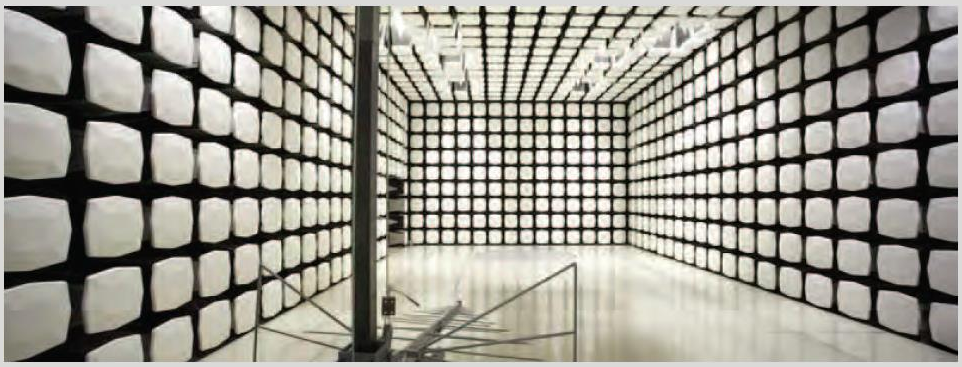
Emerson Automation Solutions, Rosemount Inc

Rosemount Model RM5800 Radio Module

FCC 15.247:2021
2.4GHz DTS Radio

Report: EMPM0122 Rev. 3, Issue Date: April 12, 2022



CERT #3310.05

CERTIFICATE OF TEST

Last Date of Test: February 4, 2022
Emerson Automation Solutions, Rosemount Inc
EUT: RM5800

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2021	ANSI C63.10:2013, KDB 558074
FCC 15.207:2022	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

James E Morris

James Morris, Operations Manager

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

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		
01	Added note to Duty Cycle	2021-12-03	21
01	Edited antenna name	2021-12-03	59
02	Powerline conducted emissions ran	2022-02-09	17-21
02	Duty cycle analysis added as appendix	2022-02-09	66-69
03	Edited Functional Description	2022-04-06-	10
03	Edited antennas in the power settings and antennas and in the configurations	2022-04-06-	11-15
03	Edited comments	2022-04-06-	17, 18, 20, 28, 32, 51, 54, 57, 60, 63
03	Edited client name to Emerson Automation Solutions, Rosemount Inc	2022-04-06-	All
03	Edited model	2022-04-06	Cover

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

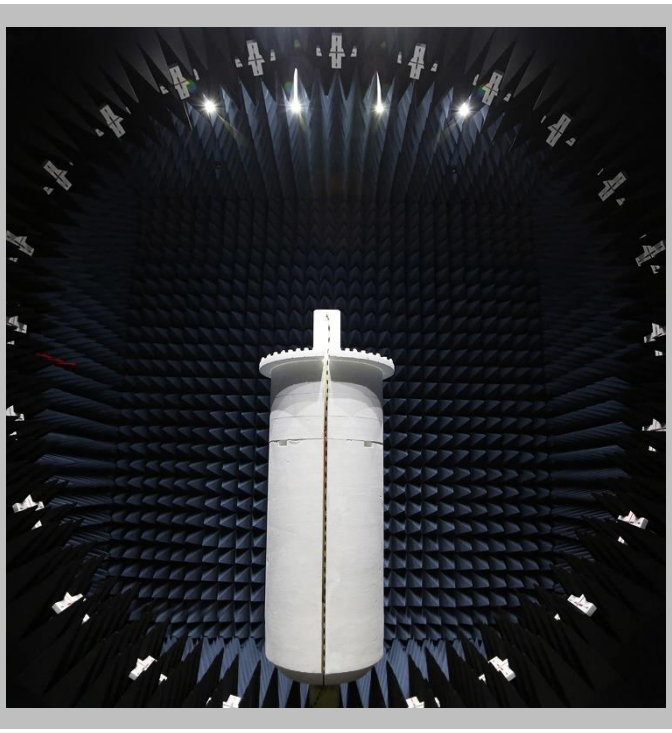
For details on the Scopes of our Accreditations, please visit:

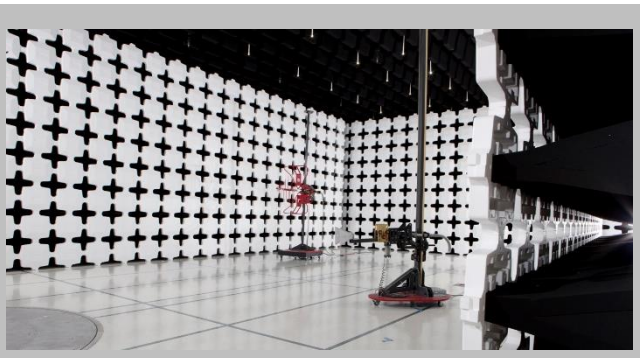
California Minnesota Oregon Texas Washington

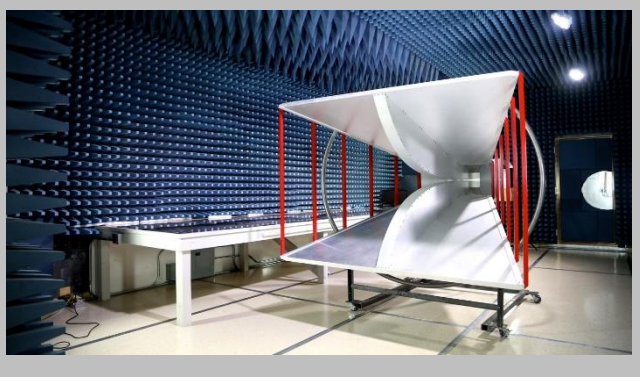
FACILITIES

element
2020.12.15

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 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
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

element
TMU.2015.07.10

Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found 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)	2.6 dB	-2.6 dB

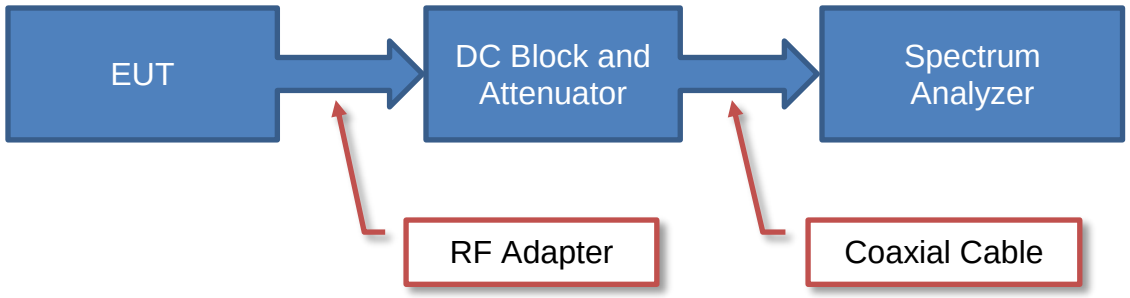
TEST SETUP BLOCK DIAGRAMS

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.

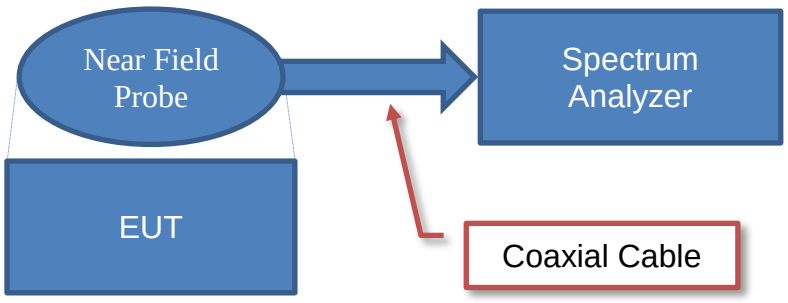
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

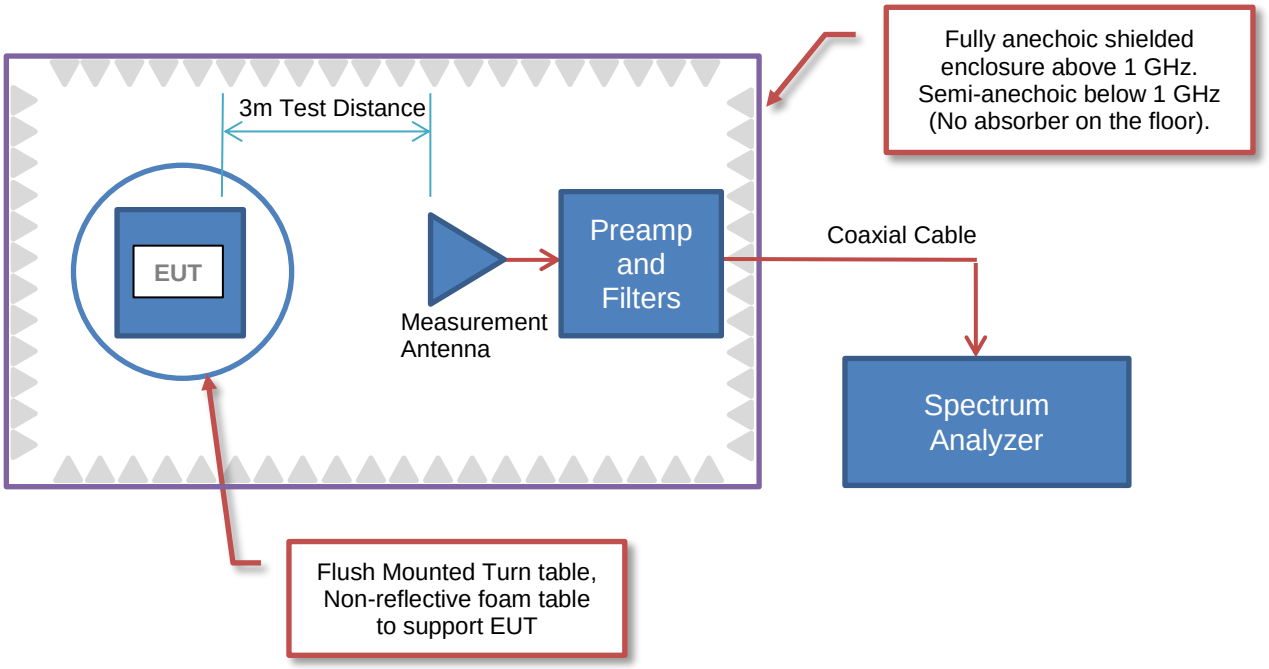


Sample Calculation (logarithmic units)

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

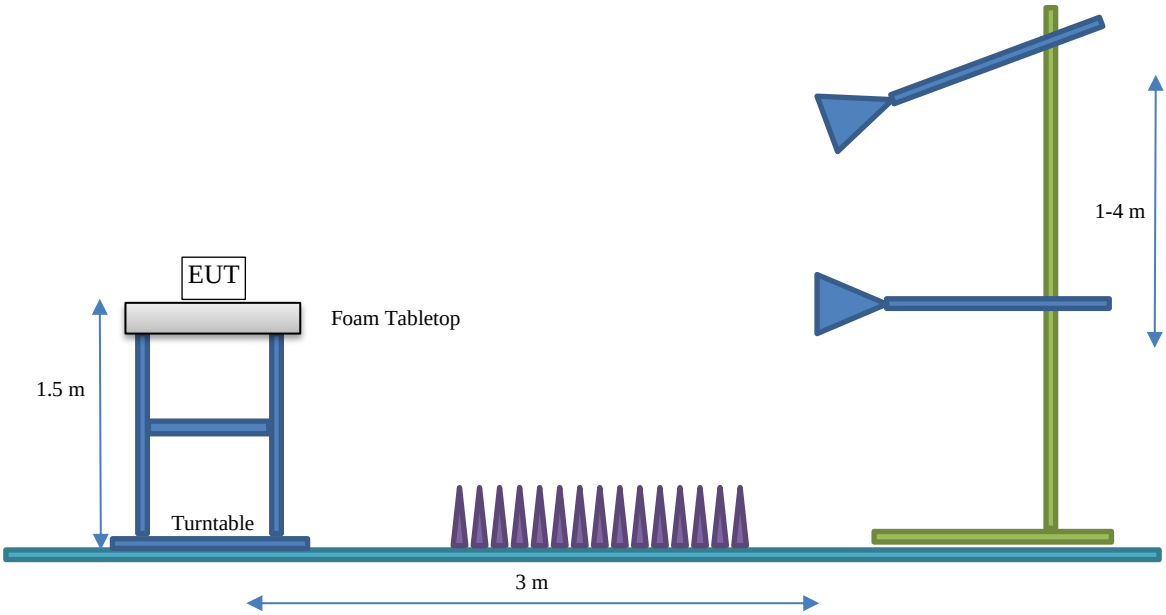
Conducted Emissions:

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

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

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



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Emerson Automation Solutions, Rosemount Inc
Address:	6021 Innovation Boulevard
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Elizabeth Reierson
EUT:	RM5800
First Date of Test:	September 13, 2021
Last Date of Test:	February 4, 2022
Receipt Date of Samples:	September 13, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
2.4GHz DTS radio module transceiver utilizing several external antenna options as shown below and on the Configurations pages: Maximum 8.0dBi dipole antenna (tested Taoglas 3dBi PCB strip, Emerson 4.5dBi per drawing 00753-2035, and PCTEL 8.0dBi omnidirectional antenna BOA24008NF) Maximum 14.5dBi yagi-uda (tested L-COM 14.5dBi model HG2415Y-HF) Maximum 18dBi reflective array (tested L-COM 18dBi flat panel antenna model HG2418P)

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

POWER SETTINGS AND ANTENNAS

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

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Reflective Array Antenna	L-Com	2400-2500	18
Yagi Antenna	L-Com	2400-2500	14.5
Dipole Antenna	PCTEL	2400-2500	8
Dipole Antenna	Emerson	2400-2483.5	4.5
Dipole Antenna	Taoglas	2400-2483.5	3

POWER SETTINGS

Radio	Modulation	Channel	Power Setting (dBm)
802.15.4	OQPSK	Low Ch. (2405 MHz)	8
802.15.4	OQPSK	Mid Ch. (2440 MHz)	8
802.15.4	OQPSK	High Ch. (2475 MHz)	8

CONFIGURATIONS

Configuration EMPM0122- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Latitude 7490	BB337S2

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	2.2 m	No	Laptop	EUT
Battery Leads	No	0.5 m	No	9V Battery	EUT

Configuration EMPM0122- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
18 dBi Reflective Array Panel Antenna	L-Com	HG2418P	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Battery Leads	No	0.5 m	No	9V Battery	EUT
RF Coax Cable (18 dBi Reflective Array Panel Antenna)	Yes	0.2 m	No	EUT	Reflective Array Panel Antenna

CONFIGURATIONS

Configuration EMPM0122- 5

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
3 dBi Dipole PCB Strip Antenna	TaoGlas	FXP73 Blue Diamond	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Battery Leads	No	0.5 m	No	9V Battery	EUT
RF Coax Cable (3 dBi Dipole PCB Strip Antenna)	Yes	0.1 m	No	EUT	Dipole PCB Strip Antenna

Configuration EMPM0122- 6

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
14.5 dBi Yagi Antenna	L-Com	HG2415Y	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Battery Leads	No	0.5 m	No	9V Battery	EUT
RF Coax Cable (14.5 dBi Yagi)	Yes	0.5 m	No	EUT	Yagi Antenna

CONFIGURATIONS

Configuration EMPM0122- 7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
8 dBi Dipole Omnidirectional Antenna	PCTEL	BOA24008NF	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Battery Leads	No	0.5 m	No	9V Battery	EUT
RF Coax Cable (8 dBi Dipole Omnidirectional)	Yes	0.2 m	No	EUT	Dipole Omnidirectional Antenna

Configuration EMPM0122- 8

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
4.5 dBi Dipole Antenna	Emerson Automation Solutions, Rosemount Inc	00753-2035-0066	W0000206

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
9V Battery	Procell	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Battery Leads	No	0.5 m	No	9V Battery	EUT
RF Coax Cable (4.5 dBi Dipole Antenna)	Yes	0.15 m	No	EUT	Dipole Antenna

CONFIGURATIONS

Configuration EMPM0122- 15

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Emerson Automation Solutions, Rosemount Inc	RM5800	W0000454
18 dBi Reflective Array Panel Antenna	L-Com	HG2418P	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Supply	Agilent	U8002A	MY50490005

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Latitude 7490	BB337S2

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	2 m	No	DC Supply	AC Mains
RF Coax Cable (18 dBi Reflective Array Panel Antenna)	Yes	0.2 m	No	EUT	Reflective Array Panel Antenna
Banana Cables x2	No	2 m	No	DC Supply	EUT

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-09-13	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.
2	2021-09-13	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2021-09-13	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-09-13	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-09-13	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2021-09-13	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2021-10-13	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2022-04-02	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.05.19.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

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	ARK	2021-11-02	2022-11-02
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2021-03-15	2022-03-15
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2021-03-10	2022-03-10

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

EMPM0122-15

MODES INVESTIGATED

Transmitting on Mid Ch (2440 MHz) continuous ,Modulated

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.05.19.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2022-02-04
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.3°C
Attendees:	Shawn Simons	Relative Humidity:	15.3%
Customer Project:	None	Bar. Pressure (PMSL):	1028 mb
Tested By:	Alexis Converse, Kyle McMullan	Job Site:	MN03
Power:	9VDC	Configuration:	EMPM0122-15

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

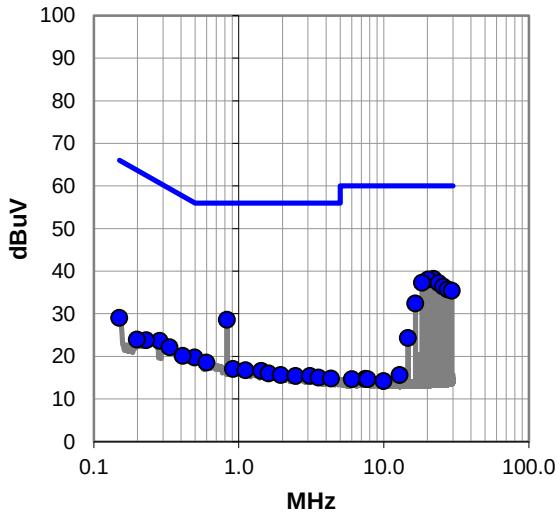
EUT OPERATING MODES

Transmitting on Mid Ch (2440 MHz) continuous, Modulated

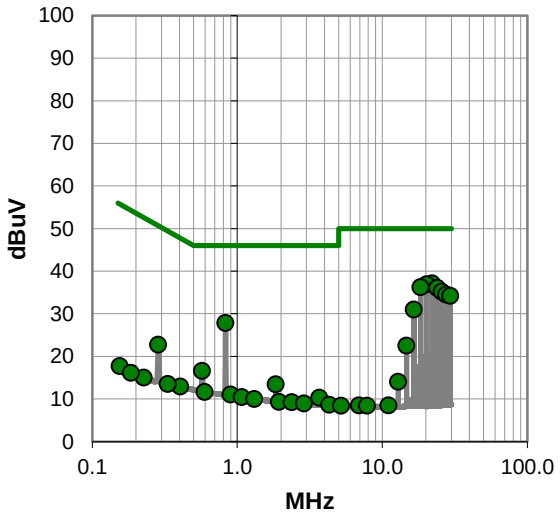
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.05.19.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.059	16.9	21.3	38.2	60.0	-21.8
20.221	16.9	21.1	38.0	60.0	-22.0
18.384	16.2	21.1	37.3	60.0	-22.7
23.898	15.9	21.3	37.2	60.0	-22.8
25.736	15.0	21.4	36.4	60.0	-23.6
27.575	14.3	21.4	35.7	60.0	-24.3
29.413	13.9	21.5	35.4	60.0	-24.6
0.830	8.1	20.5	28.6	56.0	-27.4
16.545	11.3	21.1	32.4	60.0	-27.6
14.707	3.2	21.1	24.3	60.0	-35.7
0.496	-0.8	20.5	19.7	56.1	-36.4
0.150	8.0	21.0	29.0	66.0	-37.0
0.285	3.1	20.5	23.6	60.7	-37.1
0.334	1.6	20.5	22.1	59.4	-37.3
0.411	-0.4	20.5	20.1	57.6	-37.5
0.599	-1.9	20.4	18.5	56.0	-37.5
0.229	3.2	20.6	23.8	62.5	-38.7
0.913	-3.5	20.5	17.0	56.0	-39.0
1.111	-3.8	20.5	16.7	56.0	-39.3
1.428	-3.9	20.5	16.6	56.0	-39.4
0.199	3.2	20.7	23.9	63.7	-39.8
1.603	-4.5	20.5	16.0	56.0	-40.0
1.945	-4.9	20.5	15.6	56.0	-40.4
2.460	-5.2	20.6	15.4	56.0	-40.6
3.093	-5.2	20.6	15.4	56.0	-40.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.059	15.8	21.3	37.1	50.0	-12.9
20.221	15.8	21.1	36.9	50.0	-13.1
18.384	15.1	21.1	36.2	50.0	-13.8
23.898	14.8	21.3	36.1	50.0	-13.9
25.736	13.8	21.4	35.2	50.0	-14.8
27.575	13.1	21.4	34.5	50.0	-15.5
29.413	12.7	21.5	34.2	50.0	-15.8
0.830	7.3	20.5	27.8	46.0	-18.2
16.545	9.9	21.1	31.0	50.0	-19.0
14.707	1.4	21.1	22.5	50.0	-27.5
0.285	2.2	20.5	22.7	50.7	-28.0
0.570	-3.8	20.4	16.6	46.0	-29.4
1.838	-7.1	20.5	13.4	46.0	-32.6
0.596	-8.8	20.4	11.6	46.0	-34.4
0.404	-7.6	20.5	12.9	47.8	-34.9
0.898	-9.5	20.5	11.0	46.0	-35.0
1.076	-10.1	20.5	10.4	46.0	-35.6
3.677	-10.3	20.6	10.3	46.0	-35.7
0.331	-7.0	20.5	13.5	49.4	-35.9
1.311	-10.5	20.5	10.0	46.0	-36.0
12.869	-6.9	20.9	14.0	50.0	-36.0
1.943	-11.2	20.5	9.3	46.0	-36.7
2.375	-11.4	20.6	9.2	46.0	-36.8
2.881	-11.7	20.6	8.9	46.0	-37.1
4.308	-12.0	20.6	8.6	46.0	-37.4

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.05.19.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2022-02-04
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.3°C
Attendees:	Shawn Simons	Relative Humidity:	15.3%
Customer Project:	None	Bar. Pressure (PMSL):	1028 mb
Tested By:	Alexis Converse, Kyle McMullan	Job Site:	MN03
Power:	9VDC	Configuration:	EMPM0122-15

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	9	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

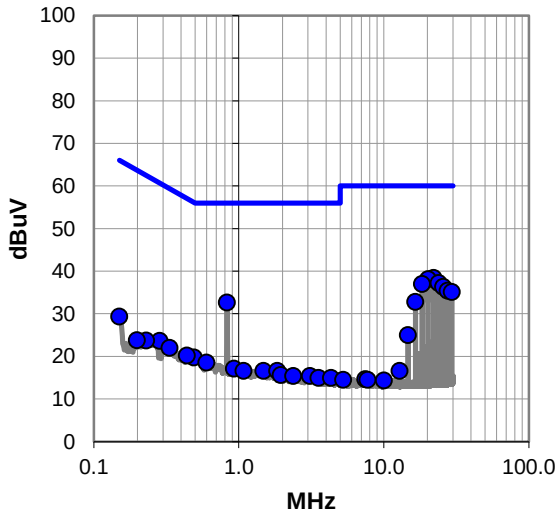
EUT OPERATING MODES

Transmitting on Mid Ch (2440 MHz) continuous, Modulated

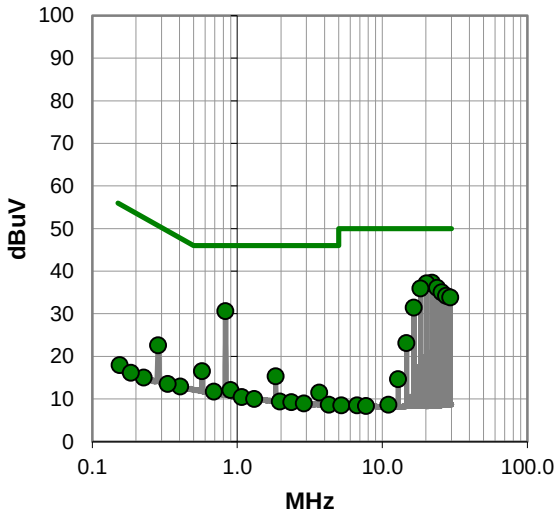
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.05.19.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #9

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.059	17.1	21.3	38.4	60.0	-21.6
20.221	17.0	21.1	38.1	60.0	-21.9
23.898	15.9	21.3	37.2	60.0	-22.8
18.382	15.9	21.1	37.0	60.0	-23.0
0.830	12.1	20.5	32.6	56.0	-23.4
25.736	14.9	21.4	36.3	60.0	-23.7
27.575	14.0	21.4	35.4	60.0	-24.6
29.413	13.6	21.5	35.1	60.0	-24.9
16.545	11.7	21.1	32.8	60.0	-27.2
14.707	3.9	21.1	25.0	60.0	-35.0
0.491	-0.8	20.5	19.7	56.2	-36.5
0.150	8.3	21.0	29.3	66.0	-36.7
0.438	-0.3	20.5	20.2	57.1	-36.9
0.285	3.1	20.5	23.6	60.7	-37.1
0.334	1.5	20.5	22.0	59.4	-37.4
0.599	-1.9	20.4	18.5	56.0	-37.5
0.229	3.1	20.6	23.7	62.5	-38.8
0.929	-3.4	20.5	17.1	56.0	-38.9
1.080	-3.9	20.5	16.6	56.0	-39.4
1.481	-3.9	20.5	16.6	56.0	-39.4
1.838	-3.9	20.5	16.6	56.0	-39.4
0.199	3.1	20.7	23.8	63.7	-39.9
1.949	-4.9	20.5	15.6	56.0	-40.4
2.376	-5.2	20.6	15.4	56.0	-40.6
3.097	-5.2	20.6	15.4	56.0	-40.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.059	16.0	21.3	37.3	50.0	-12.7
20.222	16.0	21.1	37.1	50.0	-12.9
23.898	14.8	21.3	36.1	50.0	-13.9
18.384	14.8	21.1	35.9	50.0	-14.1
25.736	13.6	21.4	35.0	50.0	-15.0
0.830	10.1	20.5	30.6	46.0	-15.4
27.575	12.8	21.4	34.2	50.0	-15.8
29.413	12.3	21.5	33.8	50.0	-16.2
16.545	10.3	21.1	31.4	50.0	-18.6
14.707	2.0	21.1	23.1	50.0	-26.9
0.285	2.1	20.5	22.6	50.7	-28.1
0.570	-3.9	20.4	16.5	46.0	-29.5
1.838	-5.2	20.5	15.3	46.0	-30.7
0.900	-8.4	20.5	12.1	46.0	-33.9
0.690	-8.7	20.4	11.7	46.0	-34.3
3.677	-9.1	20.6	11.5	46.0	-34.5
0.404	-7.6	20.5	12.9	47.8	-34.9
12.869	-6.3	20.9	14.6	50.0	-35.4
1.076	-10.1	20.5	10.4	46.0	-35.6
0.331	-7.0	20.5	13.5	49.4	-35.9
1.311	-10.5	20.5	10.0	46.0	-36.0
1.968	-11.1	20.5	9.4	46.0	-36.6
2.367	-11.4	20.6	9.2	46.0	-36.8
2.881	-11.7	20.6	8.9	46.0	-37.1
4.279	-12.0	20.6	8.6	46.0	-37.4

CONCLUSION

Pass

Tested By

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 in test mode. Operational Duty Cycle will not exceed 20.706% in 100ms and 19.09% in 1 s.

OCCUPIED BANDWIDTH

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and the 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 2021.03.19.1 XMit 2020.12.30.0

EUT:	RM5800			**Work Order:**	EMPM0122
Serial Number:	W0000454			**Date:**	13-Sep-21
Customer:	Emerson Automation Solutions, Rosemount Inc			**Temperature:**	21.8 °C
Attendees:	Shawn Simons, Elizabeth Reierson			**Humidity:**	48.4% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable. The screenshot for the high channel does not display the occupied bandwidth value. The value listed for the high channel was pulled via software directly from the analyzer and the raw log files have been checked to confirm this value.

DEVIATIONS FROM TEST STANDARD

None

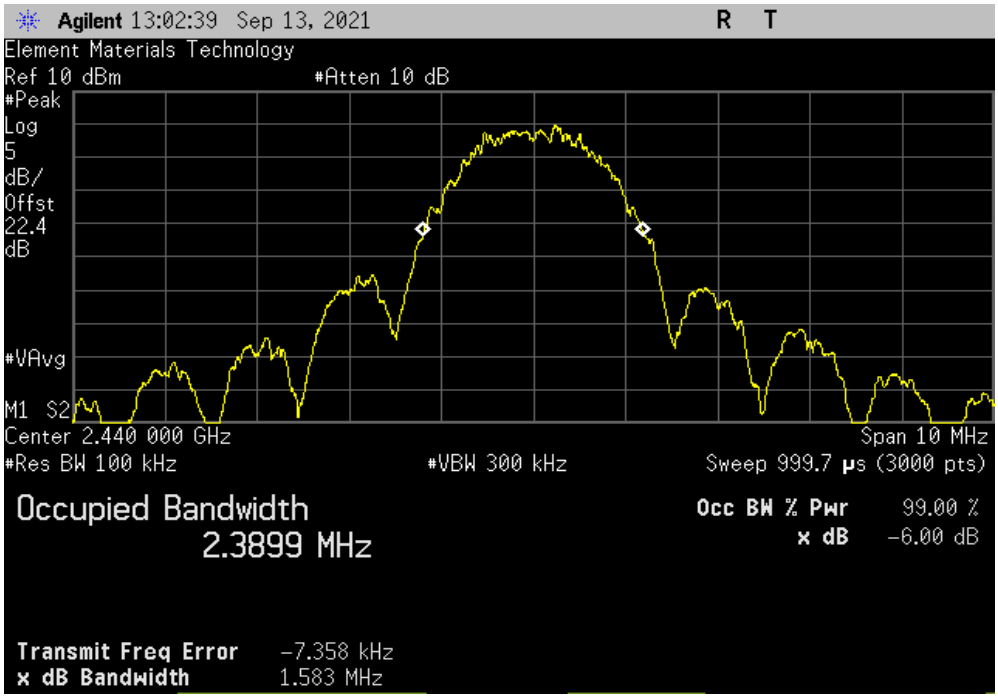
Configuration #	1	Signature

	Value	Limit (>)	Result
Low Channel, 2405 MHz	1.566 MHz	500 kHz	Pass
Mid Channel, 2440 MHz	1.583 MHz	500 kHz	Pass
High Channel, 2475 MHz	1.637 MHz	500 kHz	Pass

OCCUPIED BANDWIDTH

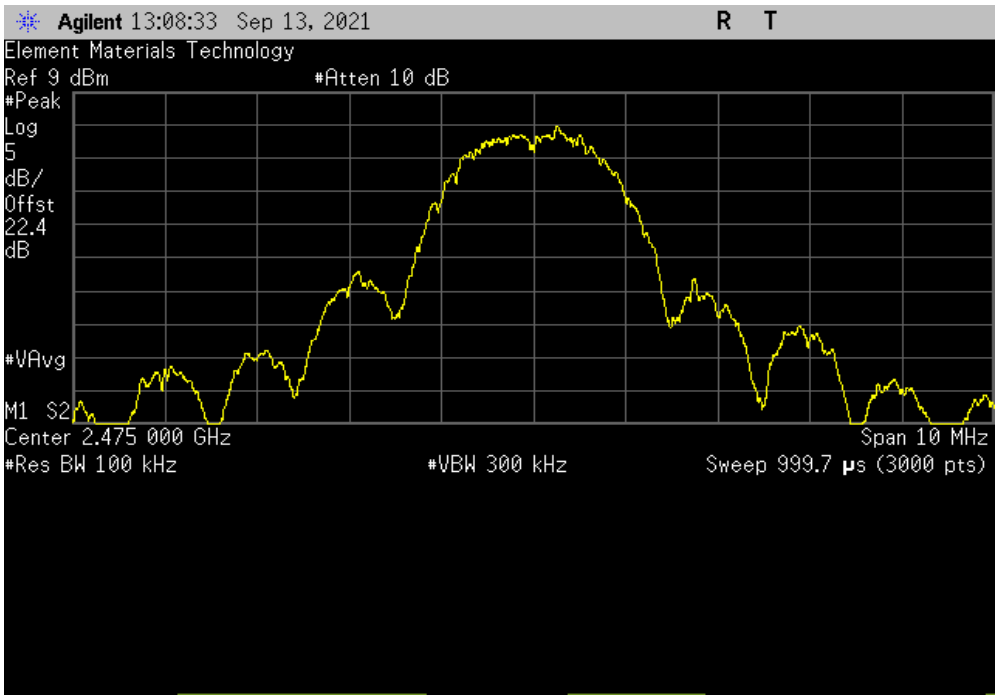
Low Channel, 2405 MHz						
				Value	Limit (>)	Result
				1.566 MHz	500 kHz	Pass

Mid Channel, 2440 MHz						
				Value	Limit (>)	Result
				1.583 MHz	500 kHz	Pass



OCCUPIED BANDWIDTH

High Channel, 2475 MHz						
				Value	Limit (>)	Result
				1.637 MHz	500 kHz	Pass



OUTPUT POWER

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and the 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 2021.03.19.1 XMit 2020.12.30.0

EUT:	RM5800			**Work Order:**	EMPM0122
Serial Number:	W0000454			**Date:**	13-Sep-21
Customer:	Emerson Automation Solutions, Rosemount Inc			**Temperature:**	21.8 °C
Attendees:	Shawn Simons, Elizabeth Reierson			**Humidity:**	48.5% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable.
Antennas are an 18 dBi reflective array panel antenna, a 14.5 dBi yagi antenna, an 8 dBi dipole antenna, a 4.5 dBi dipole antenna, and a 3 dBi dipole strip antenna.

DEVIATIONS FROM TEST STANDARD

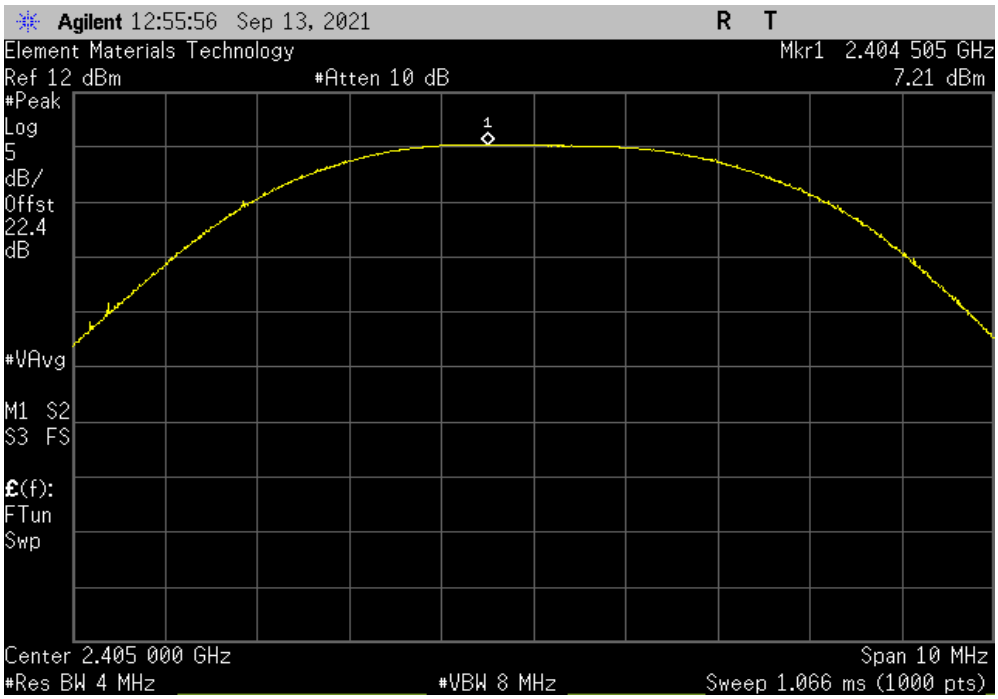
None

Configuration #	1	Signature

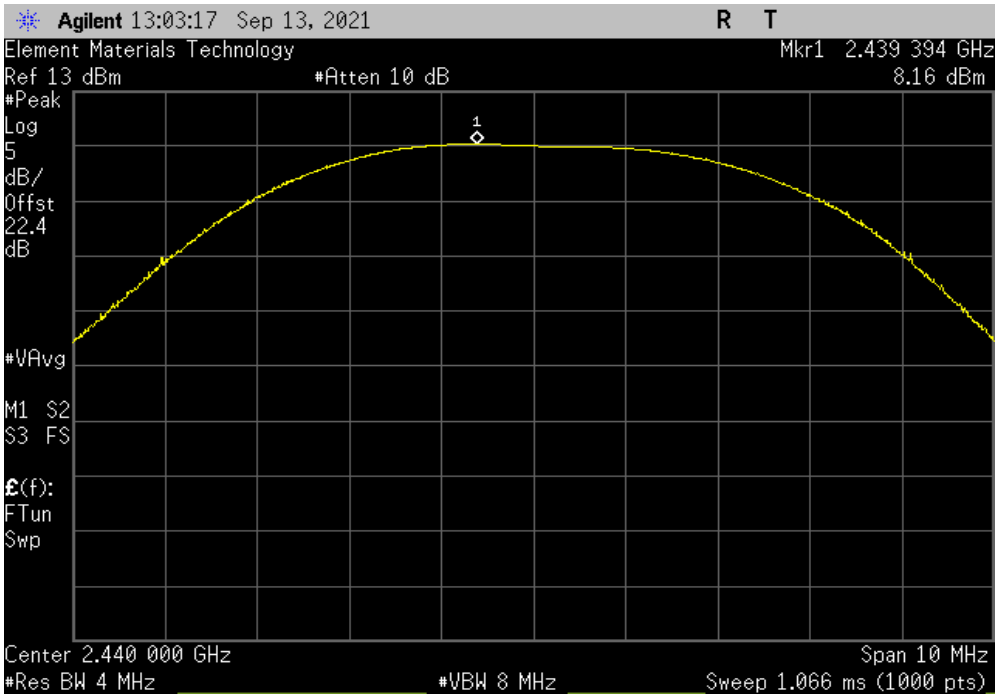
	Out Pwr (dBm)	18 dBi Limit (dBm)	14.5 dBi Limit (dBm)	8 dBi Limit (dBm)	< 6 dBi Limit (dBm)	Result
Low Channel, 2405 MHz	7.21	12	15.5	22	30	Pass
Mid Channel, 2440 MHz	8.165	12	15.5	22	30	Pass
High Channel, 2475 MHz	7.355	12	15.5	22	30	Pass

OUTPUT POWER

Low Channel, 2405 MHz						
	Out Pwr (dBm)	18 dBi Limit (dBm)	14.5 dBi Limit (dBm)	8 dBi Limit (dBm)	< 6 dBi Limit (dBm)	Result
	7.21	12	15.5	22	30	Pass



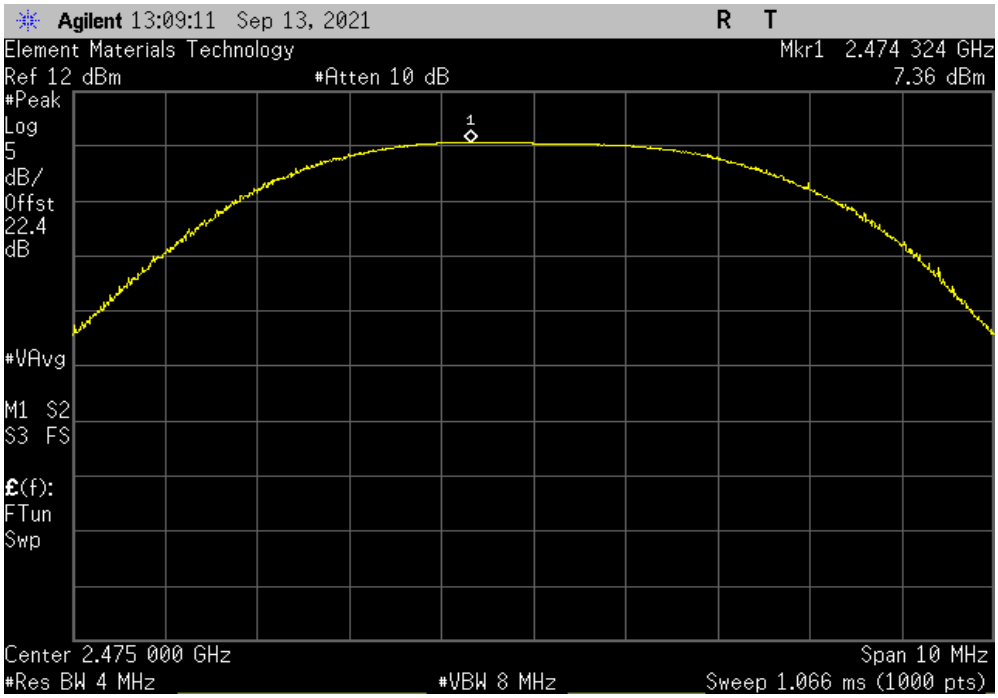
Mid Channel, 2440 MHz						
	Out Pwr (dBm)	18 dBi Limit (dBm)	14.5 dBi Limit (dBm)	8 dBi Limit (dBm)	< 6 dBi Limit (dBm)	Result
	8.165	12	15.5	22	30	Pass



OUTPUT POWER

TbtTx 2021.03.19.1 XMit 2020.12.30.0

High Channel, 2475 MHz						
	Out Pwr (dBm)	18 dBi Limit (dBm)	14.5 dBi Limit (dBm)	8 dBi Limit (dBm)	< 6 dBi Limit (dBm)	Result
	7.355	12	15.5	22	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and the 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)

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	RM5800			**Work Order:**	EMPM0122
Serial Number:	W0000454			**Date:**	13-Sep-21
Customer:	Emerson Automation Solutions, Rosemount Inc			**Temperature:**	21.8 °C
Attendees:	Shawn Simons, Elizabeth Reierson			**Humidity:**	48.6% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable.
Antennas are an 18 dBi reflective array panel antenna, a 14.5 dBi yagi antenna, an 8 dBi dipole antenna, a 4.5 dBi dipole antenna, and a 3 dBi dipole strip antenna.

DEVIATIONS FROM TEST STANDARD

None

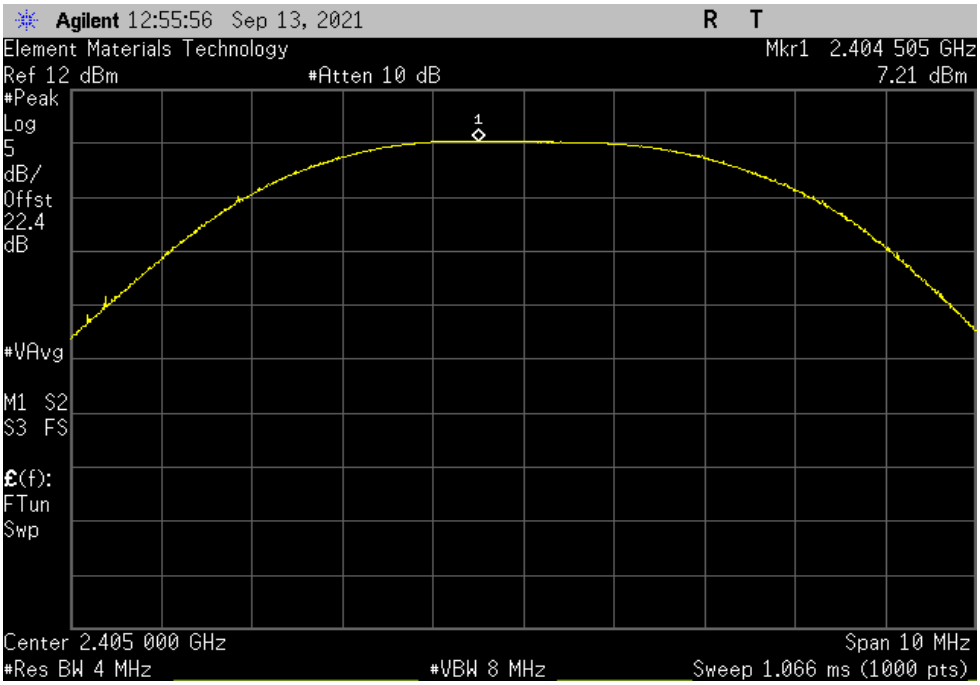
Configuration #	1	*Signature* Andrew Rogstad

	Out Pwr (dBm)	18 dBi EIRP (dBm)	14.5 dBi EIRP (dBm)	8 dBi EIRP (dBm)	4.5 dBi EIRP (dBm)	3 dBi EIRP (dBm)	EIRP Limit (dBm)	Result
Low Channel, 2405 MHz	7.21	25.2	21.7	15.2	11.7	10.2	36	Pass
Mid Channel, 2440 MHz	8.165	26.2	22.7	16.2	12.7	11.2	36	Pass
High Channel, 2475 MHz	7.355	25.4	21.9	15.4	11.9	10.4	36	Pass

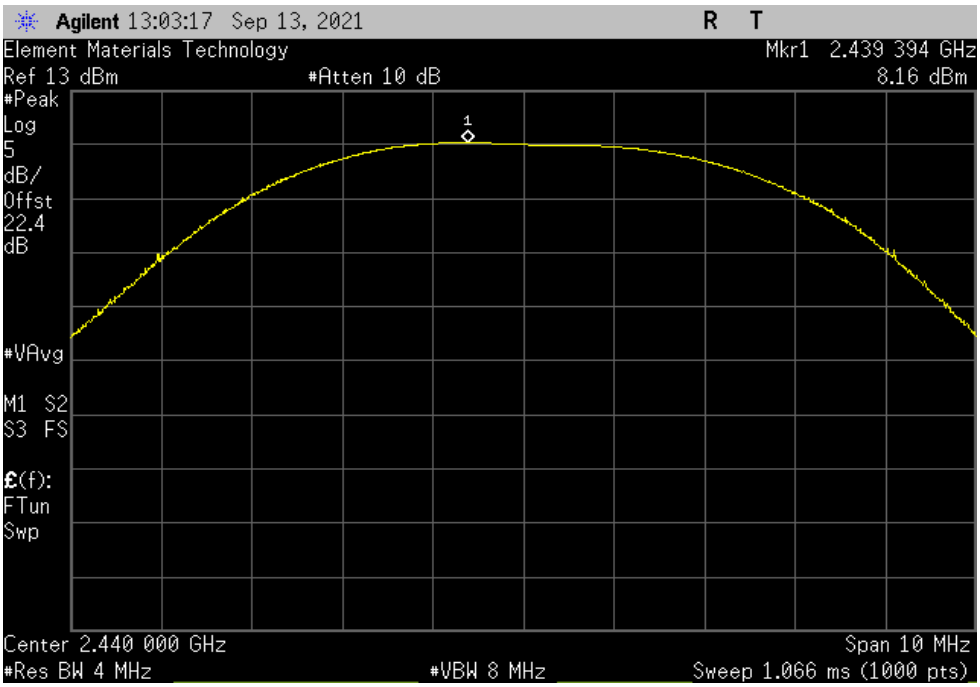
EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2021.03.19.1 XMit 2020.12.30.0

Low Channel, 2405 MHz							
Out Pwr (dBm)	18 dBi EIRP (dBm)	14.5 dBi EIRP (dBm)	8 dBi EIRP (dBm)	4.5 dBi EIRP (dBm)	3 dBi EIRP (dBm)	EIRP Limit (dBm)	Result
7.21	25.2	21.7	15.2	11.7	10.2	36	Pass



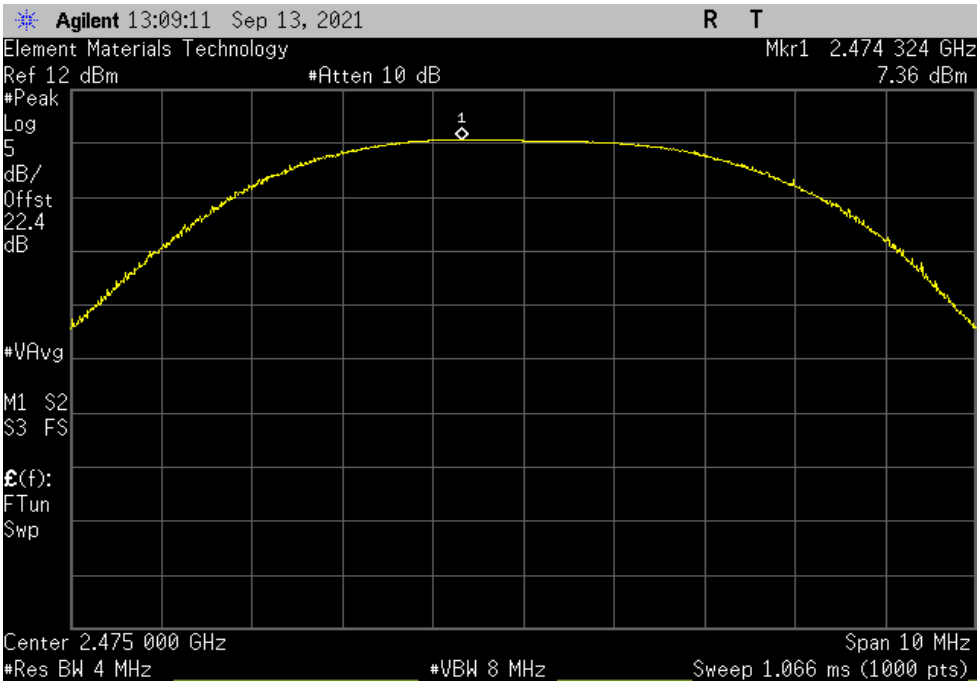
Mid Channel, 2440 MHz							
Out Pwr (dBm)	18 dBi EIRP (dBm)	14.5 dBi EIRP (dBm)	8 dBi EIRP (dBm)	4.5 dBi EIRP (dBm)	3 dBi EIRP (dBm)	EIRP Limit (dBm)	Result
8.165	26.2	22.7	16.2	12.7	11.2	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

TbtTx 2021.03.19.1 XMit 2020.12.30.0

High Channel, 2475 MHz							
Out Pwr (dBm)	18 dBi EIRP (dBm)	14.5 dBi EIRP (dBm)	8 dBi EIRP (dBm)	4.5 dBi EIRP (dBm)	3 dBi EIRP (dBm)	EIRP Limit (dBm)	Result
7.355	25.4	21.9	15.4	11.9	10.4	36	Pass



POWER SPECTRAL DENSITY

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and the 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 2021.03.19.1 XMit 2020.12.30.0

EUT:	RM5800			**Work Order:**	EMPM0122
Serial Number:	W0000454			**Date:**	13-Sep-21
Customer:	Emerson Automation Solutions, Rosemount Inc			**Temperature:**	21.8 °C
Attendees:	Shawn Simons, Elizabeth Reierson			**Humidity:**	48.6% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable.

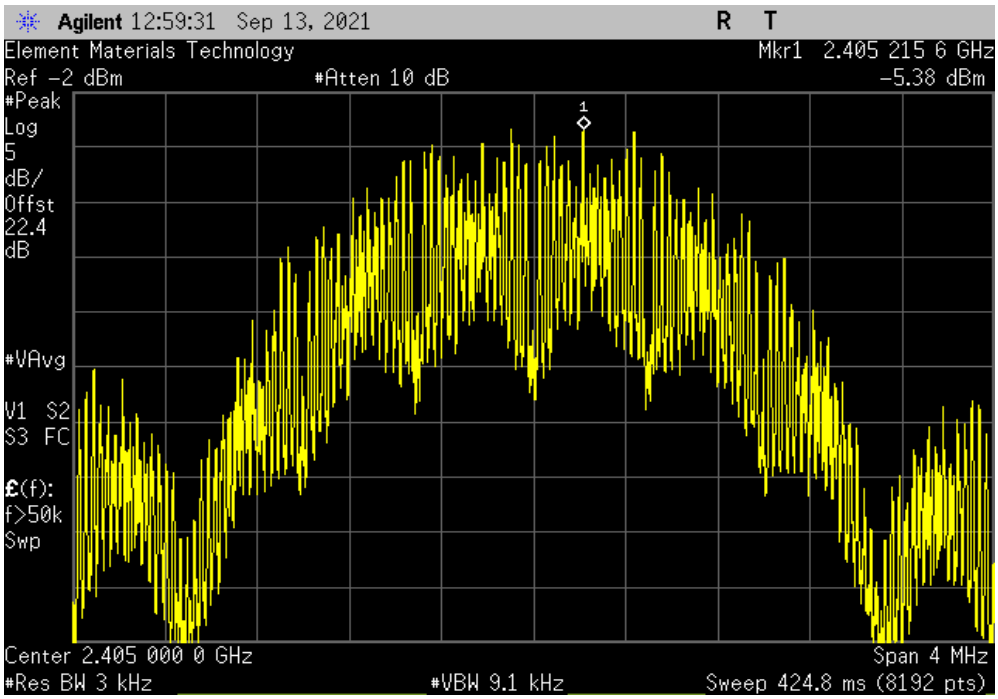
DEVIATIONS FROM TEST STANDARD

None

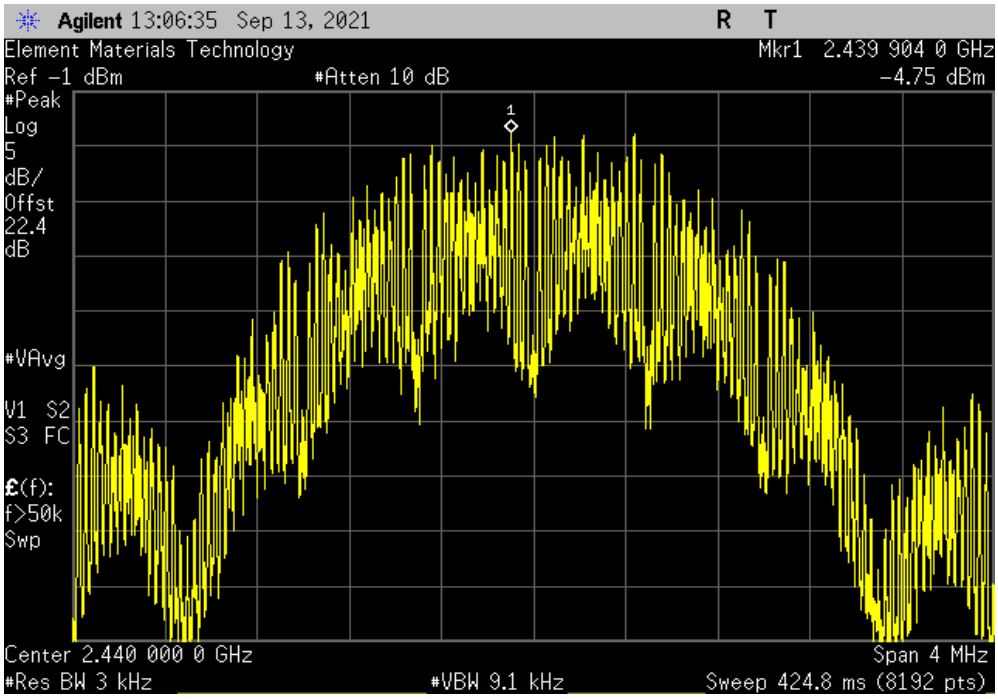
Configuration #	1	Signature

	Value dBm/3kHz	Limit < dBm/3kHz	Results
Low Channel, 2405 MHz	-5.382	8	Pass
Mid Channel, 2440 MHz	-4.752	8	Pass
High Channel, 2475 MHz	-5.625	8	Pass

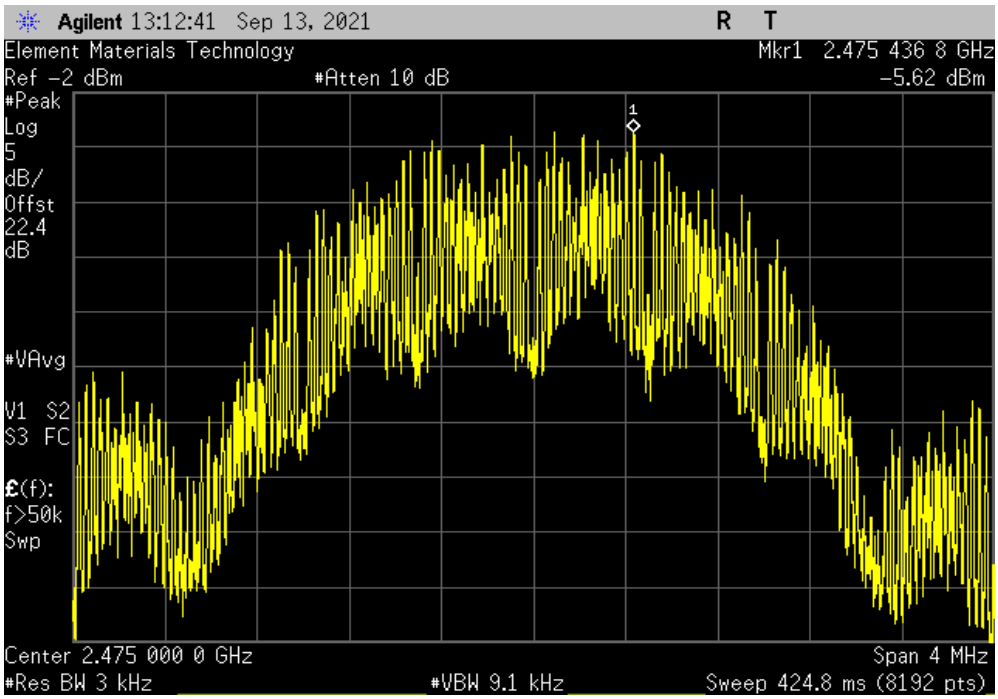
Low Channel, 2405 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-5.382	8	Pass



Mid Channel, 2440 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-4.752	8	Pass



High Channel, 2475 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-5.625	8	Pass



BAND EDGE COMPLIANCE

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18

TEST DESCRIPTION

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

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	RM5800			**Work Order:**	EMPM0122
Serial Number:	W0000454			**Date:**	13-Sep-21
Customer:	Emerson Automation Solutions, Rosemount Inc			**Temperature:**	21.8 °C
Attendees:	Shawn Simons, Elizabeth Reierson			**Humidity:**	48.3% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Andrew Rogstad	**Power:**	Battery	**Job Site:**	MN08

TEST SPECIFICATIONS	Test Method
FCC 15.247:2021	ANSI C63.10:2013

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable.

DEVIATIONS FROM TEST STANDARD

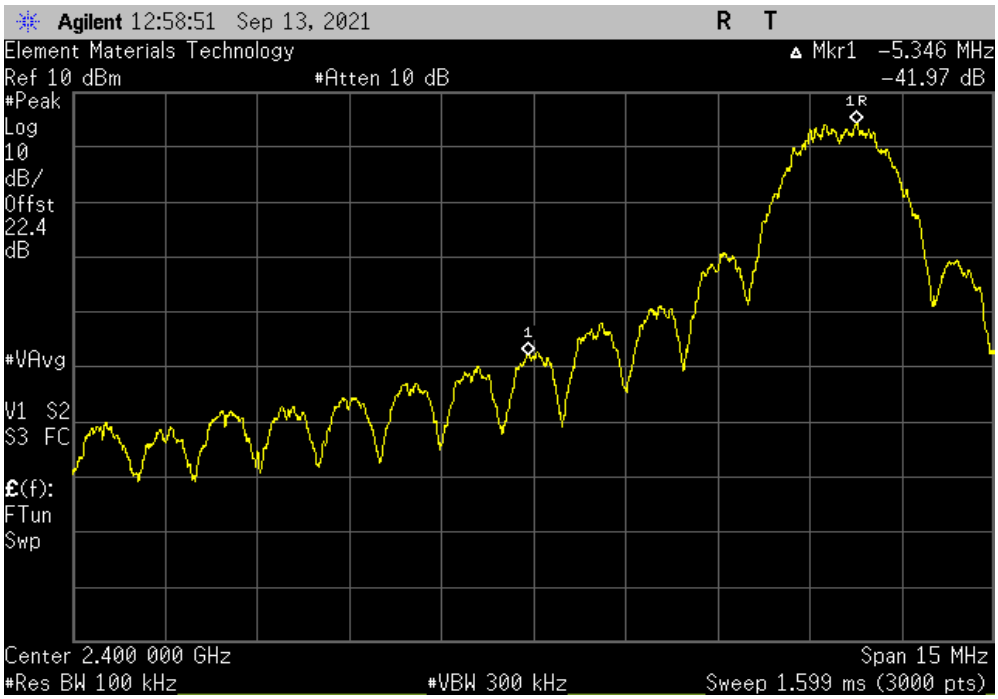
None

Configuration #	1	Signature

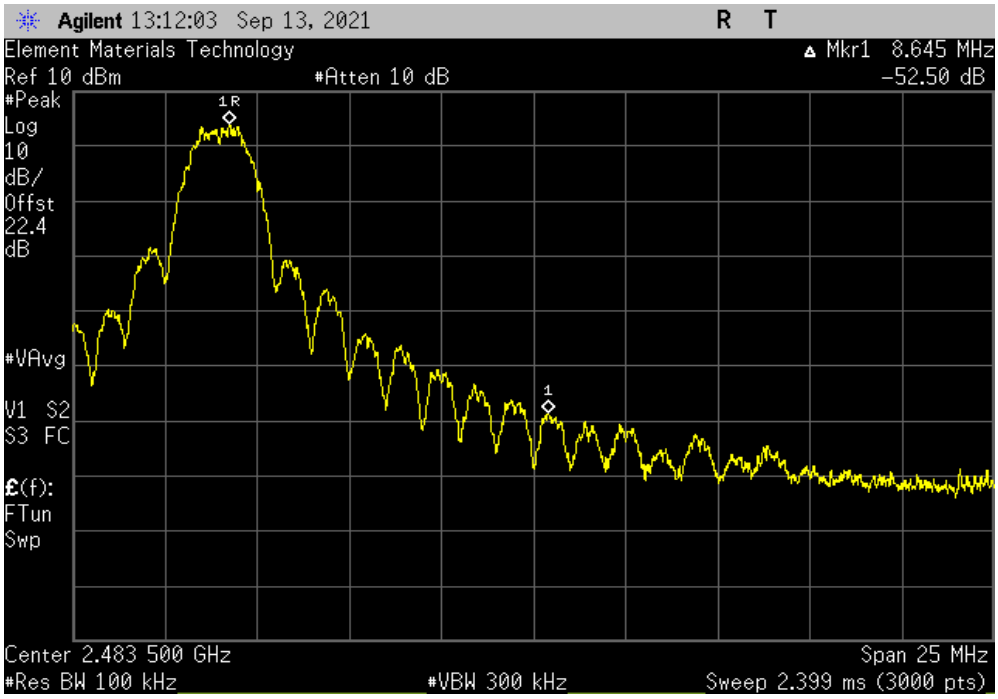
	Value (dBc)	Limit ≤ (dBc)	Result
Low Channel, 2405 MHz	-41.97	-20	Pass
High Channel, 2475 MHz	-52.5	-20	Pass

BAND EDGE COMPLIANCE

Low Channel, 2405 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-41.97	-20	Pass



High Channel, 2475 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.5	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2020.12.30.0

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	2019-04-30	2022-04-30
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2021-05-18	2022-05-18
Block - DC	Fairview Microwave	SD3379	AMZ	2020-11-04	2021-11-04
Attenuator	S.M. Electronics	SA26B-20	RFW	2021-02-05	2022-02-05
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

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

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**RM5800**			**Work Order:**	**EMPM0122**
Serial Number:	**W0000454**			**Date:**	**13-Sep-21**
Customer:	**Emerson Automation Solutions, Rosemount Inc**			**Temperature:**	**21.8 °C**
Attendees:	**Shawn Simons, Elizabeth Reierson**			**Humidity:**	**48.5% RH**
Project:	**None**			**Barometric Pres.:**	**1016 mbar**
Tested by:	**Andrew Rogstad**	**Power:**	**Battery**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2021	**ANSI C63.10:2013**

COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer patch cable.

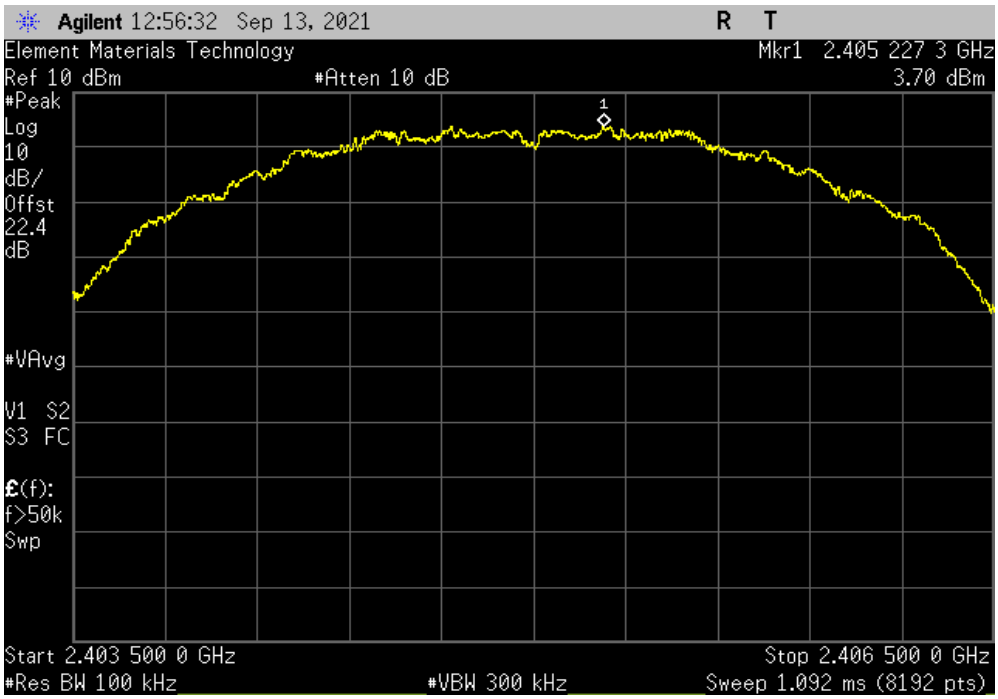
DEVIATIONS FROM TEST STANDARD

None

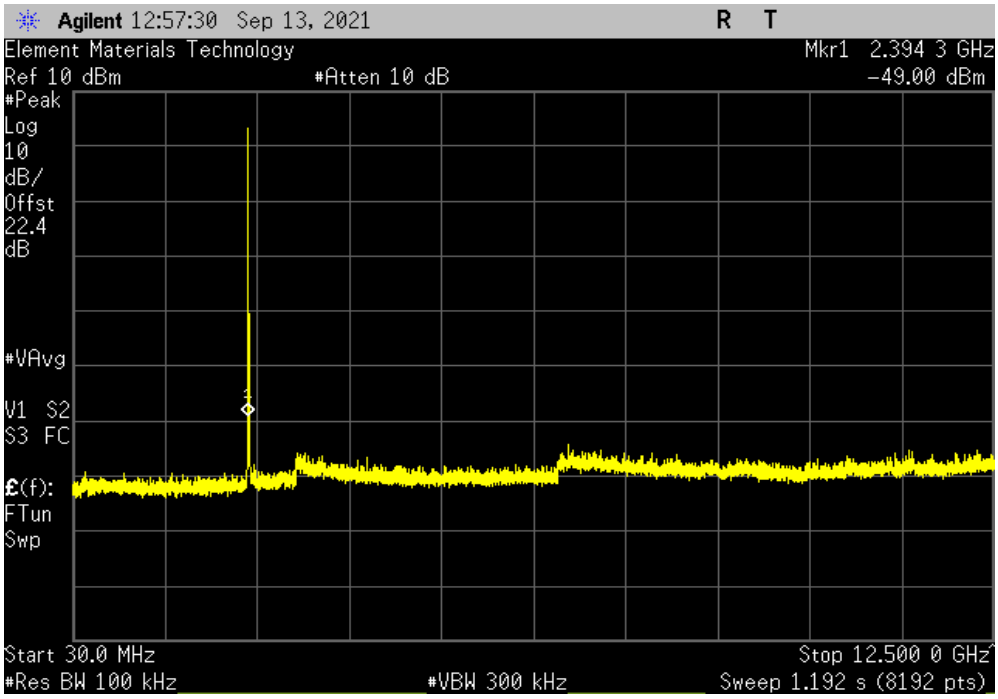
Configuration #	**1**	*Signature* Andrew Rogstad

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Low Channel, 2405 MHz	Fundamental	2405.23	N/A	N/A	N/A
Low Channel, 2405 MHz	30 MHz - 12.5 GHz	2394.3	-52.71	-20	Pass
Low Channel, 2405 MHz	12.5 GHz - 25 GHz	24937.4	-53.17	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2440.26	N/A	N/A	N/A
Mid Channel, 2440 MHz	30 MHz - 12.5 GHz	12299	-60.26	-20	Pass
Mid Channel, 2440 MHz	12.5 GHz - 25 GHz	24923.7	-53.68	-20	Pass
High Channel, 2475 MHz	Fundamental	2475.27	N/A	N/A	N/A
High Channel, 2475 MHz	30 MHz - 12.5 GHz	6988.9	-58.66	-20	Pass
High Channel, 2475 MHz	12.5 GHz - 25 GHz	24833.7	-52.14	-20	Pass

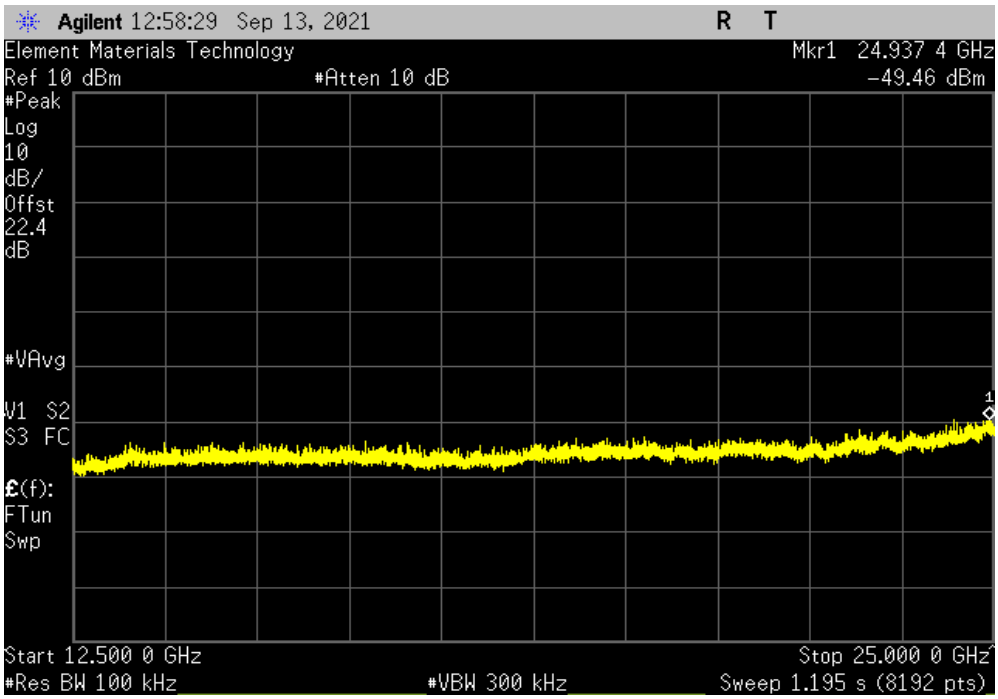
Low Channel, 2405 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental	2405.23	N/A	N/A	N/A



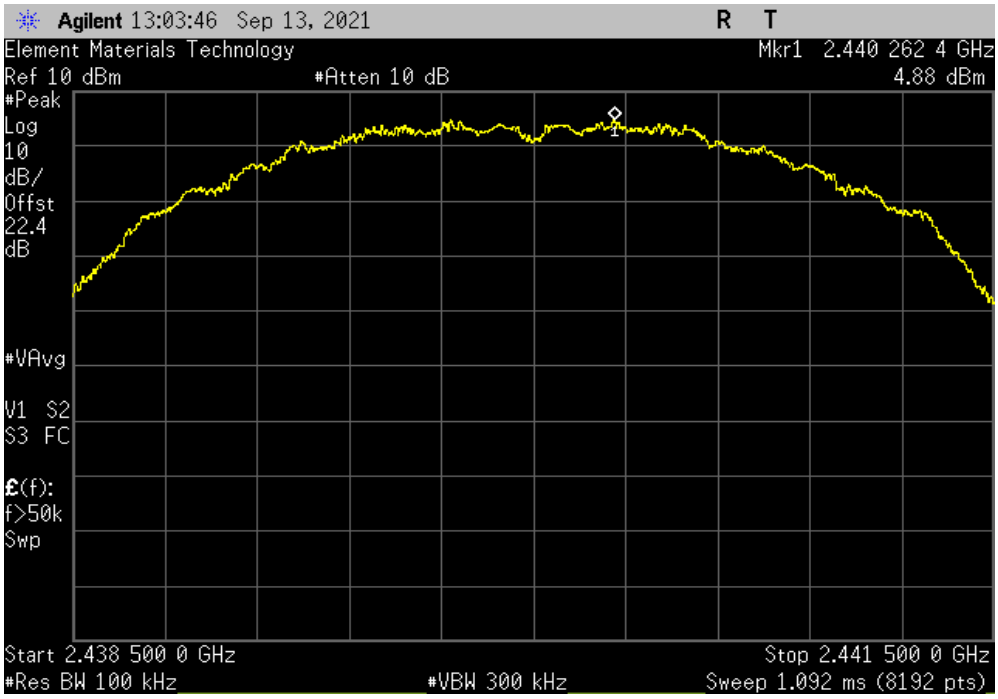
Low Channel, 2405 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	2394.3	-52.71	-20	Pass



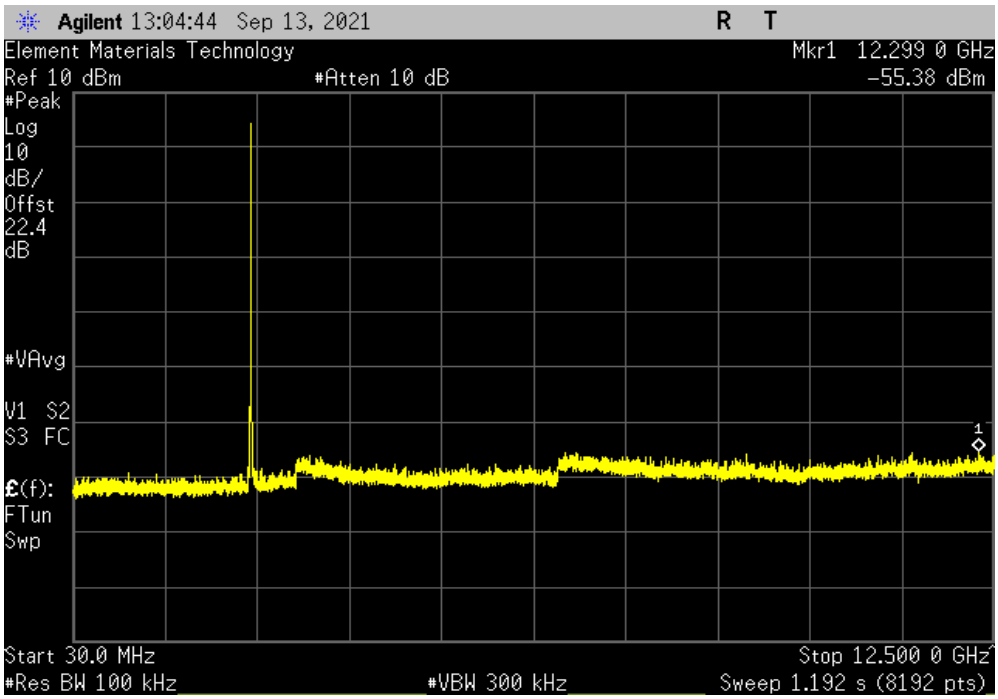
Low Channel, 2405 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24937.4	-53.17	-20	Pass



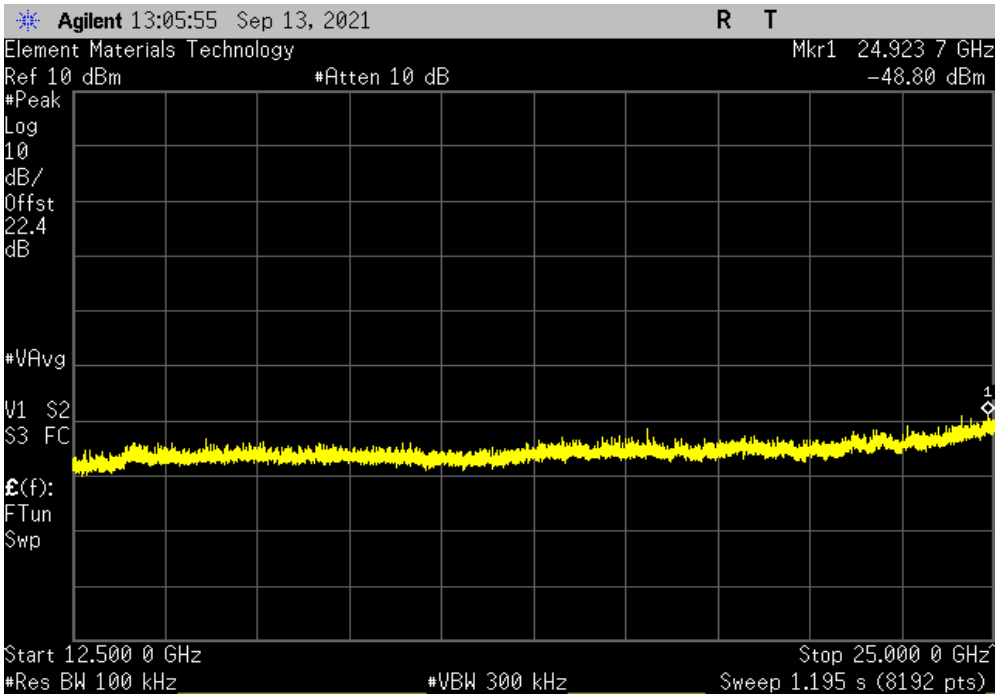
Mid Channel, 2440 MHz					
Frequency Range		Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Fundamental		2440.26	N/A	N/A	N/A



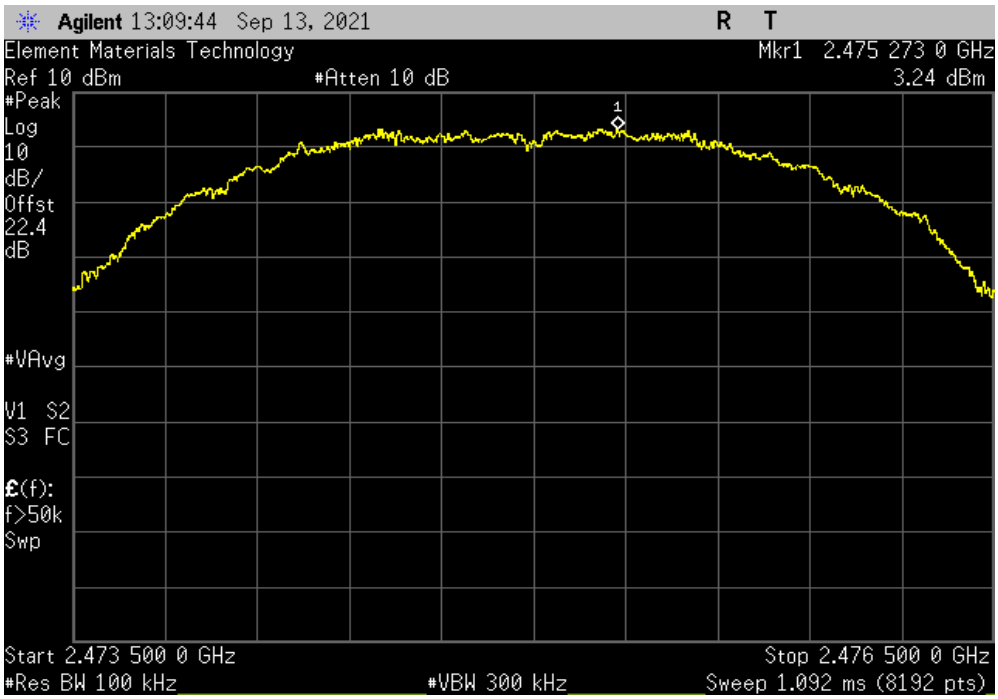
Mid Channel, 2440 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz	12299	-60.26	-20	Pass



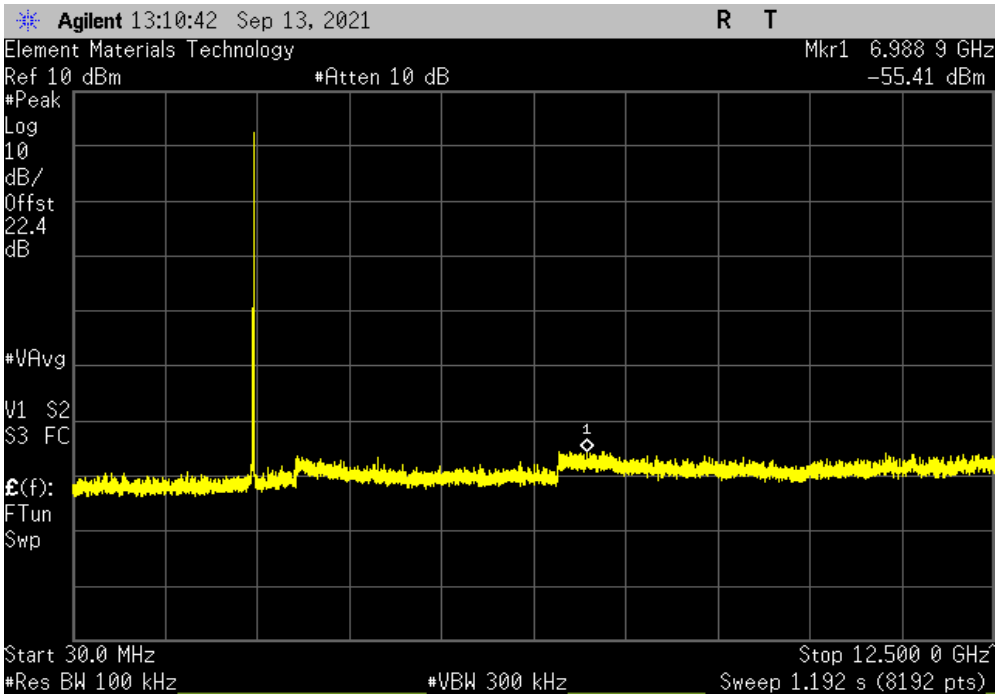
Mid Channel, 2440 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz	24923.7	-53.68	-20	Pass



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



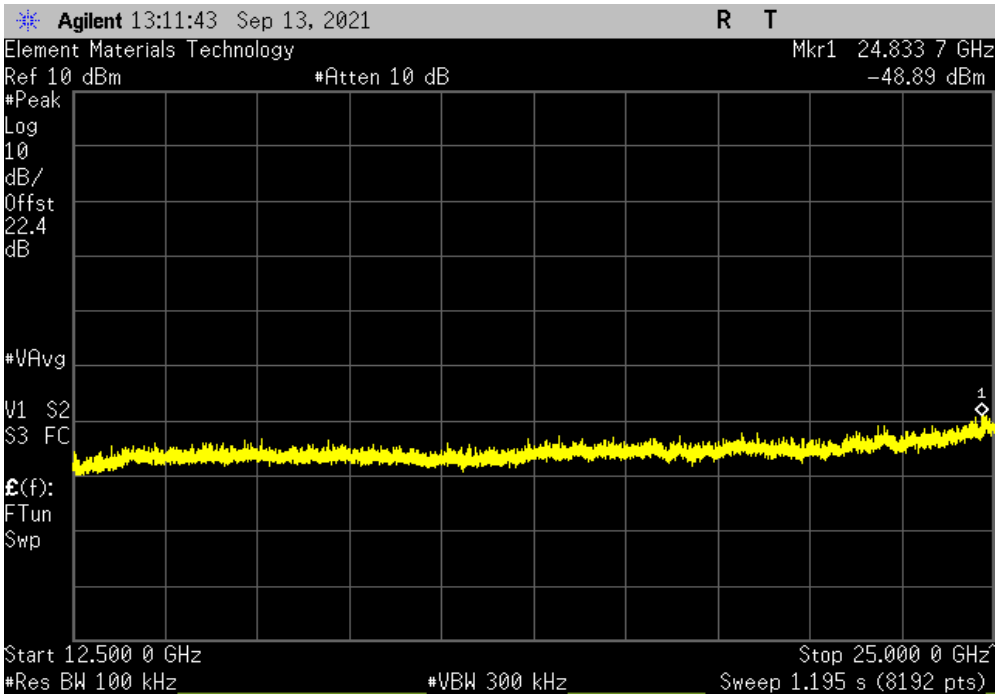
High Channel, 2475 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	6988.9	-58.66	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

TbtTx 2021.03.19.1 XMit 2020.12.30.0

High Channel, 2475 MHz				
Frequency Range	**Measured Freq (MHz)**	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz	24833.7	-52.14	-20	Pass



SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

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 (in no-hop, single channel mode) 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.

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2021-09-09	2022-09-09
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2021-09-09	2022-09-09
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2021-05-21	2022-05-21
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2020-09-03	2022-09-03
Antenna - Standard Gain	ETS-Lindgren	3160-07	AJJ	NCR	NCR
Antenna - Standard Gain	ETS-Lindgren	3160-08	AJP	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2021-02-01	2022-02-01
Antenna - Biconilog	Teseq	CBL 6141B	AYD	2020-02-05	2022-02-05
Cable	Element	Double Ridge Guide Horn Cables	MNV	2021-02-01	2022-02-01
Cable	Element	Standard Gain Cable	MNW	2021-02-01	2022-02-01
Cable	Element	Biconilog Cable	MNX	2021-02-01	2022-02-01
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-12001800-30-10P	PAP	2021-02-01	2022-02-01
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2021-09-10	2022-09-10
Attenuator	Coaxicom	3910-20	AXY	2021-09-10	2022-09-10

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 26500 MHz

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

EMPM0122-4
EMPM0122-5
EMPM0122-6
EMPM0122-7
EMPM0122-8

MODES INVESTIGATED

Transmitting on Low, Mid, and High channels (2405, 2440, and 2475 MHz), continuous modulated.

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2021-10-04
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	22.4°C
Attendees:	Shawn Simons	Relative Humidity:	52.9%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	EMPM0122-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	123	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

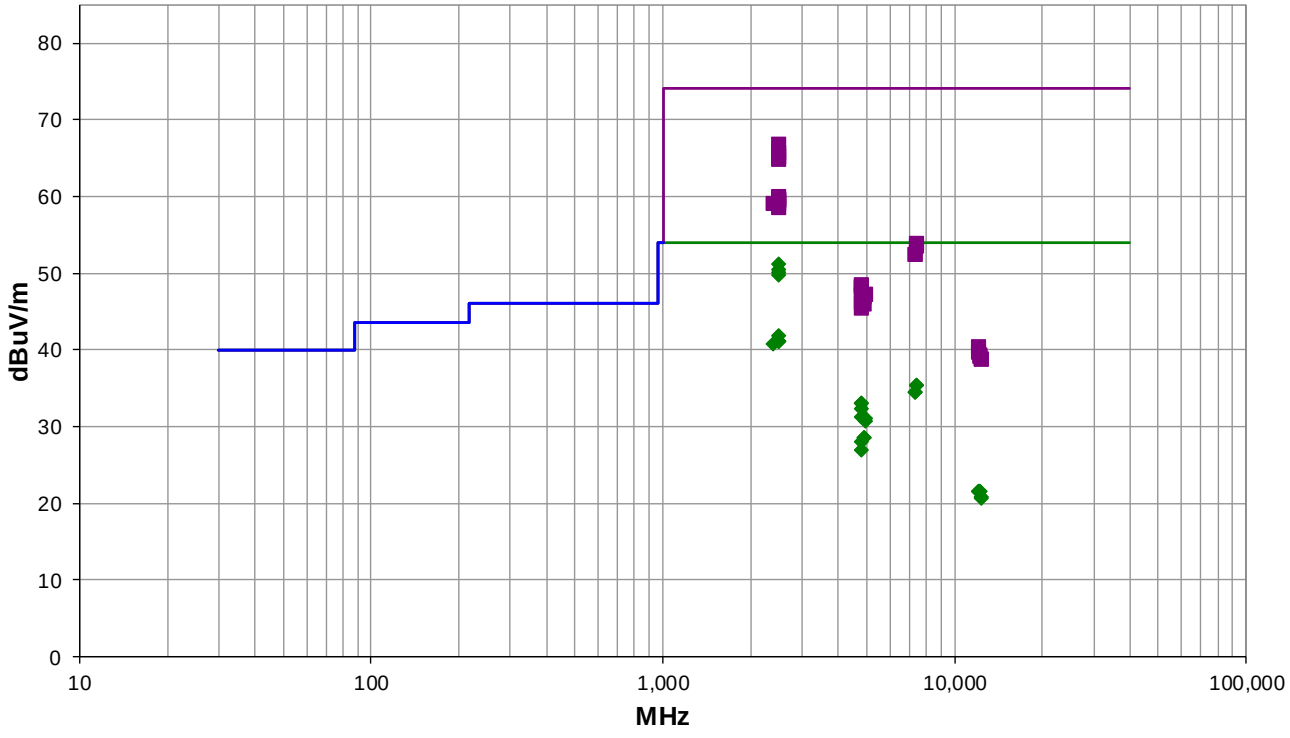
18 dBi reflective array panel antenna. 8 dBm power setting. Test mode is 100% duty cycle. Operational duty cycle is limited to 20.706% maximum duty cycle in a 100ms window. A correction factor (DCCF) was applied using the formula 10*log(duty cycle) = -6.8dB.

EUT OPERATING MODES

Transmitting Low, Mid, and High channel (2405, 2440, and 2475 MHz), continuous modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 123 PK AV QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #123

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
2483.508	41.2	-3.2	2.3	184.0	-6.8	20.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT/Ant. Vert, High Ch
2483.508	40.4	-3.2	2.6	188.0	-6.8	20.0	Vert	AV	0.0	50.4	54.0	-3.6	EUT/Ant. Vert, High Ch
2483.508	40.1	-3.2	1.5	188.0	-6.8	20.0	Horz	AV	0.0	50.1	54.0	-3.9	EUT/Ant. Horz, High Ch
2483.508	39.7	-3.2	1.5	183.0	-6.8	20.0	Horz	AV	0.0	49.7	54.0	-4.3	EUT/Ant. Horz, High Ch
2483.600	50.0	-3.2	2.3	184.0	0.0	20.0	Vert	PK	0.0	66.8	74.0	-7.2	EUT/Ant. Vert, High Ch
2483.508	49.0	-3.2	2.6	188.0	0.0	20.0	Vert	PK	0.0	65.8	74.0	-8.2	EUT/Ant. Vert, High Ch
2483.742	48.4	-3.2	1.5	188.0	0.0	20.0	Horz	PK	0.0	65.2	74.0	-8.8	EUT/Ant. Horz, High Ch
2483.642	48.0	-3.2	1.5	183.0	0.0	20.0	Horz	PK	0.0	64.8	74.0	-9.2	EUT/Ant. Horz, High Ch
2483.550	31.9	-3.2	1.5	136.0	-6.8	20.0	Horz	AV	0.0	41.9	54.0	-12.1	EUT/Ant. Vert, High Ch
2484.025	31.2	-3.2	1.2	304.0	-6.8	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT/Ant. Vert, High Ch
2484.767	31.2	-3.2	1.5	189.0	-6.8	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT/Ant. On Side, High Ch
2485.492	31.1	-3.2	1.5	324.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. Horz, High Ch
2484.408	31.1	-3.2	1.5	165.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. On Side, High Ch
2484.467	31.1	-3.2	1.5	290.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. Horz, High Ch
2385.367	31.1	-3.5	1.5	108.0	-6.8	20.0	Vert	AV	0.0	40.8	54.0	-13.2	EUT/Ant. Vert, High Ch
2484.925	43.1	-3.2	1.5	136.0	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT/Ant. Vert, High Ch
2485.892	42.8	-3.2	1.5	189.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT/Ant. On Side, High Ch
2483.825	42.8	-3.2	1.5	290.0	0.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4	EUT/Ant. Horz, High Ch
2485.133	42.7	-3.2	1.5	165.0	0.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT/Ant. On Side, High Ch
2387.492	42.6	-3.5	1.5	108.0	0.0	20.0	Vert	PK	0.0	59.1	74.0	-14.9	EUT/Ant. Vert, High Ch
2484.450	42.3	-3.2	1.5	324.0	0.0	20.0	Vert	PK	0.0	59.1	74.0	-14.9	EUT/Ant. Horz, High Ch
2484.617	41.8	-3.2	1.2	304.0	0.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT/Ant. Vert, High Ch
7425.675	28.4	13.7	1.8	238.0	-6.8	0.0	Vert	AV	0.0	35.3	54.0	-18.7	EUT/Ant. Vert, High ch
7426.383	28.4	13.7	1.5	352.0	-6.8	0.0	Horz	AV	0.0	35.3	54.0	-18.7	EUT/Ant. On Side, High Ch
7322.500	28.2	13.1	1.5	203.0	-6.8	0.0	Horz	AV	0.0	34.5	54.0	-19.5	EUT/Ant. On Side, Mid ch
7321.617	28.2	13.1	1.5	259.0	-6.8	0.0	Vert	AV	0.0	34.5	54.0	-19.5	EUT/Ant. Vert, Mid Ch
7425.375	40.1	13.7	1.5	352.0	0.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	EUT/Ant. On Side, High Ch
7423.983	39.9	13.7	1.8	238.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	EUT/Ant. Vert, High ch
4809.067	35.1	4.8	4.0	355.0	-6.8	0.0	Horz	AV	0.0	33.1	54.0	-20.9	EUT/Ant. On Side, Low Ch
4809.017	35.0	4.8	3.6	29.0	-6.8	0.0	Vert	AV	0.0	33.0	54.0	-21.0	EUT/Ant. Vert, Low Ch
7319.458	39.3	13.1	1.5	203.0	0.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	EUT/Ant. On Side, Mid ch
7318.033	39.3	13.1	1.5	259.0	0.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	EUT/Ant. Vert, Mid Ch
4808.967	34.3	4.8	4.0	133.0	-6.8	0.0	Vert	AV	0.0	32.3	54.0	-21.7	EUT/Ant. On Side, Low Ch
4808.975	33.3	4.8	1.5	313.0	-6.8	0.0	Horz	AV	0.0	31.3	54.0	-22.7	EUT/Ant. Horz, Low Ch
4950.933	33.1	4.7	1.5	328.0	-6.8	0.0	Vert	AV	0.0	31.0	54.0	-23.0	EUT/Ant. Vert, High ch
4951.042	32.9	4.7	1.1	290.0	-6.8	0.0	Horz	AV	0.0	30.8	54.0	-23.2	EUT/Ant. On Side, High Ch
4879.008	30.5	4.8	3.9	294.0	-6.8	0.0	Horz	AV	0.0	28.5	54.0	-25.5	EUT/Ant. On Side, Mid ch
4879.208	30.5	4.8	1.5	312.0	-6.8	0.0	Vert	AV	0.0	28.5	54.0	-25.5	EUT/Ant. Vert, Mid Ch
4809.192	43.7	4.8	3.6	29.0	0.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT/Ant. Vert, Low Ch
4808.900	43.5	4.8	4.0	133.0	0.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	EUT/Ant. On Side, Low Ch

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
4809.058	43.4	4.8	4.0	355.0	0.0	0.0	Horz	PK	0.0	48.2	74.0	-25.8	EUT/Ant. On Side, Low Ch
4809.092	30.0	4.8	1.5	6.0	-6.8	0.0	Horz	AV	0.0	28.0	54.0	-26.0	EUT/Ant. Vert, Low Ch
4950.700	42.5	4.7	1.5	328.0	0.0	0.0	Vert	PK	0.0	47.2	74.0	-26.8	EUT/Ant. Vert, High ch
4950.967	42.5	4.7	1.1	290.0	0.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	EUT/Ant. On Side, High Ch
4809.358	42.4	4.8	1.5	313.0	0.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	EUT/Ant. Horz, Low Ch
4808.892	29.0	4.8	1.5	168.0	-6.8	0.0	Vert	AV	0.0	27.0	54.0	-27.0	EUT/Ant. Horz, Low Ch
4881.333	42.1	4.7	1.5	312.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	EUT/Ant. Vert, Mid Ch
4809.333	41.4	4.8	1.5	6.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	EUT/Ant. Vert, Low Ch
4879.267	41.2	4.8	3.9	294.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	EUT/Ant. On Side, Mid ch
4808.450	40.7	4.8	1.5	168.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT/Ant. Horz, Low Ch
12202.380	28.8	-0.5	1.5	97.0	-6.8	0.0	Vert	AV	0.0	21.5	54.0	-32.5	EUT/Ant. Vert, Mid Ch
12202.410	28.8	-0.5	1.5	37.0	-6.8	0.0	Horz	AV	0.0	21.5	54.0	-32.5	EUT/Ant. On Side, Mid Ch
12027.130	29.8	-1.5	1.5	158.0	-6.8	0.0	Horz	AV	0.0	21.5	54.0	-32.5	EUT/Ant. On Side, Low ch
12026.420	29.8	-1.5	1.5	169.0	-6.8	0.0	Vert	AV	0.0	21.5	54.0	-32.5	EUT/Ant. Vert, Low Ch
12372.650	28.3	-0.7	1.6	68.0	-6.8	0.0	Vert	AV	0.0	20.8	54.0	-33.2	EUT/Ant. Vert, High Ch
12372.710	28.2	-0.7	1.5	37.0	-6.8	0.0	Horz	AV	0.0	20.7	54.0	-33.3	EUT/Ant. On Side, High Ch
12026.720	41.9	-1.5	1.5	169.0	0.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	EUT/Ant. Vert, Low Ch
12027.430	41.2	-1.5	1.5	158.0	0.0	0.0	Horz	PK	0.0	39.7	74.0	-34.3	EUT/Ant. On Side, Low ch
12199.550	39.9	-0.6	1.5	97.0	0.0	0.0	Vert	PK	0.0	39.3	74.0	-34.7	EUT/Ant. Vert, Mid Ch
12199.000	39.8	-0.6	1.5	37.0	0.0	0.0	Horz	PK	0.0	39.2	74.0	-34.8	EUT/Ant. On Side, Mid Ch
12373.390	39.5	-0.7	1.5	37.0	0.0	0.0	Horz	PK	0.0	38.8	74.0	-35.2	EUT/Ant. On Side, High Ch
12374.730	39.4	-0.6	1.6	68.0	0.0	0.0	Vert	PK	0.0	38.8	74.0	-35.2	EUT/Ant. Vert, High Ch

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2021-09-30
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.8°C
Attendees:	Shawn Simons	Relative Humidity:	53.4%
Customer Project:	None	Bar. Pressure (PMSL):	1021 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	EMPM0122-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	52	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

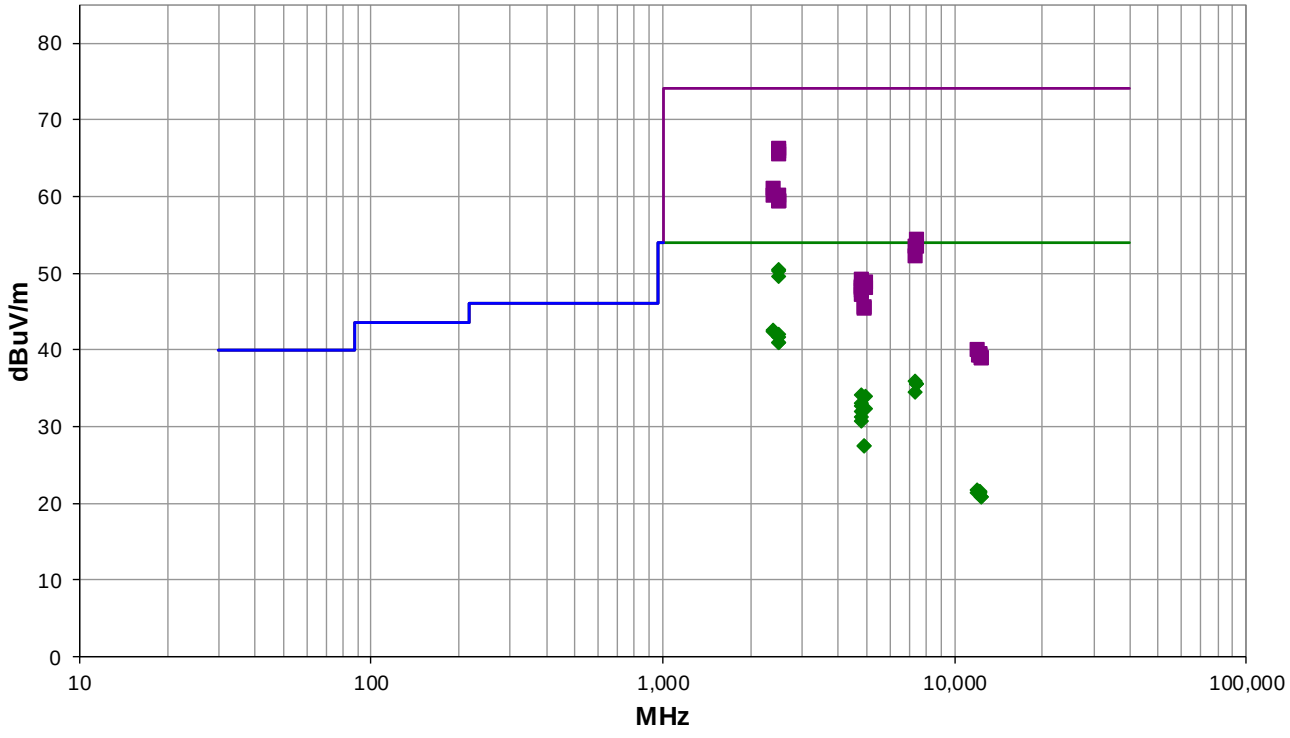
14.5 dBi Yagi antenna. 8 dBm power setting. Test mode is 100% duty cycle. Operational duty cycle is limited to 20.706% maximum duty cycle in a 100ms window. A correction factor (DCCF) was applied using the formula 10*log(duty cycle) = -6.8dB.

EUT OPERATING MODES

Transmitting Low, Mid, and High channel (2405, 2440, and 2475 MHz), continuous modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 52 PK AV QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #52

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.508	40.5	-3.2	1.0	180.0	-6.8	20.0	Vert	AV	0.0	50.5	54.0	-3.5	EUT/Ant. Horz, High Ch
2483.500	40.3	-3.2	1.0	181.0	-6.8	20.0	Horz	AV	0.0	50.3	54.0	-3.7	EUT/Ant. On Side, High Ch
2483.500	39.5	-3.2	1.0	183.0	-6.8	20.0	Vert	AV	0.0	49.5	54.0	-4.5	EUT/Ant. Horz, High Ch
2483.650	49.4	-3.2	1.0	183.0	0.0	20.0	Vert	PK	0.0	66.2	74.0	-7.8	EUT/Ant. Horz, High Ch
2483.750	49.1	-3.2	1.0	180.0	0.0	20.0	Vert	PK	0.0	65.9	74.0	-8.1	EUT/Ant. Horz, High Ch
2483.517	48.8	-3.2	1.0	181.0	0.0	20.0	Horz	PK	0.0	65.6	74.0	-8.4	EUT/Ant. On Side, High Ch
2389.983	32.9	-3.5	1.0	189.0	-6.8	20.0	Horz	AV	0.0	42.6	54.0	-11.4	EUT/Ant. On Side, Low Ch
2389.958	32.7	-3.5	1.5	177.0	-6.8	20.0	Vert	AV	0.0	42.4	54.0	-11.6	EUT/Ant. Horz, Low Ch
2483.500	32.0	-3.2	1.6	194.0	-6.8	20.0	Horz	AV	0.0	42.0	54.0	-12.0	EUT/Ant. Vert, High Ch
2483.817	31.6	-3.2	1.5	197.0	-6.8	20.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT/Ant. Horz, High Ch
2389.542	44.6	-3.5	1.0	189.0	0.0	20.0	Horz	PK	0.0	61.1	74.0	-12.9	EUT/Ant. On Side, Low Ch
2483.533	31.0	-3.2	2.9	6.0	-6.8	20.0	Vert	AV	0.0	41.0	54.0	-13.0	EUT/Ant. Vert, High Ch
2484.642	30.9	-3.2	1.5	339.0	-6.8	20.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT/Ant. On Side, High Ch
2389.658	43.6	-3.5	1.5	177.0	0.0	20.0	Vert	PK	0.0	60.1	74.0	-13.9	EUT/Ant. Horz, Low Ch
2485.267	43.3	-3.2	1.6	194.0	0.0	20.0	Horz	PK	0.0	60.1	74.0	-13.9	EUT/Ant. Vert, High Ch
2484.283	42.7	-3.2	1.5	197.0	0.0	20.0	Horz	PK	0.0	59.5	74.0	-14.5	EUT/Ant. Horz, High Ch
2483.750	42.7	-3.2	1.5	339.0	0.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT/Ant. On Side, High Ch
2486.250	42.7	-3.2	2.9	6.0	0.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT/Ant. Vert, High Ch
7318.508	29.6	13.1	3.0	145.0	-6.8	0.0	Vert	AV	0.0	35.9	54.0	-18.1	EUT/Ant. Horz, Mid Ch
7425.292	28.6	13.7	3.1	306.0	-6.8	0.0	Horz	AV	0.0	35.5	54.0	-18.5	EUT/Ant. Vert, High Ch
7426.908	28.6	13.7	1.5	268.0	-6.8	0.0	Vert	AV	0.0	35.5	54.0	-18.5	EUT/Ant. Horz, High Ch
7319.467	28.1	13.1	3.9	32.0	-6.8	0.0	Horz	AV	0.0	34.4	54.0	-19.6	EUT/Ant. Vert, Mid Ch
7426.058	40.7	13.7	3.1	306.0	0.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	EUT/Ant. Vert, High Ch
4808.975	36.2	4.8	3.6	294.0	-6.8	0.0	Horz	AV	0.0	34.2	54.0	-19.8	EUT/Ant. Vert, Low Ch
4950.958	36.0	4.7	3.1	335.0	-6.8	0.0	Horz	AV	0.0	33.9	54.0	-20.1	EUT/Ant. Vert, High Ch
7318.283	40.5	13.1	3.0	145.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	EUT/Ant. Horz, Mid Ch
7427.000	39.8	13.7	1.5	268.0	0.0	0.0	Vert	PK	0.0	53.5	74.0	-20.5	EUT/Ant. Horz, High Ch
4809.092	35.0	4.8	3.5	16.0	-6.8	0.0	Horz	AV	0.0	33.0	54.0	-21.0	EUT/Ant. On Side, Low Ch
4809.100	34.6	4.8	1.1	345.0	-6.8	0.0	Horz	AV	0.0	32.6	54.0	-21.4	EUT/Ant. Horz, Low Ch
4950.908	34.5	4.7	1.7	266.0	-6.8	0.0	Vert	AV	0.0	32.4	54.0	-21.6	EUT/Ant. Horz, High Ch
7321.700	39.1	13.1	3.9	32.0	0.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT/Ant. Vert, Mid Ch
4809.050	34.0	4.8	1.3	65.0	-6.8	0.0	Vert	AV	0.0	32.0	54.0	-22.0	EUT/Ant. Horz, Low Ch
4809.058	33.2	4.8	2.3	17.0	-6.8	0.0	Vert	AV	0.0	31.2	54.0	-22.8	EUT/Ant. Vert, Low Ch
4809.075	32.8	4.8	1.5	54.0	-6.8	0.0	Vert	AV	0.0	30.8	54.0	-23.2	EUT/Ant. On Side, Low Ch
4809.067	44.4	4.8	3.6	294.0	0.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT/Ant. Vert, Low Ch
4951.217	44.1	4.7	3.1	335.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	EUT/Ant. Vert, High Ch
4809.242	43.6	4.8	1.3	65.0	0.0	0.0	Vert	PK	0.0	48.4	74.0	-25.6	EUT/Ant. Horz, Low Ch
4808.750	43.4	4.8	3.5	16.0	0.0	0.0	Horz	PK	0.0	48.2	74.0	-25.8	EUT/Ant. On Side, Low Ch
4951.000	43.4	4.7	1.7	266.0	0.0	0.0	Vert	PK	0.0	48.1	74.0	-25.9	EUT/Ant. Horz, High Ch
4808.958	43.3	4.8	1.1	345.0	0.0	0.0	Horz	PK	0.0	48.1	74.0	-25.9	EUT/Ant. Horz, Low Ch

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4808.992	42.9	4.8	2.3	17.0	0.0	0.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT/Ant. Vert, Low Ch
4881.017	29.6	4.7	1.5	149.0	-6.8	0.0	Vert	AV	0.0	27.5	54.0	-26.5	EUT/Ant. Horz, Mid Ch
4878.033	29.5	4.8	4.0	264.0	-6.8	0.0	Horz	AV	0.0	27.5	54.0	-26.5	EUT/Ant. Vert, Mid Ch
4809.050	42.5	4.8	1.5	54.0	0.0	0.0	Vert	PK	0.0	47.3	74.0	-26.7	EUT/Ant. On Side, Low Ch
4882.133	41.0	4.7	4.0	264.0	0.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	EUT/Ant. Vert, Mid Ch
4881.975	40.8	4.7	1.5	149.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT/Ant. Horz, Mid Ch
12022.510	30.1	-1.5	1.5	131.0	-6.8	0.0	Horz	AV	0.0	21.8	54.0	-32.2	EUT/Ant. Vert, Low Ch
12202.120	28.8	-0.5	1.4	195.0	-6.8	0.0	Horz	AV	0.0	21.5	54.0	-32.5	EUT/Ant. Vert, Mid Ch
12197.780	28.8	-0.6	1.5	79.0	-6.8	0.0	Vert	AV	0.0	21.4	54.0	-32.6	EUT/Ant. Horz, Mid Ch
12022.620	29.6	-1.5	1.5	106.0	-6.8	0.0	Vert	AV	0.0	21.3	54.0	-32.7	EUT/Ant. Horz, Low Ch
12372.740	28.3	-0.7	1.5	328.0	-6.8	0.0	Vert	AV	0.0	20.8	54.0	-33.2	EUT/Ant. Horz, High ch
12372.710	28.3	-0.7	1.5	105.0	-6.8	0.0	Horz	AV	0.0	20.8	54.0	-33.2	EUT/Ant. Vert, High Ch
12024.320	41.5	-1.5	1.5	106.0	0.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT/Ant. Horz, Low Ch
12201.910	40.1	-0.5	1.4	195.0	0.0	0.0	Horz	PK	0.0	39.6	74.0	-34.4	EUT/Ant. Vert, Mid Ch
12199.640	40.0	-0.6	1.5	79.0	0.0	0.0	Vert	PK	0.0	39.4	74.0	-34.6	EUT/Ant. Horz, Mid Ch
12025.140	40.9	-1.5	1.5	131.0	0.0	0.0	Horz	PK	0.0	39.4	74.0	-34.6	EUT/Ant. Vert, Low Ch
12374.760	39.6	-0.6	1.5	105.0	0.0	0.0	Horz	PK	0.0	39.0	74.0	-35.0	EUT/Ant. Vert, High Ch
12375.880	39.5	-0.6	1.5	328.0	0.0	0.0	Vert	PK	0.0	38.9	74.0	-35.1	EUT/Ant. Horz, High ch

CONCLUSION
Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2021-09-30
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.8°C
Attendees:	Shawn Simons	Relative Humidity:	53.4%
Customer Project:	None	Bar. Pressure (PMSL):	1021 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	EMPM0122-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	56	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

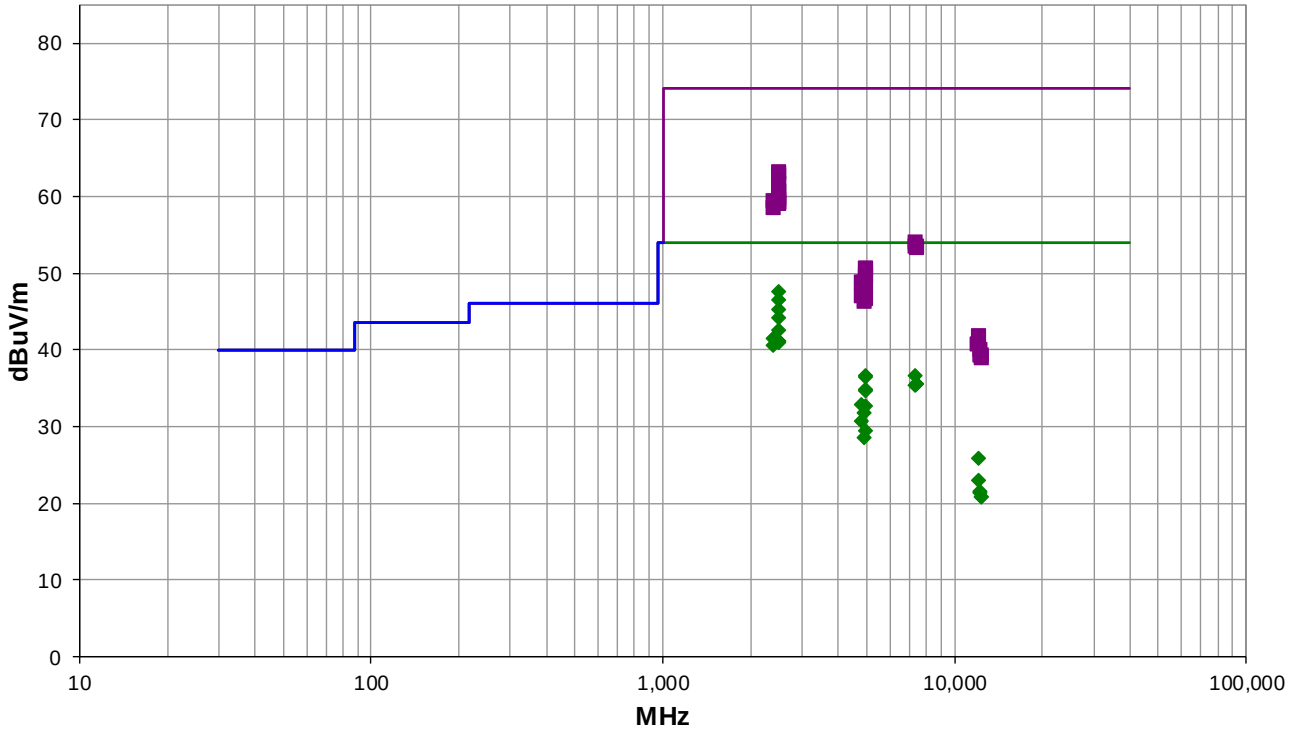
8 dBi dipole antenna. 8 dBm power setting. Test mode is 100% duty cycle. Operational duty cycle is limited to 20.706% maximum duty cycle in a 100ms window. A correction factor (DCCF) was applied using the formula 10*log(duty cycle) = -6.8dB.

EUT OPERATING MODES

Transmitting Low, Mid, and High channel (2405, 2440, and 2475 MHz), continuous modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 56 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #56

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.525	37.6	-3.2	1.0	85.0	-6.8	20.0	Horz	AV	0.0	47.6	54.0	-6.4	EUT/Ant. on side, High Ch
2483.542	36.5	-3.2	4.0	267.0	-6.8	20.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT/Ant. horz, High Ch
2483.525	35.2	-3.2	1.0	86.0	-6.8	20.0	Horz	AV	0.0	45.2	54.0	-8.8	EUT/Ant. on side, High Ch
2483.508	34.1	-3.2	1.8	87.0	-6.8	20.0	Vert	AV	0.0	44.1	54.0	-9.9	EUT/Ant. Vert, High Ch
2483.508	46.5	-3.2	1.0	85.0	0.0	20.0	Horz	PK	0.0	63.3	74.0	-10.7	EUT/Ant. on side, High Ch
2483.575	46.1	-3.2	4.0	267.0	0.0	20.0	Horz	PK	0.0	62.9	74.0	-11.1	EUT/Ant. horz, High Ch
2483.500	32.6	-3.2	1.5	81.0	-6.8	20.0	Horz	AV	0.0	42.6	54.0	-11.4	EUT/Ant. horz, High Ch
2483.800	44.9	-3.2	1.0	86.0	0.0	20.0	Horz	PK	0.0	61.7	74.0	-12.3	EUT/Ant. on side, High Ch
2389.933	31.8	-3.5	2.2	101.0	-6.8	20.0	Horz	AV	0.0	41.5	54.0	-12.5	EUT/Ant. On Side, Low Ch
2484.117	31.2	-3.2	3.5	304.0	-6.8	20.0	Vert	AV	0.0	41.2	54.0	-12.8	EUT/Ant. horz, High Ch
2485.833	31.1	-3.2	3.2	17.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. on side, High Ch
2483.658	31.1	-3.2	1.5	111.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. horz, High Ch
2484.275	31.1	-3.2	1.5	316.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. on side, High Ch
2484.517	31.0	-3.2	3.9	41.0	-6.8	20.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT/Ant. Vert, High Ch
2483.833	44.0	-3.2	1.5	81.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT/Ant. horz, High Ch
2483.817	43.9	-3.2	1.8	87.0	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	EUT/Ant. Vert, High Ch
2389.083	30.9	-3.5	1.5	85.0	-6.8	20.0	Vert	AV	0.0	40.6	54.0	-13.4	EUT/Ant. On Side, Low Ch
2487.092	43.2	-3.2	3.9	41.0	0.0	20.0	Horz	PK	0.0	60.0	74.0	-14.0	EUT/Ant. Vert, High Ch
2486.025	42.8	-3.2	3.5	304.0	0.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4	EUT/Ant. horz, High Ch
2389.958	42.9	-3.5	2.2	101.0	0.0	20.0	Horz	PK	0.0	59.4	74.0	-14.6	EUT/Ant. On Side, Low Ch
2486.617	42.5	-3.2	3.2	17.0	0.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	EUT/Ant. on side, High Ch
2485.050	42.5	-3.2	1.5	316.0	0.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	EUT/Ant. on side, High Ch
2486.208	42.2	-3.2	1.5	111.0	0.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	EUT/Ant. horz, High Ch
2387.717	42.1	-3.5	1.5	85.0	0.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	EUT/Ant. On Side, Low Ch
4950.892	38.8	4.7	1.1	205.0	-6.8	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT/Ant. On Side, High Ch
7321.358	30.4	13.1	2.7	180.0	-6.8	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT/Ant. On Side, Mid Ch
4951.042	38.6	4.7	2.4	133.0	-6.8	0.0	Horz	AV	0.0	36.5	54.0	-17.5	EUT/Ant. On Side, High Ch
7426.967	28.6	13.7	1.5	173.0	-6.8	0.0	Horz	AV	0.0	35.5	54.0	-18.5	EUT/Ant. On Side, High Ch
7427.350	28.6	13.7	3.2	78.0	-6.8	0.0	Vert	AV	0.0	35.5	54.0	-18.5	EUT/Ant. On Side, High Ch
7321.408	29.1	13.1	1.5	73.0	-6.8	0.0	Horz	AV	0.0	35.4	54.0	-18.6	EUT/Ant. On Side, Mid Ch
4951.033	36.9	4.7	2.4	97.0	-6.8	0.0	Horz	AV	0.0	34.8	54.0	-19.2	EUT/Ant. Vert, High Ch
4950.892	36.7	4.7	2.6	213.0	-6.8	0.0	Horz	AV	0.0	34.6	54.0	-19.4	EUT/Ant. Horz, High Ch
7321.750	40.9	13.1	2.7	180.0	0.0	0.0	Vert	PK	0.0	54.0	74.0	-20.0	EUT/Ant. On Side, Mid Ch
7422.633	39.9	13.7	1.5	173.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	EUT/Ant. On Side, High Ch
7322.192	40.4	13.1	1.5	73.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT/Ant. On Side, Mid Ch
7424.575	39.6	13.7	3.2	78.0	0.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	EUT/Ant. On Side, High Ch
4809.017	34.9	4.8	2.5	139.0	-6.8	0.0	Horz	AV	0.0	32.9	54.0	-21.1	EUT/Ant. On Side, Low ch
4950.925	34.8	4.7	1.7	175.0	-6.8	0.0	Vert	AV	0.0	32.7	54.0	-21.3	EUT/Ant. Vert, High Ch
4879.058	33.7	4.8	2.4	135.0	-6.8	0.0	Horz	AV	0.0	31.7	54.0	-22.3	EUT/Ant. On Side, Mid Ch
4950.750	46.0	4.7	2.4	133.0	0.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	EUT/Ant. On Side, High Ch

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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4950.917	46.0	4.7	1.1	205.0	0.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	EUT/Ant. On Side, High Ch
4809.050	32.7	4.8	1.5	13.0	-6.8	0.0	Vert	AV	0.0	30.7	54.0	-23.3	EUT/Ant. On Side, Low ch
4950.842	45.2	4.7	2.6	213.0	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	EUT/Ant. Horz, High Ch
4951.083	44.9	4.7	2.4	97.0	0.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	EUT/Ant. Vert, High Ch
4951.050	31.6	4.7	1.5	0.0	-6.8	0.0	Vert	AV	0.0	29.5	54.0	-24.5	EUT/Ant. Horz, High Ch
4879.308	44.0	4.8	2.4	135.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	EUT/Ant. On Side, Mid Ch
4809.192	44.0	4.8	2.5	139.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	EUT/Ant. On Side, Low ch
4880.800	30.6	4.7	3.5	229.0	-6.8	0.0	Vert	AV	0.0	28.5	54.0	-25.5	EUT/Ant. On Side, Mid Ch
4951.350	43.6	4.7	1.7	175.0	0.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	EUT/Ant. Vert, High Ch
4809.217	42.3	4.8	1.5	13.0	0.0	0.0	Vert	PK	0.0	47.1	74.0	-26.9	EUT/Ant. On Side, Low ch
4950.708	42.0	4.7	1.5	0.0	0.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	EUT/Ant. Horz, High Ch
4879.242	41.6	4.8	3.5	229.0	0.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	EUT/Ant. On Side, Mid Ch
12027.450	34.1	-1.5	2.0	186.0	-6.8	0.0	Vert	AV	0.0	25.8	54.0	-28.2	EUT/Ant. On Side, Low Ch
12027.480	31.3	-1.5	2.2	100.0	-6.8	0.0	Horz	AV	0.0	23.0	54.0	-31.0	EUT/Ant. On Side, Low Ch
12027.450	43.4	-1.5	2.0	186.0	0.0	0.0	Vert	PK	0.0	41.9	74.0	-32.1	EUT/Ant. On Side, Low Ch
12202.280	28.8	-0.5	1.5	219.0	-6.8	0.0	Horz	AV	0.0	21.5	54.0	-32.5	EUT/Ant. On Side, Mid Ch
12201.830	28.7	-0.5	1.5	333.0	-6.8	0.0	Vert	AV	0.0	21.4	54.0	-32.6	EUT/Ant. On Side, Mid Ch
12372.860	28.4	-0.7	1.5	25.0	-6.8	0.0	Horz	AV	0.0	20.9	54.0	-33.1	EUT/Ant. On Side, High Ch
12372.650	28.4	-0.7	1.5	315.0	-6.8	0.0	Vert	AV	0.0	20.9	54.0	-33.1	EUT/Ant. On Side, High Ch
12022.770	42.3	-1.5	2.2	100.0	0.0	0.0	Horz	PK	0.0	40.8	74.0	-33.2	EUT/Ant. On Side, Low Ch
12202.280	40.6	-0.5	1.5	219.0	0.0	0.0	Horz	PK	0.0	40.1	74.0	-33.9	EUT/Ant. On Side, Mid Ch
12197.830	39.9	-0.6	1.5	333.0	0.0	0.0	Vert	PK	0.0	39.3	74.0	-34.7	EUT/Ant. On Side, Mid Ch
12374.080	39.9	-0.6	1.5	25.0	0.0	0.0	Horz	PK	0.0	39.3	74.0	-34.7	EUT/Ant. On Side, High Ch
12372.940	39.6	-0.7	1.5	315.0	0.0	0.0	Vert	PK	0.0	38.9	74.0	-35.1	EUT/Ant. On Side, High Ch

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

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EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2021-10-01
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.7°C
Attendees:	Shawn Simons	Relative Humidity:	54.2%
Customer Project:	None	Bar. Pressure (PMSL):	1021 mb
Tested By:	Christopher Heintzelman	Job Site:	MN09
Power:	Battery	Configuration:	EMPM0122-8

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	89	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

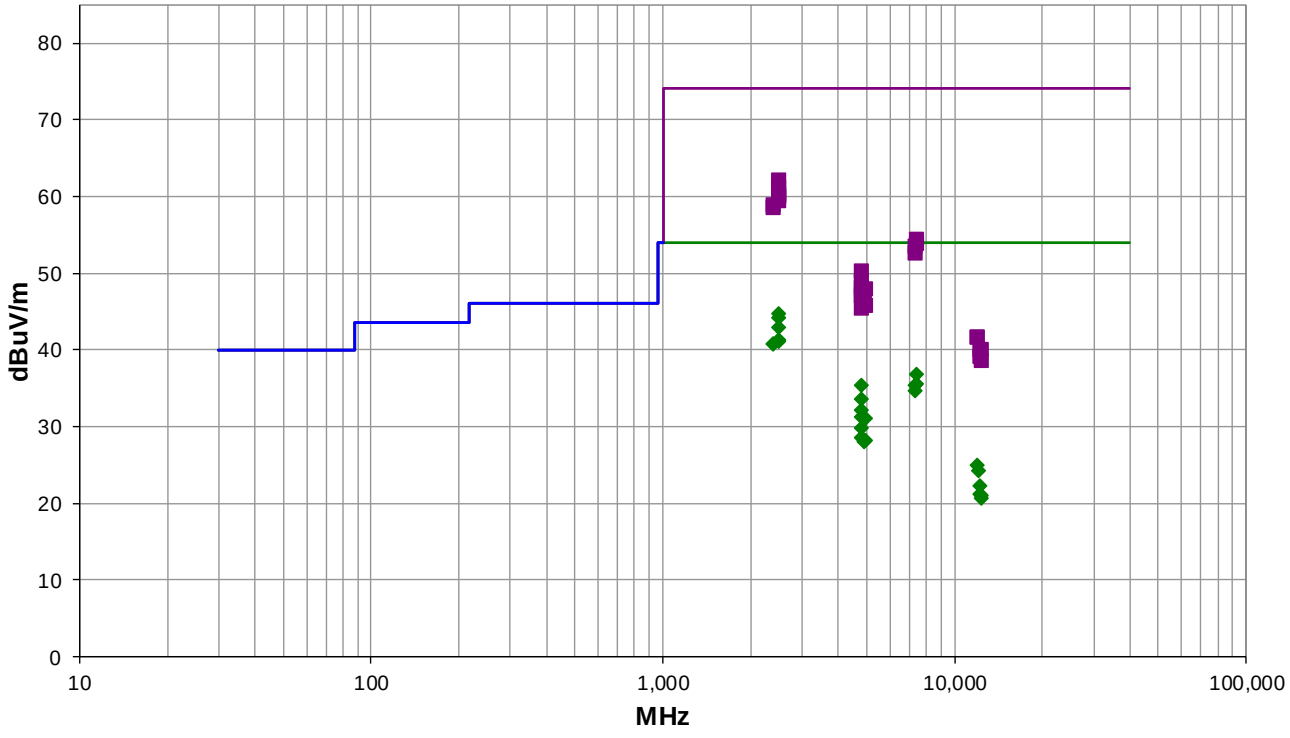
4.5 dBi Dipole antenna. 8 dBm power setting. Test mode is 100% duty cycle. Operational duty cycle is limited to 20.706% maximum duty cycle in a 100ms window. A correction factor (DCCF) was applied using the formula 10*log(duty cycle) = -6.8dB.

EUT OPERATING MODES

Transmitting Low, Mid, and High channel (2405, 2440, and 2475 MHz), continuous modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 89 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

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RESULTS - Run #89

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
2483.525	34.7	-3.2	1.0	91.0	-6.8	20.0	Horz	AV	0.0	44.7	54.0	-9.3	EUT/Ant. Horz, High Ch
2483.525	34.1	-3.2	4.0	90.0	-6.8	20.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT/Ant. On Side, High Ch
2483.525	32.9	-3.2	1.5	193.0	-6.8	20.0	Vert	AV	0.0	42.9	54.0	-11.1	EUT/Ant. Vert, High Ch
2483.958	45.3	-3.2	1.0	91.0	0.0	20.0	Horz	PK	0.0	62.1	74.0	-11.9	EUT/Ant. Horz, High Ch
2483.775	44.5	-3.2	4.0	90.0	0.0	20.0	Horz	PK	0.0	61.3	74.0	-12.7	EUT/Ant. On Side, High Ch
2483.758	31.3	-3.2	1.5	207.0	-6.8	20.0	Vert	AV	0.0	41.3	54.0	-12.7	EUT/Ant. Horz, High Ch
2483.550	31.1	-3.2	1.5	97.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. On Side, High Ch
2484.033	31.1	-3.2	1.5	69.0	-6.8	20.0	Horz	AV	0.0	41.1	54.0	-12.9	EUT/Ant. Vert, High Ch
2389.233	31.0	-3.5	1.5	353.0	-6.8	20.0	Vert	AV	0.0	40.7	54.0	-13.3	EUT/Ant. Vert, Low Ch
2389.975	31.0	-3.5	3.0	85.0	-6.8	20.0	Horz	AV	0.0	40.7	54.0	-13.3	EUT/Ant. Horz, Low Ch
2484.500	43.6	-3.2	1.5	193.0	0.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	EUT/Ant. Vert, High Ch
2484.617	43.4	-3.2	1.5	69.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	EUT/Ant. Vert, High Ch
2485.425	43.2	-3.2	1.5	207.0	0.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT/Ant. Horz, High Ch
2485.842	42.7	-3.2	1.5	97.0	0.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	EUT/Ant. On Side, High Ch
2388.192	42.4	-3.5	3.0	85.0	0.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT/Ant. Horz, Low Ch
2387.983	42.0	-3.5	1.5	353.0	0.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT/Ant. Vert, Low Ch
7426.375	30.0	13.7	2.9	322.0	-6.8	0.0	Vert	AV	0.0	36.9	54.0	-17.1	EUT/Ant. Horz, High Ch
7426.833	28.7	13.7	1.5	175.0	-6.8	0.0	Horz	AV	0.0	35.6	54.0	-18.4	EUT/Ant. Horz, High Ch
7321.208	29.0	13.1	1.5	45.0	-6.8	0.0	Vert	AV	0.0	35.3	54.0	-18.7	EUT/Ant. Horz, Mid Ch
4809.125	37.3	4.8	1.0	223.0	-6.8	0.0	Vert	AV	0.0	35.3	54.0	-18.7	EUT/Ant. Horz, Low Ch
7322.433	28.3	13.1	1.5	33.0	-6.8	0.0	Horz	AV	0.0	34.6	54.0	-19.4	EUT/Ant. Horz, Mid Ch
7423.508	40.8	13.7	2.9	322.0	0.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	EUT/Ant. Horz, High Ch
7426.042	40.2	13.7	1.5	175.0	0.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	EUT/Ant. Horz, High Ch
4809.133	35.6	4.8	2.1	301.0	-6.8	0.0	Horz	AV	0.0	33.6	54.0	-20.4	EUT/Ant. Horz, Low Ch
7318.158	40.4	13.1	1.5	45.0	0.0	0.0	Vert	PK	0.0	53.5	74.0	-20.5	EUT/Ant. Horz, Mid Ch
7319.958	39.5	13.1	1.5	33.0	0.0	0.0	Horz	PK	0.0	52.6	74.0	-21.4	EUT/Ant. Horz, Mid Ch
4809.033	34.2	4.8	2.6	228.0	-6.8	0.0	Horz	AV	0.0	32.2	54.0	-21.8	EUT/Ant On Side, Low Ch
4809.117	33.3	4.8	3.9	291.0	-6.8	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT/Ant On Side, Low Ch
4949.075	33.2	4.7	3.9	299.0	-6.8	0.0	Horz	AV	0.0	31.1	54.0	-22.9	EUT/Ant. Horz, High Ch
4809.192	45.4	4.8	1.0	223.0	0.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	EUT/Ant. Horz, Low Ch
4809.117	31.9	4.8	2.5	203.0	-6.8	0.0	Horz	AV	0.0	29.9	54.0	-24.1	EUT/Ant Vert, Low Ch
4809.292	44.2	4.8	2.1	301.0	0.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	EUT/Ant. Horz, Low Ch
4809.000	30.6	4.8	1.5	196.0	-6.8	0.0	Vert	AV	0.0	28.6	54.0	-25.4	EUT/Ant Vert, Low Ch
4879.192	30.2	4.8	1.5	45.0	-6.8	0.0	Vert	AV	0.0	28.2	54.0	-25.8	EUT/Ant. Horz, Mid Ch
4949.050	30.3	4.7	1.5	8.0	-6.8	0.0	Vert	AV	0.0	28.2	54.0	-25.8	EUT/Ant. Horz, High Ch
4808.875	43.4	4.8	2.6	228.0	0.0	0.0	Horz	PK	0.0	48.2	74.0	-25.8	EUT/Ant On Side, Low Ch
4879.175	30.1	4.8	1.5	343.0	-6.8	0.0	Horz	AV	0.0	28.1	54.0	-25.9	EUT/Ant. Horz, Mid Ch
4949.333	43.2	4.7	3.9	299.0	0.0	0.0	Horz	PK	0.0	47.9	74.0	-26.1	EUT/Ant. Horz, High Ch
4810.583	42.5	4.8	3.9	291.0	0.0	0.0	Vert	PK	0.0	47.3	74.0	-26.7	EUT/Ant On Side, Low Ch
4877.642	42.2	4.8	1.5	343.0	0.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	EUT/Ant. Horz, Mid Ch

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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
4810.783	42.2	4.8	2.5	203.0	0.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	EUT/Ant Vert, Low Ch
4878.383	42.0	4.8	1.5	45.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	EUT/Ant. Horz, Mid Ch
4949.800	41.1	4.7	1.5	8.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT/Ant. Horz, High Ch
4809.517	40.7	4.8	1.5	196.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT/Ant Vert, Low Ch
12022.580	33.3	-1.5	1.9	22.0	-6.8	0.0	Horz	AV	0.0	25.0	54.0	-29.0	EUT/Ant. Horz, Low Ch
12027.400	32.5	-1.5	1.9	263.0	-6.8	0.0	Vert	AV	0.0	24.2	54.0	-29.8	EUT/Ant. Horz, Low Ch
12202.490	29.5	-0.5	1.5	316.0	-6.8	0.0	Horz	AV	0.0	22.2	54.0	-31.8	EUT/Ant. Horz, Mid Ch
12022.500	43.2	-1.5	1.9	22.0	0.0	0.0	Horz	PK	0.0	41.7	74.0	-32.3	EUT/Ant. Horz, Low Ch
12022.580	43.1	-1.5	1.9	263.0	0.0	0.0	Vert	PK	0.0	41.6	74.0	-32.4	EUT/Ant. Horz, Low Ch
12199.880	28.6	-0.6	1.5	64.0	-6.8	0.0	Vert	AV	0.0	21.2	54.0	-32.8	EUT/Ant. Horz, Mid Ch
12372.600	28.6	-0.7	3.6	311.0	-6.8	0.0	Horz	AV	0.0	21.1	54.0	-32.9	EUT/Ant. Horz, High Ch
12373.280	28.2	-0.7	1.5	12.0	-6.8	0.0	Vert	AV	0.0	20.7	54.0	-33.3	EUT/Ant. Horz, High Ch
12197.590	40.6	-0.6	1.5	316.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	EUT/Ant. Horz, Mid Ch
12377.210	40.6	-0.6	3.6	311.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	EUT/Ant. Horz, High Ch
12200.530	39.7	-0.6	1.5	64.0	0.0	0.0	Vert	PK	0.0	39.1	74.0	-34.9	EUT/Ant. Horz, Mid Ch
12377.040	39.3	-0.6	1.5	12.0	0.0	0.0	Vert	PK	0.0	38.7	74.0	-35.3	EUT/Ant. Horz, High Ch

CONCLUSION
Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

EUT:	RM5800	Work Order:	EMPM0122
Serial Number:	W0000454	Date:	2021-09-14
Customer:	Emerson Automation Solutions, Rosemount Inc	Temperature:	21.8°C
Attendees:	Shawn Simons	Relative Humidity:	53.2%
Customer Project:	None	Bar. Pressure (PMSL):	1012 mb
Tested By:	Andrew Rogstad	Job Site:	MN09
Power:	Battery	Configuration:	EMPM0122-5

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	27	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

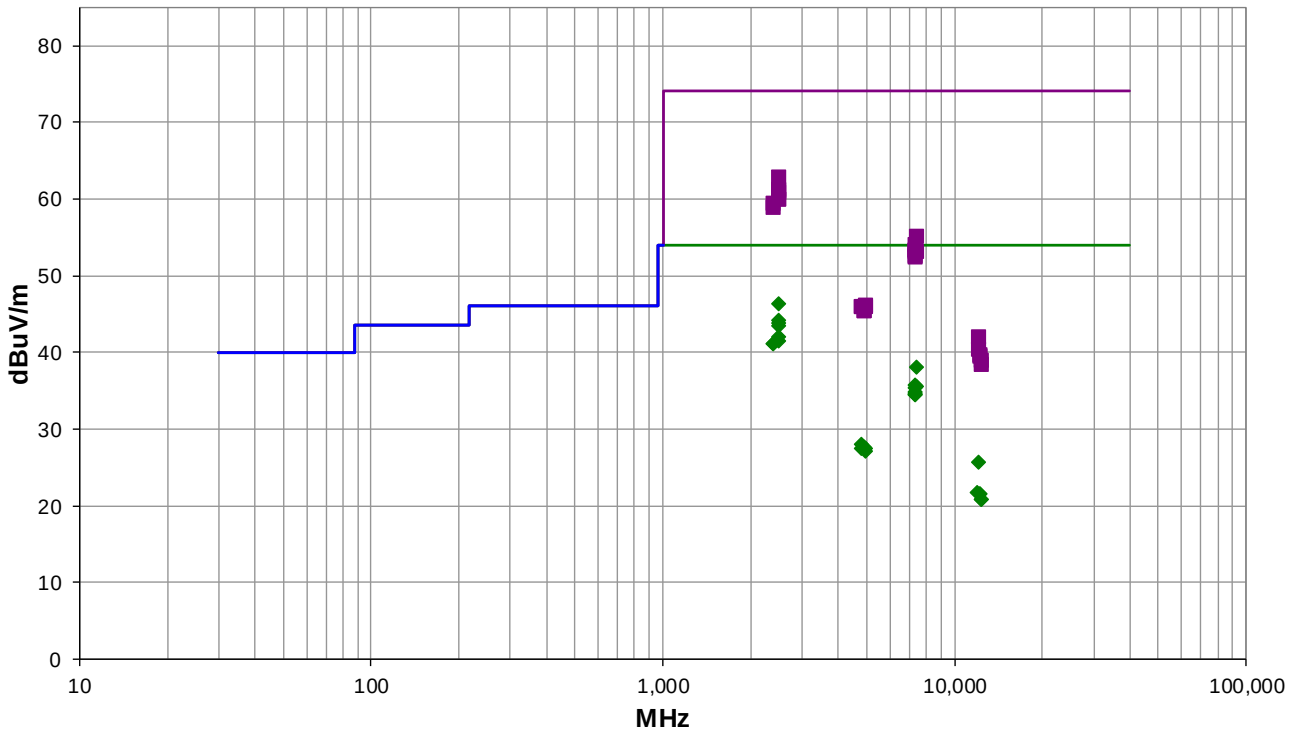
3 dBi dipole PCB strip Antenna. Test mode is 100% duty cycle. Operational duty cycle is limited to 20.706% maximum duty cycle in a 100ms window. A correction factor (DCCF) was applied using the formula 10*log(duty cycle) = -6.8dB.

EUT OPERATING MODES

Transmitting Low, Mid, and High channel (2405, 2440, and 2475 MHz), continuous modulated

DEVIATIONS FROM TEST STANDARD

None



Run #: 27 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #27

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
2483.500	36.3	-3.2	1.0	256.0	-6.8	20.0	Vert	AV	0.0	46.3	54.0	-7.7	EUT/Ant. on side, High ch
2483.508	34.1	-3.2	1.0	263.0	-6.8	20.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT/Ant. vert, High ch
2483.558	33.9	-3.2	3.1	296.0	-6.8	20.0	Horz	AV	0.0	43.9	54.0	-10.1	EUT/Ant. horz, High ch
2483.500	33.4	-3.2	4.0	110.0	-6.8	20.0	Horz	AV	0.0	43.4	54.0	-10.6	EUT/Ant. on side, High ch
2483.608	46.0	-3.2	1.0	256.0	0.0	20.0	Vert	PK	0.0	62.8	74.0	-11.2	EUT/Ant. on side, High ch
2483.625	32.1	-3.2	1.5	219.0	-6.8	20.0	Vert	AV	0.0	42.1	54.0	-11.9	EUT/Ant. horz, High ch
2483.725	31.5	-3.2	1.5	291.0	-6.8	20.0	Vert	AV	0.0	41.5	54.0	-12.5	EUT/Ant. vert, High ch
2483.725	44.5	-3.2	3.1	296.0	0.0	20.0	Horz	PK	0.0	61.3	74.0	-12.7	EUT/Ant. horz, High ch
2385.033	31.4	-3.5	1.5	130.0	-6.8	20.0	Horz	AV	0.0	41.1	54.0	-12.9	EUT/Ant. vert, Low ch
2389.917	31.4	-3.5	3.9	54.0	-6.8	20.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT/Ant. on side, Low ch
2484.758	44.2	-3.2	1.0	263.0	0.0	20.0	Horz	PK	0.0	61.0	74.0	-13.0	EUT/Ant. vert, High ch
2484.917	44.0	-3.2	4.0	110.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT/Ant. on side, High ch
2485.533	43.2	-3.2	1.5	219.0	0.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT/Ant. horz, High ch
2487.492	43.1	-3.2	1.5	291.0	0.0	20.0	Vert	PK	0.0	59.9	74.0	-14.1	EUT/Ant. vert, High ch
2386.117	43.0	-3.5	1.5	130.0	0.0	20.0	Horz	PK	0.0	59.5	74.0	-14.5	EUT/Ant. vert, Low ch
2387.642	42.4	-3.5	3.9	54.0	0.0	20.0	Vert	PK	0.0	58.9	74.0	-15.1	EUT/Ant. on side, Low ch
7426.417	31.1	13.7	3.3	44.0	-6.8	0.0	Vert	AV	0.0	38.0	54.0	-16.0	EUT/Ant. vert, High ch
7318.533	29.5	13.1	4.0	357.0	-6.8	0.0	Horz	AV	0.0	35.8	54.0	-18.2	EUT/Ant. vert, Mid ch
7426.608	28.6	13.7	1.5	188.0	-6.8	0.0	Horz	AV	0.0	35.5	54.0	-18.5	EUT/Ant. vert, High ch
7321.508	29.1	13.1	1.5	298.0	-6.8	0.0	Vert	AV	0.0	35.4	54.0	-18.6	EUT/Ant. vert, Mid ch
7423.758	41.4	13.7	3.3	44.0	0.0	0.0	Vert	PK	0.0	55.1	74.0	-18.9	EUT/Ant. vert, High ch
7321.333	28.6	13.1	1.8	227.0	-6.8	0.0	Vert	AV	0.0	34.9	54.0	-19.1	EUT/Ant. on side, Mid ch
7318.458	28.3	13.1	1.2	65.0	-6.8	0.0	Horz	AV	0.0	34.6	54.0	-19.4	EUT/Ant. on side, Mid ch
7318.650	28.2	13.1	1.5	335.0	-6.8	0.0	Horz	AV	0.0	34.5	54.0	-19.5	EUT/Ant. horz, Mid ch
7317.917	28.1	13.1	1.5	77.0	-6.8	0.0	Vert	AV	0.0	34.4	54.0	-19.6	EUT/Ant. horz, Mid ch
7321.925	40.9	13.1	4.0	357.0	0.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	EUT/Ant. vert, Mid ch
7321.842	40.3	13.1	1.5	298.0	0.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	EUT/Ant. vert, Mid ch
7319.908	40.2	13.1	1.5	335.0	0.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	EUT/Ant. horz, Mid ch
7321.292	40.0	13.1	1.8	227.0	0.0	0.0	Vert	PK	0.0	53.1	74.0	-20.9	EUT/Ant. on side, Mid ch
7424.633	39.4	13.7	1.5	188.0	0.0	0.0	Horz	PK	0.0	53.1	74.0	-20.9	EUT/Ant. vert, High ch
7320.200	39.5	13.1	1.5	77.0	0.0	0.0	Vert	PK	0.0	52.6	74.0	-21.4	EUT/Ant. horz, Mid ch
7321.742	39.4	13.1	1.2	65.0	0.0	0.0	Horz	PK	0.0	52.5	74.0	-21.5	EUT/Ant. on side, Mid ch
4809.067	30.1	4.8	1.5	165.0	-6.8	0.0	Horz	AV	0.0	28.1	54.0	-25.9	EUT/Ant. vert, Low ch
4881.892	29.7	4.7	1.5	102.0	-6.8	0.0	Horz	AV	0.0	27.6	54.0	-26.4	EUT/Ant. vert, Mid ch
4879.608	29.5	4.8	1.5	0.0	-6.8	0.0	Vert	AV	0.0	27.5	54.0	-26.5	EUT/Ant. vert, Mid ch
4951.742	29.5	4.7	1.5	96.0	-6.8	0.0	Horz	AV	0.0	27.4	54.0	-26.6	EUT/Ant. vert, High ch
4809.333	29.4	4.8	1.5	275.0	-6.8	0.0	Vert	AV	0.0	27.4	54.0	-26.6	EUT/Ant. vert, Low ch
4949.050	29.3	4.7	2.3	80.0	-6.8	0.0	Vert	AV	0.0	27.2	54.0	-26.8	EUT/Ant. vert, High ch
4951.358	41.5	4.7	1.5	96.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	EUT/Ant. vert, High ch
4810.867	41.2	4.8	1.5	165.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	EUT/Ant. vert, Low ch

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.06.24.0
PSA-ESCI 2021.03.17.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
4952.383	41.2	4.7	2.3	80.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	EUT/Ant. vert, High ch
4808.150	41.0	4.9	1.5	275.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	EUT/Ant. vert, Low ch
12027.260	34.0	-1.5	3.4	51.0	-6.8	0.0	Horz	AV	0.0	25.7	54.0	-28.3	EUT/Ant. vert, Low ch
4882.367	40.8	4.7	1.5	0.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT/Ant. vert, Mid ch
4881.242	40.7	4.7	1.5	102.0	0.0	0.0	Horz	PK	0.0	45.4	74.0	-28.6	EUT/Ant. vert, Mid ch
12027.390	43.6	-1.5	3.4	51.0	0.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	EUT/Ant. vert, Low ch
12022.630	30.0	-1.5	1.5	6.0	-6.8	0.0	Vert	AV	0.0	21.7	54.0	-32.3	EUT/Ant. vert, Low ch
12202.180	28.9	-0.5	1.5	229.0	-6.8	0.0	Vert	AV	0.0	21.6	54.0	-32.4	EUT/Ant. vert, Mid ch
12199.700	28.9	-0.6	1.5	45.0	-6.8	0.0	Horz	AV	0.0	21.5	54.0	-32.5	EUT/Ant. vert, Mid ch
12372.580	28.4	-0.7	1.5	270.0	-6.8	0.0	Horz	AV	0.0	20.9	54.0	-33.1	EUT/Ant. vert, High ch
12373.440	28.3	-0.7	1.3	268.0	-6.8	0.0	Vert	AV	0.0	20.8	54.0	-33.2	EUT/Ant. vert, High ch
12027.080	41.9	-1.5	1.5	6.0	0.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	EUT/Ant. vert, Low ch
12198.230	40.3	-0.6	1.5	229.0	0.0	0.0	Vert	PK	0.0	39.7	74.0	-34.3	EUT/Ant. vert, Mid ch
12201.000	40.1	-0.6	1.5	45.0	0.0	0.0	Horz	PK	0.0	39.5	74.0	-34.5	EUT/Ant. vert, Mid ch
12376.510	39.5	-0.6	1.5	270.0	0.0	0.0	Horz	PK	0.0	38.9	74.0	-35.1	EUT/Ant. vert, High ch
12377.340	39.1	-0.6	1.3	268.0	0.0	0.0	Vert	PK	0.0	38.5	74.0	-35.5	EUT/Ant. vert, High ch

CONCLUSION
Pass

Tested By

APPENDIX

January 23, 2014

Ref: WirelessHART Maximum Duty Cycle over a 100 ms and 1 second window

Dust WirelessHART compliant radios operate on a TDMA time schedule consisting of a continuous sequence of a minimum of 10 ms timeslots. In each timeslot radio's will do one of the following:

1) Remain inactive
2) Transmit a packet and potentially receive an acknowledge
3) Potentially receive a packet and transmit an acknowledge

When transmitting a packet, transmission duration during a timeslot varies as a function of the payload, with a maximum of 128 bytes. When receiving a packet the transmitted acknowledgement will be a maximum of 27 bytes. During network operation radios receive three times, for every transmit slot, and as a result the maximum possible duty cycle is created with the following sequence:

1) Transmit
2) Acknowledge
3) Acknowledge
4) Acknowledge
5) Transmit
6) Acknowledge
7) Acknowledge
8) Acknowledge
9) Transmit
10) Acknowledge
11) Acknowledge
12) Acknowledge
13) Transmit

A radio transmit consists of 4 stages:

1) Initialization: radio is prepared for transmit (transmitter is off)
2) Ramp up: transmitter is ramped to peak power
3) Transmit: from 0 to 128 bytes of data maximum + 5 bytes preamble/SFD
4) Ramp down: radio transmitter is turned off,

Where the data rate is 250 kbps +/- 40 ppm, or 32 us/byte.

Ramp up and ramp down of the takes 77 us. Given the frequency of the messages the maximum duty time the radio can be transmitting over a 100 ms is:

Max Tx on = 3*Transmit [128 bytes] + 7*Acknowledge
= 3*[(128+5)*32us + 77us] + 7*[(24+5)*32us + 77us]
= 3*[4.333 ms] + 7*[1.101 ms]
= 20.706 ms

Maximum duty cycle in a 100 ms window is therefore:

27.241 ms on / 100 ms = 20.706 %

Given the frequency of the messages the maximum duty time the radio can be transmitting over a 1 second is:

Max Tx on = 25*Transmit [128 bytes] + 75*Acknowledge
= 25*[(128+5)*32us + 77us] + 75*[(24+5)*32us + 77us]
= 25*[4.333 ms] + 75*[1.101 ms]
= 190.9 ms

Maximum duty cycle in a 1 s window is therefore:

190.9 ms on / 1000 ms = 19.09 %

For reference a zero span capture of a 128 byte packet followed by three acknowledges and a 2nd 128 byte packet is shown in Figure 1:.

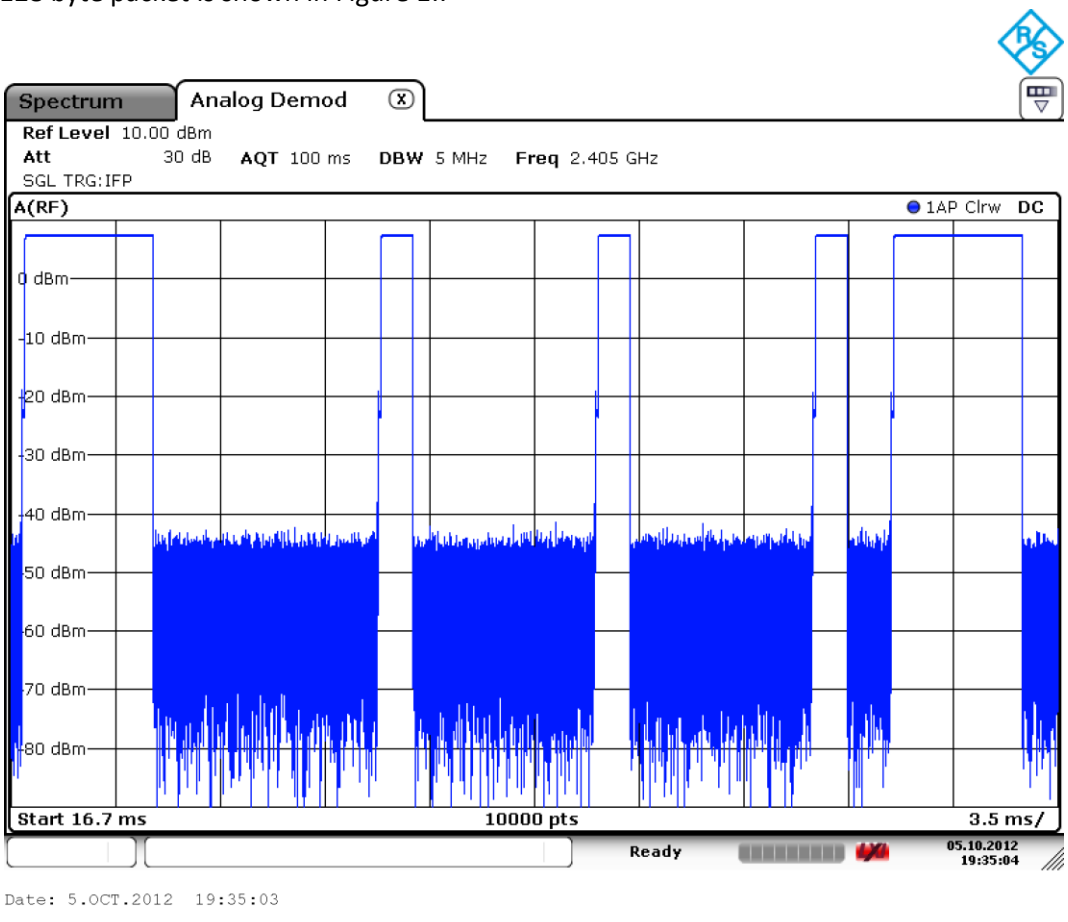


Figure 1: WirelessHART Radio Timeslot transmission sequence Tx, Ack, Ack, Ack, Tx

Sincerely yours,

Gordon Charles
Director of VLSI / Hardware
Dust Networks, Inc.

End of Test Report