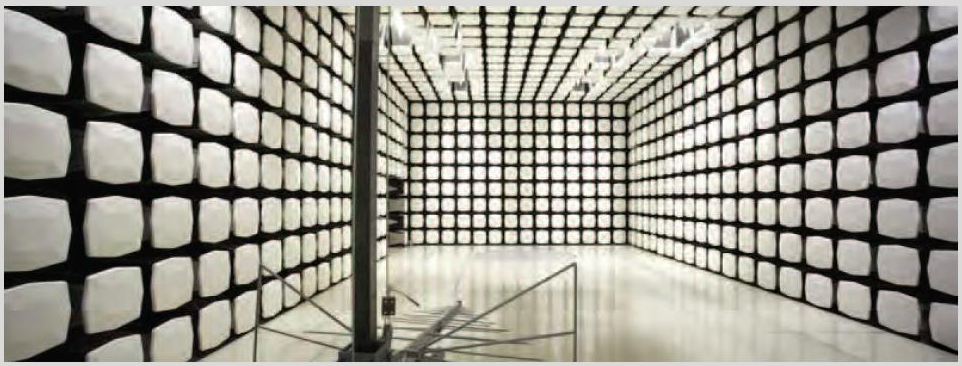
Emerson Automation Solutions/Rosemount Inc.

Model 2051/3051

FCC 15.247:2019

2.4GHz DTS

Report # EMPM0077.1



NVLAP LAB CODE: 200881-0

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CERTIFICATE OF TEST

Last Date of Test: November 5, 2019
Emerson Automation Solutions/Rosemount Inc.
EUT: Model 2051/3051

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2019	ANSI C63.10:2013

Results

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

Deviations From Test Standards

None

Approved By:

Eric Brandon, Department Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

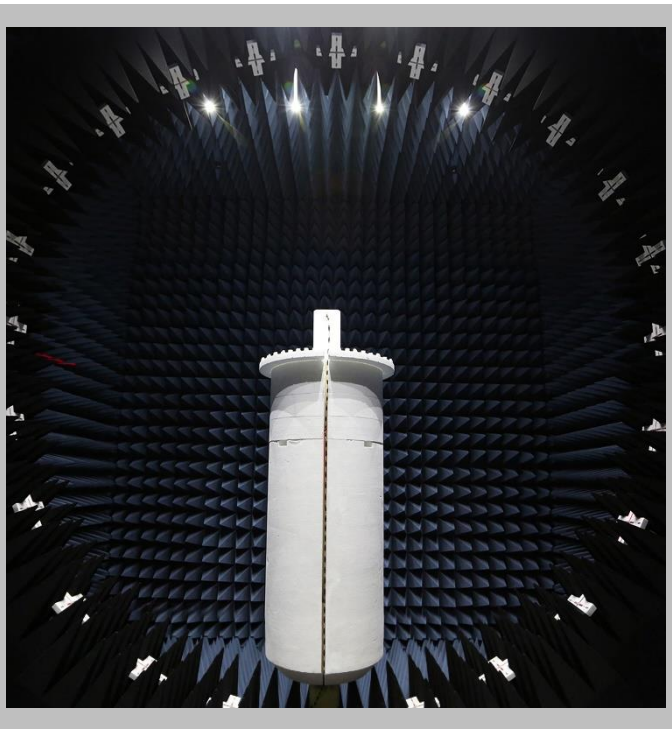
MIC – Recognized by MIC as a CAB for the acceptance of test data.

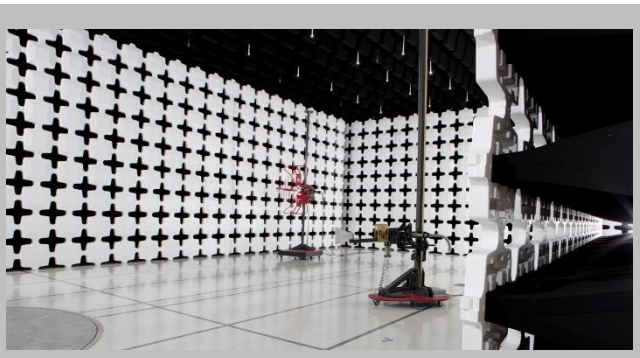
SCOPE

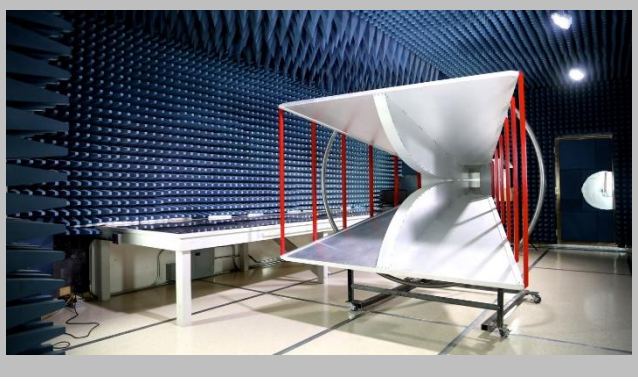
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157

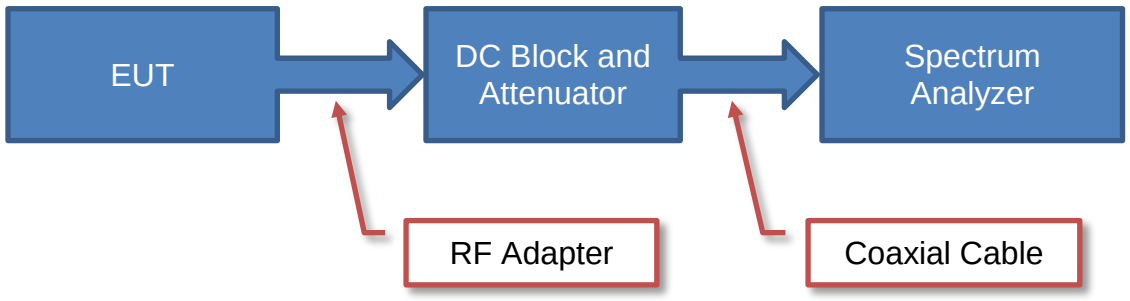




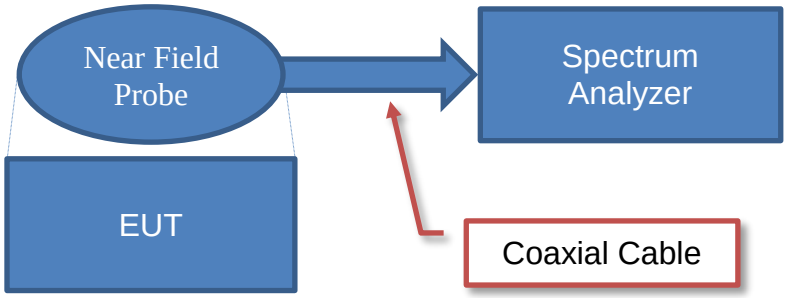


Test Setup Block Diagrams

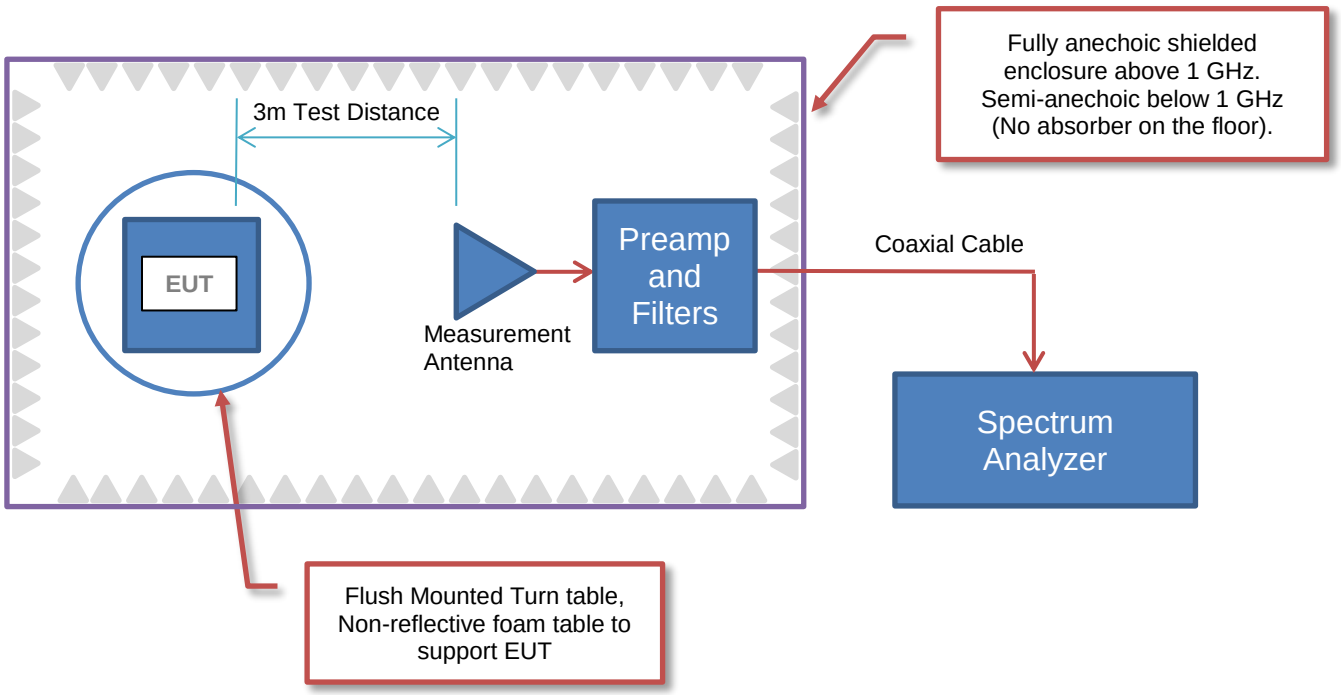
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



Measurement Uncertainty

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

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

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

Measurements were made using the bandwidths and detectors specified. No video filter was used.

Sample Calculations

Radiated Emissions:

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

Conducted Emissions:

Adjusted Level		Measured Level		Transducer Factor		Cable Factor		External Attenuation
47.1	=	26.7	+	0.3	+	0.1	+	20.0

PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Emerson Automation Solutions/Rosemount Inc.
Address:	6021 Innovation Boulevard
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Merritt Pulkrabek
EUT:	Model 2051/3051
First Date of Test:	October 29, 2019
Last Date of Test:	November 5, 2019
Receipt Date of Samples:	October 28, 2019
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Wireless Pressure Transmitter

Testing Objective:
To demonstrate compliance of the 2.4 GHz DTS radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration EMPM0077- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Pressure Transmitter	Rosemount Inc.	2051/3051	2002

Configuration EMPM0077- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Pressure Transmitter	Rosemount Inc.	2051/3051	2000

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
USB HART Interface	MACTek Corporation	Viator	346802
AC Adapter (Laptop)	Lenovo	92P1160	11S92P1160Z1ZBGH87P524
Laptop	Lenovo	ThinkPad T510	431436U

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable (Laptop)	No	1.0m	No	AC Mains	AC Adapter (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	AC Adapter (Laptop)	Laptop
HART Interface Cable	No	2.0m	No	2051/3051	USB HART Interface
USB Cable (HART Interface)	No	0.3m	No	Laptop	USB HART Interface

CONFIGURATIONS

Configuration EMPM0077- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Pressure Transmitter	Rosemount Inc.	2051/3051	2000

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Smart Wireless Gateway	Emerson	1410A2ND4WL2NA	0000942
AC Adapter (Smart Wireless Gateway)	Life-Like Racing	SDK-254(D)	06195-001
AC Adapter (Laptop)	Lenovo	92P1160	11S92P1160Z1ZBGH87P524
Laptop	Lenovo	ThinkPad T510	431436U

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable (Laptop)	No	1.0m	No	AC Mains	AC Adapter (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	AC Adapter (Laptop)	Laptop
DC Cable (Smart Wireless Gateway)	No	1.8m	No	AC Adapter (Smart Wireless Gateway)	Smart Wireless Gateway

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-10-29	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2019-11-5	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2019-11-5	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2019-11-5	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.
5	2019-11-5	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	2019-11-5	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2019-11-5	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2019-11-5	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

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

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

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

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

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

DUTY CYCLE

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			Work Order:	EMPM0077
Serial Number:	2000			Date:	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			Temperature:	22.1 °C
Attendees:	None			Humidity:	25.8% RH
Project:	None			Barometric Pres.:	1028 mbar
Tested by:	Dustin Sparks	Power:	Battery	Job Site:	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

DEVIATIONS FROM TEST STANDARD

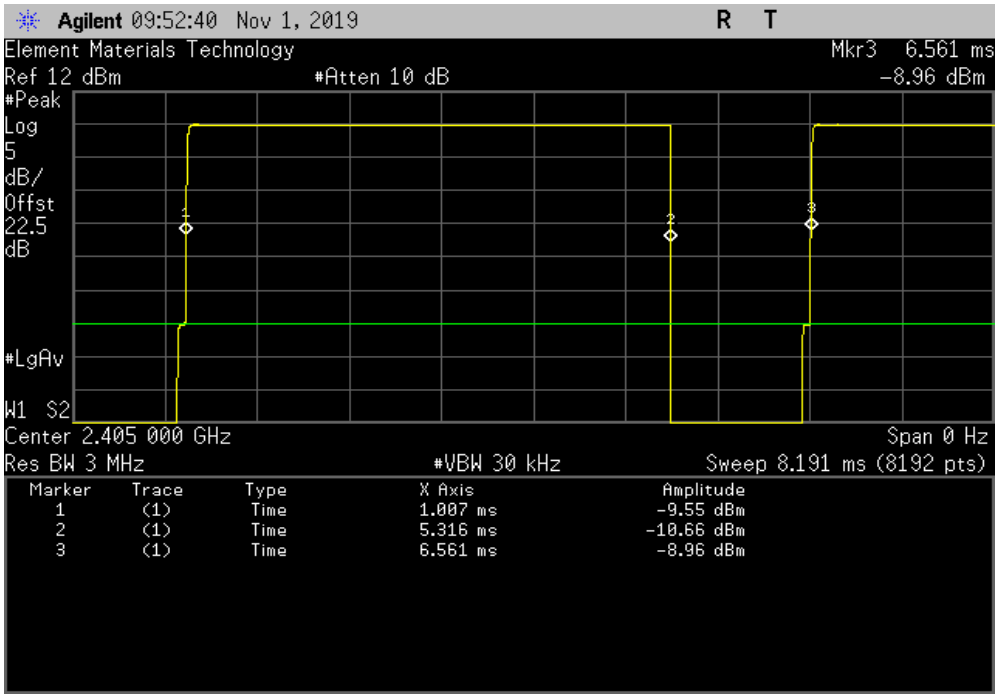
None

Configuration #	2	Signature

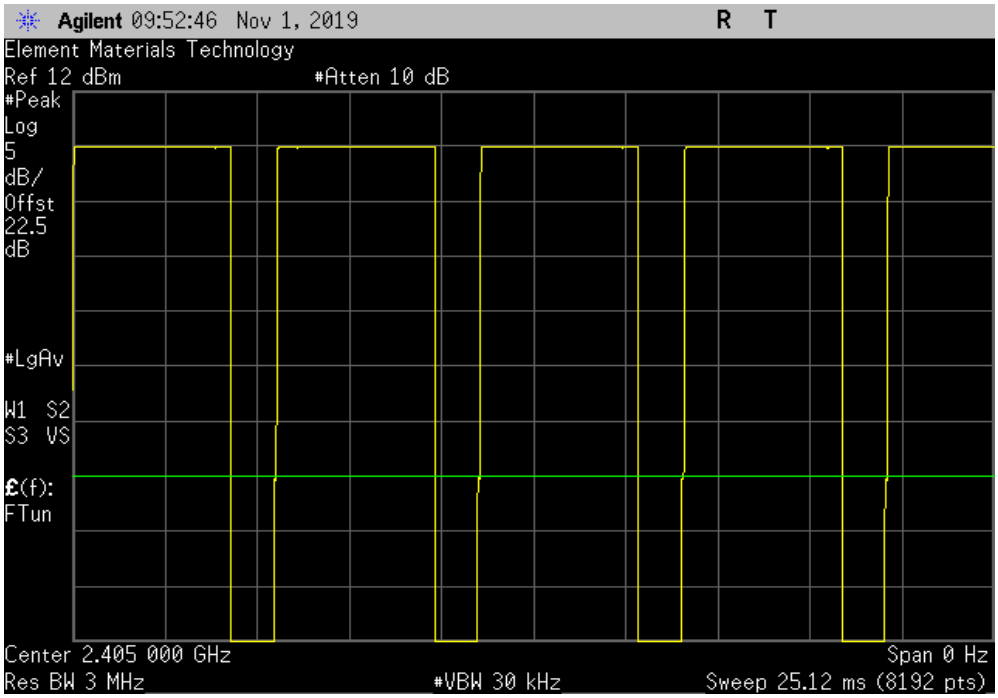
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
WirelessHART (802.15.4), Low Channel (2405 MHz)	4.309 ms	5.554 ms	1	77.6	N/A	N/A
WirelessHART (802.15.4), Low Channel (2405 MHz)	N/A	N/A	5	N/A	N/A	N/A
WirelessHART (802.15.4), Mid Channel (2440 MHz)	4.309 ms	5.555 ms	1	77.6	N/A	N/A
WirelessHART (802.15.4), Mid Channel (2440 MHz)	N/A	N/A	5	N/A	N/A	N/A
WirelessHART (802.15.4), High Channel (2475 MHz)	4.307 ms	5.553 ms	1	77.6	N/A	N/A
WirelessHART (802.15.4), High Channel (2475 MHz)	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

WirelessHART (802.15.4), Low Channel (2405 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	4.309 ms	5.554 ms	1	77.6	N/A	N/A

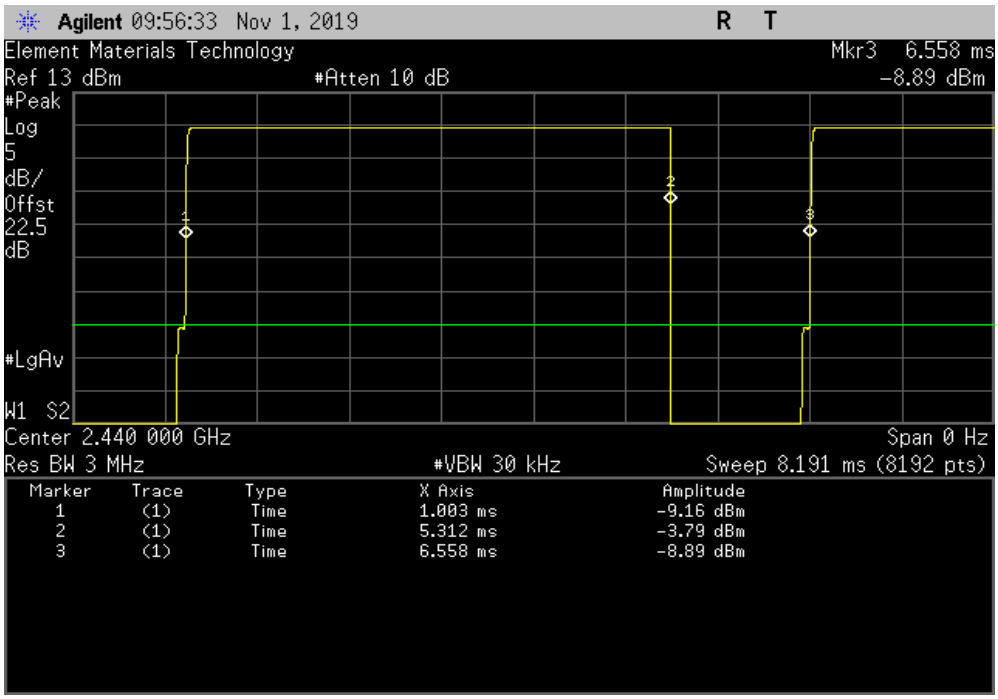


WirelessHART (802.15.4), Low Channel (2405 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

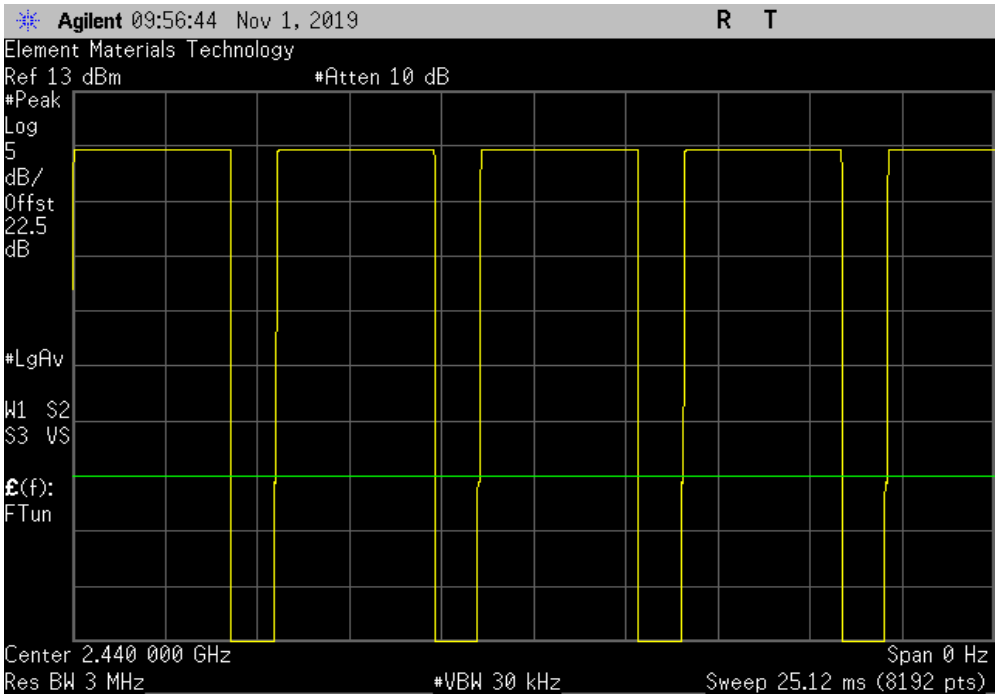


DUTY CYCLE

WirelessHART (802.15.4), Mid Channel (2440 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	4.309 ms	5.555 ms	1	77.6	N/A	N/A

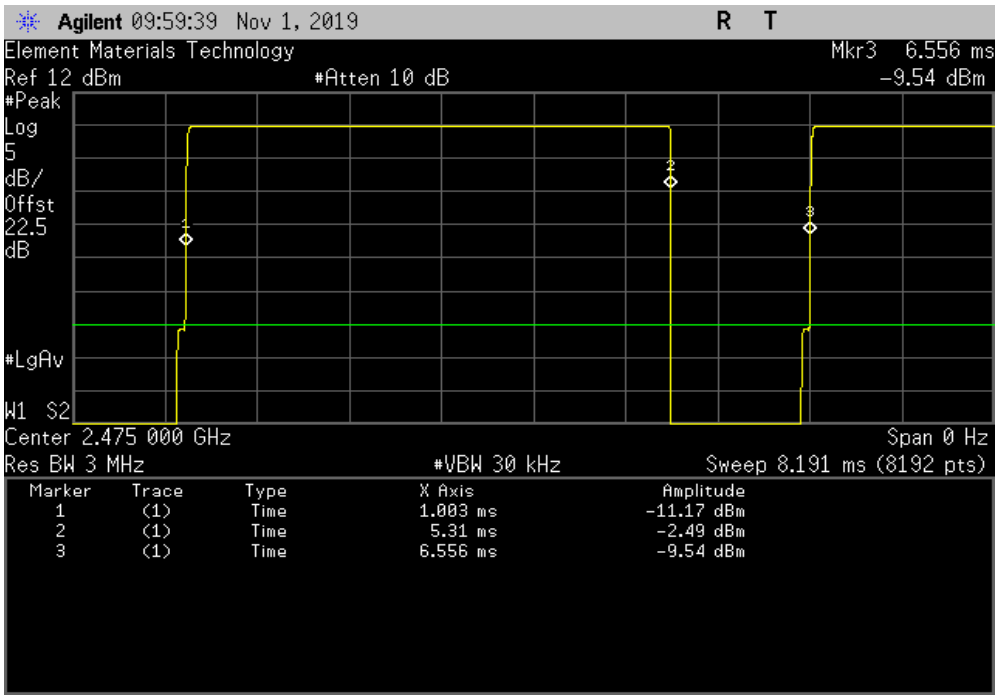


WirelessHART (802.15.4), Mid Channel (2440 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

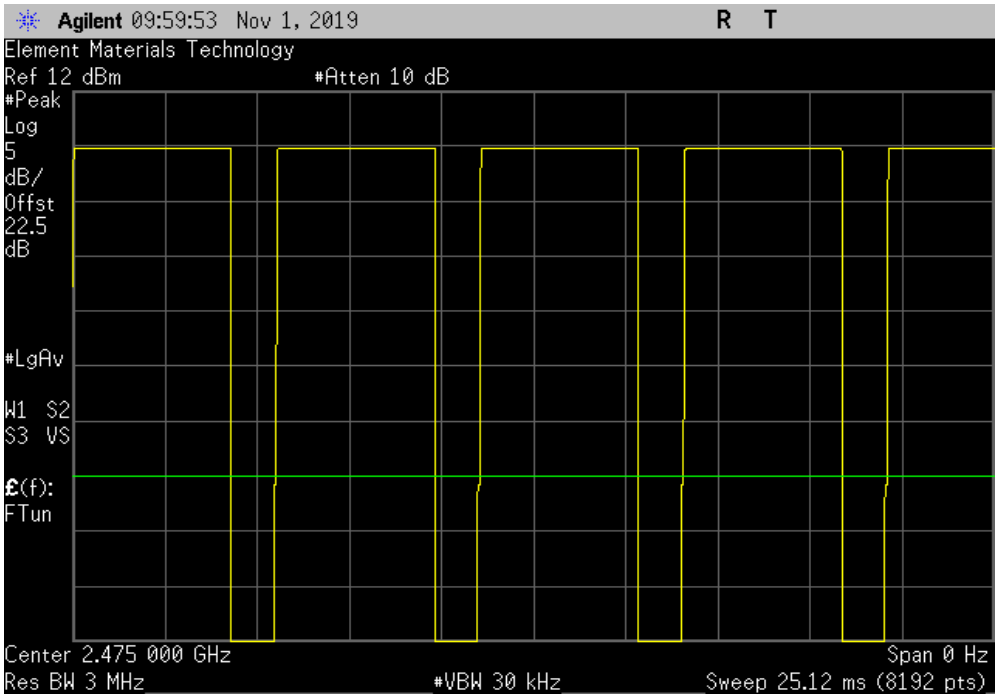


DUTY CYCLE

WirelessHART (802.15.4), High Channel (2475 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	4.307 ms	5.553 ms	1	77.6	N/A	N/A



WirelessHART (802.15.4), High Channel (2475 MHz)						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2019.09.05

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

OCCUPIED BANDWIDTH

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			**Work Order:**	EMPM0077
Serial Number:	2000			**Date:**	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			**Temperature:**	22.1 °C
Attendees:	None			**Humidity:**	26% RH
Project:	None			**Barometric Pres.:**	1027 mbar
Tested by:	Dustin Sparks	**Power:**	Battery	**Job Site:**	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

DEVIATIONS FROM TEST STANDARD

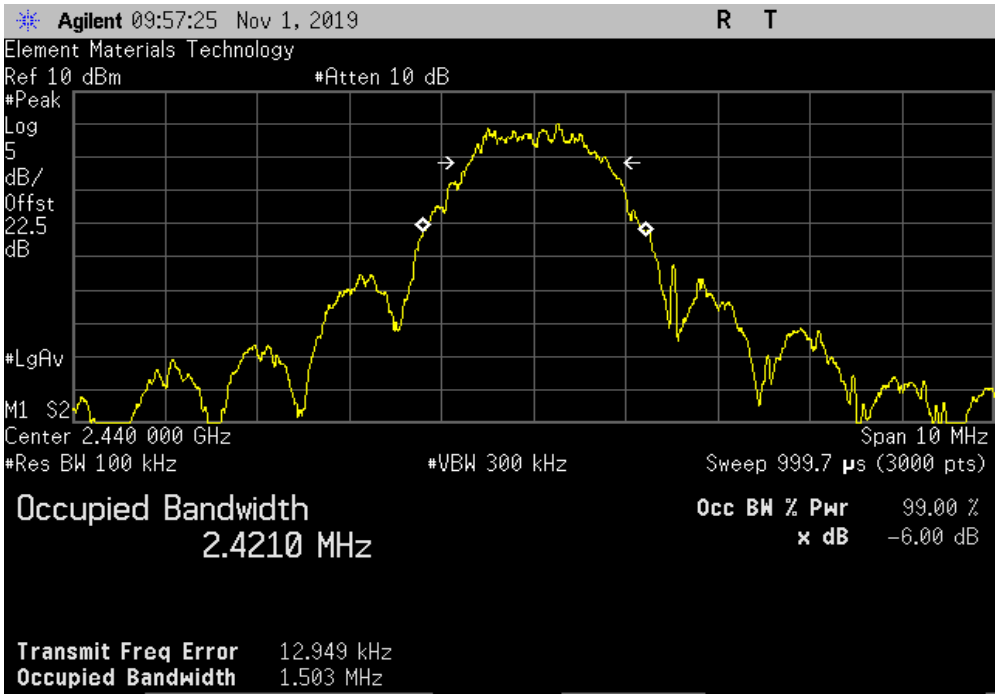
None

Configuration #	2	Signature

	Value	Limit (>)	Result
WirelessHART (802.15.4), Low Channel (2405 MHz)	1.47 MHz	500 kHz	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	1.503 MHz	500 kHz	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	1.555 MHz	500 kHz	Pass

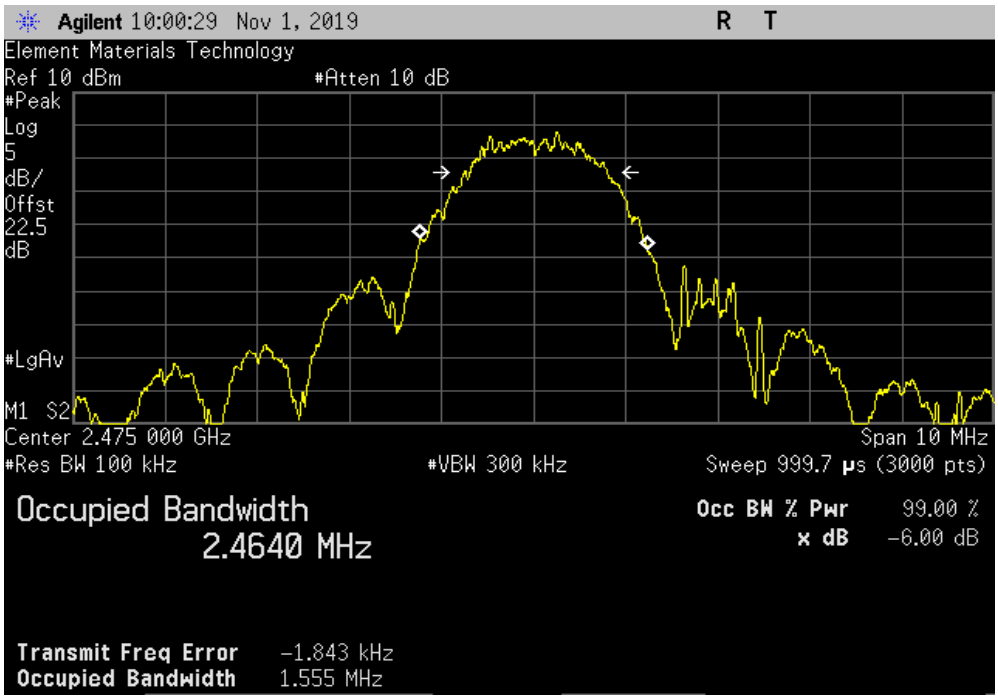
WirelessHART (802.15.4), Low Channel (2405 MHz)						
				Value	Limit (>)	Result
				1.47 MHz	500 kHz	Pass

WirelessHART (802.15.4), Mid Channel (2440 MHz)						
				Value	Limit (>)	Result
				1.503 MHz	500 kHz	Pass



OCCUPIED BANDWIDTH

WirelessHART (802.15.4), High Channel (2475 MHz)						
				Value	Limit (>)	Result
				1.555 MHz	500 kHz	Pass



OUTPUT POWER

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

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

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

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

OUTPUT POWER

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			**Work Order:**	EMPM0077
Serial Number:	2000			**Date:**	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			**Temperature:**	22.1 °C
Attendees:	None			**Humidity:**	26.1% RH
Project:	None			**Barometric Pres.:**	1027 mbar
Tested by:	Dustin Sparks	**Power:**	Battery	**Job Site:**	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

DEVIATIONS FROM TEST STANDARD

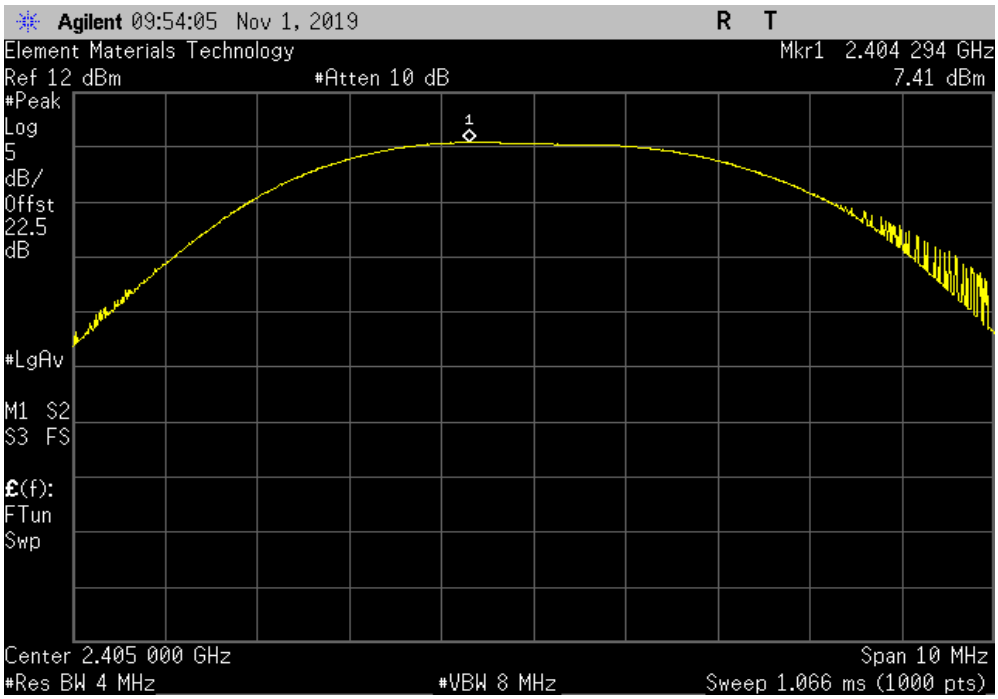
None

Configuration #	2	Signature

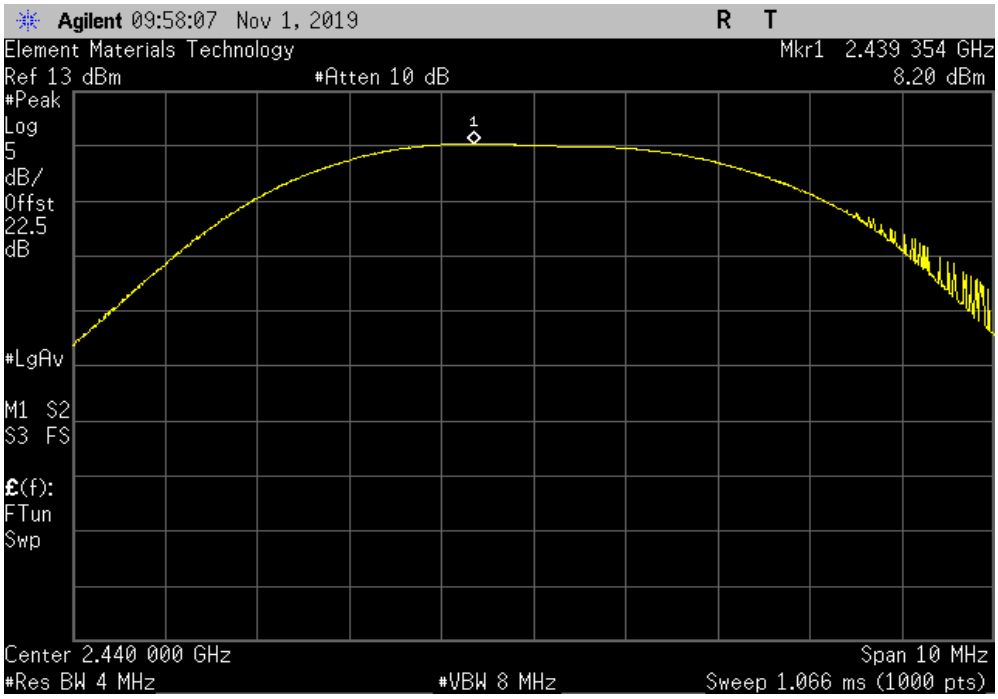
	Out Pwr (dBm)	Limit (dBm)	Result
WirelessHART (802.15.4), Low Channel (2405 MHz)	7.412	30	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	8.198	30	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	7.388	30	Pass

OUTPUT POWER

WirelessHART (802.15.4), Low Channel (2405 MHz)						
				Out Pwr (dBm)	Limit (dBm)	Result
				7.412	30	Pass



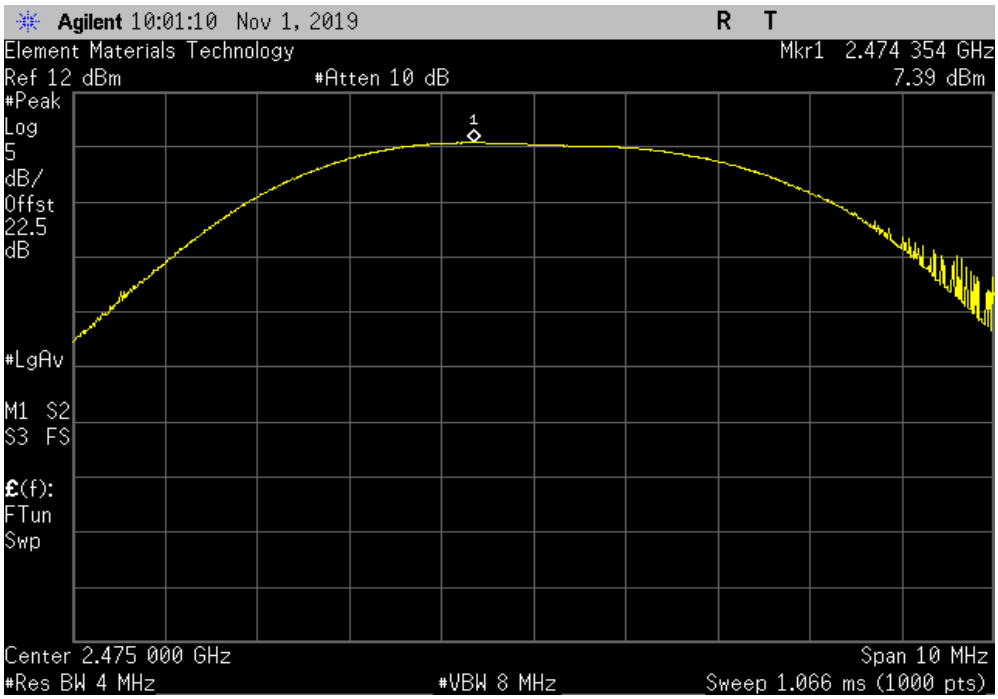
WirelessHART (802.15.4), Mid Channel (2440 MHz)						
				Out Pwr (dBm)	Limit (dBm)	Result
				8.198	30	Pass



OUTPUT POWER

TbtTx 2019.08.30.0 XMit 2019.09.05

WirelessHART (802.15.4), High Channel (2475 MHz)						
				Out Pwr (dBm)	Limit (dBm)	Result
				7.388	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

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

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

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

The antenna gain of the EUT in dBi was added to the measured output power values to calculate the EIRP.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

element

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			**Work Order:**	EMPM0077
Serial Number:	2000			**Date:**	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			**Temperature:**	22.1 °C
Attendees:	None			**Humidity:**	26.1% RH
Project:	None			**Barometric Pres.:**	1027 mbar
Tested by:	Dustin Sparks	**Power:**	Battery	**Job Site:**	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

DEVIATIONS FROM TEST STANDARD

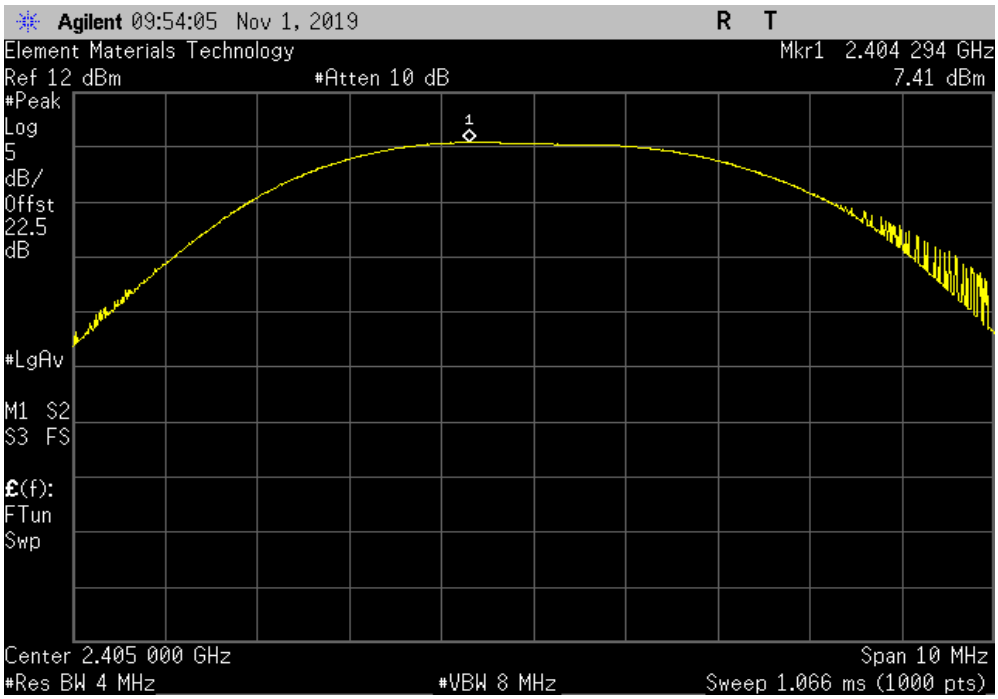
None

Configuration #	4	Signature

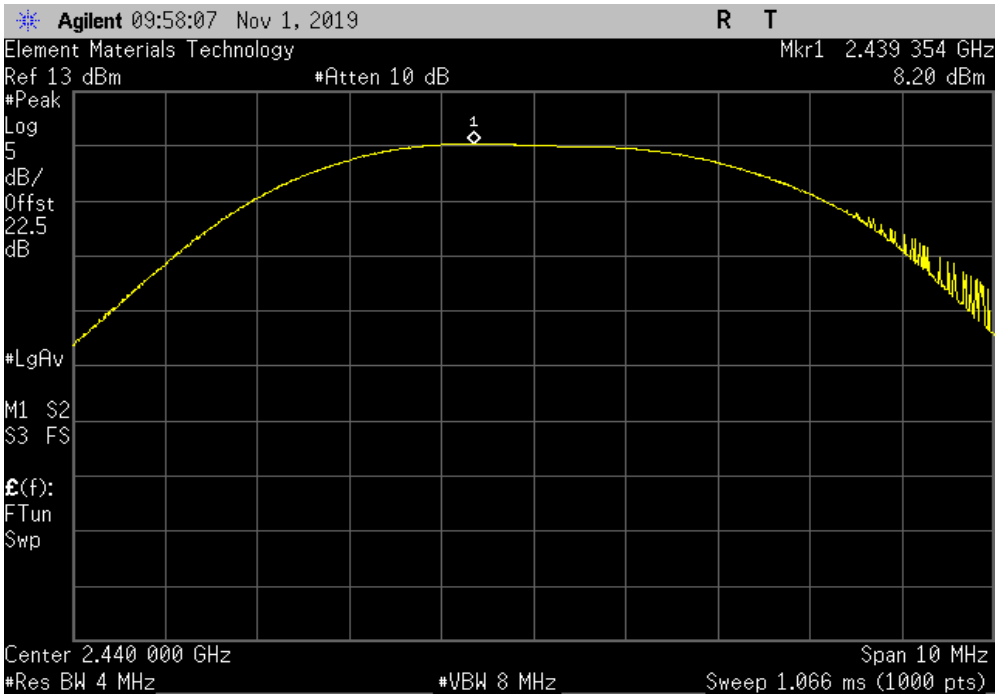
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
WirelessHART (802.15.4), Low Channel (2405 MHz)	7.412	2	9.412	36	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	8.198	2	10.198	36	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	7.388	2	9.388	36	Pass

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

WirelessHART (802.15.4), Low Channel (2405 MHz)						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		7.412	2	9.412	36	Pass

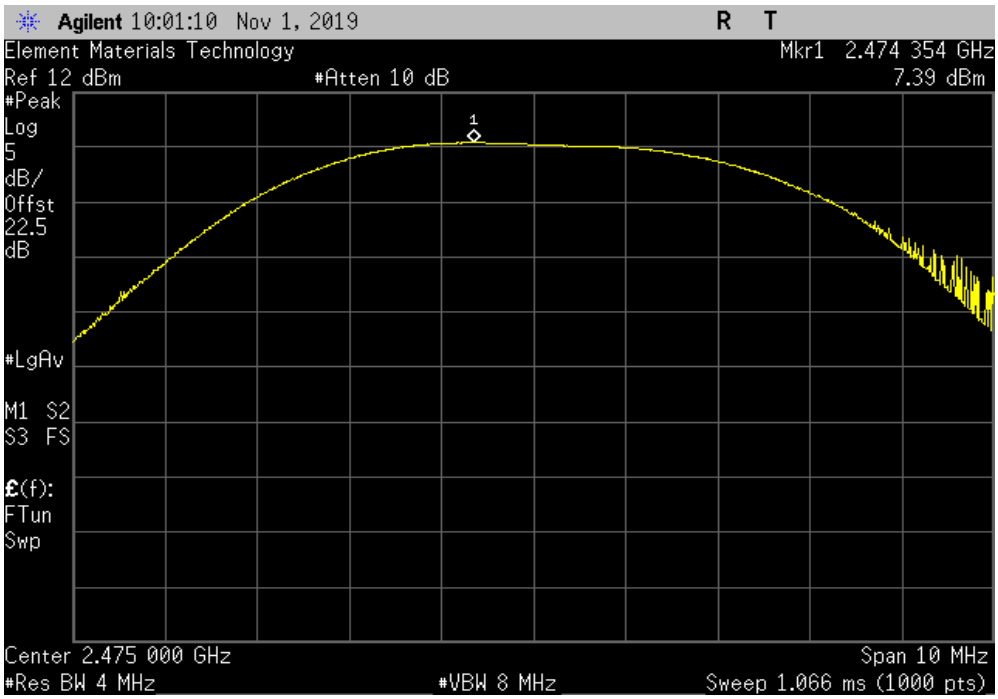


WirelessHART (802.15.4), Mid Channel (2440 MHz)						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		8.198	2	10.198	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

WirelessHART (802.15.4), High Channel (2475 MHz)						
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
		7.388	2	9.388	36	Pass



POWER SPECTRAL DENSITY

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

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

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

POWER SPECTRAL DENSITY

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			Work Order:	EMPM0077
Serial Number:	2000			Date:	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			Temperature:	22.1 °C
Attendees:	None			Humidity:	26% RH
Project:	None			Barometric Pres.:	1027 mbar
Tested by:	Dustin Sparks	Power:	Battery	Job Site:	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

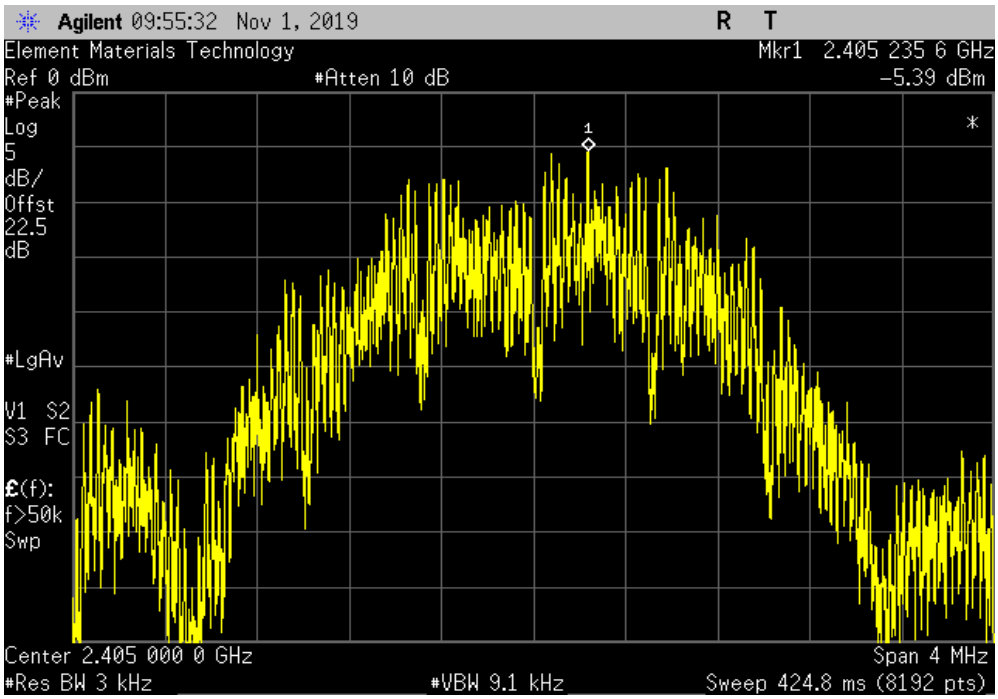
DEVIATIONS FROM TEST STANDARD

None

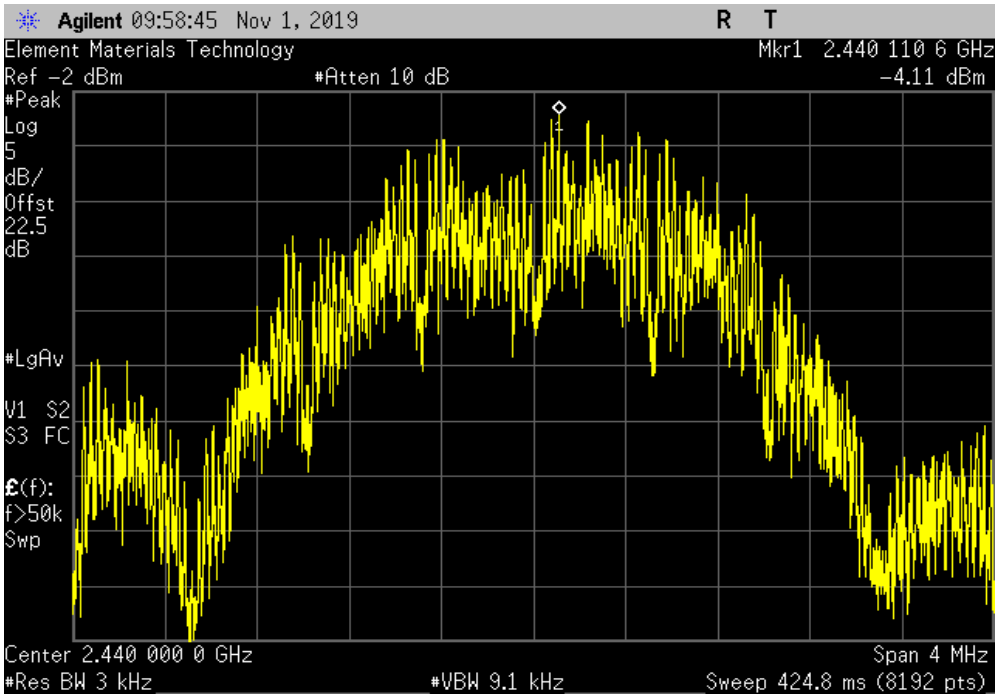
Configuration #	2	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
WirelessHART (802.15.4), Low Channel (2405 MHz)	-5.393	8	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	-4.115	8	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	-5.346	8	Pass

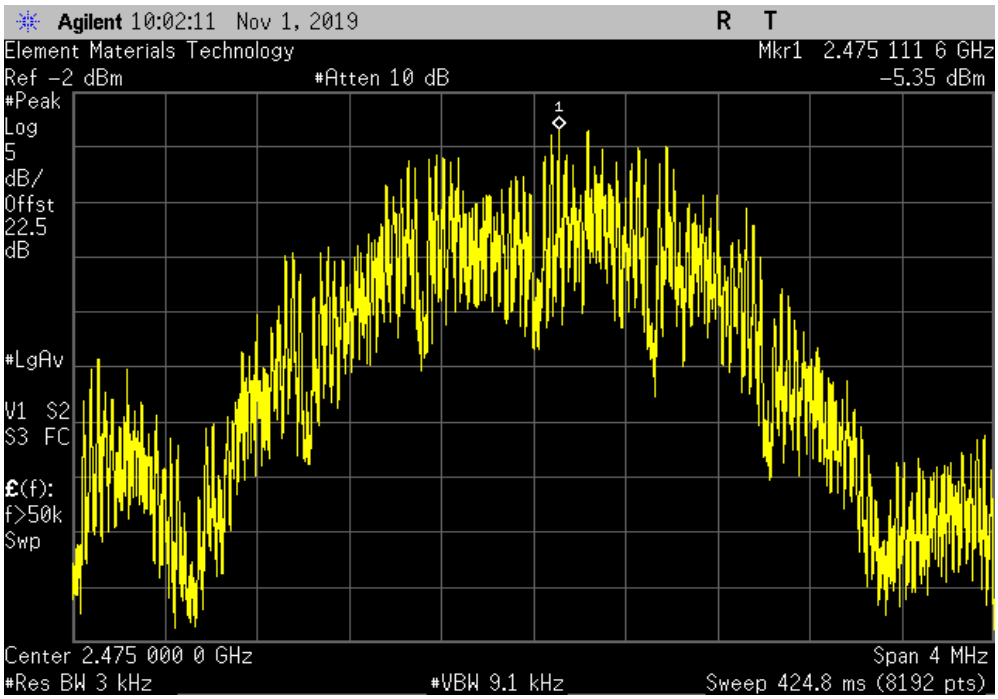
WirelessHART (802.15.4), Low Channel (2405 MHz)						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-5.393	8	Pass



WirelessHART (802.15.4), Mid Channel (2440 MHz)						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-4.115	8	Pass



WirelessHART (802.15.4), High Channel (2475 MHz)						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-5.346	8	Pass



BAND EDGE COMPLIANCE

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNO	7-Jun-19	7-Jun-20
Attenuator	Fairview Microwave	SA4014-20	AQI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAS	8-Mar-19	8-Mar-20

TEST DESCRIPTION

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

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

BAND EDGE COMPLIANCE

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			Work Order:	EMPM0077
Serial Number:	2000			Date:	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			Temperature:	22 °C
Attendees:	None			Humidity:	25.9% RH
Project:	None			Barometric Pres.:	1027 mbar
Tested by:	Dustin Sparks	Power:	Battery	Job Site:	MN10

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

DC block was verified and included in the measurement cable offset.

DEVIATIONS FROM TEST STANDARD

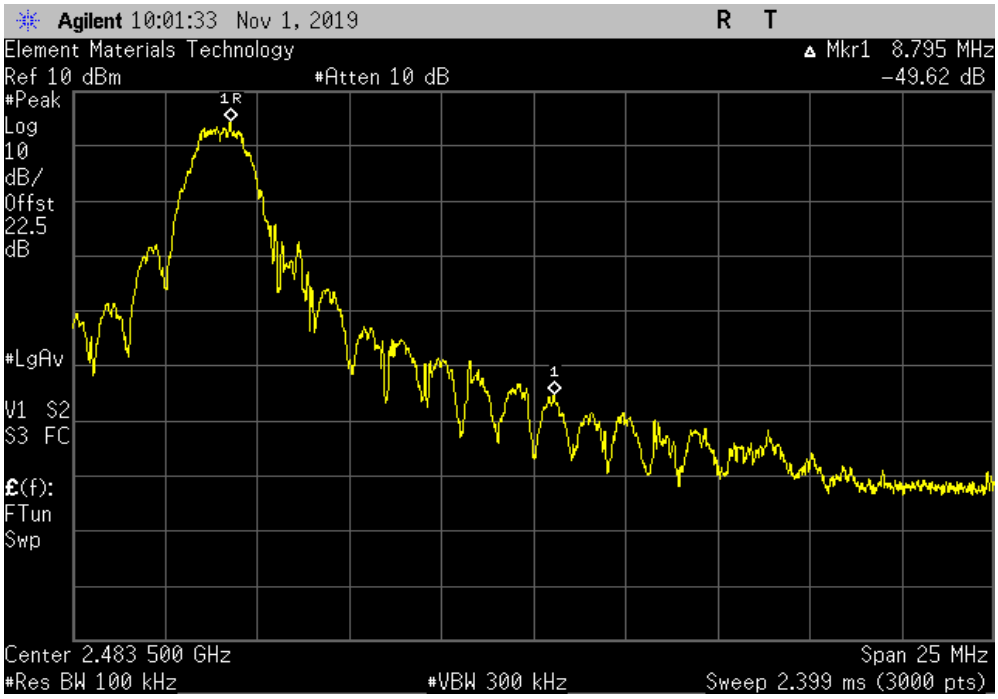
None

Configuration #	2	Signature

	Value (dBc)	Limit ≤ (dBc)	Result
WirelessHART (802.15.4), Low Channel (2405 MHz)	-41.54	-20	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	-49.62	-20	Pass

WirelessHART (802.15.4), Low Channel (2405 MHz)						
				Value (dBc)	Limit ≤ (dBc)	Result
				-41.54	-20	Pass

WirelessHART (802.15.4), High Channel (2475 MHz)						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49.62	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFX	22-Oct-18	22-Oct-21
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	MNU	11-Apr-19	11-Apr-20
Attenuator	S.M. Electronics	SA26B-20	RFW	13-Feb-19	13-Feb-20
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	1-May-19	1-May-20

TEST DESCRIPTION

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

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2019.09.05

EUT:	Model 2051/3051			**Work Order:**	EMPM0077
Serial Number:	2000			**Date:**	5-Nov-19
Customer:	Emerson Automation Solutions/Rosemount Inc.			**Temperature:**	22.1 °C
Attendees:	None			**Humidity:**	25.9% RH
Project:	None			**Barometric Pres.:**	1027 mbar
Tested by:	Dustin Sparks	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2019	ANSI C63.10:2013

COMMENTS

None

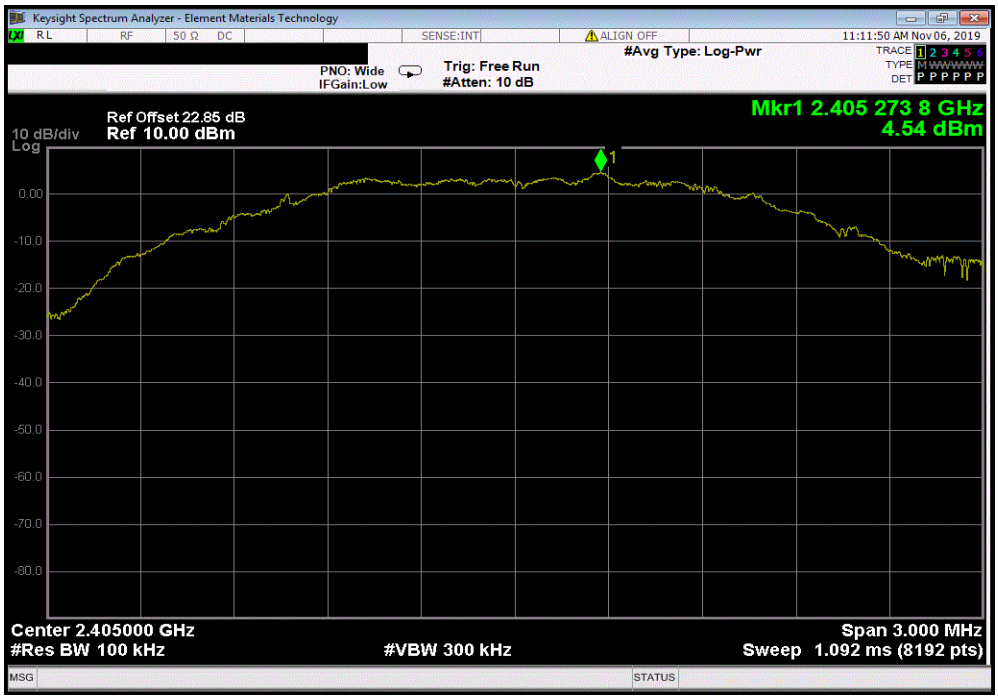
DEVIATIONS FROM TEST STANDARD

None

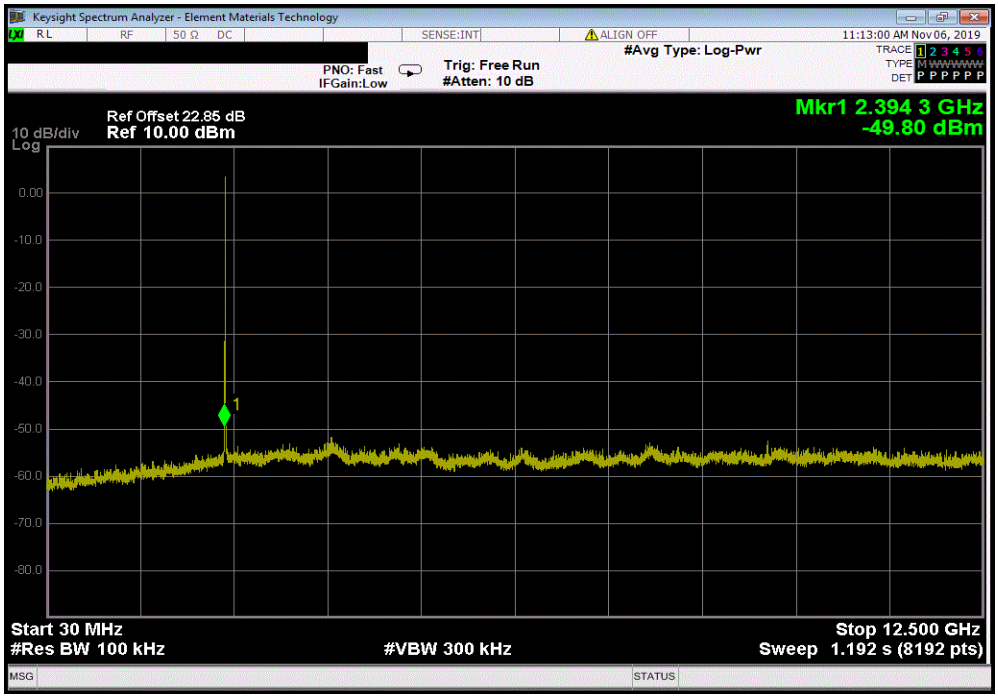
Configuration #	2	Signature

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
WirelessHART (802.15.4), Low Channel (2405 MHz)	Fundamental	2405.27	N/A	N/A	N/A
WirelessHART (802.15.4), Low Channel (2405 MHz)	30 MHz - 12.5 GHz	2394.29	-54.34	-20	Pass
WirelessHART (802.15.4), Low Channel (2405 MHz)	12.5 GHz - 25 GHz	24049.26	-54.08	-20	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	Fundamental	2440.27	N/A	N/A	N/A
WirelessHART (802.15.4), Mid Channel (2440 MHz)	30 MHz - 12.5 GHz	3861.89	-57.16	-20	Pass
WirelessHART (802.15.4), Mid Channel (2440 MHz)	12.5 GHz - 25 GHz	23913.44	-54.99	-20	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	Fundamental	2475.27	N/A	N/A	N/A
WirelessHART (802.15.4), High Channel (2475 MHz)	30 MHz - 12.5 GHz	3820.78	-56.12	-20	Pass
WirelessHART (802.15.4), High Channel (2475 MHz)	12.5 GHz - 25 GHz	24191.19	-54.58	-20	Pass

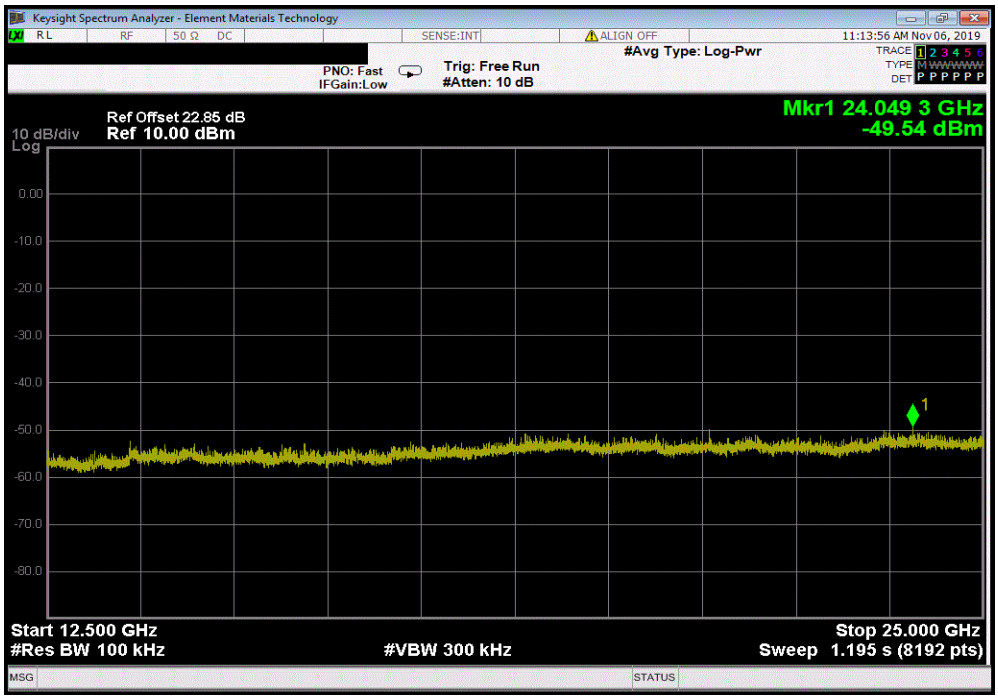
WirelessHART (802.15.4), Low Channel (2405 MHz)					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental		2405.27	N/A	N/A	N/A



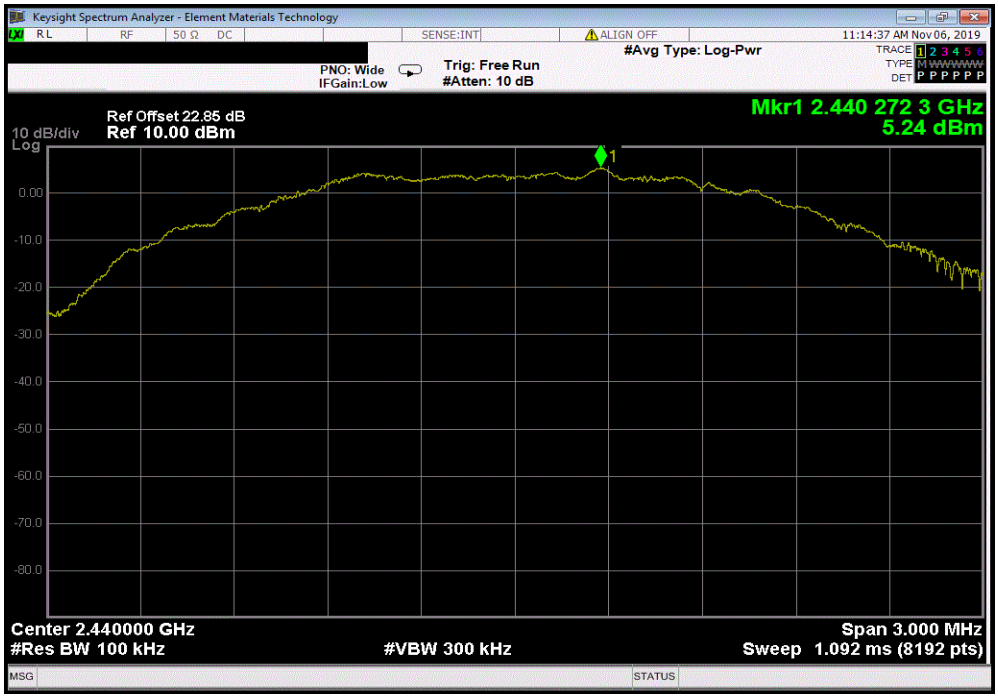
WirelessHART (802.15.4), Low Channel (2405 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	2394.29	-54.34	-20	Pass



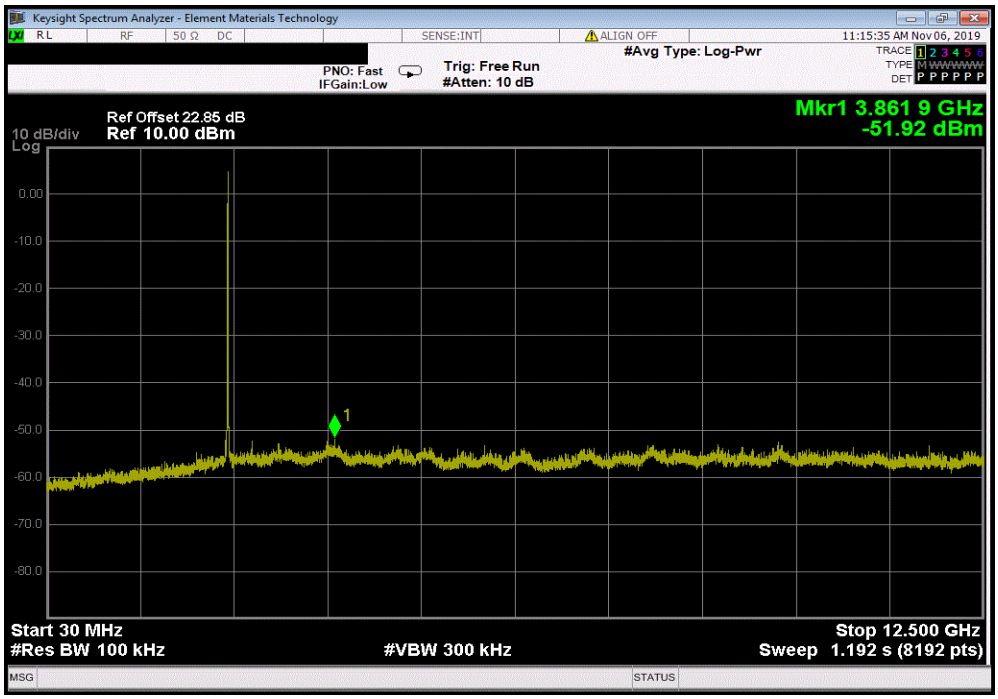
WirelessHART (802.15.4), Low Channel (2405 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24049.26	-54.08	-20	Pass



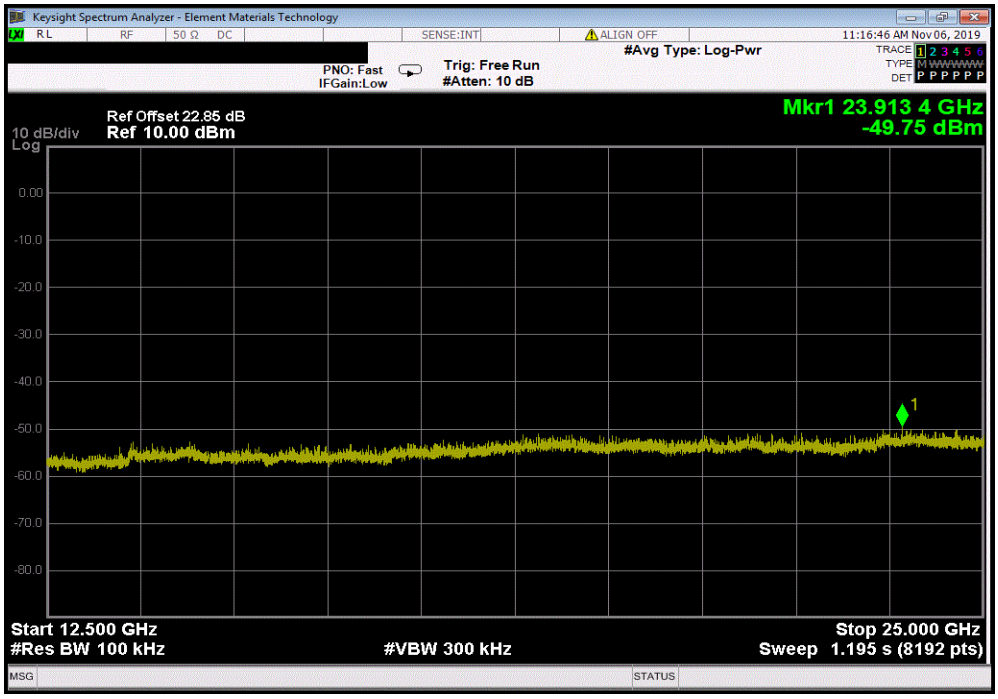
WirelessHART (802.15.4), Mid Channel (2440 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental	2440.27	N/A	N/A	N/A



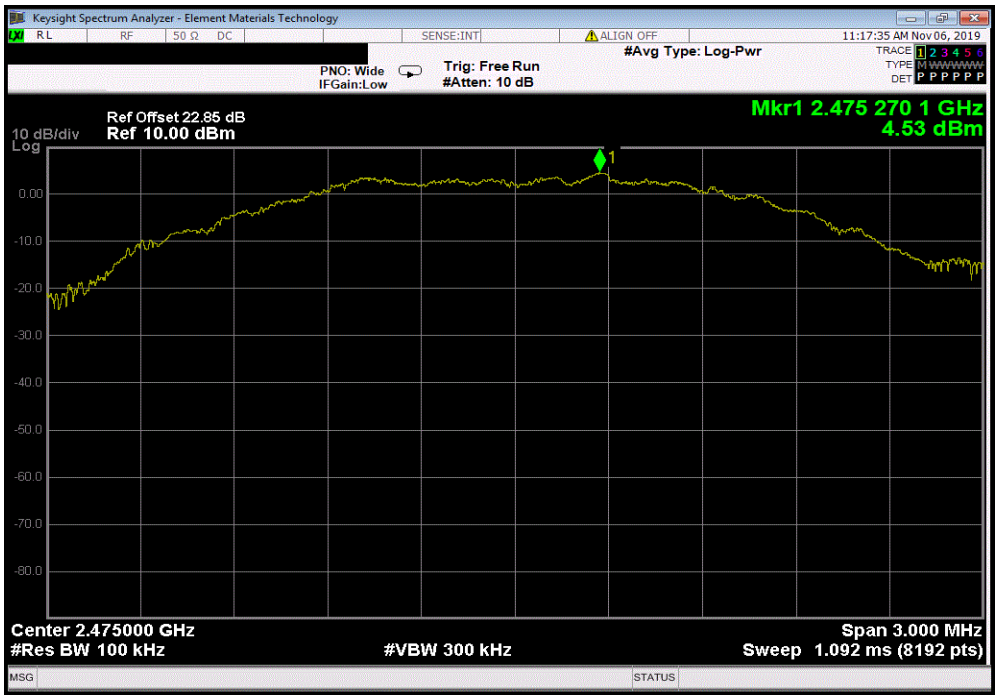
WirelessHART (802.15.4), Mid Channel (2440 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3861.89	-57.16	-20	Pass



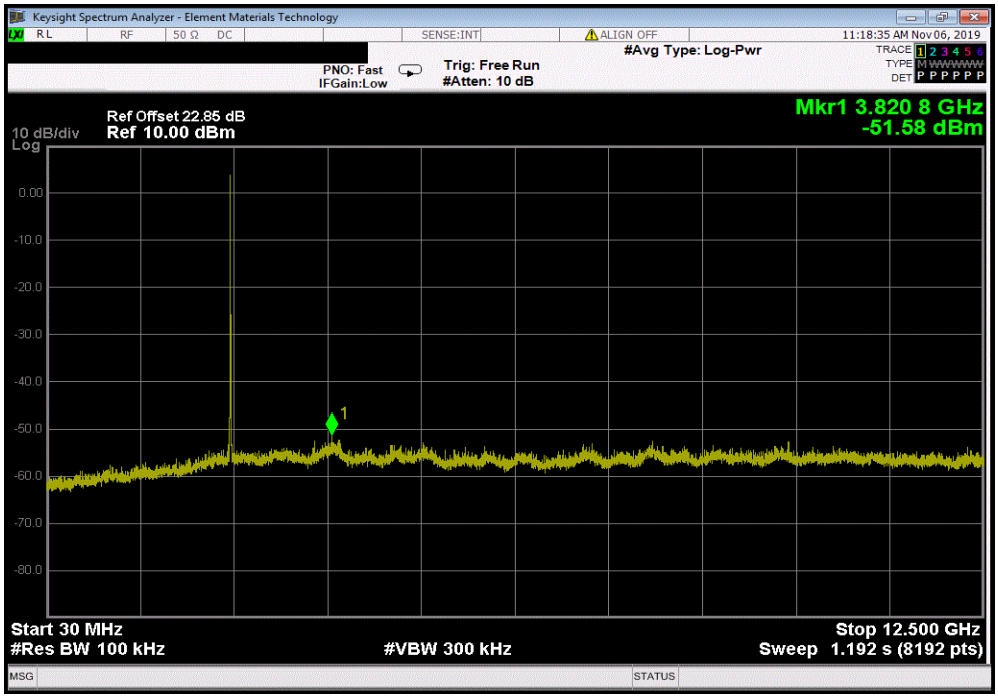
WirelessHART (802.15.4), Mid Channel (2440 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	23913.44	-54.99	-20	Pass



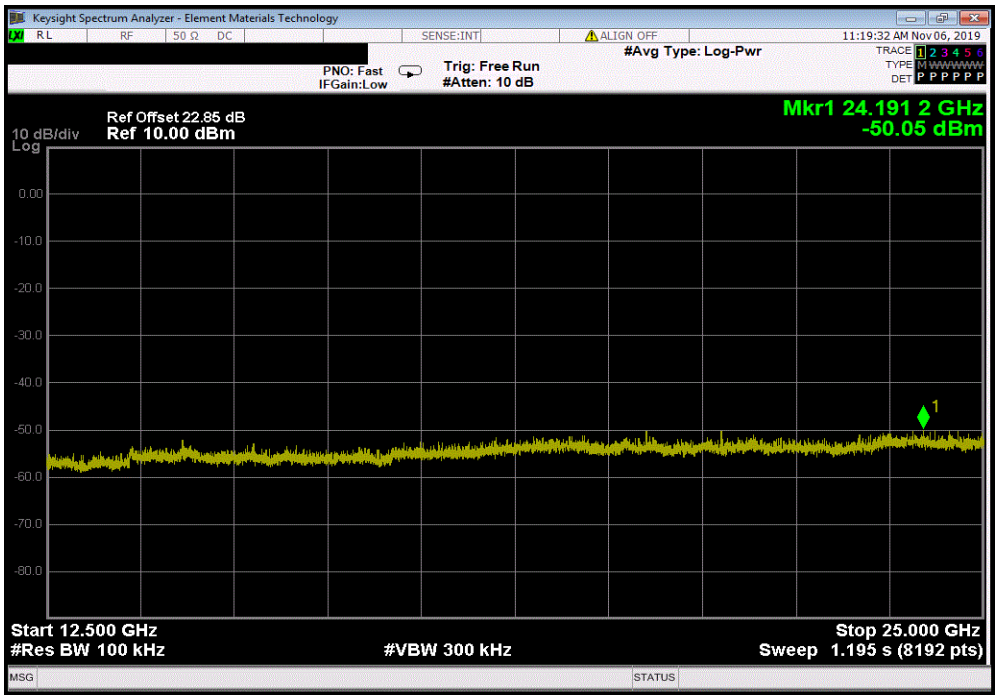
WirelessHART (802.15.4), High Channel (2475 MHz)					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2475.27	N/A	N/A	N/A



WirelessHART (802.15.4), High Channel (2475 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3820.78	-56.12	-20	Pass



WirelessHART (802.15.4), High Channel (2475 MHz)				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24191.19	-54.58	-20	Pass



SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2019.05.10

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

MODES OF OPERATION

Transmitting WirelessHART (802.15.4) - low channel (2405 MHz), mid channel (2440 MHz), and high channel (2475 MHz) modulated

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

EMPM0077 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	Micro-Tronics	HPM50111	LFN	12-Sep-2019	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	17-Sep-2019	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	17-Sep-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	11-Sep-2019	12 mo
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	11-Sep-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	8-Feb-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	8-Mar-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	8-Feb-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	8-Feb-2019	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	17-Sep-2019	12 mo
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	16-Jan-2019	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	18-Oct-2019	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	18-Oct-2019	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-2018	12 mo

MEASUREMENT BANDWIDTHS

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

SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2019.05.10

TEST DESCRIPTION

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

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

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

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

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

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

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

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

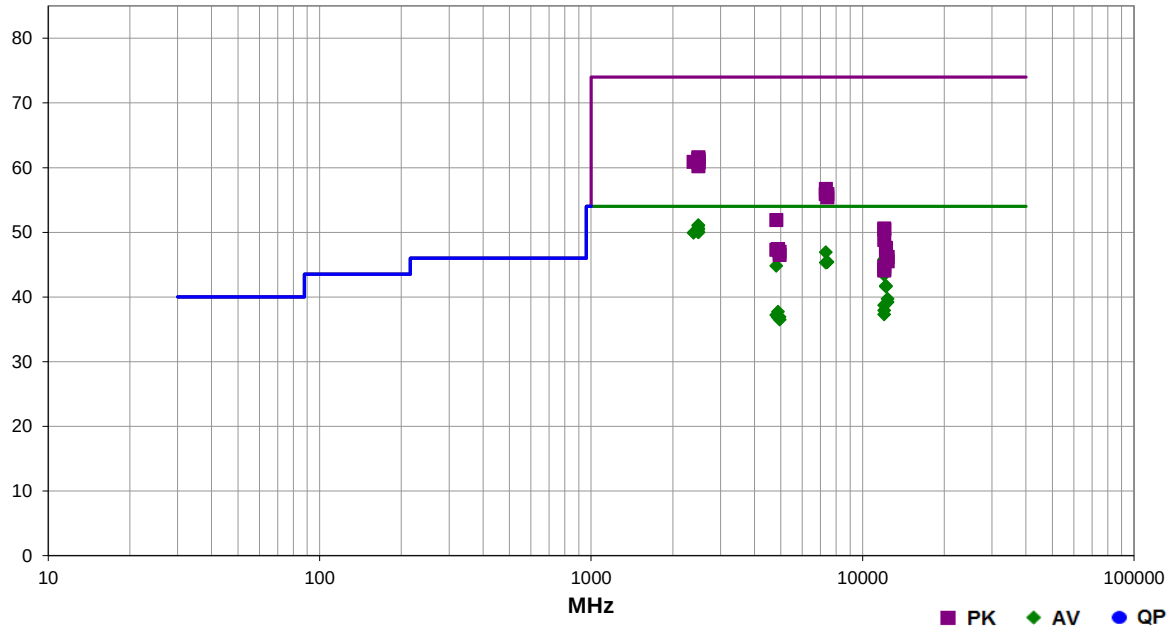
SPURIOUS RADIATED EMISSIONS

EmiR5 2019.08.15.1 PSA-ESCI 2019.05.10

Work Order:	EMPM0077	**Date:**	29-Oct-2019		
Project:	None	**Temperature:**	21.7 °C		
Job Site:	MN05	**Humidity:**	28.2% RH		
Serial Number:	2002	**Barometric Pres.:**	1026 mbar	**Tested by:**	Dustin Sparks
EUT:	Model 2051/3051				
Configuration:	1				
Customer:	Emerson Automation Solutions/Rosemount Inc.				
Attendees:	None				
EUT Power:	Battery				
Operating Mode:	Transmitting WirelessHART (802.15.4) - low channel (2405 MHz), mid channel (2440 MHz), and high channel (2475 MHz) modulated				
Deviations:	None				
Comments:	Duty cycle correction factor (DCCF) of 1.1 dB added to all RMS average points. Based on a measured duty cycle of 77.6%, using the following formula: DCCF = 10 * log(1/0.776)				

Test Specifications	**Test Method**
FCC 15.247:2019	ANSI C63.10:2013

Run #	40	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.733	33.8	-3.8	1.5	272.9	1.1	20.0	Vert	AV	0.0	51.1	54.0	-2.9	High ch, EUT on side
2483.592	33.7	-3.8	1.5	257.9	1.1	20.0	Horz	AV	0.0	51.0	54.0	-3.0	High ch, EUT vertical
2483.725	33.3	-3.8	1.5	337.9	1.1	20.0	Horz	AV	0.0	50.6	54.0	-3.4	High ch, EUT on side
2483.683	33.1	-3.8	1.5	41.0	1.1	20.0	Vert	AV	0.0	50.4	54.0	-3.6	High ch, EUT horizontal
2483.608	32.7	-3.8	1.5	91.0	1.1	20.0	Vert	AV	0.0	50.0	54.0	-4.0	High ch, EUT vertical
2486.667	32.6	-3.7	3.2	110.9	1.1	20.0	Horz	AV	0.0	50.0	54.0	-4.0	High ch, EUT horizontal
2386.225	32.4	-3.6	1.5	239.0	1.1	20.0	Vert	AV	0.0	49.9	54.0	-4.1	Low ch, EUT vertical
7321.400	32.3	13.5	1.9	325.9	1.1	0.0	Vert	AV	0.0	46.9	54.0	-7.1	Mid ch, EUT on side
12027.480	46.8	-2.1	1.8	120.9	1.1	0.0	Vert	AV	0.0	45.8	54.0	-8.2	Low ch, EUT on side
12027.440	46.5	-2.1	1.2	6.9	1.1	0.0	Horz	AV	0.0	45.5	54.0	-8.5	Low ch, EUT vertical
7426.392	31.0	13.3	1.5	285.0	1.1	0.0	Vert	AV	0.0	45.4	54.0	-8.6	High ch, EUT on side
7426.808	31.0	13.3	1.5	81.0	1.1	0.0	Horz	AV	0.0	45.4	54.0	-8.6	High ch, EUT vertical
7321.517	30.7	13.5	3.3	59.9	1.1	0.0	Horz	AV	0.0	45.3	54.0	-8.7	Mid ch, EUT vertical
4809.075	39.1	4.6	2.5	37.0	1.1	0.0	Vert	AV	0.0	44.8	54.0	-9.2	Low ch, EUT on side
12027.480	44.4	-2.1	2.9	135.9	1.1	0.0	Horz	AV	0.0	43.4	54.0	-10.6	Low ch, EUT on side
12202.460	42.4	-1.8	1.8	119.0	1.1	0.0	Vert	AV	0.0	41.7	54.0	-12.3	Mid ch, EUT on side
2483.683	45.4	-3.8	1.5	41.0	0.0	20.0	Vert	PK	0.0	61.6	74.0	-12.4	High ch, EUT horizontal
12202.460	42.3	-1.8	1.9	189.0	1.1	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Mid ch, EUT vertical

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.183	45.2	-3.8	1.5	272.9	0.0	20.0	Vert	PK	0.0	61.4	74.0	-12.6	High ch, EUT on side
2487.700	44.9	-3.7	1.5	337.9	0.0	20.0	Horz	PK	0.0	61.2	74.0	-12.8	High ch, EUT on side
2385.617	44.5	-3.6	1.5	239.0	0.0	20.0	Vert	PK	0.0	60.9	74.0	-13.1	Low ch, EUT vertical
2483.958	44.6	-3.8	1.5	257.9	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	High ch, EUT vertical
2487.642	44.5	-3.7	1.5	91.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	High ch, EUT vertical
2485.800	43.9	-3.7	3.2	110.9	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	High ch, EUT horizontal
12377.480	39.3	-0.7	1.5	120.9	1.1	0.0	Vert	AV	0.0	39.7	54.0	-14.3	High ch, EUT on side
12377.410	38.8	-0.7	1.3	192.0	1.1	0.0	Horz	AV	0.0	39.2	54.0	-14.8	High ch, EUT vertical
12027.440	39.7	-2.1	1.5	240.9	1.1	0.0	Vert	AV	0.0	38.7	54.0	-15.3	Low ch, EUT horizontal
12027.480	38.9	-2.1	1.5	162.0	1.1	0.0	Vert	AV	0.0	37.9	54.0	-16.1	Low ch, EUT vertical
4880.908	31.9	4.7	1.5	30.0	1.1	0.0	Vert	AV	0.0	37.7	54.0	-16.3	Mid ch, EUT on side
12027.420	38.3	-2.1	1.5	355.9	1.1	0.0	Horz	AV	0.0	37.3	54.0	-16.7	Low ch, EUT horizontal
4809.150	31.5	4.6	1.5	24.9	1.1	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Low ch, EUT vertical
4950.967	31.0	4.8	1.5	110.9	1.1	0.0	Horz	AV	0.0	36.9	54.0	-17.1	High ch, EUT vertical
4880.867	31.0	4.7	1.5	293.0	1.1	0.0	Horz	AV	0.0	36.8	54.0	-17.2	Mid ch, EUT vertical
7321.742	43.2	13.5	1.9	325.9	0.0	0.0	Vert	PK	0.0	56.7	74.0	-17.3	Mid ch, EUT on side
4951.500	30.6	4.8	1.5	11.0	1.1	0.0	Vert	AV	0.0	36.5	54.0	-17.5	High ch, EUT on side
7427.258	42.6	13.3	1.5	81.0	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	High ch, EUT vertical
7319.492	42.4	13.5	3.3	59.9	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	Mid ch, EUT vertical
7425.133	42.1	13.3	1.5	285.0	0.0	0.0	Vert	PK	0.0	55.4	74.0	-18.6	High ch, EUT on side
4808.900	47.3	4.6	2.5	37.0	0.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	Low ch, EUT on side
12022.530	52.8	-2.2	1.8	120.9	0.0	0.0	Vert	PK	0.0	50.6	74.0	-23.4	Low ch, EUT on side
12022.660	52.6	-2.2	1.2	6.9	0.0	0.0	Horz	PK	0.0	50.4	74.0	-23.6	Low ch, EUT vertical
12027.170	50.9	-2.1	2.9	135.9	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low ch, EUT on side
12197.560	49.4	-1.8	1.8	119.0	0.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	Mid ch, EUT on side
4878.367	42.7	4.7	1.5	293.0	0.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	Mid ch, EUT vertical
4880.742	42.7	4.7	1.5	30.0	0.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	Mid ch, EUT on side
4809.708	42.7	4.6	1.5	24.9	0.0	0.0	Horz	PK	0.0	47.3	74.0	-26.7	Low ch, EUT vertical
12197.680	48.9	-1.8	1.9	189.0	0.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	Mid ch, EUT vertical
4948.425	42.2	4.8	1.5	110.9	0.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	High ch, EUT vertical
4950.967	41.7	4.8	1.5	11.0	0.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	High ch, EUT on side
12372.720	46.9	-0.7	1.5	120.9	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	High ch, EUT on side
12377.380	46.2	-0.7	1.3	192.0	0.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	High ch, EUT vertical
12022.740	46.9	-2.2	1.5	240.9	0.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	Low ch, EUT horizontal
12027.170	46.4	-2.1	1.5	355.9	0.0	0.0	Horz	PK	0.0	44.3	74.0	-29.7	Low ch, EUT horizontal
12022.530	46.3	-2.2	1.5	162.0	0.0	0.0	Vert	PK	0.0	44.1	74.0	-29.9	Low ch, EUT vertical