



Emerson Process Management
VN210 radio module in Model 781F host device

FCC 15.247:2018
2.4 GHz DTS Radio

Report # EMPM0050.1



NVLAP LAB CODE: 200881-0



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CERTIFICATE OF TEST



Last Date of Test: September 27, 2018
Emerson Process Management
VN210 radio module in Model 781F host device

Radio Equipment Testing

Standards

| Specification | Method |
|-----------------|------------------------------|
| FCC 15.247:2018 | ANSI C63.10:2013, KDB 558074 |

Results

| Method Clause | Test Description | Applied | Results | Comments |
|-------------------------------|-------------------------------|---------|---------|---|
| 6.2 | Powerline Conducted Emissions | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.12.1, 11.13.2, 6.5, 6.6 | Spurious Radiated Emissions | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.6 | Duty Cycle | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.8.2 | Occupied Bandwidth | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.9.1.1 | Output Power | Yes | Pass | Testing completed in new host with variation in DC Voltage to verify continuing compliance. |
| 11.10.2 | Power Spectral Density | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.11 | Band Edge Compliance | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |
| 11.11 | Spurious Conducted Emissions | No | N/A | Testing covered under original grant for FCC ID:2AKZ5-CDSVN210ISA |

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

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

REVISION HISTORY



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

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

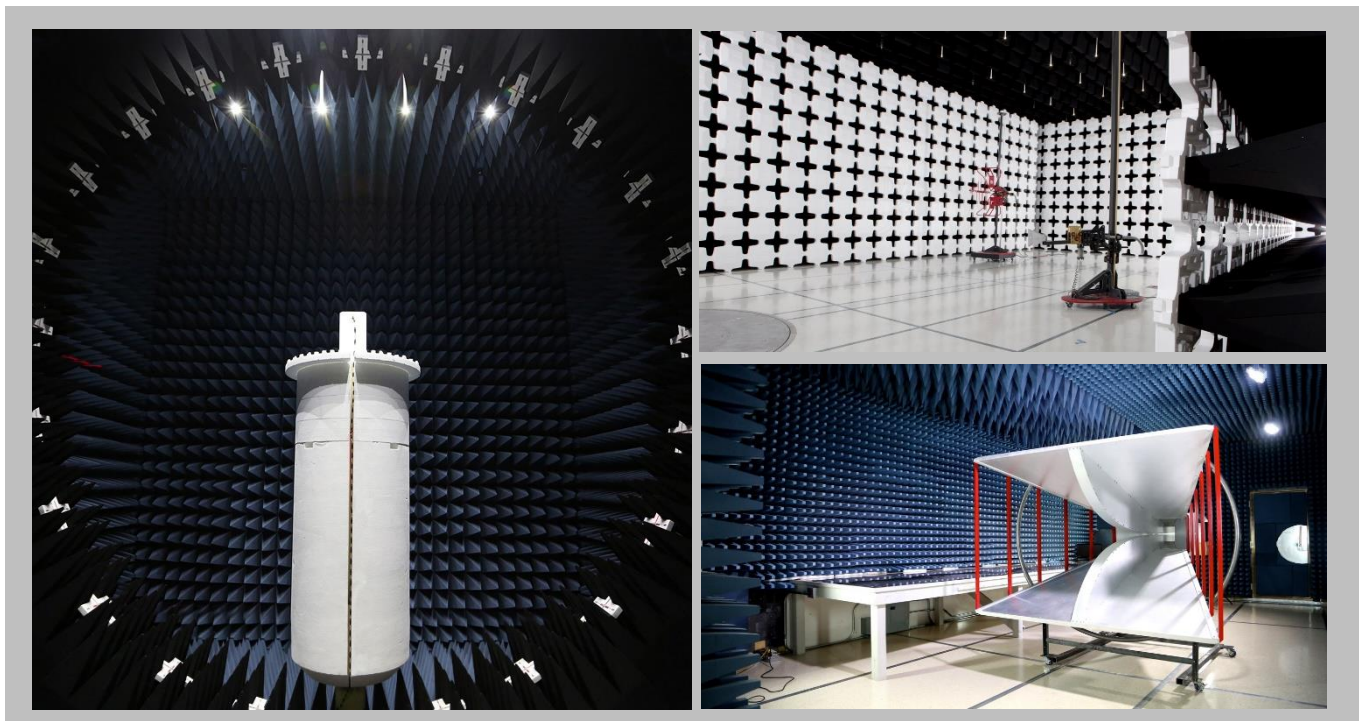
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



| | | | | | |
|---|---|--|---|--|---|
| California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918 | Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136 | New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214 | Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066 | Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255 | Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600 |
| NVLAP | | | | | |
| NVLAP Lab Code: 200676-0 | NVLAP Lab Code: 200881-0 | NVLAP Lab Code: 200761-0 | NVLAP Lab Code: 200630-0 | NVLAP Lab Code:201049-0 | NVLAP Lab Code: 200629-0 |
| Innovation, Science and Economic Development Canada | | | | | |
| 2834B-1, 2834B-3 | 2834E-1, 2834E-3 | N/A | 2834D-1, 2834D-2 | 2834G-1 | 2834F-1 |
| BSMI | | | | | |
| SL2-IN-E-1154R | SL2-IN-E-1152R | N/A | SL2-IN-E-1017 | SL2-IN-E-1158R | SL2-IN-E-1153R |
| VCCI | | | | | |
| A-0029 | A-0109 | N/A | A-0108 | A-0201 | A-0110 |
| Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA | | | | | |
| US0158 | US0175 | N/A | US0017 | US0191 | US0157 |



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

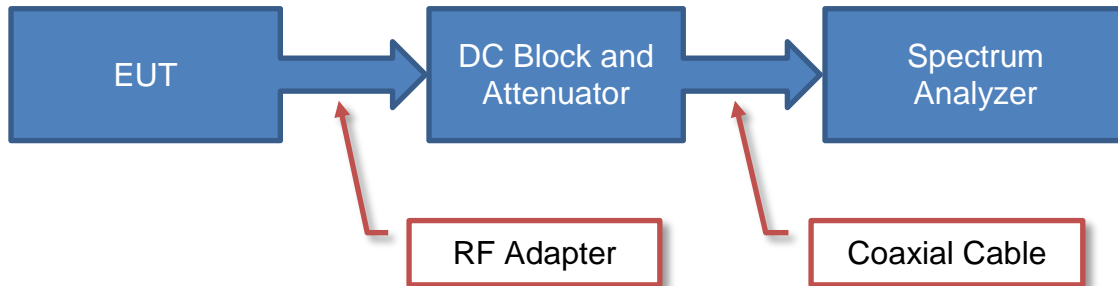
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

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

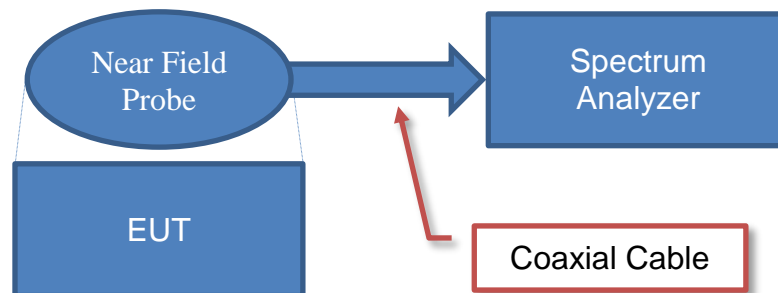
| Test | + MU | - MU |
|---------------------------------------|---------|----------|
| Frequency Accuracy (Hz) | 0.0007% | -0.0007% |
| Amplitude Accuracy (dB) | 1.2 dB | -1.2 dB |
| Conducted Power (dB) | 0.3 dB | -0.3 dB |
| Radiated Power via Substitution (dB) | 0.7 dB | -0.7 dB |
| Temperature (degrees C) | 0.7°C | -0.7°C |
| Humidity (% RH) | 2.5% RH | -2.5% RH |
| Voltage (AC) | 1.0% | -1.0% |
| Voltage (DC) | 0.7% | -0.7% |
| Field Strength (dB) | 5.2 dB | -5.2 dB |
| AC Powerline Conducted Emissions (dB) | 2.4 dB | -2.4 dB |

Test Setup Block Diagrams

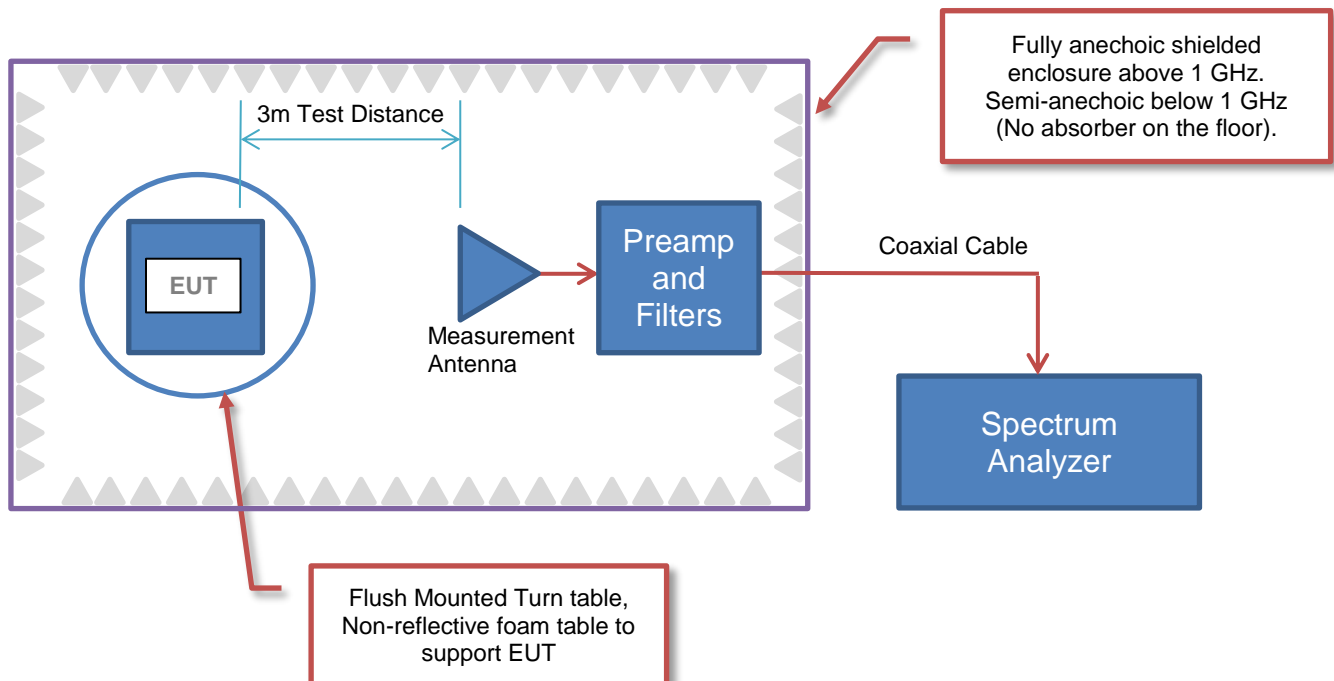
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

| | |
|---------------------------------|--|
| Company Name: | Emerson Process Management |
| Address: | 8200 Market Blvd. MS SC3L |
| City, State, Zip: | Chanhassen, MN 55317 |
| Test Requested By: | Merritt Pulkrabek |
| Model: | VN210 radio module in Model 781F host device |
| First Date of Test: | September 27, 2018 |
| Last Date of Test: | September 27, 2018 |
| Receipt Date of Samples: | September 27, 2018 |
| Equipment Design Stage: | Production |
| Equipment Condition: | No Damage |
| Purchase Authorization: | Verified |

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

2.4 GHz DTS radio "field link" device used to extend a wireless field network.

Testing Objective:

To demonstrate compliance of the 2.4 GHz DTS radio to FCC 15.247 requirements through a Class 2 Permissive Change (C2PC) to the limited modular approval under FCC ID:2AKZ5-CDSVN210ISA.

CONFIGURATIONS

Configuration EMPM0050- 1

| EUT | | | |
|-----------------------|----------------------------|-------------------|---------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Radio Module | Control Data Systems | VN210 | Unknown |
| Field Link Model 781F | Emerson Process Management | 781A1D1I5WA3WM3 | 0688512 |

| Peripherals in test setup boundary | | | |
|-------------------------------------|----------------------------|-------------------|---------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Smart Wireless Gateway | Emerson Process Management | 1410D2ADWNANA | 0002585 |
| Laptop | Dell | Latitude 7480 | 5GTMGH2 |
| AC Adapter (Smart Wireless Gateway) | Volgen | KTPS10-24005WA | 1410-6 |

| Cables | | | | | |
|-----------------------------------|--------|------------|---------|---------------------------|-------------------------------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| I/O Cable | Yes | 1.4 m | No | 781 Field Link Model 781F | Smart Wireless Gateway |
| DC Power (Smart Wireless Gateway) | No | 1.4 m | Yes | Smart Wireless Gateway | AC Adapter (Smart Wireless Gateway) |
| Ethernet Cable | No | 2.1 m | No | Smart Wireless Gateway | Laptop |
| Power Cable | No | >3.0 m | No | 781 Field Link Model 781F | R166 |

MODIFICATIONS



Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|------|------------|--------------|--------------------------------------|---|----------------------------------|
| 1 | 2018-09-27 | Output Power | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

OUTPUT POWER



XMit 2017.12.13

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 |
|-------------------------------|------------------------|-----------------|------|-----------|-----------|
| Harmonics/Flicker Test System | California Instruments | PACS-1 | R167 | 31-Jul-18 | 31-Jul-19 |
| Power Source | California Instruments | X5K10C4Y01200 | R166 | 27-Dec-17 | 27-Dec-18 |
| Meter - Multimeter | Fluke | 117 | MLS | 23-Jan-17 | 23-Jan-20 |
| Generator - Signal | Agilent | E4422B | TGQ | 15-Mar-18 | 15-Mar-21 |
| Cable | ESM Cable Corp. | TTBJ141 KMKM-72 | MNU | 15-Mar-18 | 15-Mar-19 |
| Block - DC | Fairview Microwave | SD3379 | AMI | 7-Sep-18 | 7-Sep-19 |
| Attenuator | S.M. Electronics | SA26B-20 | RFW | 13-Feb-18 | 13-Feb-19 |
| Analyzer - Spectrum Analyzer | Keysight | N9010A (EXA) | AFQ | 19-Dec-17 | 19-Dec-18 |

TEST DESCRIPTION

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

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

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

De Facto EIRP Limit: The EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER



TbTx 2018.06.19 XMt 2017.12.13

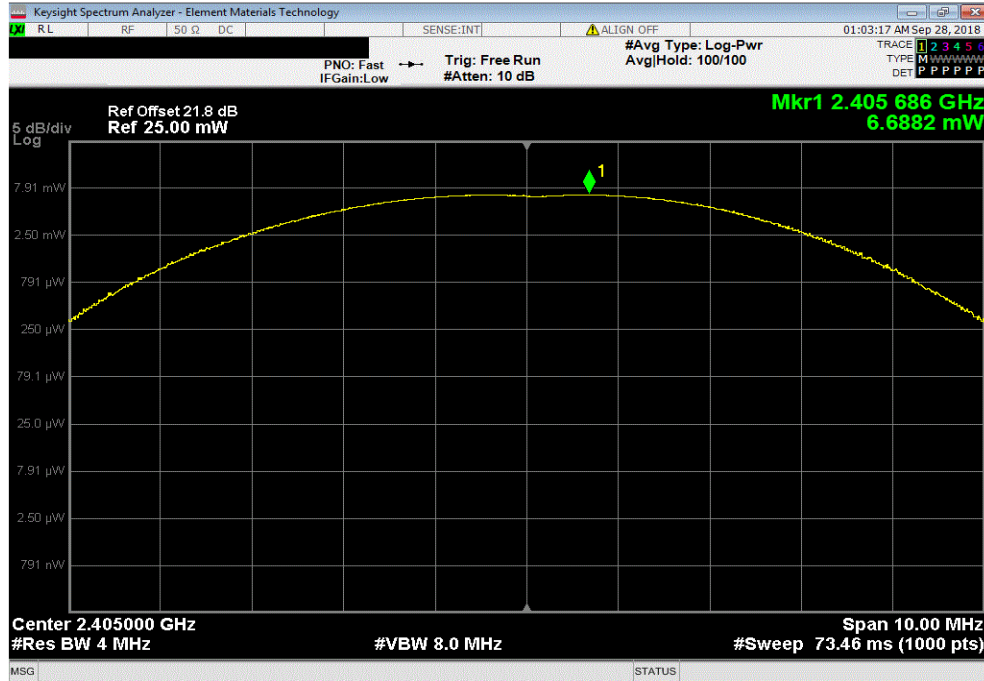
| | | | |
|--|---------------------------|--------------------------------|------------------|
| EUT: VN210 radio module in Model 781F host | | Work Order: EMPM0050 | |
| Serial Number: 0688512 | | Date: 27-Sep-18 | |
| Customer: Emerson Process Management | | Temperature: 22.8 °C | |
| Attendees: Elizabeth Reiersen, Merritt Pulkrabek | | Humidity: 40.9% RH | |
| Project: None | | Barometric Pres.: 1012 mbar | |
| Tested by: Kyle McMullan | | Power: 24VDC | |
| | | Job Site: MN08 | |
| TEST SPECIFICATIONS | | Test Method | |
| FCC 15.247:2018 | | ANSI C63.10:2013 | |
| COMMENTS | | | |
| Grant is for 11.77 mW. | | | |
| DEVIATIONS FROM TEST STANDARD | | | |
| None | | | |
| Configuration # | 1 | Signature <i>Kyle McMullan</i> | |
| | | Value | Limit (<) Result |
| 802.15.4 Low Channel, 2405 MHz | | | |
| | Extreme Voltage 8.925 VDC | 6.688 mW | 1 W Pass |
| | Nominal Voltage 24 VDC | 6.62 mW | 1 W Pass |
| | Extreme Voltage 34.5 VDC | 6.605 mW | 1 W Pass |
| 802.15.4 Mid Channel, 2440 MHz | | | |
| | Extreme Voltage 8.925 VDC | 6.138 mW | 1 W Pass |
| | Nominal Voltage 24 VDC | 6.074 mW | 1 W Pass |
| | Extreme Voltage 34.5 VDC | 6.105 mW | 1 W Pass |
| 802.15.4 High Channel, 2475 MHz | | | |
| | Extreme Voltage 8.925 VDC | 5.395 mW | 1 W Pass |
| | Nominal Voltage 24 VDC | 5.378 mW | 1 W Pass |
| | Extreme Voltage 34.5 VDC | 5.52 mW | 1 W Pass |

OUTPUT POWER

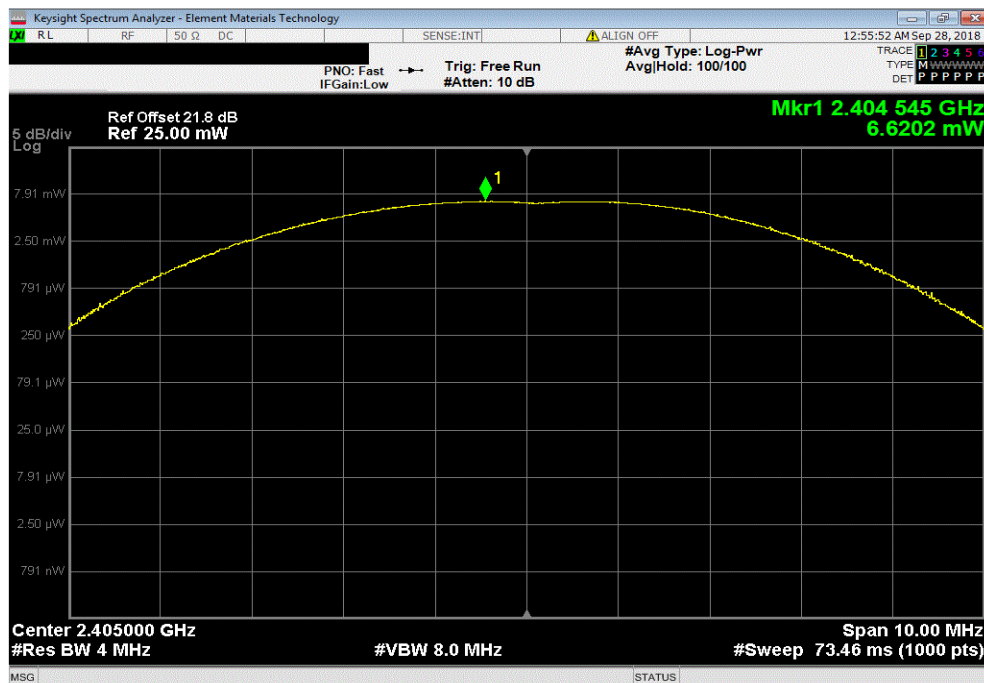


TbTx 2018.06.19 XMI 2017.12.13

| 802.15.4 Low Channel, 2405 MHz, Extreme Voltage 8.925 VDC | | | | | | |
|---|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.688 mW | 1 W | Pass |



| 802.15.4 Low Channel, 2405 MHz, Nominal Voltage 24 VDC | | | | | | |
|--|--|--|--|---------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.62 mW | 1 W | Pass |

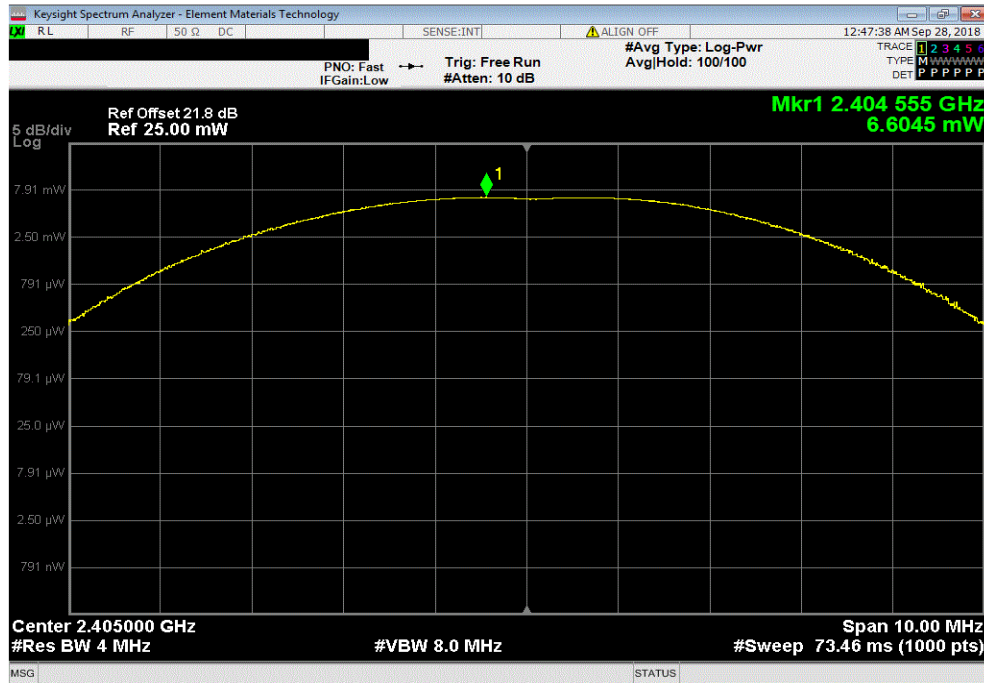


OUTPUT POWER

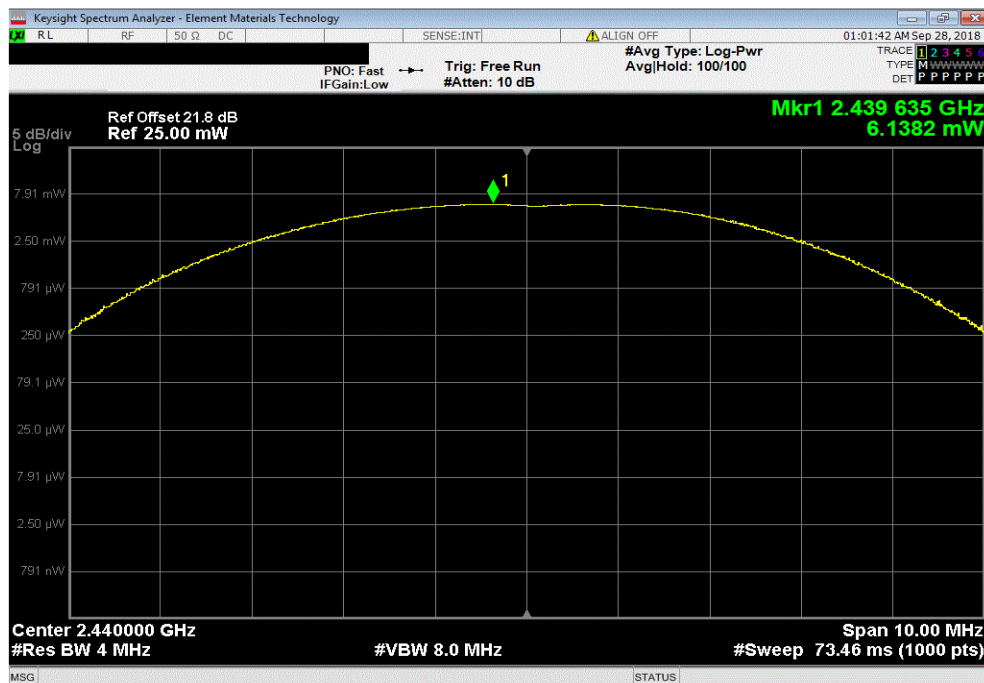


TbTx 2018.06.19 XMI 2017.12.13

| 802.15.4 Low Channel, 2405 MHz, Extreme Voltage 34.5 VDC | | | | | | |
|--|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.605 mW | 1 W | Pass |



| 802.15.4 Mid Channel, 2440 MHz, Extreme Voltage 8.925 VDC | | | | | | |
|---|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.138 mW | 1 W | Pass |

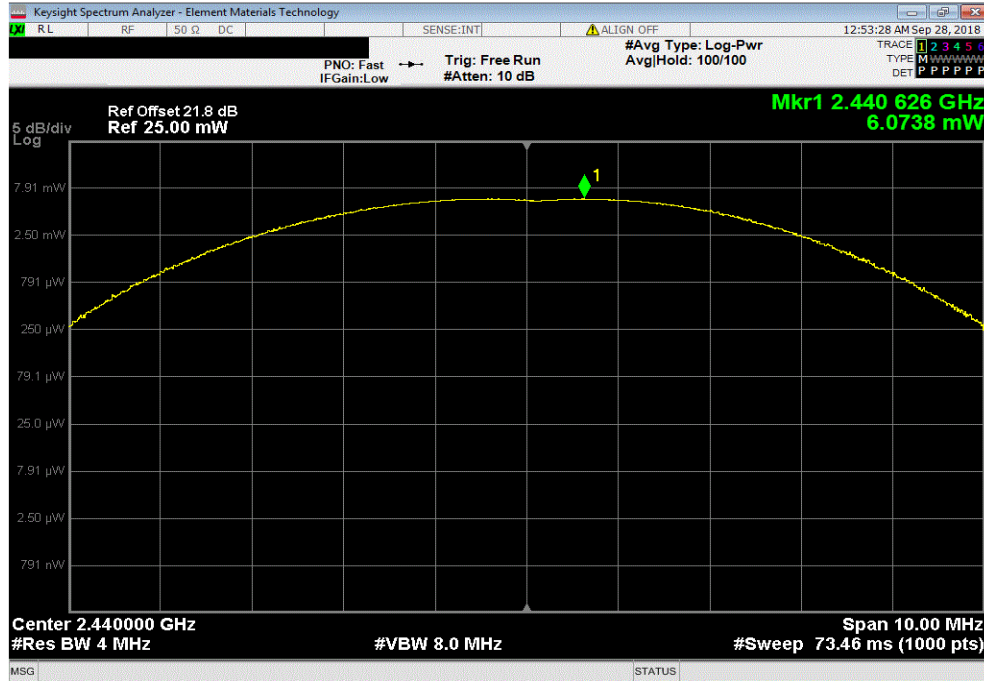


OUTPUT POWER

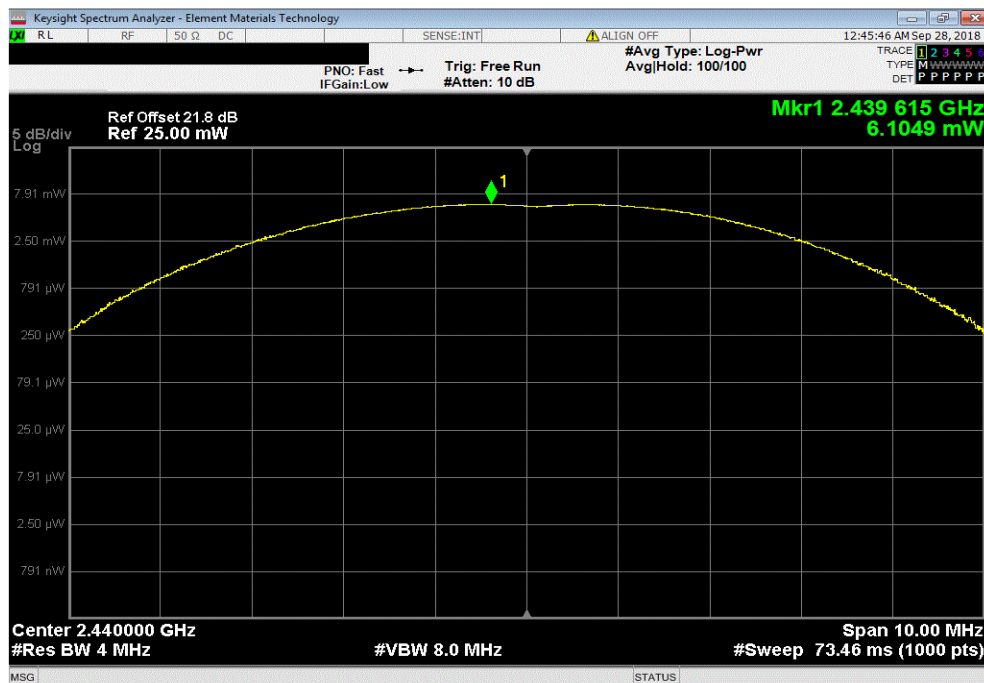


TbTx 2018.06.19 XMI 2017.12.13

| 802.15.4 Mid Channel, 2440 MHz, Nominal Voltage 24 VDC | | | | | | |
|--|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.074 mW | 1 W | Pass |



| 802.15.4 Mid Channel, 2440 MHz, Extreme Voltage 34.5 VDC | | | | | | |
|--|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 6.105 mW | 1 W | Pass |

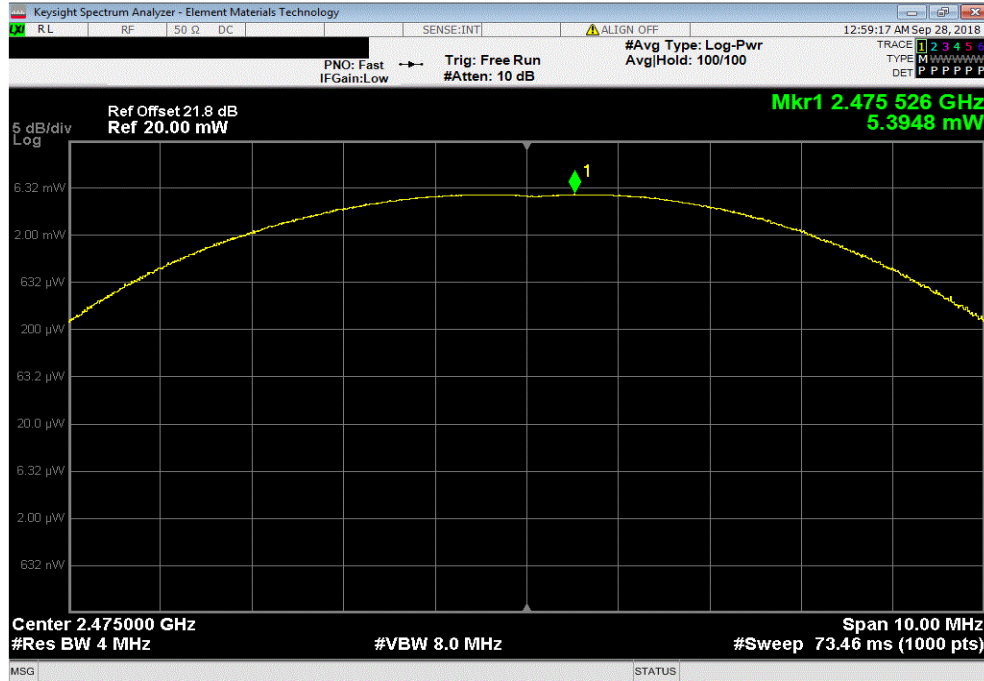


OUTPUT POWER

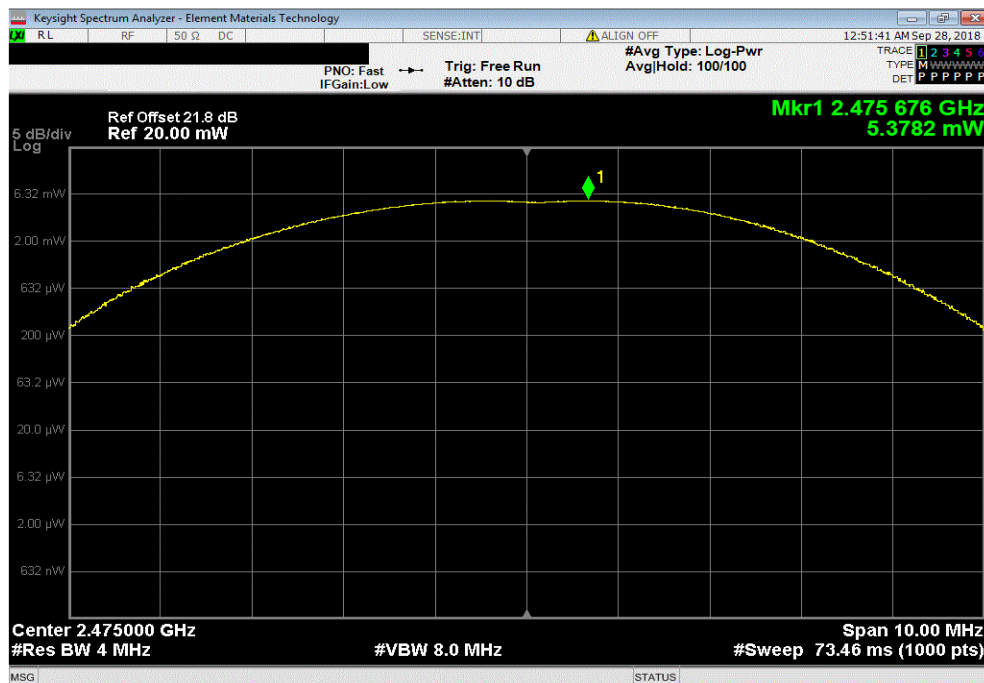


TbTx 2018.06.19 XMI 2017.12.13

| 802.15.4 High Channel, 2475 MHz, Extreme Voltage 8.925 VDC | | | | | | |
|--|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 5.395 mW | 1 W | Pass |



| 802.15.4 High Channel, 2475 MHz, Nominal Voltage 24 VDC | | | | | | |
|---|--|--|--|----------|-------|--------|
| | | | | Value | Limit | Result |
| | | | | 5.378 mW | 1 W | Pass |



OUTPUT POWER



TbTx 2018.06.19 XMI 2017.12.13

| | | | | | | |
|---|--|--|--|---------|-------|--------|
| 802.15.4 High Channel, 2475 MHz, Extreme Voltage 34.5 VDC | | | | | | |
| | | | | Value | Limit | Result |
| | | | | 5.52 mW | 1 W | Pass |

