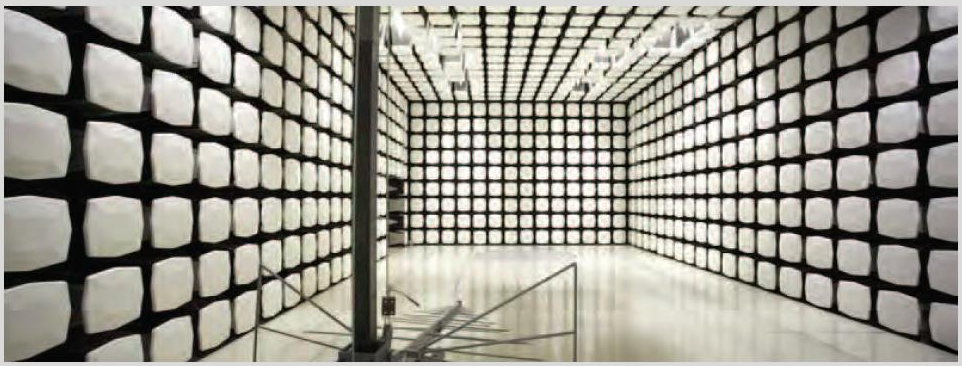
# Garrett Metal Detectors

## ACE Apex

## 2.4 GHz Transceiver
## FCC 15.247:2020

**Report: GARR0079.4, Issue Date: September 17, 2020**



NVLAP LAB CODE: 201049-0

# CERTIFICATE OF TEST

**Last Date of Test: June 5, 2020**
**Garrett Metal Detectors**
**EUT: ACE Apex**

## Radio Equipment Testing

### Standards

| Specification | Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013, KDB 558074 |

### Results

| Method Clause | Test Description | Applied | Results | Comments |
|---|---|---|---|---|
| 6.2 | Powerline Conducted Emissions (Transmitter) | No | N/A | Not required for a battery powered EUT. |
| 6.5, 6.6, 11.12.1, 11.13.2 | Spurious Radiated Emissions | Yes | Pass | |
| 11.6 | Duty Cycle | Yes | Pass | |
| 7.8.2 | Carrier Frequency Separation | No | N/A | Not required for DTS devices. |
| 7.8.3 | Number of Hopping Frequencies | No | N/A | Not required for DTS devices. |
| 7.8.4 | Dwell Time | No | N/A | Not required for DTS devices. |
| 11.9.1.1 | Output Power | Yes | Pass | |
| 11.9.1.1 | Equivalent Isotropic Radiated Power | Yes | Pass | |
| 11.11 | Band Edge Compliance | Yes | Pass | |
| 7.8.6 | Band Edge Compliance - Hopping Mode | No | N/A | Not required for DTS devices. |
| 11.8.2 | Occupied Bandwidth | Yes | Pass | |
| 11.11 | Spurious Conducted Emissions | Yes | Pass | |
| 11.10.2 | Power Spectral Density | Yes | Pass | |

### Deviations From Test Standards

None

### Approved By:

*Adam Bruno, 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) and as a CAB for the acceptance of test data.

## European Union

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

## Australia/New Zealand

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

## Korea

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

## Japan

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

## Taiwan

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

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

## Singapore

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

## Israel

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

## Hong Kong

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

## Vietnam

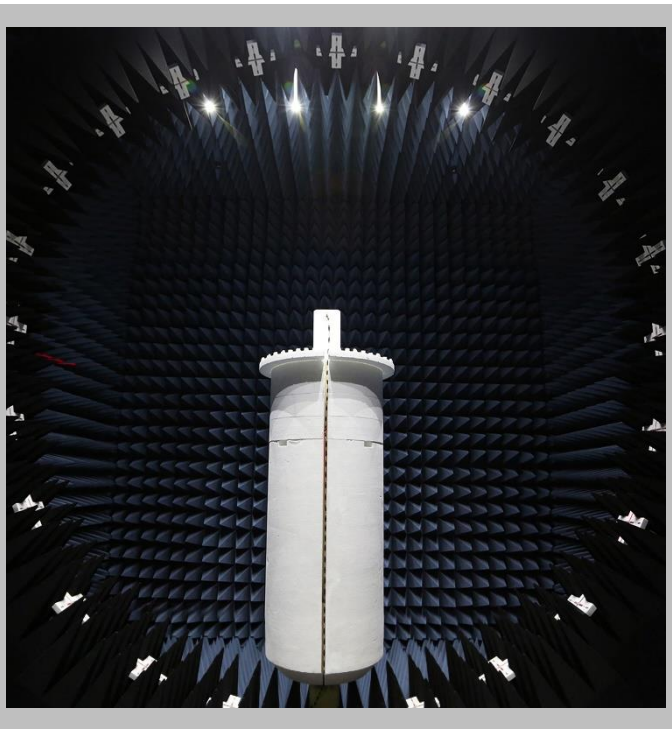
**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

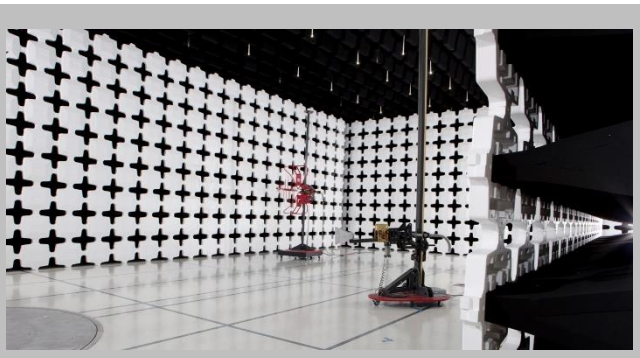
## SCOPE

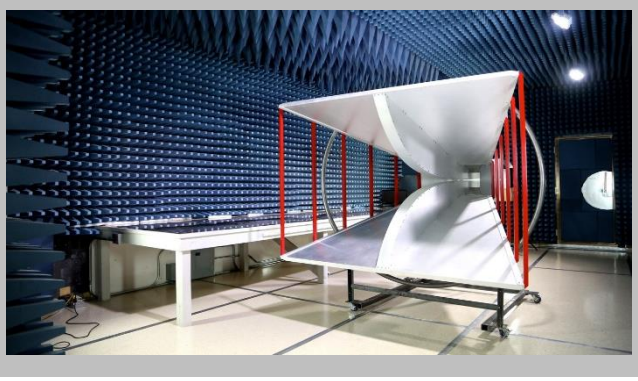
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

# FACILITIES

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







# 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.

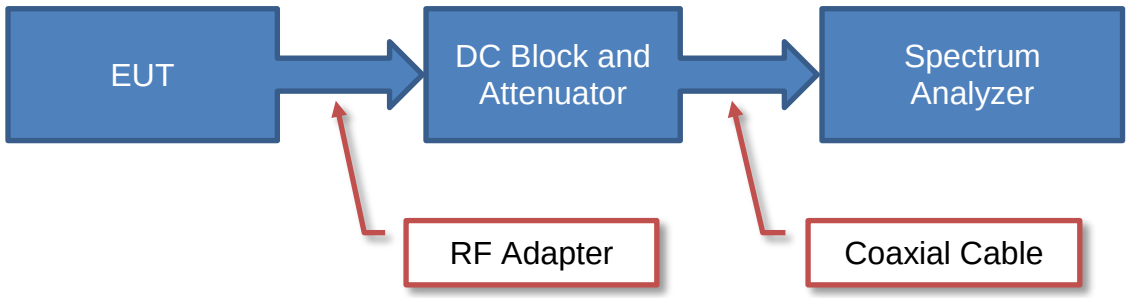
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

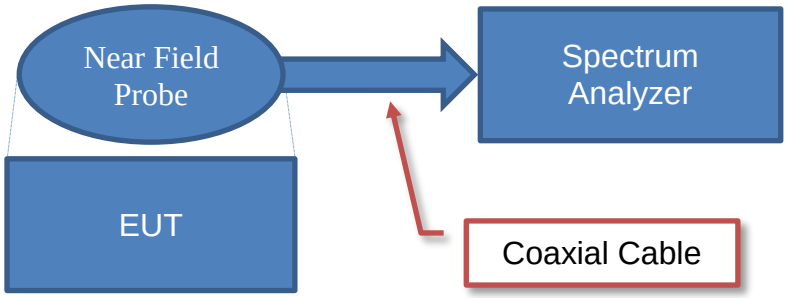
| Test | + MU | - MU |
|---|---|---|
| Frequency Accuracy | 0.0007% | -0.0007% |
| Amplitude Accuracy (dB) | 1.2 dB | -1.2 dB |
| Conducted Power (dB) | 1.2 dB | -1.2 dB |
| Radiated Power via Substitution (dB) | 0.7 dB | -0.7 dB |
| Temperature (degrees C) | 0.7°C | -0.7°C |
| Humidity (% RH) | 2.5% 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

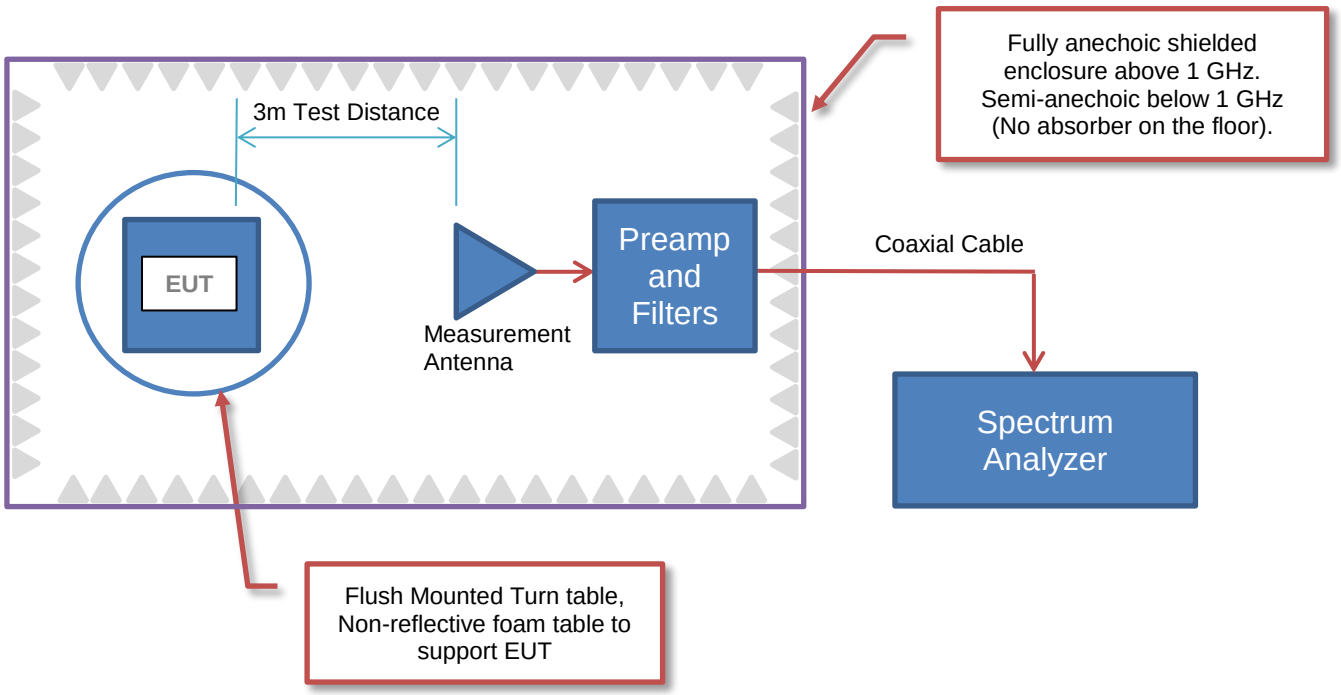
## Antenna Port Conducted Measurements




## Near Field Test Fixture Measurements




## Spurious Radiated Emissions



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

| | |
|---|---|
| **Company Name:** | Garrett Metal Detectors |
| **Address:** | 1881 W. State Street |
| **City, State, Zip:** | Garland, TX 75042 |
| **Test Requested By:** | Bob Podhrasky |
| **EUT:** | ACE Apex |
| **First Date of Test:** | June 4, 2020 |
| **Last Date of Test:** | June 5, 2020 |
| **Receipt Date of Samples:** | June 4, 2020 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |
| **Purchase Authorization:** | Verified |

## Information Provided by the Party Requesting the Test

| **Functional Description of the EUT:** |
|---|
| Metal Detector |

| **Testing Objective:** |
|---|
| Seeing to demonstrate compliance under FCC 15.247:2020 for operation in the 2400 – 2483.5 MHz band. |

# CONFIGURATIONS

## Configuration GARR0077- 1

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Programming Software | V.101 |

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Metal Detector | Garrett Metal Detectors | ACE Apex | None |
| Metal Detector Antenna | Garrett Metal Detectors | None | D7 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| DC Power Supply | Mastech | HY1803D | None |
| I/O Programmer | Texas Instruments | None | None |
| Laptop | Acer | ZG5 | 09-0053 |
| Mouse | Dell | MS116T1 | CN-OPRDV9-L0300-934-0IOD |
| AC/DC Adapter (Laptop) | Delta Electronics, Inc. | ADP-30JH B | 202W91502BN |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| DC Leads | No | 1.0m | No | Metal Detector | DC Power Supply |
| AC Cable (DC Power Supply) | No | 2.5m | No | DC Power Supply | AC Mains |
| Programming Cable | No | .1m | No | Metal Detector | Programmer |
| Programmer USB | Yes | 1.5m | No | Laptop | Programmer |
| USB Mouse Cable | Yes | 2.0m | No | Mouse | Laptop |
| AC Cable (Laptop Adapter) | No | 2.0m | No | AC Mains | AC/DC Adapter |
| DC Cable (Laptop Adapter) | No | 2.0m | No | AC/DC Adapter | Laptop |

# CONFIGURATIONS

## Configuration GARR0077- 2

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Programming Software | V.101 |

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Metal Detector | Garrett Metal Detectors | ACE Apex | None |
| Metal Detector Antenna | Garrett Metal Detectors | None | D7 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| I/O Programmer | Texas Instruments | None | None |
| Laptop | Acer | ZG5 | 09-0053 |
| Mouse | Dell | MS116T1 | CN-OPRDV9-L0300-934-0IOD |
| AC/DC Adapter (Laptop) | Delta Electronics, Inc. | ADP-30JH B | 202W91502BN |
| AC/DC Wall Power Adapter | POWER ADAPTER | US2018 | E500295 |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| Programming Cable | No | .1m | No | Metal Detector | Programmer |
| Programmer USB | Yes | 1.5m | No | Laptop | Programmer |
| USB Mouse Cable | Yes | 2.0m | No | Mouse | Laptop |
| AC Cable (Laptop Adapter) | No | 2.0m | No | AC Mains | AC/DC Adapter |
| DC Cable (Laptop Adapter) | No | 2.0m | No | AC/DC Adapter | Laptop |
| USB DC Power | Yes | 1.5m | No | DC Power Brick | Metal Detector |
| Metal Detector Antenna Cable | Yes | 2.5m | No | Antenna | Metal Detector Head |

# MODIFICATIONS

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 2020-06-04 | Output Power | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 2 | 2020-06-04 | 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. |
| 3 | 2020-06-04 | 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. |
| 4 | 2020-06-05 | Band Edge Compliance | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 5 | 2020-06-05 | 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. |
| 6 | 2020-06-05 | Spurious Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 7 | 2020-06-05 | Power Spectral Density | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Element following the test. |
| 8 | 2020-06-05 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2020.04.03.0

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

**MODES OF OPERATION**

Continuously transmitting at Low channel 2406 MHz
Continuously transmitting at Mid channel 2438 MHz
Continuously transmitting at High channel 2474 MHz

**POWER SETTINGS INVESTIGATED**

4.0 VDC

**CONFIGURATIONS INVESTIGATED**

GARR0077 - 2
GARR0077 - 1

**FREQUENCY RANGE INVESTIGATED**

| Start Frequency | 30 MHz | Stop Frequency | 26000 MHz |
|---|---|---|---|

**SAMPLE CALCULATIONS**

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Filter - High Pass | Micro-Tronics | HPM50108 | HGD | 2019-09-18 | 12 mo |
| Amplifier - Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | PAK | 2019-09-18 | 12 mo |
| Cable | Northwest EMC | 8-18GHz | TXD | 2020-05-14 | 12 mo |
| Amplifier - Pre-Amplifier | Miteq | AMF-3D-00100800-32-13P | PAJ | 2020-06-02 | 12 mo |
| Cable | Northwest EMC | 1-8.2 GHz | TXC | 2020-06-02 | 12 mo |
| Antenna - Double Ridge | ETS Lindgren | 3115 | AJL | 2018-10-11 | 24 mo |
| Analyzer - Spectrum Analyzer | Agilent | E4446A | AAQ | 2020-05-07 | 12 mo |
| Amplifier - Pre-Amplifier | Fairview Microwave | FMAM63001 | PAS | 2020-05-28 | 12 mo |
| Amplifier - Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | PAL | 2019-09-18 | 12 mo |
| Amplifier - Pre-Amplifier | Miteq | JSDWK42-18004000-60-5P | PAM | 2019-09-20 | 12 mo |
| Cable | Northwest EMC | N/A | TXE | 2019-09-20 | 12 mo |
| Antenna - Standard Gain | ETS Lindgren | 3160-07 | AJF | NCR | 0 mo |
| Antenna - Standard Gain | ETS Lindgren | 3160-08 | AJG | NCR | 0 mo |
| Attenuator | WeinSchel Corp | 4H-20 | AWB | 2020-03-11 | 12 mo |
| Cable | Northwest EMC | RE 9kHz - 1GHz | TXB | 2020-05-28 | 12 mo |
| Antenna - Biconilog | Teseq | CBL 6141B | AYD | 2020-02-05 | 24 mo |

**TEST DESCRIPTION**

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

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

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

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

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

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

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

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

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

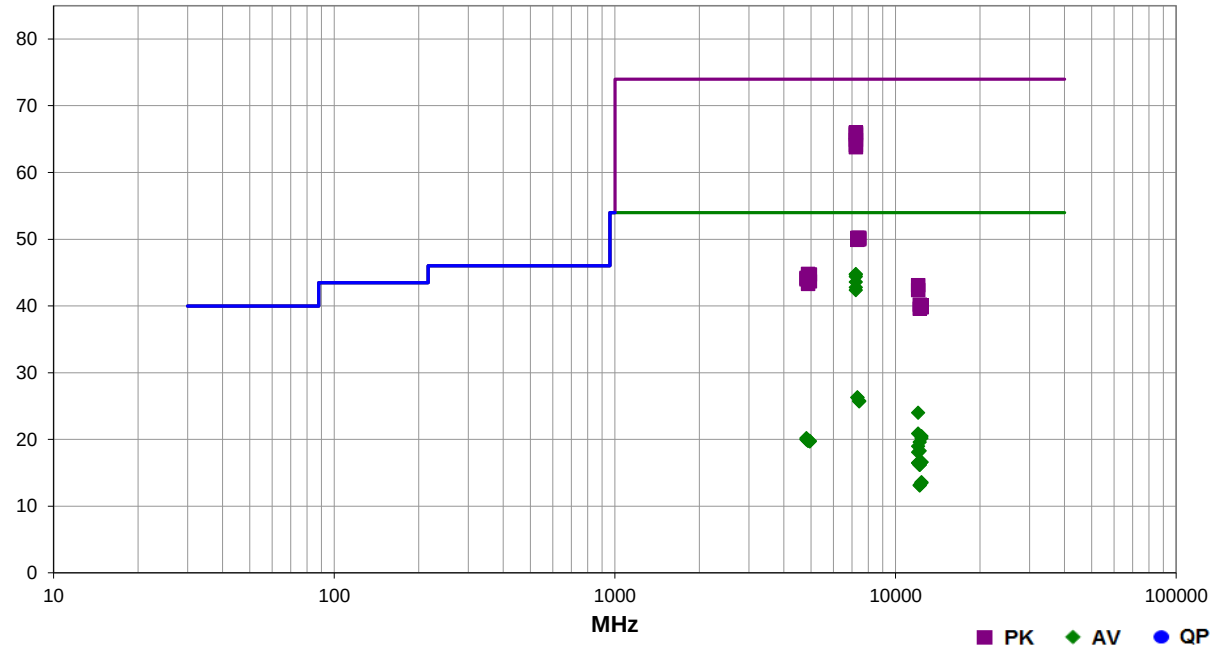
# SPURIOUS RADIATED EMISSIONS

EmiR5 2020.04.20.0 PSA-ESCI 2020.04.03.0

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | GARR0077 | **Date:** | 2020-06-04 | | |
| **Project:** | None | **Temperature:** | 21.9 °C | | |
| **Job Site:** | TX02 | **Humidity:** | 53.7% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Marty Martin, Brandon Hobbs |
| **EUT:** | ACE Apex | | | | |
| **Configuration:** | 1,2 | | | | |
| **Customer:** | Garrett Metal Detectors | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 4.0 VDC | | | | |
| **Operating Mode:** | Continuously transmitting at 100% duty cycle Low channel 2406 MHz, Mid channel 2438 MHz, and High channel 2474 MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | EUT charging via USB adapter, Per the KDB 558074 Guidance, when operating in normal DTS mode, the worst-case duty cycle inside any 100 ms period is 22%. Therefore, the downward DCCF correction applied based on 20*log(On Time(.6 us)/(2.72 ms) Pulse Period length) = -13.13. Total correction applied = -13.13. | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |

| **Run #** | 25 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1 to 4(m) | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor (dB) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7218.268 | 56.3 | 9.7 | 2.9 | 313.0 | 0.0 | 0.0 | Vert | PK | 0.0 | 66.0 | 74.0 | -8.0 |
| 7218.383 | 56.2 | 9.7 | 1.3 | 349.0 | 0.0 | 0.0 | Horz | PK | 0.0 | 65.9 | 74.0 | -8.1 |
| 7218.383 | 56.0 | 9.7 | 1.5 | 96.0 | 0.0 | 0.0 | Horz | PK | 0.0 | 65.7 | 74.0 | -8.3 |
| 7218.413 | 55.2 | 9.7 | 1.7 | 262.9 | 0.0 | 0.0 | Vert | PK | 0.0 | 64.9 | 74.0 | -9.1 |
| 7218.408 | 48.2 | 9.7 | 2.9 | 313.0 | -13.1 | 0.0 | Vert | AV | 0.0 | 44.8 | 54.0 | -9.2 |
| 7218.347 | 48.1 | 9.7 | 1.3 | 349.0 | -13.1 | 0.0 | Horz | AV | 0.0 | 44.7 | 54.0 | -9.3 |
| 7218.413 | 47.8 | 9.7 | 1.5 | 96.0 | -13.1 | 0.0 | Horz | AV | 0.0 | 44.4 | 54.0 | -9.6 |
| 7218.277 | 54.4 | 9.7 | 1.6 | 122.0 | 0.0 | 0.0 | Vert | PK | 0.0 | 64.1 | 74.0 | -9.9 |
| 7218.277 | 54.1 | 9.7 | 3.8 | 286.9 | 0.0 | 0.0 | Horz | PK | 0.0 | 63.8 | 74.0 | -10.2 |
| 7218.425 | 47.0 | 9.7 | 1.7 | 262.9 | -13.1 | 0.0 | Vert | AV | 0.0 | 43.6 | 54.0 | -10.4 |
| 7218.432 | 46.2 | 9.7 | 1.6 | 122.0 | -13.1 | 0.0 | Vert | AV | 0.0 | 42.8 | 54.0 | -11.2 |
| 7218.363 | 45.8 | 9.7 | 3.8 | 286.9 | -13.1 | 0.0 | Horz | AV | 0.0 | 42.4 | 54.0 | -11.6 |
| 7313.640 | 40.3 | 9.9 | 1.5 | 31.0 | 0.0 | 0.0 | Vert | PK | 0.0 | 50.2 | 74.0 | -23.8 |
| 7422.445 | 40.3 | 9.9 | 1.5 | 177.9 | 0.0 | 0.0 | Horz | PK | 0.0 | 50.2 | 74.0 | -23.8 |

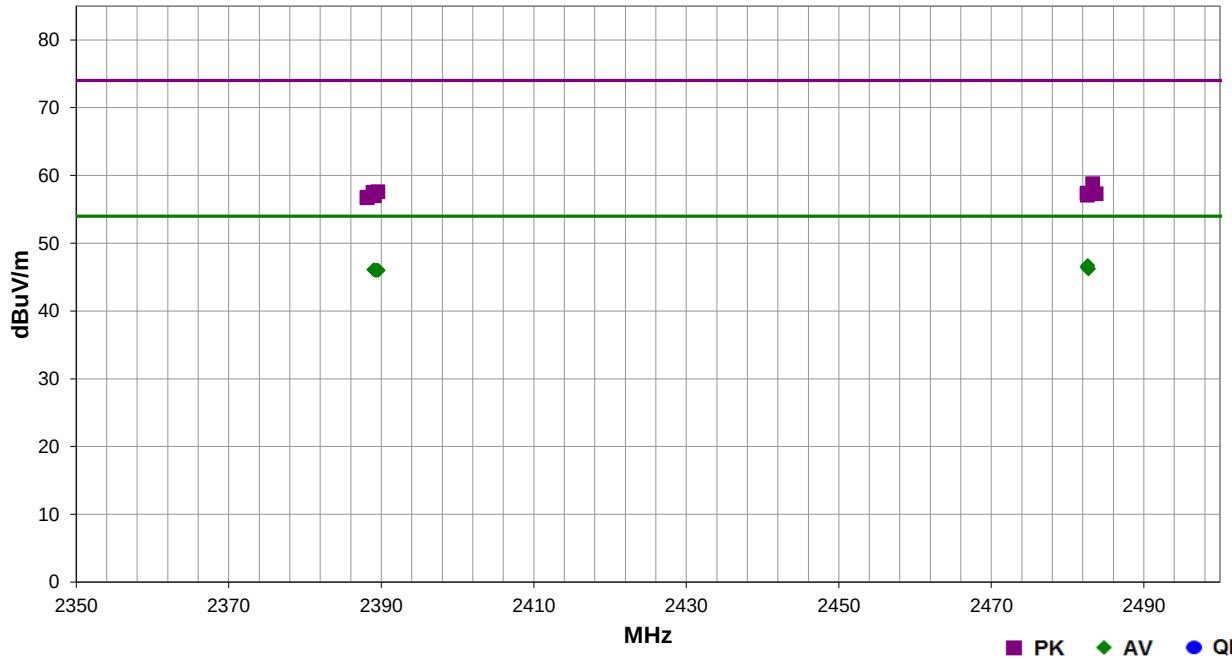
# SPURIOUS RADIATED EMISSIONS

EmiR5 2020.04.20.0 PSA-ESCI 2020.04.03.0

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | GARR0077 | **Date:** | 2020-06-05 | | |
| **Project:** | None | **Temperature:** | 22.6 °C | | |
| **Job Site:** | TX02 | **Humidity:** | 55.5% RH | | |
| **Serial Number:** | D7 | **Barometric Pres.:** | 1017 mbar | **Tested by:** | Marty Martin, Brandon Hobbs |
| **EUT:** | ACE Apex | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Garrett Metal Detectors | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 4.0 VDC | | | | |
| **Operating Mode:** | Continuously transmitting at 100% duty cycle at Low channel 2406 MHz and High channel 2474 | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | EUT charging via USB adapter. | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |

| **Run #** | 28 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1 to 4(m) | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2482.660 | 32.8 | -6.1 | 1.5 | 81.9 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.7 | 54.0 | -7.3 |
| 2482.570 | 32.6 | -6.1 | 4.0 | 313.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.5 | 54.0 | -7.5 |
| 2482.667 | 32.4 | -6.1 | 1.5 | 280.9 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.3 | 54.0 | -7.7 |
| 2482.763 | 32.3 | -6.1 | 1.5 | 57.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.2 | 54.0 | -7.8 |
| 2389.010 | 32.5 | -6.4 | 1.5 | 279.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.1 | 54.0 | -7.9 |
| 2389.200 | 32.4 | -6.4 | 1.4 | 27.9 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.0 | 54.0 | -8.0 |
| 2389.340 | 32.4 | -6.4 | 1.5 | 219.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.0 | 54.0 | -8.0 |
| 2389.630 | 32.4 | -6.4 | 1.5 | 260.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.0 | 54.0 | -8.0 |
| 2389.423 | 32.4 | -6.4 | 1.5 | 33.9 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.0 | 54.0 | -8.0 |
| 2483.293 | 44.9 | -6.1 | 4.0 | 313.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.8 | 74.0 | -15.2 |
| 2389.543 | 44.0 | -6.4 | 1.5 | 260.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.6 | 74.0 | -16.4 |
| 2388.913 | 43.9 | -6.4 | 1.5 | 279.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.5 | 74.0 | -16.5 |
| 2482.560 | 43.5 | -6.1 | 1.5 | 81.9 | 3.0 | 20.0 | Vert | PK | 0.0 | 57.4 | 74.0 | -16.6 |
| 2483.743 | 43.4 | -6.1 | 1.5 | 280.9 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.3 | 74.0 | -16.7 |

# DUTY CYCLE

XMit 2020.03.25.0

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 DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

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

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

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

# OUTPUT POWER

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |

**TEST DESCRIPTION**

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

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

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

# OUTPUT POWER

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | ACE Apex | | | **Work Order:** | GARR0077 |
| **Serial Number:** | D7 | | | **Date:** | 4-Jun-20 |
| **Customer:** | Garrett Metal Detectors | | | **Temperature:** | 22.1 °C |
| **Attendees:** | None | | | **Humidity:** | 54.8% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1013 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 4.0 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |
| | |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

**DEVIATIONS FROM TEST STANDARD**

None

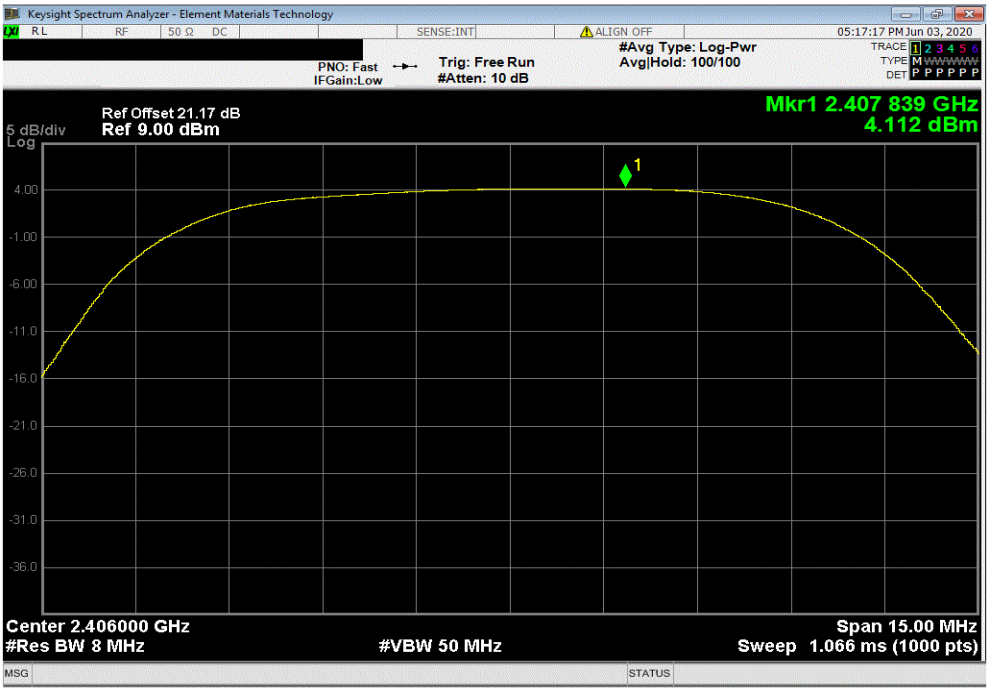
| Configuration # | 1 | Signature |
|---|---|---|

| | Out Pwr (dBm) | Limit (dBm) | Result |
|---|---|---|---|
| Low Ch.1, 2406 MHz | 4.112 | 30 | Pass |
| Mid Ch.9, 2438 MHz | 4.227 | 30 | Pass |
| High Ch.18, 2474 MHz | 3.911 | 30 | Pass |

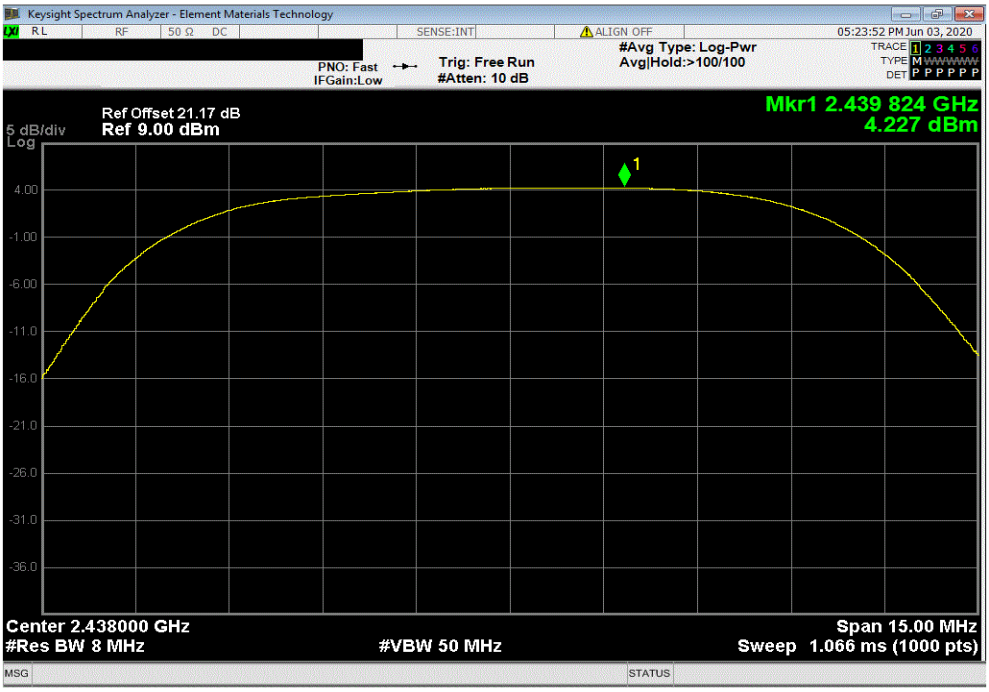
# OUTPUT POWER



| Low Ch.1, 2406 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Out Pwr (dBm) | Limit (dBm) | Result |
| | | | | 4.112 | 30 | Pass |



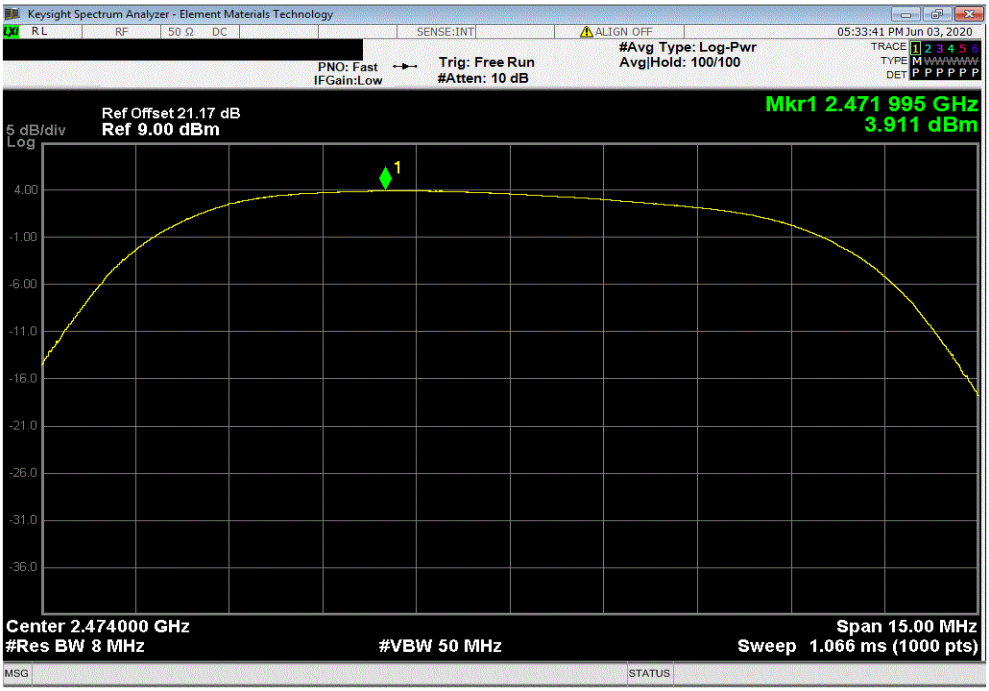

| Mid Ch.9, 2438 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Out Pwr (dBm) | Limit (dBm) | Result |
| | | | | 4.227 | 30 | Pass |



# OUTPUT POWER



| High Ch.18, 2474 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Out Pwr (dBm) | Limit (dBm) | Result |
| | | | | 3.911 | 30 | Pass |



# EQUIVALENT ISOTROPIC RADIATED POWER

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |

**TEST DESCRIPTION**

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

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | ACE Apex | | | **Work Order:** | GARR0077 |
| **Serial Number:** | D7 | | | **Date:** | 4-Jun-20 |
| **Customer:** | Garrett Metal Detectors | | | **Temperature:** | 22.1 °C |
| **Attendees:** | None | | | **Humidity:** | 54.8% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1013 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 4.0 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |
| | |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

**DEVIATIONS FROM TEST STANDARD**

None

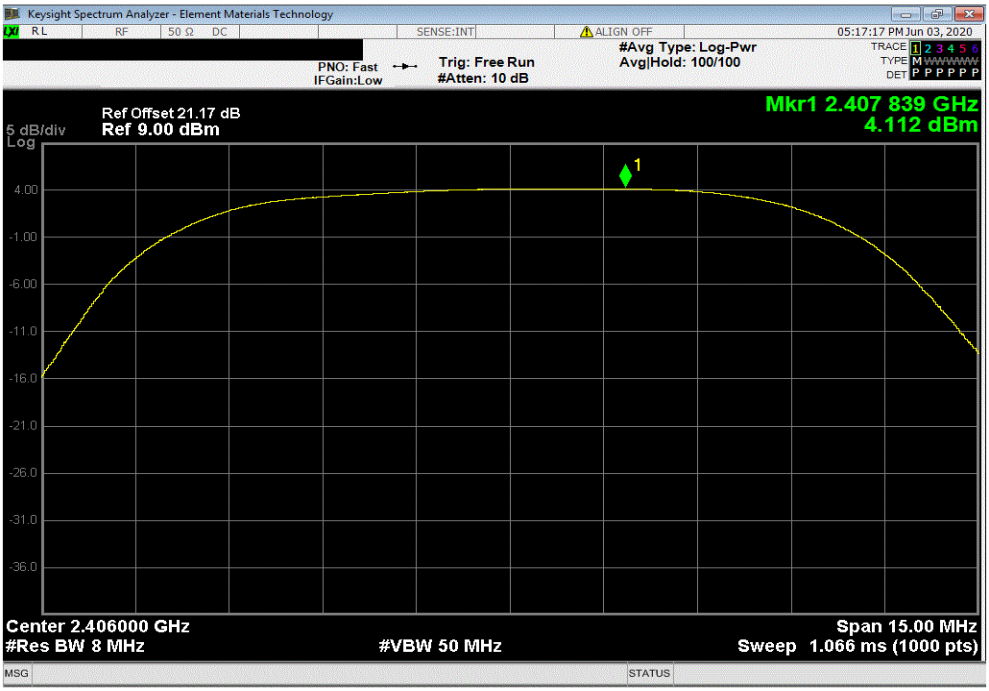
| Configuration # | 1 | Signature |
|---|---|---|

| | Out Pwr (dBm) | Duty Cycle Correction (dB) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| Low Ch.1, 2406 MHz | 4.112 | 0 | 5.44 | 9.552 | 36 | Pass |
| Mid Ch.9, 2438 MHz | 4.227 | 0 | 5.44 | 9.667 | 36 | Pass |
| High Ch.18, 2474 MHz | 3.911 | 0 | 5.44 | 9.351 | 36 | Pass |

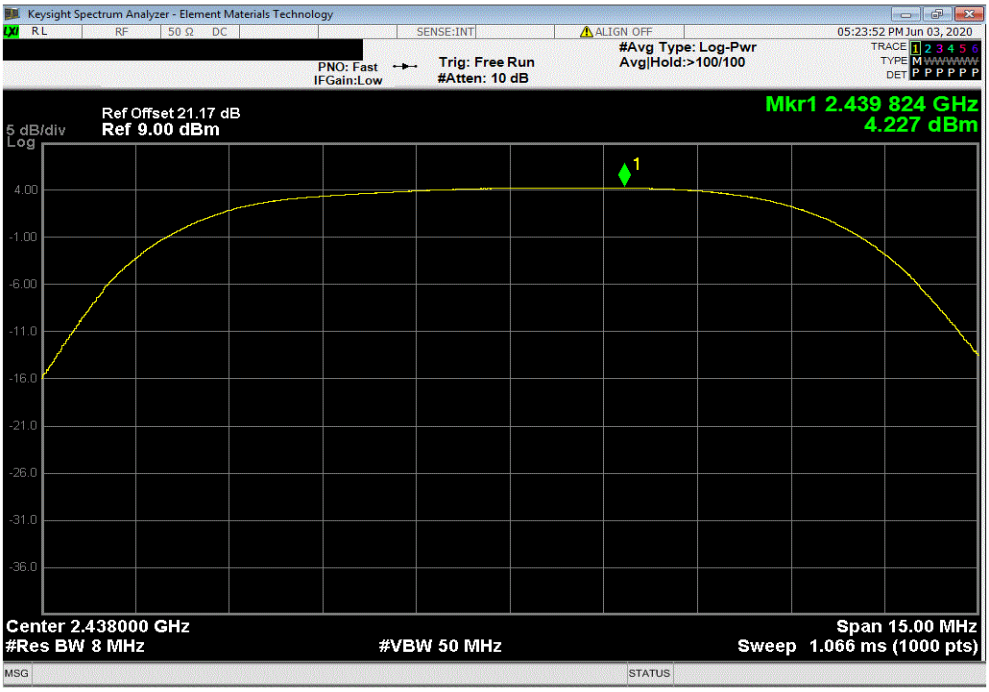
# EQUIVALENT ISOTROPIC RADIATED POWER



| Low Ch.1, 2406 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Out Pwr (dBm) | Duty Cycle Correction (dB) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
| | 4.112 | 0 | 5.44 | 9.552 | 36 | Pass |



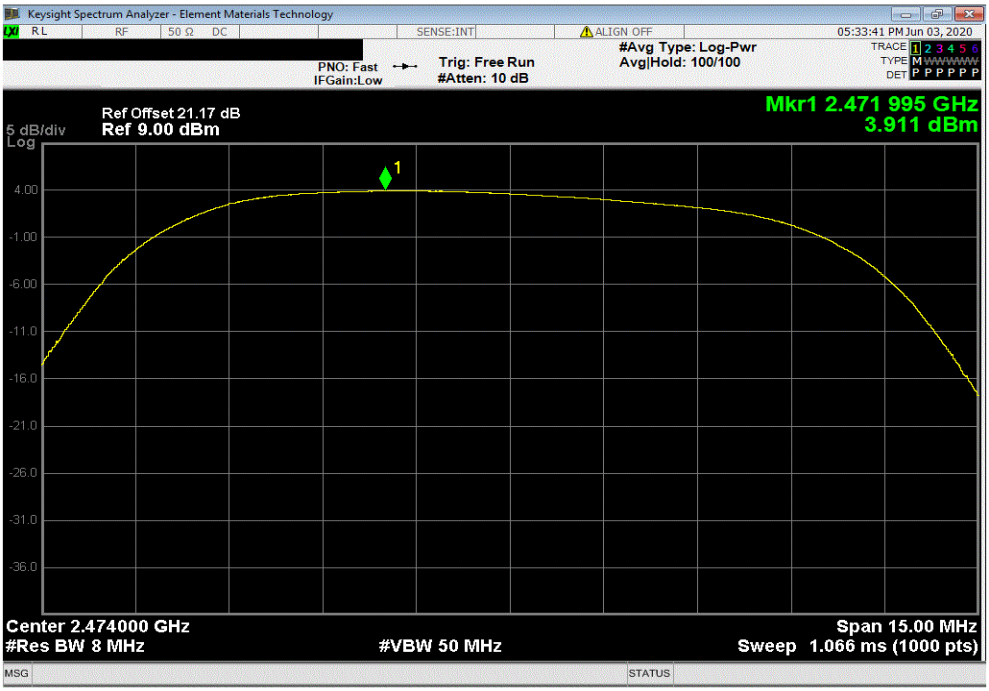

| Mid Ch.9, 2438 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Out Pwr (dBm) | Duty Cycle Correction (dB) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
| | 4.227 | 0 | 5.44 | 9.667 | 36 | Pass |



# EQUIVALENT ISOTROPIC RADIATED POWER



| High Ch.18, 2474 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Out Pwr (dBm) | Duty Cycle Correction (dB) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
| | 3.911 | 0 | 5.44 | 9.351 | 36 | Pass |



# BAND EDGE COMPLIANCE

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |

**TEST DESCRIPTION**

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 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | ACE Apex | | | Work Order: | GARR0077 |
| Serial Number: | D7 | | | Date: | 5-Jun-20 |
| Customer: | Garrett Metal Detectors | | | Temperature: | 22.7 °C |
| Attendees: | None | | | Humidity: | 53.3% RH |
| Project: | None | | | Barometric Pres.: | 1016 mbar |
| Tested by: | Brandon Hobbs | Power: | 4.0 VDC | Job Site: | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

**DEVIATIONS FROM TEST STANDARD**

None

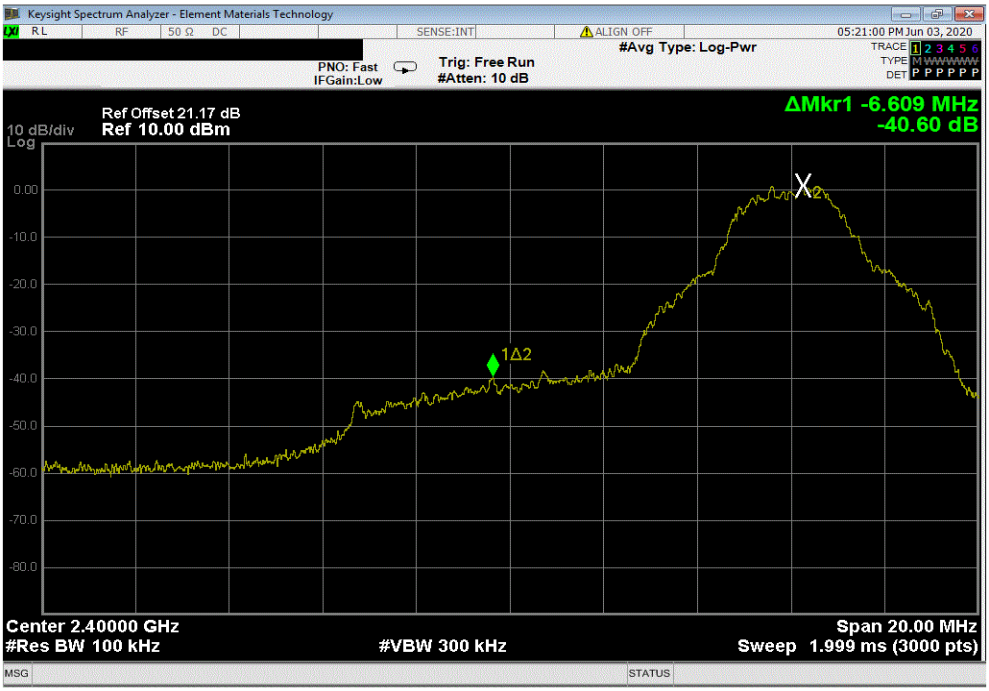
| Configuration # | 1 | Signature |
|---|---|---|

| | Value (dBc) | Limit ≤ (dBc) | Result |
|---|---|---|---|
| Low Ch.1, 2406 MHz | -40.6 | -20 | Pass |
| High Ch.18, 2474 MHz | -56.72 | -20 | Pass |

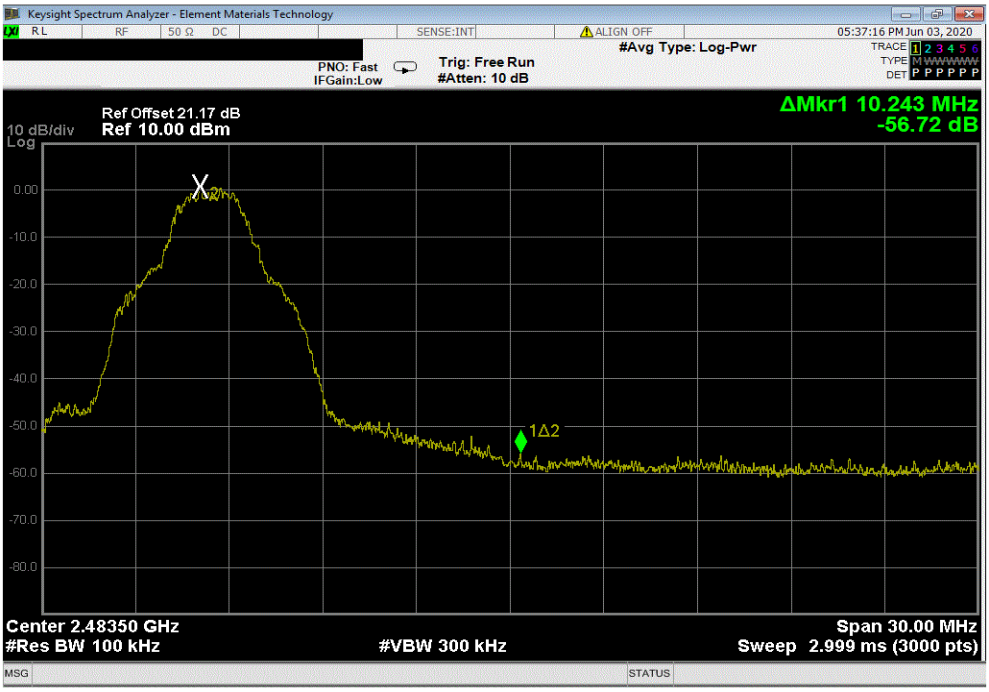
# BAND EDGE COMPLIANCE



| Low Ch.1, 2406 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | -40.6 | -20 | Pass |




| High Ch.18, 2474 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | -56.72 | -20 | Pass |



# OCCUPIED BANDWIDTH

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |

**TEST DESCRIPTION**

The EUT was set to the channels and modes listed in the datasheet.

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

# OCCUPIED BANDWIDTH

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | ACE Apex | | | **Work Order:** | GARR0077 |
| **Serial Number:** | D7 | | | **Date:** | 5-Jun-20 |
| **Customer:** | Garrett Metal Detectors | | | **Temperature:** | 22.5 °C |
| **Attendees:** | None | | | **Humidity:** | 53.7% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1017 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 4.0 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |
| | |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

**DEVIATIONS FROM TEST STANDARD**

None

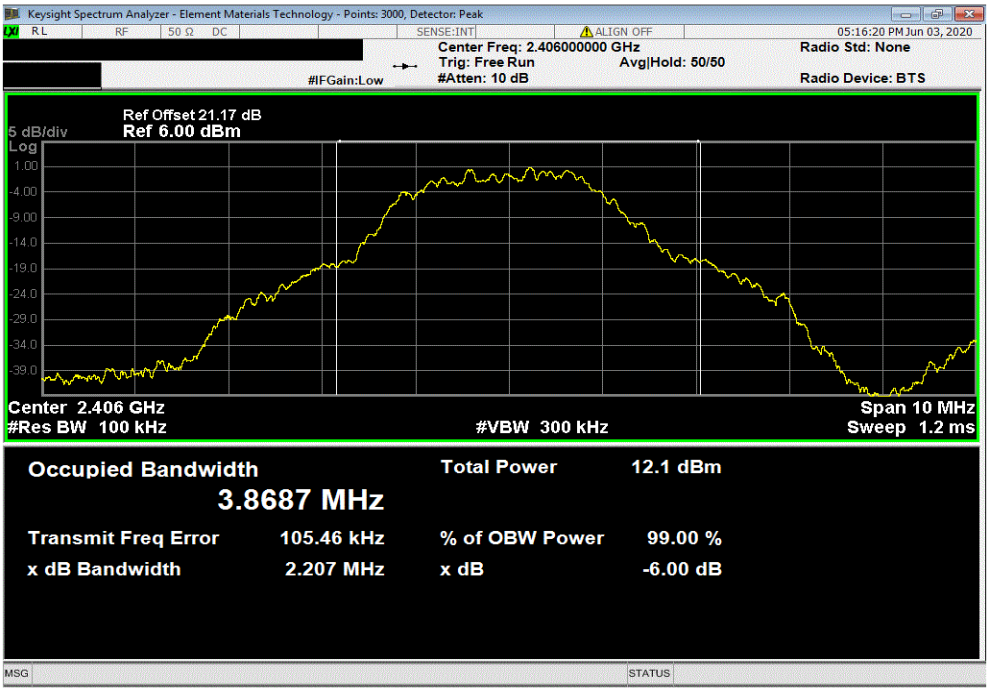
| Configuration # | 1 | Signature |
|---|---|---|

| | Value | Limit (≥) | Result |
|---|---|---|---|
| Low Ch.1, 2406 MHz | 2.207 MHz | 500 kHz | Pass |
| Mid Ch.9, 2438 MHz | 2.206 MHz | 500 kHz | Pass |
| High Ch.18, 2474 MHz | 2.199 MHz | 500 kHz | Pass |

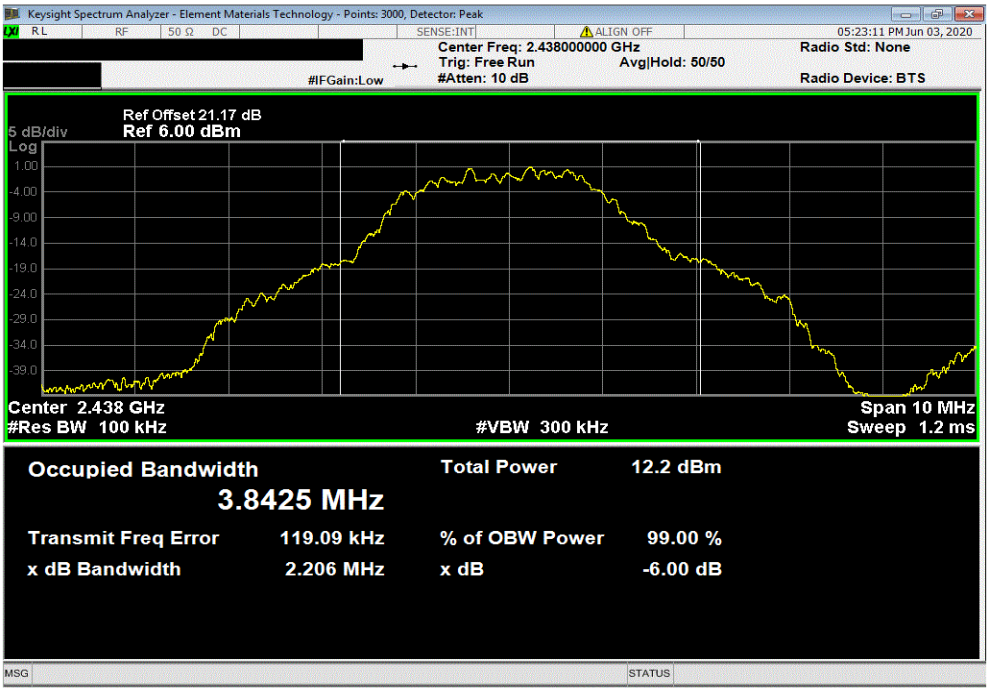
# OCCUPIED BANDWIDTH



| Low Ch.1, 2406 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (≥) | Result |
| | | | | 2.207 MHz | 500 kHz | Pass |



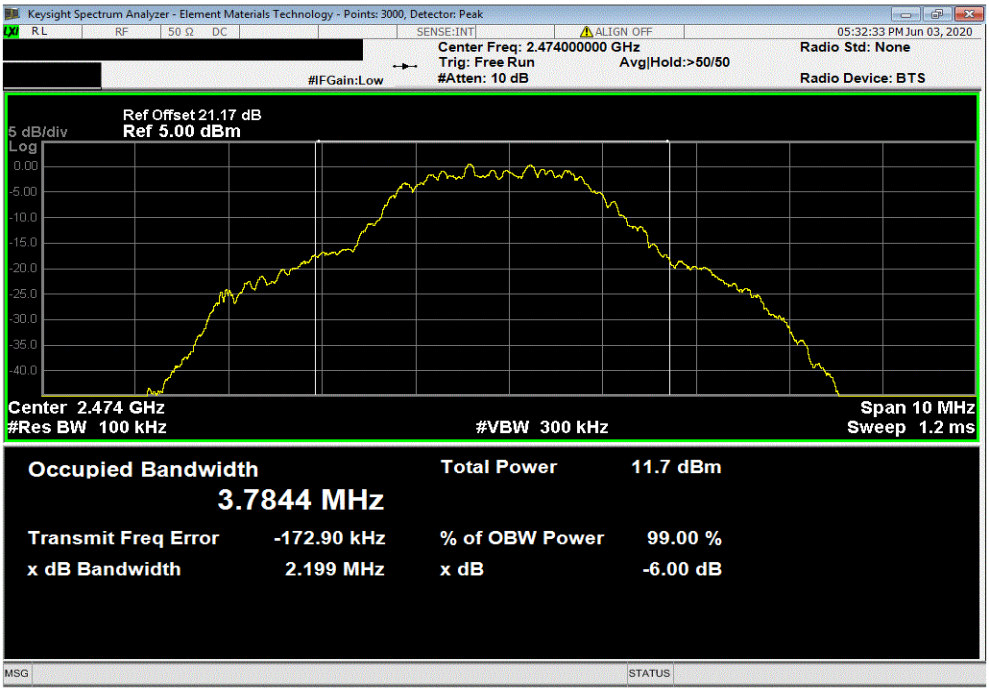

| Mid Ch.9, 2438 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (≥) | Result |
| | | | | 2.206 MHz | 500 kHz | Pass |



# OCCUPIED BANDWIDTH

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| High Ch.18, 2474 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit (≥) | Result |
| | | | | | 2.199 MHz | 500 kHz | Pass |



# SPURIOUS CONDUCTED EMISSIONS

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |

**TEST DESCRIPTION**

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | ACE Apex | | | **Work Order:** | GARR0077 |
| **Serial Number:** | D7 | | | **Date:** | 5-Jun-20 |
| **Customer:** | Garrett Metal Detectors | | | **Temperature:** | 22.6 °C |
| **Attendees:** | None | | | **Humidity:** | 53.7% RH |
| **Project:** | None | | | **Barometric Pres.:** | 1017 mbar |
| **Tested by:** | Brandon Hobbs | **Power:** | 4.0 VDC | **Job Site:** | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |
| | |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

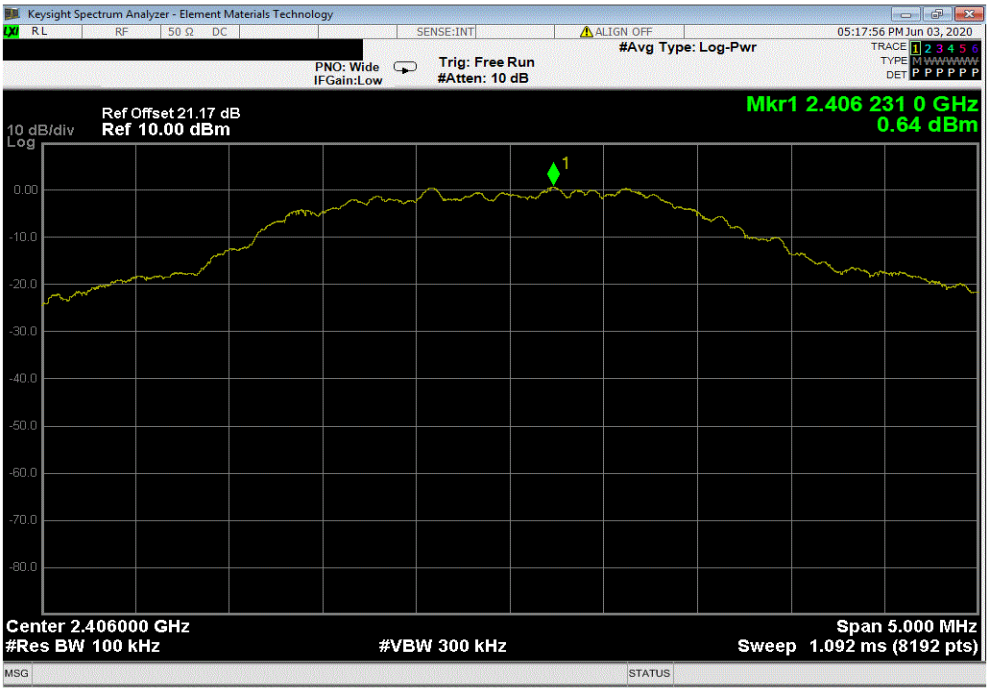
**DEVIATIONS FROM TEST STANDARD**

None

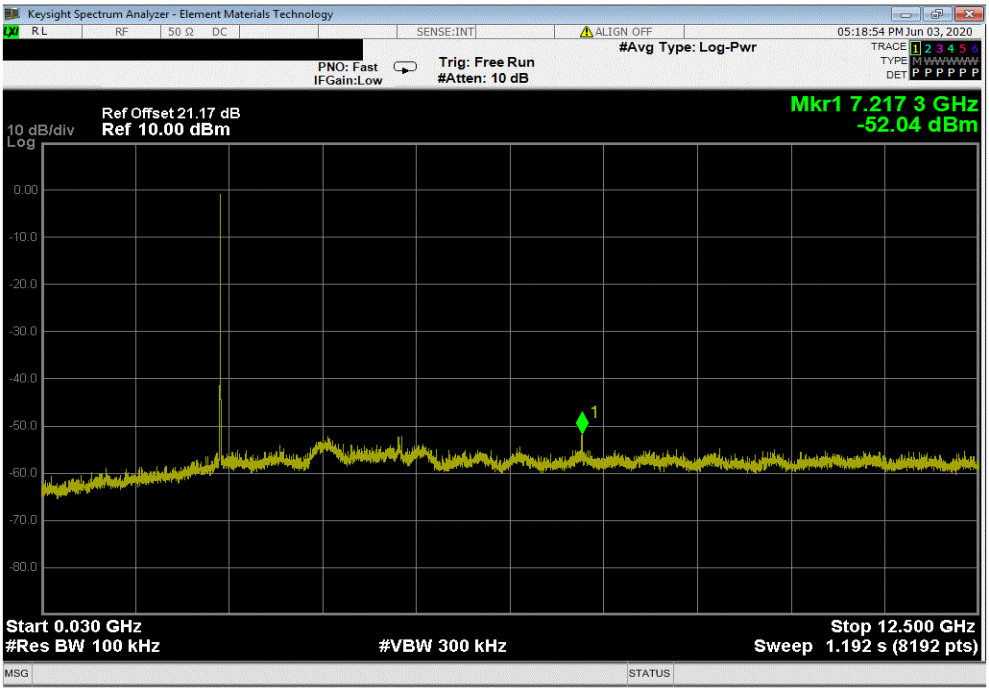
| Configuration # | 1 | Signature |
|---|---|---|

| | Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
|---|---|---|---|---|---|
| Low Ch.1, 2406 MHz | Fundamental | 2406.23 | N/A | N/A | N/A |
| Low Ch.1, 2406 MHz | 30 MHz - 12.5 GHz | 7217.26 | -52.68 | -20 | Pass |
| Low Ch.1, 2406 MHz | 12.5 GHz - 25 GHz | 24081.31 | -52.29 | -20 | Pass |
| Mid Ch.9, 2438 MHz | Fundamental | 2438.24 | N/A | N/A | N/A |
| Mid Ch.9, 2438 MHz | 30 MHz - 12.5 GHz | 3808.6 | -52.12 | -20 | Pass |
| Mid Ch.9, 2438 MHz | 12.5 GHz - 25 GHz | 24185.08 | -52.35 | -20 | Pass |
| High Ch.18, 2474 MHz | Fundamental | 2473.58 | N/A | N/A | N/A |
| High Ch.18, 2474 MHz | 30 MHz - 12.5 GHz | 4941.27 | -51.17 | -20 | Pass |
| High Ch.18, 2474 MHz | 12.5 GHz - 25 GHz | 24671.9 | -52.21 | -20 | Pass |

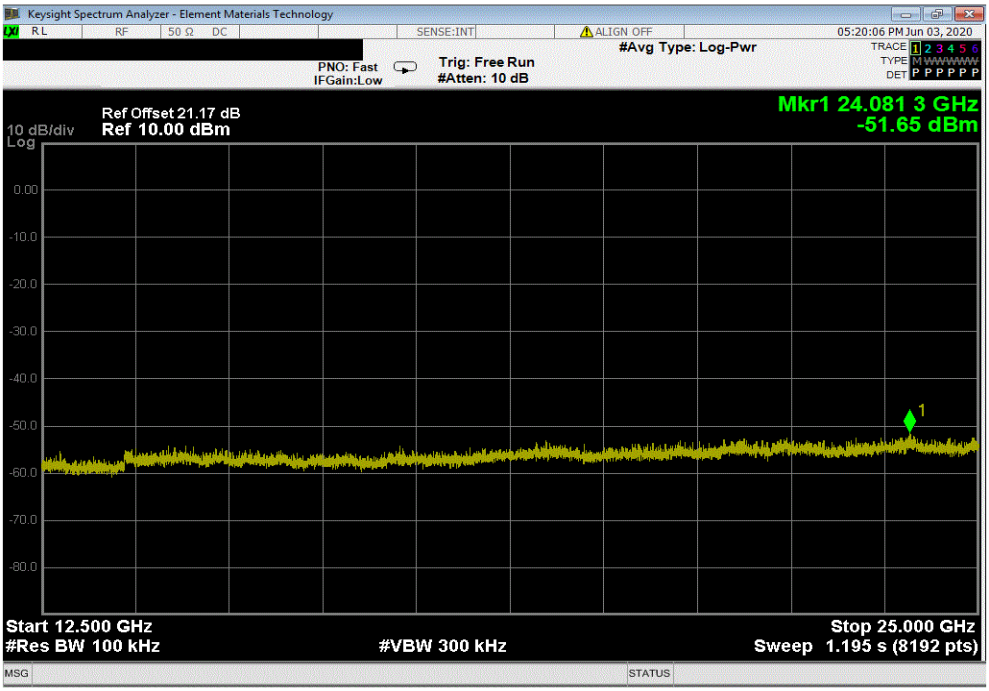
| Low Ch.1, 2406 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| | Fundamental | 2406.23 | N/A | N/A | N/A |



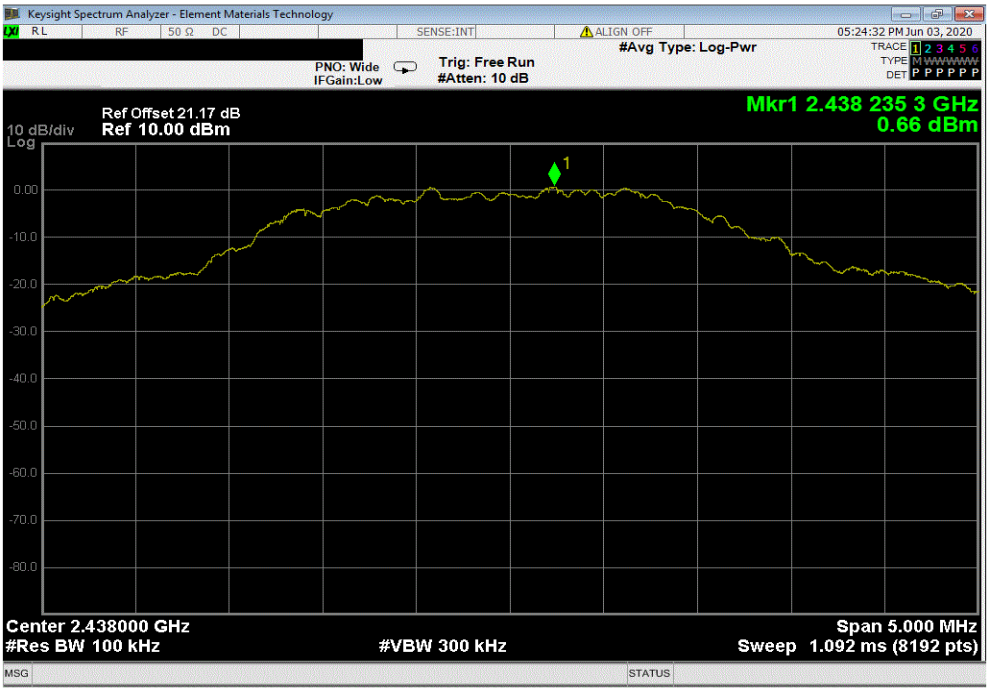

| Low Ch.1, 2406 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 30 MHz - 12.5 GHz | 7217.26 | -52.68 | -20 | Pass |



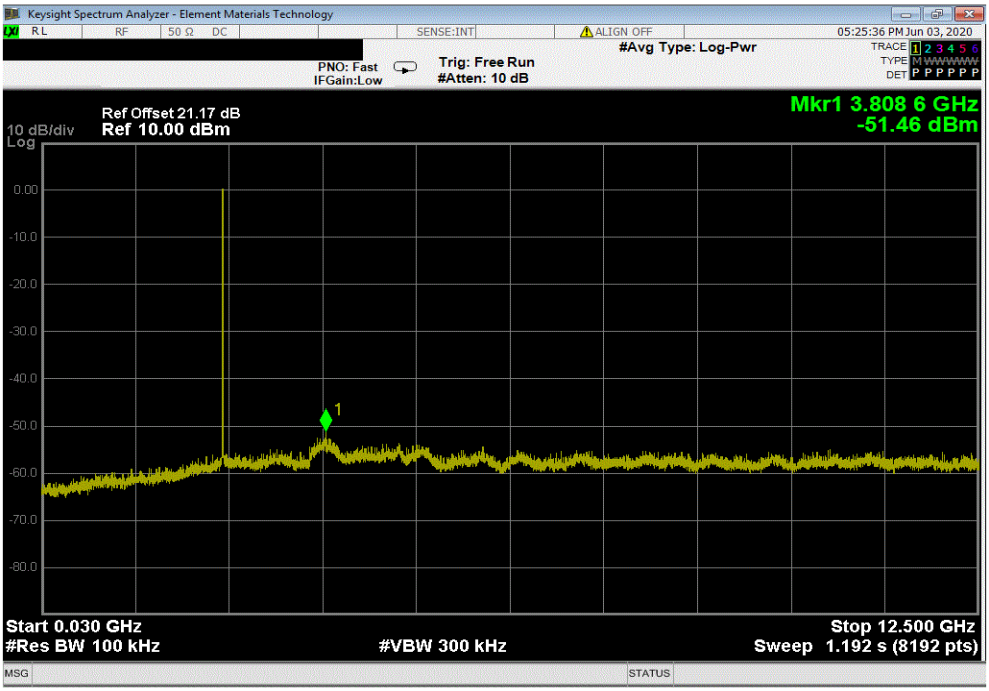
| Low Ch.1, 2406 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 12.5 GHz - 25 GHz | 24081.31 | -52.29 | -20 | Pass |



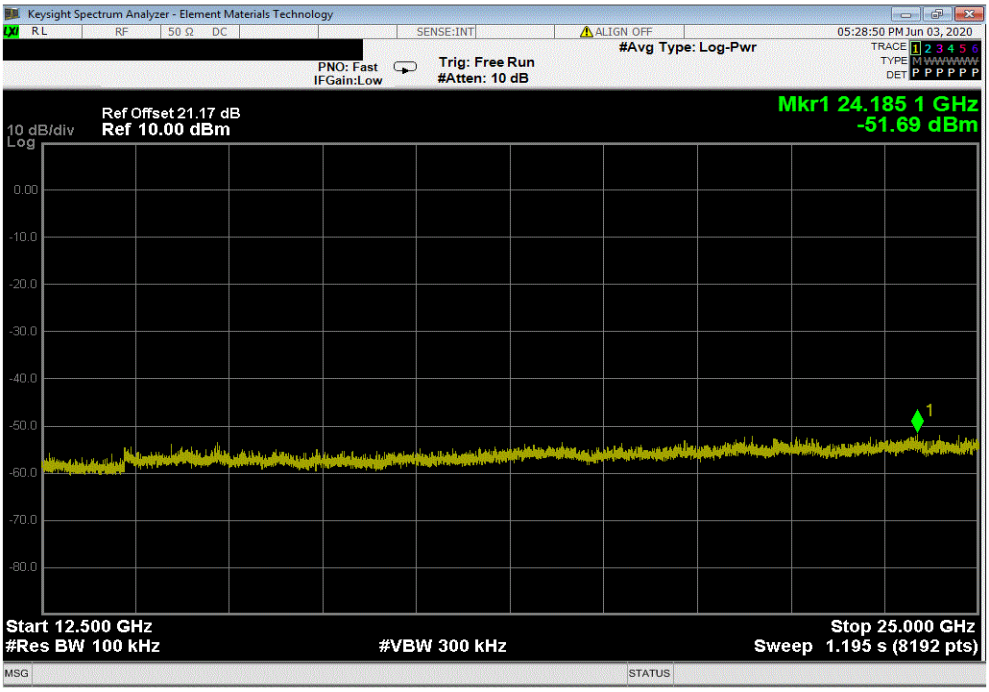

| Mid Ch.9, 2438 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| Fundamental | 2438.24 | N/A | N/A | N/A |



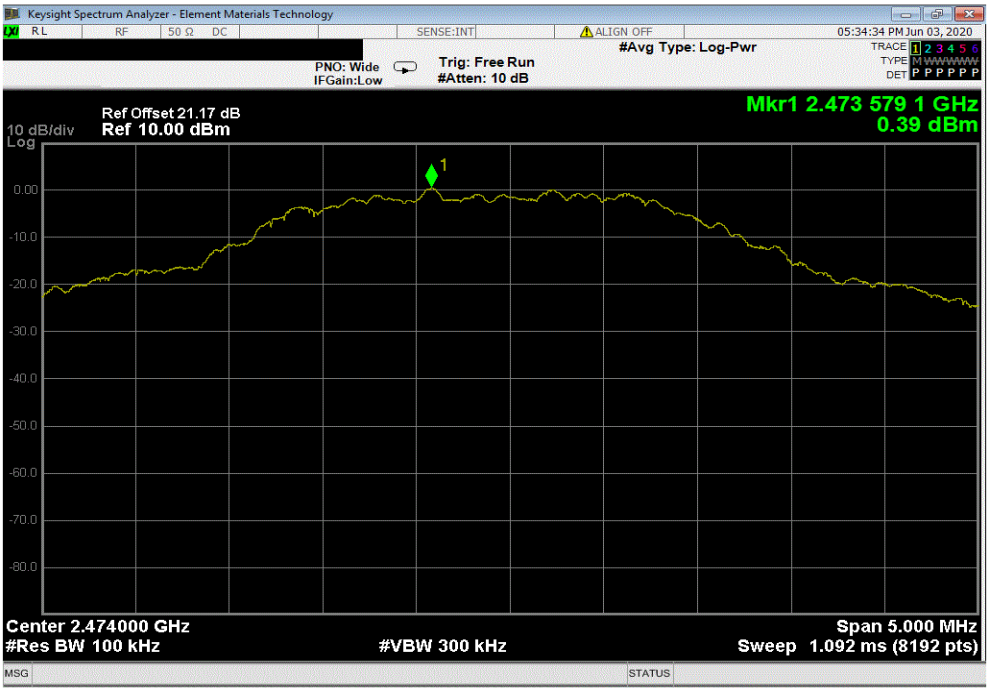
| Mid Ch.9, 2438 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 30 MHz - 12.5 GHz | 3808.6 | -52.12 | -20 | Pass |



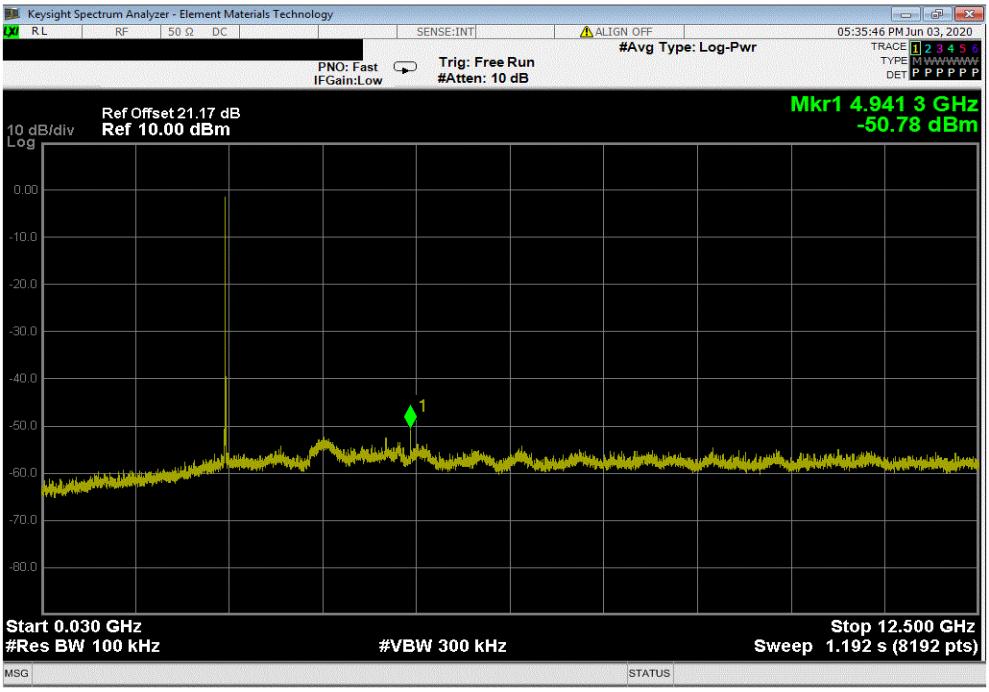

| Mid Ch.9, 2438 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 12.5 GHz - 25 GHz | 24185.08 | -52.35 | -20 | Pass |



| High Ch.18, 2474 MHz | | | | | |
|---|---|---|---|---|---|
| Frequency Range | | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| | Fundamental | 2473.58 | N/A | N/A | N/A |



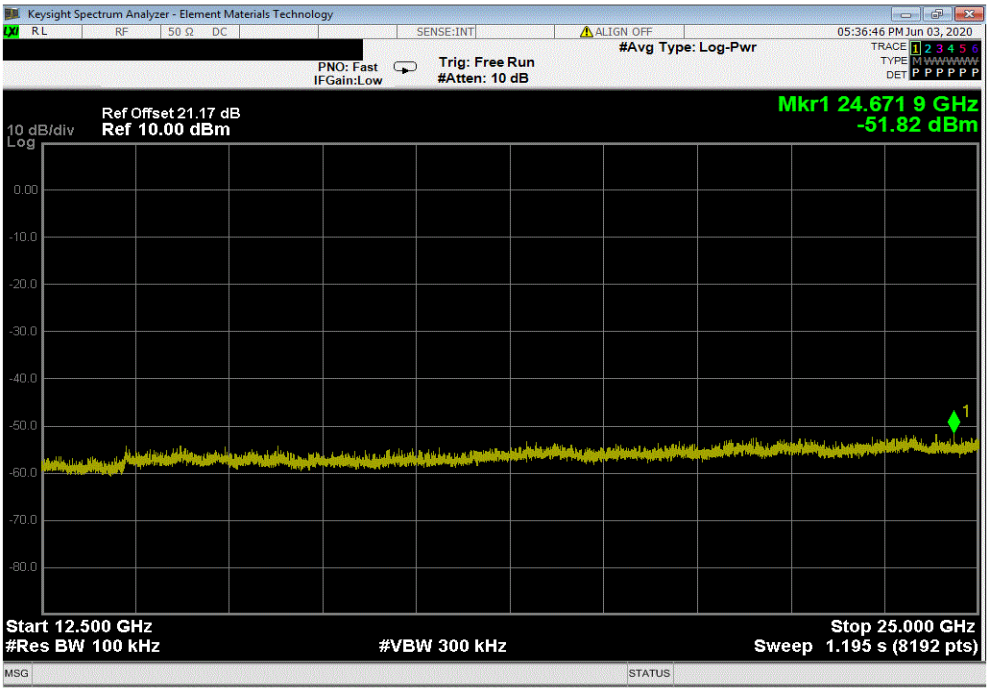

| High Ch.18, 2474 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 30 MHz - 12.5 GHz | 4941.27 | -51.17 | -20 | Pass |



# SPURIOUS CONDUCTED EMISSIONS

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| High Ch.18, 2474 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |
| 12.5 GHz - 25 GHz | 24671.9 | -52.21 | -20 | Pass |



# POWER SPECTRAL DENSITY

XMit 2020.03.25.0

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 |
|---|---|---|---|---|---|
| Analyzer - Spectrum Analyzer | Agilent | N9010A | AFL | 27-Feb-20 | 27-Feb-21 |
| Attenuator | Fairview Microwave | SA4018-20 | TYW | 13-Mar-20 | 13-Mar-21 |
| Cable | Micro-Coax | UFD150A-1-0720-200200 | TXG | 18-Sep-19 | 18-Sep-20 |
| Block - DC | Fairview Microwave | SD3379 | AMM | 13-Mar-20 | 13-Mar-21 |
| Generator - Signal | Keysight | N5171B-506 | TEW | 2-May-18 | 2-May-21 |

**TEST DESCRIPTION**

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

element

TbtTx 2019.08.30.0 XMit 2020.03.25.0

| | | | | | |
|---|---|---|---|---|---|
| EUT: | ACE Apex | | | Work Order: | GARR0077 |
| Serial Number: | D7 | | | Date: | 5-Jun-20 |
| Customer: | Garrett Metal Detectors | | | Temperature: | 22.6 °C |
| Attendees: | None | | | Humidity: | 53.2% RH |
| Project: | None | | | Barometric Pres.: | 1016 mbar |
| Tested by: | Brandon Hobbs | Power: | 4.0 VDC | Job Site: | TX05 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2020 | ANSI C63.10:2013 |

**COMMENTS**

All losses in the measurement path were accounted for: cable, DC block and attenuator.

**DEVIATIONS FROM TEST STANDARD**

None

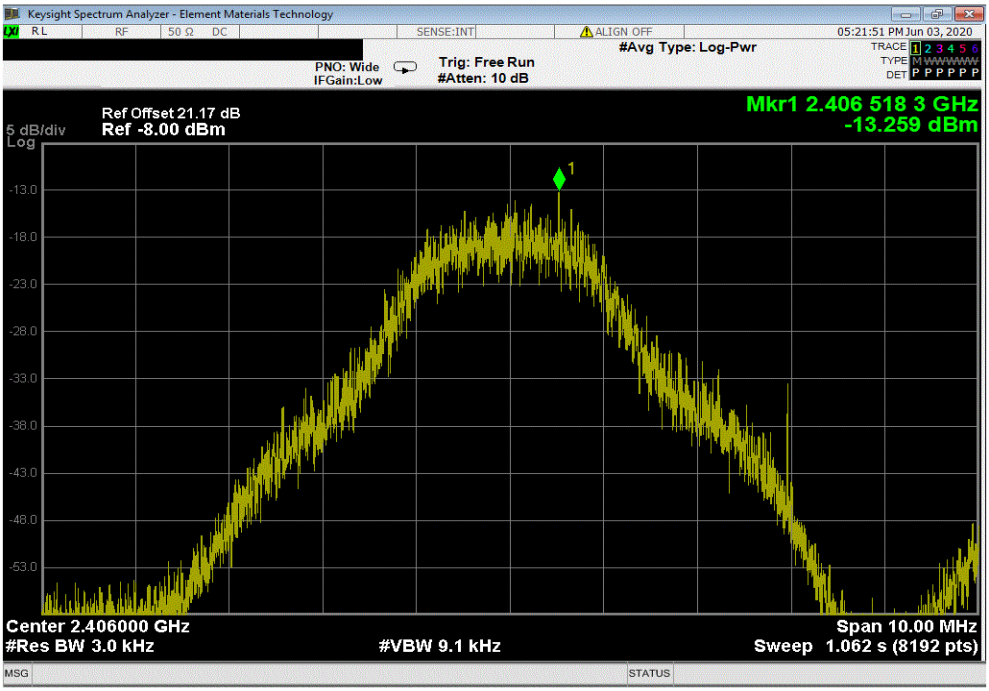
| Configuration # | 1 | Signature |
|---|---|---|

| | Value dBm/3kHz | Limit < dBm/3kHz | Results |
|---|---|---|---|
| Low Ch.1, 2406 MHz | -13.259 | 8 | Pass |
| Mid Ch.9, 2438 MHz | -13.619 | 8 | Pass |
| High Ch.18, 2474 MHz | -14.059 | 8 | Pass |

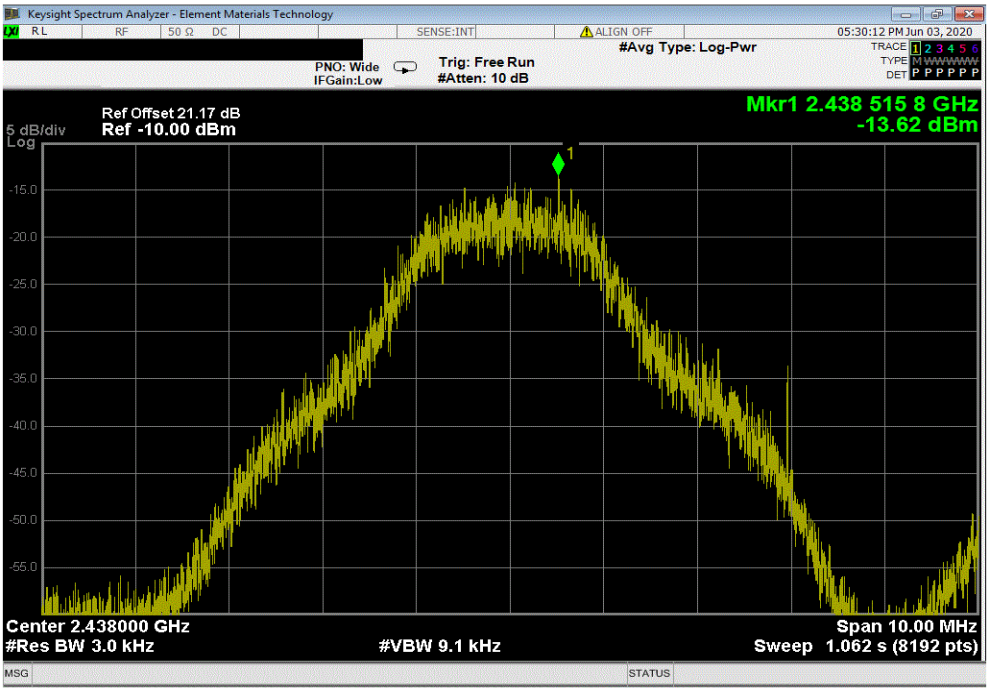
# POWER SPECTRAL DENSITY



| Low Ch.1, 2406 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value dBm/3kHz | Limit < dBm/3kHz | Results |
| | | | | -13.259 | 8 | Pass |




| Mid Ch.9, 2438 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value dBm/3kHz | Limit < dBm/3kHz | Results |
| | | | | -13.619 | 8 | Pass |



# POWER SPECTRAL DENSITY



| High Ch.18, 2474 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value dBm/3kHz | Limit < dBm/3kHz | Results |
| | | | | | -14.059 | 8 | Pass |