



# element

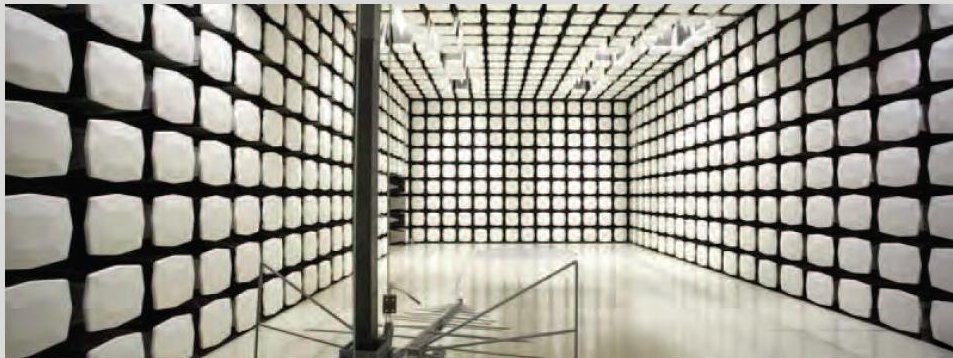
**Starkey Laboratories, Inc.**

**RIC R**

**FCC 15.209:2018**

**Inductive Radio**

**Report # STAK0153**



NVLAP LAB CODE: 200881-0



*This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government. This Report shall not be reproduced, except in full without written approval of the laboratory.*

# CERTIFICATE OF TEST

**Last Date of Test: November 30, 2018**  
**Starkey Laboratories, Inc.**  
**Model: RIC R**

## Radio Equipment Testing

### Standards

| Specification   | Method           |
|-----------------|------------------|
| FCC 15.209:2018 | ANSI C63.10:2013 |

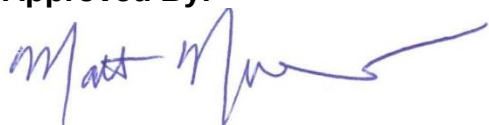
### Results

| Method Clause | Test Description                                | Applied | Results | Comments                                |
|---------------|-------------------------------------------------|---------|---------|-----------------------------------------|
| 6.2           | Powerline Conducted Emissions                   | No      | N/A     | Not required for a battery powered EUT. |
| 6.4           | Field Strength of Fundamental                   | Yes     | Pass    |                                         |
| 6.4, 6.5      | Spurious Radiated Emissions Less than 30 MHz    | Yes     | Pass    |                                         |
| 6.4, 6.5      | Spurious Radiated Emissions Greater than 30 MHz | Yes     | Pass    |                                         |

### Deviations From Test Standards

None

### Approved By:



Matt Nuernberg, Operations Manager

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

# REVISION HISTORY



| Revision Number | Description | Date<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

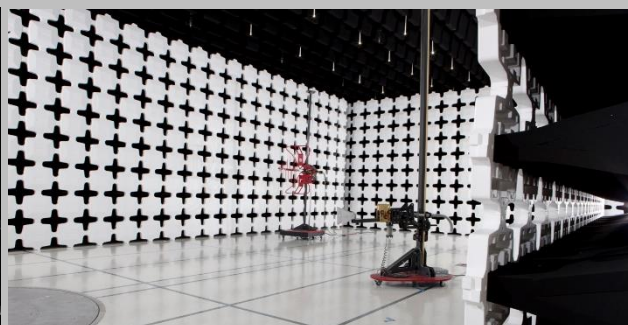
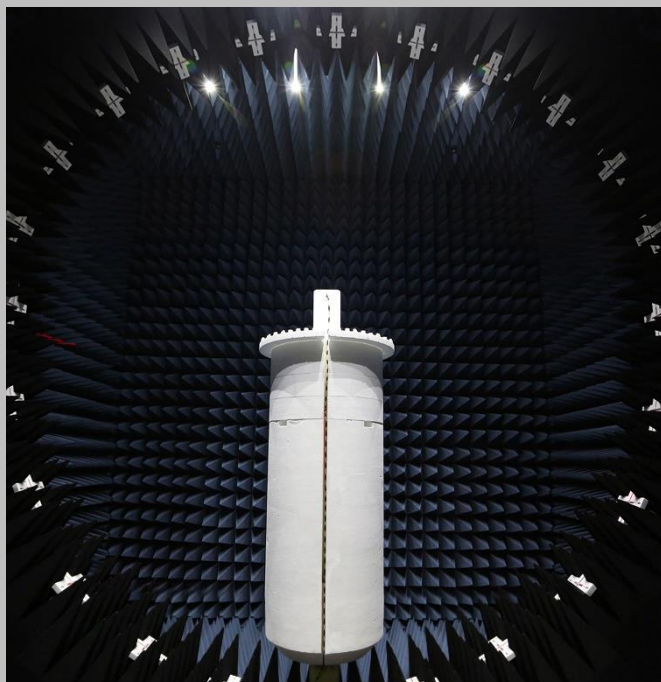
For details on the Scopes of our Accreditations, please visit:

<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, 2834D-2                                                                                      | 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.

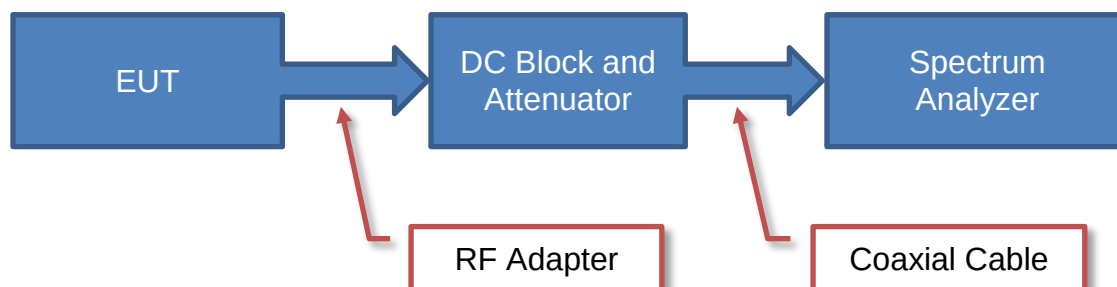
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

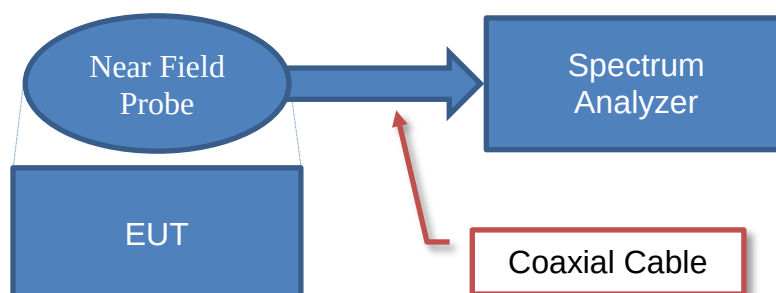
| Test                                  | + MU    | - MU     |
|---------------------------------------|---------|----------|
| Frequency Accuracy (Hz)               | 0.0007% | -0.0007% |
| Amplitude Accuracy (dB)               | 1.2 dB  | -1.2 dB  |
| Conducted Power (dB)                  | 0.3 dB  | -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

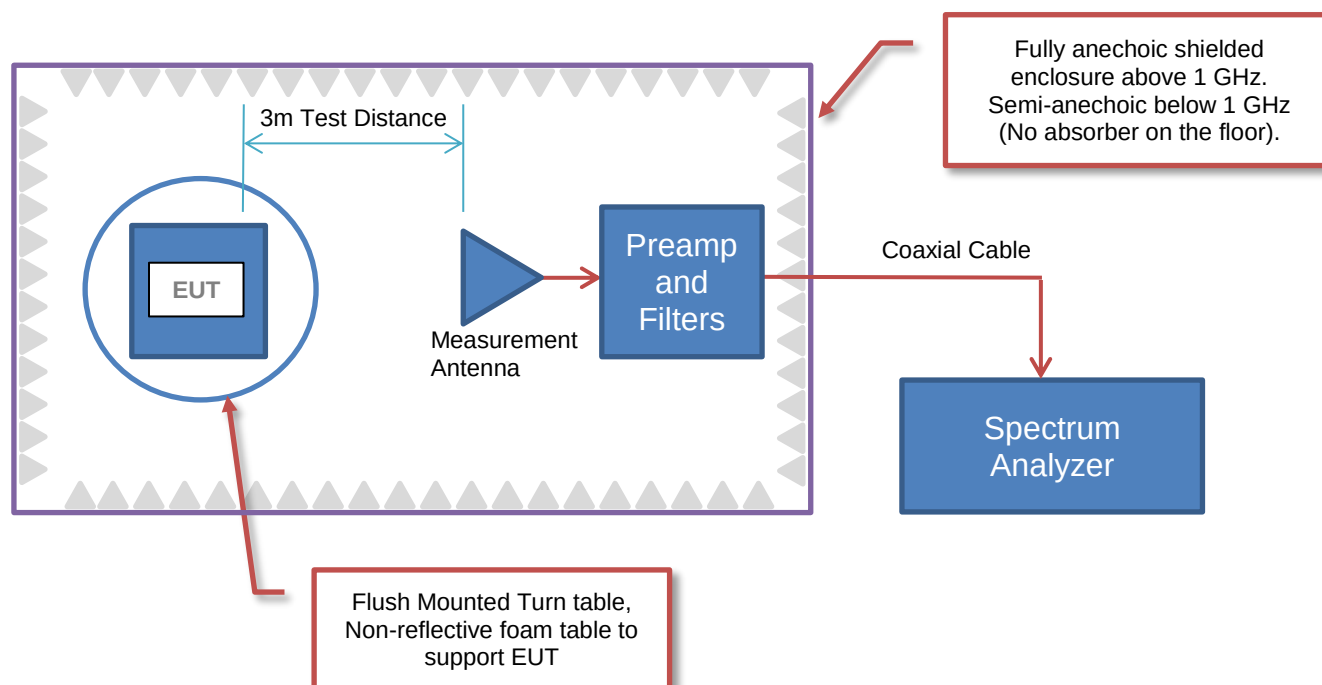
## Antenna Port Conducted Measurements



## Near Field Test Fixture Measurements



## Spurious Radiated Emissions





# PRODUCT DESCRIPTION



## Client and Equipment Under Test (EUT) Information

|                          |                             |
|--------------------------|-----------------------------|
| Company Name:            | Starkey Laboratories, Inc.  |
| Address:                 | 6600 Washington Ave S       |
| City, State, Zip:        | EDEN PRAIRIE, MN 55344-3404 |
| Test Requested By:       | Bill Mitchell               |
| Model:                   | RIC R                       |
| First Date of Test:      | November 30, 2018           |
| Last Date of Test:       | November 30, 2018           |
| Receipt Date of Samples: | November 30, 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>                                                           |
| Hearing Aid that uses an NFMI radio.                                                                |
| <b>Testing Objective:</b>                                                                           |
| To demonstrate compliance of the inductive portion of the device to FCC Part 15.209 specifications. |



# CONFIGURATIONS



## Configuration STAK0153- 1

| Software/Firmware Running during test |           |
|---------------------------------------|-----------|
| Description                           | Version   |
| Firmware                              | 6.3.1.0.0 |

| EUT           |                            |                   |               |
|---------------|----------------------------|-------------------|---------------|
| Description   | Manufacturer               | Model/Part Number | Serial Number |
| Hearing Aid 1 | Starkey Laboratories, Inc. | RIC R             | 181054608     |
| Hearing Aid 2 | Starkey Laboratories, Inc. | RIC R             | 181054609     |

# MODIFICATIONS



## Equipment Modifications

| Item | Date       | Test                                | Modification                         | Note                                                                | Disposition of EUT                          |
|------|------------|-------------------------------------|--------------------------------------|---------------------------------------------------------------------|---------------------------------------------|
| 1    | 2018-11-30 | Field Strength of Fundamental       | 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    | 2018-11-30 | Spurious Radiated Emissions <30 MHz | 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    | 2018-11-30 | Spurious Radiated Emissions >30 MHz | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed.            |

# FIELD STRENGTH OF FUNDAMENTAL

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

Transmitting 10.281 MHz NFMI

## POWER SETTINGS INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

STAK0153 - 1

## FREQUENCY RANGE INVESTIGATED

|                 |         |                |        |
|-----------------|---------|----------------|--------|
| Start Frequency | 490 kHz | Stop Frequency | 30 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. | Antenna Loop Cable | MNE | 16-Feb-2018 | 12 mo    |
| Antenna - Loop               | ETS Lindgren    | 6502               | AOB | 16-May-2017 | 24 mo    |
| Analyzer - Spectrum Analyzer | Agilent         | E4440A             | AFG | 5-Jul-2018  | 12 mo    |

## MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15           | 1.0             | 0.2                   | 0.2                |
| 0.15 - 30.0           | 10.0            | 9.0                   | 9.0                |
| 30.0 - 1000           | 100.0           | 120.0                 | 120.0              |
| Above 1000            | 1000.0          | N/A                   | 1000.0             |

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

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

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.4, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

# FIELD STRENGTH OF FUNDAMENTAL



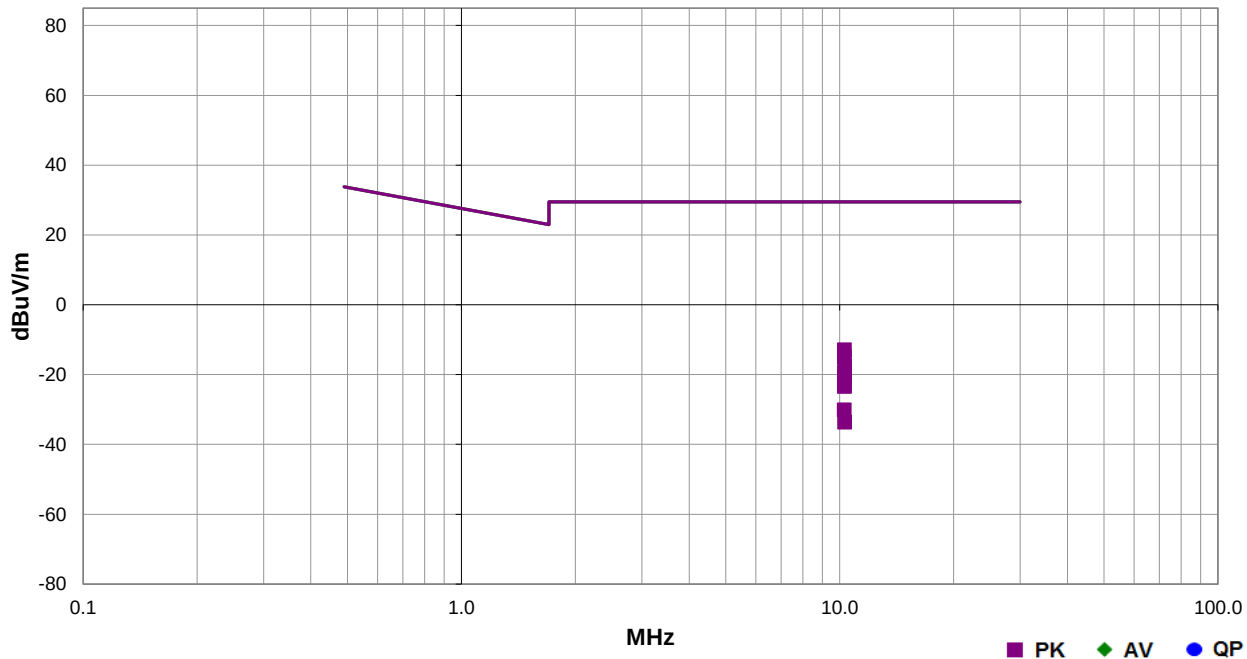
EmiRS 2018.09.26

PSA-ESCI 2018.07.27

|                 |                              |                   |             |                          |
|-----------------|------------------------------|-------------------|-------------|--------------------------|
| Work Order:     | STAK0153                     | Date:             | 30-Nov-2018 |                          |
| Project:        | None                         | Temperature:      | 20.9 °C     |                          |
| Job Site:       | MN04                         | Humidity:         | 26.2% RH    |                          |
| Serial Number:  | 181054608, 181054609         | Barometric Pres.: | 1017 mbar   | Tested by: Dustin Sparks |
| EUT:            | RIC R                        |                   |             |                          |
| Configuration:  | 1                            |                   |             |                          |
| Customer:       | Starkey Laboratories, Inc.   |                   |             |                          |
| Attendees:      | Charlie Esch                 |                   |             |                          |
| EUT Power:      | Battery                      |                   |             |                          |
| Operating Mode: | Transmitting 10.281 MHz NFMI |                   |             |                          |
| Deviations:     | None                         |                   |             |                          |
| Comments:       | None                         |                   |             |                          |

|                     |                 |             |                  |
|---------------------|-----------------|-------------|------------------|
| Test Specifications | FCC 15.209:2018 | Test Method | ANSI C63.10:2013 |
|---------------------|-----------------|-------------|------------------|

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



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments       |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|----------------|
| 10.298     | 35.3             | 10.9        | 1.0                     | 0.0               | 1.0                    | 0.0                       | Par to GND                | PK       | -59.1                    | -12.9             | 29.5                 | -42.4                  | EUT on side    |
| 10.288     | 33.3             | 10.9        | 1.0                     | 360.0             | 1.0                    | 0.0                       | Perp to GND               | PK       | -59.1                    | -14.9             | 29.5                 | -44.4                  | EUT horizontal |
| 10.308     | 30.6             | 10.9        | 1.0                     | 270.0             | 1.0                    | 0.0                       | Par to EUT                | PK       | -59.1                    | -17.6             | 29.5                 | -47.1                  | EUT horizontal |
| 10.310     | 28.8             | 10.9        | 1.0                     | 90.0              | 1.0                    | 0.0                       | Par to EUT                | PK       | -59.1                    | -19.4             | 29.5                 | -48.9                  | EUT vertical   |
| 10.289     | 27.5             | 10.9        | 1.0                     | 0.0               | 1.0                    | 0.0                       | Perp to GND               | PK       | -59.1                    | -20.7             | 29.5                 | -50.2                  | EUT vertical   |
| 10.290     | 25.1             | 10.9        | 1.0                     | 90.0              | 1.0                    | 0.0                       | Par to EUT                | PK       | -59.1                    | -23.1             | 29.5                 | -52.6                  | EUT on side    |
| 10.296     | 24.8             | 10.9        | 1.0                     | 45.0              | 1.0                    | 0.0                       | Par to GND                | PK       | -59.1                    | -23.4             | 29.5                 | -52.9                  | EUT vertical   |
| 10.282     | 18.1             | 10.9        | 1.0                     | 360.0             | 1.0                    | 0.0                       | Par to GND                | PK       | -59.1                    | -30.1             | 29.5                 | -59.6                  | EUT horizontal |
| 10.306     | 14.6             | 10.9        | 1.0                     | 45.0              | 1.0                    | 0.0                       | Perp to GND               | PK       | -59.1                    | -33.6             | 29.5                 | -63.1                  | EUT on side    |

# FIELD STRENGTH OF FUNDAMENTAL



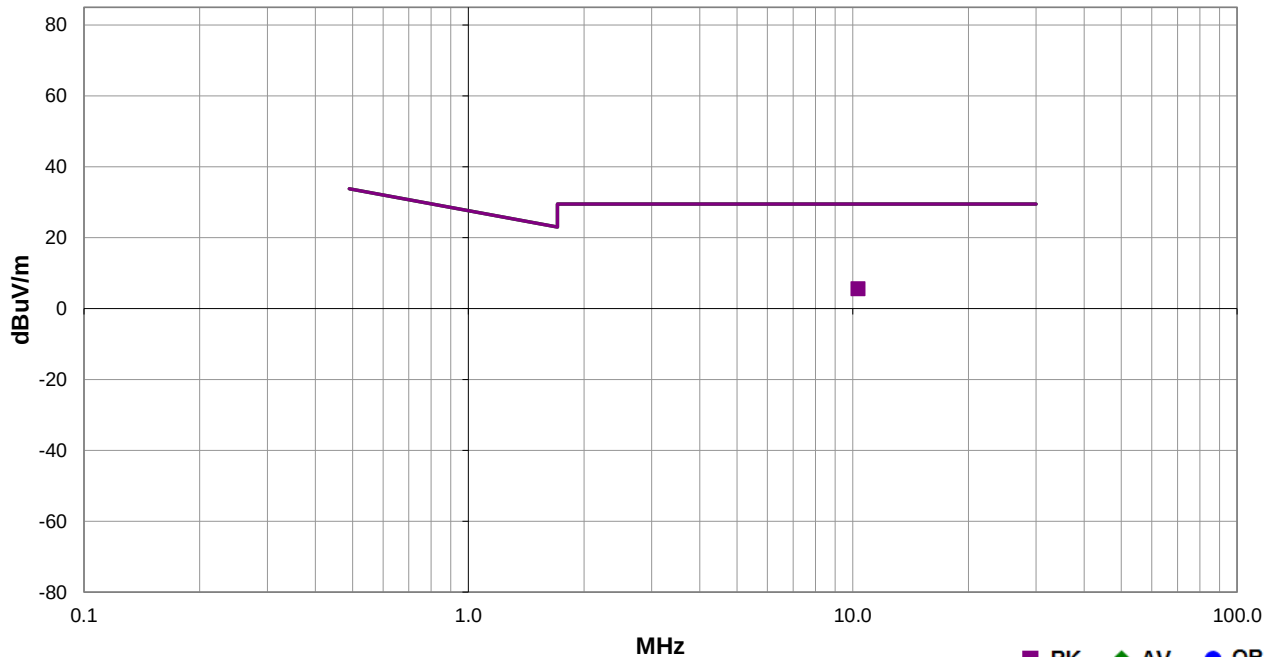
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|                 |                              |                   |             |                          |
|-----------------|------------------------------|-------------------|-------------|--------------------------|
| Work Order:     | STAK0153                     | Date:             | 30-Nov-2018 |                          |
| Project:        | None                         | Temperature:      | 20.9 °C     |                          |
| Job Site:       | MN04                         | Humidity:         | 26.2% RH    |                          |
| Serial Number:  | 181054608, 181054609         | Barometric Pres.: | 1017 mbar   | Tested by: Dustin Sparks |
| EUT:            | RIC R                        |                   |             |                          |
| Configuration:  | 1                            |                   |             |                          |
| Customer:       | Starkey Laboratories, Inc.   |                   |             |                          |
| Attendees:      | Charlie Esch                 |                   |             |                          |
| EUT Power:      | Battery                      |                   |             |                          |
| Operating Mode: | Transmitting 10.281 MHz NFMI |                   |             |                          |
| Deviations:     | None                         |                   |             |                          |
| Comments:       | None                         |                   |             |                          |

|                     |                  |
|---------------------|------------------|
| Test Specifications | Test Method      |
| FCC 15.209:2018     | ANSI C63.10:2013 |

|       |   |                   |    |                   |      |         |      |
|-------|---|-------------------|----|-------------------|------|---------|------|
| Run # | 8 | Test Distance (m) | 10 | Antenna Height(s) | 1(m) | Results | Pass |
|-------|---|-------------------|----|-------------------|------|---------|------|



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector   | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments    |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|---------------------------|------------|--------------------------|-------------------|----------------------|------------------------|-------------|
| 10.326     | 13.8             | 10.9        | 1.0                     | 0.0               | 10.0                   | 0.0                       | Horz                      | Par to GND | -19.1                    | 5.6               | 29.5                 | -23.9                  | EUT on side |

# SPURIOUS RADIATED EMISSIONS < 30 MHz



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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

Transmitting 10.281 MHz NFMI

## POWER SETTINGS INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

STAK0153 - 1

## FREQUENCY RANGE INVESTIGATED

Start Frequency 490 kHz Stop Frequency 30 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. | Antenna Loop Cable | MNE | 16-Feb-2018 | 12 mo    |
| Antenna - Loop               | ETS Lindgren    | 6502               | AOB | 16-May-2017 | 24 mo    |
| Analyzer - Spectrum Analyzer | Agilent         | E4440A             | AFG | 5-Jul-2018  | 12 mo    |

## MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15           | 1.0             | 0.2                   | 0.2                |
| 0.15 - 30.0           | 10.0            | 9.0                   | 9.0                |
| 30.0 - 1000           | 100.0           | 120.0                 | 120.0              |
| Above 1000            | 1000.0          | N/A                   | 1000.0             |

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

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

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PK = Peak Detector

AV = RMS Detector

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# SPURIOUS RADIATED EMISSIONS < 30 MHz



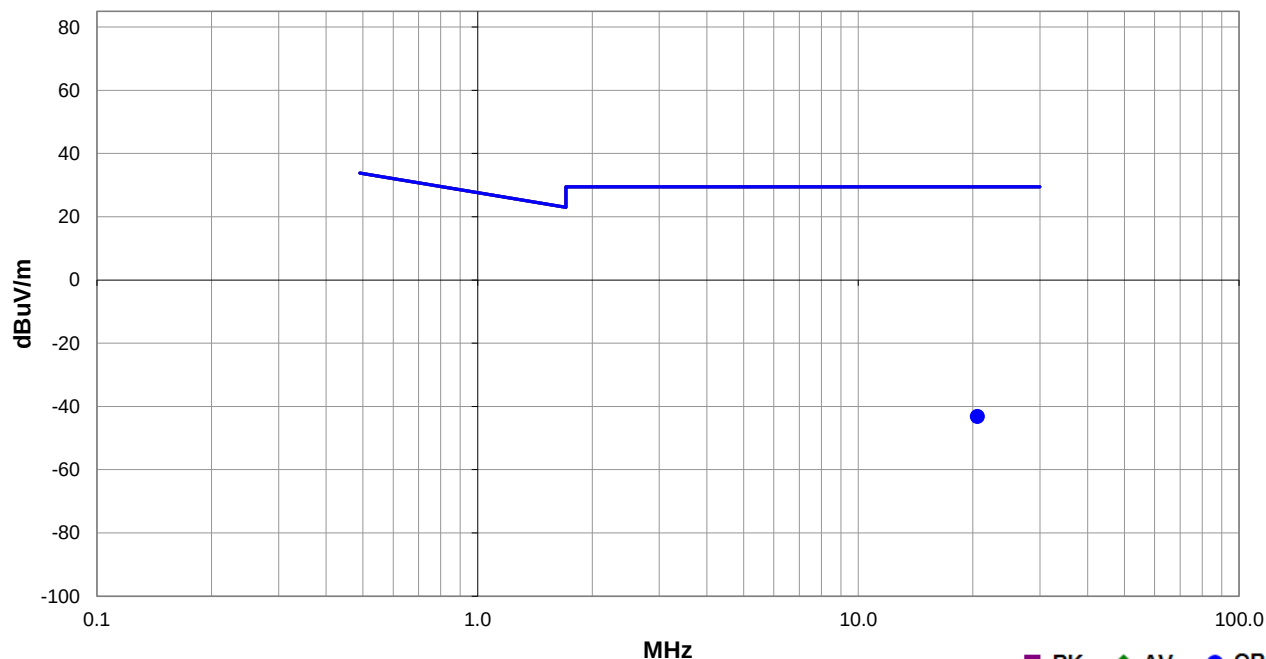
EmiRS 2018.09.26

PSA-ESCI 2018.07.27

|                 |                              |                   |             |                          |
|-----------------|------------------------------|-------------------|-------------|--------------------------|
| Work Order:     | STAK0153                     | Date:             | 30-Nov-2018 |                          |
| Project:        | None                         | Temperature:      | 20.9 °C     |                          |
| Job Site:       | MN04                         | Humidity:         | 26.2% RH    |                          |
| Serial Number:  | 181054608, 181054609         | Barometric Pres.: | 1017 mbar   | Tested by: Dustin Sparks |
| EUT:            | RIC R                        |                   |             |                          |
| Configuration:  | 1                            |                   |             |                          |
| Customer:       | Starkey Laboratories, Inc.   |                   |             |                          |
| Attendees:      | Charlie Esch                 |                   |             |                          |
| EUT Power:      | Battery                      |                   |             |                          |
| Operating Mode: | Transmitting 10.281 MHz NFMI |                   |             |                          |
| Deviations:     | None                         |                   |             |                          |
| Comments:       | None                         |                   |             |                          |

|                     |                  |
|---------------------|------------------|
| Test Specifications | Test Method      |
| FCC 15.209:2018     | ANSI C63.10:2013 |

|       |   |                   |   |                   |      |         |      |
|-------|---|-------------------|---|-------------------|------|---------|------|
| Run # | 9 | Test Distance (m) | 1 | Antenna Height(s) | 1(m) | Results | Pass |
|-------|---|-------------------|---|-------------------|------|---------|------|



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments    |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|-------------|
| 20.533     | 5.6              | 10.3        | 1.0                     | 90.0              | 1.0                    | 0.0                       | Par to GND                | QP       | -59.1                    | -43.2             | 29.5                 | -72.7                  | EUT on side |

# SPURIOUS RADIATED EMISSIONS < 30 MHz



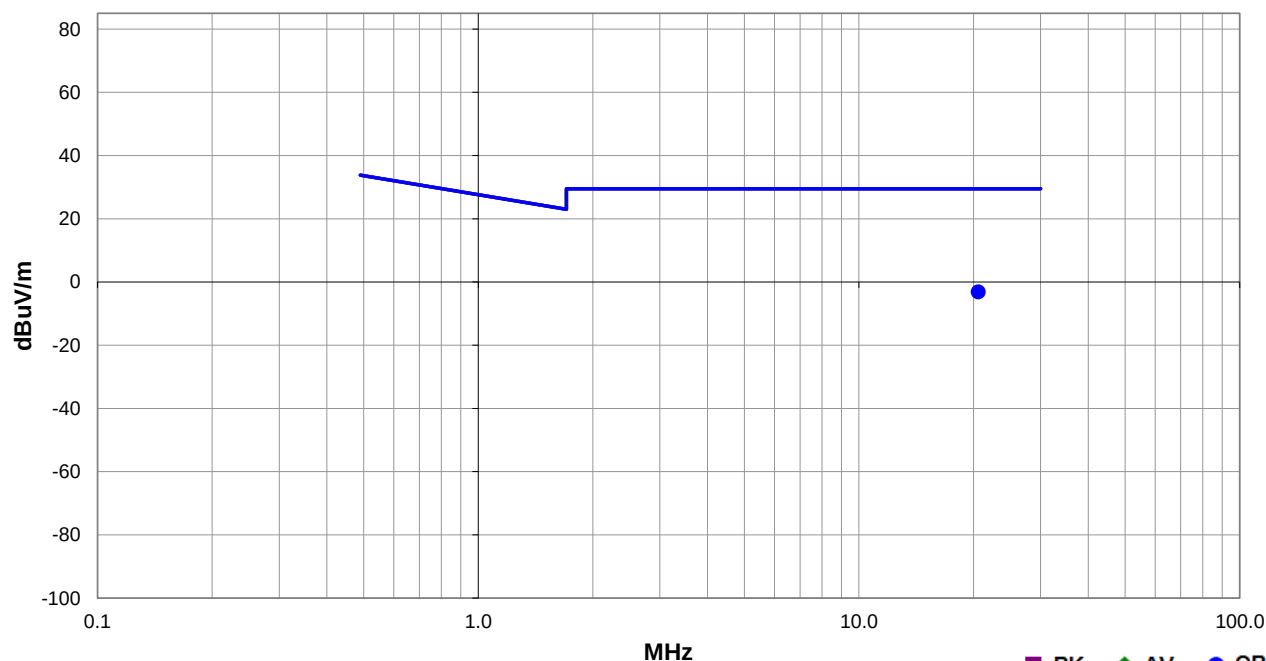
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|                 |                              |                   |             |                          |
|-----------------|------------------------------|-------------------|-------------|--------------------------|
| Work Order:     | STAK0153                     | Date:             | 30-Nov-2018 |                          |
| Project:        | None                         | Temperature:      | 20.9 °C     |                          |
| Job Site:       | MN04                         | Humidity:         | 26.2% RH    |                          |
| Serial Number:  | 181054608, 181054609         | Barometric Pres.: | 1017 mbar   | Tested by: Dustin Sparks |
| EUT:            | RIC R                        |                   |             |                          |
| Configuration:  | 1                            |                   |             |                          |
| Customer:       | Starkey Laboratories, Inc.   |                   |             |                          |
| Attendees:      | Charlie Esch                 |                   |             |                          |
| EUT Power:      | Battery                      |                   |             |                          |
| Operating Mode: | Transmitting 10.281 MHz NFMI |                   |             |                          |
| Deviations:     | None                         |                   |             |                          |
| Comments:       | None                         |                   |             |                          |

|                     |                 |             |                  |
|---------------------|-----------------|-------------|------------------|
| Test Specifications | FCC 15.209:2018 | Test Method | ANSI C63.10:2013 |
|---------------------|-----------------|-------------|------------------|

|       |    |                   |    |                   |      |         |      |
|-------|----|-------------------|----|-------------------|------|---------|------|
| Run # | 12 | Test Distance (m) | 10 | Antenna Height(s) | 1(m) | Results | Pass |
|-------|----|-------------------|----|-------------------|------|---------|------|



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments    |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|-------------|
| 20.552     | 5.7              | 10.3        | 1.0                     | 225.0             | 10.0                   | 0.0                       | Par to GND                | QP       | -19.1                    | -3.1              | 29.5                 | -32.6                  | EUT on side |

# SPURIOUS RADIATED EMISSIONS > 30 MHz



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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

Transmitting 10.281 MHz NFMI

## POWER SETTINGS INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

STAK0153 - 1

## FREQUENCY RANGE INVESTIGATED

|                 |        |                |          |
|-----------------|--------|----------------|----------|
| Start Frequency | 30 MHz | Stop Frequency | 1000 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 |
|------------------------------|-----------------|--------------|-----|-------------|----------|
| Amplifier - Pre-Amplifier    | Miteq           | AM-1616-1000 | AVO | 2-Nov-2018  | 12 mo    |
| Cable                        | ESM Cable Corp. | Bilog Cables | MNH | 2-Nov-2018  | 12 mo    |
| Antenna - Biconilog          | Teseq           | CBL 6141B    | AYD | 25-Jan-2018 | 24 mo    |
| Analyzer - Spectrum Analyzer | Keysight        | N9010A       | AFN | 27-Apr-2018 | 12 mo    |

## MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|-----------------------|-----------------|-----------------------|--------------------|
| 0.01 - 0.15           | 1.0             | 0.2                   | 0.2                |
| 0.15 - 30.0           | 10.0            | 9.0                   | 9.0                |
| 30.0 - 1000           | 100.0           | 120.0                 | 120.0              |
| Above 1000            | 1000.0          | N/A                   | 1000.0             |

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

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, 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 > 30 MHz



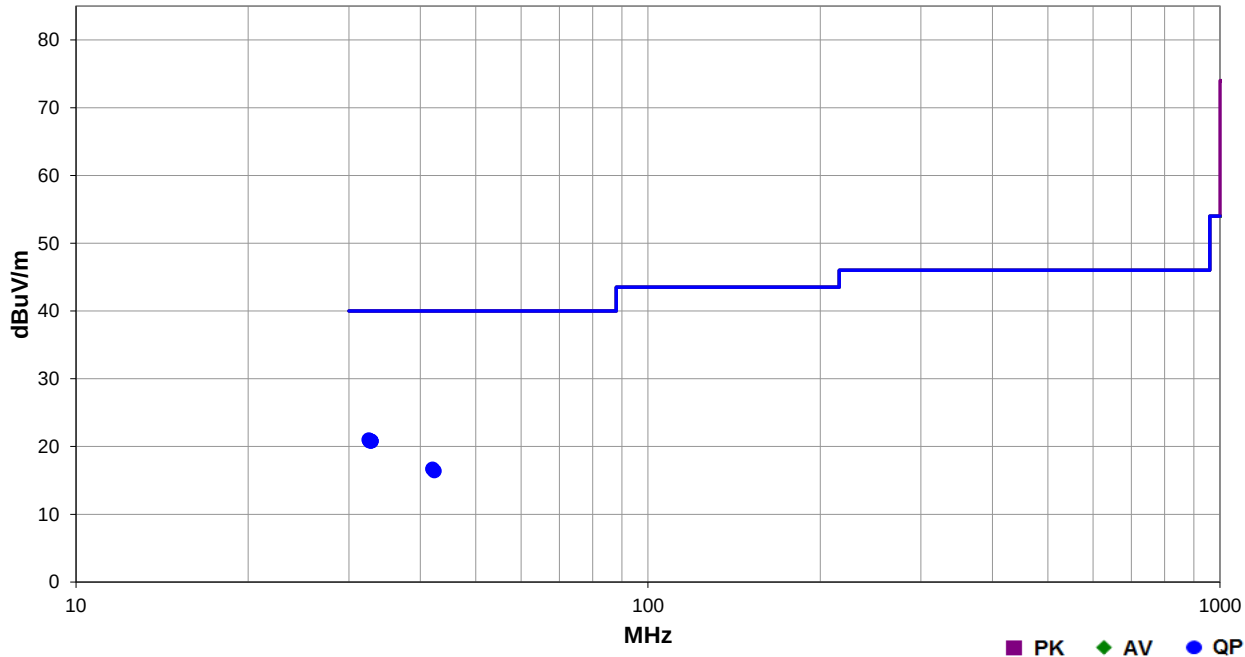
EmiRS 2018.09.26

PSA-ESCI 2018.07.27

|                        |                              |                          |             |                                 |
|------------------------|------------------------------|--------------------------|-------------|---------------------------------|
| <b>Work Order:</b>     | STAK0153                     | <b>Date:</b>             | 30-Nov-2018 |                                 |
| <b>Project:</b>        | None                         | <b>Temperature:</b>      | 21.5 °C     |                                 |
| <b>Job Site:</b>       | MN05                         | <b>Humidity:</b>         | 27.1% RH    |                                 |
| <b>Serial Number:</b>  | 181054608, 181054609         | <b>Barometric Pres.:</b> | 1018 mbar   | <b>Tested by:</b> Dustin Sparks |
| <b>EUT:</b>            | RIC R                        |                          |             |                                 |
| <b>Configuration:</b>  | 1                            |                          |             |                                 |
| <b>Customer:</b>       | Starkey Laboratories, Inc.   |                          |             |                                 |
| <b>Attendees:</b>      | Charlie Esch                 |                          |             |                                 |
| <b>EUT Power:</b>      | Battery                      |                          |             |                                 |
| <b>Operating Mode:</b> | Transmitting 10.281 MHz NFMI |                          |             |                                 |
| <b>Deviations:</b>     | None                         |                          |             |                                 |
| <b>Comments:</b>       | None                         |                          |             |                                 |

|                            |                    |
|----------------------------|--------------------|
| <b>Test Specifications</b> | <b>Test Method</b> |
| FCC 15.209:2018            | ANSI C63.10:2013   |

|              |   |                          |   |                          |           |                |      |
|--------------|---|--------------------------|---|--------------------------|-----------|----------------|------|
| <b>Run #</b> | 1 | <b>Test Distance (m)</b> | 3 | <b>Antenna Height(s)</b> | 1 to 4(m) | <b>Results</b> | Pass |
|--------------|---|--------------------------|---|--------------------------|-----------|----------------|------|



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments       |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|---------------------------|----------|--------------------------|-------------------|----------------------|------------------------|----------------|
| 32.487     | 16.6             | 4.4         | 1.0                     | 184.0             | 3.0                    | 0.0                       | Vert                      | QP       | 0.0                      | 21.0              | 40.0                 | -19.0                  | EUT horizontal |
| 32.596     | 16.5             | 4.3         | 2.4                     | 348.9             | 3.0                    | 0.0                       | Horz                      | QP       | 0.0                      | 20.8              | 40.0                 | -19.2                  | EUT vertical   |
| 32.812     | 16.6             | 4.2         | 1.0                     | 153.0             | 3.0                    | 0.0                       | Vert                      | QP       | 0.0                      | 20.8              | 40.0                 | -19.2                  | EUT vertical   |
| 32.809     | 16.6             | 4.2         | 1.0                     | 127.0             | 3.0                    | 0.0                       | Horz                      | QP       | 0.0                      | 20.8              | 40.0                 | -19.2                  | EUT on side    |
| 32.813     | 16.6             | 4.2         | 1.0                     | 300.0             | 3.0                    | 0.0                       | Vert                      | QP       | 0.0                      | 20.8              | 40.0                 | -19.2                  | EUT on side    |
| 32.710     | 16.6             | 4.2         | 1.0                     | 242.0             | 3.0                    | 0.0                       | Horz                      | QP       | 0.0                      | 20.8              | 40.0                 | -19.2                  | EUT horizontal |
| 41.991     | 16.9             | -0.2        | 4.0                     | 199.9             | 3.0                    | 0.0                       | Vert                      | QP       | 0.0                      | 16.7              | 40.0                 | -23.3                  | EUT horizontal |
| 42.309     | 16.9             | -0.5        | 2.8                     | 221.9             | 3.0                    | 0.0                       | Horz                      | QP       | 0.0                      | 16.4              | 40.0                 | -23.6                  | EUT vertical   |