

# NORTHWEST EMC

## Medtronic, Inc.

24967 CareLink SmartSync™ Device Manager Patient Connector

FCC 15.207:2016

FCC 15.247:2016

Bluetooth Low Energy Radio Module

Report # MDTR0474.3 Rev 01



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 federal government of the United States of America.

# CERTIFICATE OF TEST

Last Date of Test: May 31, 2016

Medtronic, Inc.

Model: 24967 CareLink SmartSync™ Device Manager Patient Connector

## Radio Equipment Testing

### Standards

| Specification   | Method           |
|-----------------|------------------|
| FCC 15.207:2016 | ANSI C63.10:2013 |
| FCC 15.247:2016 | KDB 558074       |

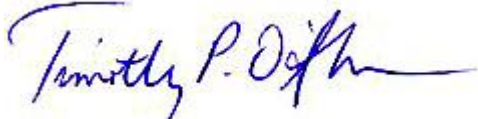
### Results

| Method Clause | Test Description                    | Applied | Results | Comments                                            |
|---------------|-------------------------------------|---------|---------|-----------------------------------------------------|
| 6.2           | Powerline Conducted Emissions       | Yes     | Pass    |                                                     |
| 6.5, 6.6      | Spurious Radiated Emissions         | Yes     | Pass    |                                                     |
| 7.5           | Duty Cycle                          | No      | N/A     | See Eurofins test report #G0M-1303-2693-TFC247W-V01 |
| 7.8.2         | Carrier Frequency Separation        | No      | N/A     |                                                     |
| 7.8.3         | Number of Hopping Frequencies       | No      | N/A     |                                                     |
| 7.8.4         | Dwell Time                          | No      | N/A     |                                                     |
| 7.8.5         | Output Power                        | No      | N/A     |                                                     |
| 7.8.6         | Band Edge Compliance                | No      | N/A     |                                                     |
| 7.8.6         | Band Edge Compliance - Hopping Mode | No      | N/A     |                                                     |
| 7.8.7         | Occupied Bandwidth                  | No      | N/A     |                                                     |
| 7.8.8         | Spurious Conducted Emissions        | No      | N/A     |                                                     |

### Deviations from Test Standards

None

### Approved By:



Tim O'Shea, Operations Manager

*Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.*

# REVISION HISTORY

| Revision Number | Description                                                                   | Date   | Page Number |
|-----------------|-------------------------------------------------------------------------------|--------|-------------|
| 01              | Revised to reference Eurofins test report for tests not done by Northwest EMC | 9/8/16 | 2           |
| 01              | Removed reference to C2PC application in the testing objective.               | 9/8/16 | 7           |

# ACCREDITATIONS AND AUTHORIZATIONS

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## United States

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**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 Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

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**IC** - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

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## European Union

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**European Commission** – Validated by the European Commission as a Notified Body under the R&TTE Directive.

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## Taiwan

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**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

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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**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:

<http://www.nwemc.com/accreditations/>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

# 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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

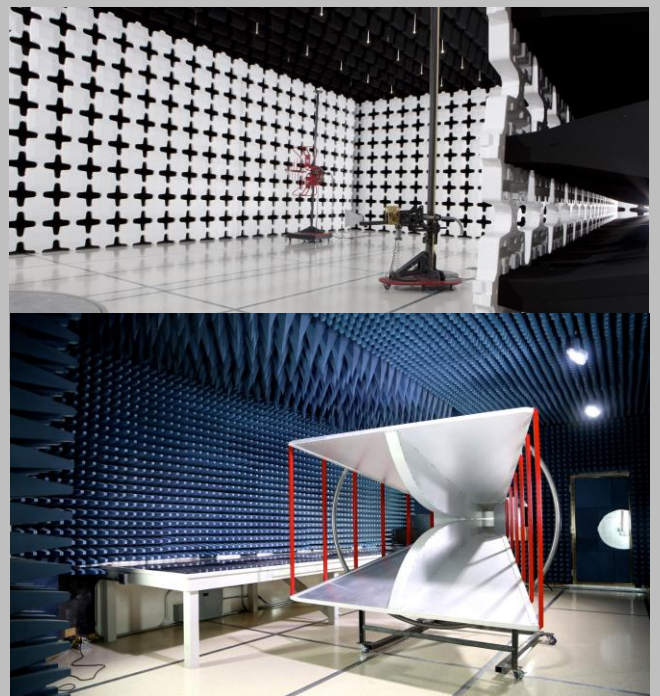
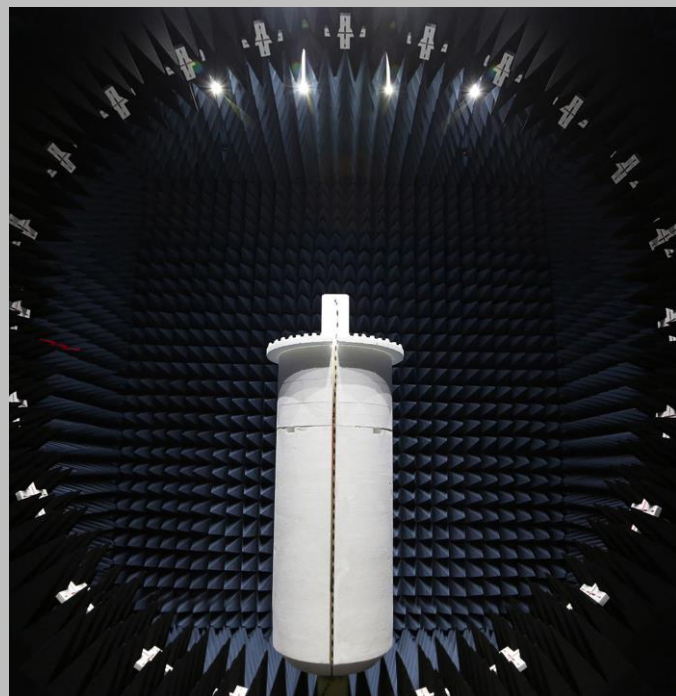
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

| <b>Test</b>                           | <b>+ MU</b> | <b>- MU</b> |
|---------------------------------------|-------------|-------------|
| Frequency Accuracy (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     |

# FACILITIES



|                                                                                     |                                                                                                             |                                                                                            |                                                                                                   |                                                                                        |                                                                                                           |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>California</b><br>Labs OC01-13<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | <b>Minnesota</b><br>Labs MN01-08, MN10<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>22975 NW Evergreen Pkwy<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>Industry Canada</b>                                                              |                                                                                                             |                                                                                            |                                                                                                   |                                                                                        |                                                                                                           |
| 2834B-1, 2834B-3                                                                    | 2834E-1                                                                                                     | 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                                                                                                    |



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

|                                 |                                                            |
|---------------------------------|------------------------------------------------------------|
| <b>Company Name:</b>            | Medtronic, Inc                                             |
| <b>Address:</b>                 | 710 Medtronic Parkway                                      |
| <b>City, State, Zip:</b>        | Fridley, MN 55432                                          |
| <b>Test Requested By:</b>       | Jay Axmann                                                 |
| <b>Model:</b>                   | 24967 CareLink SmartSync™ Device Manager Patient Connector |
| <b>First Date of Test:</b>      | May 26, 2016                                               |
| <b>Last Date of Test:</b>       | May 31, 2016                                               |
| <b>Receipt Date of Samples:</b> | May 26, 2016                                               |
| <b>Equipment Design Stage:</b>  | Production equivalent                                      |
| <b>Equipment Condition:</b>     | No Damage                                                  |

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

The 24967 CareLink SmartSync™ Device Manager Patient Connector is referred to as the RF Head throughout this report. The Sirius system consists of the Handheld RF Head and the Base Station. The RF Head will only communicate to the base station via a wired connection. The RF Head will also include a 175 kHz Inductive H Field radio. The Hand held (RF Head) includes a Bluetooth radio that can operate as both a BLE radio when communicating to an implant and a classic Bluetooth radio when communicating to an external tablet.

### Testing Objective:

To demonstrate compliance of the Bluetooth Low Energy radio in the RF Head to FCC 15.247 requirements.

# CONFIGURATIONS

## Configuration MDTR0474- 3

| EUT                                                        |                 |                   |               |
|------------------------------------------------------------|-----------------|-------------------|---------------|
| Description                                                | Manufacturer    | Model/Part Number | Serial Number |
| 24967 CareLink SmartSync™ Device Manager Patient Connector | Medtronic, Inc. | 24967             | RFA000301A    |

## Configuration MDTR0474- 4

| EUT                                                        |                 |                   |               |
|------------------------------------------------------------|-----------------|-------------------|---------------|
| Description                                                | Manufacturer    | Model/Part Number | Serial Number |
| 24967 CareLink SmartSync™ Device Manager Patient Connector | Medtronic, Inc. | 24967             | RFA000301A    |

| Peripherals in test setup boundary |              |                   |               |
|------------------------------------|--------------|-------------------|---------------|
| Description                        | Manufacturer | Model/Part Number | Serial Number |
| Power Supply (RF Head)             | SL Power     | MENB10220A0500C02 | Qual PS #1    |

| Remote Equipment Outside of Test Setup Boundary |              |                   |               |
|-------------------------------------------------|--------------|-------------------|---------------|
| Description                                     | Manufacturer | Model/Part Number | Serial Number |
| Laptop                                          | Dell         | Latitude          | Unknown       |

| Cables     |        |            |         |                        |                             |
|------------|--------|------------|---------|------------------------|-----------------------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1           | Connection 2                |
| DC Cable   | No     | 1m         | No      | Power Supply (RF Head) | Sirius Programmer (RF Head) |

# MODIFICATIONS

## Equipment Modifications

| Item | Date      | Test                          | Modification                         | Note                                                                | Disposition of EUT                                |
|------|-----------|-------------------------------|--------------------------------------|---------------------------------------------------------------------|---------------------------------------------------|
| 1    | 5/26/2016 | Spurious Radiated Emissions   | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 2    | 5/31/2016 | Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed.                  |

# POWERLINE CONDUCTED EMISSIONS

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## TEST EQUIPMENT

| Description                      | Manufacturer      | Model            | ID   | Last Cal. | Cal. Due  |
|----------------------------------|-------------------|------------------|------|-----------|-----------|
| Analyzer - Spectrum Analyzer     | Agilent           | E4443A           | AAS  | 3/8/2016  | 3/8/2017  |
| LISN                             | Solar Electronics | 9252-50-R-24-BNC | LIY  | 3/21/2016 | 3/21/2017 |
| Cable - Conducted Cable Assembly | Northwest EMC     | MNC, HGN, TYK    | MNCA | 1/29/2016 | 1/29/2017 |

## MEASUREMENT UNCERTAINTY

| Description  |        |         |
|--------------|--------|---------|
| Expanded k=2 | 2.4 dB | -2.4 dB |

## CONFIGURATIONS INVESTIGATED

MDTR0474-4

## MODES INVESTIGATED

Middle Channel 2442 MHz, Bluetooth Low Energy.

# POWERLINE CONDUCTED EMISSIONS

|                   |                                                            |                    |            |
|-------------------|------------------------------------------------------------|--------------------|------------|
| EUT:              | 24967 CareLink SmartSync™ Device Manager Patient Connector | Work Order:        | MDTR0474   |
| Serial Number:    | RFA000301A                                                 | Date:              | 05/31/2016 |
| Customer:         | Medtronic, Inc.                                            | Temperature:       | 22.2°C     |
| Attendees:        | Nick Blake                                                 | Relative Humidity: | 57%        |
| Customer Project: | None                                                       | Bar. Pressure:     | 1014 mb    |
| Tested By:        | Jared Ison                                                 | Job Site:          | MN03       |
| Power:            | 110VAC/60Hz                                                | Configuration:     | MDTR0474-4 |

## TEST SPECIFICATIONS

|                 |                  |
|-----------------|------------------|
| Specification:  | Method:          |
| FCC 15.207:2016 | ANSI C63.10:2013 |

## TEST PARAMETERS

|        |   |       |           |                             |   |
|--------|---|-------|-----------|-----------------------------|---|
| Run #: | 7 | Line: | High Line | Add. Ext. Attenuation (dB): | 0 |
|--------|---|-------|-----------|-----------------------------|---|

## COMMENTS

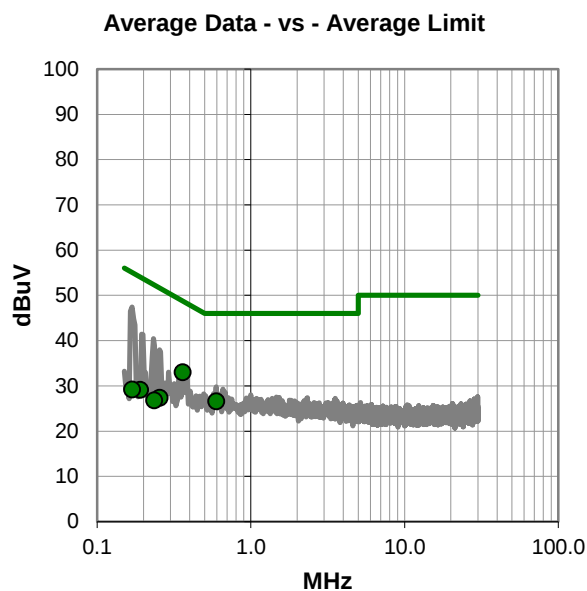
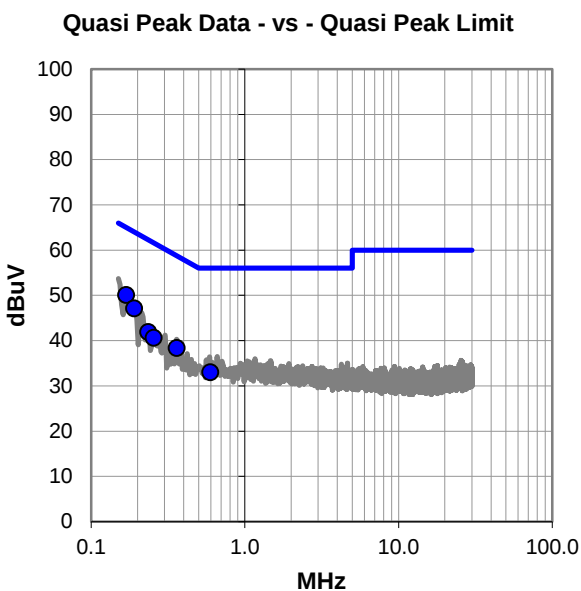
None

## EUT OPERATING MODES

Middle Channel 2442 MHz, Bluetooth Low Energy.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

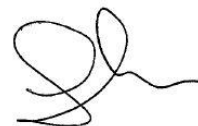
| Freq<br>(MHz) | Amp.<br>(dBuV) | Factor<br>(dB) | Adjusted<br>(dBuV) | Spec.<br>Limit<br>(dBuV) | Margin<br>(dB) |
|---------------|----------------|----------------|--------------------|--------------------------|----------------|
| 0.169         | 29.7           | 20.4           | 50.1               | 65.0                     | -14.9          |
| 0.190         | 26.8           | 20.3           | 47.1               | 64.0                     | -16.9          |
| 0.361         | 18.2           | 20.2           | 38.4               | 58.7                     | -20.3          |
| 0.235         | 21.6           | 20.3           | 41.9               | 62.3                     | -20.4          |
| 0.255         | 20.4           | 20.2           | 40.6               | 61.6                     | -21.0          |
| 0.595         | 12.9           | 20.1           | 33.0               | 56.0                     | -23.0          |

Average Data - vs - Average Limit

| Freq<br>(MHz) | Amp.<br>(dBuV) | Factor<br>(dB) | Adjusted<br>(dBuV) | Spec.<br>Limit<br>(dBuV) | Margin<br>(dB) |
|---------------|----------------|----------------|--------------------|--------------------------|----------------|
| 0.361         | 12.8           | 20.2           | 33.0               | 48.7                     | -15.7          |
| 0.595         | 6.5            | 20.1           | 26.6               | 46.0                     | -19.4          |
| 0.255         | 7.1            | 20.2           | 27.3               | 51.6                     | -24.3          |
| 0.190         | 8.8            | 20.3           | 29.1               | 54.0                     | -24.9          |
| 0.235         | 6.5            | 20.3           | 26.8               | 52.3                     | -25.5          |
| 0.169         | 8.8            | 20.4           | 29.2               | 55.0                     | -25.8          |

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

|                   |                                                            |                    |            |
|-------------------|------------------------------------------------------------|--------------------|------------|
| EUT:              | 24967 CareLink SmartSync™ Device Manager Patient Connector | Work Order:        | MDTR0474   |
| Serial Number:    | RFA000301A                                                 | Date:              | 05/31/2016 |
| Customer:         | Medtronic, Inc.                                            | Temperature:       | 22.2°C     |
| Attendees:        | Nick Blake                                                 | Relative Humidity: | 57%        |
| Customer Project: | None                                                       | Bar. Pressure:     | 1014 mb    |
| Tested By:        | Jared Ison                                                 | Job Site:          | MN03       |
| Power:            | 110VAC/60Hz                                                | Configuration:     | MDTR0474-4 |

## TEST SPECIFICATIONS

|                 |                  |
|-----------------|------------------|
| Specification:  | Method:          |
| FCC 15.207:2016 | ANSI C63.10:2013 |

## TEST PARAMETERS

|        |   |       |         |                             |   |
|--------|---|-------|---------|-----------------------------|---|
| Run #: | 8 | Line: | Neutral | Add. Ext. Attenuation (dB): | 0 |
|--------|---|-------|---------|-----------------------------|---|

## COMMENTS

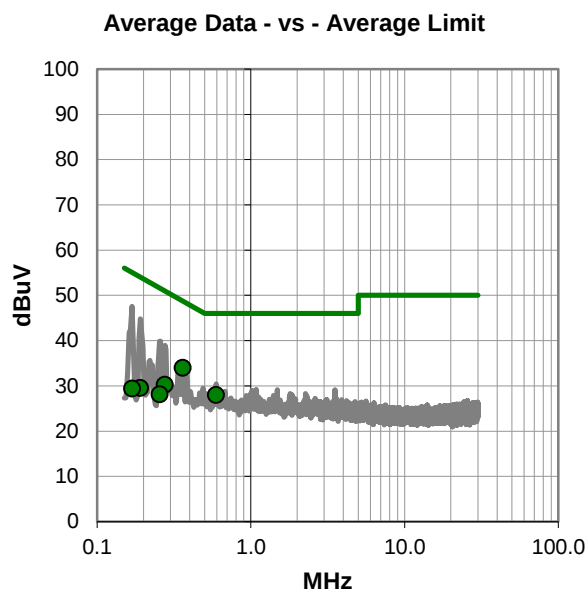
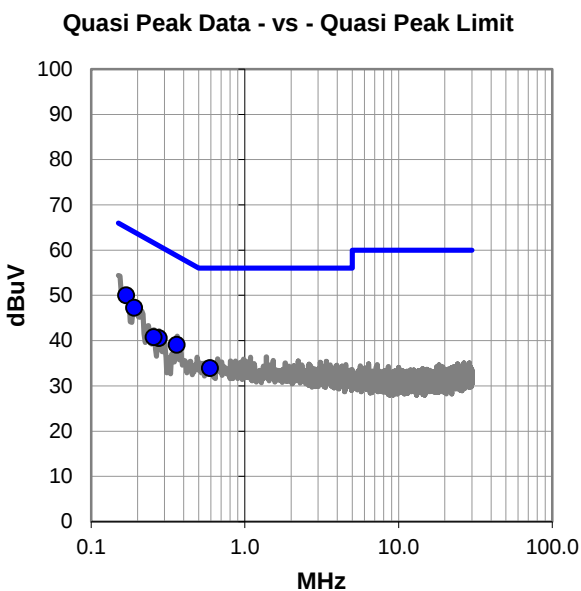
None

## EUT OPERATING MODES

Middle Channel 2442 MHz, Bluetooth Low Energy.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

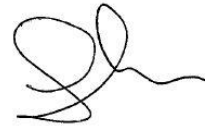
| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|------------|-------------|-------------|-----------------|--------------------|-------------|
| 0.169      | 29.6        | 20.4        | 50.0            | 65.0               | -15.0       |
| 0.191      | 26.9        | 20.3        | 47.2            | 64.0               | -16.8       |
| 0.361      | 18.9        | 20.2        | 39.1            | 58.7               | -19.6       |
| 0.276      | 20.3        | 20.2        | 40.5            | 60.9               | -20.4       |
| 0.255      | 20.5        | 20.2        | 40.7            | 61.6               | -20.8       |
| 0.594      | 13.8        | 20.1        | 33.9            | 56.0               | -22.1       |

Average Data - vs - Average Limit

| Freq (MHz) | Amp. (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Margin (dB) |
|------------|-------------|-------------|-----------------|--------------------|-------------|
| 0.361      | 13.8        | 20.2        | 34.0            | 48.7               | -14.7       |
| 0.594      | 7.9         | 20.1        | 28.0            | 46.0               | -18.0       |
| 0.276      | 10.0        | 20.2        | 30.2            | 50.9               | -20.7       |
| 0.255      | 7.9         | 20.2        | 28.1            | 51.6               | -23.4       |
| 0.191      | 9.2         | 20.3        | 29.5            | 54.0               | -24.5       |
| 0.169      | 9.0         | 20.4        | 29.4            | 55.0               | -25.6       |

## CONCLUSION

Pass



Tested By

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 BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz)

## POWER SETTINGS INVESTIGATED

5 VDC

## CONFIGURATIONS INVESTIGATED

MDTR0474 - 3

## FREQUENCY RANGE INVESTIGATED

|                 |        |                |           |
|-----------------|--------|----------------|-----------|
| Start Frequency | 30 MHz | Stop Frequency | 26500 MHz |
|-----------------|--------|----------------|-----------|

## SAMPLE CALCULATIONS

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

## TEST EQUIPMENT

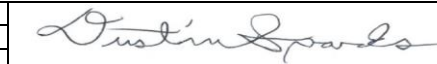
| Description                  | Manufacturer       | Model                             | ID  | Last Cal.  | Interval |
|------------------------------|--------------------|-----------------------------------|-----|------------|----------|
| Attenuator                   | Fairview Microwave | SA18E-20                          | TWZ | 10/21/2015 | 12 mo    |
| Filter - Low Pass            | Micro-Tronics      | LPM50004                          | LFK | 10/21/2015 | 12 mo    |
| Filter - High Pass           | Micro-Tronics      | HPM50111                          | LFN | 10/21/2015 | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq              | JSD4-18002600-26-8P               | APU | 9/18/2015  | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-09                           | AHG | NCR        | 0 mo     |
| Cable                        | Northwest EMC      | 18-26GHz Standard Gain Horn Cable | MNP | 9/18/2015  | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-6F-12001800-30-10P            | AVW | 3/1/2016   | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-08                           | AIQ | NCR        | 0 mo     |
| Cable                        | ESM Cable Corp.    | Standard Gain Horn Cables         | MNJ | 12/7/2015  | 12 mo    |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-6F-08001200-30-10P            | AVV | 3/1/2016   | 12 mo    |
| Antenna - Standard Gain      | ETS Lindgren       | 3160-07                           | AXP | NCR        | 0 mo     |
| Amplifier - Pre-Amplifier    | Miteq              | AMF-3D-00100800-32-13P            | AVT | 3/1/2016   | 12 mo    |
| Cable                        | ESM Cable Corp.    | Double Ridge Guide Horn Cables    | MNI | 12/7/2015  | 12 mo    |
| Antenna - Double Ridge       | ETS Lindgren       | 3115                              | AIB | 8/12/2014  | 24 mo    |
| Amplifier - Pre-Amplifier    | Miteq              | AM-1616-1000                      | AVO | 12/10/2015 | 12 mo    |
| Cable                        | ESM Cable Corp.    | Bilog Cables                      | MNH | 12/7/2015  | 12 mo    |
| Antenna - Biconilog          | Teseq              | CBL 6141B                         | AYD | 1/6/2016   | 24 mo    |
| Analyzer - Spectrum Analyzer | Agilent            | N9010A                            | AFI | 1/27/2016  | 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             |

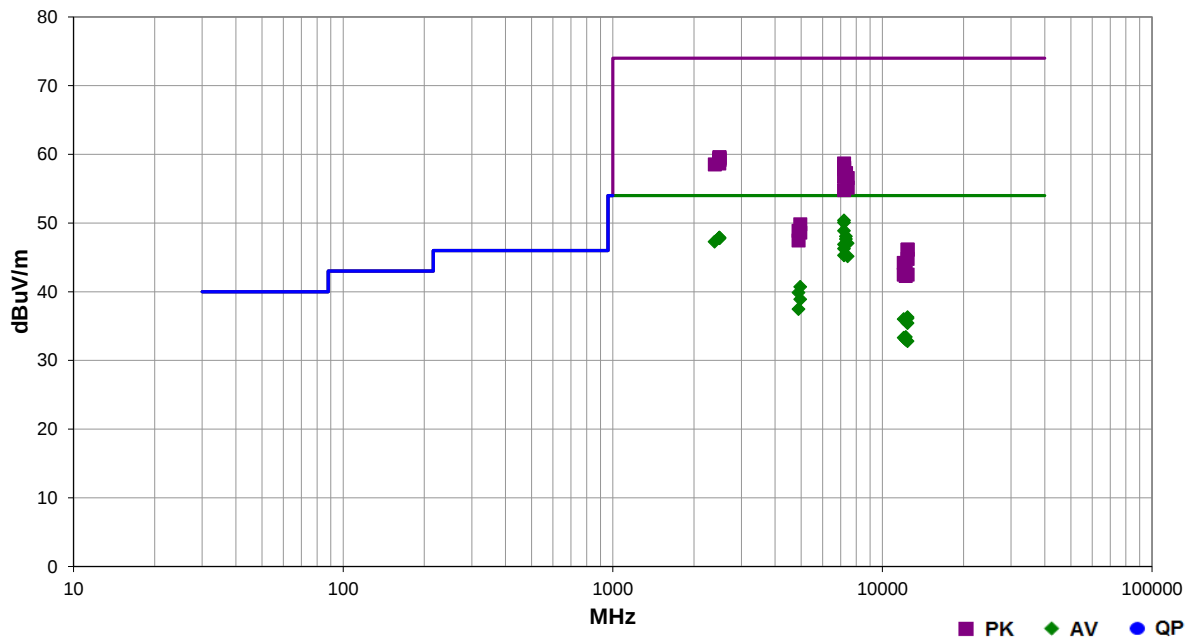
## TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

|                 |                                                                                                |                   |           |                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------|-------------------|-----------|------------------------------------------------------------------------------------|
| Work Order:     | MDTR0474                                                                                       | Date:             | 05/27/16  |  |
| Project:        | None                                                                                           | Temperature:      | 22.3 °C   |                                                                                    |
| Job Site:       | MN05                                                                                           | Humidity:         | 52.1% RH  |                                                                                    |
| Serial Number:  | RFA000301A                                                                                     | Barometric Pres.: | 1012 mbar |                                                                                    |
| EUT:            | 24967 CareLink SmartSync™ Device Manager Patient Connector                                     |                   |           |                                                                                    |
| Configuration:  | 3                                                                                              |                   |           |                                                                                    |
| Customer:       | Medtronic, Inc.                                                                                |                   |           |                                                                                    |
| Attendees:      | Nick Blake                                                                                     |                   |           |                                                                                    |
| EUT Power:      | 5 VDC                                                                                          |                   |           |                                                                                    |
| Operating Mode: | Transmitting BLE - low channel (2402 MHz), mid channel (2442 MHz), and high channel (2480 MHz) |                   |           |                                                                                    |
| Deviations:     | None                                                                                           |                   |           |                                                                                    |
| Comments:       | None                                                                                           |                   |           |                                                                                    |

|                     |                  |
|---------------------|------------------|
| Test Specifications | Test Method      |
| FCC 15.247:2016     | ANSI C63.10:2013 |

|       |    |                   |   |                   |           |         |      |
|-------|----|-------------------|---|-------------------|-----------|---------|------|
| Run # | 41 | Test Distance (m) | 3 | Antenna Height(s) | 1 to 4(m) | Results | Pass |
|-------|----|-------------------|---|-------------------|-----------|---------|------|



| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments             |
|------------|------------------|-------------|-------------------------|-------------------|------------------------|---------------------------|--------------------------|----------|--------------------------|-------------------|----------------------|------------------------|----------------------|
| 7205.367   | 38.0             | 12.4        | 2.1                     | 195.1             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 50.4              | 54.0                 | -3.6                   | Low ch, EUT horz     |
| 7205.250   | 37.7             | 12.4        | 2.1                     | 53.0              | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 50.1              | 54.0                 | -3.9                   | Low ch, EUT vert     |
| 7205.358   | 36.5             | 12.4        | 1.0                     | 258.9             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 48.9              | 54.0                 | -5.1                   | Low ch, EUT horz     |
| 7326.533   | 34.9             | 13.2        | 1.1                     | 260.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 48.1              | 54.0                 | -5.9                   | Mid ch, EUT vert     |
| 2486.675   | 31.5             | -3.6        | 1.0                     | 98.1              | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 47.9              | 54.0                 | -6.1                   | High ch, EUT horz    |
| 2488.500   | 31.4             | -3.6        | 1.0                     | 130.1             | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   | High ch, EUT on side |
| 2487.983   | 31.4             | -3.6        | 1.0                     | 33.1              | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   | High ch, EUT horz    |
| 2487.008   | 31.4             | -3.6        | 1.0                     | 354.9             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   | High ch, EUT vert    |
| 2485.617   | 31.4             | -3.6        | 1.4                     | 268.0             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   | High ch, EUT on side |
| 2484.333   | 31.4             | -3.6        | 1.0                     | 182.0             | 3.0                    | 20.0                      | Vert                     | AV       | 0.0                      | 47.8              | 54.0                 | -6.2                   | High ch, EUT vert    |
| 7326.542   | 34.5             | 13.2        | 1.0                     | 112.1             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 47.7              | 54.0                 | -6.3                   | Mid ch, EUT horz     |
| 2386.742   | 31.1             | -3.8        | 1.0                     | 324.0             | 3.0                    | 20.0                      | Horz                     | AV       | 0.0                      | 47.3              | 54.0                 | -6.7                   | Low ch, EUT horz     |
| 7440.533   | 33.8             | 13.3        | 1.7                     | 73.1              | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 47.1              | 54.0                 | -6.9                   | High ch, EUT vert    |
| 7205.333   | 34.5             | 12.4        | 1.0                     | 136.0             | 3.0                    | 0.0                       | Horz                     | AV       | 0.0                      | 46.9              | 54.0                 | -7.1                   | Low ch, EUT on side  |
| 7205.333   | 33.9             | 12.4        | 1.0                     | 278.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 46.3              | 54.0                 | -7.7                   | Low ch, EUT on side  |
| 7206.550   | 32.9             | 12.4        | 1.0                     | 297.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 45.3              | 54.0                 | -8.7                   | Low ch, EUT vert     |
| 7440.542   | 31.9             | 13.3        | 1.0                     | 293.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 45.2              | 54.0                 | -8.8                   | High ch, EUT horz    |
| 4960.175   | 35.3             | 5.4         | 1.0                     | 66.1              | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 40.7              | 54.0                 | -13.3                  | High ch, EUT horz    |
| 4884.233   | 34.7             | 5.2         | 1.0                     | 215.0             | 3.0                    | 0.0                       | Vert                     | AV       | 0.0                      | 39.9              | 54.0                 | -14.1                  | Mid ch, EUT horz     |
| 2484.842   | 43.2             | -3.6        | 1.0                     | 354.9             | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 59.6              | 74.0                 | -14.4                  | High ch, EUT vert    |
| 2487.617   | 43.1             | -3.6        | 1.0                     | 182.0             | 3.0                    | 20.0                      | Vert                     | PK       | 0.0                      | 59.5              | 74.0                 | -14.5                  | High ch, EUT vert    |
| 2487.675   | 43.0             | -3.6        | 1.0                     | 98.1              | 3.0                    | 20.0                      | Horz                     | PK       | 0.0                      | 59.4              | 74.0                 | -14.6                  | High ch, EUT horz    |

| Freq<br>(MHz) | Amplitude<br>(dBuV) | Factor<br>(dB) | Antenna Height<br>(meters) | Azimuth<br>(degrees) | Test Distance<br>(meters) | External<br>Attenuation<br>(dB) | Polarity/<br>Transducer<br>Type | Detector | Distance<br>Adjustment<br>(dB) | Adjusted<br>(dBuV/m) | Spec. Limit<br>(dBuV/m) | Compared to<br>Spec.<br>(dB) | Comments             |
|---------------|---------------------|----------------|----------------------------|----------------------|---------------------------|---------------------------------|---------------------------------|----------|--------------------------------|----------------------|-------------------------|------------------------------|----------------------|
| 2488.142      | 42.8                | -3.6           | 1.0                        | 130.1                | 3.0                       | 20.0                            | Vert                            | PK       | 0.0                            | 59.2                 | 74.0                    | -14.8                        | High ch, EUT on side |
| 2484.658      | 42.8                | -3.6           | 1.0                        | 33.1                 | 3.0                       | 20.0                            | Vert                            | PK       | 0.0                            | 59.2                 | 74.0                    | -14.8                        | High ch, EUT horz    |
| 4960.100      | 33.5                | 5.4            | 3.0                        | 315.9                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 38.9                 | 54.0                    | -15.1                        | High ch, EUT vert    |
| 2483.583      | 42.3                | -3.6           | 1.4                        | 268.0                | 3.0                       | 20.0                            | Horz                            | PK       | 0.0                            | 58.7                 | 74.0                    | -15.3                        | High ch, EUT on side |
| 7205.200      | 46.3                | 12.4           | 2.1                        | 195.1                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 58.7                 | 74.0                    | -15.3                        | Low ch, EUT horz     |
| 2389.750      | 42.4                | -3.9           | 1.0                        | 324.0                | 3.0                       | 20.0                            | Horz                            | PK       | 0.0                            | 58.5                 | 74.0                    | -15.5                        | Low ch, EUT horz     |
| 7206.392      | 45.7                | 12.4           | 1.0                        | 258.9                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 58.1                 | 74.0                    | -15.9                        | Low ch, EUT horz     |
| 7205.067      | 45.7                | 12.4           | 2.1                        | 53.0                 | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 58.1                 | 74.0                    | -15.9                        | Low ch, EUT vert     |
| 7205.050      | 45.5                | 12.4           | 1.0                        | 136.0                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 57.9                 | 74.0                    | -16.1                        | Low ch, EUT on side  |
| 4883.542      | 32.3                | 5.2            | 1.0                        | 319.9                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 37.5                 | 54.0                    | -16.5                        | Mid ch, EUT vert     |
| 7325.217      | 44.1                | 13.2           | 1.0                        | 112.1                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 57.3                 | 74.0                    | -16.7                        | Mid ch, EUT horz     |
| 7325.600      | 44.1                | 13.2           | 1.1                        | 260.0                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 57.3                 | 74.0                    | -16.7                        | Mid ch, EUT vert     |
| 7205.142      | 44.4                | 12.4           | 1.0                        | 278.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 56.8                 | 74.0                    | -17.2                        | Low ch, EUT on side  |
| 7440.650      | 43.3                | 13.3           | 1.7                        | 73.1                 | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 56.6                 | 74.0                    | -17.4                        | High ch, EUT vert    |
| 12398.730     | 36.3                | 0.0            | 2.5                        | 315.0                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 36.3                 | 54.0                    | -17.7                        | High ch, EUT vert    |
| 12400.990     | 30.6                | 5.5            | 1.0                        | 329.0                | 3.0                       | 0.0                             | Vert                            | AV       | 0.0                            | 36.1                 | 54.0                    | -17.9                        | High ch, EUT horz    |
| 12011.020     | 37.4                | -1.4           | 2.4                        | 219.0                | 3.0                       | 0.0                             | Vert                            | AV       | 0.0                            | 36.0                 | 54.0                    | -18.0                        | Low ch, EUT horz     |
| 12401.050     | 29.9                | 5.5            | 1.0                        | 318.9                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 35.4                 | 54.0                    | -18.6                        | High ch, EUT vert    |
| 7439.317      | 41.9                | 13.3           | 1.0                        | 293.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 55.2                 | 74.0                    | -18.8                        | High ch, EUT horz    |
| 7206.675      | 42.4                | 12.4           | 1.0                        | 297.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 54.8                 | 74.0                    | -19.2                        | Low ch, EUT vert     |
| 12211.030     | 34.1                | -0.7           | 1.0                        | 159.1                | 3.0                       | 0.0                             | Vert                            | AV       | 0.0                            | 33.4                 | 54.0                    | -20.6                        | Mid ch, EUT horz     |
| 12008.640     | 34.7                | -1.4           | 1.0                        | 103.0                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 33.3                 | 54.0                    | -20.7                        | Low ch, EUT vert     |
| 12208.730     | 33.7                | -0.7           | 1.0                        | 107.0                | 3.0                       | 0.0                             | Horz                            | AV       | 0.0                            | 33.0                 | 54.0                    | -21.0                        | Mid ch, EUT vert     |
| 12398.700     | 32.8                | 0.0            | 3.3                        | 27.0                 | 3.0                       | 0.0                             | Vert                            | AV       | 0.0                            | 32.8                 | 54.0                    | -21.2                        | High ch, EUT horz    |
| 4960.383      | 44.4                | 5.4            | 1.0                        | 66.1                 | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 49.8                 | 74.0                    | -24.2                        | High ch, EUT horz    |
| 4884.558      | 43.7                | 5.2            | 1.0                        | 215.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 48.9                 | 74.0                    | -25.1                        | Mid ch, EUT horz     |
| 4960.375      | 43.2                | 5.4            | 3.0                        | 315.9                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 48.6                 | 74.0                    | -25.4                        | High ch, EUT vert    |
| 4883.692      | 42.3                | 5.2            | 1.0                        | 319.9                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 47.5                 | 74.0                    | -26.5                        | Mid ch, EUT vert     |
| 12401.140     | 40.6                | 5.5            | 1.0                        | 329.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 46.1                 | 74.0                    | -27.9                        | High ch, EUT horz    |
| 12401.260     | 40.6                | 5.5            | 1.0                        | 318.9                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 46.1                 | 74.0                    | -27.9                        | High ch, EUT vert    |
| 12398.600     | 44.8                | 0.0            | 2.5                        | 315.0                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 44.8                 | 74.0                    | -29.2                        | High ch, EUT vert    |
| 12010.950     | 45.6                | -1.4           | 2.4                        | 219.0                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 44.2                 | 74.0                    | -29.8                        | Low ch, EUT horz     |
| 12210.650     | 43.5                | -0.7           | 1.0                        | 159.1                | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 42.8                 | 74.0                    | -31.2                        | Mid ch, EUT horz     |
| 12008.610     | 43.9                | -1.4           | 1.0                        | 103.0                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 42.5                 | 74.0                    | -31.5                        | Low ch, EUT vert     |
| 12398.670     | 42.5                | 0.0            | 3.3                        | 27.0                 | 3.0                       | 0.0                             | Vert                            | PK       | 0.0                            | 42.5                 | 74.0                    | -31.5                        | High ch, EUT horz    |
| 12208.580     | 43.0                | -0.7           | 1.0                        | 107.0                | 3.0                       | 0.0                             | Horz                            | PK       | 0.0                            | 42.3                 | 74.0                    | -31.7                        | Mid ch, EUT vert     |