



# element

## ESCO Corporation

GET Detect Bucket Module 4265507

FCC 15.247:2019

Bluetooth Low Energy (DTS) Radio

Report # ESCO0012.1



NVLAP LAB CODE: 200630-0



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# CERTIFICATE OF TEST

**Last Date of Test: December 19, 2018**  
**ESCO Corporation**  
**Model: GET Detect Bucket Module 4265507**

## Radio Equipment Testing

### Standards

| Specification   | Method                       |
|-----------------|------------------------------|
| FCC 15.247:2019 | ANSI C63.10:2013, KDB 558074 |

### Results

| Method Clause                 | Test Description                    | Applied | Results | Comments                             |
|-------------------------------|-------------------------------------|---------|---------|--------------------------------------|
| 11.12.1,<br>11.13.2, 6.5, 6.6 | Spurious Radiated Emissions         | Yes     | Pass    |                                      |
| 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    |                                      |
| 11.9.1.1                      | Equivalent Isotropic Radiated Power | Yes     | Pass    |                                      |
| 11.10.2                       | Power Spectral Density              | Yes     | Pass    |                                      |
| 11.11                         | Band Edge Compliance                | Yes     | Pass    |                                      |
| 11.11                         | Spurious Conducted Emissions        | Yes     | Pass    |                                      |

### Deviations From Test Standards

None

### Approved By:



Kyle Holgate, 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<br>(yyyy-mm-dd) | Page Number |
|-----------------|-------------|----------------------|-------------|
| 00              | None        |                      |             |

# 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** - 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

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## 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.

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## European Union

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

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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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## SCOPE

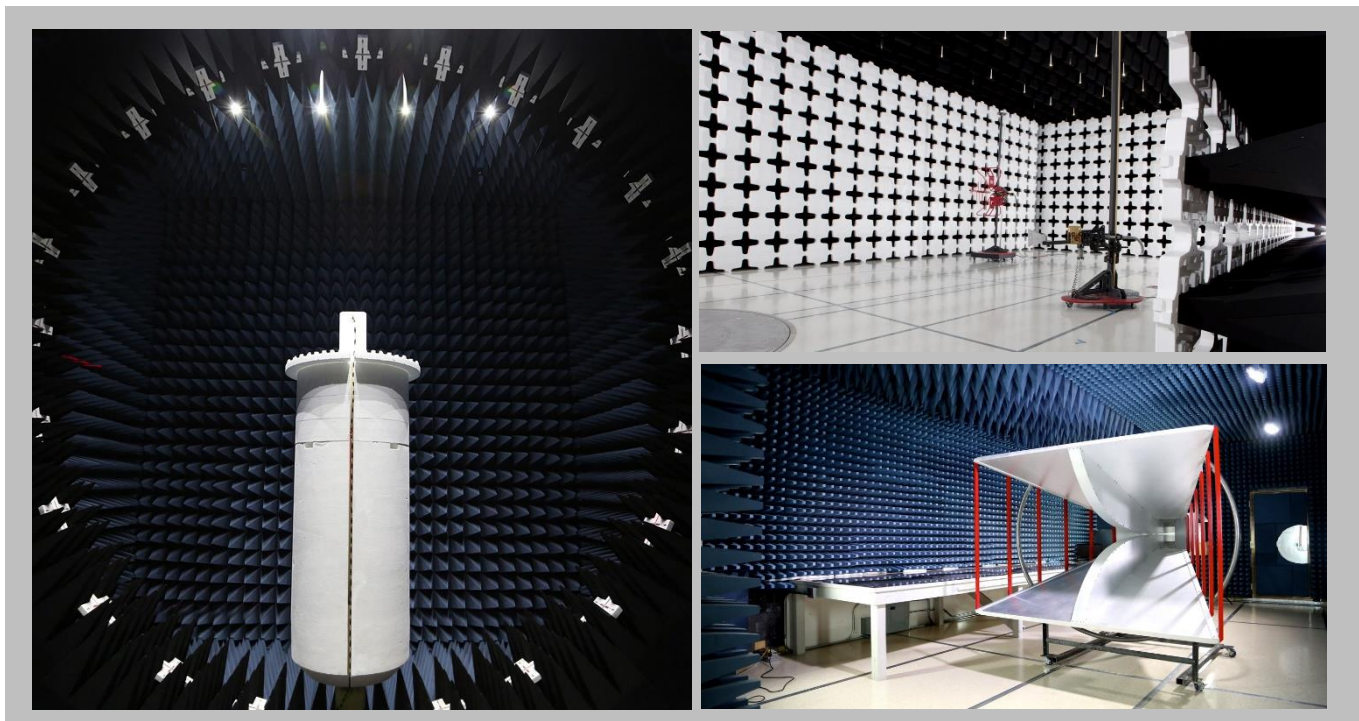
For details on the Scopes of our Accreditations, please visit:

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

# FACILITIES



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



# MEASUREMENT UNCERTAINTY

## Measurement Uncertainty

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

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

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

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

# Test Setup Block Diagrams

## Antenna Port Conducted Measurements



## Near Field Test Fixture Measurements



## Spurious Radiated Emissions



# PRODUCT DESCRIPTION



## Client and Equipment Under Test (EUT) Information

|                          |                                  |
|--------------------------|----------------------------------|
| Company Name:            | ESCO Corporation                 |
| Address:                 | Building #3 2141 NW 25th Ave.    |
| City, State, Zip:        | Portland, OR 97210               |
| Test Requested By:       | Jason Betournay                  |
| Model:                   | GET Detect Bucket Module 4265507 |
| First Date of Test:      | December 18, 2018                |
| Last Date of Test:       | December 19, 2018                |
| Receipt Date of Samples: | December 18, 2018                |
| Equipment Design Stage:  | Production                       |
| Equipment Condition:     | No Damage                        |
| Purchase Authorization:  | Verified                         |

## Information Provided by the Party Requesting the Test

|                                                                                               |
|-----------------------------------------------------------------------------------------------|
| <b>Functional Description of the EUT:</b>                                                     |
| Battery operated telemetry sensor (BTLE Radio)                                                |
| <b>Testing Objective:</b>                                                                     |
| To demonstrate compliance of the Bluetooth Low Energy (DTS) radio to FCC 15.247 requirements. |

# CONFIGURATIONS



## Configuration ESCO0008- 1

| Software/Firmware Running during test |         |
|---------------------------------------|---------|
| Description                           | Version |
| nRF Connect                           | 4.22.1  |

| EUT                                            |                  |                                  |               |
|------------------------------------------------|------------------|----------------------------------|---------------|
| Description                                    | Manufacturer     | Model/Part Number                | Serial Number |
| Battery operated telemetry sensor (BTLE Radio) | ESCO Corporation | GET Detect Bucket Module 4265507 | None          |

# MODIFICATIONS

## Equipment Modifications

| Item | Date       | Test                                | Modification                         | Note                                                                | Disposition of EUT                          |
|------|------------|-------------------------------------|--------------------------------------|---------------------------------------------------------------------|---------------------------------------------|
| 1    | 2018-12-18 | 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    | 2018-12-19 | 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. |
| 3    | 2018-12-19 | 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. |
| 4    | 2018-12-19 | 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. |
| 5    | 2018-12-19 | 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    | 2018-12-19 | 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. |
| 7    | 2018-12-19 | Spurious Conducted Emissions        | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed.            |

# POWER SETTINGS



The EUT was tested using the power settings provided by the manufacturer:

## SETTINGS FOR ALL TESTS IN THIS REPORT

| Modulation Types / Data Rates | Type | Channel | Frequency (MHz) | Power Setting |
|-------------------------------|------|---------|-----------------|---------------|
| BLE                           | DTS  | 0       | 2402            | 0             |
|                               |      | 20      | 2442            | 0             |
|                               |      | 39      | 2480            | 0             |

# SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2018.07.27

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

BTLE continuous TX, Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz, Software power setting = 0

## POWER SETTINGS INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

ESCO0008 - 2

## FREQUENCY RANGE INVESTIGATED

|                 |        |                |          |
|-----------------|--------|----------------|----------|
| Start Frequency | 30 MHz | Stop Frequency | 26.5 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 |
|------------------------------|-----------------|---------------------------|-----|-------------|----------|
| Cable                        | ESM Cable Corp. | KMKM-72                   | EVY | 24-Aug-2018 | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq           | AMF-6F-18002650-25-10P    | AVU | 24-Aug-2018 | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren    | 3160-09                   | AIV | NCR         | 0 mo     |
| Amplifier - Pre-Amplifier    | Miteq           | AMF-6F-12001800-30-10P    | AVD | 24-Nov-2018 | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren    | 3160-08                   | AHV | NCR         | 0 mo     |
| Cable                        | None            | Standard Gain Horns Cable | EVF | 24-Nov-2018 | 12 mo    |
| Amplifier - Pre-Amplifier    | L-3 Narda-MITEQ | AMF-6F-08001200-30-10P    | PAO | 24-Nov-2018 | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren    | 3160-07                   | AHU | NCR         | 0 mo     |
| Cable                        | N/A             | Double Ridge Horn Cables  | EVB | 24-Nov-2018 | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq           | AMF-3D-00100800-32-13P    | PAG | 24-Nov-2018 | 12 mo    |
| Antenna - Double Ridge       | ETS Lindgren    | 3115                      | AIZ | 7-Feb-2018  | 24 mo    |
| Attenuator                   | Coaxicom        | 3910-20                   | AXZ | 28-Feb-2018 | 12 mo    |
| Filter - Low Pass            | Micro-Tronics   | LPM50004                  | LFD | 28-Feb-2018 | 12 mo    |
| Cable                        | N/A             | Bilog Cables              | EVA | 24-Nov-2018 | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq           | AM-1616-1000              | AOL | 24-Nov-2018 | 12 mo    |
| Antenna - Biconilog          | Teseq           | CBL 6141B                 | AXR | 2-Oct-2018  | 24 mo    |
| Analyzer - Spectrum Analyzer | Agilent         | E4446A                    | AAQ | 18-Mar-2018 | 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.

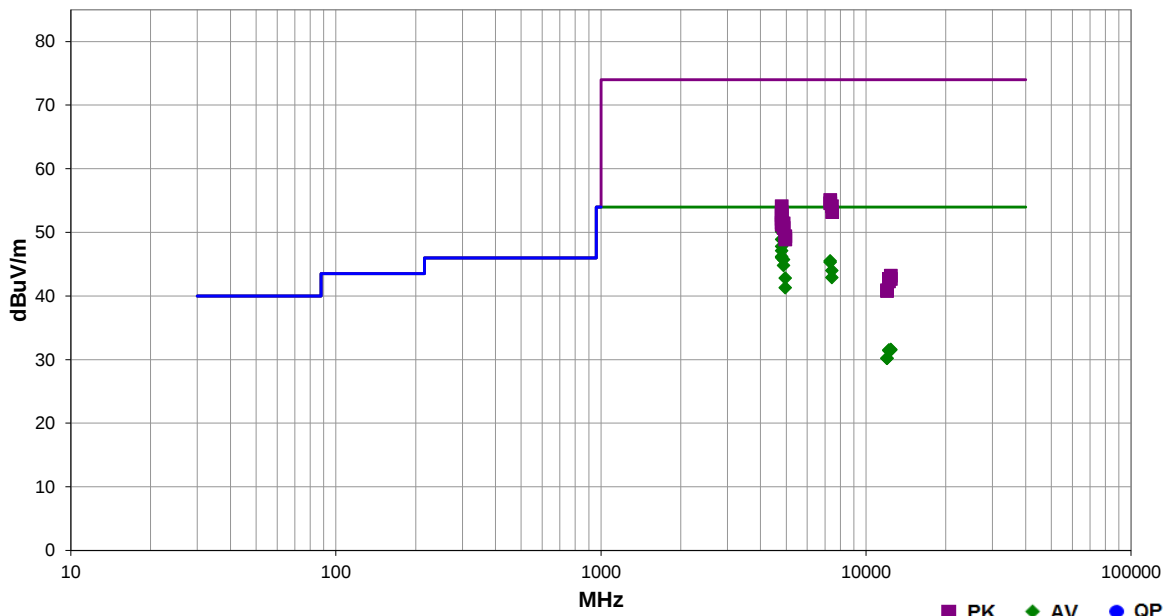
# SPURIOUS RADIATED EMISSIONS



|                 |                                                                                                                         |                   |             |                                                            |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|------------------------------------------------------------|
| Work Order:     | ESCO0008                                                                                                                | Date:             | 18-Dec-2018 | <div>EmiR5 2018.09.26</div> <div>PSA-ESCI 2018.07.27</div> |
| Project:        | None                                                                                                                    | Temperature:      | 20 °C       |                                                            |
| Job Site:       | EV01                                                                                                                    | Humidity:         | 46.3% RH    |                                                            |
| Serial Number:  | None                                                                                                                    | Barometric Pres.: | 1011 mbar   |                                                            |
| EUT:            | GET Detect Bucket Module 4265507                                                                                        |                   |             | Tested by: Jeff Alcock                                     |
| Configuration:  | 2                                                                                                                       |                   |             |                                                            |
| Customer:       | ESCO Corporation                                                                                                        |                   |             |                                                            |
| Attendees:      | Jason Betournay                                                                                                         |                   |             |                                                            |
| EUT Power:      | Battery                                                                                                                 |                   |             |                                                            |
| Operating Mode: | BTLE continuous TX, Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz, Software power setting = 0 |                   |             |                                                            |
| Deviations:     | None                                                                                                                    |                   |             |                                                            |
| Comments:       | See comments below for Channel, EUT, and EUT orientation.                                                               |                   |             |                                                            |

|                     |                  |
|---------------------|------------------|
| Test Specifications | Test Method      |
| FCC 15.247:2018     | ANSI C63.10:2013 |

|       |    |                   |   |                   |           |         |      |
|-------|----|-------------------|---|-------------------|-----------|---------|------|
| Run # | 17 | 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) |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|
| 4803.850   | 45.6             | 4.5         | 1.1                     | 200.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 50.1              | 54.0                 | -3.9                   |
| 4803.808   | 44.4             | 4.5         | 1.0                     | 48.0              | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 48.9              | 54.0                 | -5.1                   |
| 4803.833   | 43.3             | 4.5         | 3.5                     | 169.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   |
| 4803.900   | 42.6             | 4.5         | 1.9                     | 36.0              | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 47.1              | 54.0                 | -6.9                   |
| 4803.867   | 41.7             | 4.5         | 1.8                     | 271.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 46.2              | 54.0                 | -7.8                   |
| 4803.842   | 41.5             | 4.5         | 1.0                     | 271.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 46.0              | 54.0                 | -8.0                   |
| 4883.867   | 40.3             | 5.4         | 2.8                     | 120.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 45.7              | 54.0                 | -8.3                   |
| 7325.220   | 32.3             | 13.2        | 1.4                     | 107.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 45.5              | 54.0                 | -8.5                   |
| 7325.137   | 32.1             | 13.2        | 2.1                     | 203.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 45.3              | 54.0                 | -8.7                   |
| 4883.790   | 39.4             | 5.4         | 2.2                     | 153.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 44.8              | 54.0                 | -9.2                   |
| 7439.267   | 29.8             | 14.2        | 1.6                     | 229.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 44.0              | 54.0                 | -10.0                  |
| 7440.367   | 28.7             | 14.2        | 1.4                     | 245.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 42.9              | 54.0                 | -11.1                  |
| 4959.817   | 37.2             | 5.6         | 2.4                     | 296.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 42.8              | 54.0                 | -11.2                  |
| 4959.817   | 35.7             | 5.6         | 4.0                     | 244.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 41.3              | 54.0                 | -12.7                  |
| 7326.290   | 41.9             | 13.2        | 2.1                     | 203.0             | 3.0                    | 0.0                       | Vert                     | PK       | 0.0                      | 55.1              | 74.0                 | -18.9                  |
| 7325.563   | 41.4             | 13.2        | 1.4                     | 107.0             | 3.0                    | 0.0                       | Horz                     | PK       | 0.0                      | 54.6              | 74.0                 | -19.4                  |
| 4803.500   | 49.6             | 4.5         | 1.1                     | 200.0             | 3.0                    | 0.0                       | Vert                     | PK       | 0.0                      | 54.1              | 74.0                 | -19.9                  |
| 7438.917   | 39.9             | 14.2        | 1.6                     | 229.0             | 3.0                    | 0.0                       | Horz                     | PK       | 0.0                      | 54.1              | 74.0                 | -19.9                  |
| 4803.792   | 48.7             | 4.5         | 1.0                     | 48.0              | 3.0                    | 0.0                       | Horz                     | PK       | 0.0                      | 53.2              | 74.0                 | -20.8                  |
| 7442.242   | 39.0             | 14.2        | 1.4                     | 245.0             | 3.0                    | 0.0                       | Vert                     | PK       | 0.0                      | 53.2              | 74.0                 | -20.8                  |

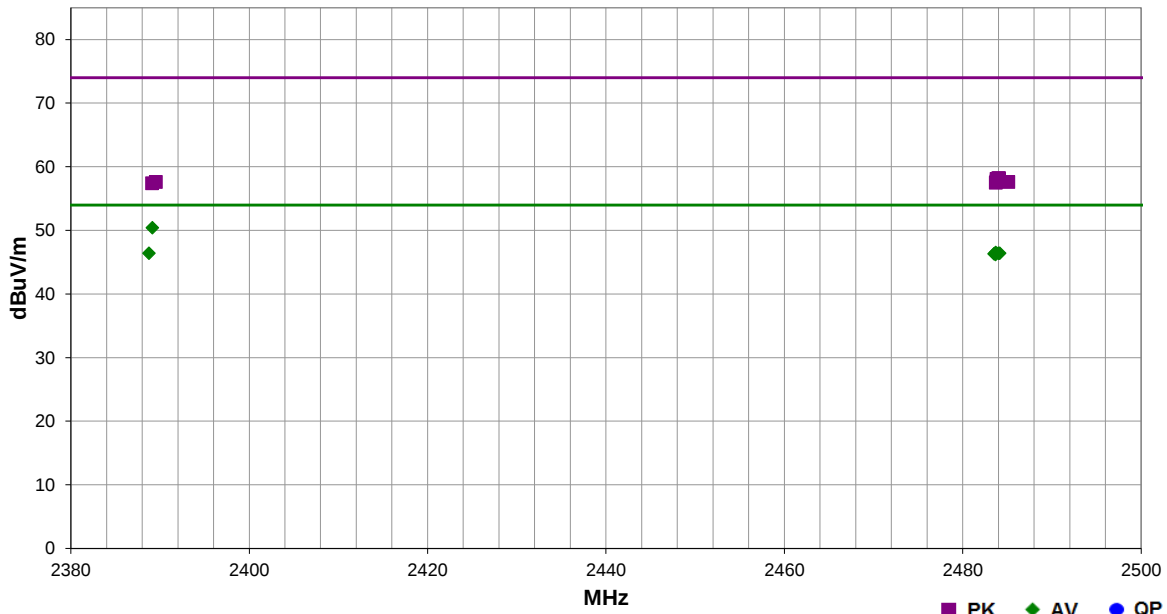
# SPURIOUS RADIATED EMISSIONS



|                 |                                                                                                                         |                   |             |                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|---------------------------------------------------------------------------|
| Work Order:     | ESCO0008                                                                                                                | Date:             | 18-Dec-2018 | <small>EmiR5 2018.09.26</small><br><small>PSA-ESCI 2018.07.27</small><br> |
| Project:        | None                                                                                                                    | Temperature:      | 20 °C       |                                                                           |
| Job Site:       | EV01                                                                                                                    | Humidity:         | 46.3% RH    |                                                                           |
| Serial Number:  | None                                                                                                                    | Barometric Pres.: | 1011 mbar   |                                                                           |
| EUT:            | GET Detect Bucket Module 4265507                                                                                        |                   |             | Tested by: Jeff Alcock                                                    |
| Configuration:  | 2                                                                                                                       |                   |             |                                                                           |
| Customer:       | ESCO Corporation                                                                                                        |                   |             |                                                                           |
| Attendees:      | Jason Betournay                                                                                                         |                   |             |                                                                           |
| EUT Power:      | Battery                                                                                                                 |                   |             |                                                                           |
| Operating Mode: | BTLE continuous TX, Low Channel = 2402 MHz, Mid Channel = 2442 MHz, High Channel = 2480 MHz, Software power setting = 0 |                   |             |                                                                           |
| Deviations:     | None                                                                                                                    |                   |             |                                                                           |
| Comments:       | See comments below for Channel, EUT, and EUT orientation.                                                               |                   |             |                                                                           |

|                     |                  |
|---------------------|------------------|
| Test Specifications | Test Method      |
| FCC 15.247:2018     | ANSI C63.10:2013 |

|       |    |                   |   |                   |           |         |      |
|-------|----|-------------------|---|-------------------|-----------|---------|------|
| Run # | 21 | 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) |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|
| 2389.137   | 35.5             | -5.1        | 1.0                     | 196.0             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 50.4              | 54.0                 | -3.6                   |
| 2483.697   | 31.4             | -4.9        | 1.0                     | 59.0              | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 46.5              | 54.0                 | -7.5                   |
| 2483.670   | 31.3             | -4.9        | 1.0                     | 252.0             | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 46.4              | 54.0                 | -7.6                   |
| 2483.990   | 31.3             | -4.9        | 1.3                     | 187.0             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 46.4              | 54.0                 | -7.6                   |
| 2484.147   | 31.2             | -4.8        | 1.0                     | 360.0             | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 46.4              | 54.0                 | -7.6                   |
| 2388.763   | 31.5             | -5.1        | 1.0                     | 31.0              | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 46.4              | 54.0                 | -7.6                   |
| 2483.503   | 31.2             | -4.9        | 1.0                     | 114.0             | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 46.3              | 54.0                 | -7.7                   |
| 2483.683   | 31.1             | -4.9        | 3.2                     | 189.0             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 46.2              | 54.0                 | -7.8                   |
| 2483.980   | 43.1             | -4.9        | 1.0                     | 252.0             | 3.0                    | 20.0                      | Vert                     | PK       | 0.0                      | 58.2              | 74.0                 | -15.8                  |
| 2484.057   | 43.1             | -4.9        | 1.3                     | 187.0             | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 58.2              | 74.0                 | -15.8                  |
| 2483.783   | 43.0             | -4.9        | 1.0                     | 59.0              | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 58.1              | 74.0                 | -15.9                  |
| 2483.770   | 42.6             | -4.9        | 1.0                     | 360.0             | 3.0                    | 20.0                      | Vert                     | PK       | 0.0                      | 57.7              | 74.0                 | -16.3                  |
| 2485.093   | 42.4             | -4.8        | 3.2                     | 189.0             | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 57.6              | 74.0                 | -16.4                  |
| 2389.537   | 42.7             | -5.1        | 1.0                     | 31.0              | 3.0                    | 20.0                      | Vert                     | PK       | 0.0                      | 57.6              | 74.0                 | -16.4                  |
| 2483.713   | 42.4             | -4.9        | 1.0                     | 114.0             | 3.0                    | 20.0                      | Vert                     | PK       | 0.0                      | 57.5              | 74.0                 | -16.5                  |
| 2389.103   | 42.5             | -5.1        | 1.0                     | 196.0             | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 57.4              | 74.0                 | -16.6                  |

# 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. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

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 BANDWIDTH



XMIT 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-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 occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

# OCCUPIED BANDWIDTH



THxTx 2018.09.13 XMM 2017.12.13

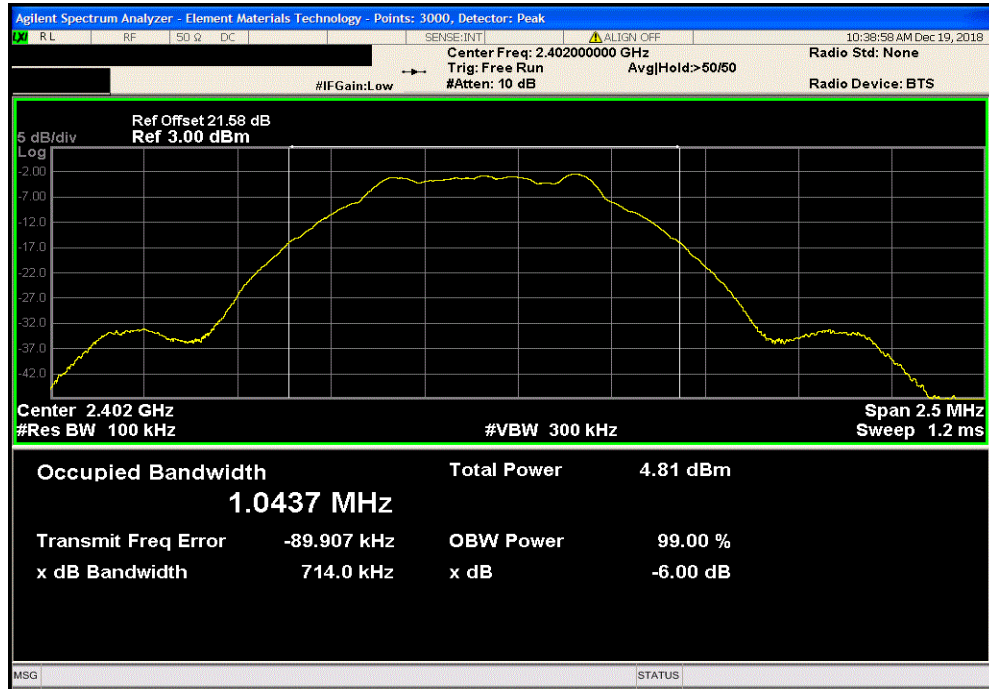
|                                                                                                                 |                |                                                                                             |                  |
|-----------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|------------------|
| EUT: GET Detect Bucket Module 4265507                                                                           |                | Work Order: ESCO0008                                                                        |                  |
| Serial Number: None                                                                                             |                | Date: 19-Dec-18                                                                             |                  |
| Customer: ESCO Corporation                                                                                      |                | Temperature: 21.2 °C                                                                        |                  |
| Attendees: Jason Betournay                                                                                      |                | Humidity: 43.8% RH                                                                          |                  |
| Project: None                                                                                                   |                | Barometric Pres.: 1027 mbar                                                                 |                  |
| Tested by: Jeff Alcock                                                                                          | Power: Battery | Job Site: EV06                                                                              |                  |
| TEST SPECIFICATIONS                                                                                             |                | Test Method                                                                                 |                  |
| FCC 15.247:2018                                                                                                 |                | ANSI C63.10:2013                                                                            |                  |
| COMMENTS                                                                                                        |                |                                                                                             |                  |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                |                                                                                             |                  |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                |                                                                                             |                  |
| None                                                                                                            |                |                                                                                             |                  |
| Configuration #                                                                                                 | 1              | Signature  |                  |
|                                                                                                                 |                | Value                                                                                       | Limit (±) Result |
| Bucket Module                                                                                                   |                |                                                                                             |                  |
| BLE/GFSK Low Channel, 2402 MHz                                                                                  |                | 714.049 kHz                                                                                 | 500 kHz Pass     |
| BLE/GFSK Mid Channel, 2442 MHz                                                                                  |                | 706.544 kHz                                                                                 | 500 kHz Pass     |
| BLE/GFSK High Channel, 2480 MHz                                                                                 |                | 710.819 kHz                                                                                 | 500 kHz Pass     |

# OCCUPIED BANDWIDTH

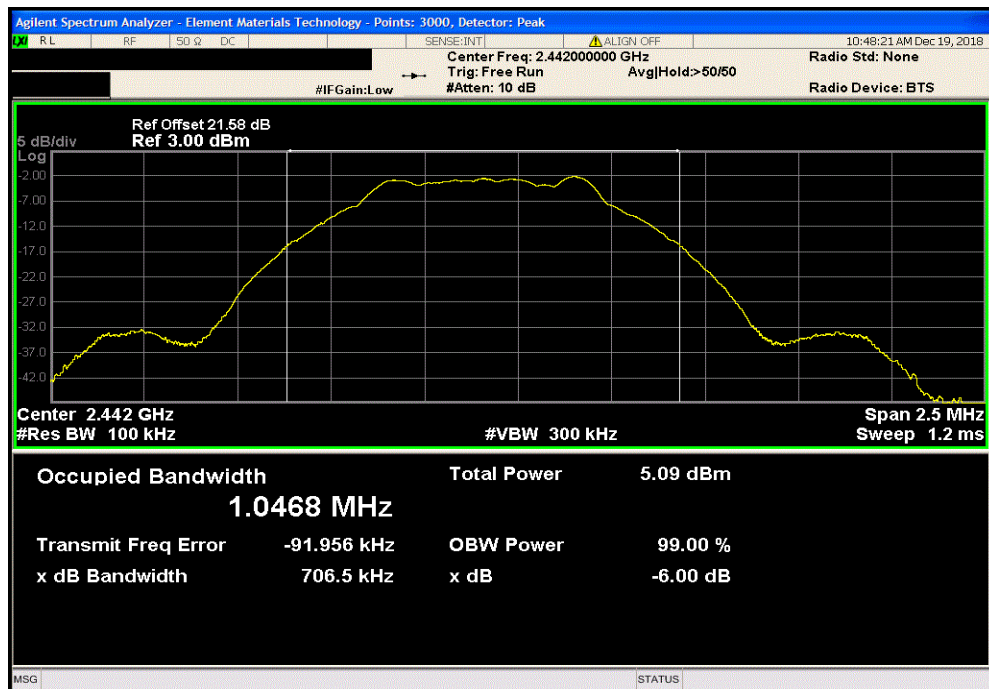


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |             |           |        |  |  |  |
|-----------------------------------------------|-------------|-----------|--------|--|--|--|
|                                               | Value       | Limit (≥) | Result |  |  |  |
|                                               | 714.049 kHz | 500 kHz   | Pass   |  |  |  |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |             |           |        |  |  |  |
|-----------------------------------------------|-------------|-----------|--------|--|--|--|
|                                               | Value       | Limit (≥) | Result |  |  |  |
|                                               | 706.544 kHz | 500 kHz   | Pass   |  |  |  |

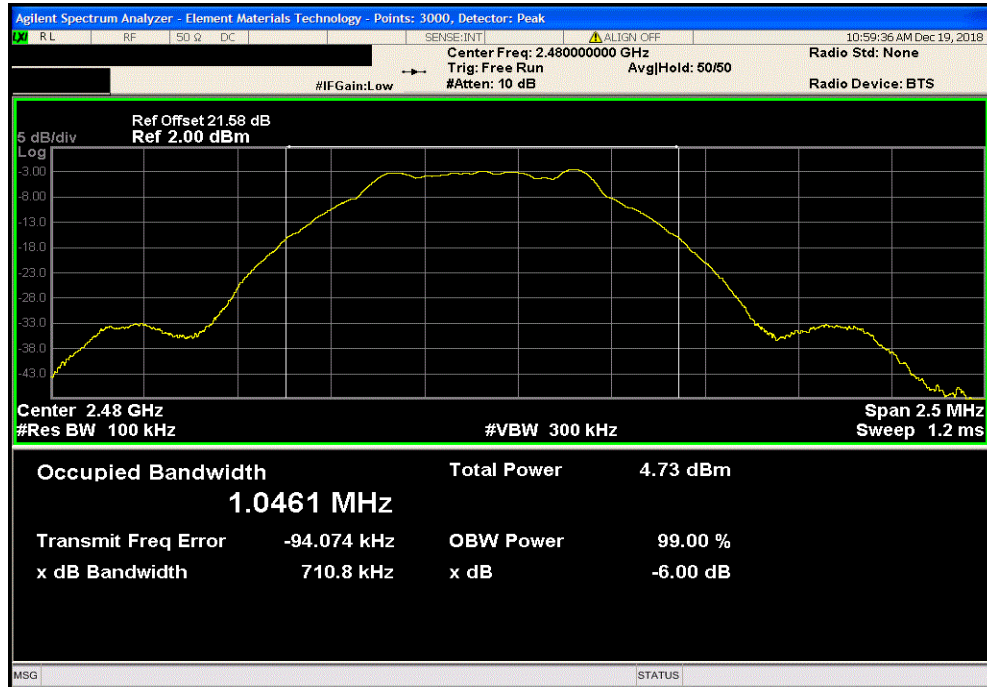


# OCCUPIED BANDWIDTH

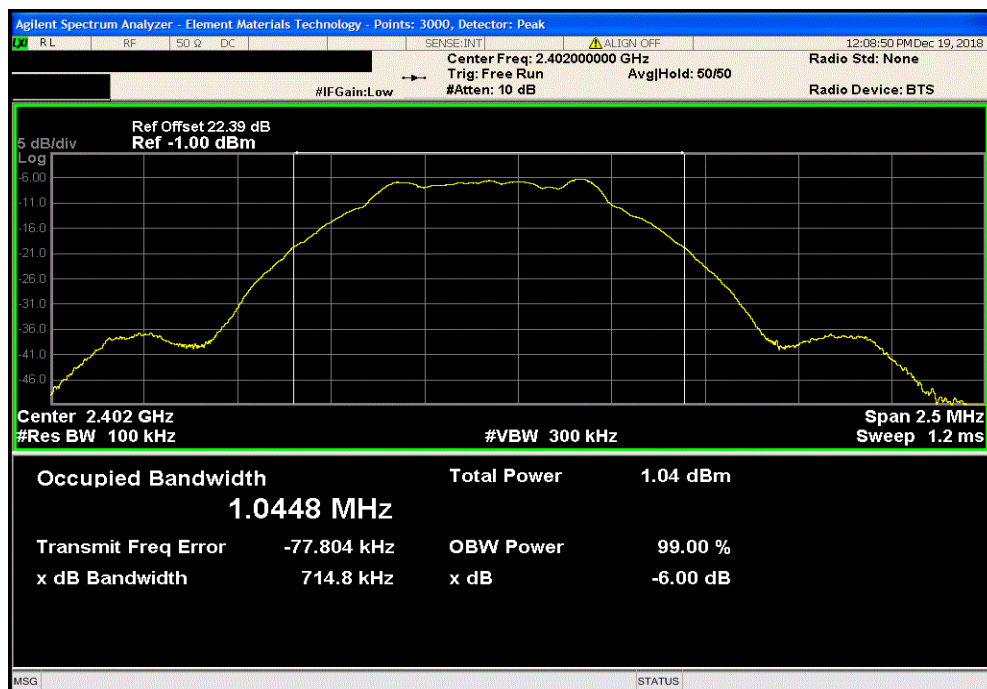


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |  |  |  |             |              |        |
|------------------------------------------------|--|--|--|-------------|--------------|--------|
|                                                |  |  |  | Value       | Limit<br>(≥) | Result |
|                                                |  |  |  | 710.819 kHz | 500 kHz      | Pass   |



| Point Sensor, BLE/GFSK Low Channel, 2402 MHz |  |  |  |             |              |        |
|----------------------------------------------|--|--|--|-------------|--------------|--------|
|                                              |  |  |  | Value       | Limit<br>(≥) | Result |
|                                              |  |  |  | 714.835 kHz | 500 kHz      | Pass   |

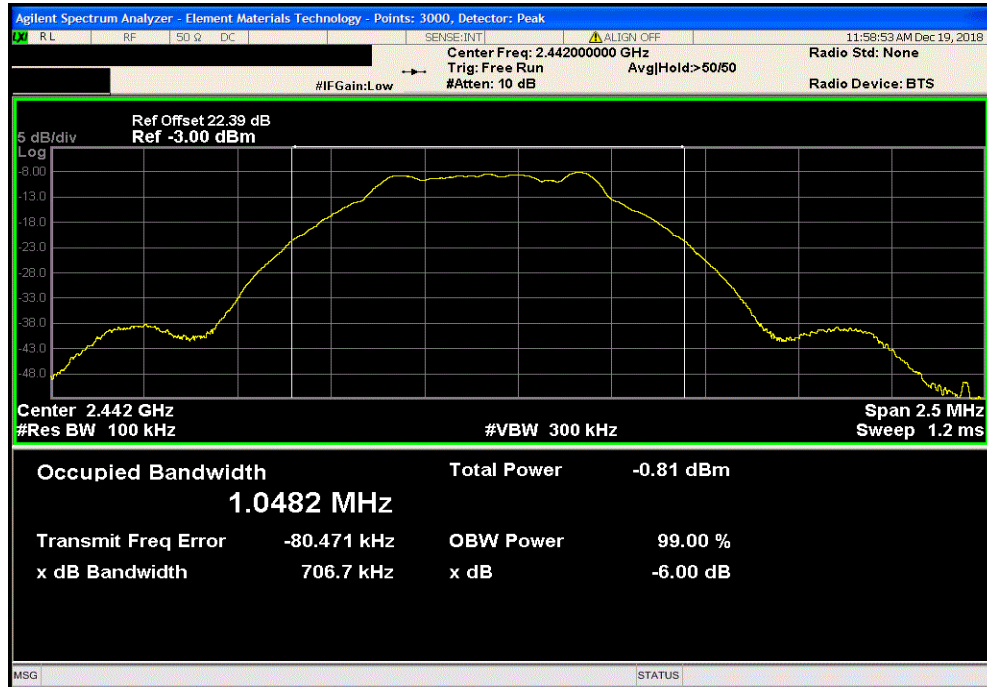


# OCCUPIED BANDWIDTH

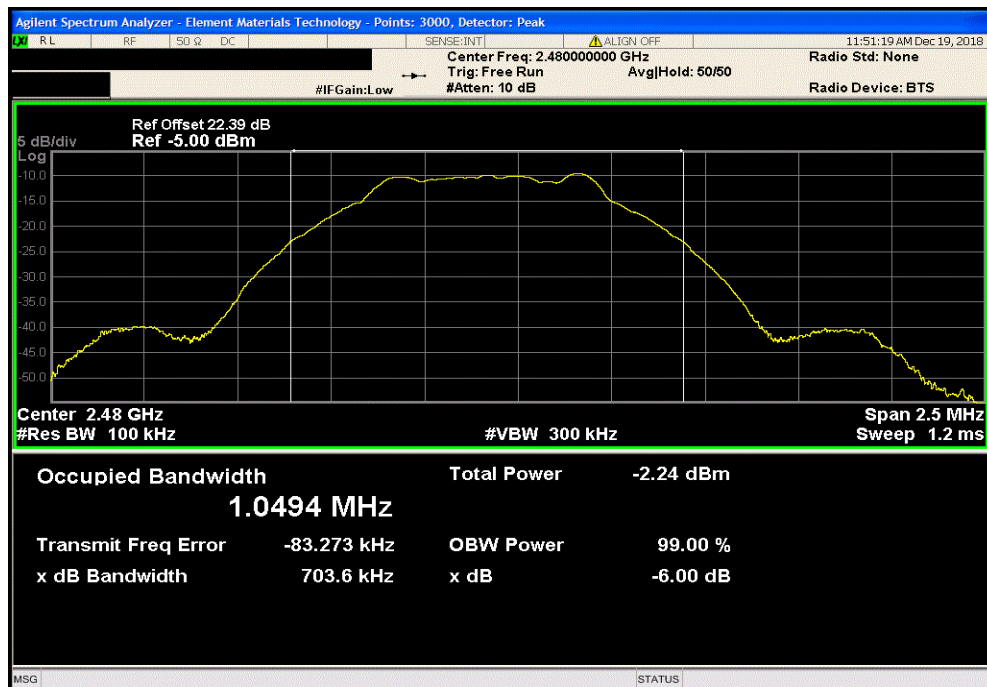


TMTx 2018.09.13 XMI 2017.12.13

| Point Sensor, BLE/GFSK Mid Channel, 2442 MHz |             |           |        |  |  |  |
|----------------------------------------------|-------------|-----------|--------|--|--|--|
|                                              | Value       | Limit (≥) | Result |  |  |  |
|                                              | 706.671 kHz | 500 kHz   | Pass   |  |  |  |



| Point Sensor, BLE/GFSK High Channel, 2480 MHz |             |           |        |  |  |  |
|-----------------------------------------------|-------------|-----------|--------|--|--|--|
|                                               | Value       | Limit (≥) | Result |  |  |  |
|                                               | 703.579 kHz | 500 kHz   | Pass   |  |  |  |



# OUTPUT POWER



XMIT 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-19 |

## 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.

# OUTPUT POWER



TM17x 2018.09.13 XM16 2017.12.13

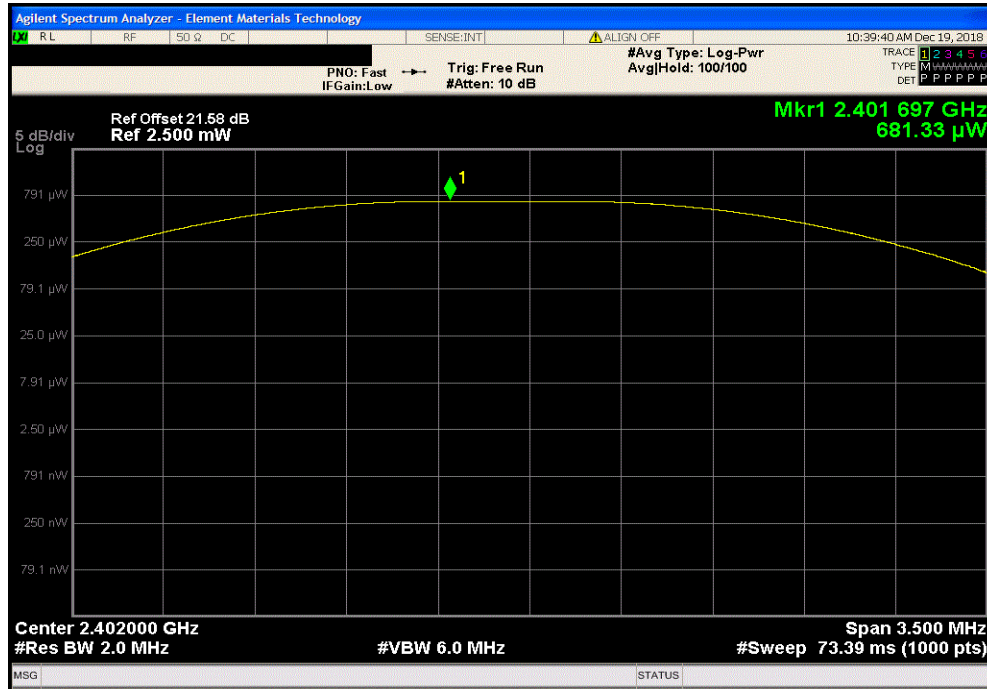
|                                                                                                                 |                |                                                                                             |                  |
|-----------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|------------------|
| EUT: GET Detect Bucket Module 4265507                                                                           |                | Work Order: ESCO0008                                                                        |                  |
| Serial Number: None                                                                                             |                | Date: 19-Dec-18                                                                             |                  |
| Customer: ESCO Corporation                                                                                      |                | Temperature: 21.2 °C                                                                        |                  |
| Attendees: Jason Betournay                                                                                      |                | Humidity: 43.9% RH                                                                          |                  |
| Project: None                                                                                                   |                | Barometric Pres.: 1027 mbar                                                                 |                  |
| Tested by: Jeff Alcoke                                                                                          | Power: Battery | Job Site: EV06                                                                              |                  |
| TEST SPECIFICATIONS                                                                                             |                | Test Method                                                                                 |                  |
| FCC 15.247:2018                                                                                                 |                | ANSI C63.10:2013                                                                            |                  |
| COMMENTS                                                                                                        |                |                                                                                             |                  |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                |                                                                                             |                  |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                |                                                                                             |                  |
| None                                                                                                            |                |                                                                                             |                  |
| Configuration #                                                                                                 | 1              | Signature  |                  |
|                                                                                                                 |                | Value                                                                                       | Limit (<) Result |
| Bucket Module                                                                                                   |                |                                                                                             |                  |
| BLE/GFSK Low Channel, 2402 MHz                                                                                  |                | 681.33 uW                                                                                   | 1 W Pass         |
| BLE/GFSK Mid Channel, 2442 MHz                                                                                  |                | 725.06 uW                                                                                   | 1 W Pass         |
| BLE/GFSK High Channel, 2480 MHz                                                                                 |                | 667.46 uW                                                                                   | 1 W Pass         |

# OUTPUT POWER

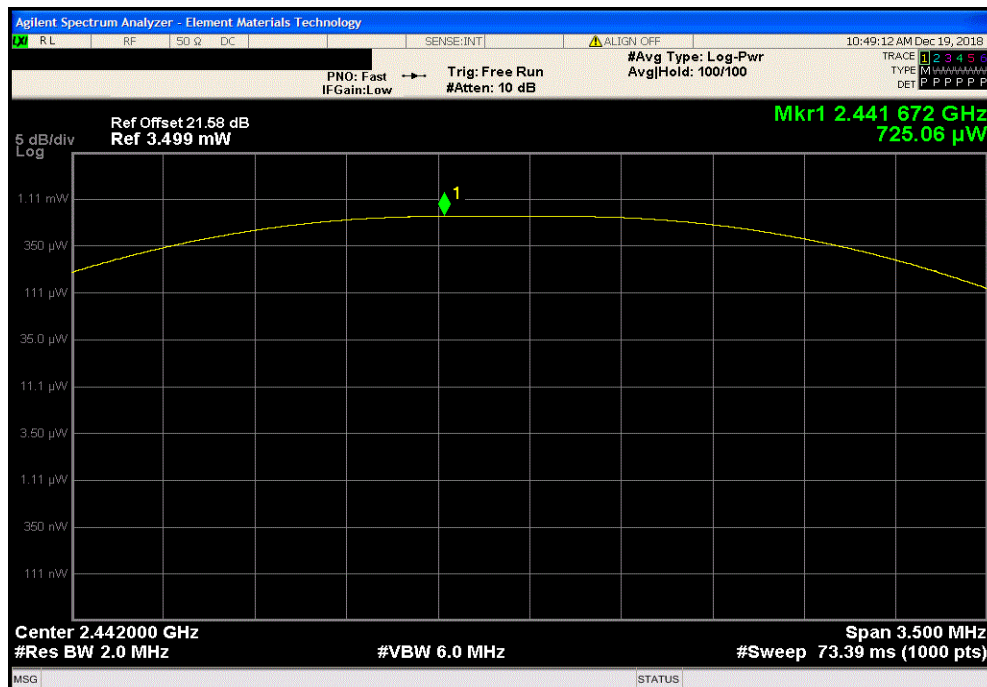


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |  |  |  |                |       |        |
|-----------------------------------------------|--|--|--|----------------|-------|--------|
|                                               |  |  |  | Value          | Limit | Result |
|                                               |  |  |  | 681.33 $\mu$ W | 1 W   | Pass   |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |  |  |  |                |       |        |
|-----------------------------------------------|--|--|--|----------------|-------|--------|
|                                               |  |  |  | Value          | Limit | Result |
|                                               |  |  |  | 725.06 $\mu$ W | 1 W   | Pass   |

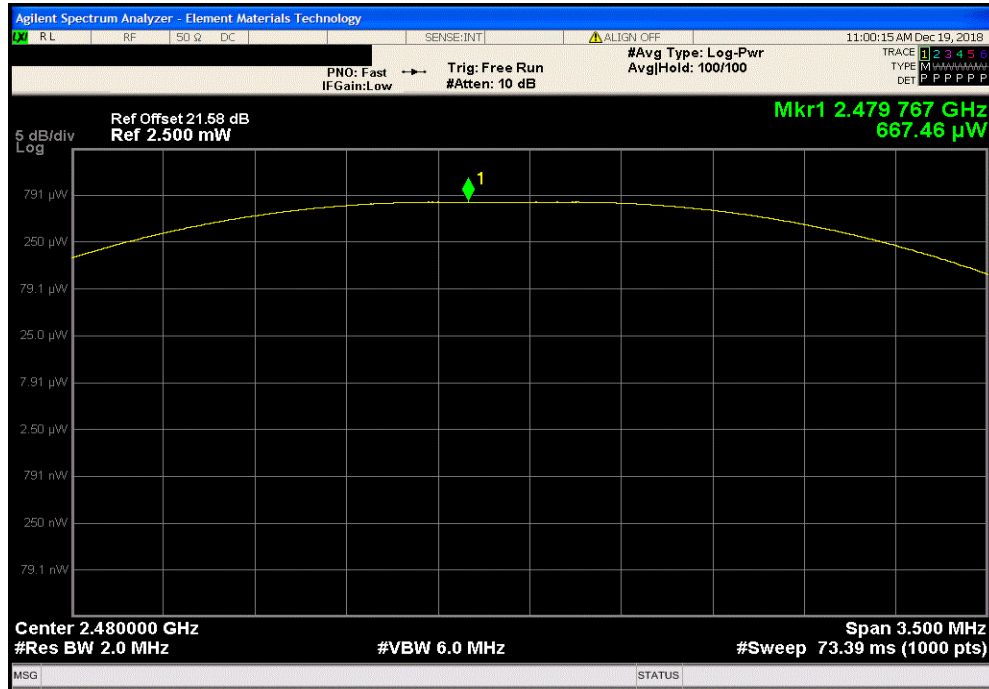


# OUTPUT POWER



TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |  |  |                |       |        |  |
|------------------------------------------------|--|--|----------------|-------|--------|--|
| Value                                          |  |  |                | Limit | Result |  |
|                                                |  |  |                | (<)   |        |  |
|                                                |  |  | 667.46 $\mu$ W | 1 W   | Pass   |  |



# EQUIVALENT ISOTROPIC RADIATED POWER



XMIT 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-19 |

## 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.

The antenna gain of the EUT was then added to the conducted output power to derive the EIRP Values.

# EQUIVALENT ISOTROPIC RADIATED POWER



THxTx 2018.09.13 XMM 2017.12.13

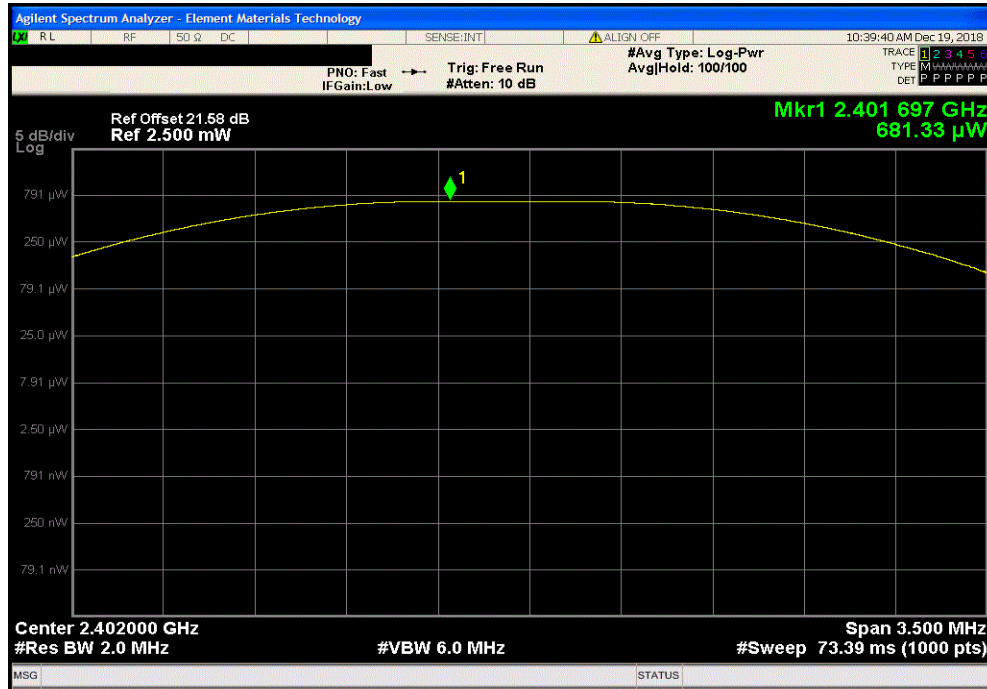
|                                                                                                                 |                |                             |             |
|-----------------------------------------------------------------------------------------------------------------|----------------|-----------------------------|-------------|
| EUT: GET Detect Bucket Module 4265507                                                                           |                | Work Order: ESCO0008        |             |
| Serial Number: None                                                                                             |                | Date: 19-Dec-18             |             |
| Customer: ESCO Corporation                                                                                      |                | Temperature: 21.2 °C        |             |
| Attendees: Jason Betournay                                                                                      |                | Humidity: 43.9% RH          |             |
| Project: None                                                                                                   |                | Barometric Pres.: 1027 mbar |             |
| Tested by: Jeff Alcoke                                                                                          | Power: Battery | Job Site: EV06              |             |
| TEST SPECIFICATIONS                                                                                             |                | Test Method                 |             |
| FCC 15.247:2018                                                                                                 |                | ANSI C63.10:2013            |             |
| COMMENTS                                                                                                        |                |                             |             |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                |                             |             |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                |                             |             |
| None                                                                                                            |                |                             |             |
| Configuration #                                                                                                 | 1              | Signature                   |             |
|                                                                                                                 |                | Value (µW)                  | Value (dBm) |
|                                                                                                                 |                | Antenna Gain (dBi)          | EIRP (dBm)  |
|                                                                                                                 |                | Limit (< dBm)               | Result      |
| Bucket Module                                                                                                   |                |                             |             |
| BLE/GFSK Low Channel, 2402 MHz                                                                                  |                | 681.33                      | -1.67       |
| BLE/GFSK Mid Channel, 2442 MHz                                                                                  |                | 725.06                      | -1.40       |
| BLE/GFSK High Channel, 2480 MHz                                                                                 |                | 667.46                      | -1.76       |

# EQUIVALENT ISOTROPIC RADIATED POWER

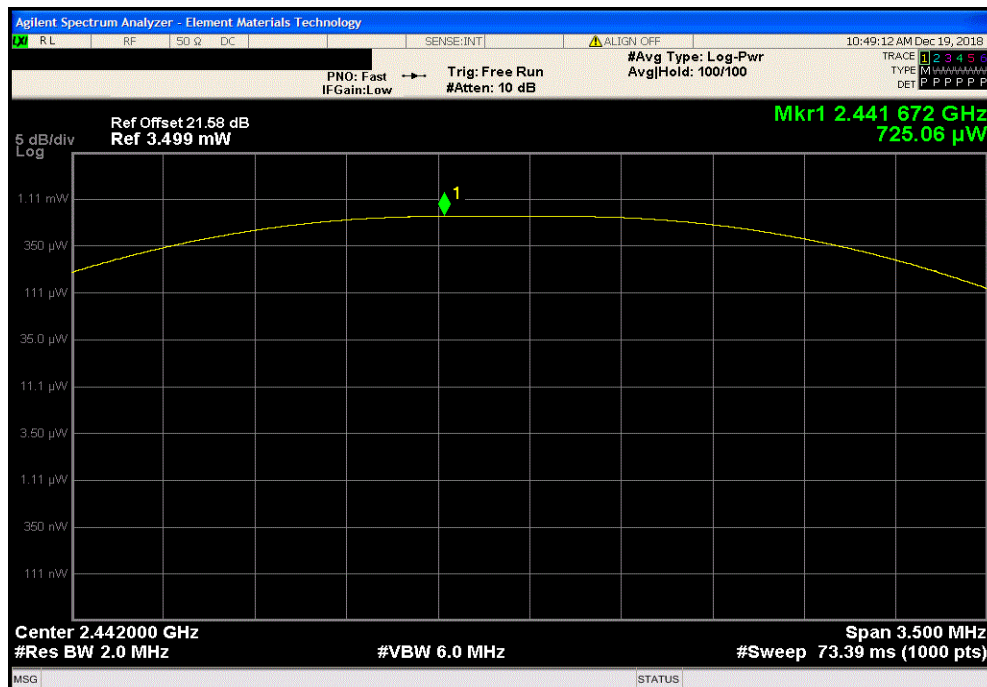


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |       |            |       |         |        |  |
|-----------------------------------------------|-------|------------|-------|---------|--------|--|
| Value                                         | Value | Antenna    | EIRP  | Limit   | Result |  |
| ( $\mu$ W)                                    | (dBm) | Gain (dBi) | (dBm) | (< dBm) |        |  |
| 681.33                                        | -1.67 | 2          | 0.33  | 36      | Pass   |  |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |       |            |       |         |        |  |
|-----------------------------------------------|-------|------------|-------|---------|--------|--|
| Value                                         | Value | Antenna    | EIRP  | Limit   | Result |  |
| ( $\mu$ W)                                    | (dBm) | Gain (dBi) | (dBm) | (< dBm) |        |  |
| 725.06                                        | -1.40 | 2          | 0.60  | 36      | Pass   |  |

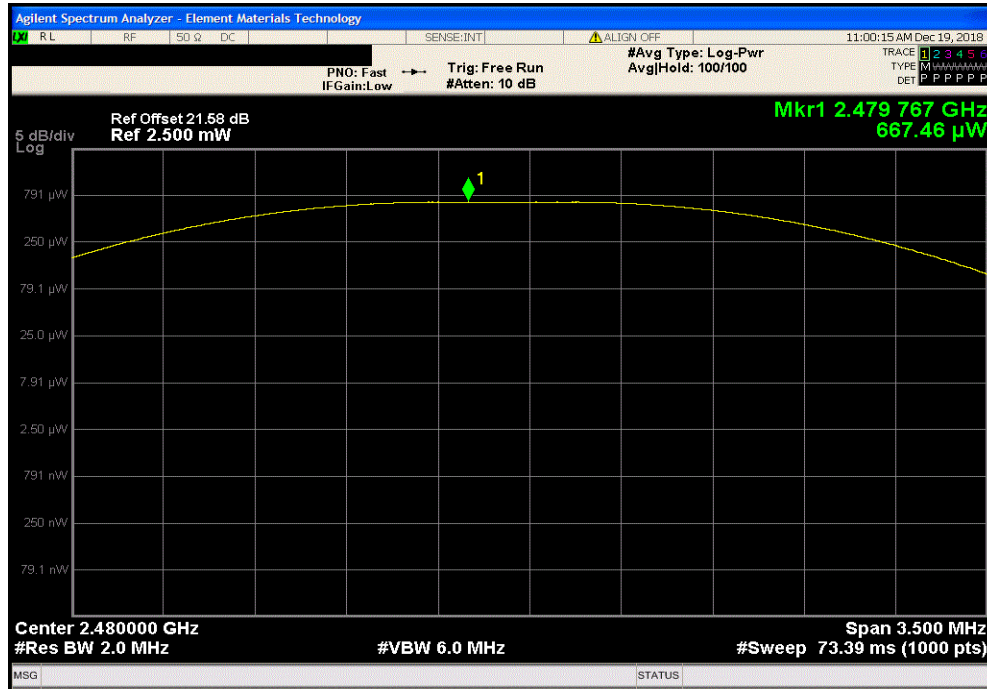


# EQUIVALENT ISOTROPIC RADIATED POWER



TMTx 2018.09.13 XMt 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |                |                       |               |                  |        |  |
|------------------------------------------------|----------------|-----------------------|---------------|------------------|--------|--|
| Value<br>( $\mu$ W)                            | Value<br>(dBm) | Antenna<br>Gain (dBi) | EIRP<br>(dBm) | Limit<br>(< dBm) | Result |  |
| 667.46                                         | -1.76          | 2                     | 0.24          | 36               | Pass   |  |



# POWER SPECTRAL DENSITY



XMit 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-19 |

## 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



THdTx 2018.09.13 XMM 2017.12.13

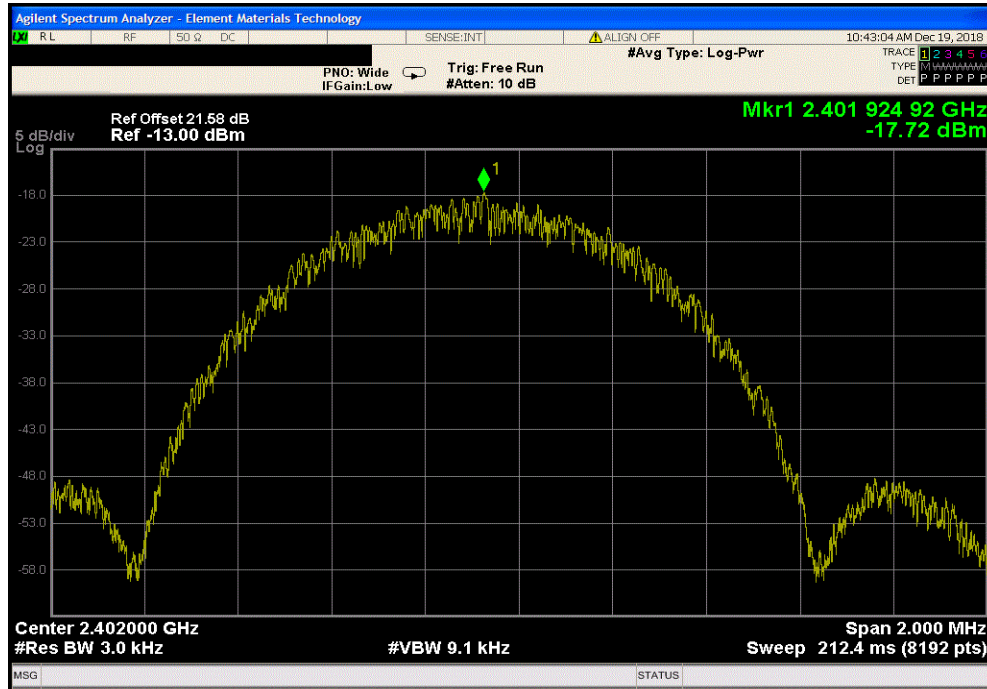
|                                                                                                                 |                |                                                                                             |                     |
|-----------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|---------------------|
| EUT: GET Detect Bucket Module 4265507                                                                           |                | Work Order: ESCO0008                                                                        |                     |
| Serial Number: None                                                                                             |                | Date: 19-Dec-18                                                                             |                     |
| Customer: ESCO Corporation                                                                                      |                | Temperature: 21.2 °C                                                                        |                     |
| Attendees: Jason Betournay                                                                                      |                | Humidity: 43.8% RH                                                                          |                     |
| Project: None                                                                                                   |                | Barometric Pres.: 1026 mbar                                                                 |                     |
| Tested by: Jeff Alcock                                                                                          | Power: Battery | Job Site: EV06                                                                              |                     |
| TEST SPECIFICATIONS                                                                                             |                | Test Method                                                                                 |                     |
| FCC 15.247:2018                                                                                                 |                | ANSI C63.10:2013                                                                            |                     |
| COMMENTS                                                                                                        |                |                                                                                             |                     |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                |                                                                                             |                     |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                |                                                                                             |                     |
| None                                                                                                            |                |                                                                                             |                     |
| Configuration #                                                                                                 | 1              | Signature  |                     |
|                                                                                                                 |                | Value<br>dBm/3kHz                                                                           | Limit<br>< dBm/3kHz |
| Bucket Module                                                                                                   |                |                                                                                             | Results             |
| BLE/GFSK Low Channel, 2402 MHz                                                                                  |                | -17.723                                                                                     | 8 Pass              |
| BLE/GFSK Mid Channel, 2442 MHz                                                                                  |                | -17.404                                                                                     | 8 Pass              |
| BLE/GFSK High Channel, 2480 MHz                                                                                 |                | -17.819                                                                                     | 8 Pass              |

# POWER SPECTRAL DENSITY

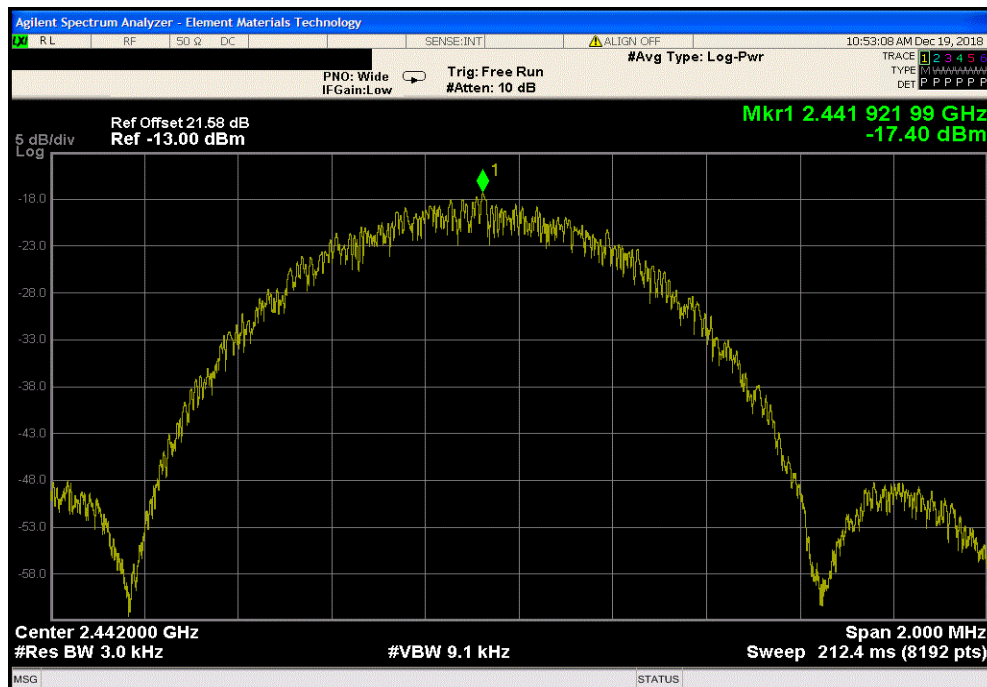


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |  |  |         |            |         |  |
|-----------------------------------------------|--|--|---------|------------|---------|--|
| Value                                         |  |  |         | Limit      | Results |  |
| dBm/3kHz                                      |  |  |         | < dBm/3kHz |         |  |
|                                               |  |  | -17.723 | 8          | Pass    |  |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |  |  |         |            |         |  |
|-----------------------------------------------|--|--|---------|------------|---------|--|
| Value                                         |  |  |         | Limit      | Results |  |
| dBm/3kHz                                      |  |  |         | < dBm/3kHz |         |  |
|                                               |  |  | -17.404 | 8          | Pass    |  |

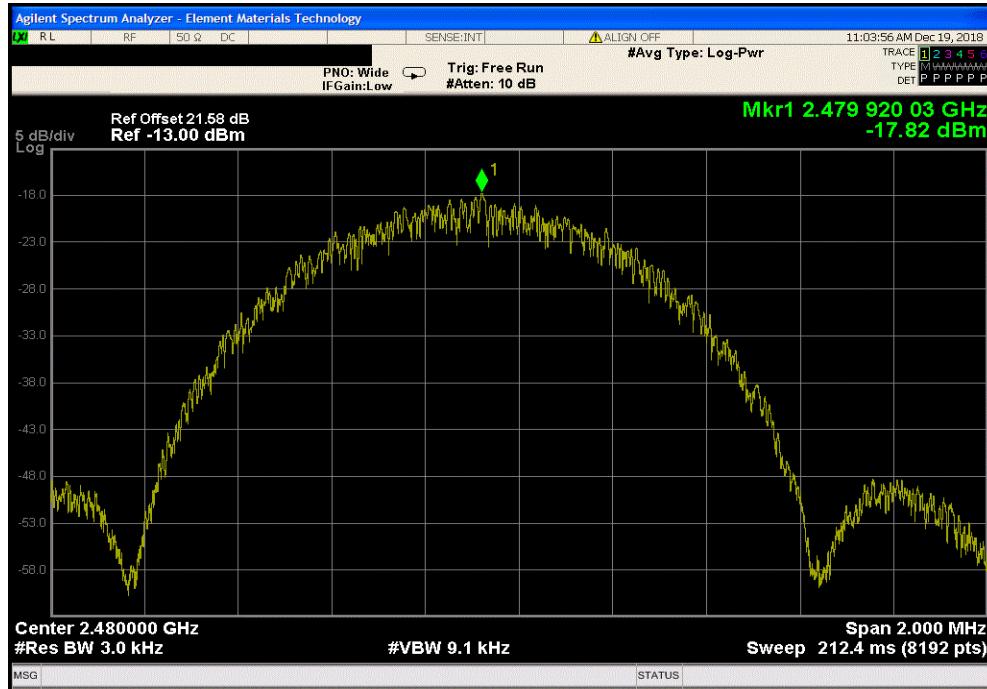


# POWER SPECTRAL DENSITY



TMTx 2018.09.13 XMt 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |  |  |  |  |            |   |         |
|------------------------------------------------|--|--|--|--|------------|---|---------|
| Value                                          |  |  |  |  | Limit      |   | Results |
| dBm/3kHz                                       |  |  |  |  | < dBm/3kHz |   |         |
|                                                |  |  |  |  | -17.819    | 8 | Pass    |



# BAND EDGE COMPLIANCE



XMI 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-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 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



TM17x 2018.09.13 XMM 2017.12.13

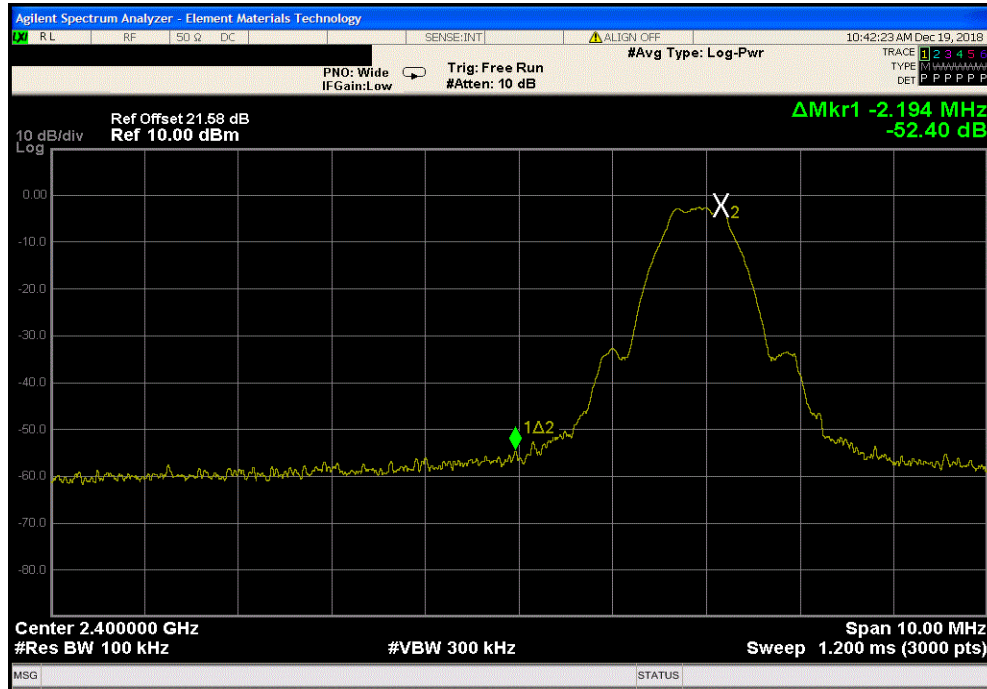
|                                                                                                                 |                |                                                                                             |                      |
|-----------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|----------------------|
| EUT: GET Detect Bucket Module 4265507                                                                           |                | Work Order: ESCO0008                                                                        |                      |
| Serial Number: None                                                                                             |                | Date: 19-Dec-18                                                                             |                      |
| Customer: ESCO Corporation                                                                                      |                | Temperature: 21.2 °C                                                                        |                      |
| Attendees: Jason Betournay                                                                                      |                | Humidity: 43.7% RH                                                                          |                      |
| Project: None                                                                                                   |                | Barometric Pres.: 1027 mbar                                                                 |                      |
| Tested by: Jeff Alcock                                                                                          | Power: Battery | Job Site: EV06                                                                              |                      |
| TEST SPECIFICATIONS                                                                                             |                | Test Method                                                                                 |                      |
| FCC 15.247:2018                                                                                                 |                | ANSI C63.10:2013                                                                            |                      |
| COMMENTS                                                                                                        |                |                                                                                             |                      |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                |                                                                                             |                      |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                |                                                                                             |                      |
| None                                                                                                            |                |                                                                                             |                      |
| Configuration #                                                                                                 | 1              | Signature  |                      |
|                                                                                                                 |                | Value (dBc)                                                                                 | Limit ≤ (dBc) Result |
| Bucket Module                                                                                                   |                |                                                                                             |                      |
| BLE/GFSK Low Channel, 2402 MHz                                                                                  |                | -52.4                                                                                       | -20 Pass             |
| BLE/GFSK High Channel, 2480 MHz                                                                                 |                | -53.81                                                                                      | -20 Pass             |

# BAND EDGE COMPLIANCE

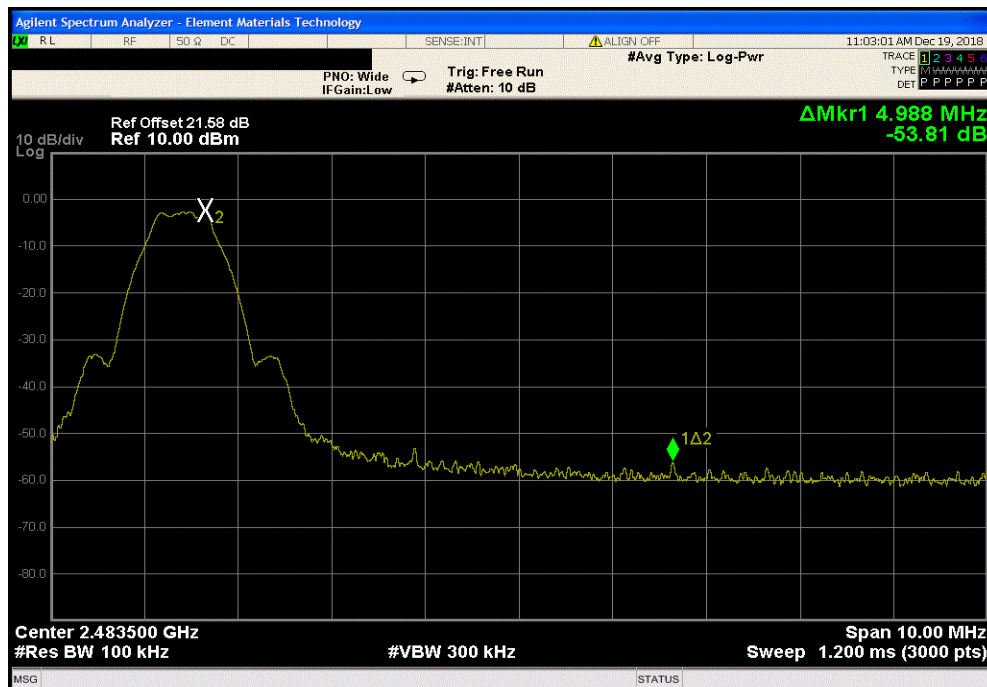


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |  |  |  |                |                  |        |
|-----------------------------------------------|--|--|--|----------------|------------------|--------|
|                                               |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                               |  |  |  | -52.4          | -20              | Pass   |



| Bucket Module, BLE/GFSK High Channel, 2480 MHz |  |  |  |                |                  |        |
|------------------------------------------------|--|--|--|----------------|------------------|--------|
|                                                |  |  |  | Value<br>(dBc) | Limit<br>≤ (dBc) | Result |
|                                                |  |  |  | -53.81         | -20              | Pass   |



# SPURIOUS CONDUCTED EMISSIONS



XMR 2017.12.13

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

## TEST EQUIPMENT

| Description                  | Manufacturer       | Model                 | ID  | Last Cal. | Cal. Due  |
|------------------------------|--------------------|-----------------------|-----|-----------|-----------|
| Generator - Signal           | Keysight           | N5182B                | TFU | 5-Nov-18  | 5-Nov-21  |
| Cable                        | Micro-Coax         | UFD150A-1-0720-200200 | EVH | 23-Apr-18 | 23-Apr-19 |
| Attenuator                   | S.M. Electronics   | SA26B-20              | AUY | 16-Apr-18 | 16-Apr-19 |
| Block - DC                   | Fairview Microwave | SD3379                | AMW | 23-Apr-18 | 23-Apr-19 |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                | AFI | 12-Jan-18 | 12-Jan-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 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



THxTx 2018.09.13 XMM 2017.12.13

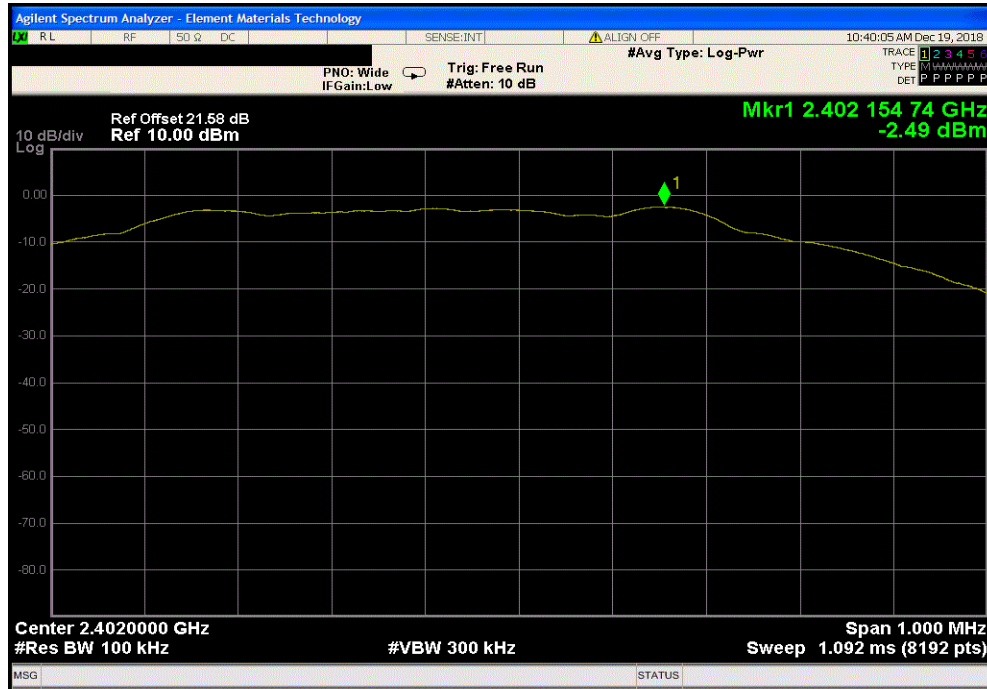
| EUT: GET Detect Bucket Module 4265507                                                                           |                                 | Work Order: ESCO0008                                                                        |                 |               |        |      |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------|-----------------|---------------|--------|------|
| Serial Number: None                                                                                             |                                 | Date: 19-Dec-18                                                                             |                 |               |        |      |
| Customer: ESCO Corporation                                                                                      |                                 | Temperature: 21.2 °C                                                                        |                 |               |        |      |
| Attendees: Jason Betournay                                                                                      |                                 | Humidity: 43.9% RH                                                                          |                 |               |        |      |
| Project: None                                                                                                   |                                 | Barometric Pres.: 1026 mbar                                                                 |                 |               |        |      |
| Tested by: Jeff Alcock                                                                                          | Power: Battery                  | Job Site: EV06                                                                              |                 |               |        |      |
| TEST SPECIFICATIONS                                                                                             |                                 | Test Method                                                                                 |                 |               |        |      |
| FCC 15.247:2018                                                                                                 |                                 | ANSI C63.10:2013                                                                            |                 |               |        |      |
| COMMENTS                                                                                                        |                                 |                                                                                             |                 |               |        |      |
| Reference level offset of 21.58 dB includes measurement cable and 20 dB attenuator. Software power setting = 0. |                                 |                                                                                             |                 |               |        |      |
| DEVIATIONS FROM TEST STANDARD                                                                                   |                                 |                                                                                             |                 |               |        |      |
| None                                                                                                            |                                 |                                                                                             |                 |               |        |      |
| Configuration #                                                                                                 | 1                               | Signature  |                 |               |        |      |
|                                                                                                                 | Frequency Range                 | Measured Freq (MHz)                                                                         | Max Value (dBc) | Limit ≤ (dBc) | Result |      |
| Bucket Module                                                                                                   | BLE/GFSK Low Channel, 2402 MHz  | Fundamental                                                                                 | 2402.15         | N/A           | N/A    | N/A  |
|                                                                                                                 | BLE/GFSK Low Channel, 2402 MHz  | 30 MHz - 12.5 GHz                                                                           | 4804.25         | -42.91        | -20    | Pass |
|                                                                                                                 | BLE/GFSK Low Channel, 2402 MHz  | 12.5 GHz - 25 GHz                                                                           | 23741           | -48.42        | -20    | Pass |
|                                                                                                                 | BLE/GFSK Mid Channel, 2442 MHz  | Fundamental                                                                                 | 2442.15         | N/A           | N/A    | N/A  |
|                                                                                                                 | BLE/GFSK Mid Channel, 2442 MHz  | 30 MHz - 12.5 GHz                                                                           | 9767.29         | -45.37        | -20    | Pass |
|                                                                                                                 | BLE/GFSK Mid Channel, 2442 MHz  | 12.5 GHz - 25 GHz                                                                           | 24971           | -49.25        | -20    | Pass |
|                                                                                                                 | BLE/GFSK High Channel, 2480 MHz | Fundamental                                                                                 | 2480.15         | N/A           | N/A    | N/A  |
|                                                                                                                 | BLE/GFSK High Channel, 2480 MHz | 30 MHz - 12.5 GHz                                                                           | 9921.05         | -46.65        | -20    | Pass |
|                                                                                                                 | BLE/GFSK High Channel, 2480 MHz | 12.5 GHz - 25 GHz                                                                           | 25000           | -49.25        | -20    | Pass |

# SPURIOUS CONDUCTED EMISSIONS

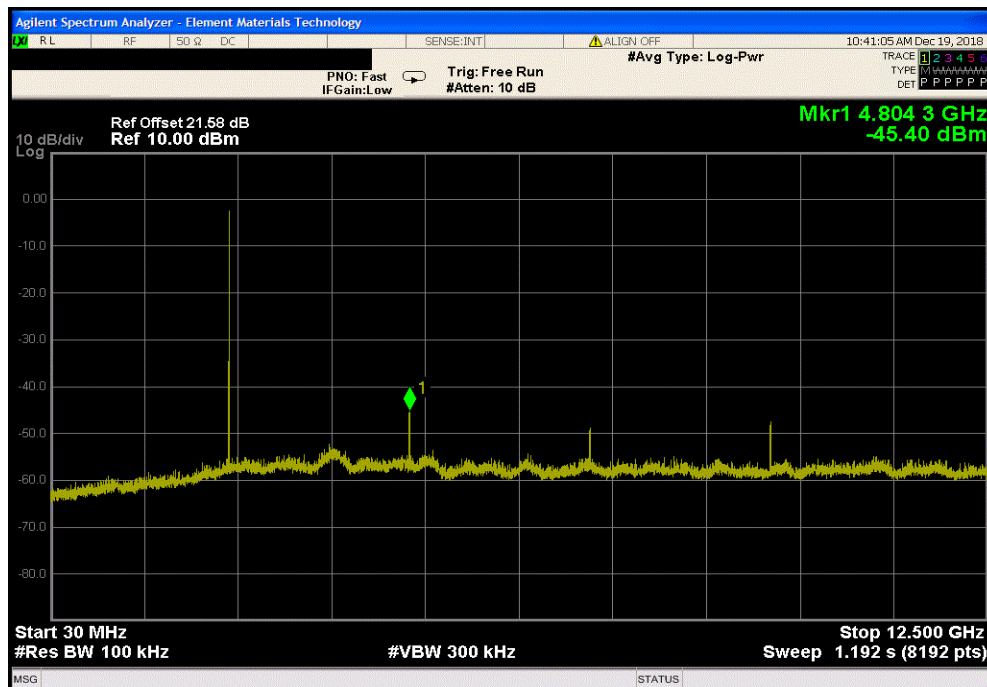


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| Fundamental                                   | 2402.15             | N/A             | N/A           | N/A    |  |  |



| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |                     |                 |               |        |  |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| 30 MHz - 12.5 GHz                             | 4804.25             | -42.91          | -20           | Pass   |  |  |

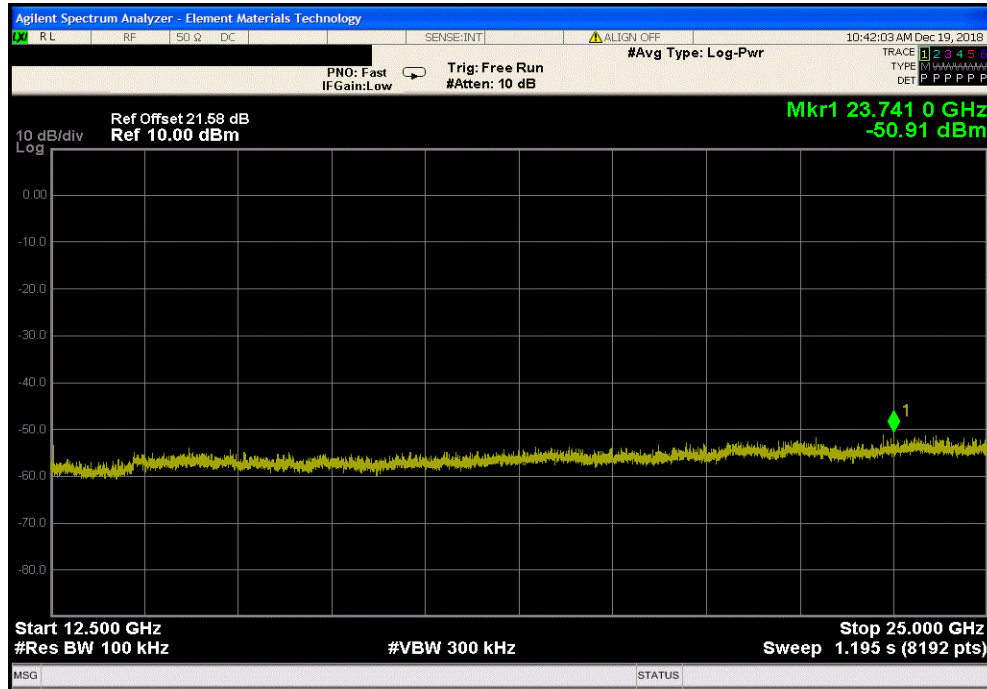


# SPURIOUS CONDUCTED EMISSIONS

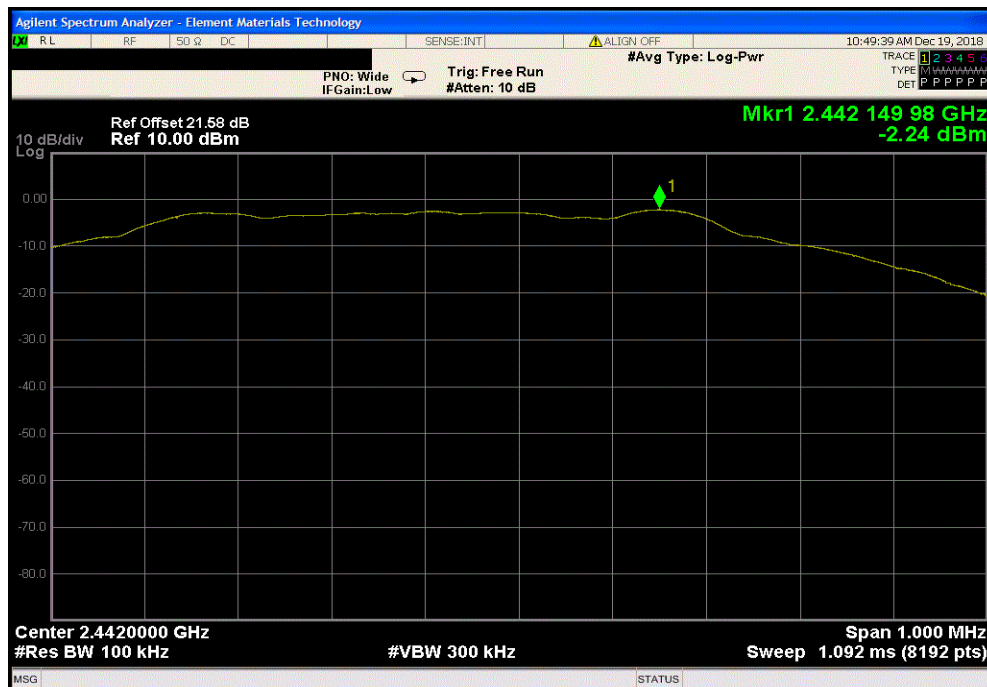


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Low Channel, 2402 MHz |                     |                 |               |        |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                             | 23741               | -48.42          | -20           | Pass   |  |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |                     |                 |               |        |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| Fundamental                                   | 2442.15             | N/A             | N/A           | N/A    |  |

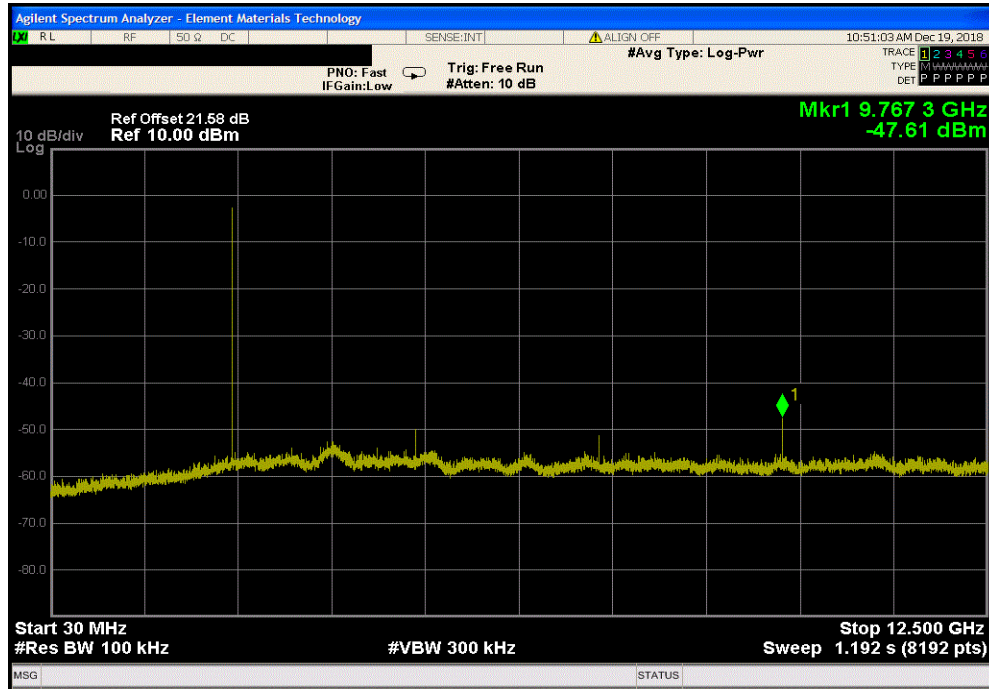


# SPURIOUS CONDUCTED EMISSIONS

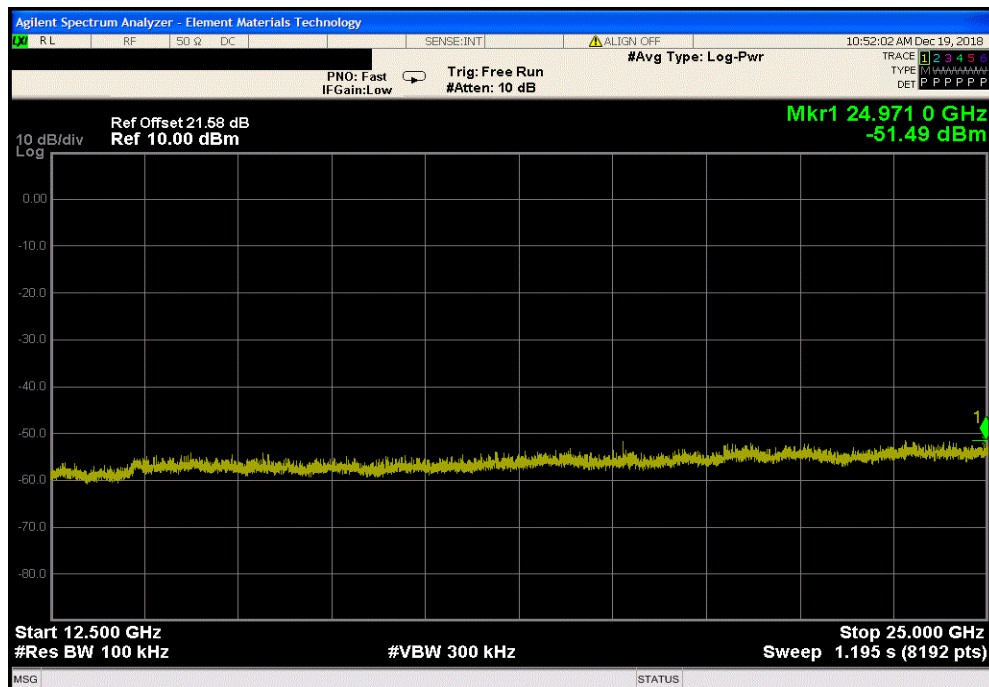


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |                     |                 |               |        |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 30 MHz - 12.5 GHz                             | 9767.29             | -45.37          | -20           | Pass   |  |



| Bucket Module, BLE/GFSK Mid Channel, 2442 MHz |                     |                 |               |        |  |
|-----------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                               | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                             | 24971               | -49.25          | -20           | Pass   |  |

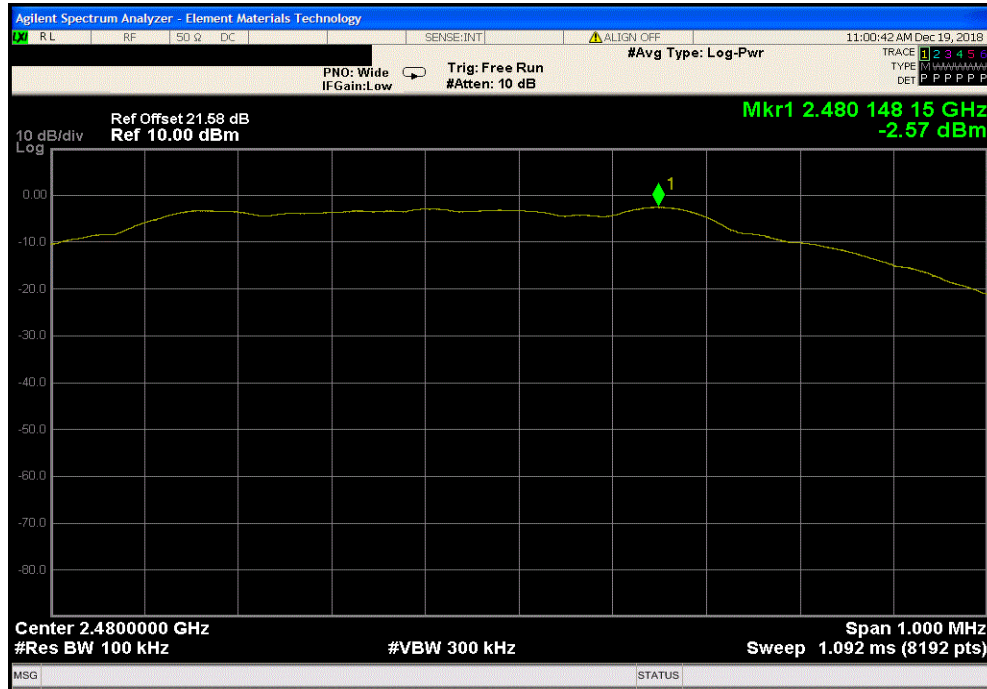


# SPURIOUS CONDUCTED EMISSIONS

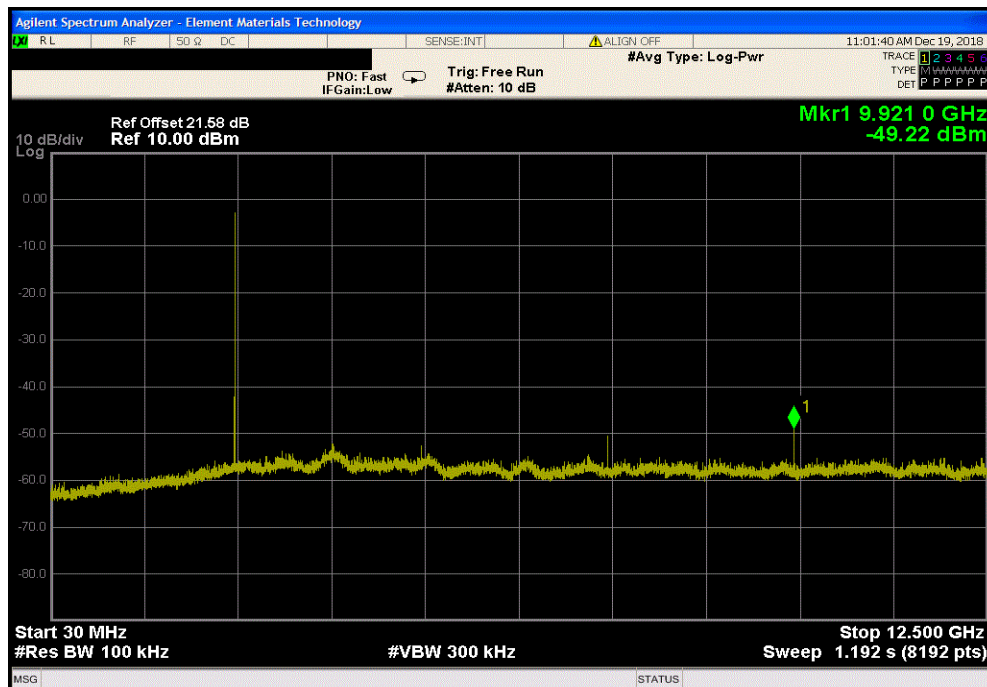


TMTx 2018.09.13 XMI 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |                     |                 |               |        |  |  |
|------------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                                | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| Fundamental                                    | 2480.15             | N/A             | N/A           | N/A    |  |  |



| Bucket Module, BLE/GFSK High Channel, 2480 MHz |                     |                 |               |        |  |  |
|------------------------------------------------|---------------------|-----------------|---------------|--------|--|--|
| Frequency Range                                | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |  |
| 30 MHz - 12.5 GHz                              | 9921.05             | -46.65          | -20           | Pass   |  |  |



# SPURIOUS CONDUCTED EMISSIONS



TMTx 2018.09.13 XMt 2017.12.13

| Bucket Module, BLE/GFSK High Channel, 2480 MHz |                     |                 |               |        |  |
|------------------------------------------------|---------------------|-----------------|---------------|--------|--|
| Frequency Range                                | Measured Freq (MHz) | Max Value (dBc) | Limit ≤ (dBc) | Result |  |
| 12.5 GHz - 25 GHz                              | 25000               | -49.25          | -20           | Pass   |  |

