



# element

## Garrett Metal Detectors

Garrett Axiom

FCC 15.247:2022

2400 - 2483.5 MHz Other Wideband (DTS) Transceiver

Report: GARR0095.0 Rev. 1, Issue Date: November 28, 2022



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# CERTIFICATE OF TEST



Last Date of Test: November 3, 2022  
Garrett Metal Detectors  
EUT: Garrett Axiom

## Radio Equipment Testing

### Standards

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

### Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions (Transmitter)	N/A	15.207	6.2	Not required for a battery powered EUT.
Occupied Bandwidth (99%)	Pass	15.247(a), KDB 558074 -8.2	6.9.3	
Carrier Frequency Separation	N/A	15.247(a)(1)	7.8.2	Not required for DTS devices.
Number of Hopping Frequencies	N/A	15.247(a)(1)	7.8.3	Not required for DTS devices.
Dwell Time	N/A	15.247(a)(1)	7.8.4	Not required for DTS devices.
Band Edge Compliance - Hopping Mode	N/A	15.247(d)	7.8.6	Not required for DTS devices.
Band Edge Compliance	Pass	15.247(d), KDB 558074 -11	11.11	
Spurious Conducted Emissions	Pass	15.247(d), KDB 558074 -11	11.11	
Power Spectral Density	Pass	15.247(e), KDB 558074 -10.2	11.10.2	
Duty Cycle	Pass	15.247, KDB 558074 -6.0	11.6	
DTS Bandwidth (6 dB)	Pass	15.247(a), KDB 558074 -8.2	11.8.2	
Equivalent Isotropic Radiated Power	Pass	15.247(b), KDB 558074 -9.1.1	11.9.1.1	
Output Power	Pass	15.247(b), KDB 558074 -9.1.1	11.9.1.1	
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 -12.1, 13.2	6.5, 6.6, 11.12.1, 11.13.2	

### Deviations From Test Standards

None

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

# CERTIFICATE OF TEST

**Approved By:**



*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
01	Added signal generator to the test equipment list	2022-11-28	19
	Retested; 4 MHz RBW, 50 MHz VBW, 12 MHz span.	2022-11-28	39-41, 43-45
	Edited to state data rate and modulation type.	2022-11-28	12
	EIRP corrected based on 3.3 dBi gain as opposed to original 5.1 dBi gain.	2022-11-28	39-41
	Added high pass filter and 20 dB attenuator to equipment list.	2022-11-28	47

# ACCREDITATIONS AND AUTHORIZATIONS



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## 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.

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## 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.

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## European Union

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

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## United Kingdom

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

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## 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.

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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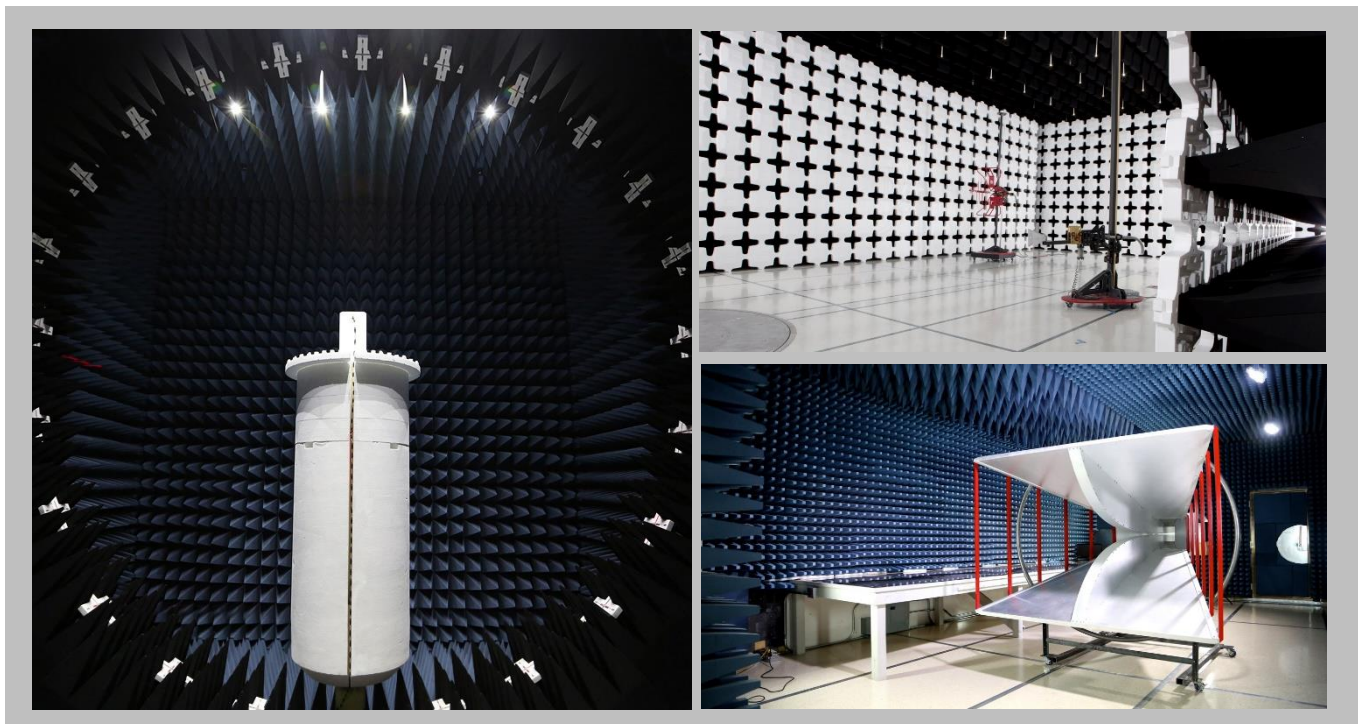
[Texas](#)

[Washington](#)

# FACILITIES



<b>California</b> Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>Oregon</b> Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>A2LA</b>				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
<b>Innovation, Science and Economic Development Canada</b>				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
<b>BSMI</b>				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>				
A-0029	A-0109	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA</b>				
US0158	US0175	US0017	US0191	US0157





# MEASUREMENT UNCERTAINTY



## Measurement Uncertainty

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

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

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

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
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)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	3.1 dB	-3.1 dB

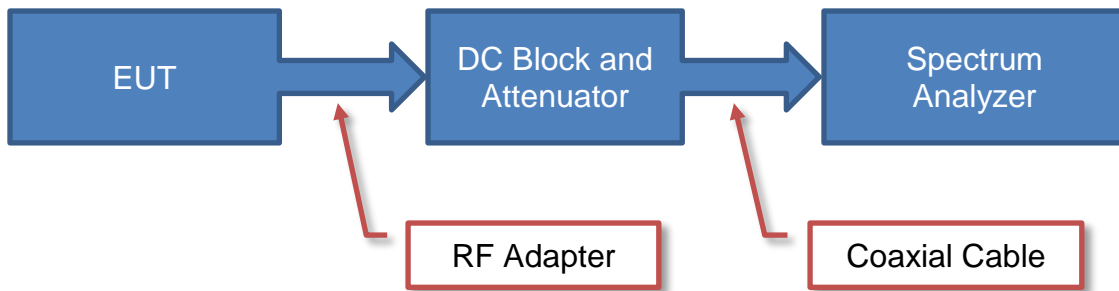
# TEST SETUP BLOCK DIAGRAMS

## 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.

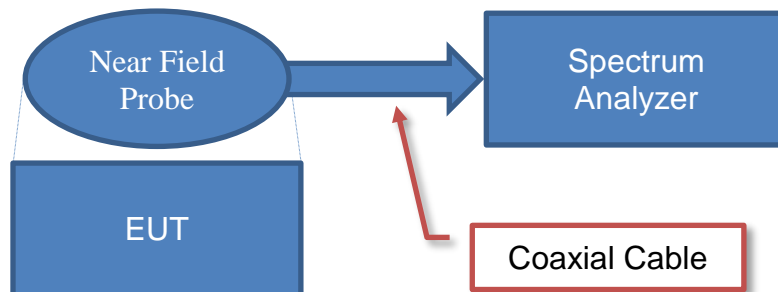
## Antenna Port Conducted Measurements



### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$

## Near Field Test Fixture Measurements



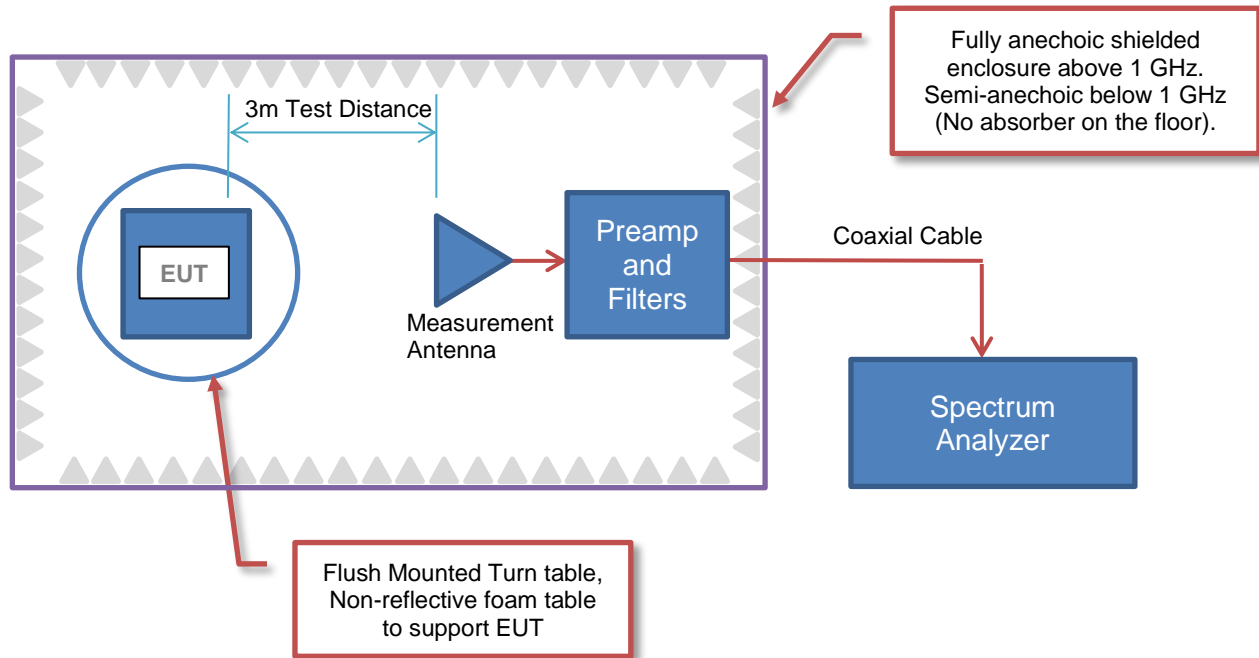
### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$



# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements



## Sample Calculation (logarithmic units)

### Radiated Emissions:

Measured Level (Amplitude)	Factor			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

42.6 + 28.6 + 3.1 - 40.8 + 0.0 + 0.0 = 33.5

### Conducted Emissions:

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

26.7 + 0.3 + 0.1 + 20.0 = 47.1

### Radiated Power (ERP/EIRP) – Substitution Method:

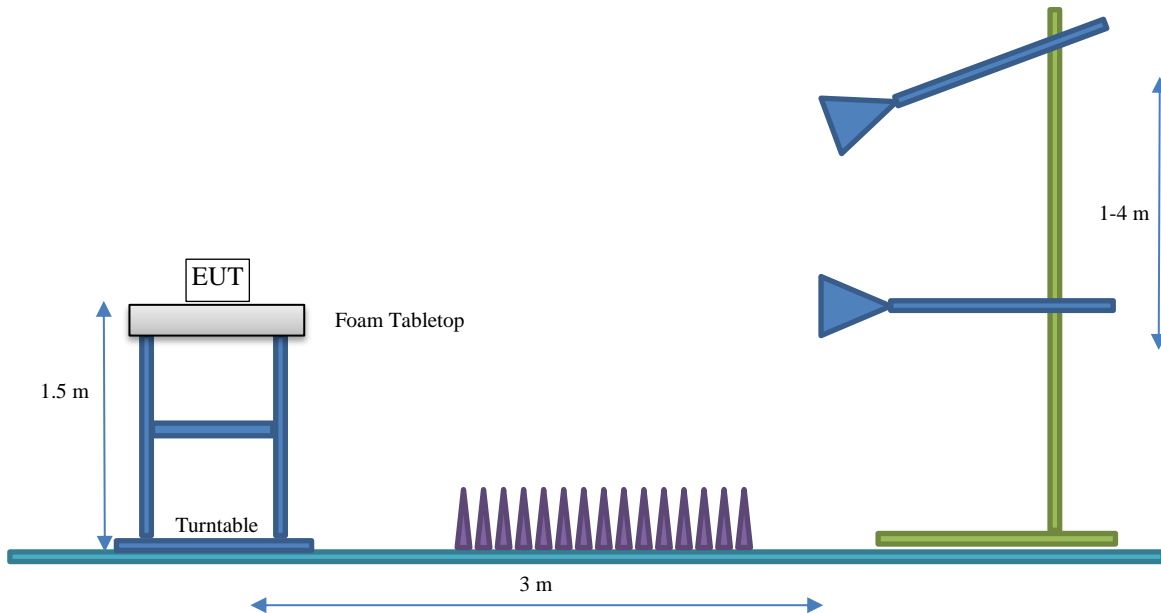
Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

10.0 + 6.0 - 2.15 = 13.9/16.0

# TEST SETUP BLOCK DIAGRAMS

## Bore Sighting (>1GHz)

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





# PRODUCT DESCRIPTION

## Client and Equipment under Test (EUT) Information

<b>Company Name:</b>	Garrett Metal Detectors
<b>Address:</b>	1881 West State Street
<b>City, State, Zip:</b>	Garland, TX 75042
<b>Test Requested By:</b>	Bob Podhrasky
<b>EUT:</b>	Garrett Axiom
<b>First Date of Test:</b>	May 27, 2022
<b>Last Date of Test:</b>	November 3, 2022
<b>Receipt Date of Samples:</b>	May 27, 2022
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
Pulse Induction Metal Detector
<b>Testing Objective:</b>
Seeking to demonstrate compliance under FCC 15.247:2022 for operation in the 2400 - 2483.5 MHz Band.

# POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

## ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Inverted F	Texas Instruments	2406 – 2474	3.3

The EUT was tested using the power settings provided by the manufacturer which were based upon test software.

Test software/firmware installed on EUT: 0.43.0

## SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Position (if multiple channels)	Power Setting
8FSK, 5 Mbps	Low Channel	+5 dBm
	Mid Channel	+5 dBm
	High Channel	+5 dBm

# CONFIGURATIONS



## Configuration GARR0095- 2

Software/Firmware Running During Test	
Description	Version
PurePath Wireless Commander	1.0.0 (Build ID 36940)

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Axiom Direct Connect Board	Garrett Metal Detectors	2353300 r5	RF2

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Module Board	Garrett Metal Detectors	2353400	2353400
Programmer/Debugger	Texas Instruments	CC-DEBUGGER	6380
Laptop PC	Acer	Aspire One	09-0053
Var DC Power Supply	BK Precision	9110	183B15145
DC Power Supply	Delta Electronics Inc	ADP-30JH	202W91502BN

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power Lead (Positive)	No	0.9m	No	Var DC Power Supply	Power Module Board
DC Power Lead (Negative)	No	0.9m	No	Var DC Power Supply	Power Module Board
Ribbon Cable, Long	No	0.5m	No	Power Module Board	Axiom Board
Ribbon Cable, Short	No	0.2m	No	Programmer/Debugger	Axiom Board
USB Cable	Yes	0.8m	No	Laptop PC	Programmer/Debugger
DC Power Cable	Yes	0.9m	No	AC Mains	Var DC Power Supply
DC Power Cable	Yes	1.1m	No	DC Power Supply	Laptop PC
AC Power cable	Yes	1.0m	No	AC Mains	DC Power Supply

## Configuration GARR0095- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Axiom Metal Detector	Garrett Metal Detectors	11427xx	62381721

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-05-27	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.
2	2022-05-31	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2022-05-31	DTS Bandwidth (6 dB)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2022-05-31	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-05-31	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.
6	2022-09-28	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.
7	2022-11-03	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.
8	2022-11-03	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# OCCUPIED BANDWIDTH (99%)



XMI 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Attenuator	Fairview Microwave	SA4018-20	TYW	2022-03-01	2023-03-01
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

## TEST DESCRIPTION

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

The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation.

Per ANSI C63.10:2013, 6.9.3, the spectrum analyzer was configured as follows:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.


The spectrum analyzer occupied bandwidth measurement function was used to sum the power of the transmission in linear terms to obtain the 99% bandwidth.



# OCCUPIED BANDWIDTH (99%)



TelTx 2022.05.02.0 XMI 2022.02.07.0

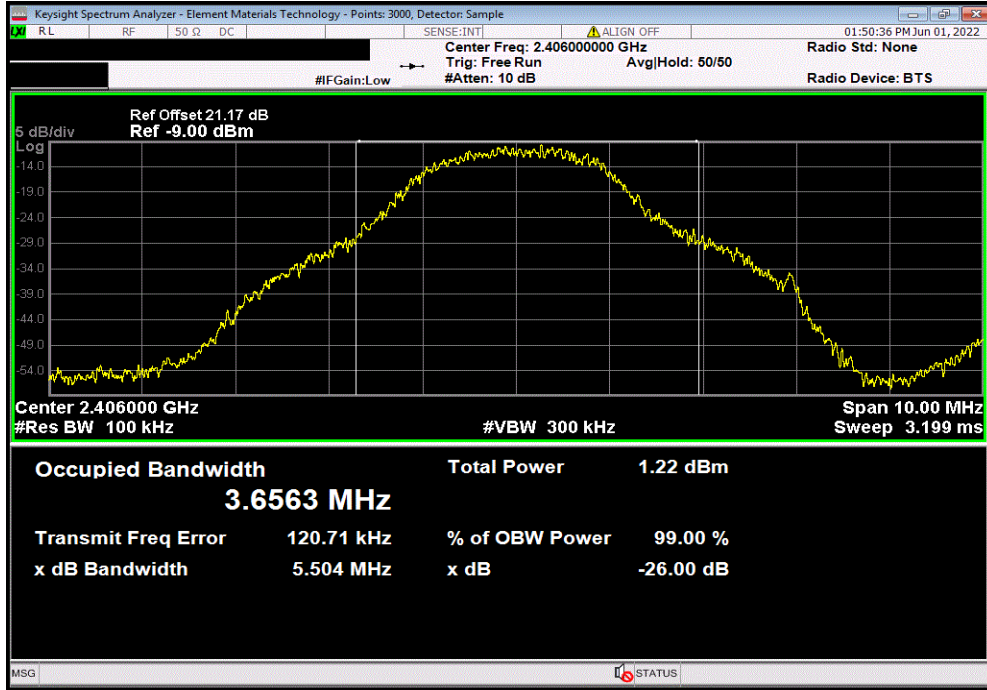
EUT: Garrett Axiom		Work Order: GARR0095	
Serial Number: See Configurations		Date: 31-May-22	
Customer: Garrett Metal Detectors		Temperature: 22.1 °C	
Attendees: None		Humidity: 55.2% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Brandon Hobbs and Jarrod Brenden		Power: 3.8 VDC	
		Job Site: TX01	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
All losses in the measurement path were accounted for: cable, DC block, and attenuator. Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature 	
		Value	99% Limit (S) Result
Normal Test Conditions			
	+5dBm, Low Channel, 2406 MHz	3.656 MHz	N/A N/A
	+5dBm, Mid Channel, 2438 MHz	3.678 MHz	N/A N/A
	+5dBm, High Channel, 2474 MHz	3.706 MHz	N/A N/A

# OCCUPIED BANDWIDTH (99%)

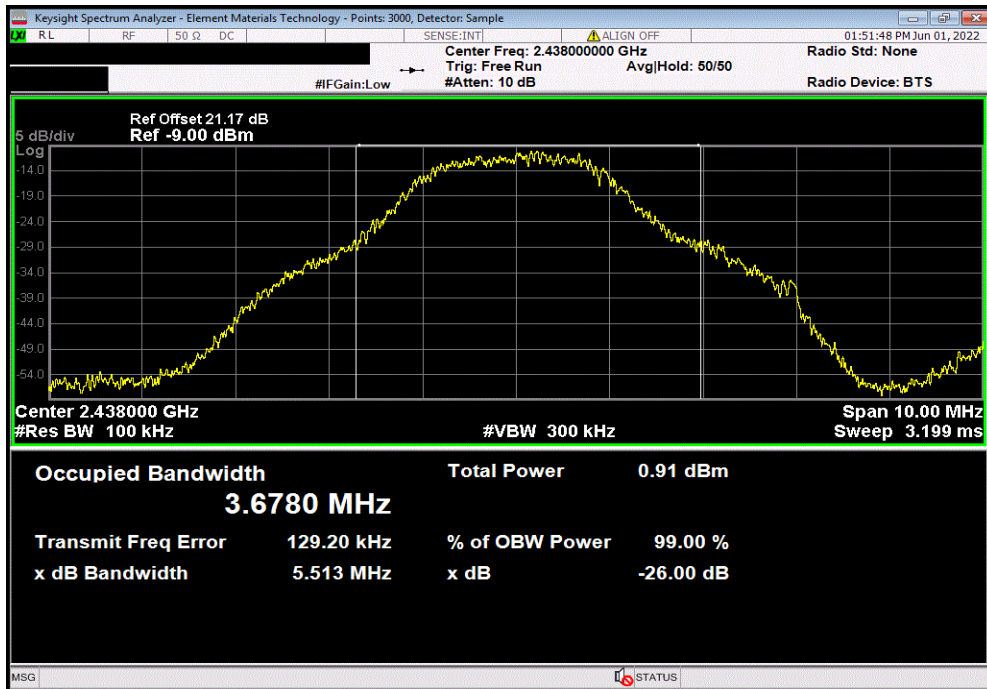


TuTx 2022.05.02.0 XMt 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz						
				Value	99% Limit (S)	Result
				3.656 MHz	N/A	N/A



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz						
				Value	99% Limit (S)	Result
				3.678 MHz	N/A	N/A

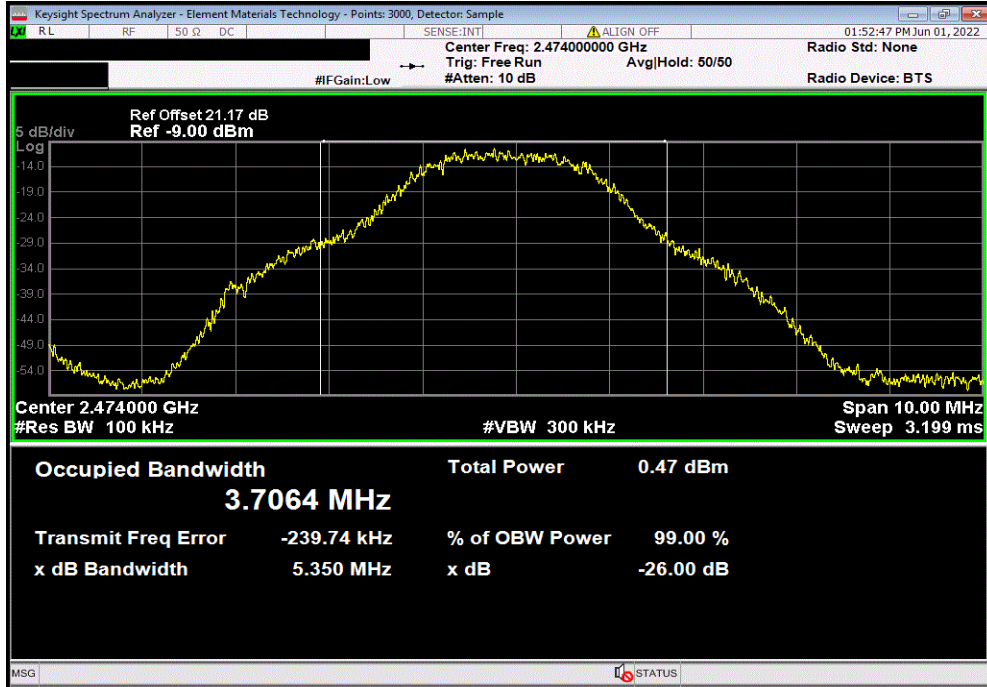


# OCCUPIED BANDWIDTH (99%)



TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz				99% Limit	
	Value	( $\leq$ )	Result		
	3.706 MHz	N/A	N/A		



# BAND EDGE COMPLIANCE



XMII 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Attenuator	Fairview Microwave	SA4018-20	TYW	2022-03-01	2023-03-01
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

## TEST DESCRIPTION

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


The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

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

# BAND EDGE COMPLIANCE



TelTx 2022.05.02.0 XMI: 2022.02.07.0

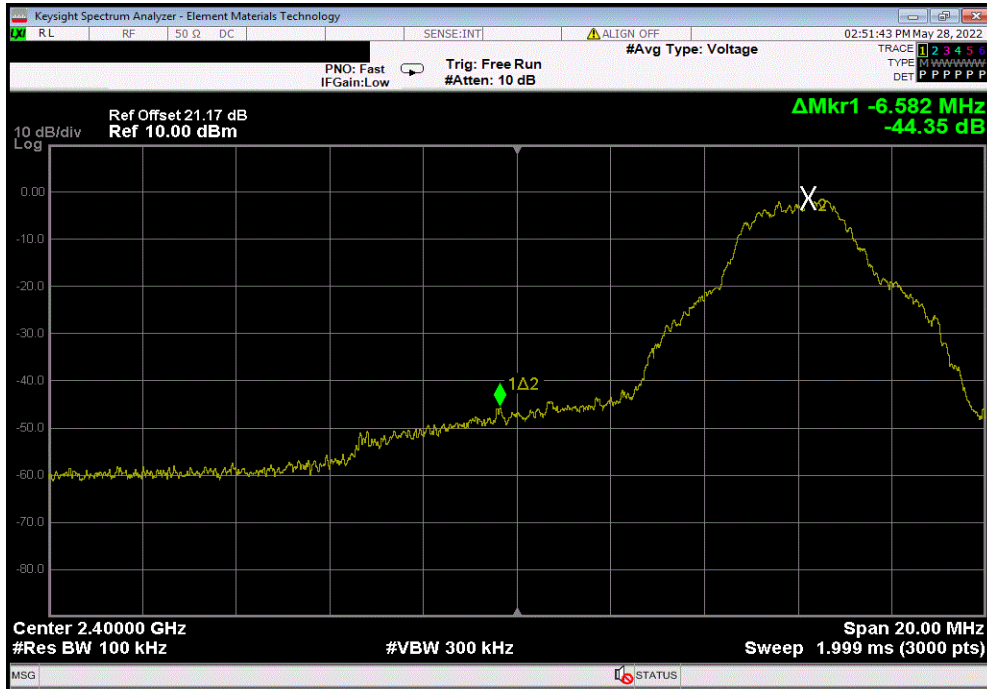
EUT: Garrett Axiom		Work Order: GARR0095	
Serial Number: See Configurations		Date: 27-May-22	
Customer: Garrett Metal Detectors		Temperature: 22.6 °C	
Attendees: None		Humidity: 43.3% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Brandon Hobbs and Jarrod Brenden		Power: 3.8 VDC	Job Site: TX01
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
All losses in the measurement path were accounted for: cable, DC block, and attenuator. Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
Normal Test Conditions			
+5dBm, Low Channel, 2406 MHz		-44.4	-20 Pass
+5dBm, High Channel, 2474 MHz		-51.5	-20 Pass

# BAND EDGE COMPLIANCE

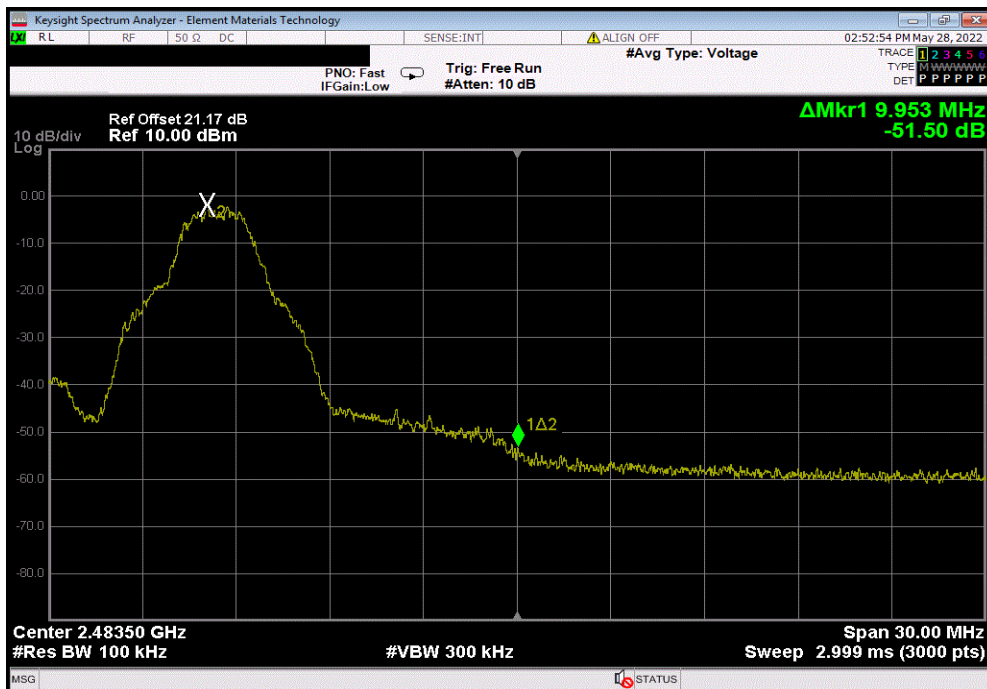


TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.35	-20	Pass



Normal Test Conditions, +5dBm, High Channel, 2474 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.5	-20	Pass



# SPURIOUS CONDUCTED EMISSIONS



XMit 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Attenuator	Fairview Microwave	SA4018-20	TYW	2022-03-01	2023-03-01
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

## TEST DESCRIPTION

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


The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. 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



TelTx 2022.05.02.0 XMI 2022.02.07.0

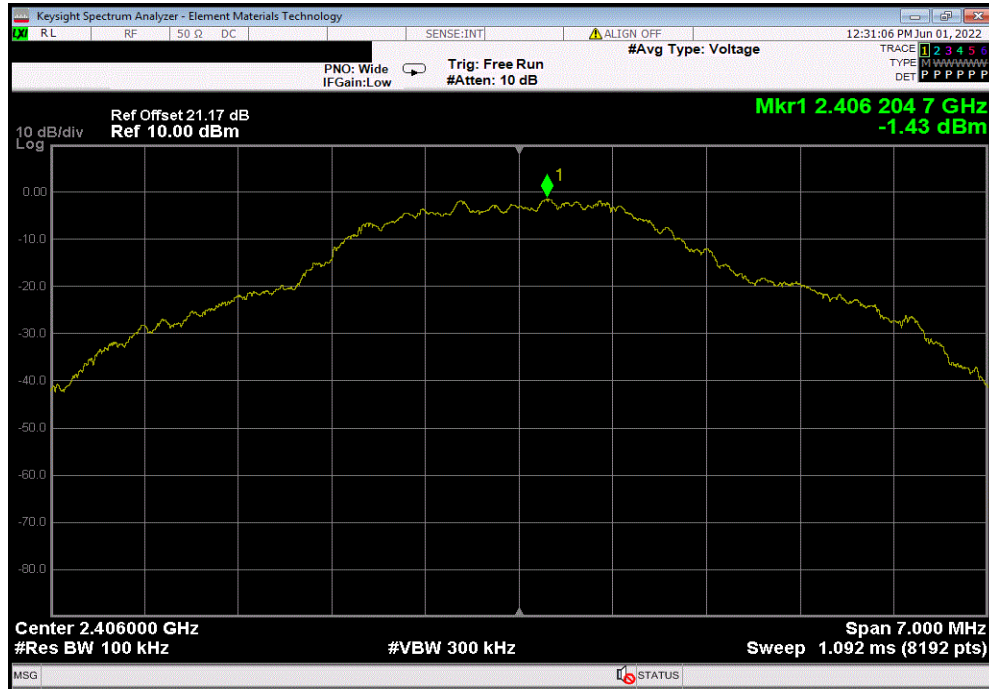
EUT: <b>Garrett Axiom</b>		Work Order: <b>GARR0095</b>				
Serial Number: <b>RF2</b>		Date: <b>31-May-22</b>				
Customer: <b>Garrett Metal Detectors</b>		Temperature: <b>22.7 °C</b>				
Attendees: <b>None</b>		Humidity: <b>53.9% RH</b>				
Project: <b>None</b>		Barometric Pres.: <b>1014 mbar</b>				
Tested by: <b>Brandon Hobbs and Jarrod Brenden</b>		Power: <b>3.8 VDC</b>				
Job Site: <b>TX01</b>		Test Method				
TEST SPECIFICATIONS		ANSI C63.10:2013				
FCC 15.247:2022						
COMMENTS						
All losses in the measurement path were accounted for: cable, DC block, and attenuator. Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz)						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	2	Signature 				
		Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
Normal Test Conditions						
		Fundamental	2406.20	N/A	N/A	N/A
		30 MHz - 12.5 GHz	12256.42	-51.5	-20	Pass
		12.5 GHz - 25 GHz	24964.90	-46.2	-20	Pass
		Fundamental	2438.20	N/A	N/A	N/A
		30 MHz - 12.5 GHz	3805.56	-52.0	-20	Pass
		12.5 GHz - 25 GHz	24844.34	-47.0	-20	Pass
		Fundamental	2473.57	N/A	N/A	N/A
		30 MHz - 12.5 GHz	10720.31	-51.7	-20	Pass
		12.5 GHz - 25 GHz	24011.11	-47.2	-20	Pass

# SPURIOUS CONDUCTED EMISSIONS

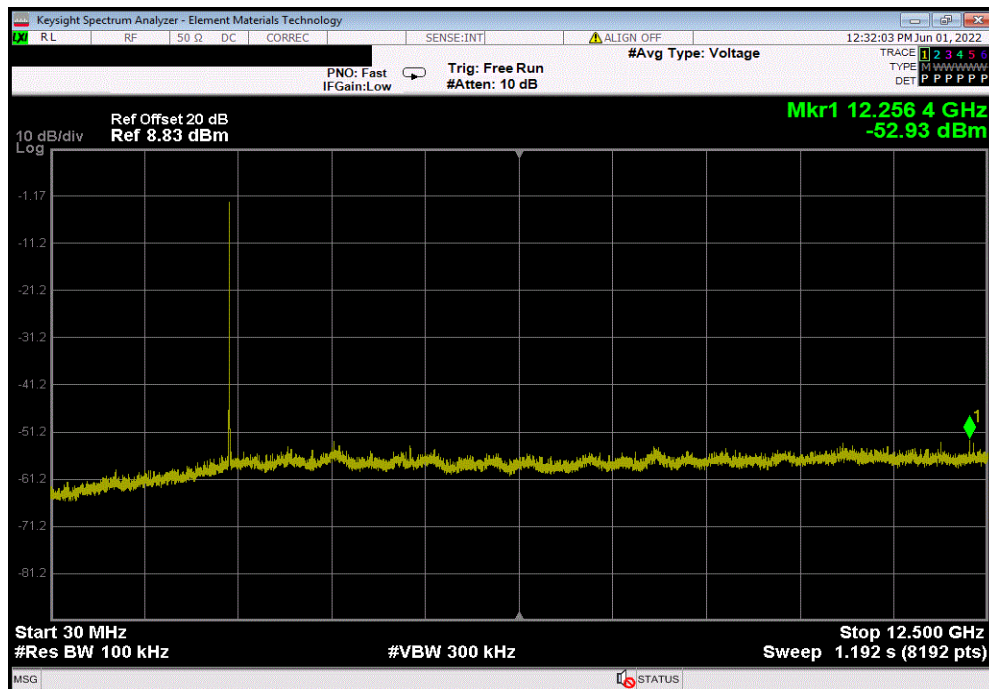


TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2406.2	N/A	N/A	N/A	



Normal Test Conditions, +5dBm, Low Channel, 2406 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12256.42	-51.5	-20	Pass	

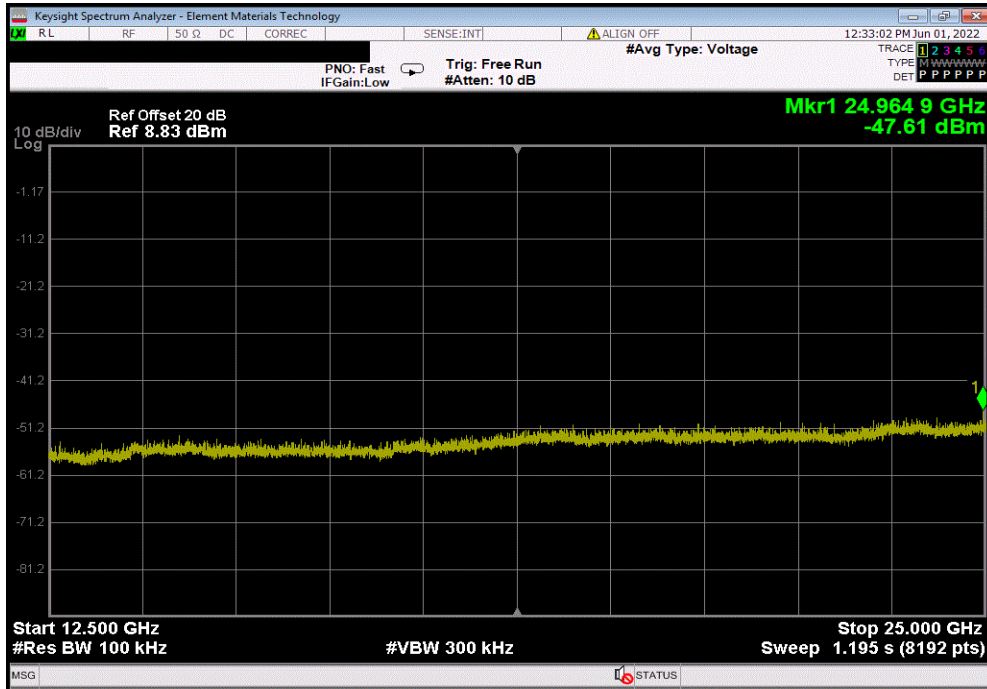


# SPURIOUS CONDUCTED EMISSIONS



TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24964.9	-46.18	-20	Pass	



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2438.2	N/A	N/A	N/A	

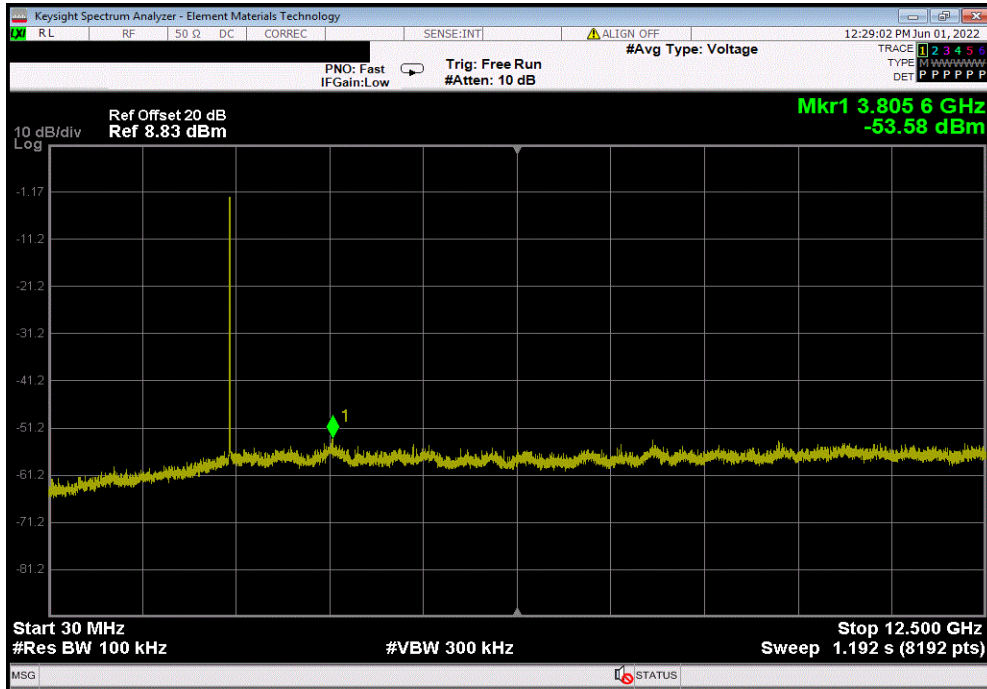


# SPURIOUS CONDUCTED EMISSIONS

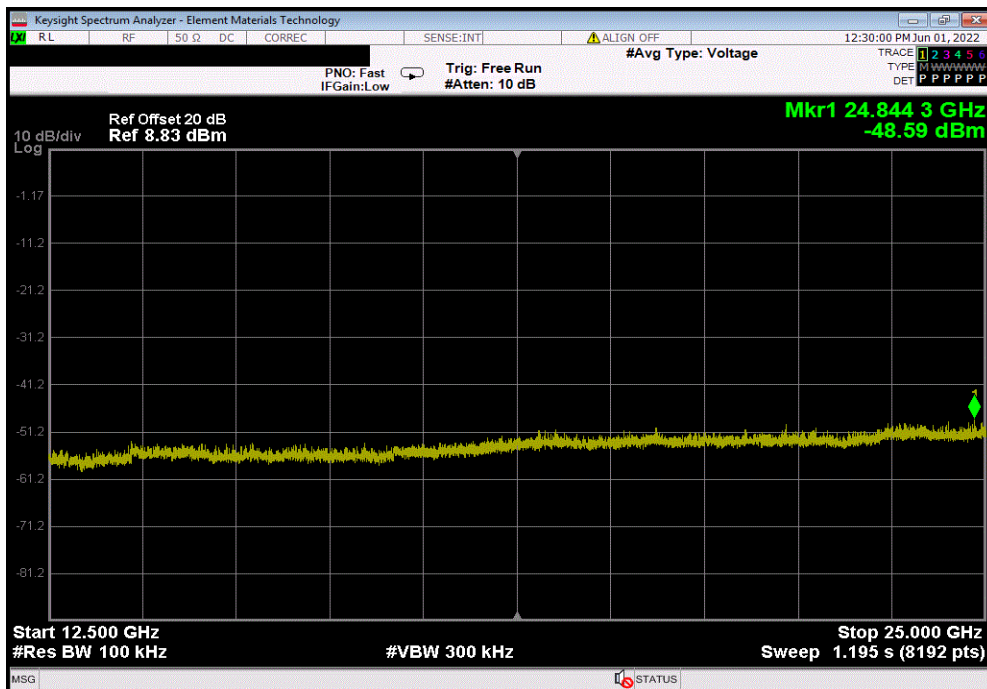


TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	3805.56	-52	-20	Pass



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24844.34	-47.01	-20	Pass

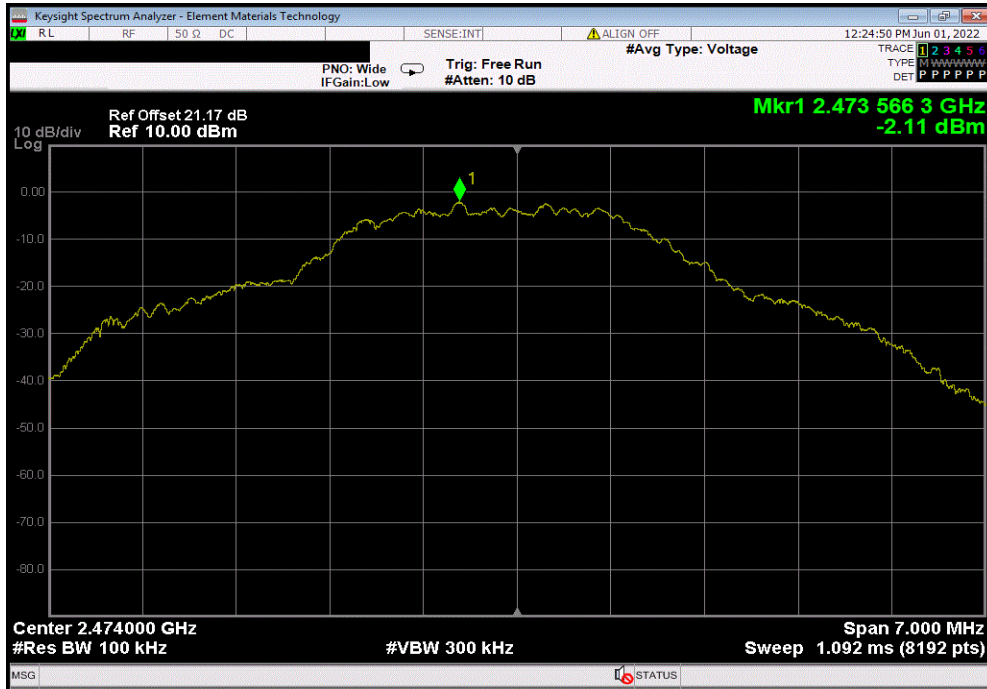


# SPURIOUS CONDUCTED EMISSIONS

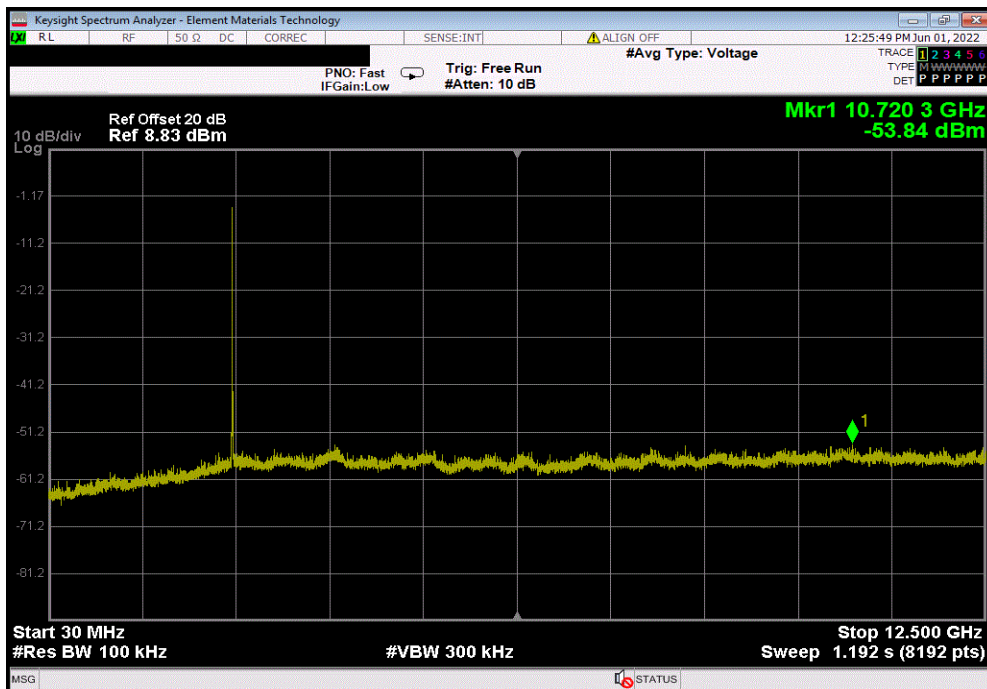


TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2473.57	N/A	N/A	N/A	



Normal Test Conditions, +5dBm, High Channel, 2474 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	10720.31	-51.73	-20	Pass	

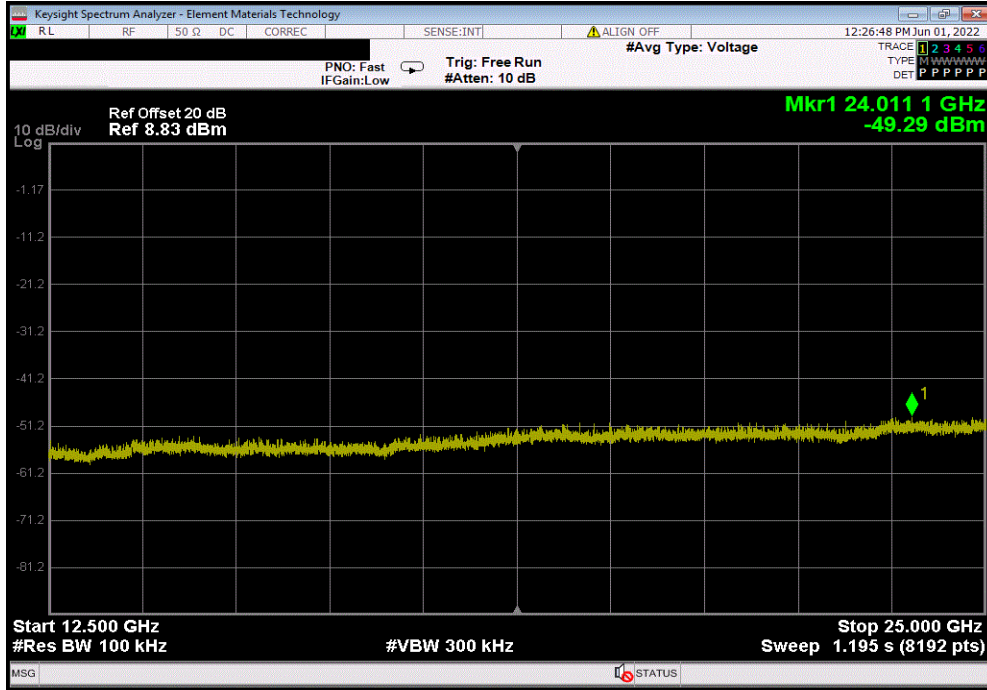


# SPURIOUS CONDUCTED EMISSIONS



TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	24011.11	-47.18	-20	Pass



# POWER SPECTRAL DENSITY



XMI 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Attenuator	Fairview Microwave	SA4018-20	TYW	2022-03-01	2023-03-01
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

## 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



TelTx 2022.05.02.0 XMI 2022.02.07.0

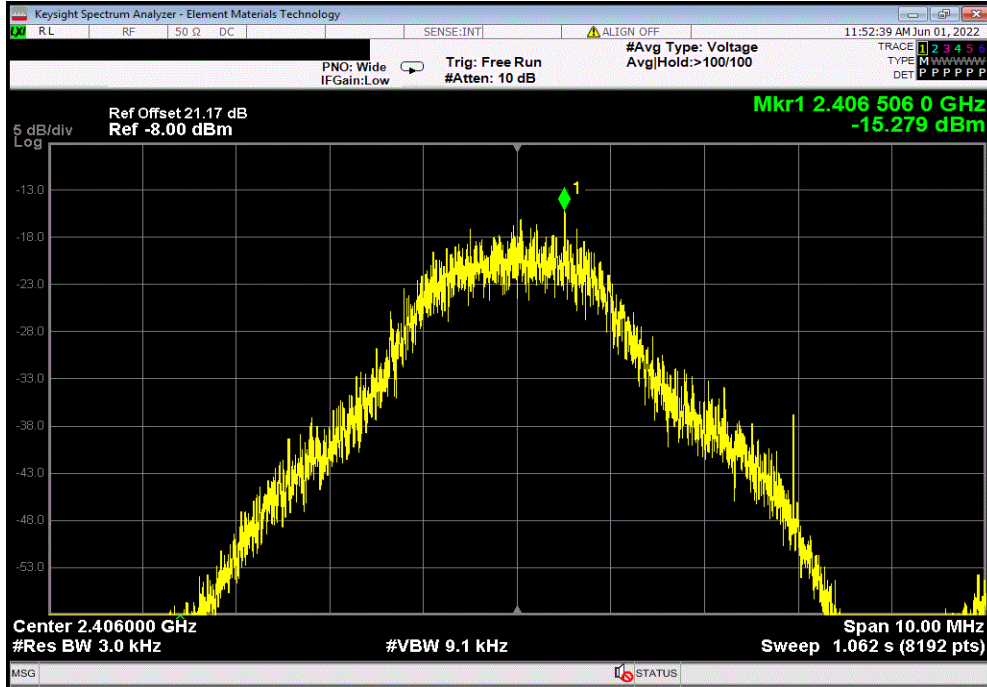
EUT: Garrett Axiom		Work Order: GARR0095	
Serial Number: RF2		Date: 31-May-22	
Customer: Garrett Metal Detectors		Temperature: 22.9 °C	
Attendees: None		Humidity: 54.5% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Brandon Hobbs and Jarrod Brenden		Power: 3.8 VDC	
Job Site: TX01		Test Method	
TEST SPECIFICATIONS		FCC 15.247:2022	
ANSI C63.10:2013			
COMMENTS			
All losses in the measurement path were accounted for: cable, DC block, and attenuator. Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature 	
		Value dBm/3kHz	Limit < dBm/3kHz
Normal Test Conditions			Results
+5dBm, Low Channel, 2406 MHz		-15.28	8 Pass
+5dBm, Mid Channel, 2438 MHz		-16.47	8 Pass
+5dBm, High Channel, 2474 MHz		-16.74	8 Pass

# POWER SPECTRAL DENSITY

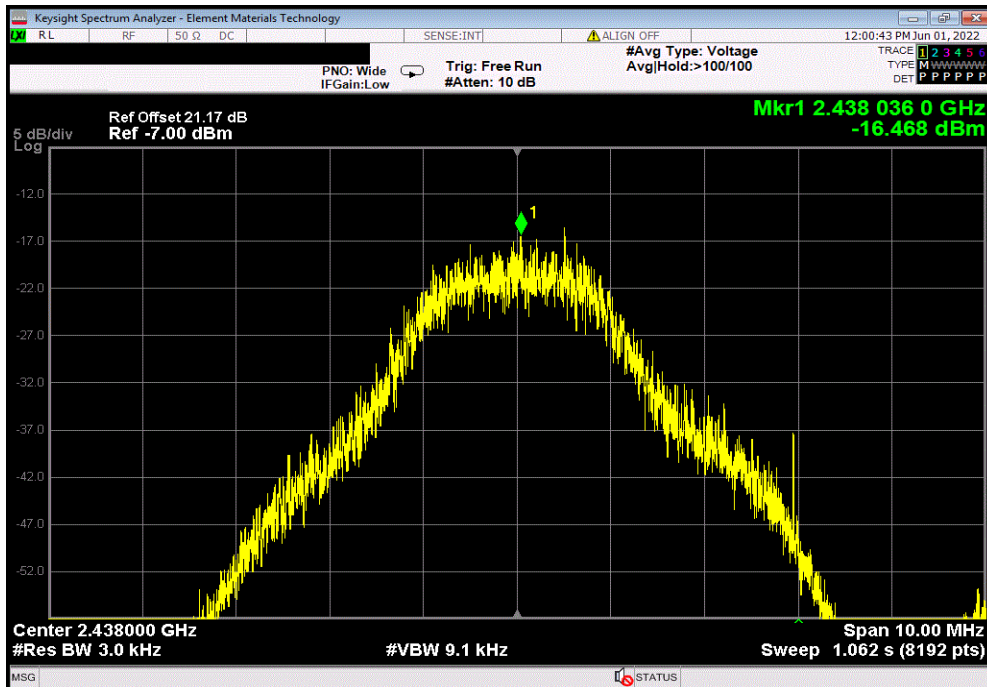


TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-15.279	8	Pass			



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-16.468	8	Pass			

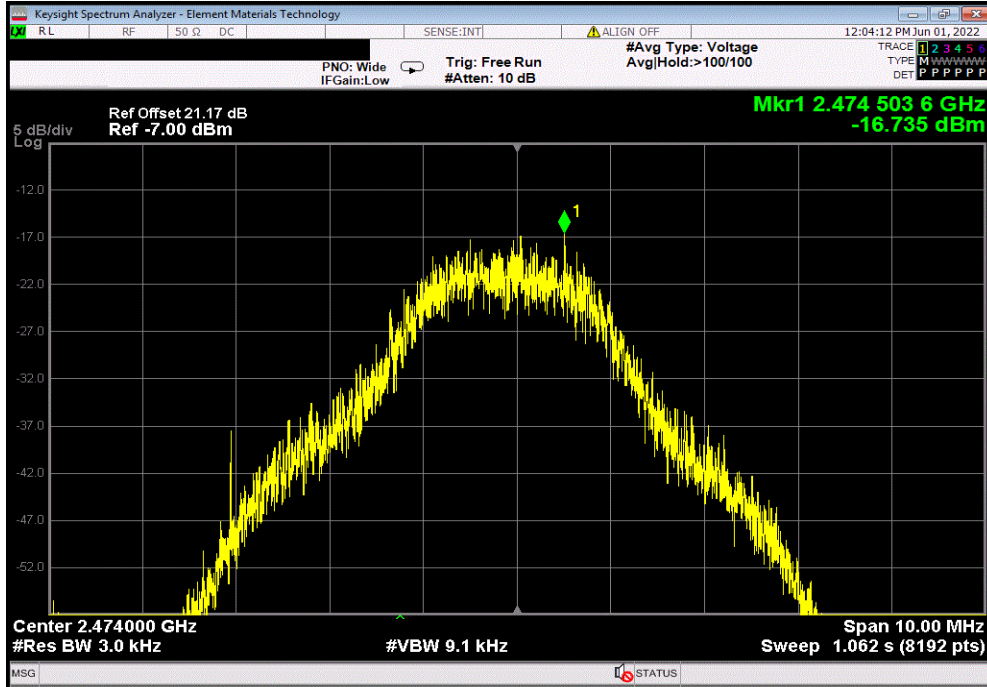


# POWER SPECTRAL DENSITY



TbTx 2022.05.02.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-16.735	8	Pass



# DUTY CYCLE



XMI 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Block - DC	Fairview Microwave	SD3239	ANE	2022-03-02	2023-03-02
Attenuator	Fairview Microwave	SA4018-20	TYE	2022-09-13	2023-09-13
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Power Supply - DC	B&K Precision	9110	TQI	NCR	NCR

## TEST DESCRIPTION

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

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

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

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

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

# DTS BANDWIDTH (6 dB)



XMit 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10
Attenuator	Fairview Microwave	SA4018-20	TYW	2022-03-01	2023-03-01
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19

## TEST DESCRIPTION

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


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

The 6dB DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

# DTS BANDWIDTH (6 dB)



Tel: 2022.04.28.0 XM: 2022.02.07.0

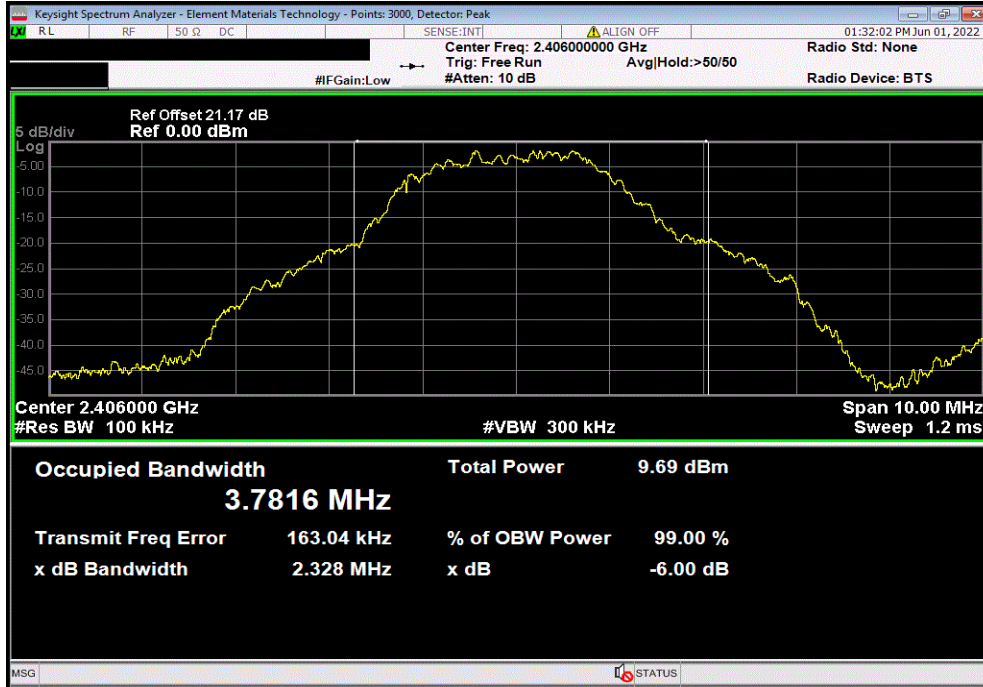
EUT: Garrett Axiom		Work Order: GARR0095	
Serial Number: See Configurations		Date: 31-May-22	
Customer: Garrett Metal Detectors		Temperature: 21.8 °C	
Attendees: None		Humidity: 57.3% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Brandon Hobbs and Jarrod Brenden		Power: 3.8 VDC	
		Job Site: TX01	
TEST SPECIFICATIONS			
FCC 15.247:2022		Test Method	
		ANSI C63.10:2013	
COMMENTS			
All losses in the measurement path were accounted for: cable, DC block, and attenuator. Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz)			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature 	
		Value	Limit (>)
Normal Test Conditions			
	+5dBm, Low Channel, 2406 MHz	2.328 MHz	500 kHz
	+5dBm, Mid Channel, 2438 MHz	2.195 MHz	500 kHz
	+5dBm, High Channel, 2474 MHz	2.216 MHz	500 kHz
			Pass
			Pass
			Pass

# DTS BANDWIDTH (6 dB)

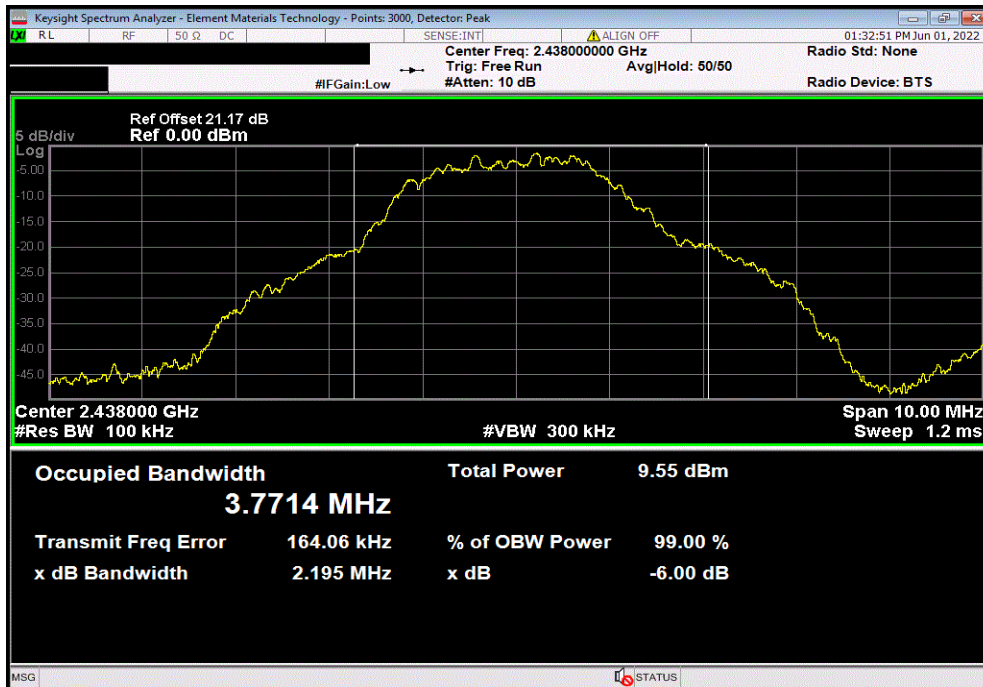


TuTx 2022.04.28.0 XMt 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz			
	Value	Limit (>)	Result
	2.328 MHz	500 kHz	Pass



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz			
	Value	Limit (>)	Result
	2.195 MHz	500 kHz	Pass



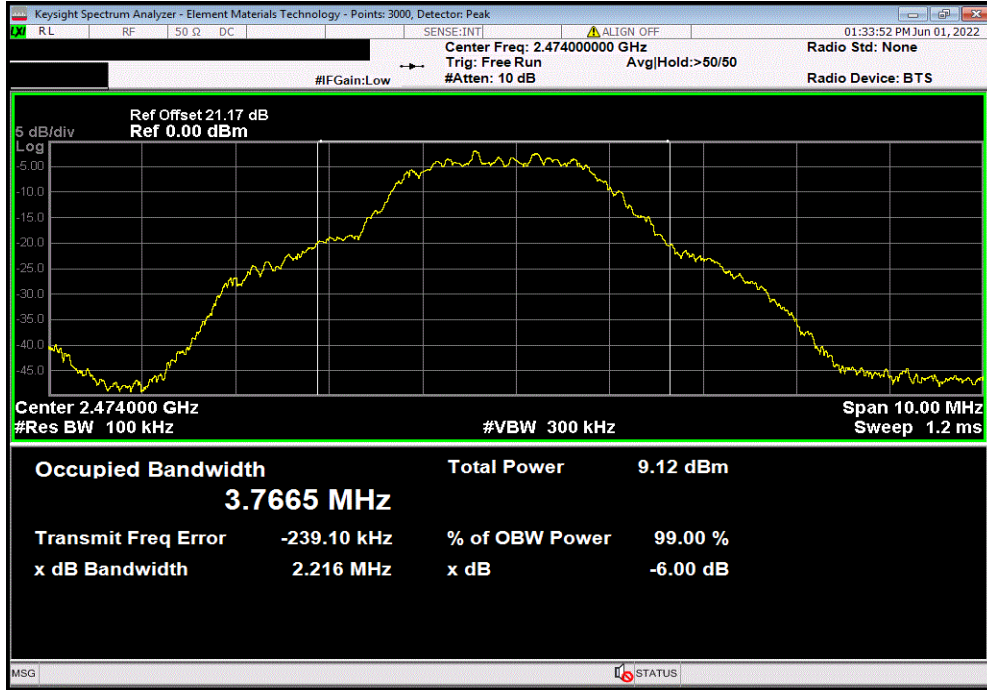


# DTS BANDWIDTH (6 dB)



TbTx 2022.04.28.0 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz		
Value	Limit	Result
2.216 MHz	(>) 500 kHz	Pass



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



element

XMIT 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17
Generator - Signal	Keysight	N5182B	TEV	2021-04-27	2024-04-27
Block - DC	Fairview Microwave	SD3239	ANE	2022-03-02	2023-03-02
Attenuator	Fairview Microwave	SA18E 1913	TZV	2022-09-13	2023-09-13
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10

## TEST DESCRIPTION

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

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

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


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

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TelTx 2022.05.02.0 XMit 2022.02.07.0

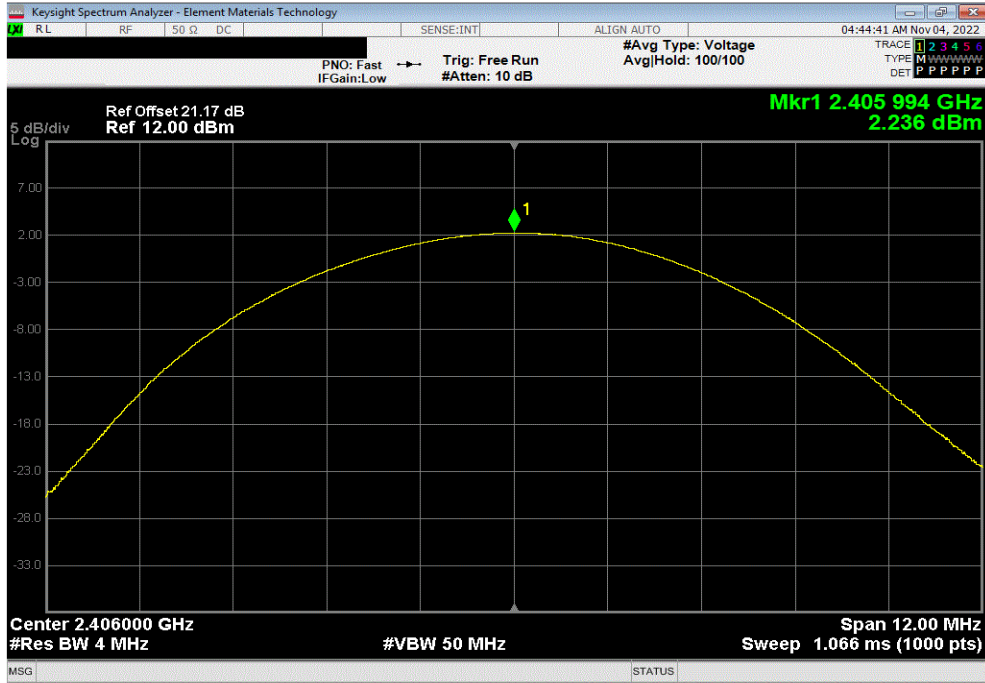
EUT: <b>Garrett Axiom</b>		Work Order: <b>GARR0095</b>				
Serial Number: <b>RF2</b>		Date: <b>3-Nov-22</b>				
Customer: <b>Garrett Metal Detectors</b>		Temperature: <b>21.2 °C</b>				
Attendees: <b>None</b>		Humidity: <b>52.2% RH</b>				
Project: <b>None</b>		Barometric Pres.: <b>1021 mbar</b>				
Tested by: <b>Jarrold Brenden</b>		Power: <b>3.8 VDC via Battery</b>				
		Job Site: <b>TX07</b>				
<b>TEST SPECIFICATIONS</b>						
FCC 15.247:2022		Test Method: <b>ANSI C63.10:2013</b>				
<b>COMMENTS</b>						
All losses in the measurement path were accounted for: cable, DC block, and attenuator (21.17 dB). Single data rate/modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), and High Channel (2474 MHz).						
<b>DEVIATIONS FROM TEST STANDARD</b>						
None						
Configuration #	2	Signature 				
		Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
<b>Normal Test Conditions</b>						
	+5dBm, Low Channel, 2406 MHz	2.236	3.3	5.536	36	Pass
	+5dBm, Mid Channel, 2438 MHz	1.958	3.3	5.258	36	Pass
	+5dBm, High Channel, 2474 MHz	1.475	3.3	4.775	36	Pass

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

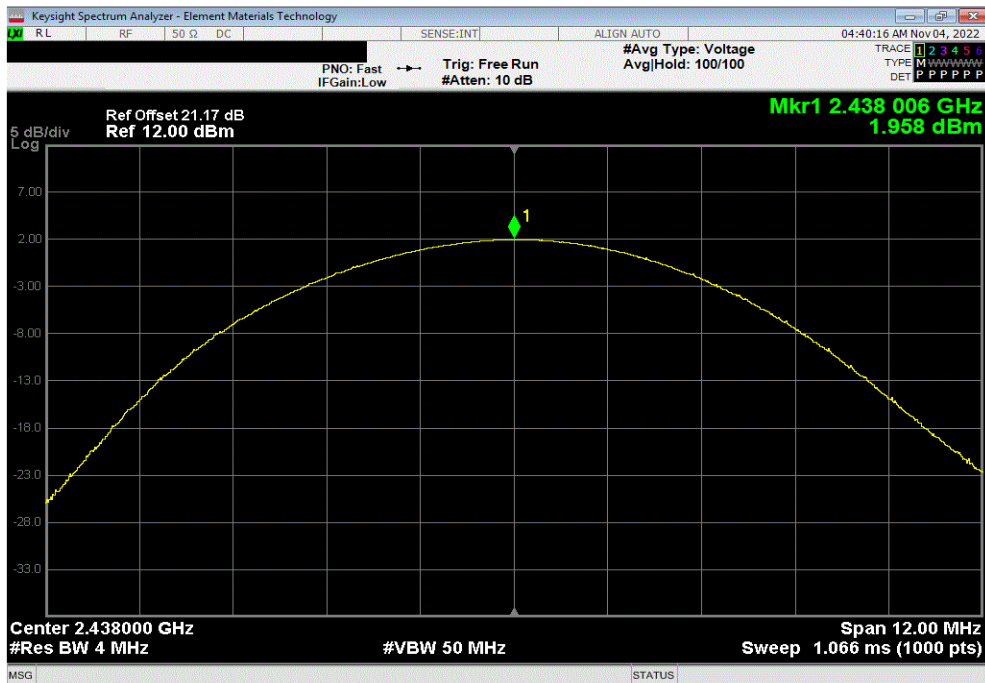


TbTx 2022.05.02.0 XMi 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
2.236	3.3	5.536	36	Pass		



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
1.958	3.3	5.258	36	Pass		





# RF OUTPUT POWER



XMIT 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17
Generator - Signal	Keysight	N5182B	TEV	2021-04-27	2024-04-27
Block - DC	Fairview Microwave	SD3239	ANE	2022-03-02	2023-03-02
Attenuator	Fairview Microwave	SA18E 1913	TZV	2022-09-13	2023-09-13
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	2021-12-10	2022-12-10

## 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.

# RF OUTPUT POWER



TelTx 2021.12.14.1 XMit 2022.02.07.0

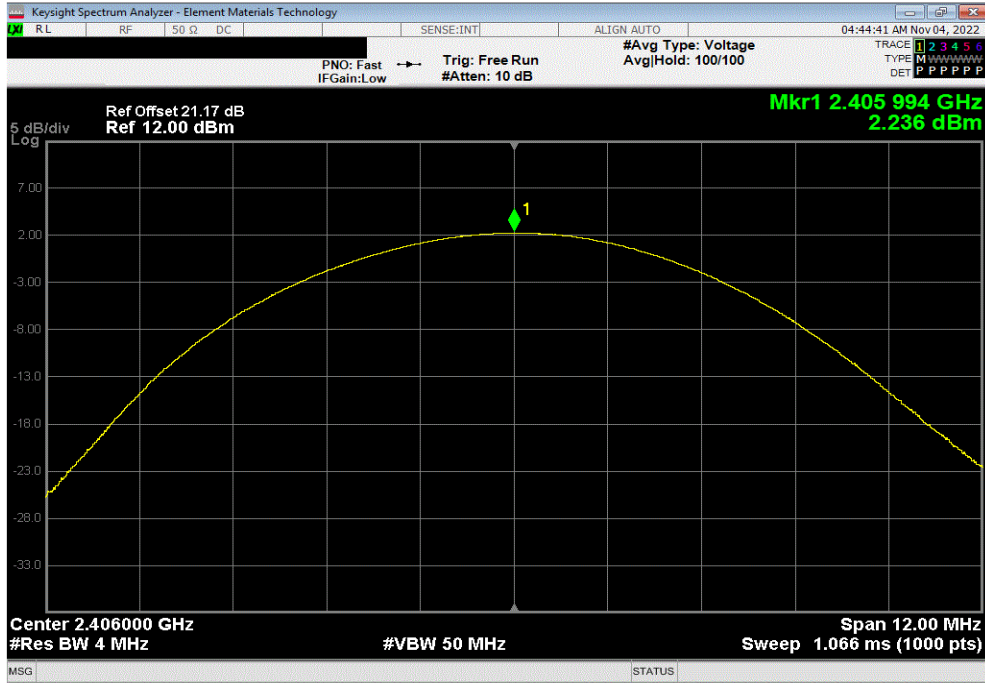
EUT: <b>Garrett Axiom</b>		Work Order: <b>GARR0095</b>	
Serial Number: <b>RF2</b>		Date: <b>3-Nov-22</b>	
Customer: <b>Garrett Metal Detectors</b>		Temperature: <b>21.5 °C</b>	
Attendees: <b>None</b>		Humidity: <b>51.4% RH</b>	
Project: <b>None</b>		Barometric Pres.: <b>1021 mbar</b>	
Tested by: <b>Jarrold Brenden</b>		Power: <b>3.8 VDC via Battery</b>	
		Job Site: <b>TX07</b>	
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2022		Test Method: <b>ANSI C63.10:2013</b>	
<b>COMMENTS</b>			
All losses in the measurement path were accounted for: cable, DC block, and attenuator (21.17 dB). Single data rate/modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), and High Channel (2474 MHz).			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	2	Signature 	
		Out Pwr (dBm)	Limit (dBm)
Normal Test Conditions			Result
+5dBm, Low Channel, 2406 MHz		2.236	30 Pass
+5dBm, Mid Channel, 2438 MHz		1.958	30 Pass
+5dBm, High Channel, 2474 MHz		1.475	30 Pass

# RF OUTPUT POWER

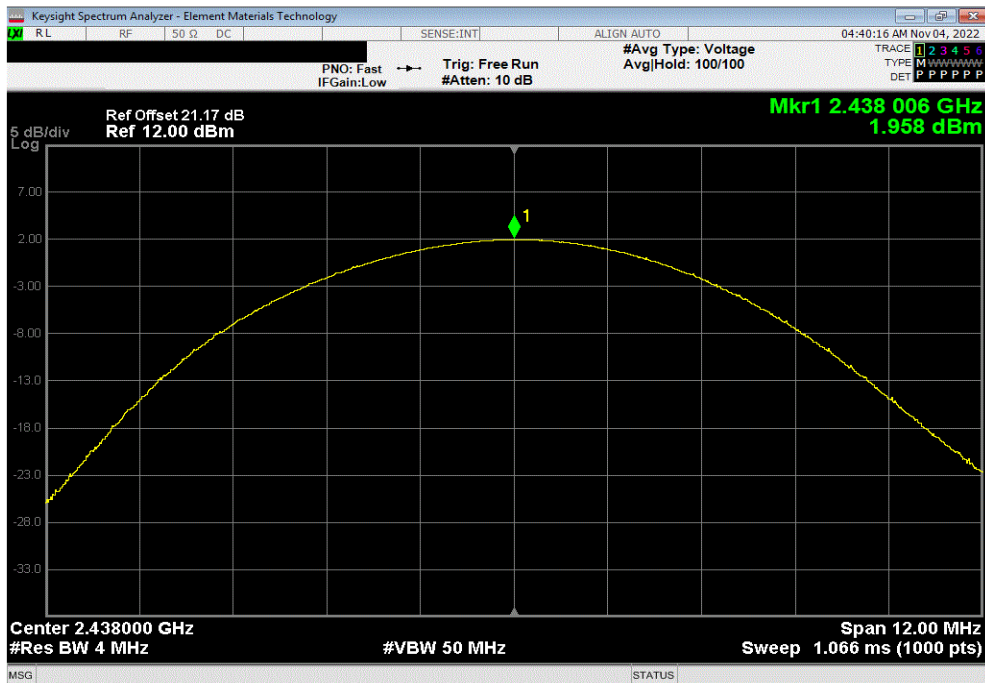


TbTx 2021.12.14.1 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, Low Channel, 2406 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				2.236	30	Pass



Normal Test Conditions, +5dBm, Mid Channel, 2438 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.958	30	Pass



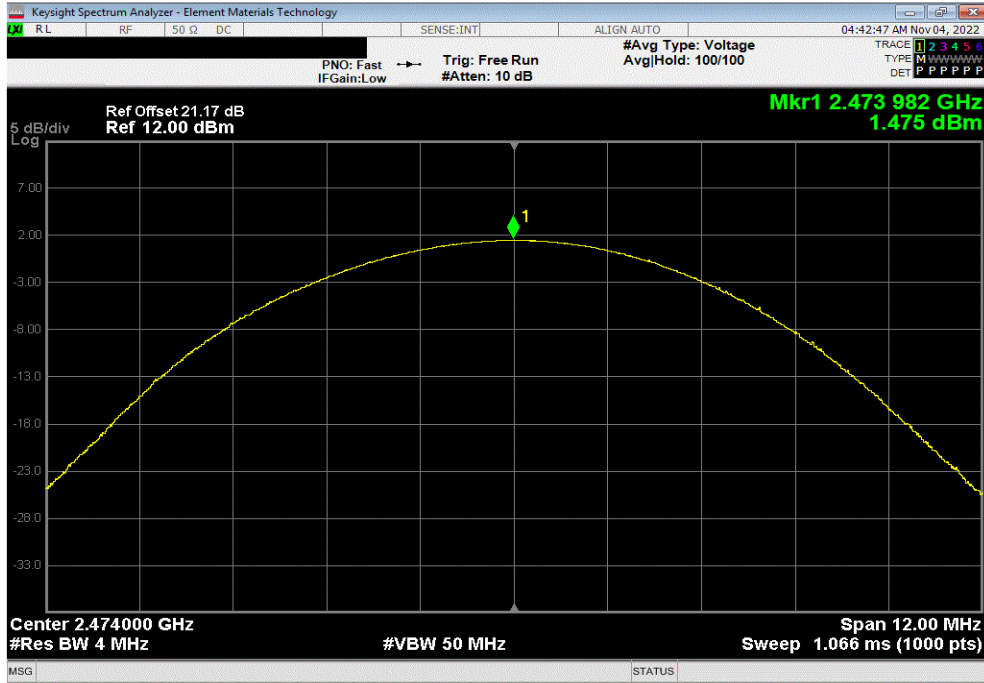


# RF OUTPUT POWER



TbTx 2021.12.14.1 XMI 2022.02.07.0

Normal Test Conditions, +5dBm, High Channel, 2474 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				1.475	30	Pass



# SPURIOUS RADIATED EMISSIONS

## TEST DESCRIPTION

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

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

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

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

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

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

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

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

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

# SPURIOUS RADIATED EMISSIONS



## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2022-01-19	2023-01-19
Antenna - Biconilog	ETS Lindgren	3143B	AYF	2022-09-02	2024-09-02
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	2022-06-10	2023-06-10
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	2022-04-19	2023-04-19
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	2022-07-22	2023-07-22
Antenna - Double Ridge	ETS Lindgren	3115	AJL	2020-10-20	2022-10-20
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	2022-04-19	2023-04-19
Cable	Northwest EMC	1-8.2 GHz	TXC	2022-04-19	2023-04-19
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	2022-09-09	2023-09-09
Cable	Northwest EMC	8-18GHz	TXD	2022-04-12	2023-04-12
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	2022-09-09	2023-09-09
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXW	2022-09-09	2024-09-09
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	2022-09-14	2023-09-14
Cable	Northwest EMC	18-40GHz	TXE	2022-09-09	2023-09-09
Filter - High Pass	Micro-Tronics	HPM50111	HGC	2022-02-23	2023-02-23
Attenuator	Weinschel Corp	4H-20	AWB	2022-02-23	2023-02-23

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.1 dB	-5.1 dB

## FREQUENCY RANGE INVESTIGATED

30 MHz TO 26 GHz

## POWER INVESTIGATED

3.8 VDC via Battery

## CONFIGURATIONS INVESTIGATED

GARR0095-3

## MODES INVESTIGATED

Wideband DTS, 8FSK / 5 Mbps, Continuous Tx, 100% Duty Cycle

# SPURIOUS RADIATED EMISSIONS



EUT:	GarrettAxiom	Work Order:	GARR0095
Serial Number:	62381721	Date:	2022-09-28
Customer:	Garrett Metal Detectors	Temperature:	21.9°C
Attendees:	None	Relative Humidity:	42.1%
Customer Project:	None	Bar. Pressure (PMSL):	1027 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	3.8 VDC via Battery	Configuration:	GARR0095-3

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	102	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

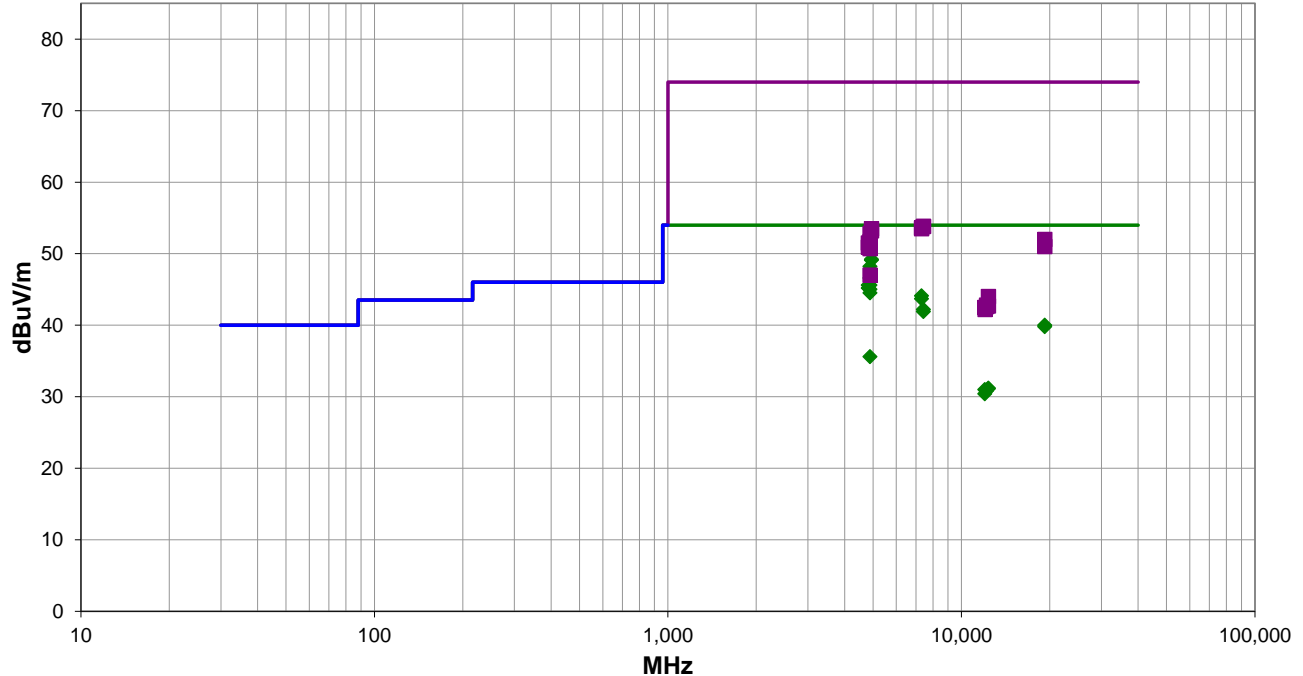
Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 Mhz). See comments below for channel, modulation, and EUT orientation.

## EUT OPERATING MODES

Wideband DTS, 8FSK / 5 Mbps, Continuous Tx, 100% Duty Cycle

## DEVIATIONS FROM TEST STANDARD

None



Run #: 102

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS

## RESULTS - Run #102

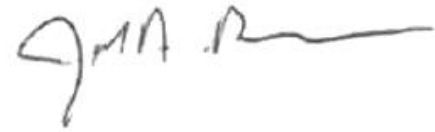
Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4941.983	44.2	5.0	4.0	360.0	3.0	0.0	Vert	AV	0.0	49.2	54.0	-4.8	EUT vert, high ch, 5 Mbps
4941.992	44.1	5.0	1.9	175.0	3.0	0.0	Horz	AV	0.0	49.1	54.0	-4.9	EUT side, high ch, 5 Mbps
4881.967	43.2	5.0	3.8	0.0	3.0	0.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT side, mid ch, 5 Mbps
4881.975	41.6	5.0	3.8	177.0	3.0	0.0	Vert	AV	0.0	46.6	54.0	-7.4	EUT vert, mid ch, 5 Mbps
4881.967	40.6	5.0	3.5	57.9	3.0	0.0	Horz	AV	0.0	45.6	54.0	-8.4	EUT vert, mid ch, 5 Mbps
4818.008	40.4	5.2	2.7	356.0	3.0	0.0	Vert	AV	0.0	45.6	54.0	-8.4	EUT vert, low ch, 5 Mbps
4818.017	40.0	5.2	1.7	195.0	3.0	0.0	Horz	AV	0.0	45.2	54.0	-8.8	EUT side, low ch, 5 Mbps
4881.950	40.0	5.0	1.7	12.0	3.0	0.0	Horz	AV	0.0	45.0	54.0	-9.0	EUT horz, mid ch, 5 Mbps
4881.983	39.5	5.0	1.9	339.0	3.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	EUT side, mid ch, 5 Mbps
7313.900	32.8	11.3	3.7	344.0	3.0	0.0	Vert	AV	0.0	44.1	54.0	-9.9	EUT vert, mid ch, 5 Mbps
7314.017	32.4	11.3	1.5	268.9	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT side, mid ch, 5 Mbps
7422.083	30.8	11.4	1.5	55.0	3.0	0.0	Vert	AV	0.0	42.2	54.0	-11.8	EUT vert, high ch, 5 Mbps
7422.133	30.5	11.4	1.5	195.9	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	EUT side, high ch, 5 Mbps
19250.480	46.5	-6.5	1.5	242.0	3.0	0.0	Horz	AV	0.0	40.0	54.0	-14.0	EUT side, low ch, 5 Mbps
19249.980	46.3	-6.5	1.5	286.9	3.0	0.0	Vert	AV	0.0	39.8	54.0	-14.2	EUT vert, low ch, 5 Mbps
4882.100	30.6	5.0	3.4	213.0	3.0	0.0	Vert	AV	0.0	35.6	54.0	-18.4	EUT horz, mid ch, 5 Mbps
7422.399	42.4	11.4	1.5	195.9	3.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	EUT side, high ch, 5 Mbps
7421.909	42.4	11.4	1.5	55.0	3.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	EUT vert, high ch, 5 Mbps
7314.067	42.3	11.3	3.7	344.0	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	EUT vert, mid ch, 5 Mbps
7315.140	42.2	11.3	1.5	268.9	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT side, mid ch, 5 Mbps
4941.925	48.5	5.0	1.9	175.0	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT side, high ch, 5 Mbps
4941.917	48.2	5.0	4.0	360.0	3.0	0.0	Vert	PK	0.0	53.2	74.0	-20.8	EUT vert, high ch, 5 Mbps
4881.917	47.8	5.0	3.8	0.0	3.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	EUT side, mid ch, 5 Mbps
19246.970	58.5	-6.5	1.5	242.0	3.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	EUT side, low ch, 5 Mbps
4882.108	46.7	5.0	3.8	177.0	3.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT vert, mid ch, 5 Mbps
4818.058	46.3	5.2	2.7	356.0	3.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	EUT vert, low ch, 5 Mbps
4881.950	46.4	5.0	3.5	57.9	3.0	0.0	Horz	PK	0.0	51.4	74.0	-22.6	EUT vert, mid ch, 5 Mbps
4881.983	46.2	5.0	1.9	339.0	3.0	0.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT side, mid ch, 5 Mbps
12368.990	34.4	-3.2	1.5	208.9	3.0	0.0	Vert	AV	0.0	31.2	54.0	-22.8	EUT vert, high ch, 5 Mbps
12368.390	34.3	-3.2	1.5	63.0	3.0	0.0	Horz	AV	0.0	31.1	54.0	-22.9	EUT side, high ch, 5 Mbps
12029.920	35.3	-4.3	1.5	9.9	3.0	0.0	Horz	AV	0.0	31.0	54.0	-23.0	EUT side, low ch, 5 Mbps
19246.640	57.5	-6.5	1.5	286.9	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT vert, low ch, 5 Mbps
4818.216	45.7	5.2	1.7	195.0	3.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT side, low ch, 5 Mbps
12189.850	34.2	-3.3	3.6	104.0	3.0	0.0	Horz	AV	0.0	30.9	54.0	-23.1	EUT side, mid ch, 5 Mbps
12189.050	34.1	-3.3	1.5	75.9	3.0	0.0	Vert	AV	0.0	30.8	54.0	-23.2	EUT vert, mid ch, 5 Mbps
4882.183	45.7	5.0	1.7	12.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	EUT horz, mid ch, 5 Mbps
12029.010	34.7	-4.3	1.5	210.0	3.0	0.0	Vert	AV	0.0	30.4	54.0	-23.6	EUT vert, low ch, 5 Mbps
4881.426	42.0	5.0	3.4	213.0	3.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	EUT horz, mid ch, 5 Mbps
12369.230	47.2	-3.2	1.5	208.9	3.0	0.0	Vert	PK	0.0	44.0	74.0	-30.0	EUT vert, high ch, 5 Mbps
12188.160	46.1	-3.3	3.6	104.0	3.0	0.0	Horz	PK	0.0	42.8	74.0	-31.2	EUT side, mid ch, 5 Mbps

# SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)	Comments
12367.980	45.9	-3.2	1.5	63.0	3.0	0.0	Horz	PK	0.0	42.7	74.0	-31.3	EUT side, high ch, 5 Mbps
12191.830	45.9	-3.3	1.5	75.9	3.0	0.0	Vert	PK	0.0	42.6	74.0	-31.4	EUT vert, mid ch, 5 Mbps
12028.590	46.8	-4.3	1.5	210.0	3.0	0.0	Vert	PK	0.0	42.5	74.0	-31.5	EUT vert, low ch, 5 Mbps
12031.100	46.5	-4.3	1.5	9.9	3.0	0.0	Horz	PK	0.0	42.2	74.0	-31.8	EUT side, low ch, 5 Mbps

## CONCLUSION

Pass



Tested By

# SPURIOUS RADIATED EMISSIONS



EUT:	Garrett Axiom	Work Order:	GARR0095
Serial Number:	62381721	Date:	2022-09-28
Customer:	Garrett Metal Detectors	Temperature:	21.9°C
Attendees:	None	Relative Humidity:	42.1%
Customer Project:	None	Bar. Pressure (PMSL):	1027 mb
Tested By:	Jarrod Brenden	Job Site:	TX02
Power:	3.8 VDC via Battery	Configuration:	GARR0095-3

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2022	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	106	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

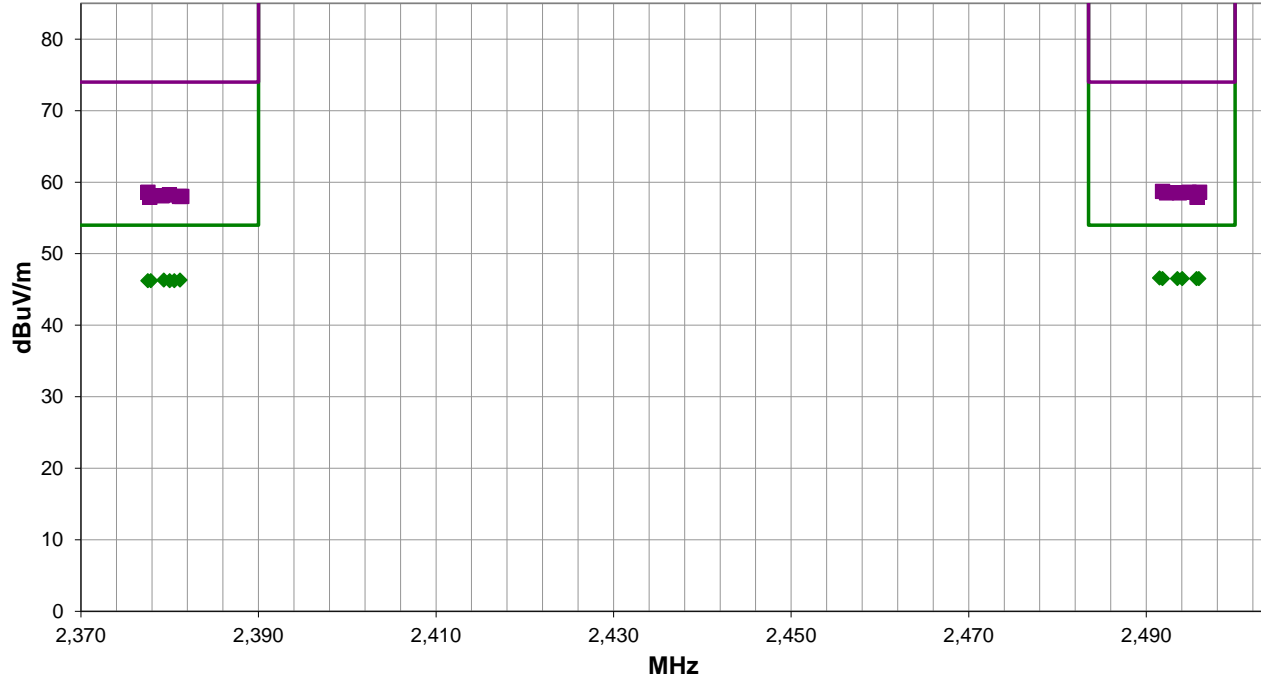
Single Data Rate/Modulation Wideband (DTS) transceiver: Low Channel (2406 MHz), Mid Channel (2438 MHz), High Channel (2474 MHz). See comments below for channel, modulation, and EUT orientation.

## EUT OPERATING MODES

Wideband DTS, 8FSK / 5 Mbps, Continuous Tx, 100% Duty Cycle

## DEVIATIONS FROM TEST STANDARD

None



Run #: 106

■ PK    ◆ AV    ● QP

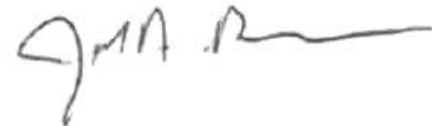
# SPURIOUS RADIATED EMISSIONS

## RESULTS - Run #106

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)	Comments
2491.503	32.6	-6.0	1.5	108.0	3.0	20.0	Vert	AV	0.0	46.6	54.0	-7.4	EUT side, high ch, 5 Mbps
2495.938	32.5	-6.0	1.5	46.9	3.0	20.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT side, high ch, 5 Mbps
2494.066	32.5	-6.0	1.5	225.0	3.0	20.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT horz, high ch, 5 Mbps
2495.671	32.5	-6.0	1.5	135.9	3.0	20.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT horz, high ch, 5 Mbps
2491.828	32.5	-6.0	1.5	171.9	3.0	20.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT vert, high ch, 5 Mbps
2493.508	32.5	-6.0	1.5	202.9	3.0	20.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT vert, high ch, 5 Mbps
2379.359	32.6	-6.3	3.82	205.0	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	EUT horz, low ch, 5 Mbps
2381.165	32.6	-6.3	1.5	273.9	3.0	20.0	Vert	AV	0.0	46.3	54.0	-7.7	EUT vert, low ch, 5 Mbps
2380.008	32.5	-6.3	2.38	124.9	3.0	20.0	Horz	AV	0.0	46.2	54.0	-7.8	EUT side, low ch, 5 Mbps
2377.879	32.5	-6.3	1.23	253.0	3.0	20.0	Vert	AV	0.0	46.2	54.0	-7.8	EUT side, low ch, 5 Mbps
2377.537	32.5	-6.3	1.5	136.9	3.0	20.0	Vert	AV	0.0	46.2	54.0	-7.8	EUT horz, low ch, 5 Mbps
2380.541	32.5	-6.3	1.5	355.0	3.0	20.0	Horz	AV	0.0	46.2	54.0	-7.8	EUT vert, low ch, 5 Mbps
2491.836	44.7	-6.0	1.5	202.9	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT vert, high ch, 5 Mbps
2377.554	44.9	-6.3	1.5	136.9	3.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	EUT horz, low ch, 5 Mbps
2494.823	44.6	-6.0	1.5	225.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT horz, high ch, 5 Mbps
2495.996	44.6	-6.0	1.5	135.9	3.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	EUT horz, high ch, 5 Mbps
2493.733	44.5	-6.0	1.5	46.9	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT side, high ch, 5 Mbps
2492.294	44.5	-6.0	1.5	171.9	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT vert, high ch, 5 Mbps
2379.975	44.5	-6.3	1.23	253.0	3.0	20.0	Vert	PK	0.0	58.2	74.0	-15.8	EUT side, low ch, 5 Mbps
2379.127	44.4	-6.3	3.82	205.0	3.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	EUT horz, low ch, 5 Mbps
2381.090	44.3	-6.3	2.38	124.9	3.0	20.0	Horz	PK	0.0	58.0	74.0	-16.0	EUT side, low ch, 5 Mbps
2381.364	44.3	-6.3	1.5	355.0	3.0	20.0	Horz	PK	0.0	58.0	74.0	-16.0	EUT vert, low ch, 5 Mbps
2495.721	43.9	-6.0	1.5	108.0	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	EUT side, high ch, 5 Mbps
2377.762	44.2	-6.3	1.5	273.9	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	EUT vert, low ch, 5 Mbps

## CONCLUSION

Pass



Tested By



End of Test Report