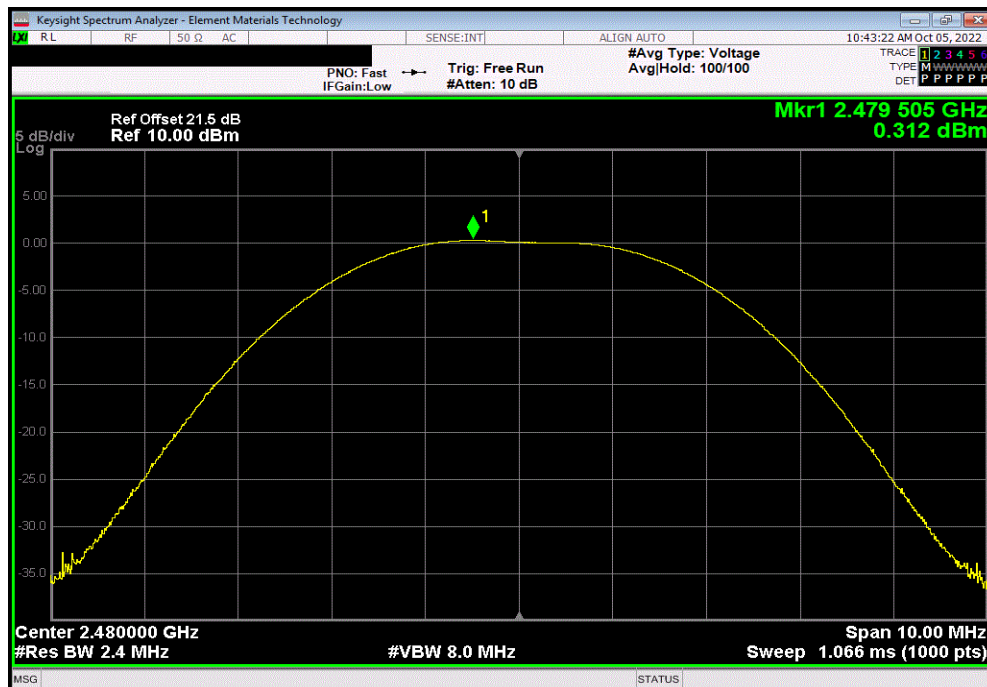


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	1.966	3.5	5.466	36	Pass	



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result	
	0.312	3.5	3.812	36	Pass	



OCCUPIED BANDWIDTH



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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
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

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



TbTx 2022.06.03.0 XMR 2022.02.07.0

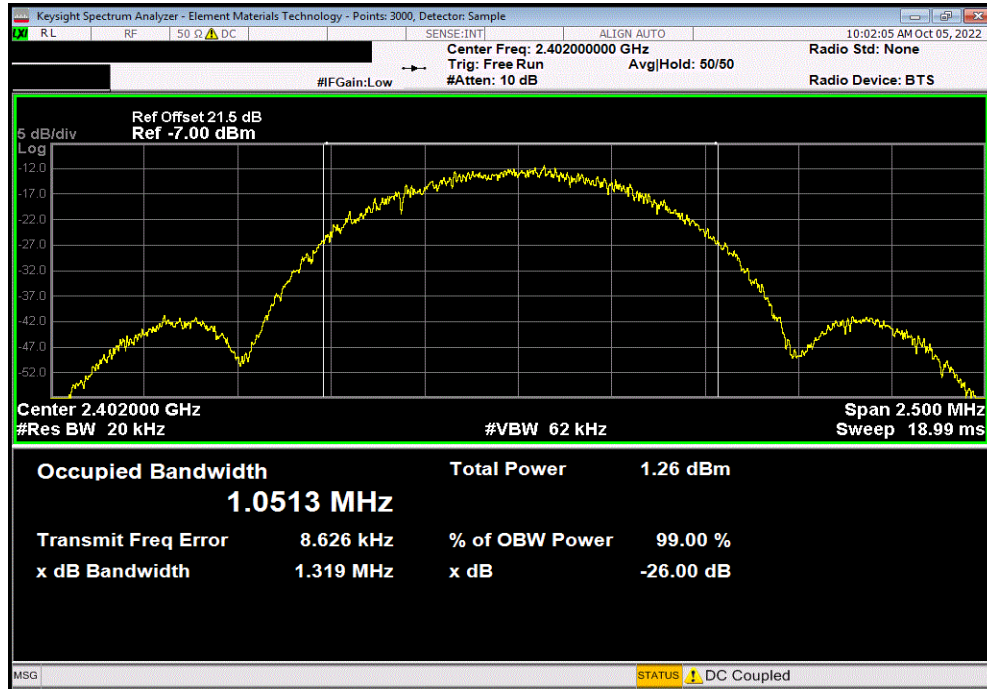
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47.2% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS		ANSI C63.10:2013	
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Chris Heintzelman</i>	
		Value	Limit
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		1.051 MHz	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		1.045 MHz	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz		1.061 MHz	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		2.088 MHz	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		2.093 MHz	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz		2.099 MHz	N/A
		Result	N/A

OCCUPIED BANDWIDTH

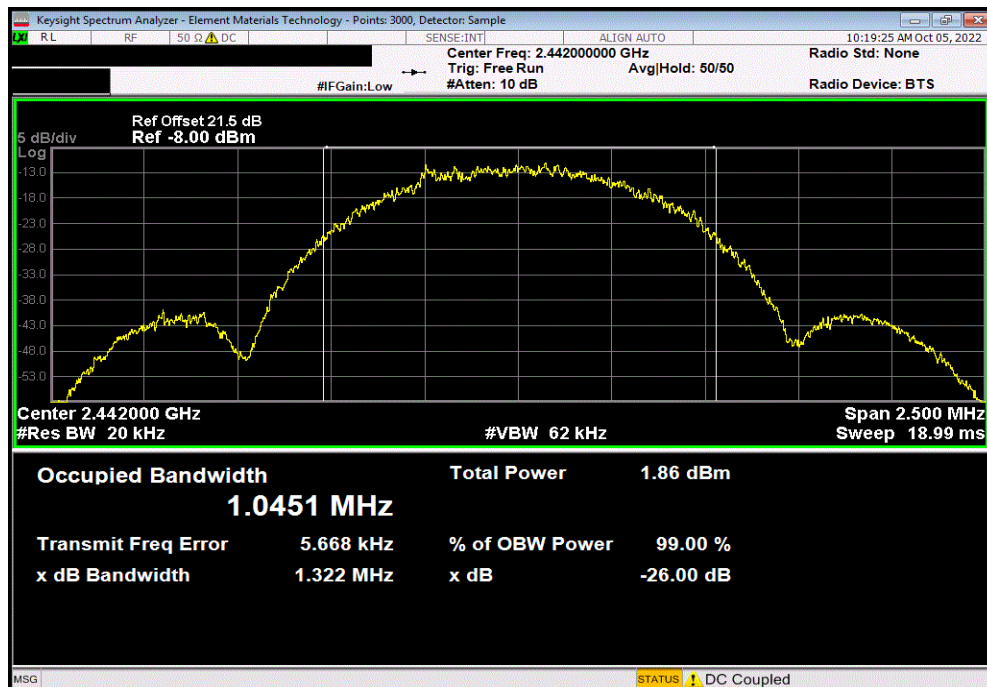


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



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

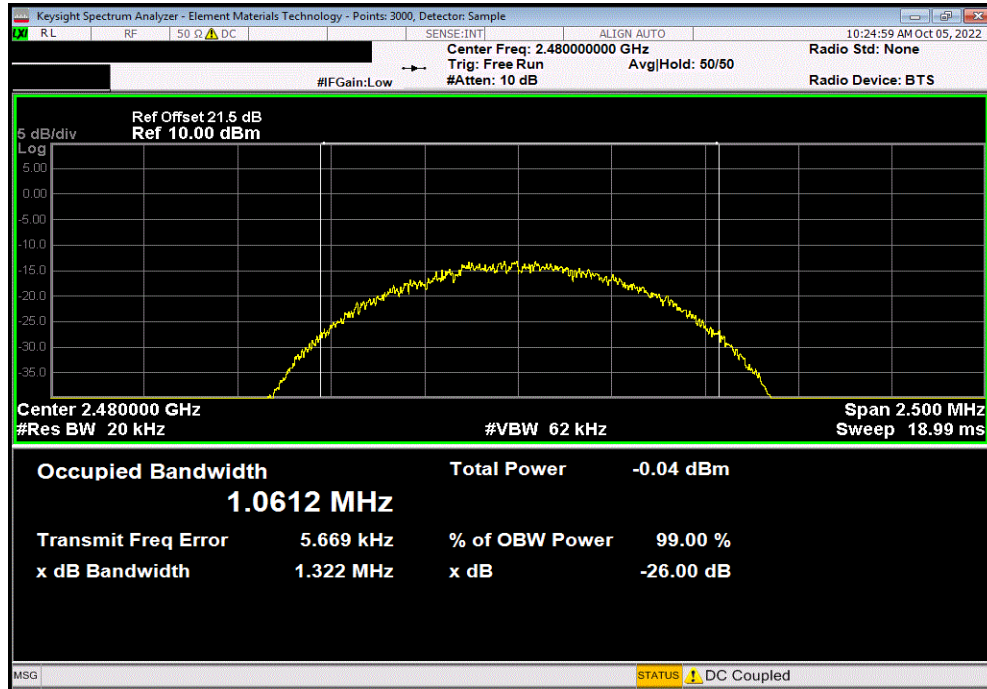


OCCUPIED BANDWIDTH

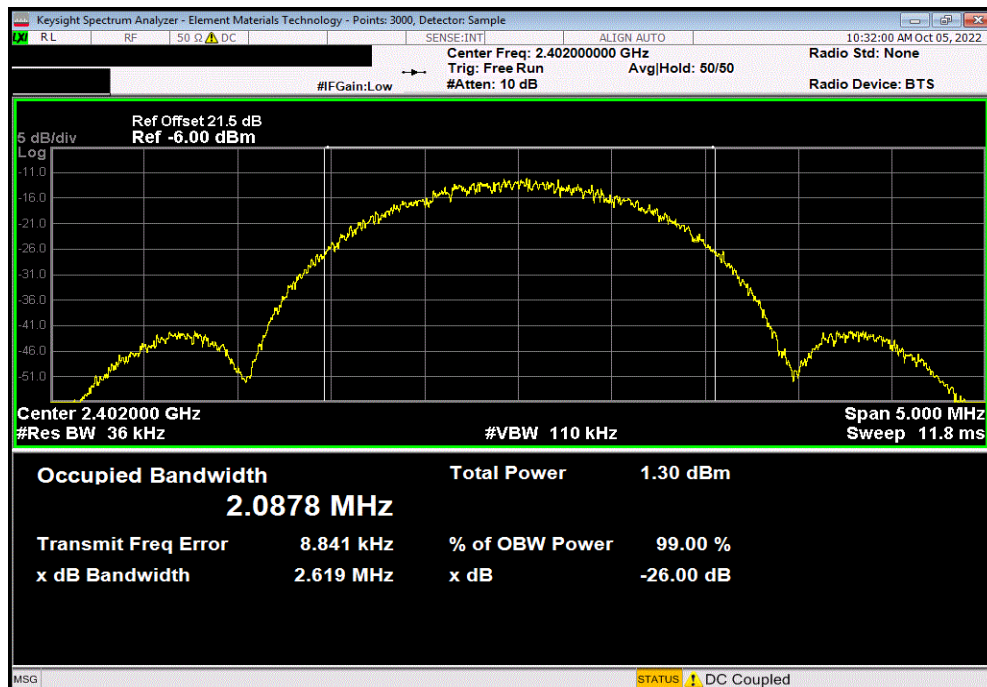


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



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

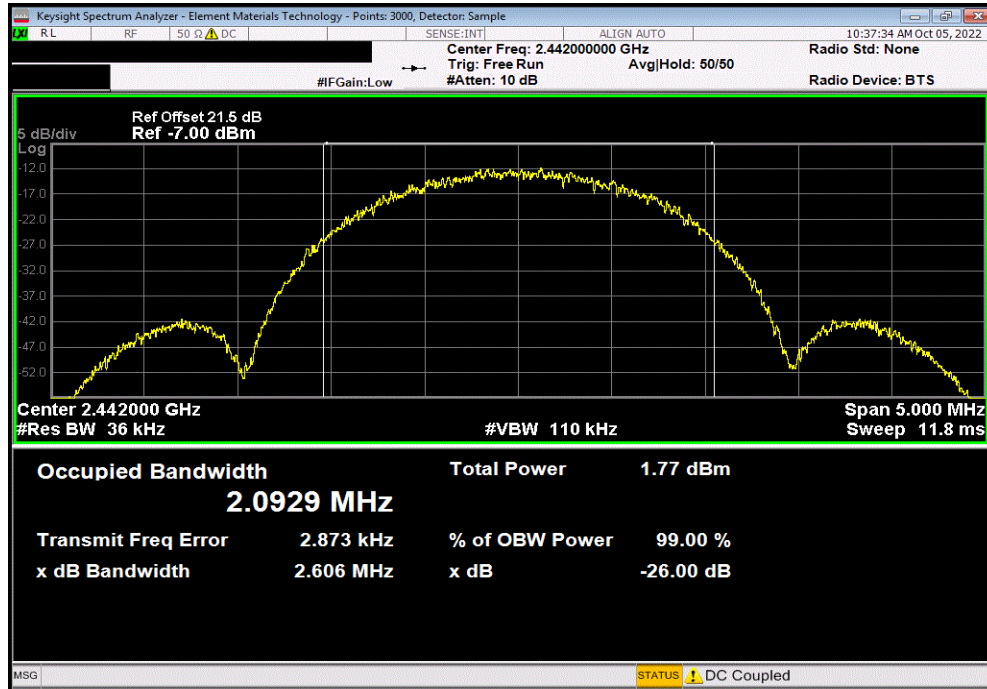


OCCUPIED BANDWIDTH

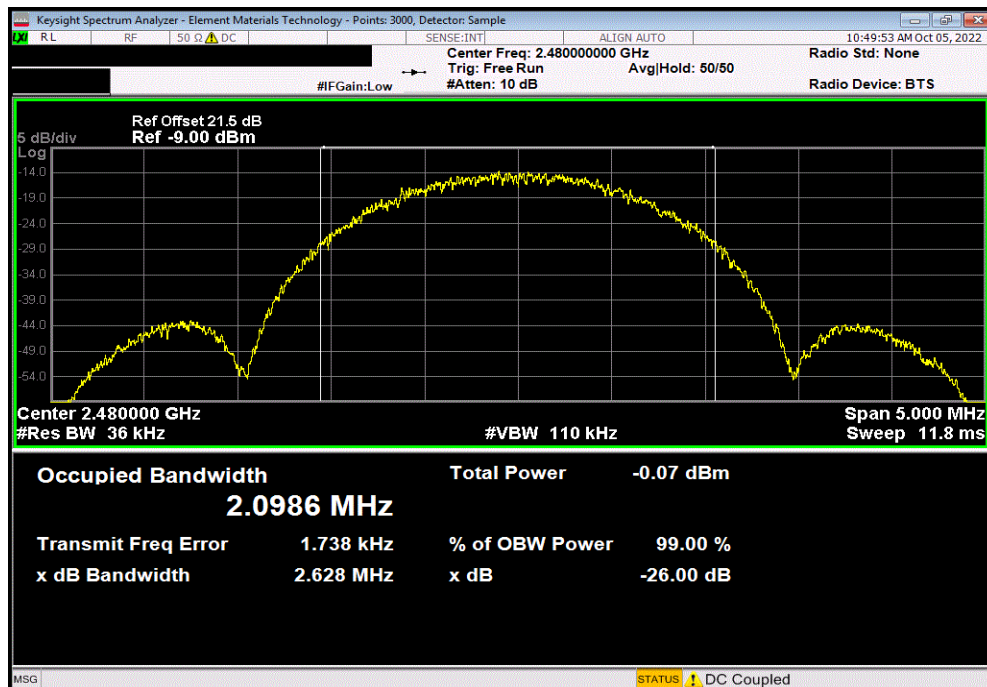


TbTx 2022.06.03.0 XMt 2022.02.07.0

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



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Value	Limit	Result
				2.099 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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
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

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

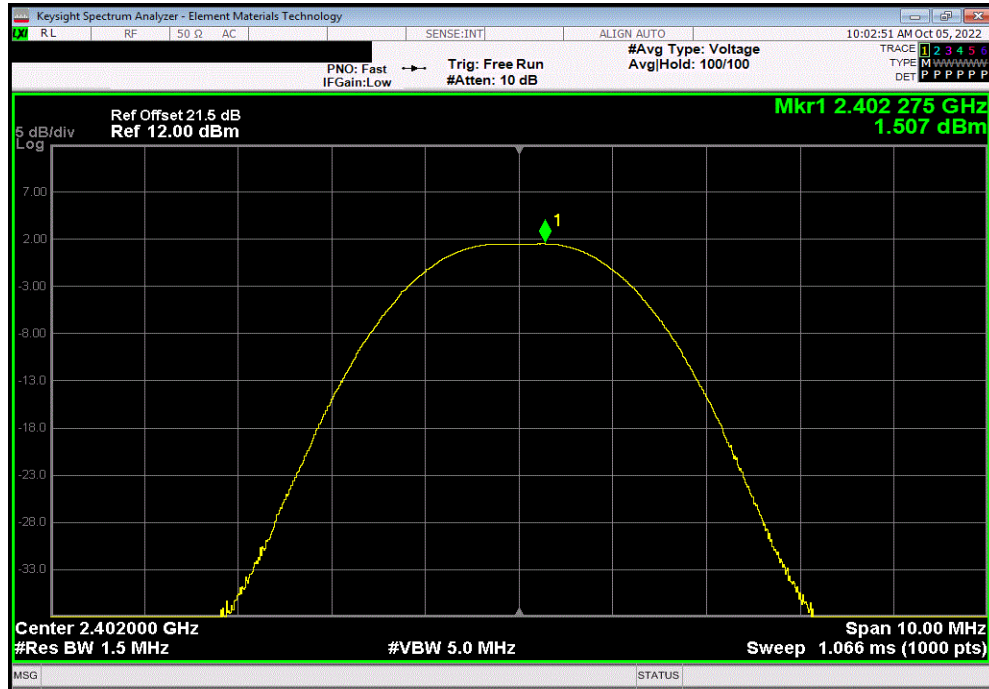
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47.6% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
COMMENTS		ANSI C63.10:2013	
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Chris Heintzelman</i>	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		1.507	30 Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		1.937	30 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		0.222	30 Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		1.557	30 Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		1.966	30 Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz		0.312	30 Pass

OUTPUT POWER

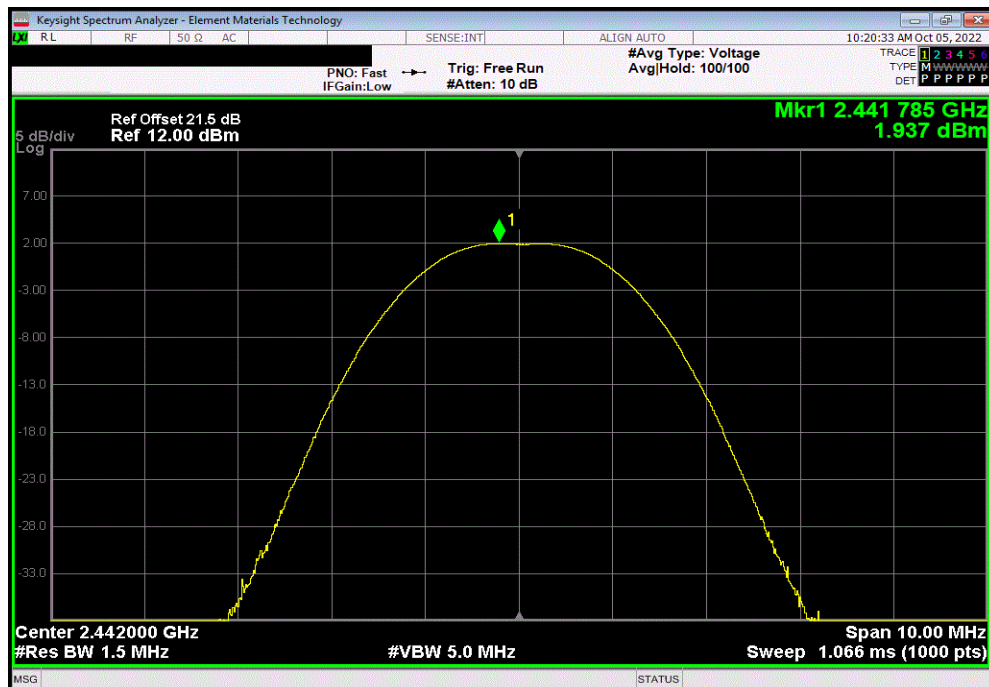


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.507	30	Pass



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.937	30	Pass

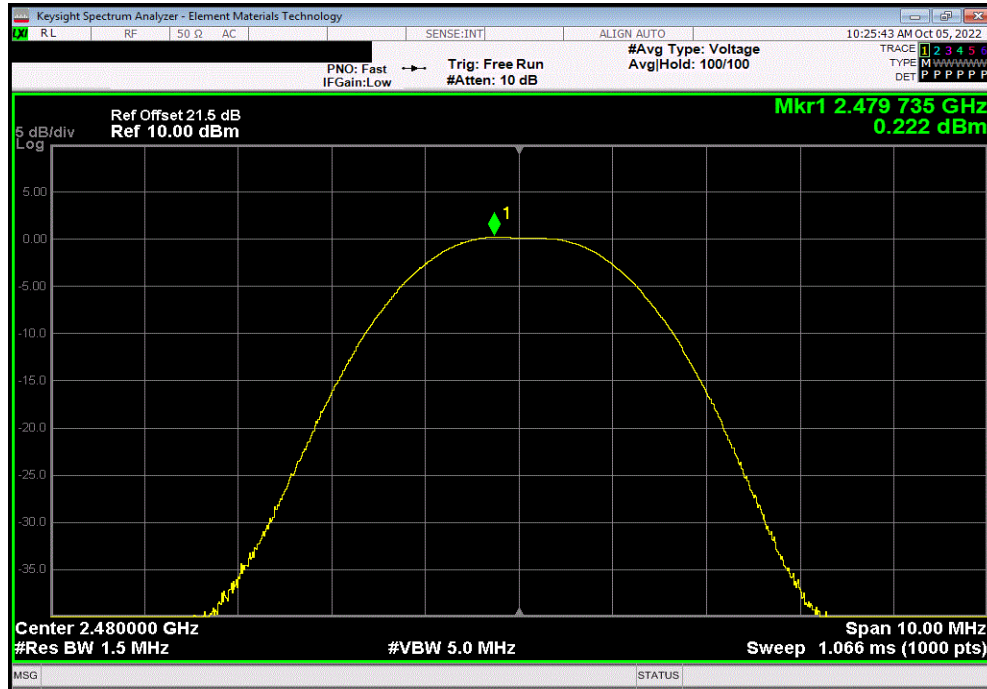


OUTPUT POWER

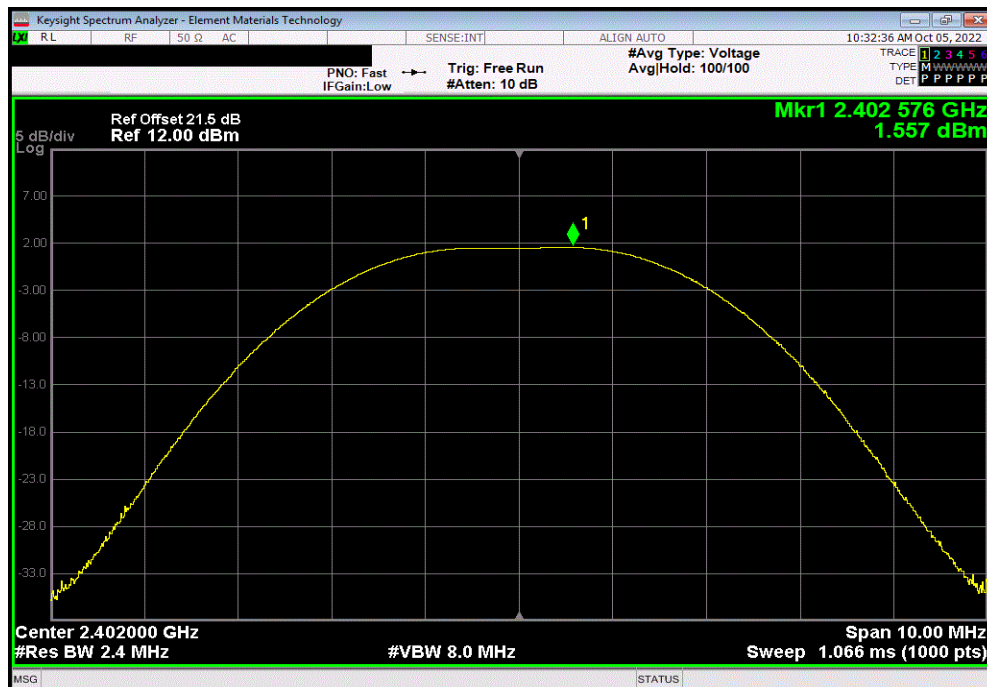


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.222	30	Pass



BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.557	30	Pass

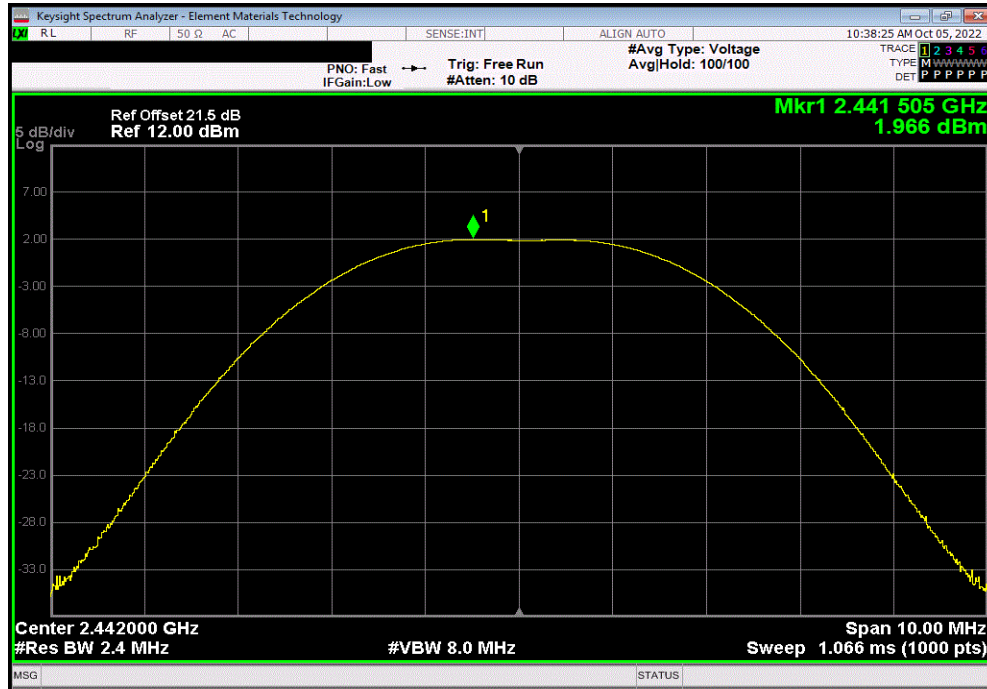


OUTPUT POWER

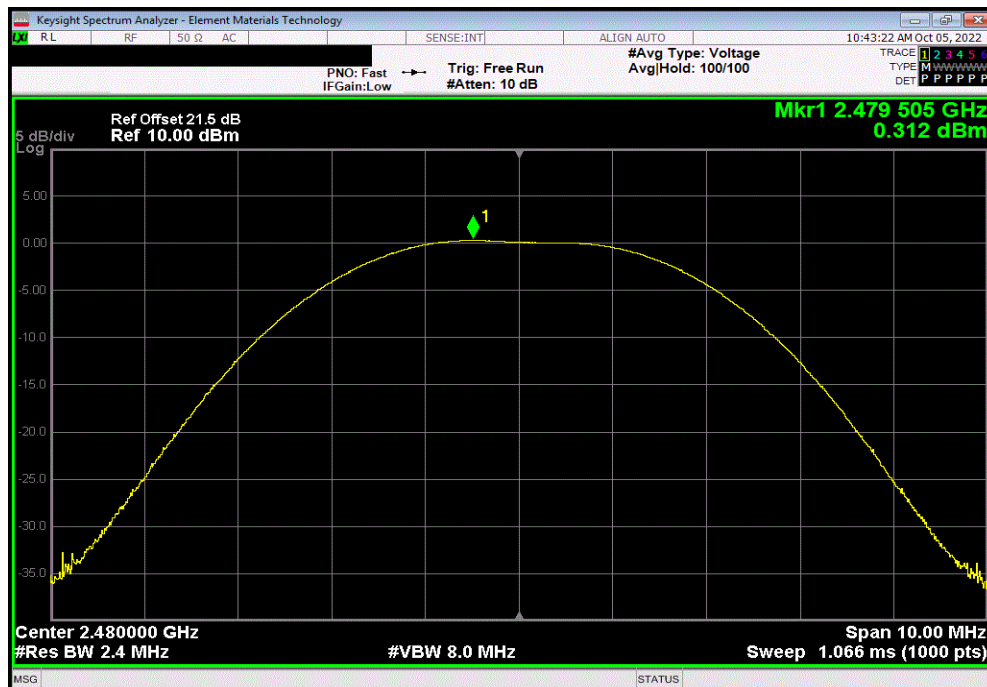


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.966	30	Pass



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				0.312	30	Pass



POWER SPECTRAL DENSITY



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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
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

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



TSTx 2022.06.03.0 XMR 2022.02.07.0

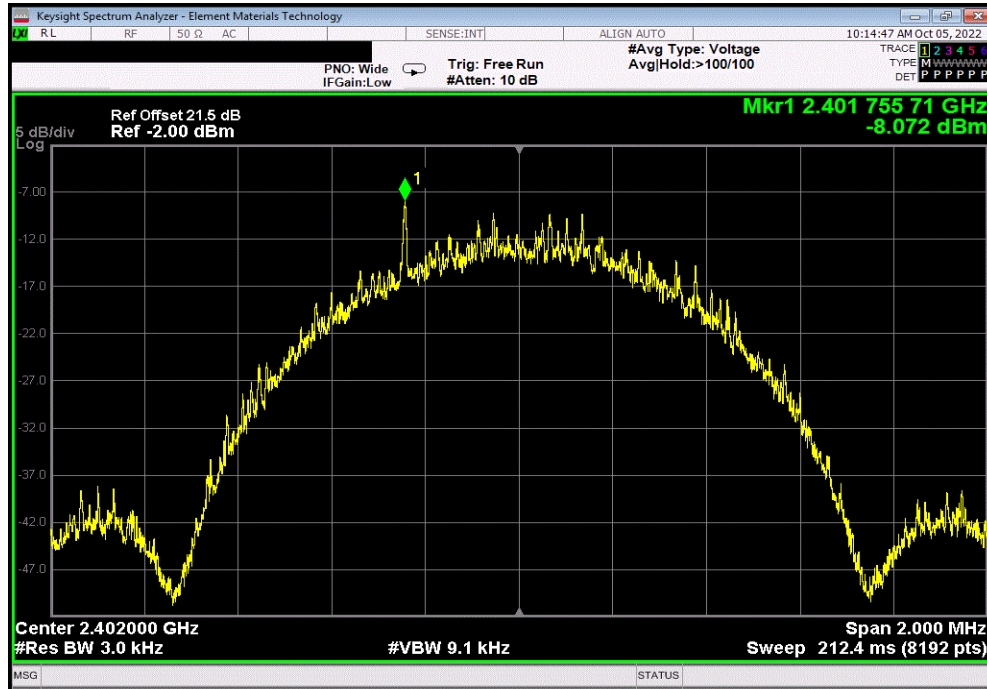
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007	
Serial Number: 178		Date: 5-Oct-22	
Customer: Emerson Automation Solutions		Temperature: 22.6 °C	
Attendees: Randy Beuc, Eugene Korolev		Humidity: 47.9% RH	
Project: None		Barometric Pres.: 1019 mbar	
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
RSS-247 Issue 2:2017		ANSI C63.10:2013	
ANSI C63.10:2013			
COMMENTS			
Reference level offset includes measurement cable, attenuator, and DC block.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Chris Heintzelman</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		-8.072	8
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		-9.018	8
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-10.042	8
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		-11.754	8
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		-10.995	8
BLE/GFSK 2 Mbps High Channel, 2480 MHz		-12.692	8
			Results
			Pass
			Pass
			Pass
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

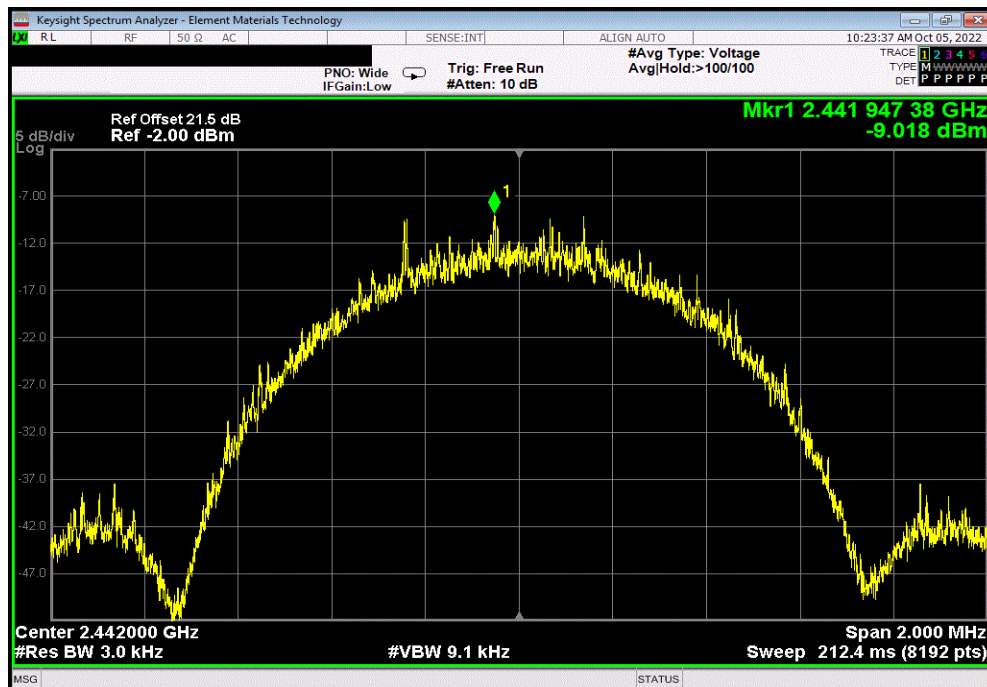


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-8.072	8	Pass			



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-9.018	8	Pass			

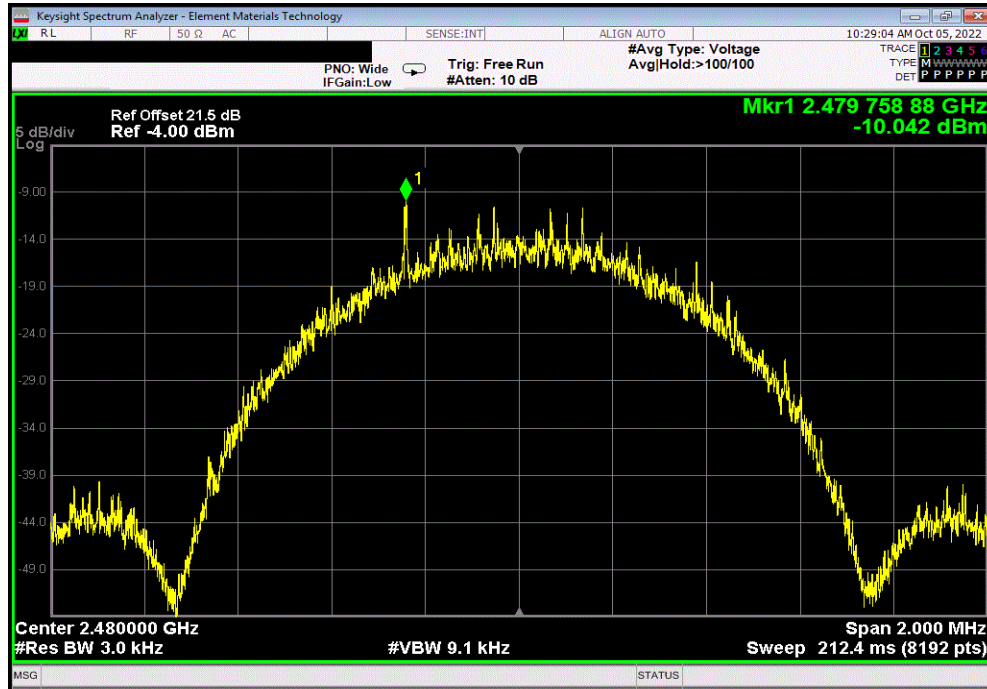


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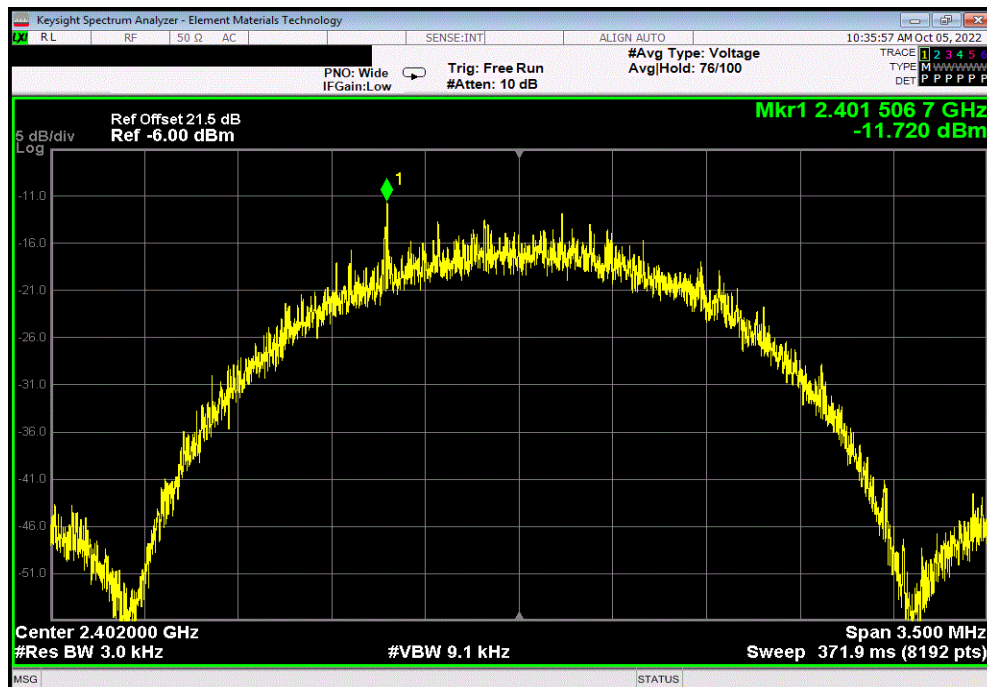


TbTtX 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-10.042	8	Pass			



BLE/GFSK 2 Mbps Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-11.754	8	Pass			

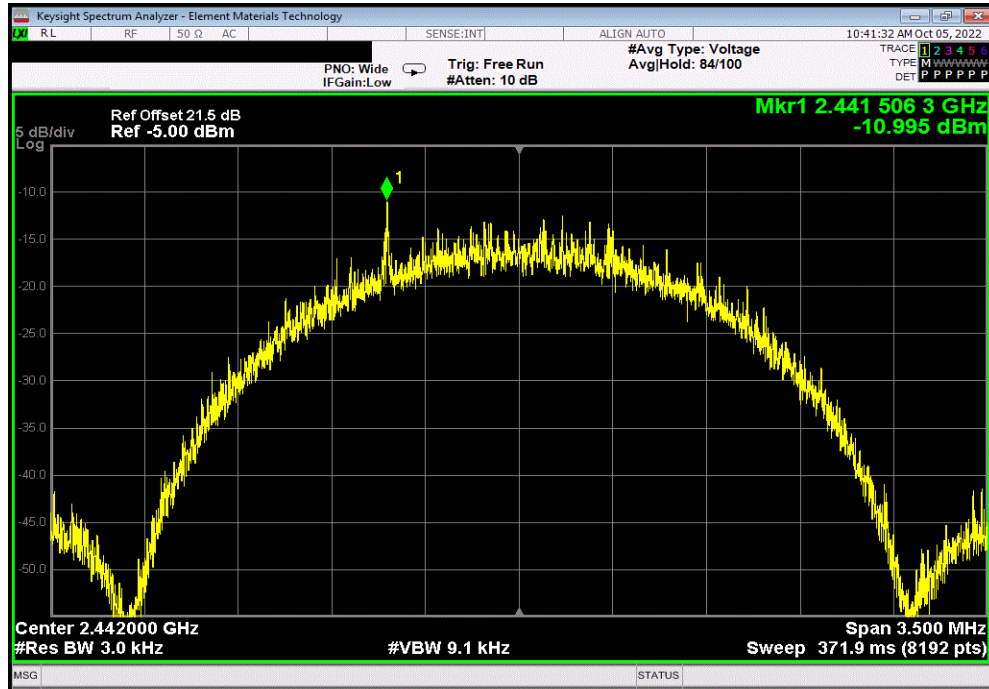


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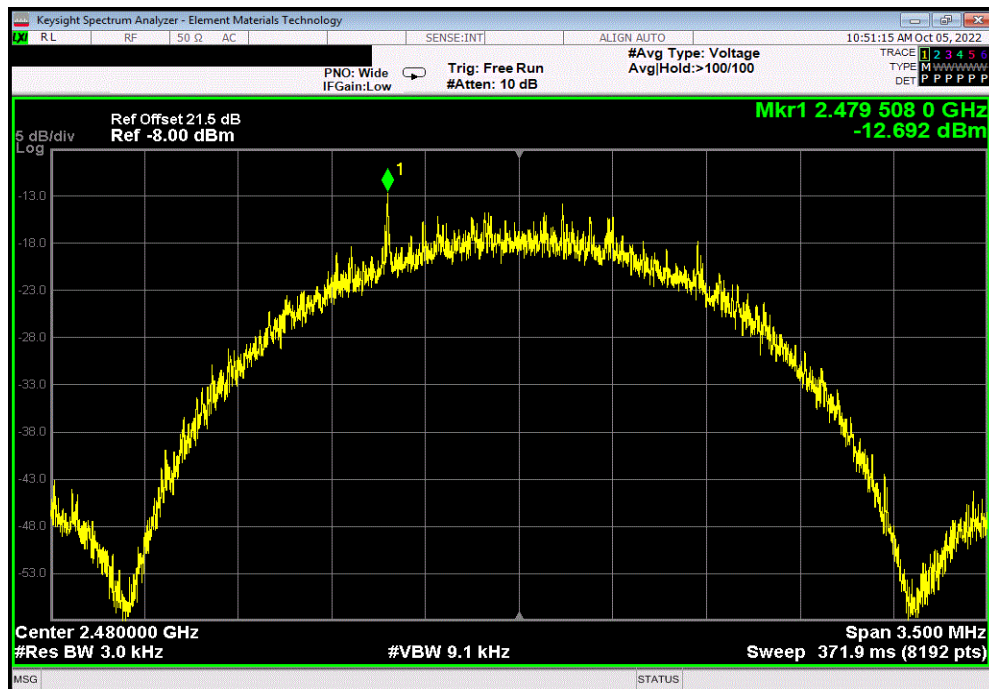


TbTtX 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-10.995	8	Pass			



BLE/GFSK 2 Mbps High Channel, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-12.692	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
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2022-03-07	2023-03-07
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2022-04-04	2023-04-04

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

EMAU0007-3

MODES INVESTIGATED

BLE Transmitting Mid Channel 2442 MHz, 1 Mbps

POWERLINE CONDUCTED EMISSIONS

EUT:	Rosemount 3051C	Work Order:	EMAU0007
Serial Number:	DUT3	Date:	2022-10-06
Customer:	Emerson Automation Solutions	Temperature:	22.9°C
Attendees:	Randy Beuc, Eugene Korolev	Relative Humidity:	35.1%
Customer Project:	None	Bar. Pressure (PMSL):	1029 mb
Tested By:	Christopher Heintzelman	Job Site:	MN03
Power:	24VDC via DC Supply at 120VAC/60Hz	Configuration:	EMAU0007-3

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	4	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

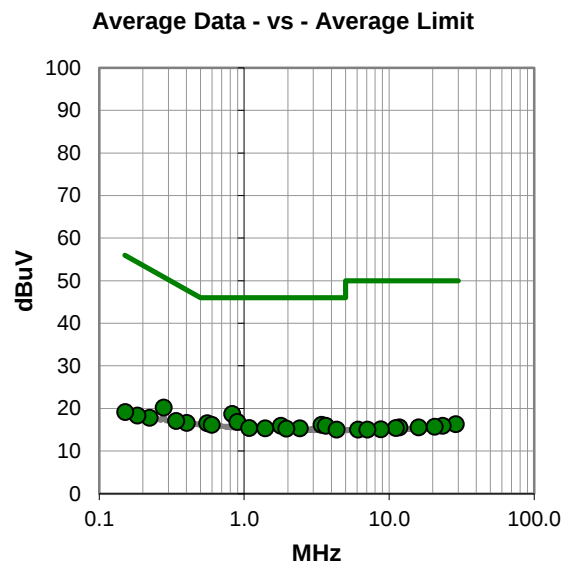
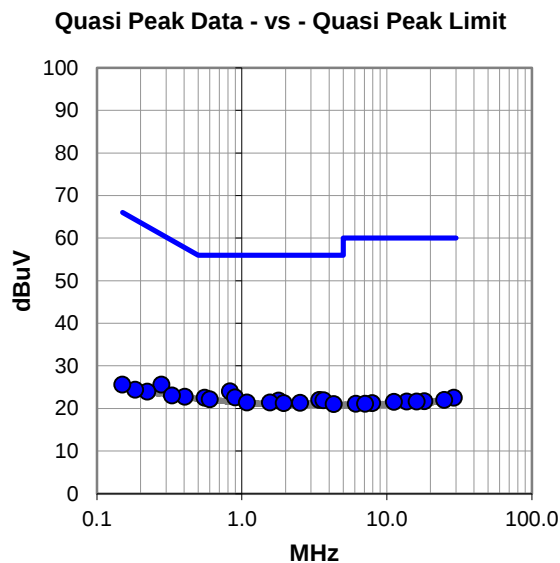
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EUT OPERATING MODES

BLE Transmitting Mid Channel 2442 MHz, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.831	3.8	20.2	24.0	56.0	-32.0
0.898	2.4	20.2	22.6	56.0	-33.4
0.554	2.2	20.3	22.5	56.0	-33.5
0.600	1.8	20.3	22.1	56.0	-33.9
3.426	1.5	20.5	22.0	56.0	-34.0
3.661	1.4	20.5	21.9	56.0	-34.1
1.796	1.5	20.3	21.8	56.0	-34.2
1.082	1.2	20.2	21.4	56.0	-34.6
1.566	1.1	20.3	21.4	56.0	-34.6
2.521	0.9	20.4	21.3	56.0	-34.7
1.946	0.9	20.3	21.2	56.0	-34.8
4.305	0.5	20.5	21.0	56.0	-35.0
0.403	2.4	20.3	22.7	57.8	-35.1
0.278	5.3	20.3	25.6	60.9	-35.3
0.330	2.7	20.3	23.0	59.5	-36.5
29.040	0.0	22.5	22.5	60.0	-37.5
24.967	0.0	22.0	22.0	60.0	-38.0
18.225	0.0	21.7	21.7	60.0	-38.3
13.768	0.2	21.4	21.6	60.0	-38.4
16.084	0.0	21.6	21.6	60.0	-38.4
11.188	0.1	21.4	21.5	60.0	-38.5
7.930	0.3	20.9	21.2	60.0	-38.8
0.223	3.5	20.4	23.9	62.7	-38.8
6.128	0.4	20.7	21.1	60.0	-38.9
7.092	0.3	20.8	21.1	60.0	-38.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.831	-1.5	20.2	18.7	46.0	-27.3
0.898	-3.4	20.2	16.8	46.0	-29.2
0.556	-3.8	20.3	16.5	46.0	-29.5
0.597	-4.2	20.3	16.1	46.0	-29.9
3.426	-4.4	20.5	16.1	46.0	-29.9
1.796	-4.4	20.3	15.9	46.0	-30.1
3.661	-4.6	20.5	15.9	46.0	-30.1
1.084	-4.8	20.2	15.4	46.0	-30.6
0.278	-0.1	20.3	20.2	50.9	-30.7
1.401	-5.0	20.3	15.3	46.0	-30.7
2.425	-5.1	20.4	15.3	46.0	-30.7
1.954	-5.1	20.3	15.2	46.0	-30.8
4.360	-5.5	20.5	15.0	46.0	-31.0
0.402	-3.7	20.3	16.6	47.8	-31.2
0.339	-3.3	20.3	17.0	49.2	-32.2
28.922	-6.2	22.5	16.3	50.0	-33.7
23.435	-6.1	22.0	15.9	50.0	-34.1
20.613	-6.1	21.8	15.7	50.0	-34.3
11.807	-5.9	21.4	15.5	50.0	-34.5
16.034	-6.1	21.6	15.5	50.0	-34.5
11.151	-6.0	21.4	15.4	50.0	-34.6
8.772	-5.9	21.0	15.1	50.0	-34.9
0.223	-2.6	20.4	17.8	52.7	-34.9
6.128	-5.7	20.7	15.0	50.0	-35.0
7.092	-5.8	20.8	15.0	50.0	-35.0

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	Rosemount 3051C	Work Order:	EMAU0007
Serial Number:	DUT3	Date:	2022-10-06
Customer:	Emerson Automation Solutions	Temperature:	22.9°C
Attendees:	Randy Beuc, Eugene Korolev	Relative Humidity:	35.1%
Customer Project:	None	Bar. Pressure (PMSL):	1029 mb
Tested By:	Christopher Heintzelman	Job Site:	MN03
Power:	24VDC via DC Supply at 120VAC/60Hz	Configuration:	EMAU0007-3

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	5	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

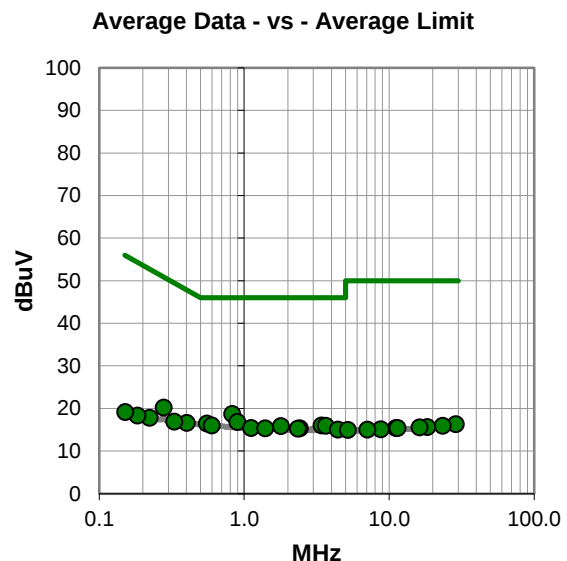
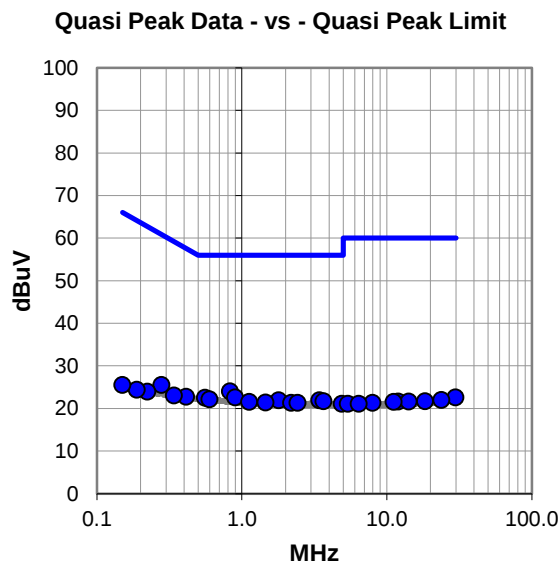
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EUT OPERATING MODES

BLE Transmitting Mid Channel 2442 MHz, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #5

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.829	3.8	20.2	24.0	56.0	-32.0
0.899	2.4	20.2	22.6	56.0	-33.4
0.556	2.2	20.3	22.5	56.0	-33.5
0.597	1.8	20.3	22.1	56.0	-33.9
1.796	1.6	20.3	21.9	56.0	-34.1
3.426	1.4	20.5	21.9	56.0	-34.1
3.659	1.2	20.5	21.7	56.0	-34.3
1.123	1.3	20.2	21.5	56.0	-34.5
1.461	1.1	20.3	21.4	56.0	-34.6
2.192	1.0	20.3	21.3	56.0	-34.7
2.425	0.9	20.4	21.3	56.0	-34.7
4.885	0.5	20.6	21.1	56.0	-34.9
0.412	2.4	20.3	22.7	57.6	-34.9
0.278	5.2	20.3	25.5	60.9	-35.4
0.339	2.7	20.3	23.0	59.2	-36.2
29.758	0.1	22.5	22.6	60.0	-37.4
23.861	0.0	22.0	22.0	60.0	-38.0
18.348	0.0	21.7	21.7	60.0	-38.3
11.973	0.2	21.4	21.6	60.0	-38.4
14.180	0.2	21.4	21.6	60.0	-38.4
11.156	0.1	21.4	21.5	60.0	-38.5
7.971	0.4	20.9	21.3	60.0	-38.7
0.223	3.5	20.4	23.9	62.7	-38.8
5.388	0.5	20.6	21.1	60.0	-38.9
6.391	0.4	20.7	21.1	60.0	-38.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.829	-1.5	20.2	18.7	46.0	-27.3
0.898	-3.4	20.2	16.8	46.0	-29.2
0.553	-3.9	20.3	16.4	46.0	-29.6
0.597	-4.3	20.3	16.0	46.0	-30.0
3.426	-4.5	20.5	16.0	46.0	-30.0
3.661	-4.6	20.5	15.9	46.0	-30.1
1.795	-4.5	20.3	15.8	46.0	-30.2
1.119	-4.8	20.2	15.4	46.0	-30.6
0.278	-0.1	20.3	20.2	50.9	-30.7
1.400	-5.0	20.3	15.3	46.0	-30.7
2.425	-5.1	20.4	15.3	46.0	-30.7
2.346	-5.2	20.4	15.2	46.0	-30.8
4.439	-5.5	20.5	15.0	46.0	-31.0
0.402	-3.7	20.3	16.6	47.8	-31.2
0.330	-3.4	20.3	16.9	49.5	-32.6
28.925	-6.2	22.5	16.3	50.0	-33.7
23.437	-6.1	22.0	15.9	50.0	-34.1
18.360	-6.1	21.7	15.6	50.0	-34.4
16.244	-6.1	21.6	15.5	50.0	-34.5
11.182	-6.0	21.4	15.4	50.0	-34.6
11.450	-6.0	21.4	15.4	50.0	-34.6
8.786	-5.9	21.0	15.1	50.0	-34.9
0.223	-2.6	20.4	17.8	52.7	-34.9
7.091	-5.8	20.8	15.0	50.0	-35.0
5.211	-5.7	20.6	14.9	50.0	-35.1

CONCLUSION

Pass



Tested By

SPURIOUS CONDUCTED EMISSIONS



element

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
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2022-05-30	2023-05-30
Block - DC	Fairview Microwave	SD3379	AMI	2022-09-10	2023-09-10
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

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



TMTx 2022.06.03.0 XMR 2022.02.07.0

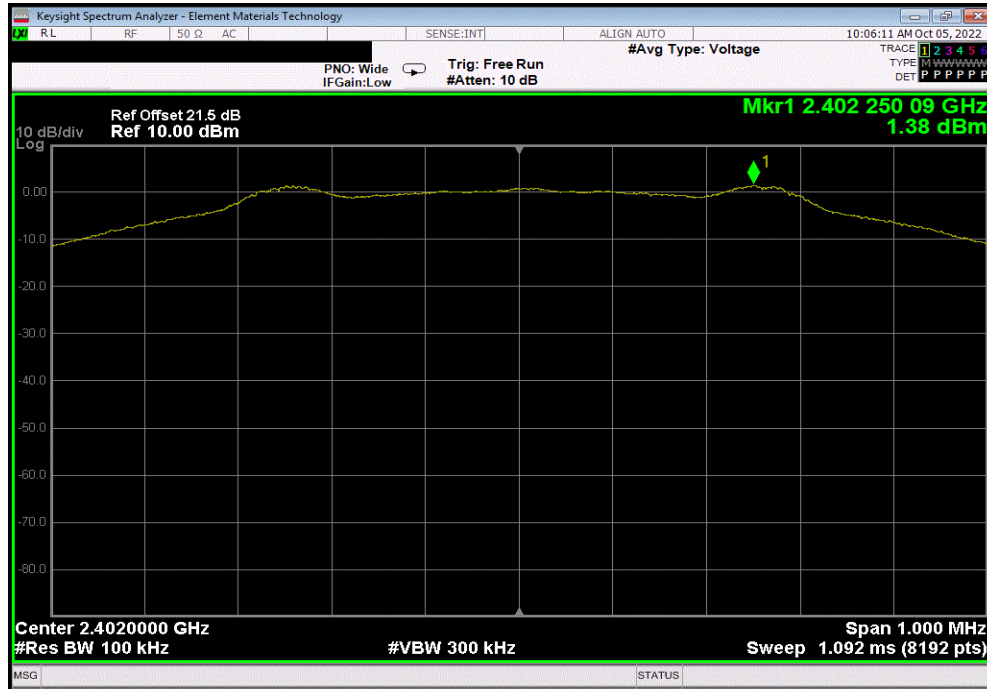
EUT: Rosemount 3051 Pressure Transmitter		Work Order: EMAU0007				
Serial Number: 178		Date: 5-Oct-22				
Customer: Emerson Automation Solutions		Temperature: 22.6 °C				
Attendees: Randy Beuc, Eugene Korolev		Humidity: 48% RH				
Project: None		Barometric Pres.: 1019 mbar				
Tested by: Christopher Heintzelman	Power: 4.3 VDC	Job Site: MN11				
TEST SPECIFICATIONS						
FCC 15.247:2022		Test Method				
RSS-247 Issue 2:2017		ANSI C63.10:2013				
COMMENTS		ANSI C63.10:2013				
Reference level offset includes measurement cable, attenuator, and DC block.						
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	2402.25	N/A	N/A	
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		30 MHz - 12.5 GHz	12037.19	-50.88	-20	Pass
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		12.5 GHz - 25 GHz	24905.38	-37.83	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		Fundamental	2442.26	N/A	N/A	N/A
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		30 MHz - 12.5 GHz	12197.04	-50.93	-20	Pass
BLE/GFSK 1 Mbps Mid Channel, 2442 MHz		12.5 GHz - 25 GHz	24929.8	-38.65	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		Fundamental	2479.75	N/A	N/A	N/A
BLE/GFSK 1 Mbps High Channel, 2480 MHz		30 MHz - 12.5 GHz	11988.47	-49.28	-20	Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		12.5 GHz - 25 GHz	24896.23	-36.88	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		Fundamental	2402	N/A	N/A	N/A
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		30 MHz - 12.5 GHz	5665.93	-49.03	-20	Pass
BLE/GFSK 2 Mbps Low Channel, 2402 MHz		12.5 GHz - 25 GHz	24928.27	-36.61	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		Fundamental	2441.51	N/A	N/A	N/A
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		30 MHz - 12.5 GHz	11831.67	-49.84	-20	Pass
BLE/GFSK 2 Mbps Mid Channel, 2442 MHz		12.5 GHz - 25 GHz	24822.98	-37.64	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz		Fundamental	2479.52	N/A	N/A	N/A
BLE/GFSK 2 Mbps High Channel, 2480 MHz		30 MHz - 12.5 GHz	2761.19	-48.1	-20	Pass
BLE/GFSK 2 Mbps High Channel, 2480 MHz		12.5 GHz - 25 GHz	24760.41	-35.73	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

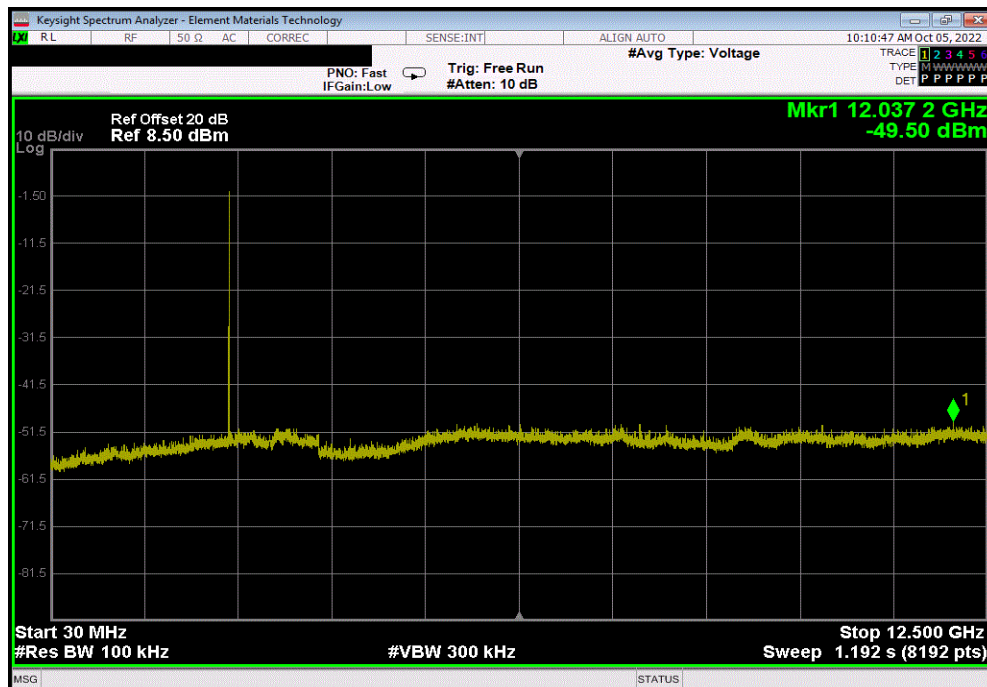


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2402.25	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	12037.19	-50.88	-20	Pass		

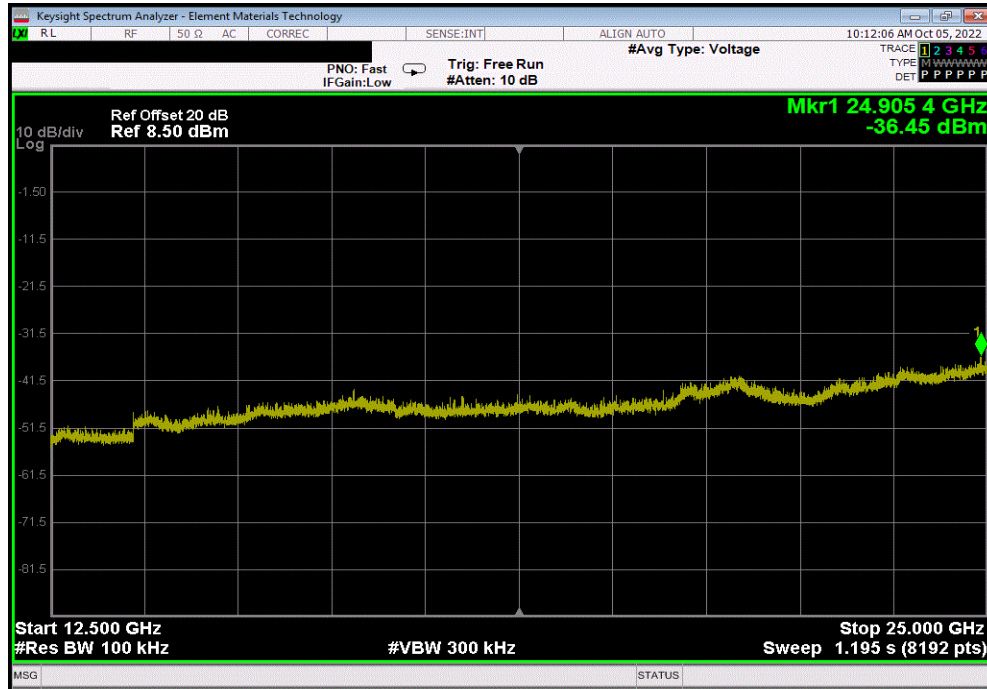


SPURIOUS CONDUCTED EMISSIONS

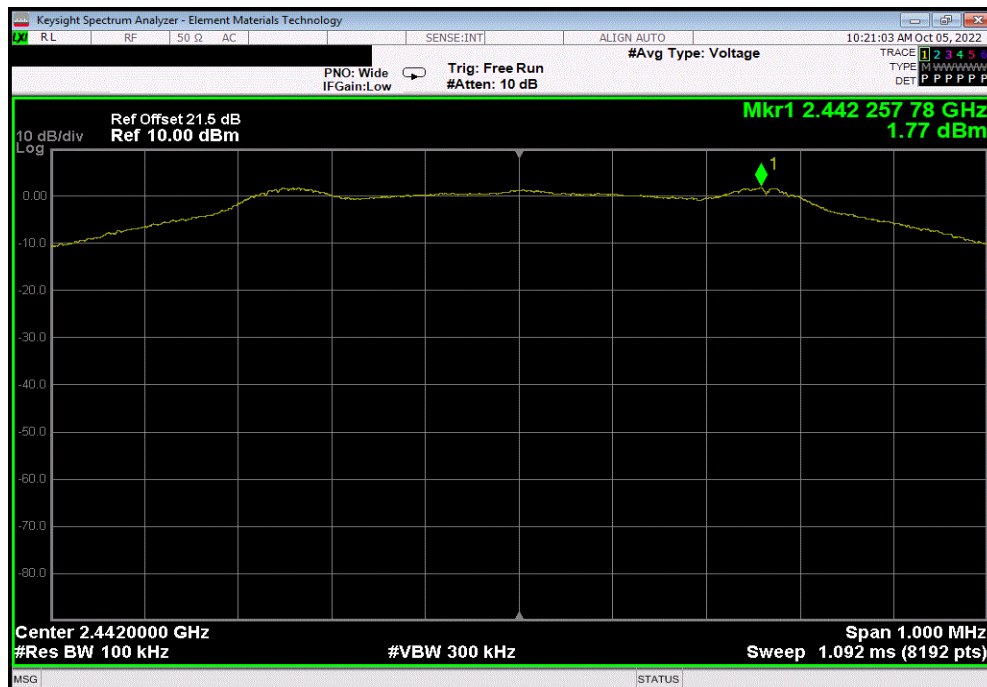


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24905.38	-37.83	-20	Pass	



BLE/GFSK 1 Mbps Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.26	N/A	N/A	N/A	

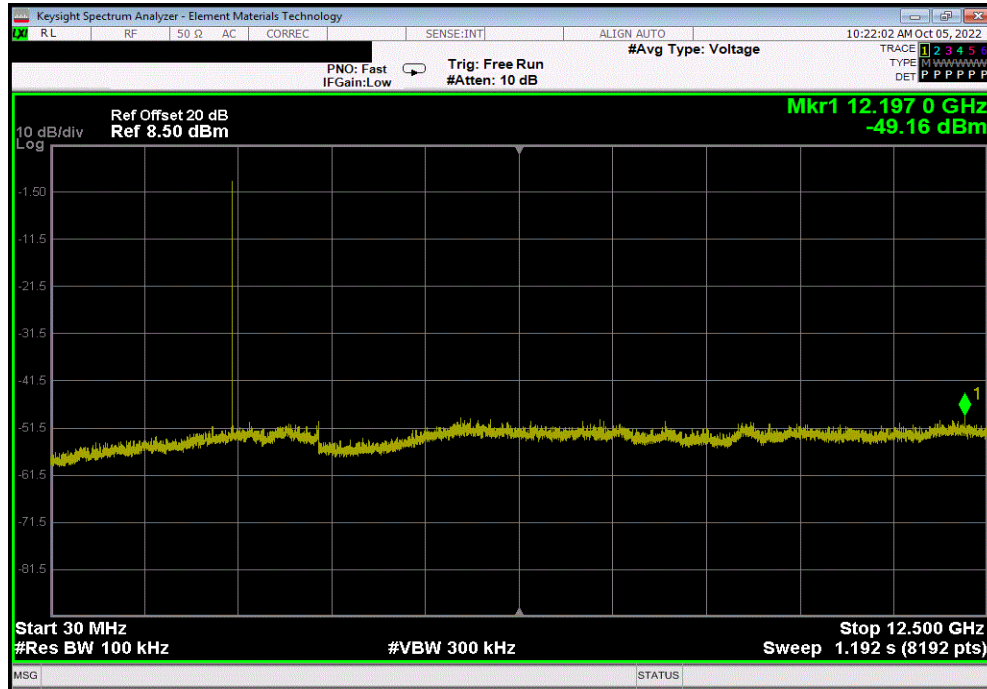


SPURIOUS CONDUCTED EMISSIONS

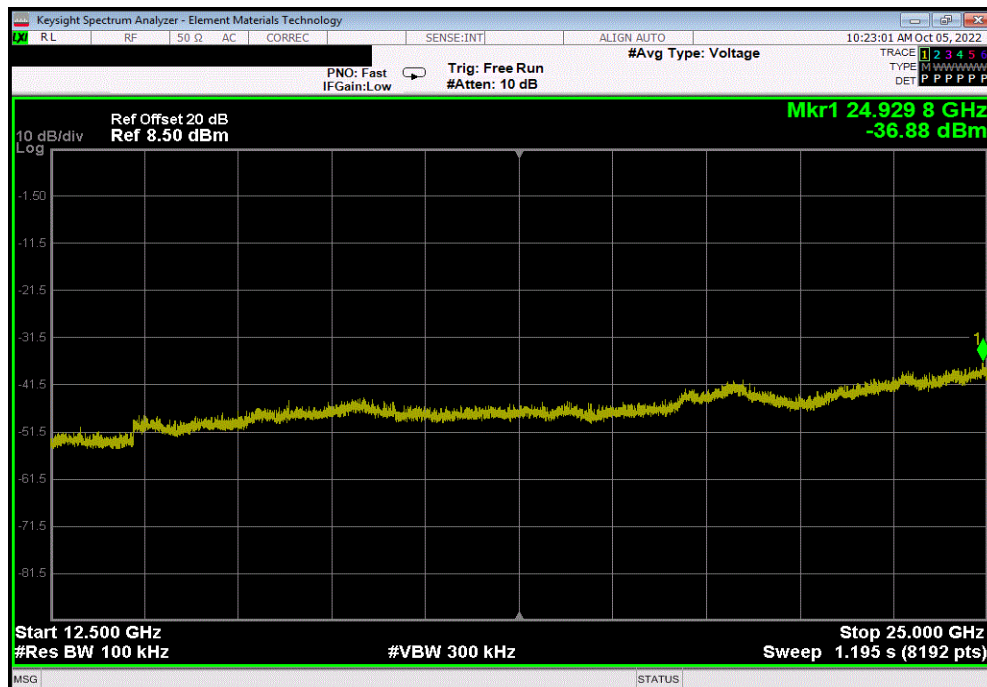


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12197.04	-50.93	-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	24929.8	-38.65	-20	Pass	

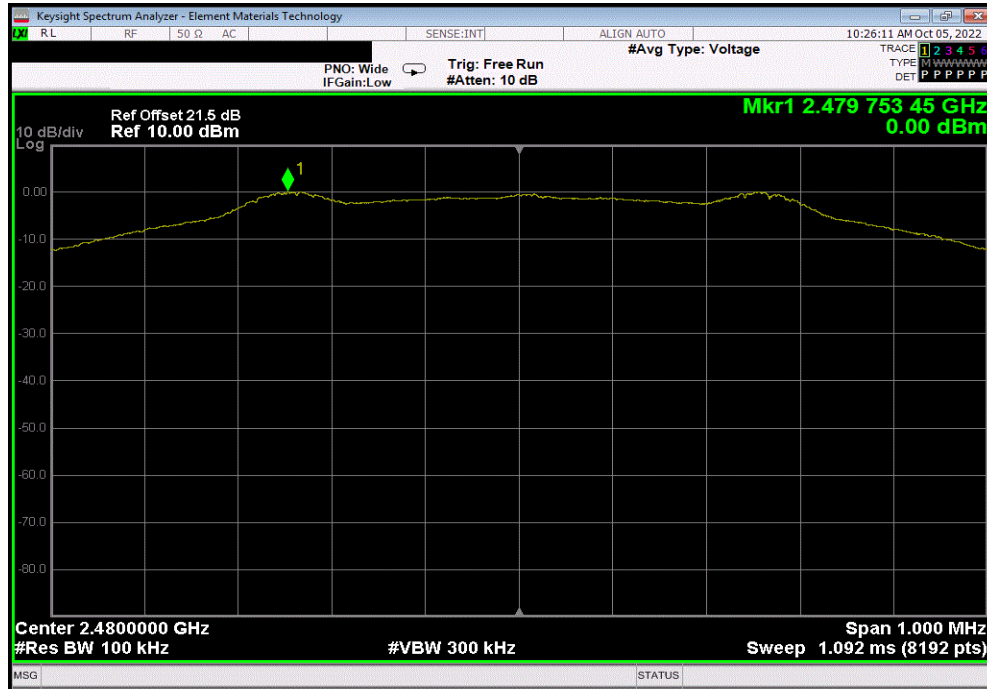


SPURIOUS CONDUCTED EMISSIONS

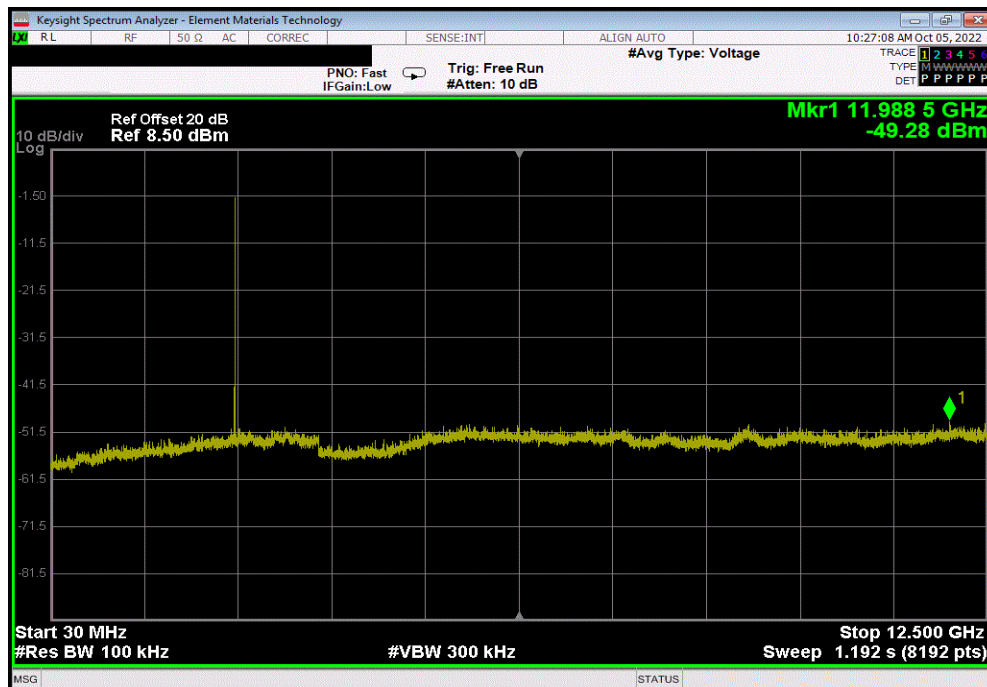


TbTx 2022.06.03.0 XMR 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2479.75	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	11988.47	-49.28	-20	Pass		

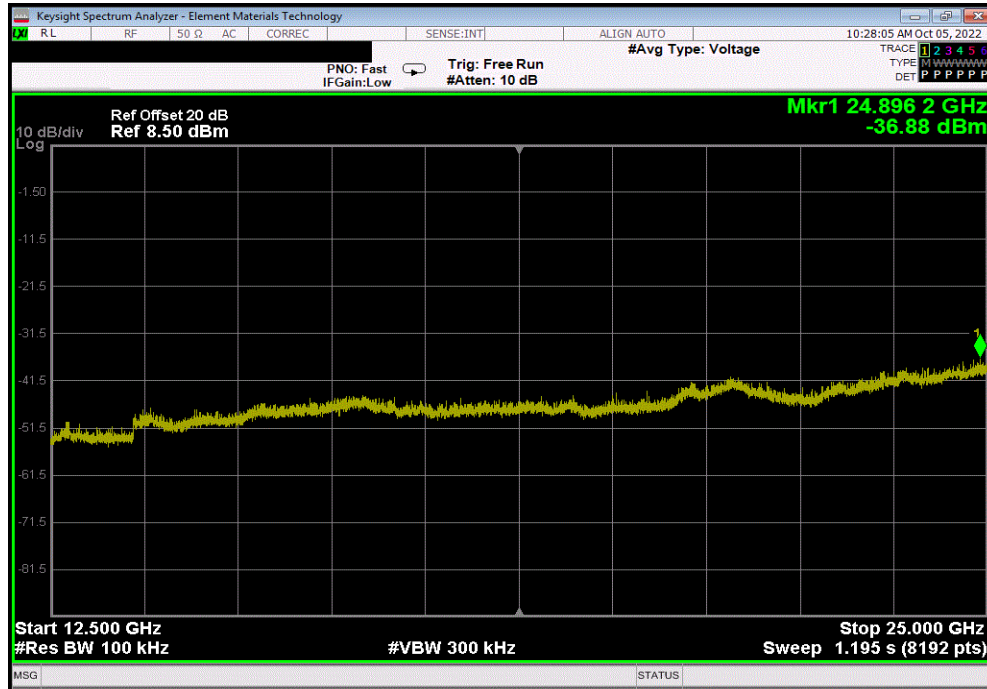


SPURIOUS CONDUCTED EMISSIONS

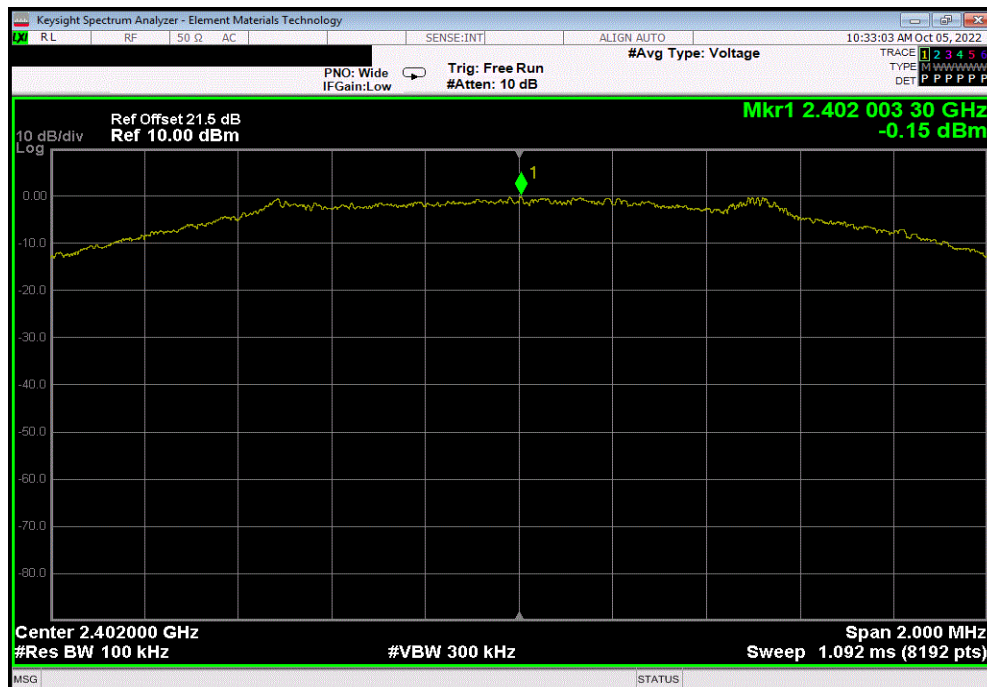


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 1 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24896.23	-36.88	-20	Pass	



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

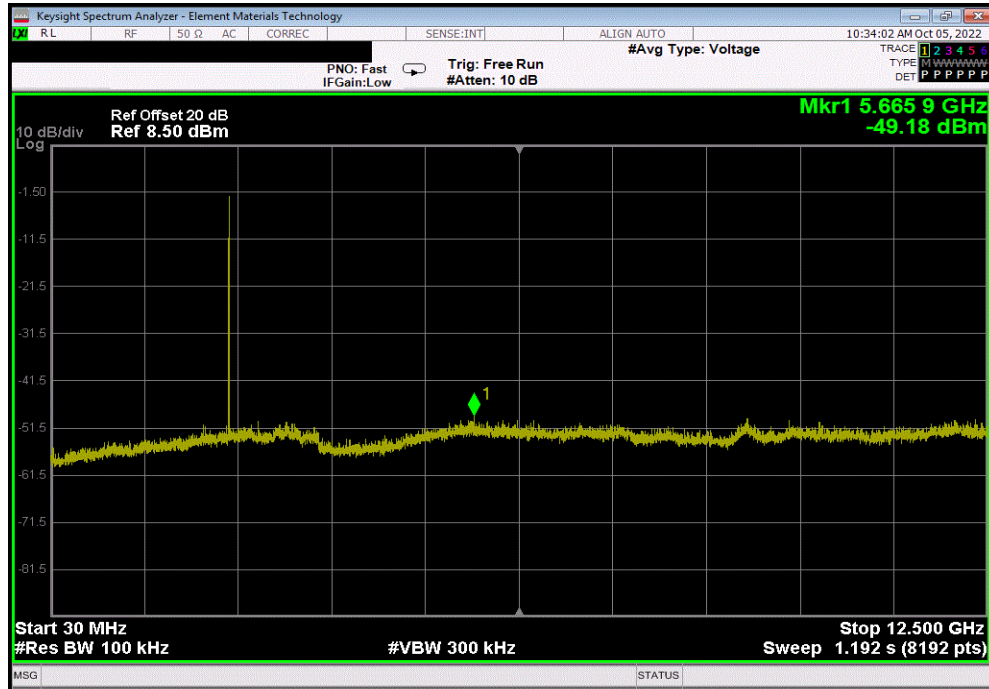


SPURIOUS CONDUCTED EMISSIONS

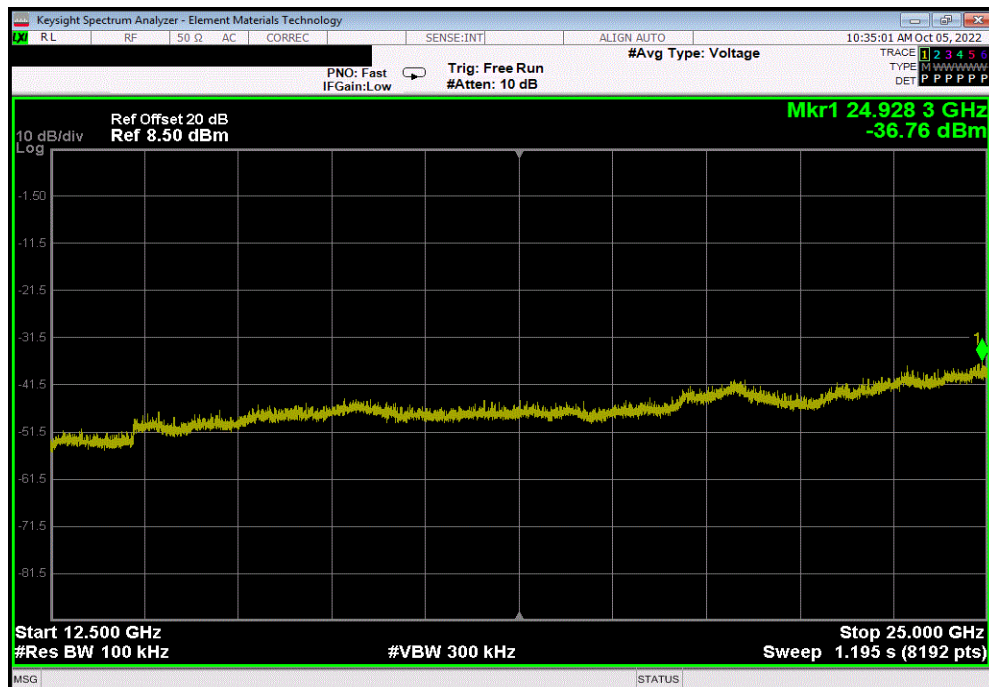


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	5665.93	-49.03	-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	24928.27	-36.61	-20	Pass	

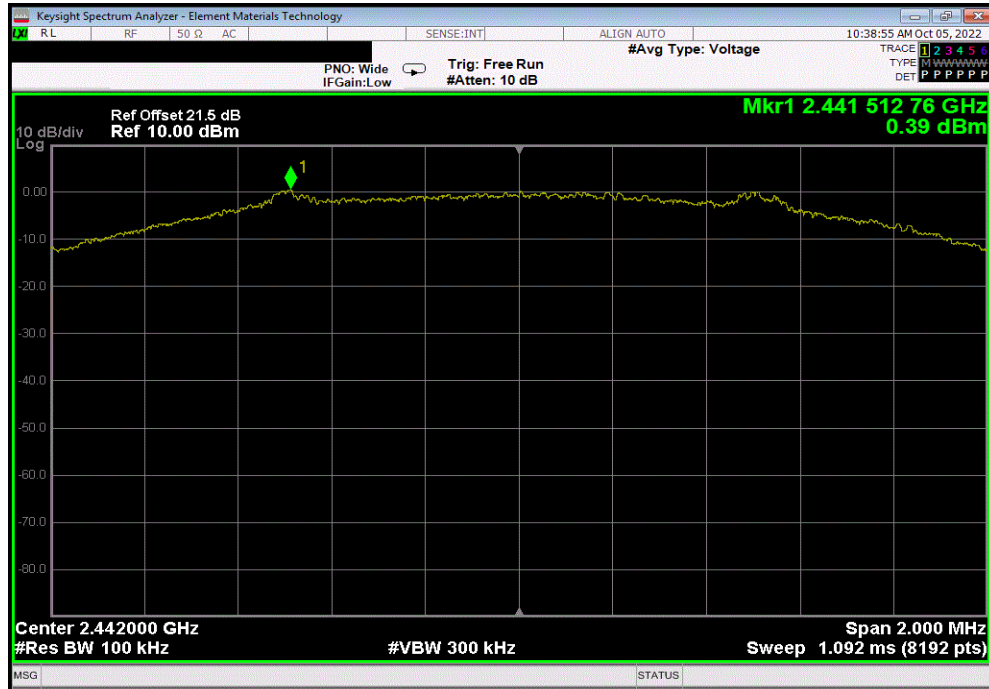


SPURIOUS CONDUCTED EMISSIONS

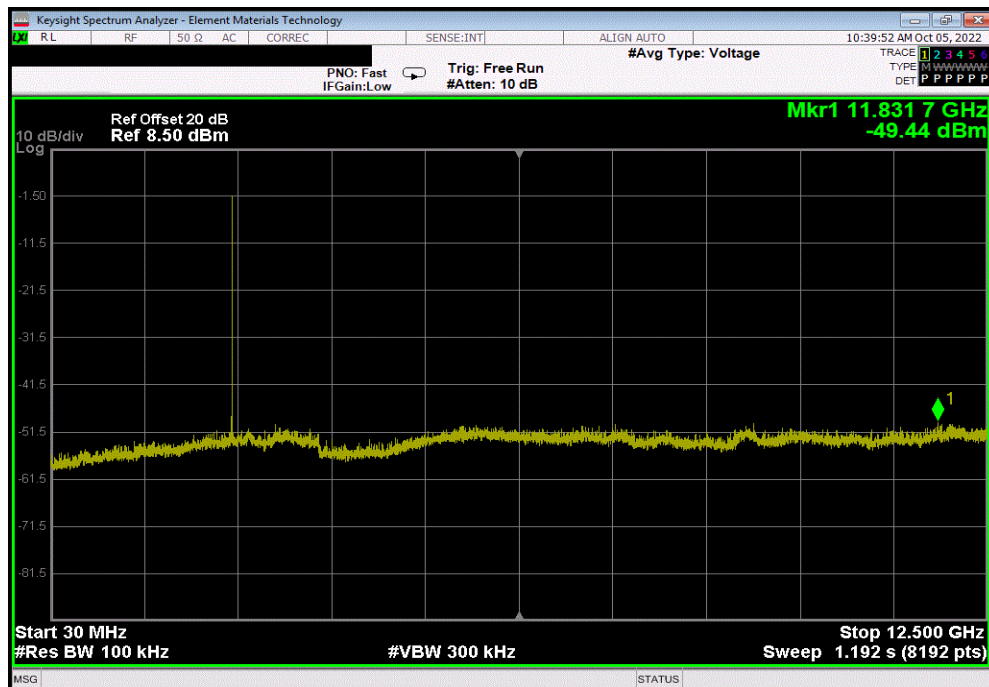


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz						
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	2441.51	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	11831.67	-49.84	-20	Pass		

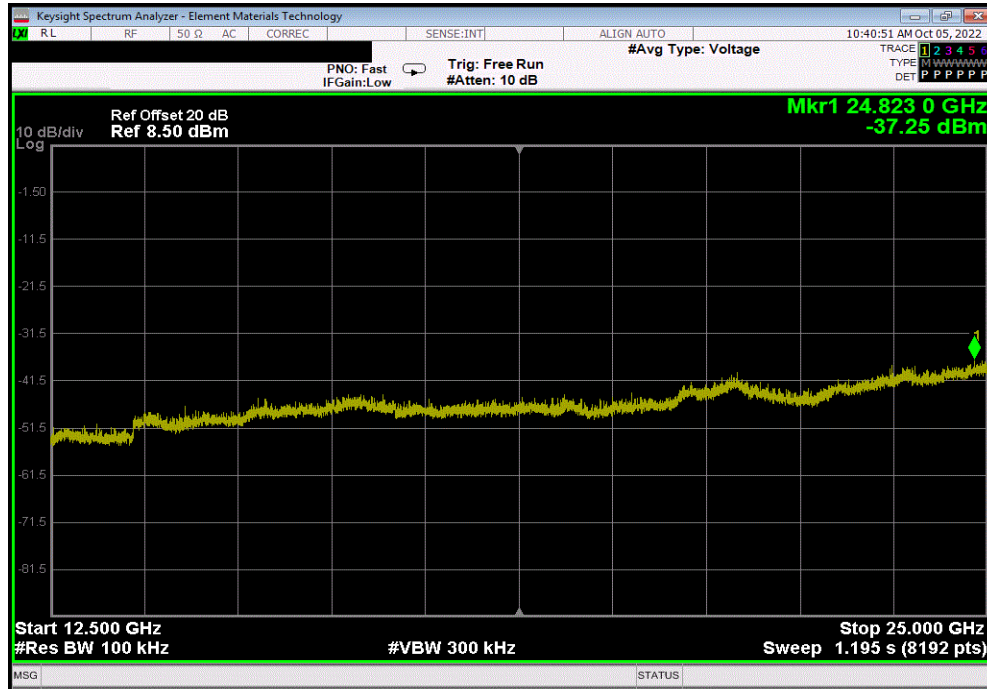


SPURIOUS CONDUCTED EMISSIONS

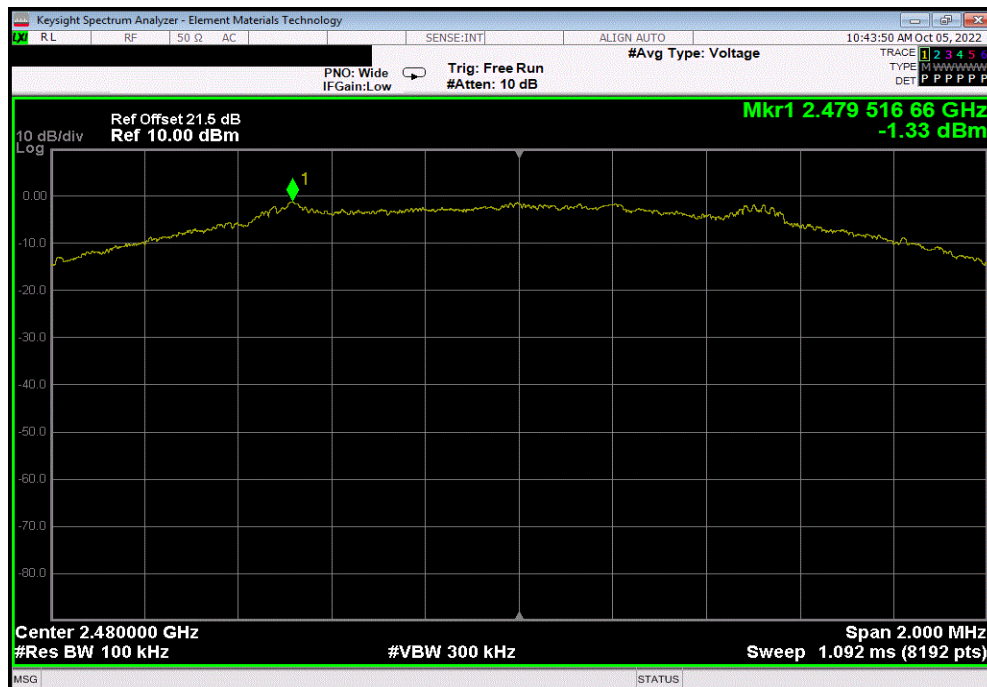


TbTtx 2022.06.03.0 XMt 2022.02.07.0

BLE/GFSK 2 Mbps Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24822.98	-37.64	-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	

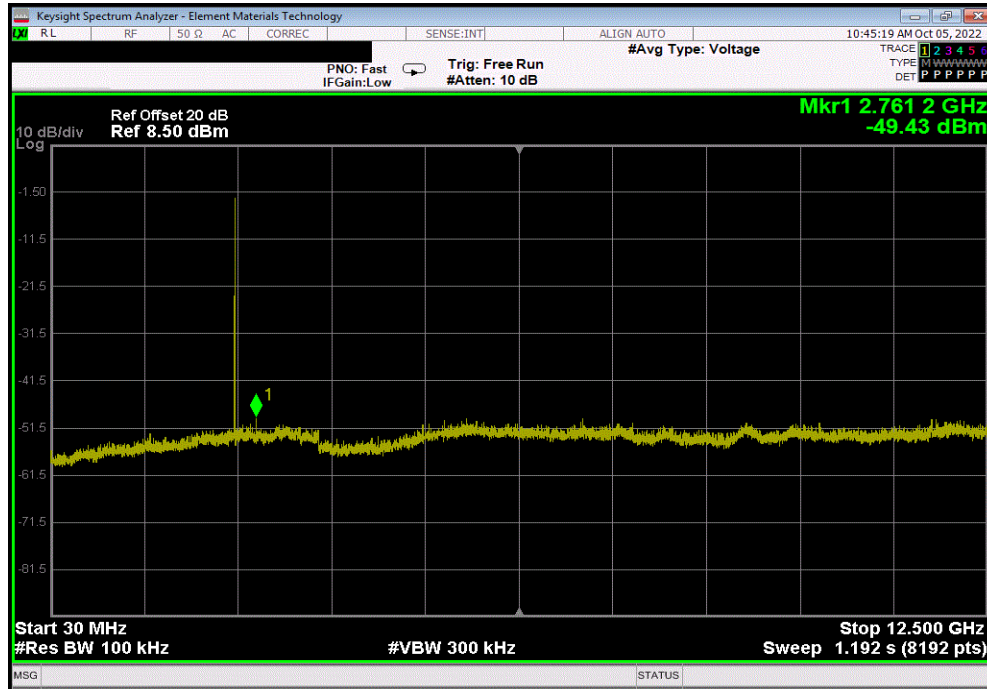


SPURIOUS CONDUCTED EMISSIONS

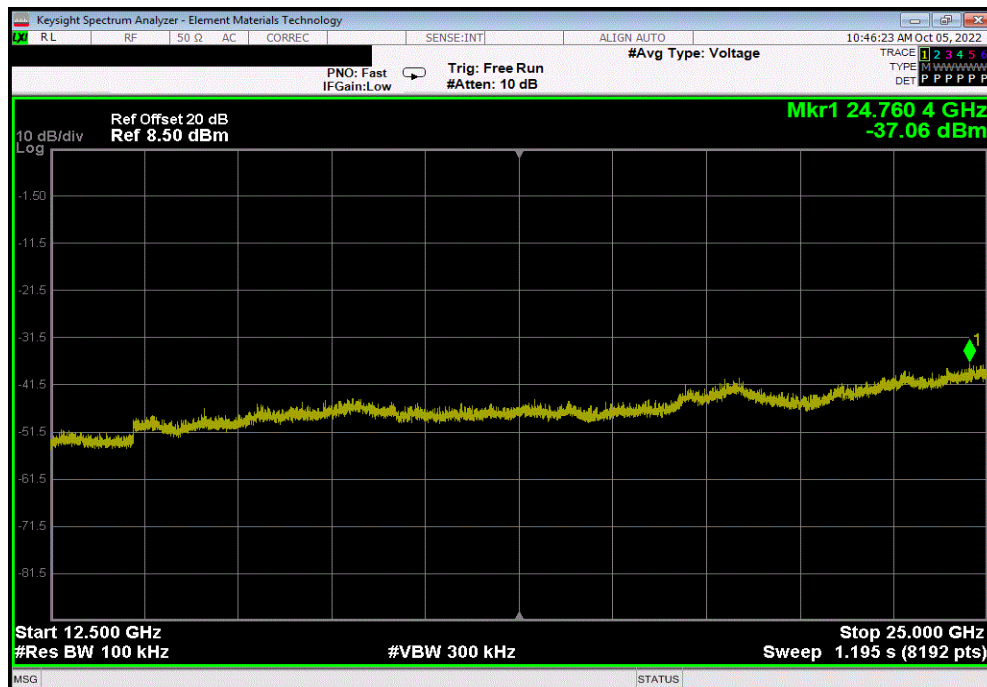


TbTtx 2022.06.03.0 XMI 2022.02.07.0

BLE/GFSK 2 Mbps High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	2761.19	-48.1	-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	24760.41	-35.73	-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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Cable	Element	Standard Gain Cable	MNW	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2022-01-24	2023-01-24
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	L-3 Narda-Miteq	AMF-6F-12001800-30-10P	PAP	2022-01-24	2023-01-24
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2022-09-01	2024-09-01
Cable	Element	Double Ridge Guide Horn Cables	MNV	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2022-01-24	2023-01-24
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2022-09-10	2023-09-10
Attenuator	Coaxicom	3910-20	AXY	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2022-03-22	2023-03-22
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2021-03-09	2023-03-09
Cable	Element	Biconilog Cable	MNX	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2022-01-24	2023-01-24
Filter - Low Pass	Micro-Tronics	LPM50004	HGG	2022-09-10	2023-09-10
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

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

POWER INVESTIGATED

24VDC via DC Supply at 120VAC/60Hz

CONFIGURATIONS INVESTIGATED

EMAU0007-4

MODES INVESTIGATED

BLE transmitting on Low, Mid, and High Channels (2402, 2442, and 2480 MHz), 1 Mbps and 2 Mbps

SPURIOUS RADIATED EMISSIONS

EUT:	Rosemount 3051HT	Work Order:	EMAU0007
Serial Number:	0043355	Date:	2022-10-07
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc, Eugene Korolev	Relative Humidity:	36.8%
Customer Project:	None	Bar. Pressure (PMSL):	1037 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC via DC Supply at 120VAC/60Hz	Configuration:	EMAU0007-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013
RSS-247 Issue 2:2017, 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

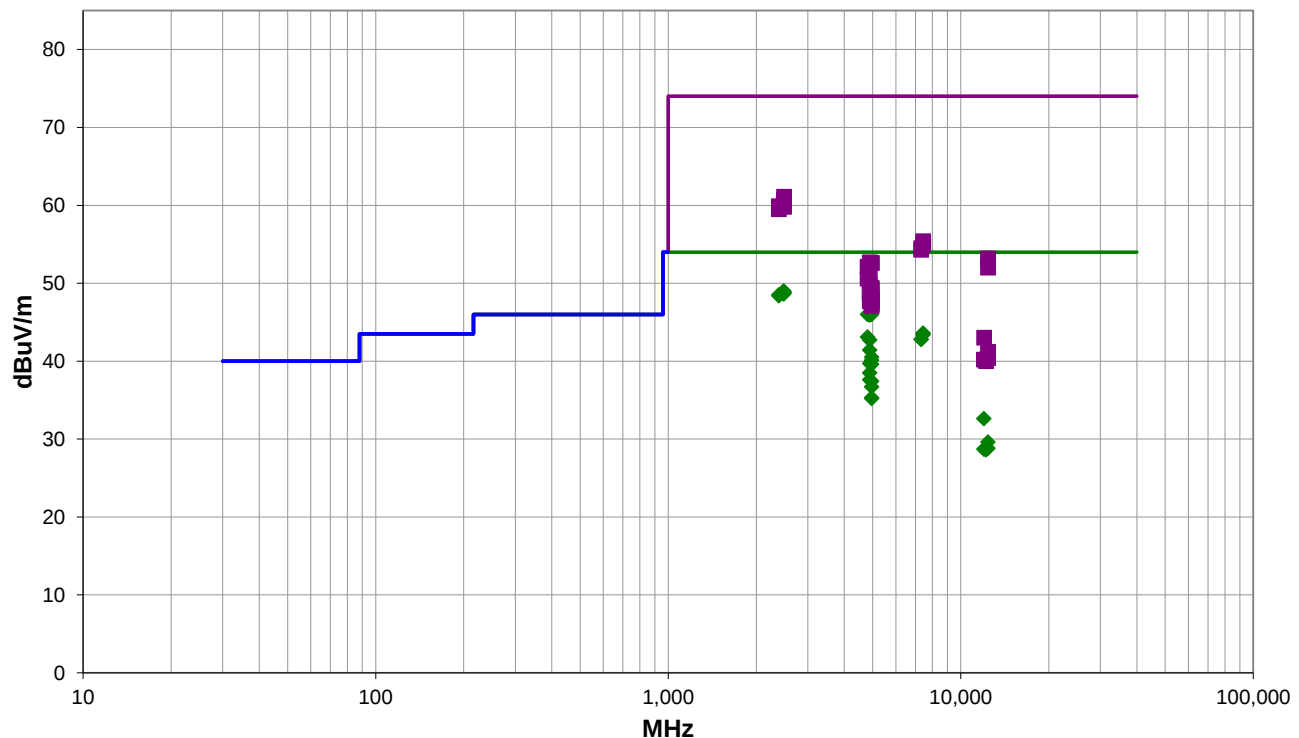
Display orientation vertical unless marked otherwise. SST Housing. Test mode is 100% duty cycle.

EUT OPERATING MODES

BLE transmitting on Low, Mid, and High Channels (2402, 2442, and 2480 MHz), 1 Mbps 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	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.500	31.2	-2.2	1.5	203.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
2483.800	31.1	-2.2	1.5	77.0	3.0	20.0	Horz	AV	0.0	48.9	54.0	-5.1	EUT On Side, High Ch, 1 Mbps
2485.933	31.1	-2.2	1.5	41.0	3.0	20.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
2484.292	31.0	-2.2	3.9	74.0	3.0	20.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT On Side, High Ch, 2 Mbps
2483.783	31.0	-2.2	3.1	351.0	3.0	20.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Vert, High Ch, 2 Mbps
2483.583	30.9	-2.2	1.5	186.0	3.0	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT On Side, High Ch, 2 Mbps
2483.800	30.9	-2.2	3.4	248.0	3.0	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT Horz, High Ch, 2 Mbps
2485.342	30.9	-2.2	2.4	83.0	3.0	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT Vert, High Ch, 2 Mbps
2484.067	30.8	-2.2	1.5	196.0	3.0	20.0	Horz	AV	0.0	48.6	54.0	-5.4	EUT Horz, High Ch, 2 Mbps
2389.108	30.8	-2.3	1.5	357.0	3.0	20.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT On Side, Low Ch, 1 Mbps
2389.883	30.7	-2.3	3.1	76.0	3.0	20.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT On Side, Low Ch, 2 Mbps
4960.142	40.9	5.6	3.3	270.0	3.0	0.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT On Side, High Ch, 1 Mbps
4803.875	40.2	5.8	1.0	281.0	3.0	0.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT On Side, Low Ch, 1 Mbps
4960.008	40.4	5.6	2.2	255.0	3.0	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT Vert, High Ch, 1 Mbps
4884.042	40.2	5.7	1.1	2.0	3.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT Vert, Mid Ch, 1 Mbps
7437.567	28.3	15.3	1.5	88.0	3.0	0.0	Vert	AV	0.0	43.6	54.0	-10.4	EUT Vert, High Ch, 1 Mbps
7438.708	28.1	15.3	1.5	234.0	3.0	0.0	Horz	AV	0.0	43.4	54.0	-10.6	EUT On Side, High Ch, 1 Mbps
4804.042	37.3	5.8	1.3	270.0	3.0	0.0	Vert	AV	0.0	43.1	54.0	-10.9	EUT Vert, Low Ch, 1 Mbps
7327.000	28.3	14.5	4.0	217.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	EUT On Side, Mid Ch, 1 Mbps
7326.900	28.3	14.5	1.5	333.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	EUT Vert, Mid Ch, 1 Mbps
4884.175	37.0	5.7	1.1	192.0	3.0	0.0	Vert	AV	0.0	42.7	54.0	-11.3	EUT Horz, Mid Ch, 1 Mbps
4884.108	35.7	5.7	1.5	196.0	3.0	0.0	Horz	AV	0.0	41.4	54.0	-12.6	EUT On Side, Mid Ch, 1 Mbps
2487.758	43.3	-2.2	1.5	77.0	3.0	20.0	Horz	PK	0.0	61.1	74.0	-12.9	EUT On Side, High Ch, 1 Mbps
12401.230	25.2	15.7	1.5	155.0	3.0	0.0	Horz	AV	0.0	40.9	54.0	-13.1	EUT On Side, High Ch, 1 Mbps
12400.080	25.2	15.7	1.5	162.0	3.0	0.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT Vert, High Ch, 1 Mbps
2486.800	42.9	-2.2	1.5	196.0	3.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	EUT Horz, High Ch, 2 Mbps
4960.208	34.9	5.6	2.0	84.0	3.0	0.0	Horz	AV	0.0	40.5	54.0	-13.5	EUT Vert, High Ch, 1 Mbps, Horizontal display orientation
2485.075	42.5	-2.2	1.5	186.0	3.0	20.0	Vert	PK	0.0	60.3	74.0	-13.7	EUT On Side, High Ch, 2 Mbps
2484.033	42.5	-2.2	1.5	203.0	3.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
2487.033	42.4	-2.2	3.4	248.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT Horz, High Ch, 2 Mbps
2484.375	42.4	-2.2	1.5	41.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
4959.058	34.5	5.6	1.5	208.0	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT On Side, High Ch, 2 Mbps
2487.358	42.2	-2.2	3.1	351.0	3.0	20.0	Horz	PK	0.0	60.0	74.0	-14.0	EUT Vert, High Ch, 2 Mbps
2487.275	42.1	-2.2	3.9	74.0	3.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT On Side, High Ch, 2 Mbps
2387.683	42.2	-2.3	1.5	357.0	3.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT On Side, Low Ch, 1 Mbps
2486.367	42.0	-2.2	2.4	83.0	3.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	EUT Vert, High Ch, 2 Mbps
4884.092	34.0	5.7	1.0	269.0	3.0	0.0	Vert	AV	0.0	39.7	54.0	-14.3	EUT On Side, Mid Ch, 1 Mbps
4960.092	34.0	5.6	3.5	85.0	3.0	0.0	Vert	AV	0.0	39.6	54.0	-14.4	EUT Horz, High Ch, 1 Mbps, Horizontal display orientation
2389.517	41.8	-2.3	3.1	76.0	3.0	20.0	Horz	PK	0.0	59.5	74.0	-14.5	EUT On Side, Low Ch, 2 Mbps

SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4884.017	32.8	5.7	1.1	329.0	3.0	0.0	Horz	AV	0.0	38.5	54.0	-15.5	EUT Vert, Mid Ch, 1 Mbps
4884.092	31.9	5.7	2.9	136.0	3.0	0.0	Horz	AV	0.0	37.6	54.0	-16.4	EUT Horz, Mid Ch, 1 Mbps
4960.283	31.8	5.6	1.1	360.0	3.0	0.0	Vert	AV	0.0	37.4	54.0	-16.6	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
4959.917	31.1	5.6	3.3	346.0	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Vert, High ch, 1 Mbps, Horizontal display orientation
7440.617	40.1	15.3	1.5	88.0	3.0	0.0	Vert	PK	0.0	55.4	74.0	-18.6	EUT Vert, High Ch, 1 Mbps
4960.183	29.7	5.6	1.5	149.0	3.0	0.0	Horz	AV	0.0	35.3	54.0	-18.7	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
4960.092	29.6	5.6	1.5	71.0	3.0	0.0	Horz	AV	0.0	35.2	54.0	-18.8	EUT Horz, High Ch, 1 Mbps, Horizontal display orientation
7440.442	39.7	15.3	1.5	234.0	3.0	0.0	Horz	PK	0.0	55.0	74.0	-19.0	EUT On Side, High Ch, 1 Mbps
7328.317	39.9	14.6	1.5	333.0	3.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	EUT Vert, Mid Ch, 1 Mbps
7325.475	39.8	14.5	4.0	217.0	3.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	EUT On Side, Mid Ch, 1 Mbps
12400.870	37.5	15.7	1.5	155.0	3.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	EUT On Side, High Ch, 1 Mbps
4883.458	47.0	5.7	1.1	2.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	EUT Vert, Mid Ch, 1 Mbps
12008.840	33.9	-1.3	2.1	327.0	3.0	0.0	Horz	AV	0.0	32.6	54.0	-21.4	EUT On Side, Low Ch, 1 Mbps
4959.858	47.0	5.6	2.2	255.0	3.0	0.0	Vert	PK	0.0	52.6	74.0	-21.4	EUT Vert, High Ch, 1 Mbps
4959.792	47.0	5.6	3.3	270.0	3.0	0.0	Horz	PK	0.0	52.6	74.0	-21.4	EUT On Side, High Ch, 1 Mbps
4803.867	46.3	5.8	1.0	281.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	EUT On Side, Low Ch, 1 Mbps
12401.780	36.3	15.7	1.5	162.0	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	EUT Vert, High Ch, 1 Mbps
4883.425	44.9	5.7	1.1	192.0	3.0	0.0	Vert	PK	0.0	50.6	74.0	-23.4	EUT Horz, Mid Ch, 1 Mbps
4803.283	44.8	5.8	1.3	270.0	3.0	0.0	Vert	PK	0.0	50.6	74.0	-23.4	EUT Vert, Low Ch, 1 Mbps
4884.492	44.1	5.7	1.5	196.0	3.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT On Side, Mid Ch, 1 Mbps
12398.840	29.7	-0.1	1.5	176.0	3.0	0.0	Horz	AV	0.0	29.6	54.0	-24.4	EUT On Side, High Ch, 1 Mbps
4959.333	43.8	5.6	1.5	208.0	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	EUT On Side, High Ch, 2 Mbps
4960.142	43.6	5.6	2.0	84.0	3.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT Vert, High ch, 1 Mbps, Horizontal display orientation
12208.950	29.0	-0.1	2.4	261.0	3.0	0.0	Horz	AV	0.0	28.9	54.0	-25.1	EUT On Side, Mid Ch, 1 Mbps
12399.170	28.9	-0.1	1.5	224.0	3.0	0.0	Vert	AV	0.0	28.8	54.0	-25.2	EUT Vert, High Ch, 1 Mbps
4883.450	43.1	5.7	1.0	269.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT On Side, Mid Ch, 1 Mbps
4884.667	43.0	5.7	1.1	329.0	3.0	0.0	Horz	PK	0.0	48.7	74.0	-25.3	EUT Vert, Mid Ch, 1 Mbps
12008.650	30.0	-1.3	1.5	41.0	3.0	0.0	Vert	AV	0.0	28.7	54.0	-25.3	EUT Vert, Low Ch, 1 Mbps
12208.300	28.7	-0.1	1.5	27.0	3.0	0.0	Vert	AV	0.0	28.6	54.0	-25.4	EUT Vert, Mid Ch, 1 Mbps
4960.200	42.7	5.6	3.5	85.0	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	EUT Horz, High Ch, 1 Mbps, Horizontal display orientation
4962.167	42.2	5.6	3.3	346.0	3.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	EUT Vert, High ch, 1 Mbps, Horizontal display orientation
4883.983	42.0	5.7	2.9	136.0	3.0	0.0	Horz	PK	0.0	47.7	74.0	-26.3	EUT Horz, Mid Ch, 1 Mbps
4960.092	41.9	5.6	1.1	360.0	3.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
4960.533	41.7	5.6	1.5	71.0	3.0	0.0	Horz	PK	0.0	47.3	74.0	-26.7	EUT Horz, High Ch, 1 Mbps, Horizontal display orientation
4958.942	41.5	5.6	1.5	149.0	3.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT On Side, High Ch, 1 Mbps, Horizontal display orientation
12011.530	44.3	-1.3	2.1	327.0	3.0	0.0	Horz	PK	0.0	43.0	74.0	-31.0	EUT On Side, Low Ch, 1 Mbps
12399.000	41.3	-0.1	1.5	224.0	3.0	0.0	Vert	PK	0.0	41.2	74.0	-32.8	EUT Vert, High Ch, 1 Mbps
12398.410	40.5	-0.1	1.5	176.0	3.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	EUT On Side, 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	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12209.140	40.3	-0.1	2.4	261.0	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	EUT On Side, Mid Ch, 1 Mbps
12010.070	41.5	-1.3	1.5	41.0	3.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	EUT Vert, Low Ch, 1 Mbps
12209.130	40.1	-0.1	1.5	27.0	3.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT Vert, Mid Ch, 1 Mbps

CONCLUSION
Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

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	AIB	2022-09-01	2024-09-01
Cable	Element	Double Ridge Guide Horn Cables	MNV	2023-01-31	2024-01-31
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2023-01-31	2024-01-31
Attenuator	Coaxicom	3910-20	AXY	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2022-05-18	2023-05-18
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2022-09-10	2023-09-10
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Cable	Element	Standard Gain Cable	MNW	2023-01-31	2024-01-31
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2023-01-31	2024-01-31
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	L-3 Narda-Miteq	AMF-6F-12001800-30-10P	PAP	2023-01-31	2024-01-31

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

FREQUENCY RANGE INVESTIGATED

1 GHz TO 18 GHz

POWER INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

EMAU0008-1
EMAU0008-2
EMAU0008-3

MODES INVESTIGATED

Transmitting BLE High Ch, 1 Mbps

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

EUT:	3051C	Work Order:	EMAU0008
Serial Number:	20765675	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

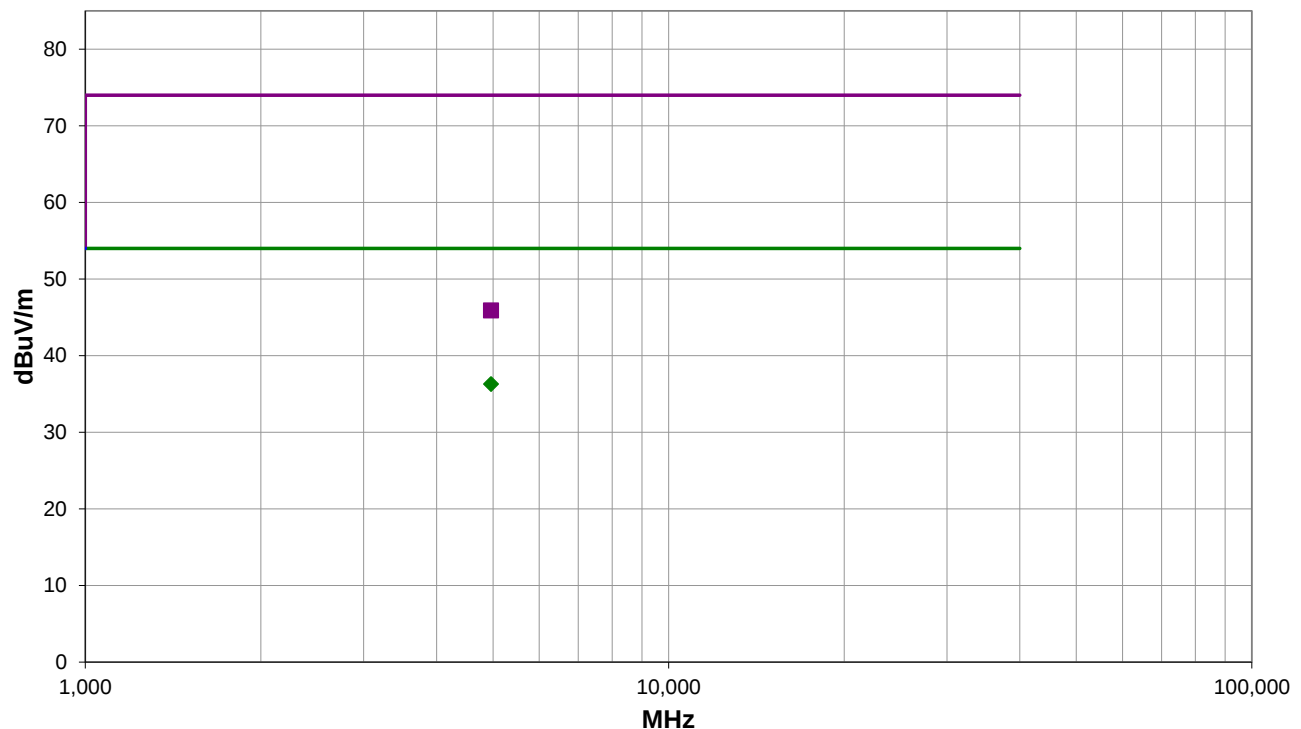
High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional model variants. The radio is the same between the variants, only housing is different. 3051C.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 4

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #4

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.992	31.3	5.0	3.37	42.0	3.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	High Ch, 1 Mbps, EUT Vert, Vert screen orientation
4958.958	40.9	5.0	3.37	42.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High Ch, 1 Mbps, EUT Vert, Vert screen orientation

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	3051C	Work Order:	EMAU0008
Serial Number:	20765675	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	9	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

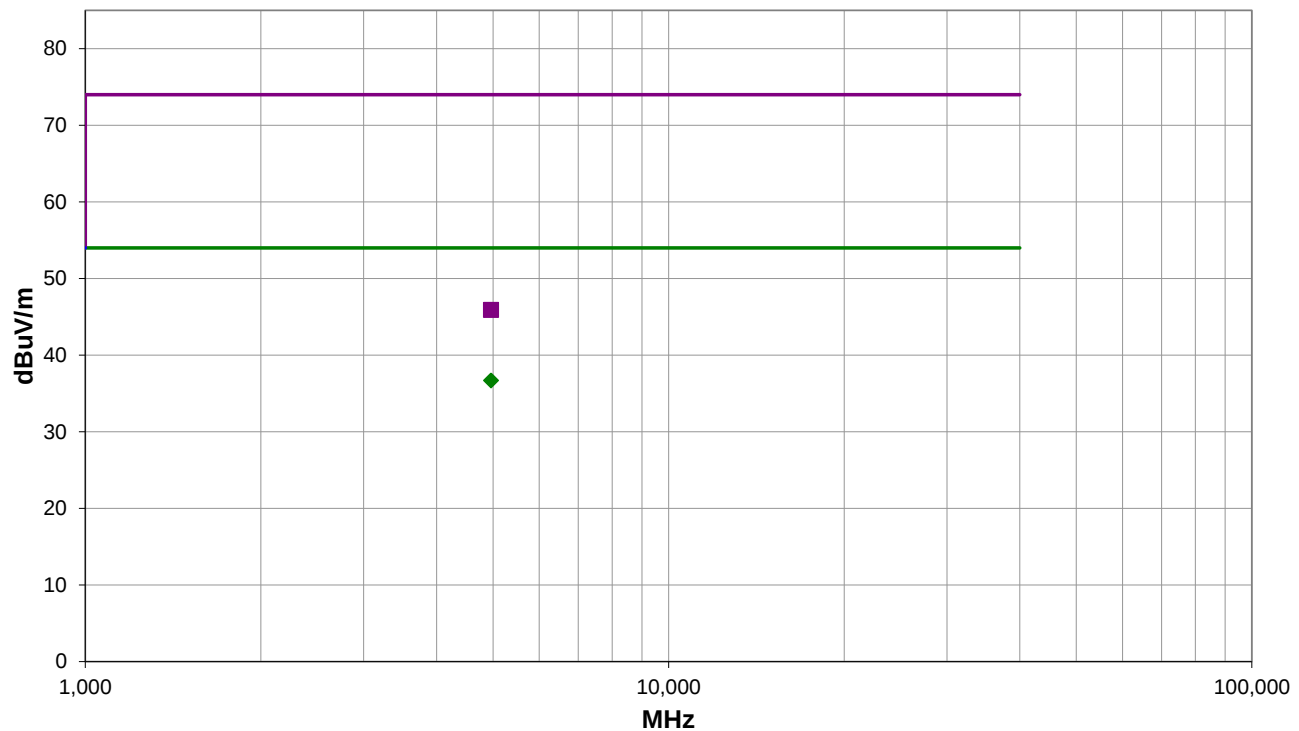
High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional models. 3051C. Horizontal display orientation.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 9

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #9

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4960.150	31.7	5.0	1.5	329.0	3.0	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Vert, High Ch, 1 Mbps, Horz display orientation
4960.483	40.9	5.0	1.5	329.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	EUT Vert, High Ch, 1 Mbps, Horz display orientation

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

EUT:	3051L	Work Order:	EMAU0008
Serial Number:	18761351	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	13	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional models. 3051L. Vertical display orientation.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 13

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #13

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.833	29.8	5.0	1.5	249.0	3.0	0.0	Horz	AV	0.0	34.8	54.0	-19.2	Hich Ch, 1 Mbps, EUT Vert, Screen position Vert
4957.958	41.2	5.0	1.5	249.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Hich Ch, 1 Mbps, EUT Vert, Screen position Vert

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	3051L	Work Order:	EMAU0008
Serial Number:	18761351	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	17	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

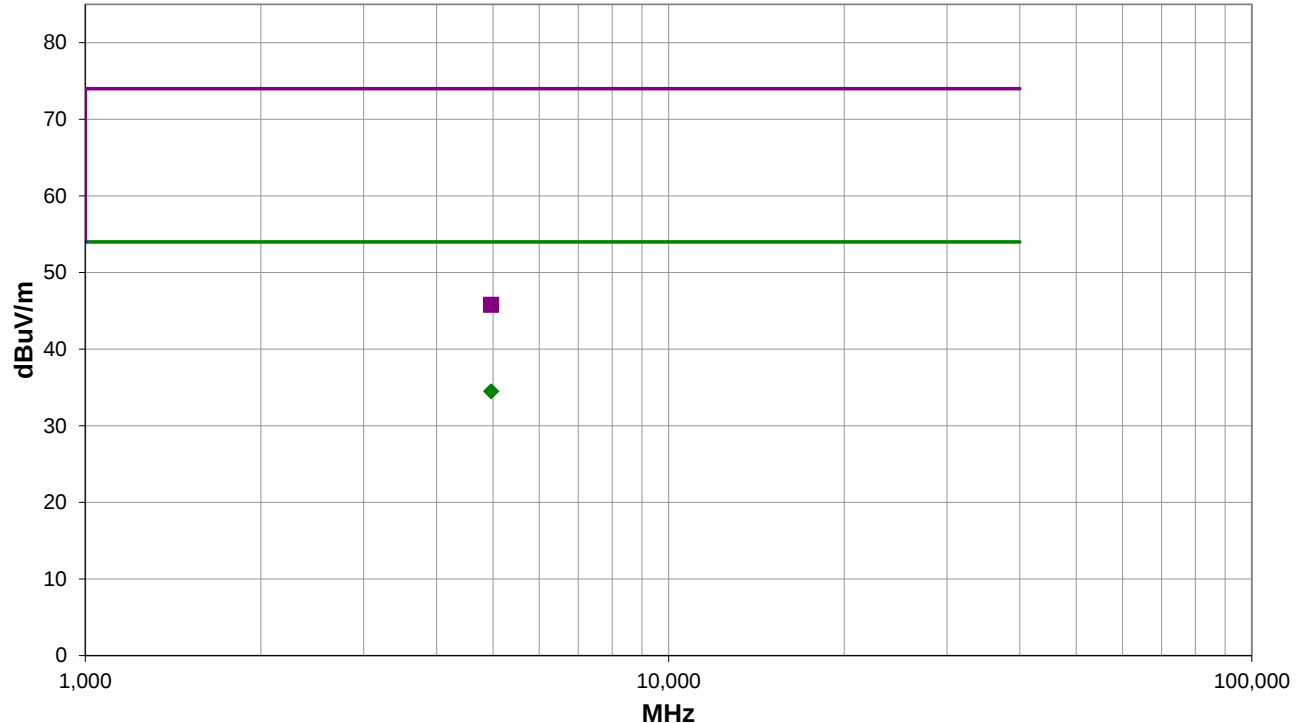
High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional models. 3051L. Horizontal display orientation.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 17

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #17

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4962.392	29.5	5.0	1.5	324.0	3.0	0.0	Horz	AV	0.0	34.5	54.0	-19.5	Hich Ch, 1 Mbps, EUT Vert, Screen position Horz
4958.617	40.8	5.0	1.5	324.0	3.0	0.0	Horz	PK	0.0	45.8	74.0	-28.2	Hich Ch, 1 Mbps, EUT Vert, Screen position Horz

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	3051CF	Work Order:	EMAU0008
Serial Number:	20671037	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	21	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

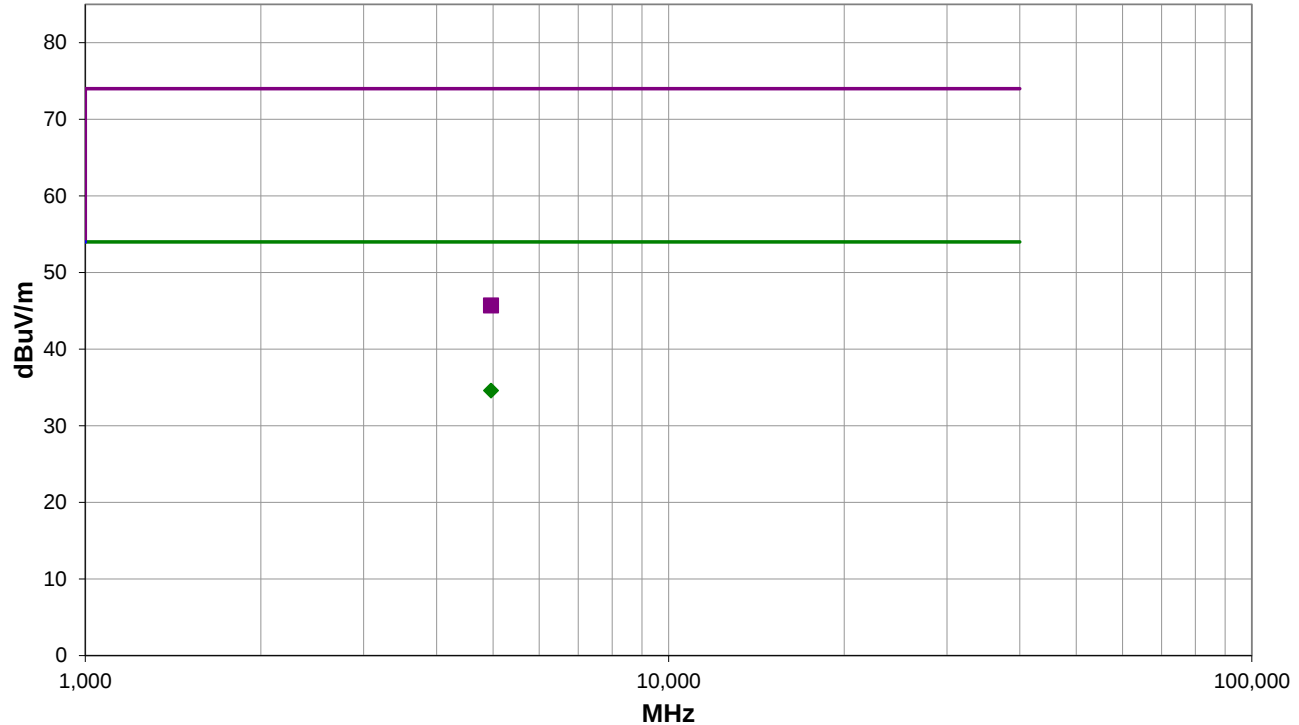
High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional models. 3051CF. Vertical display orientation.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 21

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #21

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4960.083	29.6	5.0	1.5	283.0	3.0	0.0	Horz	AV	0.0	34.6	54.0	-19.4	EUT Vert, High Ch, 1 Mbps, Display orientation vert
4960.600	40.7	5.0	1.5	283.0	3.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	EUT Vert, High Ch, 1 Mbps, Display orientation vert

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	3051CF	Work Order:	EMAU0008
Serial Number:	20671037	Date:	2023-02-27
Customer:	Emerson Automation Solutions	Temperature:	22.8°C
Attendees:	Randy Beuc	Relative Humidity:	25%
Customer Project:	None	Bar. Pressure (PMSL):	995 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC	Configuration:	EMAU0008-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	25	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

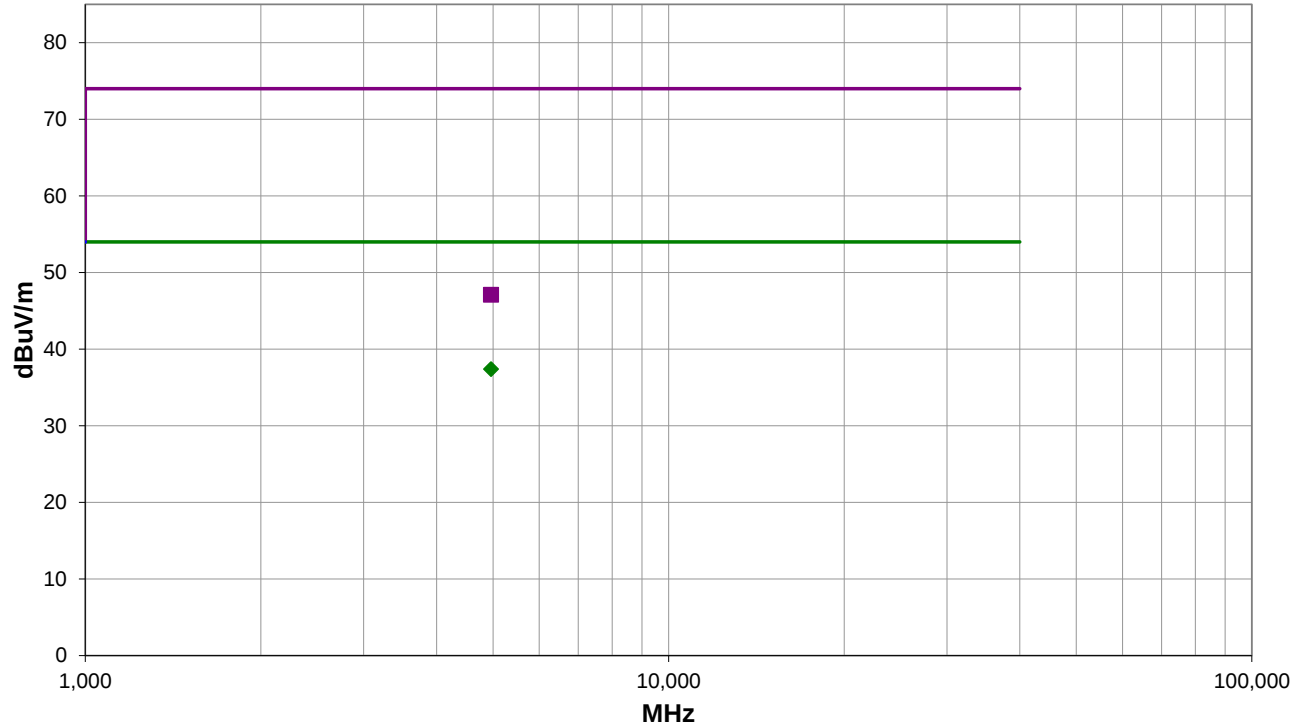
High channel, 1 Mbps was the worst case for EMAU0007, therefore this channel was explored for the additional models. 3051CF. Horz display orientation.

EUT OPERATING MODES

Transmitting BLE High Ch, 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 25

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

RESULTS - Run #25

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4960.150	32.4	5.0	1.35	30.0	3.0	0.0	Horz	AV	0.0	37.4	54.0	-16.6	EUT Vert, High Ch, 1 Mbps, Display orientation horz
4960.408	42.1	5.0	1.35	30.0	3.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT Vert, High Ch, 1 Mbps, Display orientation horz

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS – 3051T SPOT CHECKS

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 - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Cable	Element	Standard Gain Cable	MNW	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2022-01-24	2023-01-24
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	L-3 Narda-Miteq	AMF-6F-12001800-30-10P	PAP	2022-01-24	2023-01-24
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2022-09-01	2024-09-01
Cable	Element	Double Ridge Guide Horn Cables	MNV	2022-01-24	2023-01-24
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2022-01-24	2023-01-24
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2022-09-10	2023-09-10
Attenuator	Coaxicom	3910-20	AXY	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2022-03-22	2023-03-22

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

SPURIOUS RADIATED EMISSIONS – 3051T SPOT CHECKS

FREQUENCY RANGE INVESTIGATED

1 GHz TO 18 GHz

POWER INVESTIGATED

24VDC via DC Supply at 120VAC/60Hz

CONFIGURATIONS INVESTIGATED

EMAU0007-5

MODES INVESTIGATED

BLE transmitting Low, Mid, and High Channels (2402, 2442, and 2480 MHz), 1 Mbps

SPURIOUS RADIATED EMISSIONS – 3051T SPOT CHECKS

EUT:	Rosemount 3051T	Work Order:	EMAU0007
Serial Number:	DUT1	Date:	2022-10-10
Customer:	Emerson Automation Solutions	Temperature:	22.5°C
Attendees:	Randy Beuc, Eugene Korolev	Relative Humidity:	36.1%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	24VDC via DC Supply at 120VAC/60Hz	Configuration:	EMAU0007-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	32	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

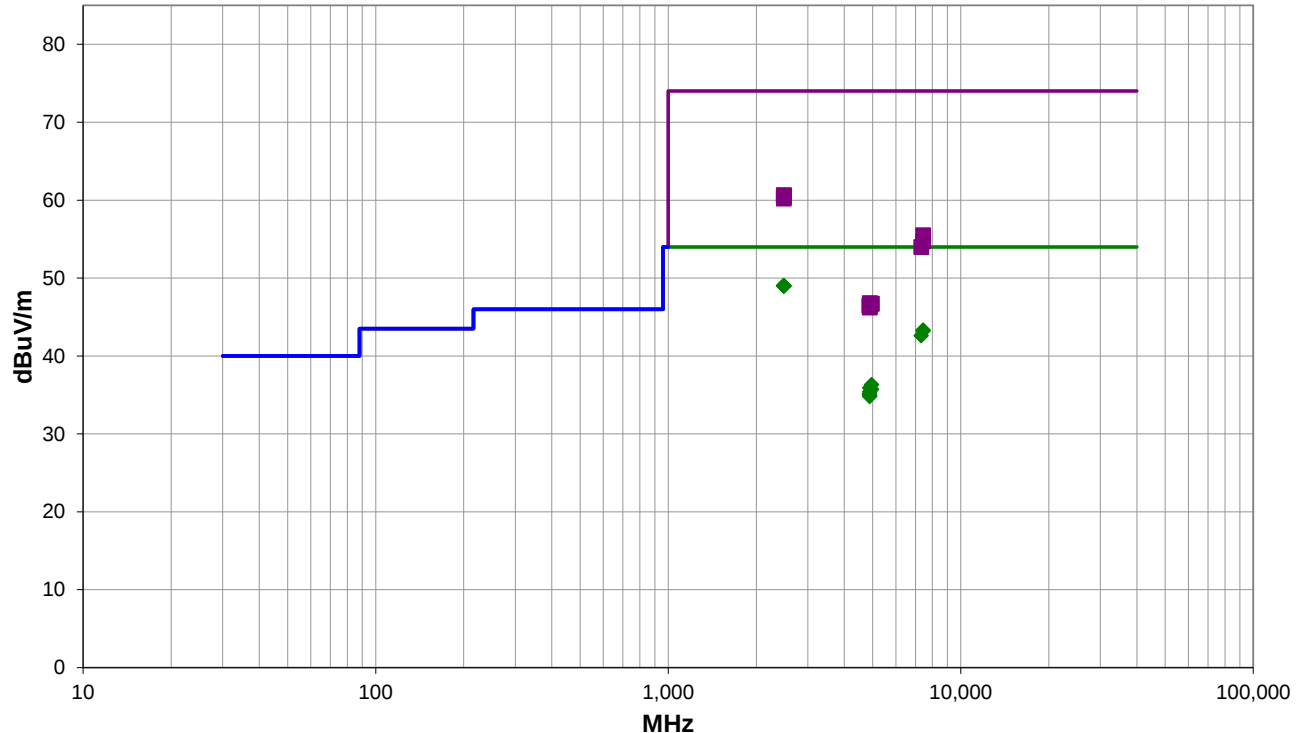
Display orientation vertical unless marked otherwise. 3051T spot check.

EUT OPERATING MODES

BLE transmitting Low, Mid, and High Channels (2402, 2442, and 2480 MHz), 1 Mbps

DEVIATIONS FROM TEST STANDARD

None



Run #: 32

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS – 3051T SPOT CHECKS

RESULTS - Run #32

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.842	31.2	-2.2	4.0	84.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT On Side, High Ch, 1 Mbps
2486.292	31.2	-2.2	3.7	279.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT On Side, High Ch, 1 Mbps
2483.800	31.2	-2.2	1.5	316.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT Horz, High Ch, 1 Mbps
2486.583	31.2	-2.2	1.7	35.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT Horz, High Ch, 1 Mbps
2483.542	31.2	-2.2	2.0	195.0	3.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT Vert, High Ch, 1 Mbps
2484.708	31.2	-2.2	1.5	328.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	EUT Vert, High Ch, 1 Mbps
7440.358	28.0	15.3	1.5	6.0	3.0	0.0	Horz	AV	0.0	43.3	54.0	-10.7	EUT On Side, High Ch, 1 Mbps
7441.083	27.9	15.3	1.5	62.0	3.0	0.0	Horz	AV	0.0	43.2	54.0	-10.8	EUT Vert, High Ch, 1 Mbps
7327.342	28.1	14.5	1.5	268.0	3.0	0.0	Horz	AV	0.0	42.6	54.0	-11.4	EUT On Side, Mid Ch, 1 Mbps
2483.758	42.8	-2.2	1.5	316.0	3.0	20.0	Horz	PK	0.0	60.6	74.0	-13.4	EUT Horz, High Ch, 1 Mbps
2483.717	42.8	-2.2	1.7	35.0	3.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	EUT Horz, High Ch, 1 Mbps
2486.375	42.8	-2.2	2.0	195.0	3.0	20.0	Horz	PK	0.0	60.6	74.0	-13.4	EUT Vert, High Ch, 1 Mbps
2486.825	42.7	-2.2	1.5	328.0	3.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	EUT Vert, High Ch, 1 Mbps
2485.000	42.6	-2.2	4.0	84.0	3.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	EUT On Side, High Ch, 1 Mbps
2485.658	42.4	-2.2	3.7	279.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT On Side, High Ch, 1 Mbps
4959.958	30.7	5.6	2.3	25.0	3.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	EUT On Side, High Ch, 1 Mbps
4884.258	30.2	5.7	2.1	273.0	3.0	0.0	Horz	AV	0.0	35.9	54.0	-18.1	EUT On Side, Mid Ch, 1 Mbps
4959.842	30.1	5.6	1.5	35.0	3.0	0.0	Horz	AV	0.0	35.7	54.0	-18.3	EUT Vert, High Ch, 1 Mbps
7439.567	40.2	15.3	1.5	6.0	3.0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	EUT On Side, High Ch, 1 Mbps
4883.750	29.7	5.7	1.5	79.0	3.0	0.0	Vert	AV	0.0	35.4	54.0	-18.6	EUT Vert, Mid Ch, 1 Mbps
4881.575	29.4	5.7	1.5	281.0	3.0	0.0	Horz	AV	0.0	35.1	54.0	-18.9	EUT Vert, Mid Ch, 1 Mbps
4881.950	29.4	5.7	4.0	204.0	3.0	0.0	Horz	AV	0.0	35.1	54.0	-18.9	EUT Horz, Mid Ch, 1 Mbps
4883.008	29.2	5.7	2.7	70.0	3.0	0.0	Vert	AV	0.0	34.9	54.0	-19.1	EUT Horz, Mid Ch, 1 Mbps
4883.550	29.1	5.7	3.7	321.0	3.0	0.0	Vert	AV	0.0	34.8	54.0	-19.2	EUT On Side, Mid Ch, 1 Mbps
7439.858	39.4	15.3	1.5	62.0	3.0	0.0	Horz	PK	0.0	54.7	74.0	-19.3	EUT Vert, High Ch, 1 Mbps
7324.475	39.5	14.5	1.5	268.0	3.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	EUT On Side, Mid Ch, 1 Mbps
4882.058	41.1	5.7	4.0	204.0	3.0	0.0	Horz	PK	0.0	46.8	74.0	-27.2	EUT Horz, Mid Ch, 1 Mbps
4960.800	41.1	5.6	1.5	35.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Vert, High Ch, 1 Mbps
4960.217	41.1	5.6	2.3	25.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT On Side, High Ch, 1 Mbps
4883.600	40.8	5.7	1.5	79.0	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	EUT Vert, Mid Ch, 1 Mbps
4882.208	40.8	5.7	2.7	70.0	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	EUT Horz, Mid Ch, 1 Mbps
4884.117	40.8	5.7	2.1	273.0	3.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	EUT On Side, Mid Ch, 1 Mbps
4881.758	40.7	5.7	1.5	281.0	3.0	0.0	Horz	PK	0.0	46.4	74.0	-27.6	EUT Vert, Mid Ch, 1 Mbps
4885.042	40.5	5.7	3.7	321.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT On Side, Mid Ch, 1 Mbps

CONCLUSION

Pass



Tested By

End of Test Report