Garrett Metal Detectors

AT Max (1142000/1142100)

FCC 15.247:2017

2400 – 2483.5 MHz Other Wideband (DTS) Transceiver

Report # GARR0033.5

NVLAP Lab Code: 201049-0

CERTIFICATE OF TEST

Last Date of Test: August 28, 2017
Garrett Metal Detectors
Model: AT Max (1142000/1142100)

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2017	ANSI C63.10:2013, KDB 558074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	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	
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.
7.8.6	Band Edge Compliance - Hopping Mode	No	N/A	Not required for DTS devices.
11.6	Duty Cycle	Yes	N/A	Characterization of radio operation.
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Jeremiah Darden, 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.

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

2017.6.12

United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

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

Australia/New Zealand

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

Korea

MSIP / 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:
http://portlandcustomer.element.com/ts/scope/scope.htm
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

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.

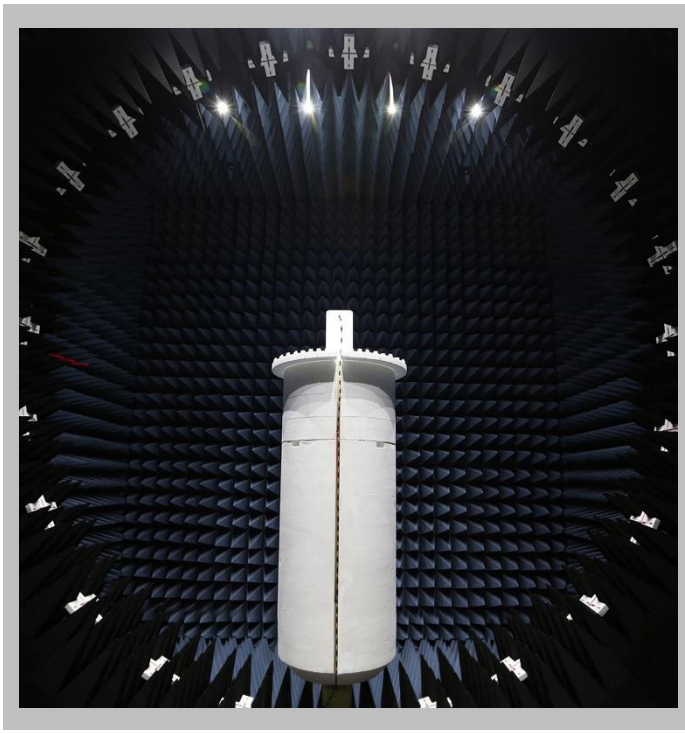
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

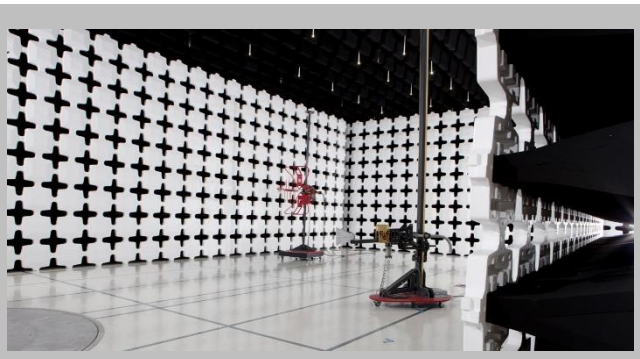
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	4.9 dB	-4.9 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

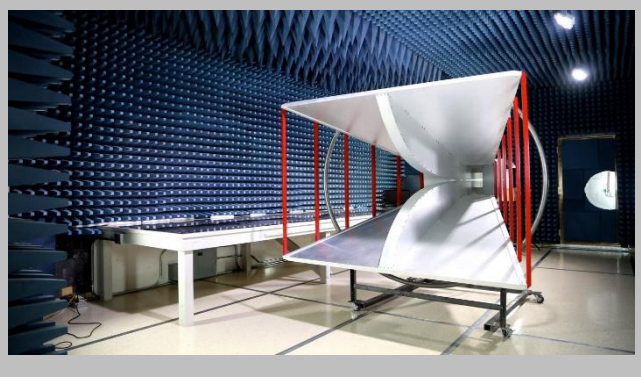
FACILITIES

2017.7.25

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157

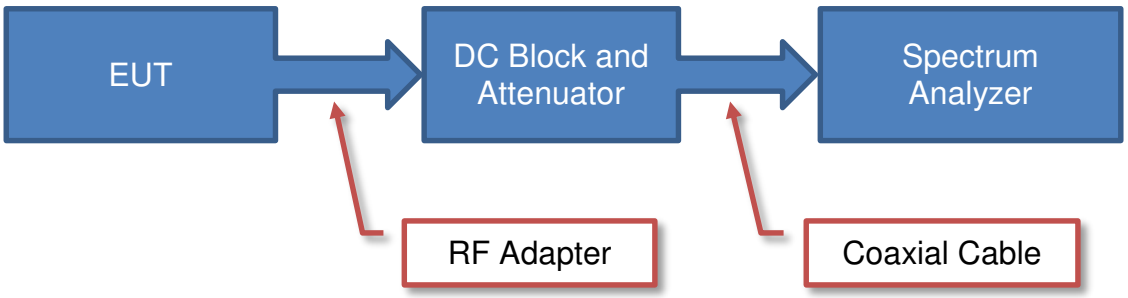




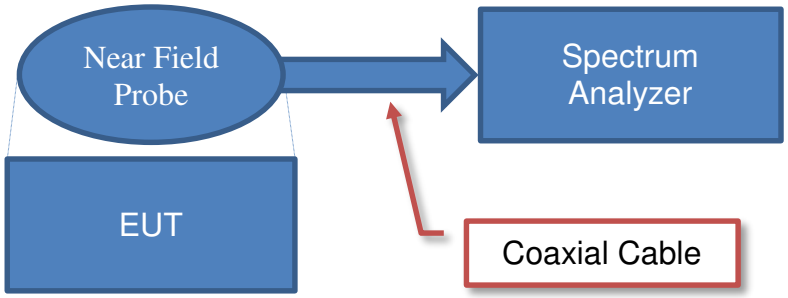


Test Setup Block Diagrams

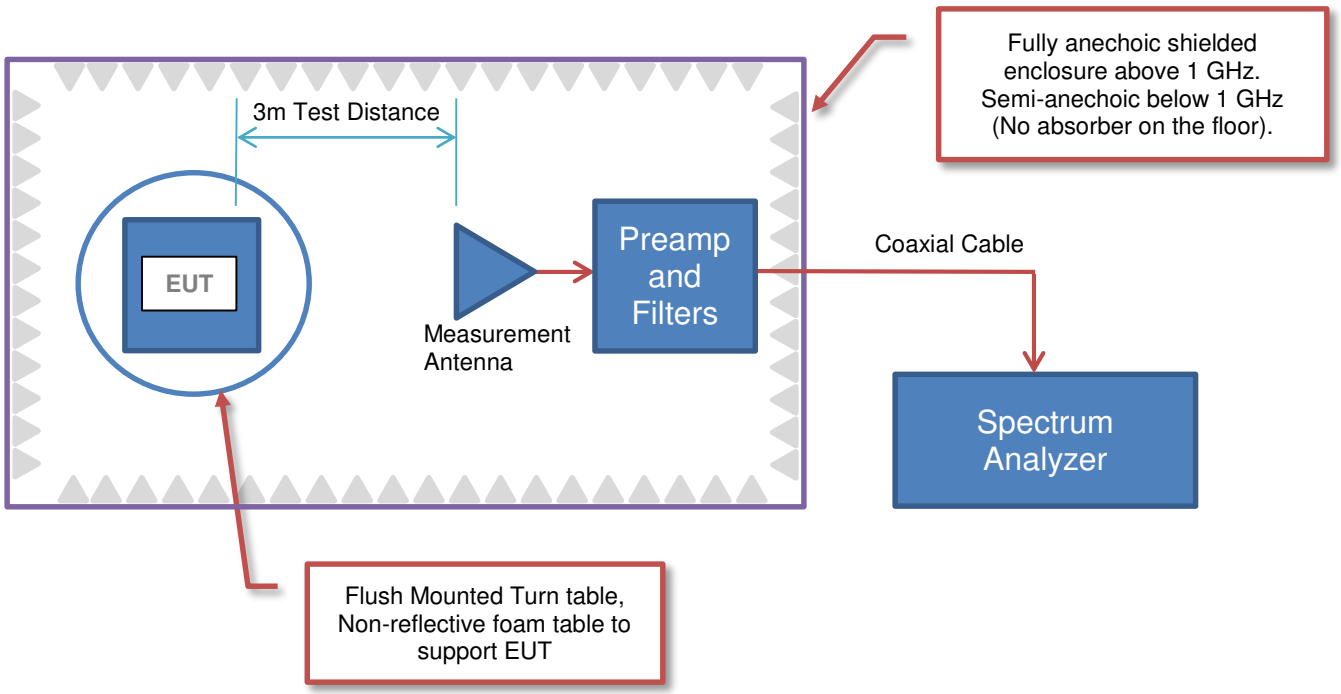
Antenna Port Conducted Measurements



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:	Weldon Sanders
Model:	AT Max (1142000/1142100)
First Date of Test:	August 22, 2017
Last Date of Test:	August 28, 2017
Receipt Date of Samples:	August 16, 2017
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 with built in Z-Lynk radio

Testing Objective:
Seeking to demonstrate compliance under FCC 15.247:2017 for operation in the 2400 - 2483.5 MHz Band.

CONFIGURATIONS

Configuration GARR0033- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Metal Detector Wand (Transmitter)	Garrett Metal Detectors	AT Max (1142000/1142100)	57296858

Configuration GARR0033- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Direct Conn Module	Garrett Metal Detectors	AT Max (1142000/1142100)	C1-17031354

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
SMA	Yes	10cm	No	Direct Conn Module	Direct Conn Cable Assembly

MODIFICATIONS

2017-1-25

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	8/22/2017	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	8/28/2017	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.
3	8/28/2017	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	8/28/2017	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	8/28/2017	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.
6	8/28/2017	Spurious Conducted 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 2017.06.01

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 Ch 2406MHz, High Ch 2476MHz
Continuously Transmitting at Low Ch 2406MHz, Mid Ch 2437MHz, High Ch 2476MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

GARR0033 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	Weinschel Corp	4H-20	AWB	3/3/2017	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGC	3/1/2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	8/3/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	11/18/2016	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXW	8/5/2016	24 mo
Cable	Element	18-40GHz	TXE	11/18/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	10/12/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	10/18/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	0 mo
Cable	Element	8-18GHz	TXD	5/31/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	5/31/2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJN	9/15/2016	24 mo
Cable	Element	1-8.2 GHz	TXC	5/31/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1551	PAH	11/9/2016	12 mo
Antenna - Biconilog	ETS Lindgren	3143B	AYF	4/13/2016	24 mo
Cable	Element	RE 9kHz - 1GHz	TXB	11/9/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	10/4/2016	12 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 at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

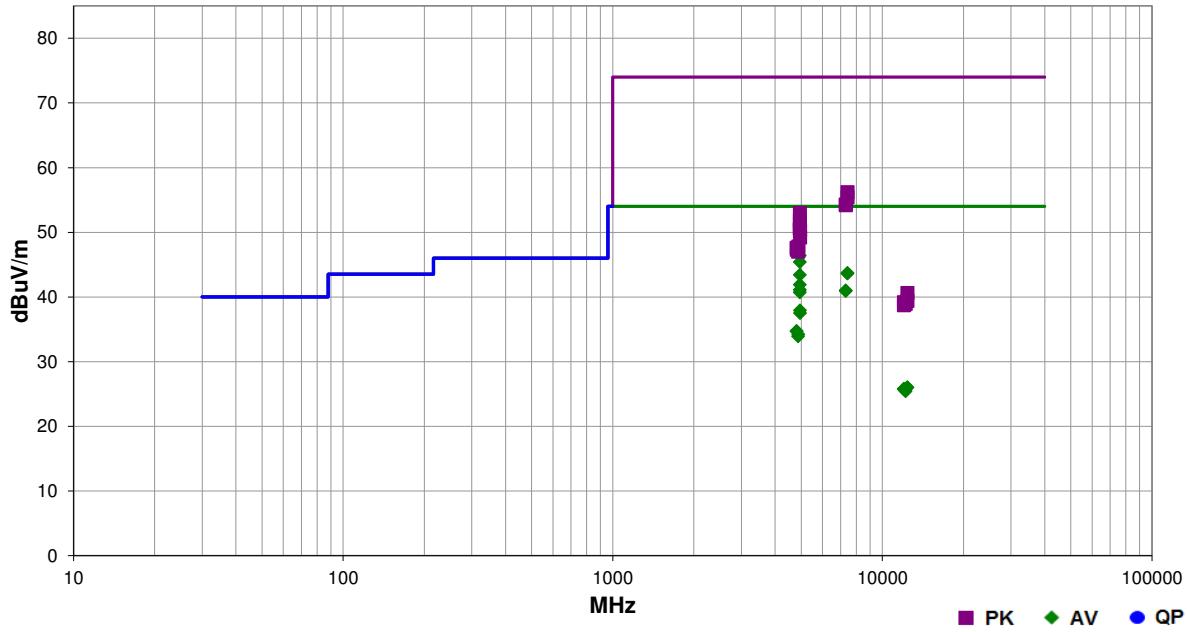
SPURIOUS RADIATED EMISSIONS

EmiR5 2017.07.11 PSA-ESCI 2017.06.01

Work Order:	GARR0033	**Date:**	08/22/17		
Project:	None	**Temperature:**	23.9 °C		
Job Site:	TX02	**Humidity:**	52.8% RH		
Serial Number:	57296858	**Barometric Pres.:**	1021 mbar	**Tested by:**	Willie Love
EUT:	AT Max (1142000/1142100)				
Configuration:	1				
Customer:	Garrett Metal Detectors				
Attendees:	None				
EUT Power:	Battery				
Operating Mode:	Continuously Transmitting at Low Ch 2406MHz, Mid Ch 2437MHz, High Ch 2476MHz				
Deviations:	None				
Comments:	PK and AVG(RMS) data. Harmonics.				

Test Specifications	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

Run #	64	**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)	Comments
4945.917	39.4	7.0	1.0	242.0	3.0	0.0	Horz	AV	0.0	46.4	54.0	-7.6	High Ch, EUT Horizontal
4945.900	38.4	7.0	1.0	319.0	3.0	0.0	Vert	AV	0.0	45.4	54.0	-8.6	High Ch, EUT Horizontal
7427.325	29.7	14.0	1.0	136.9	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	High Ch, EUT Horizontal
7426.133	29.6	14.0	1.0	24.0	3.0	0.0	Vert	AV	0.0	43.6	54.0	-10.4	High Ch, EUT Horizontal
4945.967	36.4	7.0	1.0	116.0	3.0	0.0	Vert	AV	0.0	43.4	54.0	-10.6	High Ch, EUT On Side
4945.925	34.9	7.0	1.0	337.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	High Ch, EUT On Side
4946.033	34.1	7.0	1.0	339.0	3.0	0.0	Vert	AV	0.0	41.1	54.0	-12.9	High Ch, EUT Vertical
7313.967	27.0	14.0	1.0	238.9	3.0	0.0	Vert	AV	0.0	41.0	54.0	-13.0	Mid Ch, EUT Horizontal
7313.275	26.9	14.0	1.0	330.0	3.0	0.0	Horz	AV	0.0	40.9	54.0	-13.1	Mid Ch, EUT Horizontal
4945.950	33.7	7.0	1.0	66.0	3.0	0.0	Horz	AV	0.0	40.7	54.0	-13.3	High Ch, EUT Vertical
4953.533	30.9	7.0	1.0	186.0	3.0	0.0	Horz	AV	0.0	37.9	54.0	-16.1	High Ch, EUT Horizontal
4954.275	30.5	7.0	1.0	147.0	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	High Ch, EUT Horizontal
7427.758	42.2	14.0	1.0	136.9	3.0	0.0	Horz	PK	0.0	56.2	74.0	-17.8	High Ch, EUT Horizontal
7427.733	41.4	14.0	1.0	24.0	3.0	0.0	Vert	PK	0.0	55.4	74.0	-18.6	High Ch, EUT Horizontal
4810.008	27.9	6.8	1.0	313.0	3.0	0.0	Horz	AV	0.0	34.7	54.0	-19.3	Low Ch, EUT Horizontal
4810.008	27.9	6.8	1.0	160.9	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	Low Ch, EUT Horizontal
7313.325	40.3	14.0	1.0	238.9	3.0	0.0	Vert	PK	0.0	54.3	74.0	-19.7	Mid Ch, EUT Horizontal
4878.167	27.3	6.9	1.0	81.9	3.0	0.0	Horz	AV	0.0	34.2	54.0	-19.8	Mid Ch, EUT Horizontal

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)	Comments
7315.917	40.2	14.0	1.0	330.0	3.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	Mid Ch, EUT Horizontal
4874.117	27.1	6.8	1.0	145.0	3.0	0.0	Vert	AV	0.0	33.9	54.0	-20.1	Mid Ch, EUT Horizontal
4946.192	46.0	7.0	1.0	242.0	3.0	0.0	Horz	PK	0.0	53.0	74.0	-21.0	High Ch, EUT Horizontal
4945.892	44.9	7.0	1.0	319.0	3.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	High Ch, EUT Horizontal
4945.717	44.3	7.0	1.0	116.0	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	High Ch, EUT On Side
4946.075	43.6	7.0	1.0	337.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	High Ch, EUT On Side
4946.567	43.6	7.0	1.0	66.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	High Ch, EUT Vertical
4949.933	43.3	7.0	1.0	186.0	3.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	High Ch, EUT Horizontal
4945.900	43.2	7.0	1.0	339.0	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	High Ch, EUT Vertical
4952.217	42.2	7.0	1.0	147.0	3.0	0.0	Vert	PK	0.0	49.2	74.0	-24.8	High Ch, EUT Horizontal
4876.167	40.9	6.9	1.0	145.0	3.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Mid Ch, EUT Horizontal
4810.208	40.8	6.8	1.0	160.9	3.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	Low Ch, EUT Horizontal
4811.842	40.5	6.8	1.0	313.0	3.0	0.0	Horz	PK	0.0	47.3	74.0	-26.7	Low Ch, EUT Horizontal
4873.525	40.2	6.8	1.0	81.9	3.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	Mid Ch, EUT Horizontal
12377.910	26.9	-0.9	1.0	50.0	3.0	0.0	Vert	AV	0.0	26.0	54.0	-28.0	High Ch, EUT Horizontal
12377.800	26.9	-0.9	1.0	87.9	3.0	0.0	Horz	AV	0.0	26.0	54.0	-28.0	High Ch, EUT Horizontal
12031.350	27.8	-2.0	1.0	118.9	3.0	0.0	Horz	AV	0.0	25.8	54.0	-28.2	Low Ch, EUT Horizontal
12192.500	27.4	-1.7	1.0	296.0	3.0	0.0	Horz	AV	0.0	25.7	54.0	-28.3	Mid Ch, EUT Horizontal
12031.810	27.7	-2.0	1.0	277.0	3.0	0.0	Vert	AV	0.0	25.7	54.0	-28.3	Low Ch, EUT Horizontal
12192.420	27.1	-1.7	2.6	154.9	3.0	0.0	Vert	AV	0.0	25.4	54.0	-28.6	Mid Ch, EUT Horizontal
12379.520	41.5	-0.9	1.0	50.0	3.0	0.0	Vert	PK	0.0	40.6	74.0	-33.4	High Ch, EUT Horizontal
12379.730	40.3	-0.9	1.0	87.9	3.0	0.0	Horz	PK	0.0	39.4	74.0	-34.6	High Ch, EUT Horizontal
12030.570	41.2	-2.0	1.0	277.0	3.0	0.0	Vert	PK	0.0	39.2	74.0	-34.8	Low Ch, EUT Horizontal
12189.280	40.7	-1.7	1.0	296.0	3.0	0.0	Horz	PK	0.0	39.0	74.0	-35.0	Mid Ch, EUT Horizontal
12189.930	40.6	-1.7	2.6	154.9	3.0	0.0	Vert	PK	0.0	38.9	74.0	-35.1	Mid Ch, EUT Horizontal
12030.190	40.7	-2.0	1.0	118.9	3.0	0.0	Horz	PK	0.0	38.7	74.0	-35.3	Low Ch, EUT Horizontal

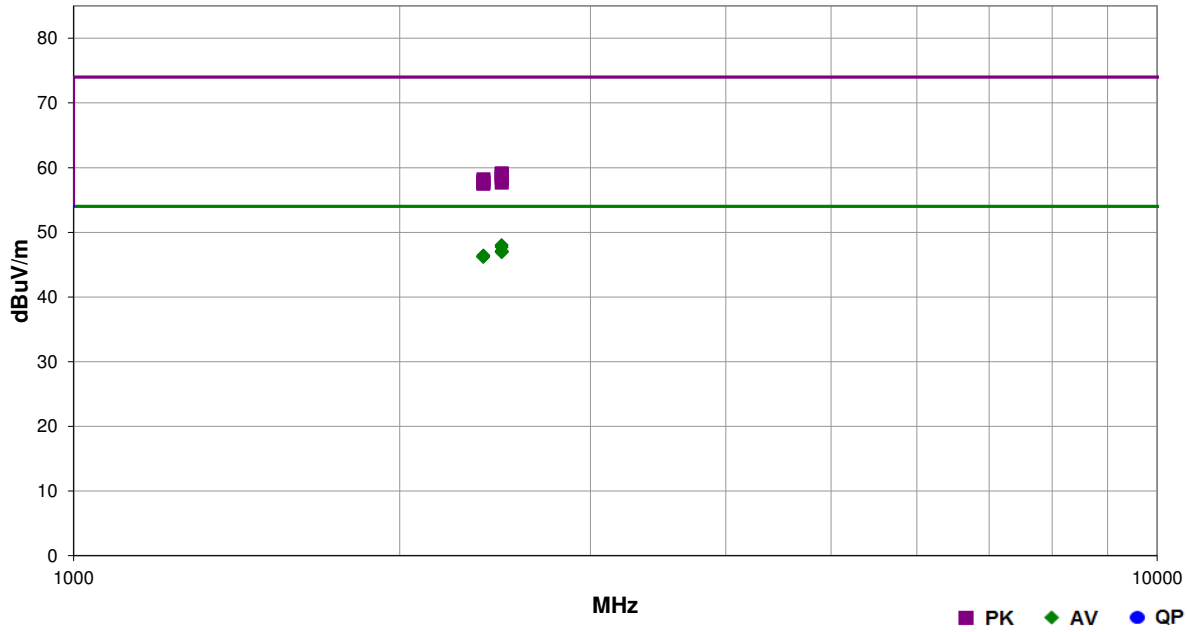
SPURIOUS RADIATED EMISSIONS

EmiR5 2017.07.11 PSA-ESCI 2017.06.01

Work Order:	GARR0033	**Date:**	08/22/17		
Project:	None	**Temperature:**	23.9 °C		
Job Site:	TX02	**Humidity:**	52.8% RH		
Serial Number:	57296858	**Barometric Pres.:**	1021 mbar	**Tested by:**	Willie Love
EUT:	AT Max (1142000/1142100)				
Configuration:	1				
Customer:	Garrett Metal Detectors				
Attendees:	None				
EUT Power:	Battery				
Operating Mode:	Continuously Transmitting at Low Ch 2406MHz, High Ch 2476MHz				
Deviations:	None				
Comments:	PK and AVG(RMS) data. Transmit Band Edge.				

Test Specifications	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

Run #	68	**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)	Comments
2483.657	32.0	-4.0	1.0	79.0	3.0	20.0	Horz	AV	0.0	48.0	54.0	-6.0	High Ch, EUT Horizontal
2484.043	31.7	-4.0	1.0	87.0	3.0	20.0	Horz	AV	0.0	47.7	54.0	-6.3	High Ch, EUT Vertical
2483.797	31.1	-4.0	1.0	86.0	3.0	20.0	Vert	AV	0.0	47.1	54.0	-6.9	High Ch, EUT On Side
2484.950	31.0	-4.0	1.0	63.0	3.0	20.0	Vert	AV	0.0	47.0	54.0	-7.0	High Ch, EUT Horizontal
2485.093	31.0	-4.0	1.0	0.0	3.0	20.0	Vert	AV	0.0	47.0	54.0	-7.0	High Ch, EUT Vertical
2483.520	30.9	-4.0	1.0	121.0	3.0	20.0	Horz	AV	0.0	46.9	54.0	-7.1	High Ch, EUT On Side
2389.730	31.1	-4.7	1.0	109.0	3.0	20.0	Horz	AV	0.0	46.4	54.0	-7.6	Low Ch, EUT Horizontal
2388.600	31.0	-4.7	1.0	202.9	3.0	20.0	Horz	AV	0.0	46.3	54.0	-7.7	Low Ch, EUT Vertical
2388.630	30.9	-4.7	1.0	133.0	3.0	20.0	Vert	AV	0.0	46.2	54.0	-7.8	Low Ch, EUT Horizontal
2388.177	30.9	-4.7	1.0	7.0	3.0	20.0	Vert	AV	0.0	46.2	54.0	-7.8	Low Ch, EUT Vertical
2484.050	43.1	-4.0	1.0	79.0	3.0	20.0	Horz	PK	0.0	59.1	74.0	-14.9	High Ch, EUT Horizontal
2484.447	43.1	-4.0	1.0	87.0	3.0	20.0	Horz	PK	0.0	59.1	74.0	-14.9	High Ch, EUT Vertical
2483.507	42.7	-4.0	1.0	86.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	High Ch, EUT On Side
2483.803	42.4	-4.0	1.0	0.0	3.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	High Ch, EUT Vertical
2485.033	42.2	-4.0	1.0	63.0	3.0	20.0	Vert	PK	0.0	58.2	74.0	-15.8	High Ch, EUT Horizontal
2389.860	42.9	-4.7	1.0	109.0	3.0	20.0	Horz	PK	0.0	58.2	74.0	-15.8	Low Ch, EUT Horizontal
2388.830	42.6	-4.7	1.0	133.0	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	Low Ch, EUT Horizontal
2483.893	41.7	-4.0	1.0	121.0	3.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	High Ch, EUT On Side

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)	Comments
2389.153	42.3	-4.7	1.0	7.0	3.0	20.0	Vert	PK	0.0	57.6	74.0	-16.4	Low Ch, EUT Vertical
2388.747	42.2	-4.7	1.0	202.9	3.0	20.0	Horz	PK	0.0	57.5	74.0	-16.5	Low Ch, EUT Vertical

DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

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

The EUT operates at 100% Duty Cycle.

OCCUPIED CHANNEL BANDWIDTH

XMit 2017.02.08

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	Fairview Microwave	SCK0963-60	TXF	11/18/2016	11/18/2017
Block - DC	Fairview Microwave	SD3379	AMT	10/24/2016	10/24/2017
Attenuator	Fairview Microwave	SA4018-20	TYE	10/24/2016	10/24/2017
Generator - Signal	Agilent	E4422B	TGS	7/11/2017	7/11/2020
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/14/2017	3/14/2018

TEST DESCRIPTION

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

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

OCCUPIED CHANNEL BANDWIDTH

TbtTx 2017.07.11 XMit 2017.02.08

EUT:	AT Max (1142000/1142100)			**Work Order:**	GARR0033
Serial Number:	C1-17031354			**Date:**	08/28/17
Customer:	Garrett Metal Detectors			**Temperature:**	23.9 °C
Attendees:	None			**Humidity:**	53.1% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Marty Martin	**Power:**	Battery	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

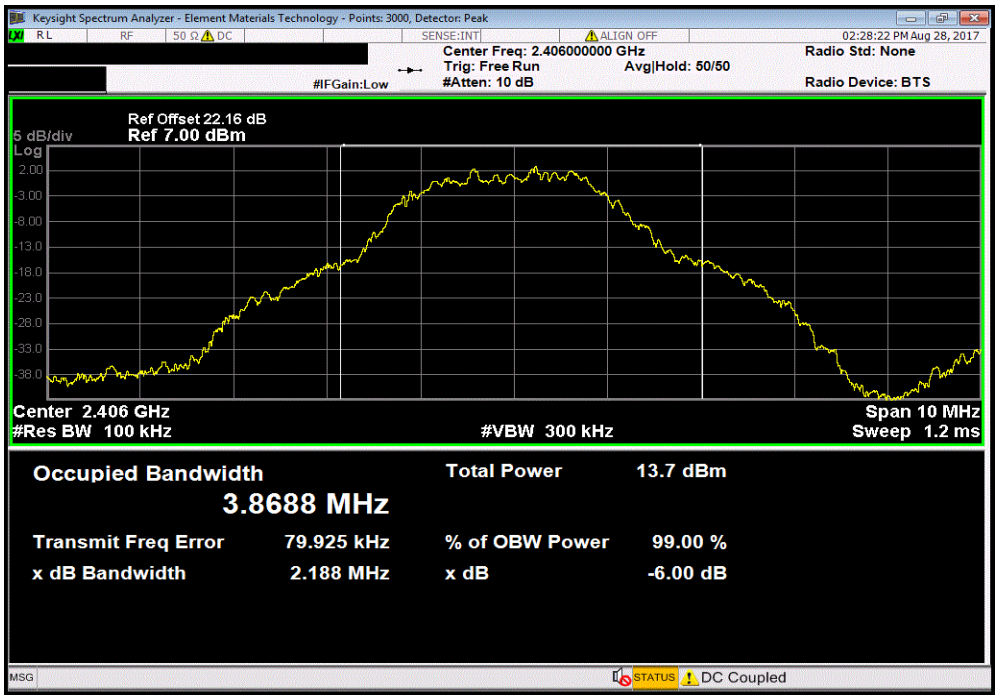
Configuration #	3	Signature

	Value	Limit (≥)	Result
Normal Test Conditions			
BLE/GFSK Low Channel, 2406 MHz	2.188 MHz	500 kHz	Pass
BLE/GFSK Mid Channel, 2437 MHz	2.21 MHz	500 kHz	Pass
BLE/GFSK High Channel, 2476 MHz	2.194 MHz	500 kHz	Pass

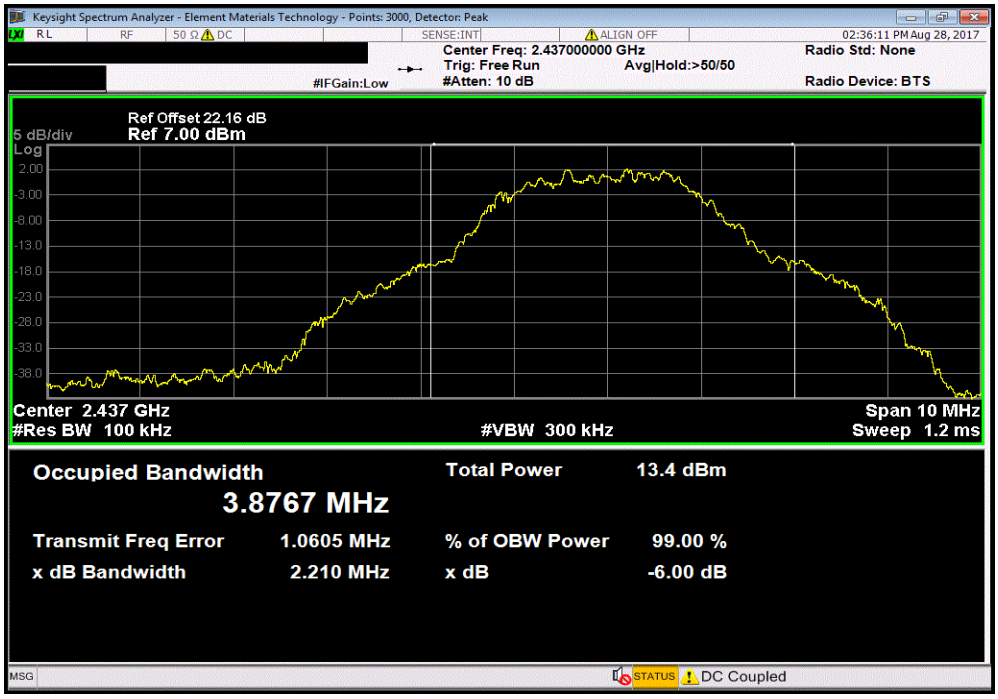
OCCUPIED CHANNEL BANDWIDTH

TbtTx 2017.07.11 XMit 2017.02.08

Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz						
				Value	Limit (≥)	Result
				2.188 MHz	500 kHz	Pass



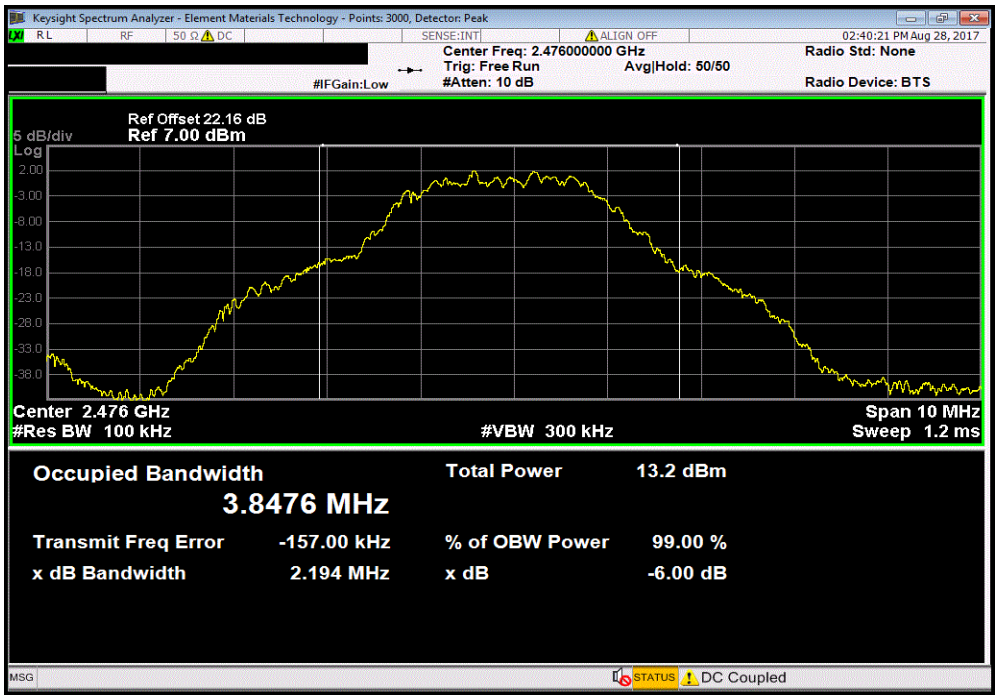
Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz						
				Value	Limit (≥)	Result
				2.21 MHz	500 kHz	Pass



OCCUPIED CHANNEL BANDWIDTH

TbtTx 2017.07.11 XMit 2017.02.08

Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz						
				Value	Limit (≥)	Result
				2.194 MHz	500 kHz	Pass



OUTPUT POWER

XMit 2017.02.08

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	Fairview Microwave	SCK0963-60	TXF	11/18/2016	11/18/2017
Block - DC	Fairview Microwave	SD3379	AMT	10/24/2016	10/24/2017
Attenuator	Fairview Microwave	SA4018-20	TYE	10/24/2016	10/24/2017
Generator - Signal	Agilent	E4422B	TGS	7/11/2017	7/11/2020
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/14/2017	3/14/2018

TEST DESCRIPTION

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

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

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

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

OUTPUT POWER

TbtTx 2017.07.11 XMit 2017.02.08

EUT:	AT Max (1142000/1142100)			**Work Order:**	GARR0033
Serial Number:	C1-17031354			**Date:**	08/28/17
Customer:	Garrett Metal Detectors			**Temperature:**	24 °C
Attendees:	None			**Humidity:**	53.2% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Marty Martin	**Power:**	Battery	**Job Site:**	TX09

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

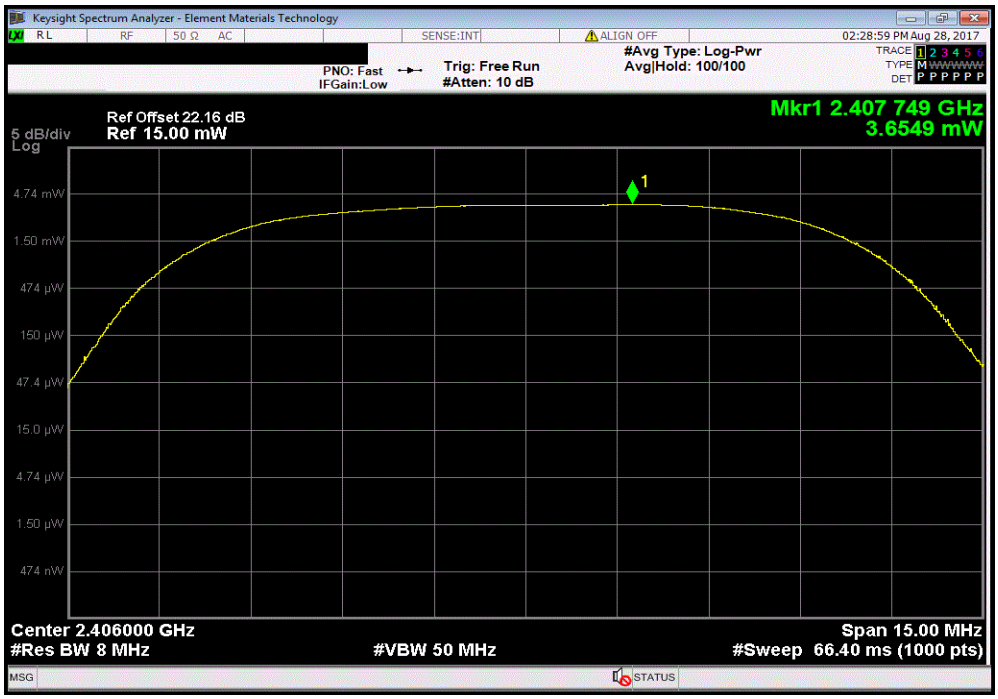
Configuration #	3	*Signature* Marty Martin

	Value	**Limit (<)**	**Result**
Normal Test Conditions			
BLE/GFSK Low Channel, 2406 MHz	3.655 mW	1 W	Pass
BLE/GFSK Mid Channel, 2437 MHz	3.474 mW	1 W	Pass
BLE/GFSK High Channel, 2476 MHz	3.445 mW	1 W	Pass

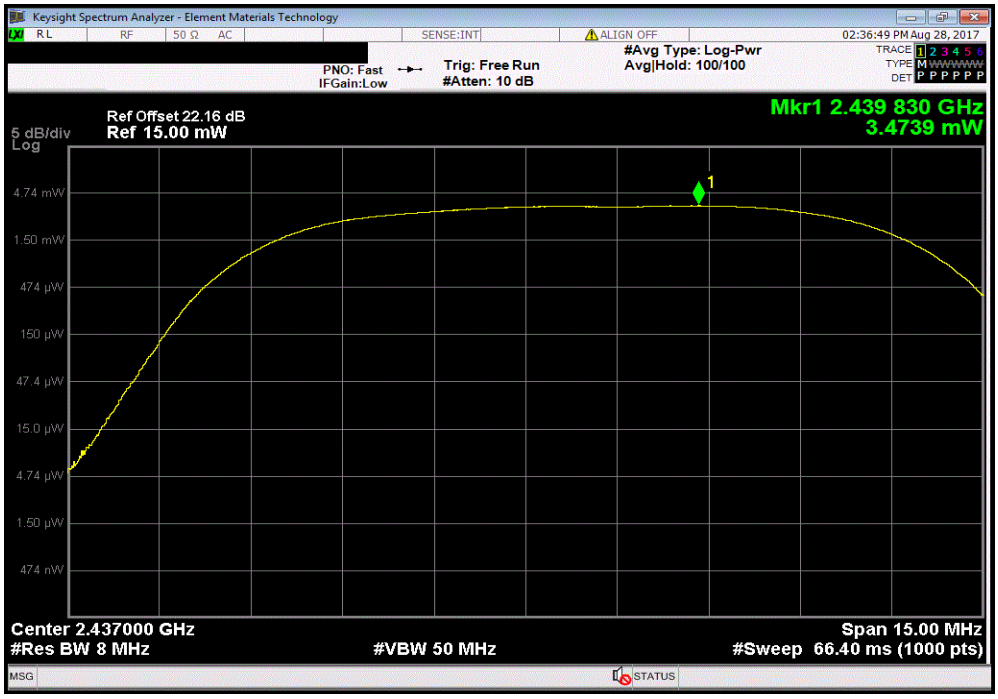
OUTPUT POWER

TbtTx 2017.07.11 XMit 2017.02.08

Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz						
				Value	Limit (<)	Result
				3.655 mW	1 W	Pass

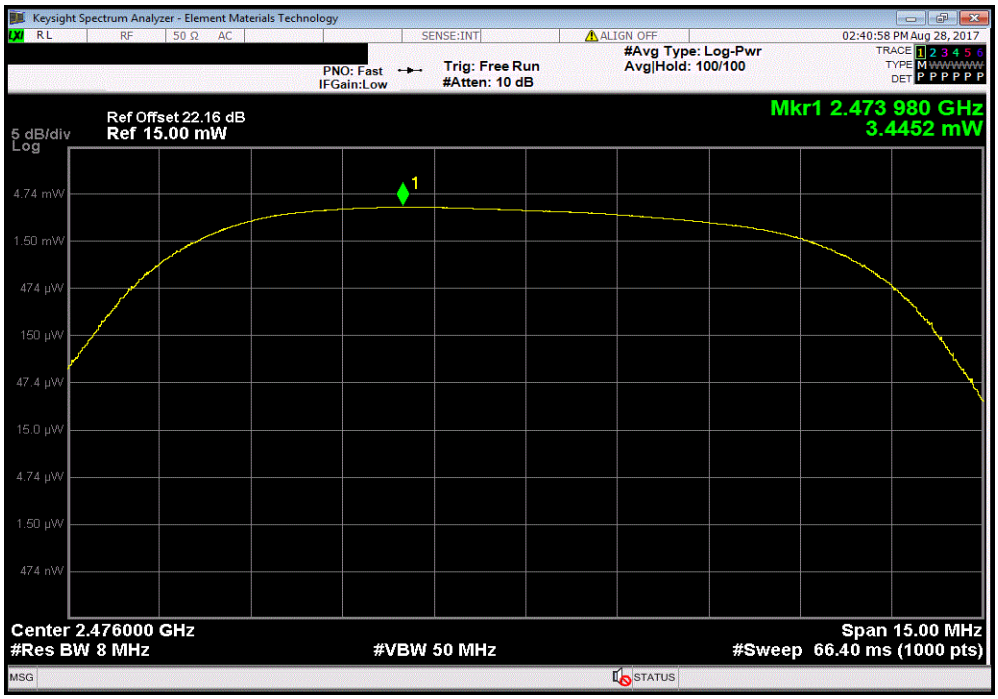


Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz						
				Value	Limit (<)	Result
				3.474 mW	1 W	Pass



OUTPUT POWER

Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz						
				Value	Limit (<)	Result
				3.445 mW	1 W	Pass



POWER SPECTRAL DENSITY

XMit 2017.02.08

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	Fairview Microwave	SCK0963-60	TXF	11/18/2016	11/18/2017
Block - DC	Fairview Microwave	SD3379	AMT	10/24/2016	10/24/2017
Attenuator	Fairview Microwave	SA4018-20	TYE	10/24/2016	10/24/2017
Generator - Signal	Agilent	E4422B	TGS	7/11/2017	7/11/2020
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/14/2017	3/14/2018

TEST DESCRIPTION

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

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

POWER SPECTRAL DENSITY

TbtTx 2017.07.11 XMit 2017.02.08

EUT:	AT Max (1142000/1142100)			**Work Order:**	GARR0033
Serial Number:	C1-17031354			**Date:**	08/28/17
Customer:	Garrett Metal Detectors			**Temperature:**	23.8 °C
Attendees:	None			**Humidity:**	53.4% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Marty Martin	**Power:**	Battery	**Job Site:**	TX09

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

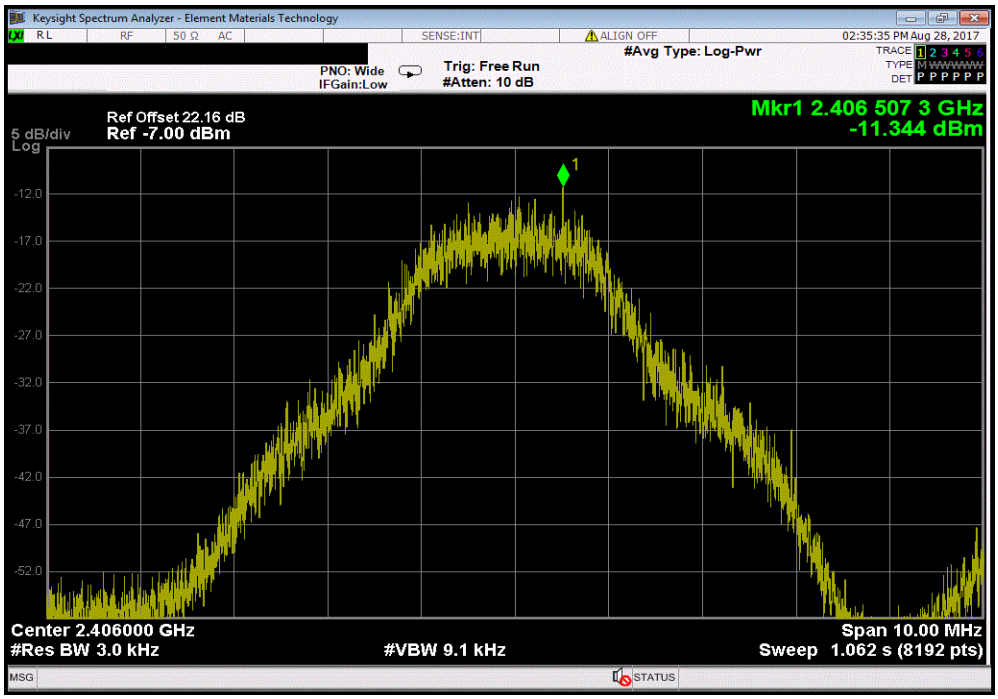
None

Configuration #	3	*Signature* Marty Martin

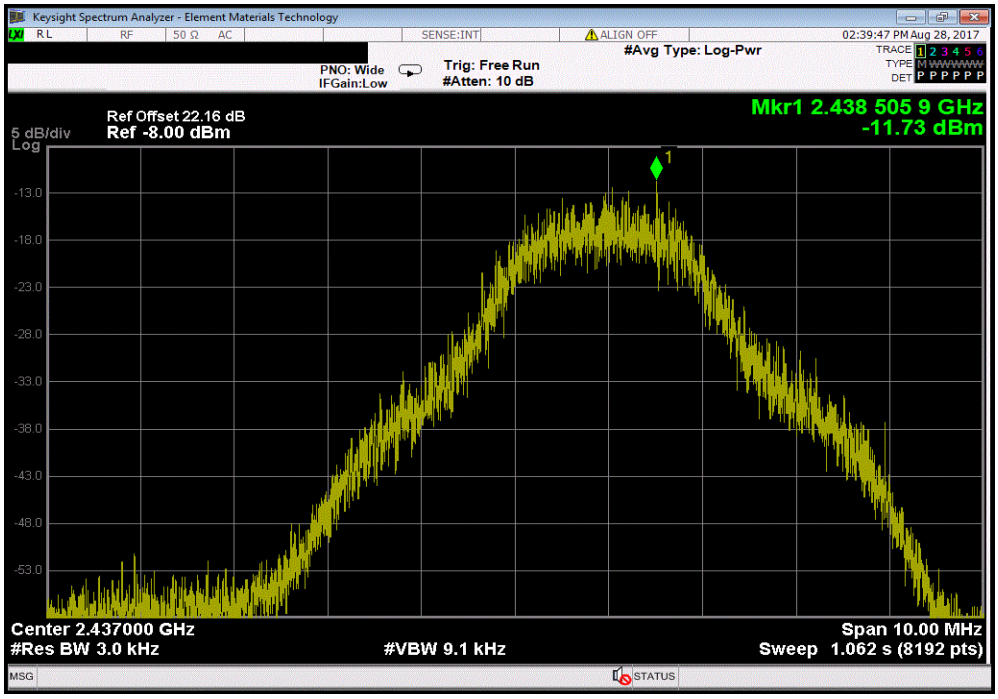
	Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
Normal Test Conditions			
BLE/GFSK Low Channel, 2406 MHz	-11.344	8	Pass
BLE/GFSK Mid Channel, 2437 MHz	-11.734	8	Pass
BLE/GFSK High Channel, 2476 MHz	-12.6	8	Pass

POWER SPECTRAL DENSITY

Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-11.344	8	Pass

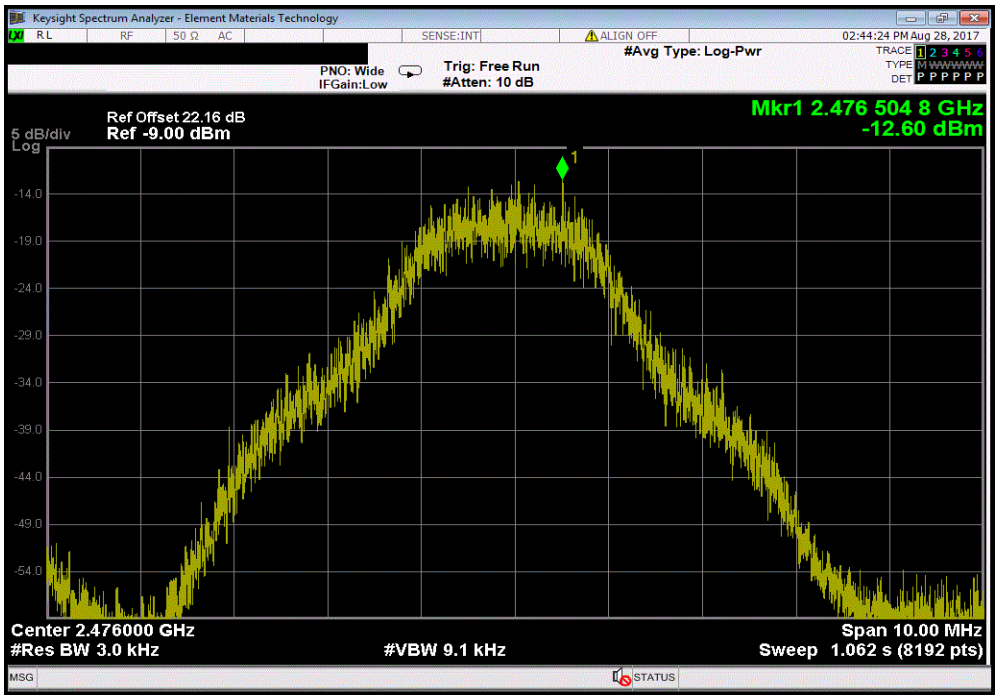


Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-11.734	8	Pass



POWER SPECTRAL DENSITY

Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-12.6	8	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2017.02.08

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
Block - DC	Fairview Microwave	SD3379	AMT	10/24/2016	10/24/2017
Cable	Fairview Microwave	SCK0963-60	TXF	11/18/2016	11/18/2017
Attenuator	Fairview Microwave	SA4018-20	TYE	10/24/2016	10/24/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/14/2017	3/14/2018
Generator - Signal	Agilent	E4422B	TGS	7/11/2017	7/11/2020

TEST DESCRIPTION

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

SPURIOUS CONDUCTED EMISSIONS

TbtTx 2017.07.11 XMit 2017.02.08

EUT:	AT Max (1142000/1142100)			**Work Order:**	GARR0033
Serial Number:	C1-17031354			**Date:**	08/28/17
Customer:	Garrett Metal Detectors			**Temperature:**	23.8 °C
Attendees:	None			**Humidity:**	53.2% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Marty Martin	**Power:**	Battery	**Job Site:**	TX09

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

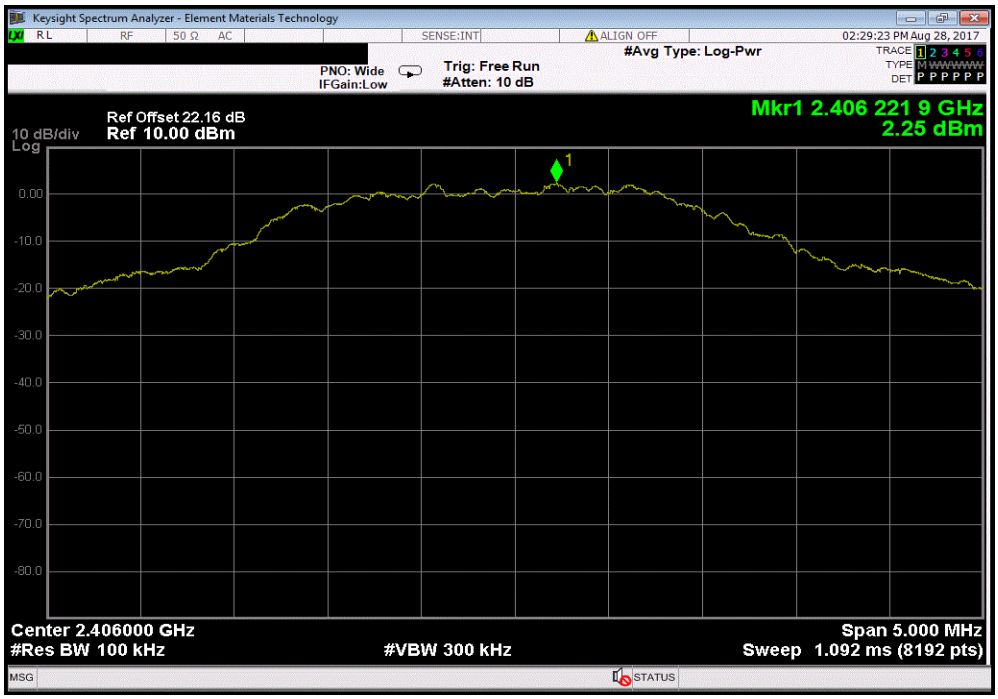
Configuration #	3	*Signature*

	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
Normal Test Conditions				
BLE/GFSK Low Channel, 2406 MHz	Fundamental	N/A	N/A	N/A
BLE/GFSK Low Channel, 2406 MHz	30 MHz - 12.5 GHz	-50.47	-20	Pass
BLE/GFSK Low Channel, 2406 MHz	12.5 GHz - 25 GHz	-40.92	-20	Pass
BLE/GFSK Mid Channel, 2437 MHz	Fundamental	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2437 MHz	30 MHz - 12.5 GHz	-50.52	-20	Pass
BLE/GFSK Mid Channel, 2437 MHz	12.5 GHz - 25 GHz	-40.46	-20	Pass
BLE/GFSK High Channel, 2476 MHz	Fundamental	N/A	N/A	N/A
BLE/GFSK High Channel, 2476 MHz	30 MHz - 12.5 GHz	-51.16	-20	Pass
BLE/GFSK High Channel, 2476 MHz	12.5 GHz - 25 GHz	-40.5	-20	Pass

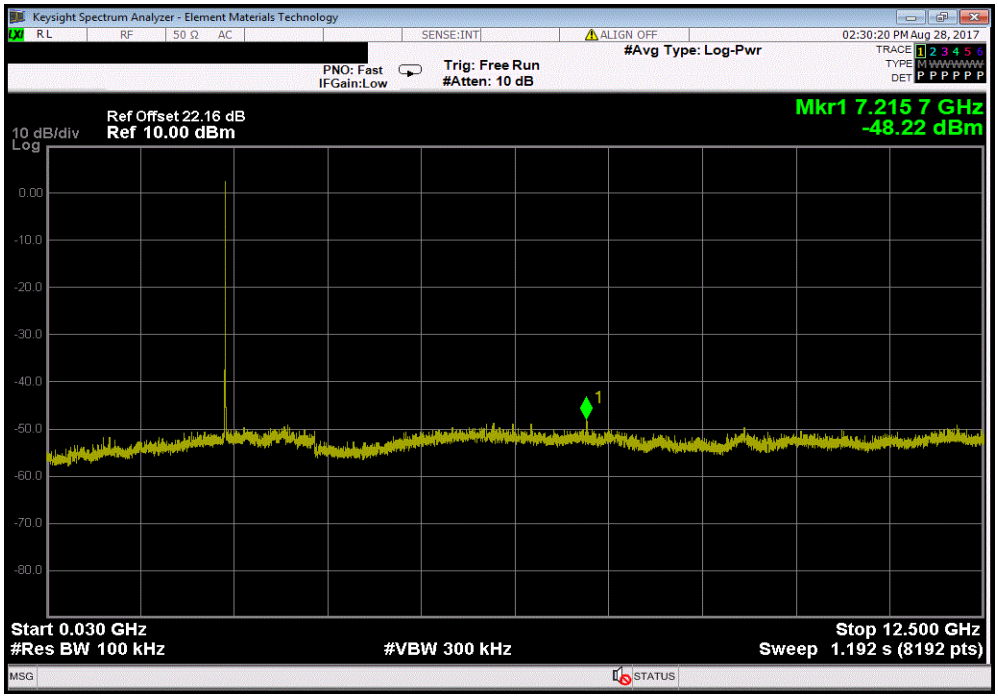
SPURIOUS CONDUCTED EMISSIONS

TbtTx 2017.07.11 XMit 2017.02.08

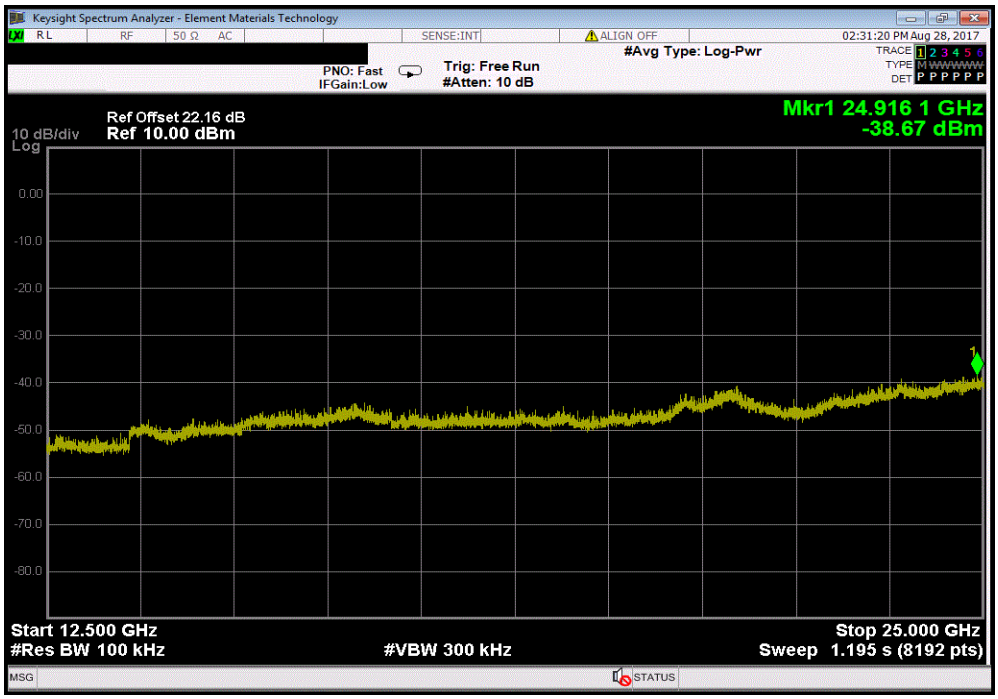
Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz						
Frequency Range				Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



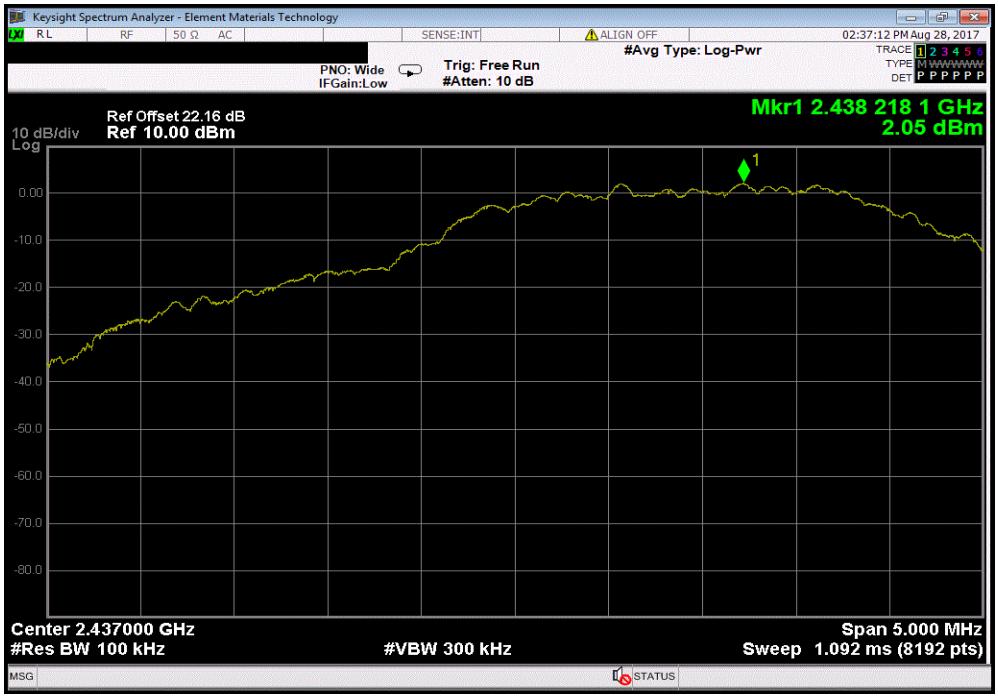
Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz		-50.47	-20	Pass



Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-40.92	-20	Pass

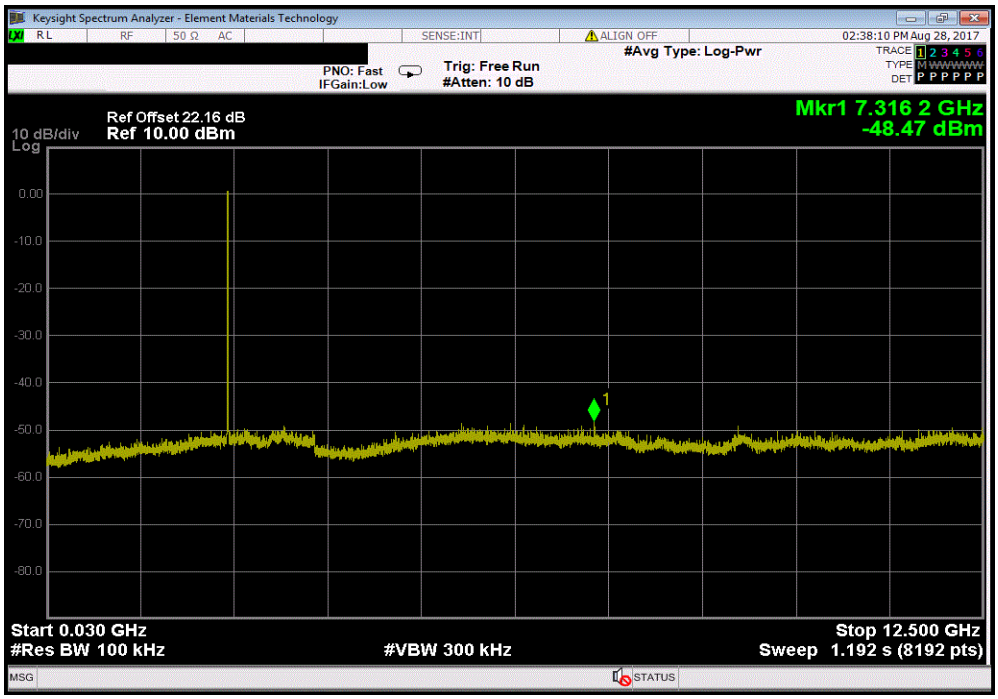


Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz					
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental		N/A	N/A	N/A

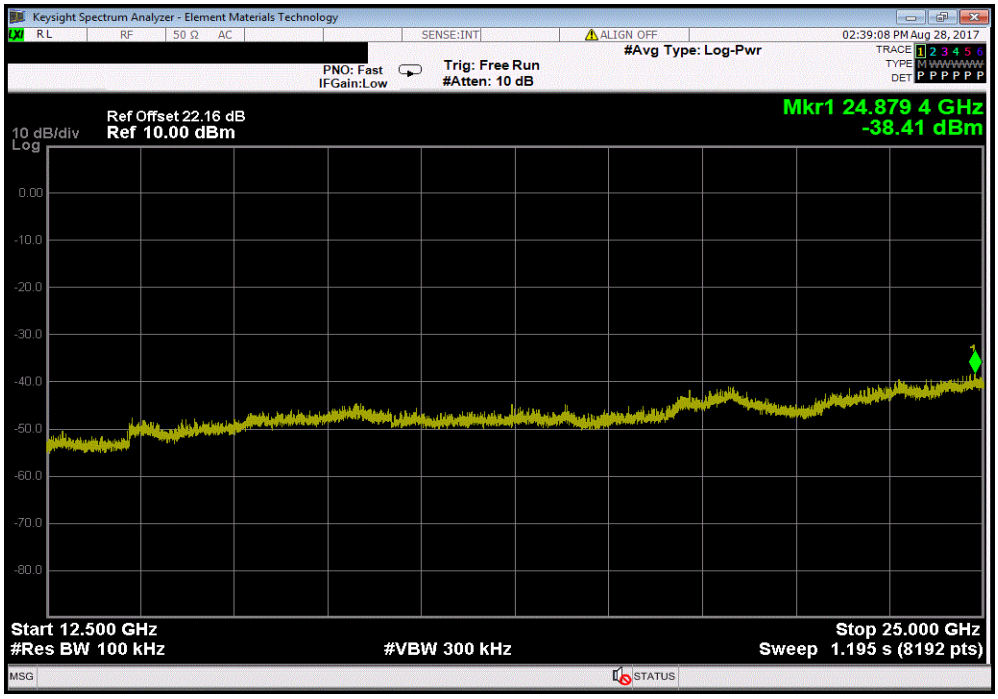


SPURIOUS CONDUCTED EMISSIONS

Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz		-50.52	-20	Pass

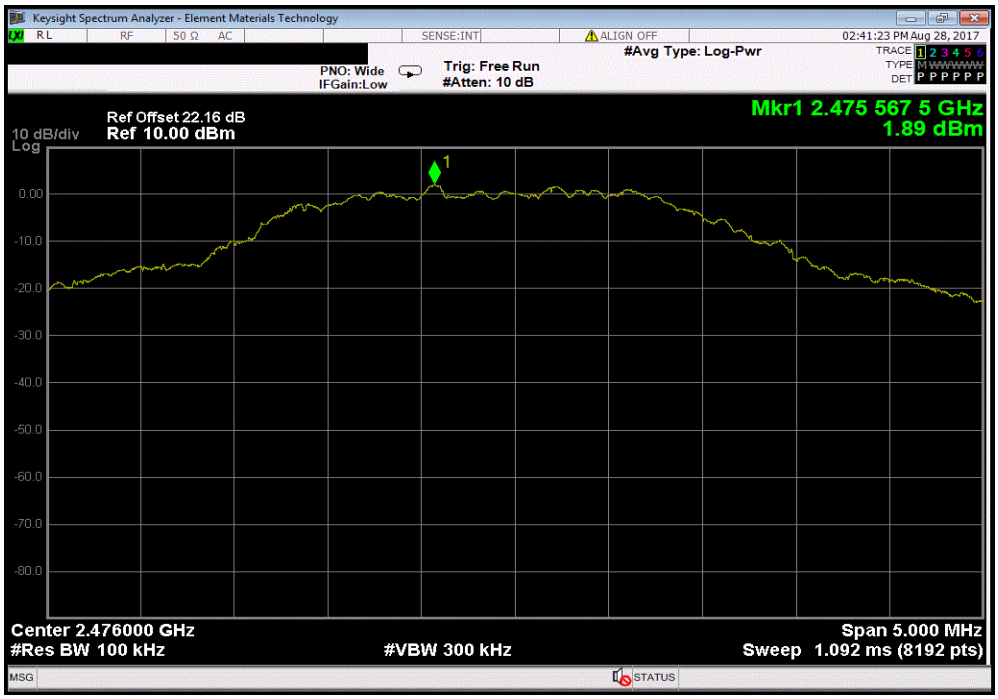


Normal Test Conditions, BLE/GFSK Mid Channel, 2437 MHz				
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-40.46	-20	Pass

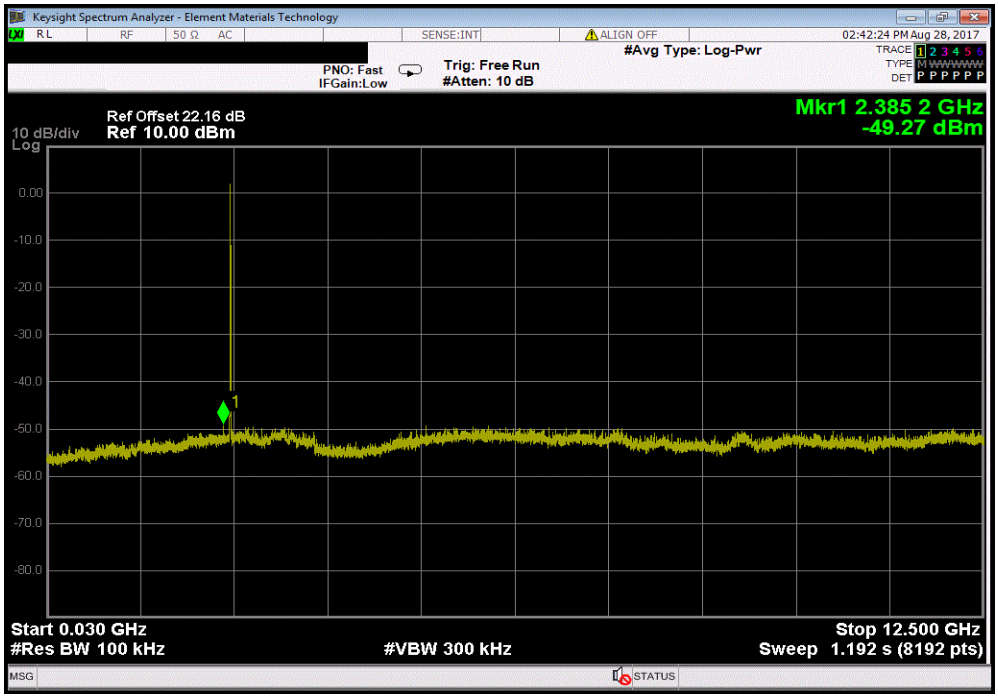


SPURIOUS CONDUCTED EMISSIONS

Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A

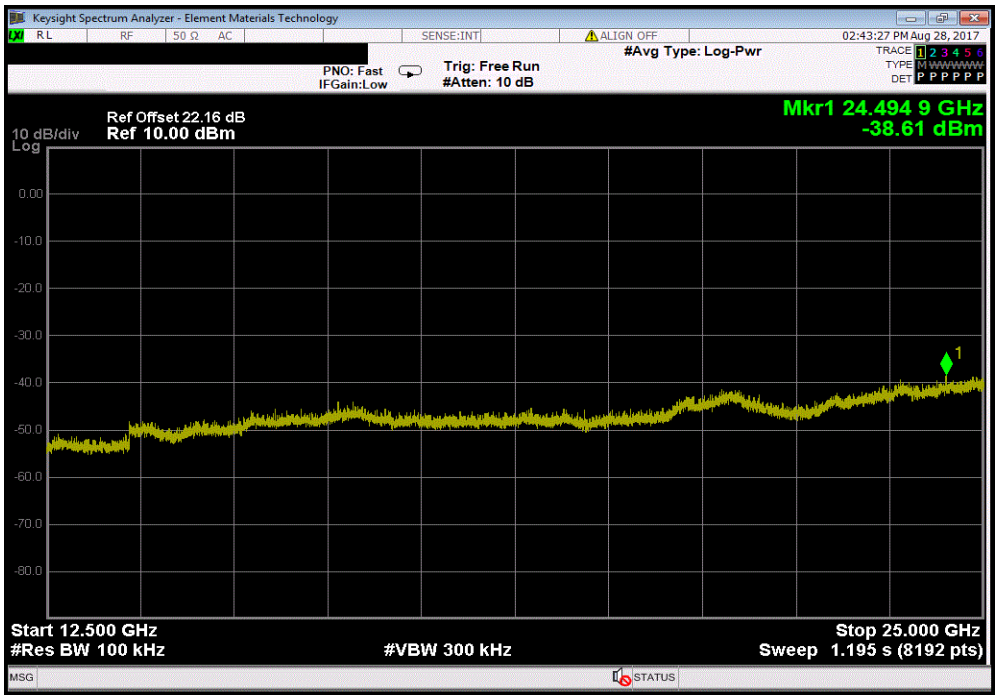


Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-51.16	-20	Pass	



SPURIOUS CONDUCTED EMISSIONS

Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-40.5	-20	Pass



BAND EDGE COMPLIANCE

XMit 2017.02.08

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	Fairview Microwave	SCK0963-60	TXF	11/18/2016	11/18/2017
Block - DC	Fairview Microwave	SD3379	AMT	10/24/2016	10/24/2017
Attenuator	Fairview Microwave	SA4018-20	TYE	10/24/2016	10/24/2017
Generator - Signal	Agilent	E4422B	TGS	7/11/2017	7/11/2020
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	3/14/2017	3/14/2018

TEST DESCRIPTION

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

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

BAND EDGE COMPLIANCE

TbtTx 2017.07.11 XMit 2017.02.08

EUT:	AT Max (1142000/1142100)			**Work Order:**	GARR0033
Serial Number:	C1-17031354			**Date:**	08/28/17
Customer:	Garrett Metal Detectors			**Temperature:**	24 °C
Attendees:	None			**Humidity:**	53.2% RH
Project:	None			**Barometric Pres.:**	1017 mbar
Tested by:	Marty Martin	**Power:**	Battery	**Job Site:**	TX09

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

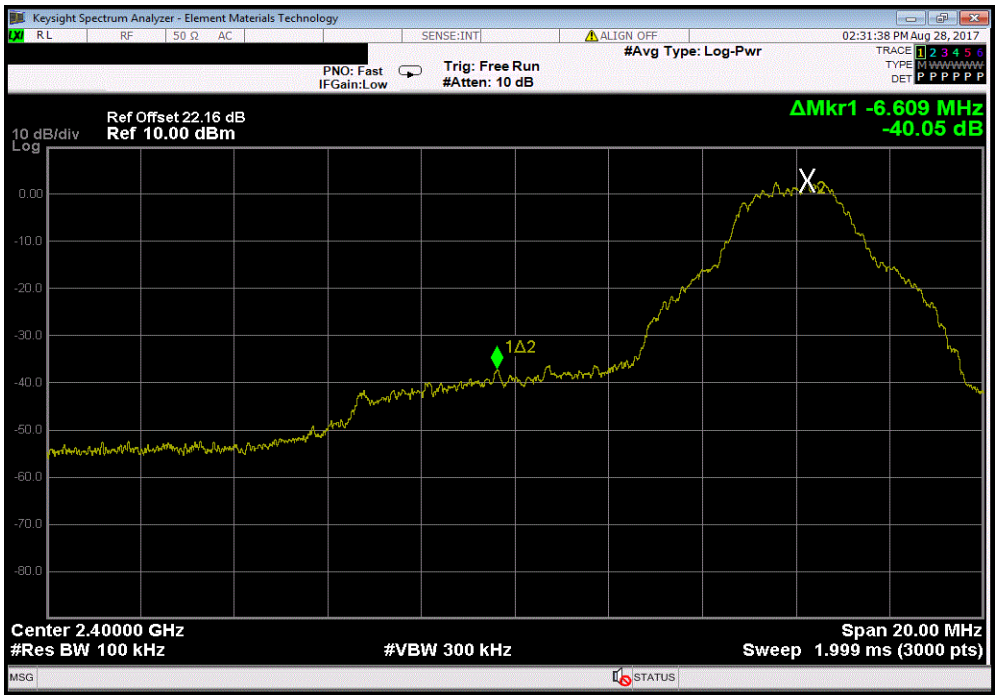
None

Configuration #	3	*Signature* Marty Martin

	Value (dBc)	**Limit ≤ (dBc)**	**Result**
Normal Test Conditions			
BLE/GFSK Low Channel, 2406 MHz	-40.05	-20	Pass
BLE/GFSK High Channel, 2476 MHz	-44.36	-20	Pass

BAND EDGE COMPLIANCE

Normal Test Conditions, BLE/GFSK Low Channel, 2406 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-40.05	-20	Pass



Normal Test Conditions, BLE/GFSK High Channel, 2476 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.36	-20	Pass