# Masimo Corporation

## RAD7A/Radical 7 V2

## FCC 15.207:2014
## FCC 15.247:2014

**Report # MASI0234.2**

NVLAP Lab Code: 200676-0

NORTHWEST EMC

WTD 13.9.30

# CERTIFICATE OF TEST

**Last Date of Test: August 29, 2014**
**Masimo Corporation**
**Model: RAD7A/Radical 7 V2**

## Radio Equipment Testing

### Standards

| Specification | Method |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |
| FCC 15.247:2014 | ANSI C63.10:2009 |

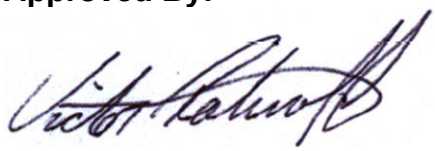
### Results

| Method Clause | Test Description | Applied | Results | Comments |
|---|---|---|---|---|
| 6.2 | AC Powerline Conducted Emissions | Yes | Pass | |
| 6.5, 6.6 | Spurious Radiated Emissions | Yes | Pass | |
| 6.7 | Spurious Conducted Emissions | Yes | Pass | |
| 6.9.1 | Occupied Bandwidth | Yes | Pass | |
| 6.10.1 | Output Power | Yes | Pass | |
| 7.7.2 | Channel Separation | Yes | Pass | |
| 7.7.3 | Number of Hopping Channels | Yes | Pass | |
| 7.7.4 | Dwell Time | Yes | Pass | |
| 7.5 | Duty Cycle | Yes | N/A | Characterization of radio operation. |
| 7.7.9 | Band Edge Compliance | Yes | Pass | |
| 7.7.9 | Band Edge Compliance- Hopping Mode | Yes | Pass | |

### Deviations From Test Standards

None

### Approved By:



*Victor Ratinoff, 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.***

# REVISION HISTORY

REV 2012.08.02

| Revision Number | Description | Date | Page Number |
|---|---|---|---|
| 00 | None | | |

## Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

REV 2014.08.11

# ACCREDITATIONS AND AUTHORIZATIONS

## 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 Guide 65 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

## Canada

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

## European Union

**European Commission** – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

## Australia/New Zealand

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

## Korea

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

## Japan

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

## Taiwan

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

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

## Singapore

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

## Israel

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

## Hong Kong

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

## Vietnam

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

## SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

# 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 listed below. 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 16-4-1 as applicable), and are available upon request.

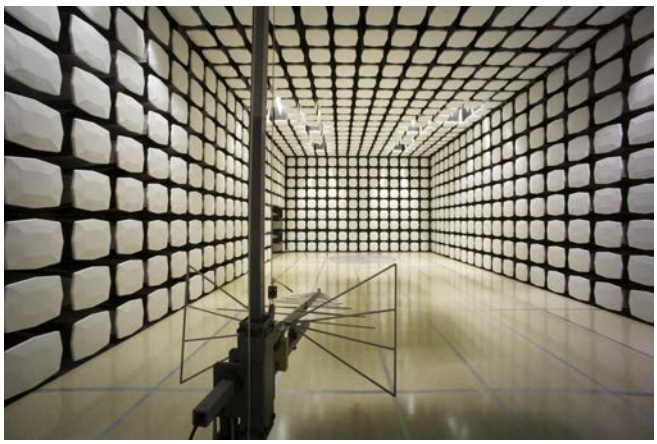
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

| Test | + MU | - MU |
|---|---|---|
| Frequency Accuracy (Hz) | 0.12 | -0.01 |
| Amplitude Accuracy (dB) | 0.49 | -0.49 |
| Conducted Power (dB) | 0.41 | -0.41 |
| Radiated Power via Substitution (dB) | 0.69 | -0.68 |
| Temperature (degrees C) | 0.81 | -0.81 |
| Humidity (% RH) | 2.89 | -2.89 |
| Field Strength (dB) | 3.80 | -3.80 |
| AC Powerline Conducted Emissions (dB) | 2.94 | -2.94 |

# FACILITIES

REV 2013.06.28

| Oregon | California | New York | Minnesota | Washington |
|---|---|---|---|---|
| Labs EV01-12<br>22975 NW Evergreen Pkwy<br>Hillsboro, OR 97124<br>(503) 844-4066 | Labs OC01-13<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | Labs NY01-04<br>4939 Jordan Rd.<br>Elbridge, NY 13060<br>(315) 685-0796 | Labs MN01-08<br>9349 W Broadway Ave.<br>Brooklyn Park, MN 55445<br>(763) 425-2281 | Labs NC01-05,SU02,SU07<br>19201 120th Ave. NE<br>Bothell, WA 98011<br>(425) 984-6600 |
| **VCCI** | | | | |
| A-0108 | A-0029 | | A-0109 | A-0110 |
| **Industry Canada** | | | | |
| 2834D-1, 2834D-*2* | 2834B-1, 2834B-2, 2834B-3 | | 2834E-1 | 2834F-1 |
| **NVLAP** | | | | |
| NVLAP Lab Code: 200630-0 | NVLAP Lab Code: 200676-0 | NVLAP Lab Code: 200761-0 | NVLAP Lab Code: 200881-0 | NVLAP Lab Code: 200629-0 |



# PRODUCT DESCRIPTION

WTD 13.9.30

## Client and Equipment Under Test (EUT) Information

| | |
|---|---|
| **Company Name:** | Masimo Corporation |
| **Address:** | 40 Parker |
| **City, State, Zip:** | Irvine, CA 92618 |
| **Test Requested By:** | Michael Clark |
| **Model:** | RAD7A/Radical 7 V2 |
| **First Date of Test:** | August 28, 2014 |
| **Last Date of Test:** | August 29, 2014 |
| **Receipt Date of Samples:** | January 19, 2014 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |

## Information Provided by the Party Requesting the Test

**Functional Description of the EUT:**

The device is a Pulse Co-Oximeter incorporating a Bluetooth wireless radio assembly. Masimo radio assembly part number = 24514.

**Client supplied information:**

The client has confirmed that the short dwell time for DH5 is representative of their implementation. Typical Bluetooth has a burst duration of 2.8 ms - 3.2 ms range when operating in the Basic Rate DH5 mode. The mode that the client provided has a burst duration of 126 - 132 µs. The Bluetooth is used for doctor identification. A "Presence tag" which once paired, gives the doctor access to a patient's data, or authorized access to patient connected equipment.

**Testing Objective:**

To demonstrate compliance under FCC 15.247 for frequency hopping spread spectrum operation in the 2.4 GHz band.

# CONFIGURATIONS

## Configuration MASI0234- 1

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Pulse Co-Oximeter | Masimo Corporation | RAD7A/Radical 7 V2 | 1000000349 |
| Wireless Radio | Broadcom | BCM 4334/Azurewave AW-AH634 | 24514 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Charging and Docking Station | Masimo Corporation | RDS-1 | 147484 |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Cable | No | 1.8m | No | Charging and Docking Station | AC Mains |

## Configuration MASI0234- 2

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Pulse Co-Oximeter | Masimo Corporation | RAD7A/Radical 7 V2 | 1000000349 |
| Wireless Radio | Broadcom | BCM 4334/Azurewave AW-AH634 | 24514 |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Charging and Docking Station | Masimo Corporation | RDS-1 | 147484 |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Cable | No | 1.8m | No | Charging and Docking Station | AC Mains |
| RS 232 | No | 1.8m | Yes | Charging and Docking Station | Unterminated |
| Vue Link Cable | No | 1.8m | Yes | Charging and Docking Station | Unterminated |
| Nursecall Cable | No | 1.0m | Yes | Charging and Docking Station | Unterminated |
| Sp02 Cable | Yes | 3.0m | No | Pulse Co-Oximeter | Unterminated |
| Ground Cable | Yes | 1.8m | No | Charging and Docking Station | Grounded |

# MODIFICATIONS

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 08/28/2014 | Occupied Bandwidth | 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 | 08/28/2014 | Band Edge Compliance | 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. |
| 3 | 08/28/2014 | Output Power | 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. |
| 4 | 08/28/2014 | Dwell Time | 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. |
| 5 | 08/28/2014 | Duty Cycle | 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. |
| 6 | 08/28/2014 | Spurious Conducted 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. |
| 7 | 08/28/2014 | AC Powerline Conducted 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. |
| 8 | 08/28/2014 | Band Edge Compliance-Hopping Mode | 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. |
| 9 | 08/28/2014 | Channel Separation | 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. |
| 10 | 08/28/2014 | Number of Hopping Channels | 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. |
| 11 | 08/29/2014 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# AC POWERLINE CONDUCTED EMISSIONS

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.

**MODES OF OPERATION**

Continuously transmitting on high channel, 2480MHz.
Continuously transmitting on mid channel, 2440MHz.
Continuously transmitting on low channel, 2402MHz.

**POWER SETTINGS INVESTIGATED**

120VAC/60Hz

**CONFIGURATIONS INVESTIGATED**

MASI0234 - 2

**SAMPLE CALCULATIONS**

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| LISN | Solar | 9252-50-24-BNC | LIB | 3/27/2014 | 12 mo |
| LISN | Solar | 9252-50-24-BNC | LIA | 4/22/2014 | 12 mo |
| Attenuator | Pasternack | 6N10W-20 | AWC | 1/3/2014 | 12 mo |
| HP Filter | TTE | H97-100K-50-720B | HFP | 3/1/2012 | 36 mo |
| OC06 Cables | N/A | Telecom Cables | OCP | 8/15/2014 | 12 mo |
| Receiver | Rohde & Schwarz | ESCI | ARG | 5/13/2014 | 12 mo |

**MEASUREMENT BANDWIDTHS**

| Frequency Range (MHz) | BWI (kHz) |
|---|---|
| 0.15 - 30.0 | 1.0 |
| 30.0 - 400.0 | 10.0 |
| 400.0 - 1000.0 | 100.0 |
| 1000.0 - 6000.0 | 1000.0 |

**TEST DESCRIPTION**

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

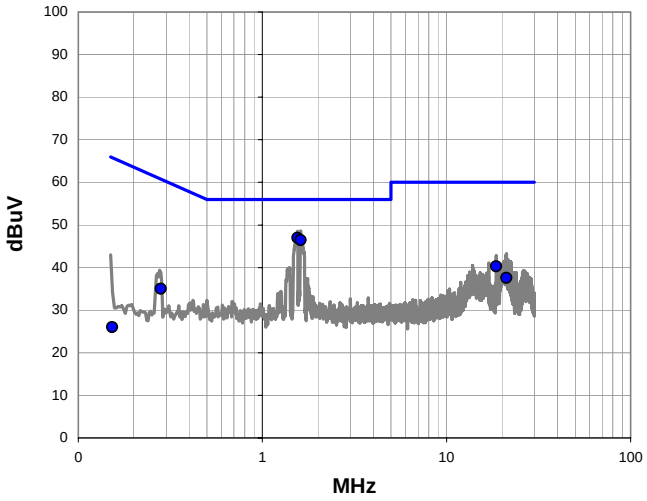
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on low channel, 2402MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412. Docking Station serial number 113674. | | | | |

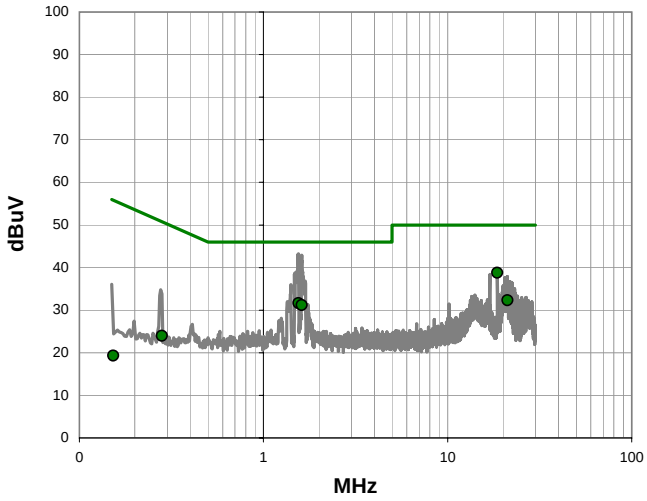
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 1 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.550 | 26.7 | 20.2 | 46.9 | 56.0 | -9.1 |
| 1.617 | 26.2 | 20.2 | 46.4 | 56.0 | -9.6 |
| 18.650 | 19.0 | 21.2 | 40.2 | 60.0 | -19.8 |
| 21.202 | 16.2 | 21.4 | 37.6 | 60.0 | -22.4 |
| 0.281 | 14.8 | 20.2 | 35.0 | 60.8 | -25.8 |
| 0.153 | 5.6 | 20.4 | 26.0 | 65.9 | -39.8 |

Average Data - vs - Average Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 18.650 | 17.5 | 21.2 | 38.7 | 50.0 | -11.3 |
| 1.550 | 11.4 | 20.2 | 31.6 | 46.0 | -14.4 |
| 1.617 | 11.0 | 20.2 | 31.2 | 46.0 | -14.8 |
| 21.202 | 10.9 | 21.4 | 32.3 | 50.0 | -17.7 |
| 0.281 | 3.8 | 20.2 | 24.0 | 50.8 | -26.8 |
| 0.153 | -1.1 | 20.4 | 19.3 | 55.9 | -36.5 |

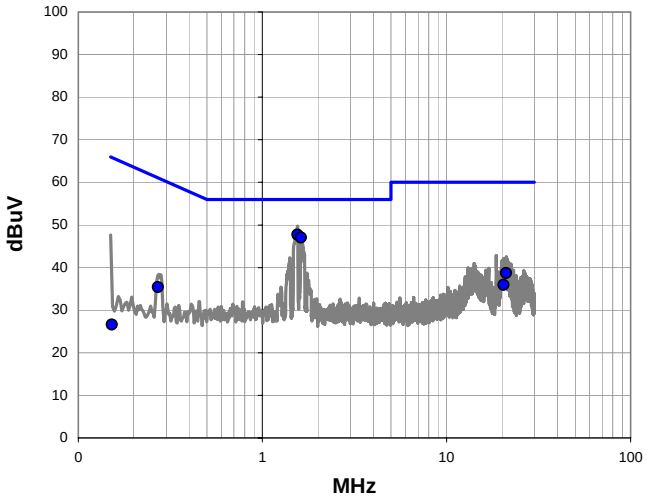
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on low channel, 2402MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674. | | | | |

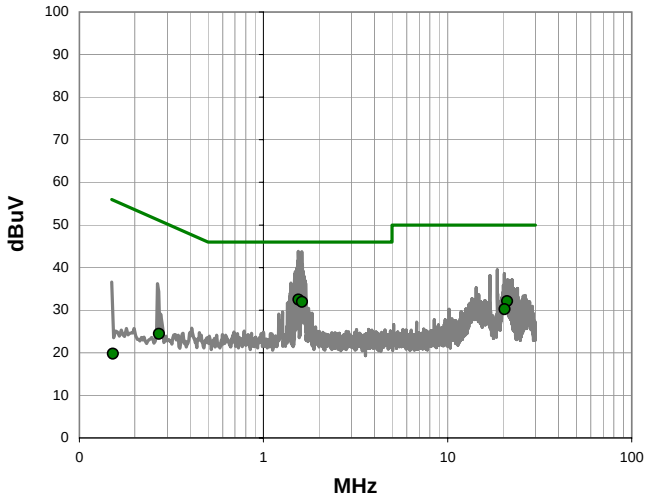
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 2 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.551 | 27.5 | 20.2 | 47.7 | 56.0 | -8.3 |
| 1.618 | 26.8 | 20.2 | 47.0 | 56.0 | -9.0 |
| 21.074 | 17.3 | 21.4 | 38.7 | 60.0 | -21.3 |
| 20.379 | 14.6 | 21.3 | 35.9 | 60.0 | -24.1 |
| 0.271 | 15.2 | 20.2 | 35.4 | 61.1 | -25.7 |
| 0.153 | 6.2 | 20.4 | 26.6 | 65.9 | -39.2 |

Average Data - vs - Average Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.551 | 12.2 | 20.2 | 32.4 | 46.0 | -13.6 |
| 1.618 | 11.7 | 20.2 | 31.9 | 46.0 | -14.1 |
| 21.074 | 10.7 | 21.4 | 32.1 | 50.0 | -17.9 |
| 20.379 | 8.9 | 21.3 | 30.2 | 50.0 | -19.8 |
| 0.271 | 4.2 | 20.2 | 24.4 | 51.1 | -26.7 |
| 0.153 | -0.7 | 20.4 | 19.7 | 55.9 | -36.1 |

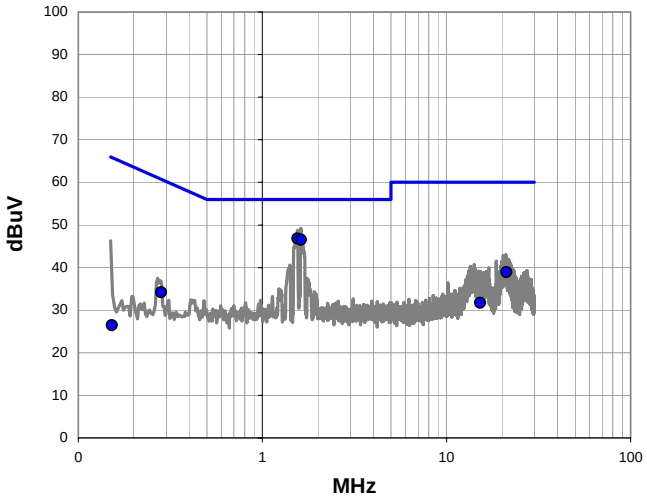
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on mid channel, 2440MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674. | | | | |

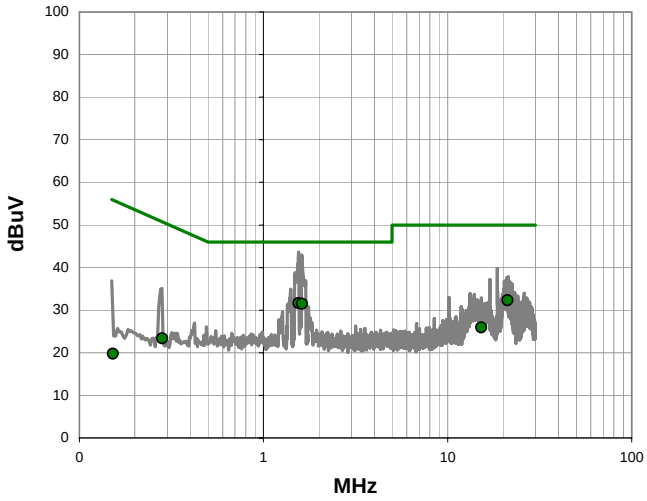
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 3 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.553 | 26.6 | 20.2 | 46.8 | 56.0 | -9.2 |
| 1.620 | 26.3 | 20.2 | 46.5 | 56.0 | -9.5 |
| 21.147 | 17.5 | 21.4 | 38.9 | 60.0 | -21.1 |
| 0.282 | 14.0 | 20.2 | 34.2 | 60.8 | -26.6 |
| 15.219 | 10.7 | 21.0 | 31.7 | 60.0 | -28.3 |
| 0.153 | 6.0 | 20.4 | 26.4 | 65.9 | -39.4 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.553 | 11.4 | 20.2 | 31.6 | 46.0 | -14.4 |
| 1.620 | 11.3 | 20.2 | 31.5 | 46.0 | -14.5 |
| 21.147 | 10.9 | 21.4 | 32.3 | 50.0 | -17.7 |
| 15.219 | 4.9 | 21.0 | 25.9 | 50.0 | -24.1 |
| 0.282 | 3.2 | 20.2 | 23.4 | 50.8 | -27.4 |
| 0.153 | -0.7 | 20.4 | 19.7 | 55.9 | -36.1 |

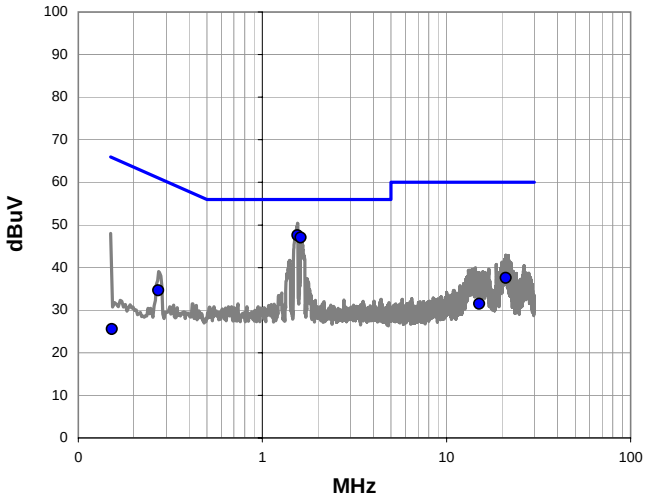
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on mid channel, 2440MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674. | | | | |

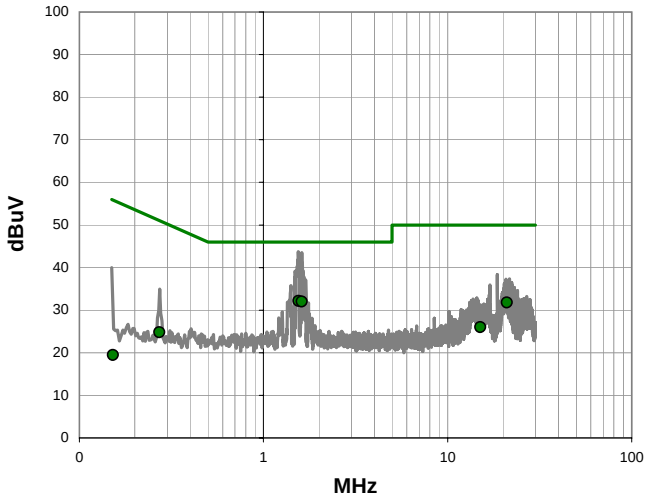
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 4 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.551 | 27.3 | 20.2 | 47.5 | 56.0 | -8.5 |
| 1.617 | 26.8 | 20.2 | 47.0 | 56.0 | -9.0 |
| 20.966 | 16.2 | 21.4 | 37.6 | 60.0 | -22.4 |
| 0.272 | 14.4 | 20.2 | 34.6 | 61.1 | -26.5 |
| 15.081 | 10.5 | 21.0 | 31.5 | 60.0 | -28.5 |
| 0.153 | 5.1 | 20.4 | 25.5 | 65.9 | -40.3 |

Average Data - vs - Average Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.551 | 11.9 | 20.2 | 32.1 | 46.0 | -13.9 |
| 1.617 | 11.8 | 20.2 | 32.0 | 46.0 | -14.0 |
| 20.966 | 10.4 | 21.4 | 31.8 | 50.0 | -18.2 |
| 15.081 | 5.0 | 21.0 | 26.0 | 50.0 | -24.0 |
| 0.272 | 4.6 | 20.2 | 24.8 | 51.1 | -26.3 |
| 0.153 | -1.0 | 20.4 | 19.4 | 55.9 | -36.4 |

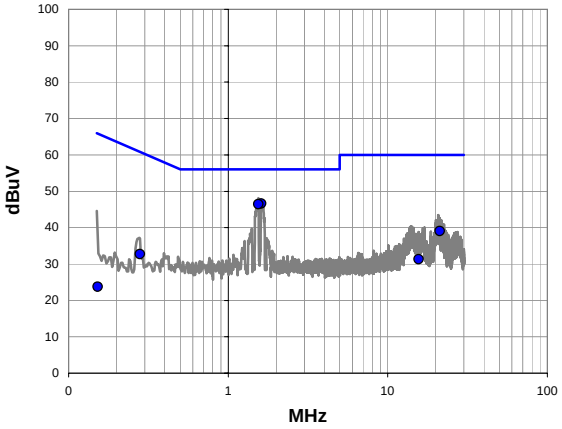
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on high channel, 2480MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674. | | | | |

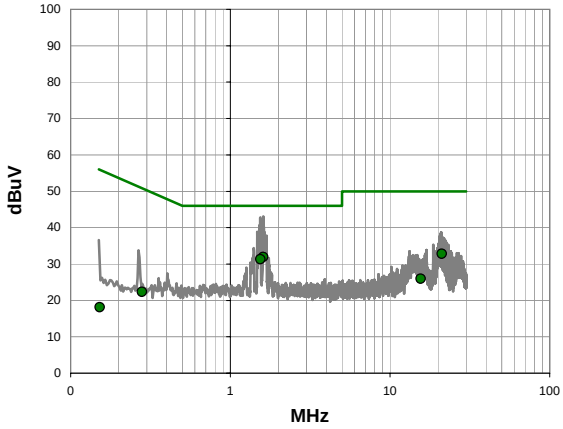
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 5 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.609 | 26.4 | 20.2 | 46.6 | 56.0 | -9.4 |
| 1.543 | 26.2 | 20.2 | 46.4 | 56.0 | -9.6 |
| 21.145 | 17.7 | 21.4 | 39.1 | 60.0 | -20.9 |
| 0.280 | 12.5 | 20.2 | 32.7 | 60.8 | -28.1 |
| 15.601 | 10.3 | 21.0 | 31.3 | 60.0 | -28.7 |
| 0.153 | 3.3 | 20.4 | 23.7 | 65.9 | -42.1 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.609 | 11.7 | 20.2 | 31.9 | 46.0 | -14.1 |
| 1.543 | 11.1 | 20.2 | 31.3 | 46.0 | -14.7 |
| 21.145 | 11.4 | 21.4 | 32.8 | 50.0 | -17.2 |
| 15.601 | 4.9 | 21.0 | 25.9 | 50.0 | -24.1 |
| 0.280 | 2.1 | 20.2 | 22.3 | 50.8 | -28.5 |
| 0.153 | -2.3 | 20.4 | 18.1 | 55.9 | -37.7 |

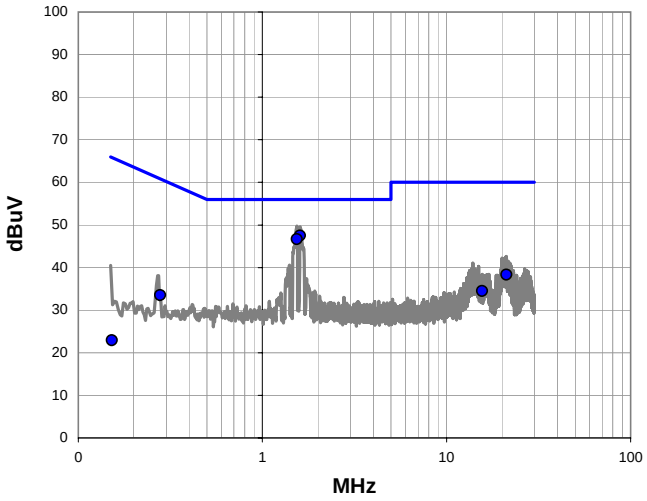
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/28/14 | | |
| **Project:** | None | **Temperature:** | 24.8 °C | | |
| **Job Site:** | OC06 | **Humidity:** | 41.8% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1015 mbar | **Tested by:** | Mike Tran & Johnny Candelas |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously transmitting on high channel, 2480MHz. | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | RDS-1 Rev 1, MX-5 24494 C, Radio=24514 , Radio Chip= 24412. Docking Station serial number 113674. | | | | |

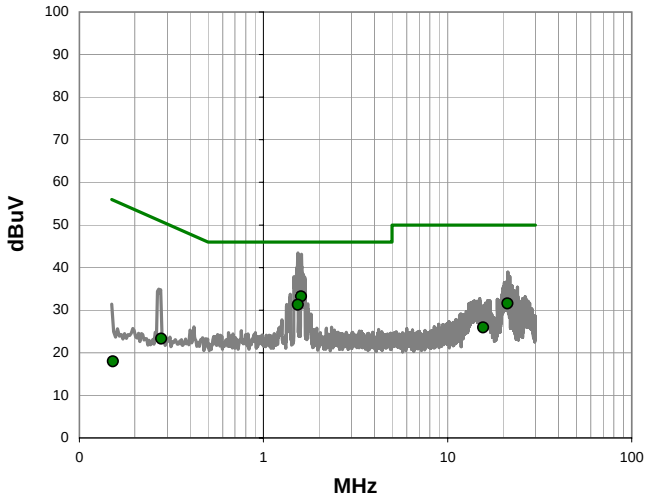
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2014 | ANSI C63.10:2009 |

| **Run #** | 6 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Quasi Peak Data - vs - Quasi Peak Limit**




**Average Data - vs - Average Limit**




Quasi Peak Data - vs - Quasi Peak Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.600 | 27.3 | 20.2 | 47.5 | 56.0 | -8.5 |
| 1.538 | 26.4 | 20.2 | 46.6 | 56.0 | -9.4 |
| 21.149 | 16.9 | 21.4 | 38.3 | 60.0 | -21.7 |
| 15.599 | 13.5 | 21.0 | 34.5 | 60.0 | -25.5 |
| 0.278 | 13.3 | 20.2 | 33.5 | 60.9 | -27.4 |
| 0.153 | 2.5 | 20.4 | 22.9 | 65.9 | -42.9 |

Average Data - vs - Average Limit

| **Freq (MHz)** | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 1.600 | 13.0 | 20.2 | 33.2 | 46.0 | -12.8 |
| 1.538 | 11.0 | 20.2 | 31.2 | 46.0 | -14.8 |
| 21.149 | 10.2 | 21.4 | 31.6 | 50.0 | -18.4 |
| 15.599 | 4.9 | 21.0 | 25.9 | 50.0 | -24.1 |
| 0.278 | 3.1 | 20.2 | 23.3 | 50.9 | -27.6 |
| 0.153 | -2.5 | 20.4 | 17.9 | 55.9 | -37.9 |

# SPURIOUS RADIATED EMISSIONS

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

**MODES OF OPERATION**

Continuously Transmitting on Low Channel 0 - 2402MHz, Mid Channel 39 - 2440MHz, & High Channel 78 - 2480MHz
Continuously Transmitting on Low Channel 0 - 2402MHz & High Channel 78 - 2480MHz

**POWER SETTINGS INVESTIGATED**

120VAC/60Hz

**CONFIGURATIONS INVESTIGATED**

MASI0234 - 2

**FREQUENCY RANGE INVESTIGATED**

| Start Frequency | 30 MHz | Stop Frequency | 26 GHz |
|---|---|---|---|

**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 |
|---|---|---|---|---|---|
| Low Pass Filter 0-1000 MHz | Micro-Tronics | LPM50004 | LFC | 11/27/2012 | 24 mo |
| Attenuator, 20db, 'SMA' | Weinschel Corp | 4H-20 | AWB | 4/28/2014 | 12 mo |
| HP Filter | Micro-Tronics | HPM50111 | HGC | 11/27/2012 | 36 mo |
| OC floating Cable | N/A | 18-26GHz RE Cables | OCK | 2/6/2014 | 12 mo |
| Pre-Amplifier | Miteq | AMF-6F-18002650-25-10P | AOI | 1/10/2014 | 12 mo |
| Antenna, Horn | EMCO | 3160-09 | AHN | NCR | 0 mo |
| OC07 Cables | ESM Cable Corp. | 8-18GHz cables | OCY | 3/27/2014 | 12 mo |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AVP | 10/24/2013 | 12 mo |
| Antenna, Horn | EMCO | 3160-08 | AHK | NCR | 0 mo |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AVL | 10/24/2013 | 12 mo |
| Antenna, Horn | ETS | 3160-07 | AHX | NCR | 0 mo |
| OC07 Cables | ESM Cable Corp. | 1-8GHz cables | OCX | 3/27/2014 | 12 mo |
| Pre-Amplifier | Miteq | AMF-3D-00100800-32-13P | AVJ | 10/24/2013 | 12 mo |
| Antenna, Horn (DRG) | ETS Lindgren | 3115 | AIR | 6/4/2014 | 24 mo |
| OC07 Cables | ESM Cable Corp. | 30-1GHz cables | OCW | 4/17/2014 | 12 mo |
| Pre-Amplifier | Miteq | AM-1402 | AOZ | 1/13/2014 | 12 mo |
| Antenna, Biconilog | EMCO | 3142 | AXA | 11/25/2013 | 24 mo |
| Spectrum Analyzer | Agilent | N9010A | AFJ | 7/10/2013 | 24 mo |

**TEST DESCRIPTION**

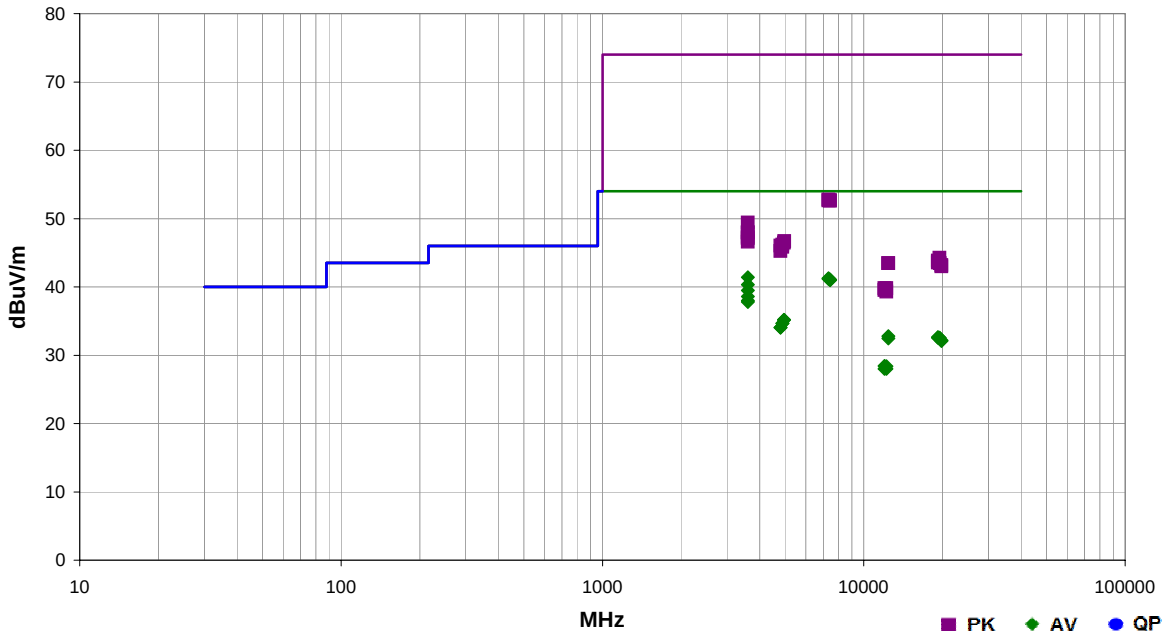
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify 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.

# SPURIOUS RADIATED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/29/14 | | |
| **Project:** | None | **Temperature:** | 24.6 °C | | |
| **Job Site:** | OC07 | **Humidity:** | 43.2% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1012 mbar | **Tested by:** | Johnny Candelas & Mike Tran |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously Transmitting on Low Channel 0 - 2402MHz, Mid Channel 39 - 2440MHz, & High Channel 78 - 2480MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | Using Max Power Setting 20<br>Radio=24514<br>Radio chip=24412 | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |

| **Run #** | 14 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3599.817 | 40.4 | 1.0 | 1.2 | 360.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 41.4 | 54.0 | -12.6 | EUT Vertical, Low Ch |
| 7320.368 | 31.0 | 10.3 | 1.2 | 51.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 41.3 | 54.0 | -12.7 | EUT Vertical, Mid Ch |
| 7320.190 | 30.9 | 10.3 | 1.2 | 28.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 41.2 | 54.0 | -12.8 | EUT Vertical, Mid Ch |
| 7437.792 | 30.7 | 10.4 | 1.2 | 79.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 41.1 | 54.0 | -12.9 | EUT Vertical, High Ch |
| 7437.808 | 30.6 | 10.4 | 3.8 | 181.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 41.0 | 54.0 | -13.0 | EUT Vertical, High Ch |
| 3599.775 | 39.3 | 1.0 | 1.5 | 307.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 40.3 | 54.0 | -13.7 | EUT Vertical, Low Ch |
| 3599.817 | 38.5 | 1.0 | 1.4 | 58.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 39.5 | 54.0 | -14.5 | EUT Horizontal, Low Ch |
| 3600.133 | 37.6 | 1.0 | 1.5 | 29.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 38.6 | 54.0 | -15.4 | EUT On Side, Low Ch |
| 3599.967 | 37.0 | 1.0 | 1.2 | 0.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 38.0 | 54.0 | -16.0 | EUT On Side, Low Ch |
| 3599.900 | 36.8 | 1.0 | 1.2 | 114.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 37.8 | 54.0 | -16.2 | EUT Horizontal, Low Ch |
| 4957.925 | 31.9 | 3.3 | 1.2 | 360.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 35.2 | 54.0 | -18.8 | EUT Vertical, High Ch |
| 4957.567 | 31.9 | 3.3 | 1.2 | 233.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 35.2 | 54.0 | -18.8 | EUT Vertical, High Ch |
| 4880.155 | 31.5 | 3.2 | 1.2 | 348.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 34.7 | 54.0 | -19.3 | EUT Vertical, Mid Ch |
| 4879.732 | 31.5 | 3.2 | 1.2 | 268.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 34.7 | 54.0 | -19.3 | EUT Vertical, Mid Ch |
| 4806.483 | 30.9 | 3.1 | 1.0 | 132.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 34.0 | 54.0 | -20.0 | EUT Vertical, Low Ch |
| 4803.993 | 30.9 | 3.1 | 1.0 | 346.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 34.0 | 54.0 | -20.0 | EUT Vertical, Low Ch |
| 12400.330 | 30.9 | 1.9 | 1.2 | 30.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 32.8 | 54.0 | -21.2 | EUT Vertical, High Ch |
| 7320.383 | 42.5 | 10.3 | 1.2 | 51.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 52.8 | 74.0 | -21.2 | EUT Vertical, Mid Ch |
| 7438.475 | 42.3 | 10.4 | 3.8 | 181.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 52.7 | 74.0 | -21.3 | EUT Vertical, High Ch |
| 7320.168 | 42.4 | 10.3 | 1.2 | 28.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.7 | 74.0 | -21.3 | EUT Vertical, Mid Ch |
| 19214.300 | 35.8 | -3.1 | 1.2 | 0.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 32.7 | 54.0 | -21.3 | EUT Vertical, Low Ch |
| 7439.642 | 42.2 | 10.4 | 1.2 | 79.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 52.6 | 74.0 | -21.4 | EUT Vertical, High Ch |

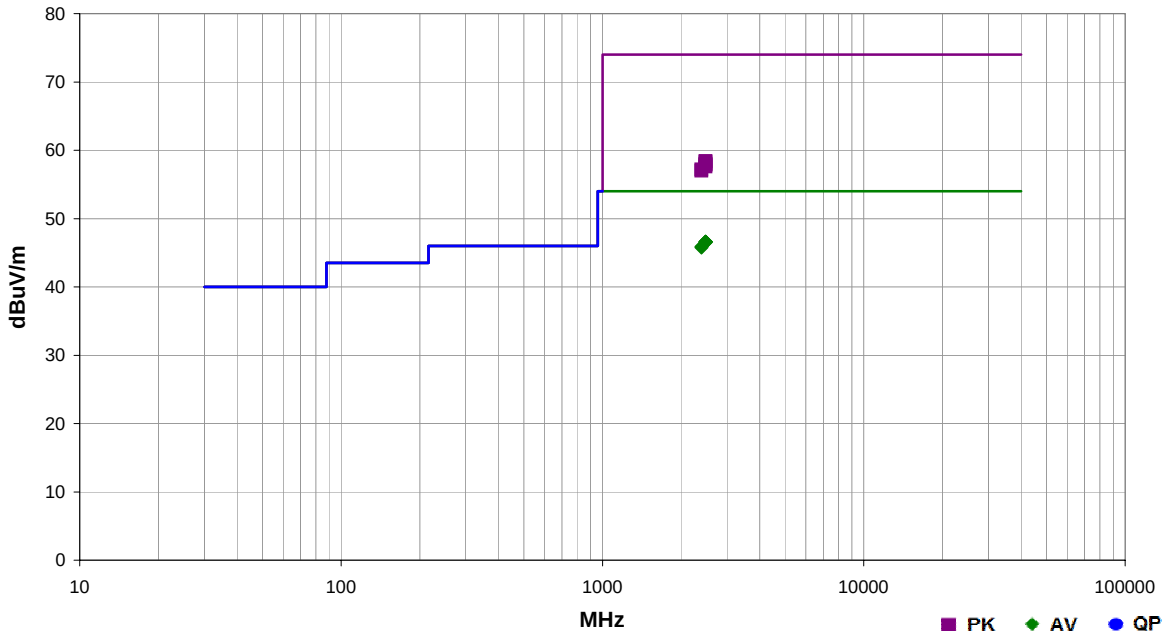
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19213.530 | 35.7 | -3.1 | 1.2 | 68.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 32.6 | 54.0 | -21.4 | EUT Vertical, Low Ch |
| 19518.560 | 35.4 | -2.9 | 1.2 | 211.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 32.5 | 54.0 | -21.5 | EUT Vertical, Mid Ch |
| 19519.270 | 35.4 | -2.9 | 1.2 | 173.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 32.5 | 54.0 | -21.5 | EUT Vertical, Mid Ch |
| 12400.450 | 30.6 | 1.9 | 1.8 | 294.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 32.5 | 54.0 | -21.5 | EUT Vertical, High Ch |
| 19838.950 | 35.1 | -2.9 | 1.2 | 128.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 32.2 | 54.0 | -21.8 | EUT Vertical, High Ch |
| 19838.730 | 35.0 | -2.9 | 1.2 | 357.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 32.1 | 54.0 | -21.9 | EUT Vertical, High Ch |
| 3598.783 | 48.4 | 1.0 | 1.2 | 360.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 49.4 | 74.0 | -24.6 | EUT Vertical, Low Ch |
| 12009.660 | 36.4 | -8.0 | 1.2 | 307.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 28.4 | 54.0 | -25.6 | EUT Vertical, Low Ch |
| 12200.080 | 36.1 | -7.7 | 1.2 | 76.0 | 3.0 | 0.0 | Horz | AV | 0.0 | 28.4 | 54.0 | -25.6 | EUT Vertical, Mid Ch |
| 12009.810 | 36.0 | -8.0 | 1.2 | 55.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 28.0 | 54.0 | -26.0 | EUT Vertical, Low Ch |
| 3600.958 | 47.0 | 1.0 | 1.4 | 58.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 48.0 | 74.0 | -26.0 | EUT Horizontal, Low Ch |
| 12199.680 | 35.7 | -7.7 | 1.2 | 236.0 | 3.0 | 0.0 | Vert | AV | 0.0 | 28.0 | 54.0 | -26.0 | EUT Vertical, Mid Ch |
| 3600.775 | 46.9 | 1.0 | 1.5 | 307.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 47.9 | 74.0 | -26.1 | EUT Vertical, Low Ch |
| 3600.050 | 46.3 | 1.0 | 1.5 | 29.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 47.3 | 74.0 | -26.7 | EUT On Side, Low Ch |
| 3600.292 | 46.1 | 1.0 | 1.2 | 114.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 47.1 | 74.0 | -26.9 | EUT Horizontal, Low Ch |
| 4960.233 | 43.4 | 3.3 | 1.2 | 360.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 46.7 | 74.0 | -27.3 | EUT Vertical, High Ch |
| 3599.042 | 45.6 | 1.0 | 1.2 | 0.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 46.6 | 74.0 | -27.4 | EUT On Side, Low Ch |
| 4957.892 | 43.2 | 3.3 | 1.2 | 233.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 46.5 | 74.0 | -27.5 | EUT Vertical, High Ch |
| 4879.928 | 43.0 | 3.2 | 1.2 | 268.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 46.2 | 74.0 | -27.8 | EUT Vertical, Mid Ch |
| 4803.558 | 42.9 | 3.1 | 1.0 | 346.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 46.0 | 74.0 | -28.0 | EUT Vertical, Low Ch |
| 4880.015 | 42.7 | 3.2 | 1.2 | 348.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 45.9 | 74.0 | -28.1 | EUT Vertical, Mid Ch |
| 4804.917 | 42.1 | 3.1 | 1.0 | 132.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 45.2 | 74.0 | -28.8 | EUT Vertical, Low Ch |
| 19518.440 | 47.1 | -2.9 | 1.2 | 173.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 44.2 | 74.0 | -29.8 | EUT Vertical, Mid Ch |
| 19215.910 | 47.0 | -3.1 | 1.2 | 0.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 43.9 | 74.0 | -30.1 | EUT Vertical, Low Ch |
| 19213.930 | 46.7 | -3.1 | 1.2 | 68.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 43.6 | 74.0 | -30.4 | EUT Vertical, Low Ch |
| 12400.260 | 41.6 | 1.9 | 1.8 | 294.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 43.5 | 74.0 | -30.5 | EUT Vertical, High Ch |
| 12400.420 | 41.6 | 1.9 | 1.2 | 30.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 43.5 | 74.0 | -30.5 | EUT Vertical, High Ch |
| 19522.270 | 46.3 | -2.9 | 1.2 | 211.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 43.4 | 74.0 | -30.6 | EUT Vertical, Mid Ch |
| 19839.760 | 46.1 | -2.9 | 1.2 | 128.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 43.2 | 74.0 | -30.8 | EUT Vertical, High Ch |
| 19840.300 | 45.9 | -2.9 | 1.2 | 357.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 43.0 | 74.0 | -31.0 | EUT Vertical, High Ch |
| 12009.880 | 47.8 | -8.0 | 1.2 | 307.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 39.8 | 74.0 | -34.2 | EUT Vertical, Low Ch |
| 12200.170 | 47.5 | -7.7 | 1.2 | 76.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 39.8 | 74.0 | -34.2 | EUT Vertical, Mid Ch |
| 12010.120 | 47.5 | -8.0 | 1.2 | 55.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 39.5 | 74.0 | -34.5 | EUT Vertical, Low Ch |
| 12199.980 | 47.0 | -7.7 | 1.2 | 236.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 39.3 | 74.0 | -34.7 | EUT Vertical, Mid Ch |

# SPURIOUS RADIATED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | MASI0234 | **Date:** | 08/29/14 | | |
| **Project:** | None | **Temperature:** | 24.6 °C | | |
| **Job Site:** | OC07 | **Humidity:** | 43.2% RH | | |
| **Serial Number:** | 1000000349 | **Barometric Pres.:** | 1012 mbar | **Tested by:** | Johnny Candelas & Mike Tran |
| **EUT:** | RAD7A/Radical 7 V2 | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | Masimo Corporation | | | | |
| **Attendees:** | Michael Clark | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | Continuously Transmitting on Low Channel 0 - 2402MHz & High Channel 78 - 2480MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | Using Max Power Setting 20<br>Radio= 24514<br>Radio chip=24412 | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |

| **Run #** | 21 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1 to 4(m) | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Test Distance (meters) | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted (dBuV/m) | Spec. Limit (dBuV/m) | Compared to Spec. (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.535 | 31.9 | -5.3 | 1.2 | 212.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.6 | 54.0 | -7.4 | EUT Vertical, High Ch |
| 2483.514 | 31.9 | -5.3 | 1.2 | 28.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.6 | 54.0 | -7.4 | EUT Vertical, High Ch |
| 2483.532 | 31.9 | -5.3 | 1.2 | 204.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.6 | 54.0 | -7.4 | EUT Horizontal, High Ch |
| 2483.521 | 31.9 | -5.3 | 1.2 | 33.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.6 | 54.0 | -7.4 | EUT Horizontal, High Ch |
| 2483.465 | 31.9 | -5.3 | 1.2 | 98.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 46.6 | 54.0 | -7.4 | EUT on Side, High Ch |
| 2483.534 | 31.8 | -5.3 | 1.2 | 105.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 46.5 | 54.0 | -7.5 | EUT on Side, High Ch |
| 2390.047 | 31.6 | -5.7 | 2.7 | 245.0 | 3.0 | 20.0 | Vert | AV | 0.0 | 45.9 | 54.0 | -8.1 | EUT Vertical, Low Ch |
| 2390.048 | 31.5 | -5.7 | 1.2 | 15.0 | 3.0 | 20.0 | Horz | AV | 0.0 | 45.8 | 54.0 | -8.2 | EUT Vertical, Low Ch |
| 2483.544 | 43.7 | -5.3 | 1.2 | 28.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 58.4 | 74.0 | -15.6 | EUT Vertical, High Ch |
| 2483.532 | 43.6 | -5.3 | 1.2 | 212.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.3 | 74.0 | -15.7 | EUT Vertical, High Ch |
| 2483.529 | 43.3 | -5.3 | 1.2 | 105.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 58.0 | 74.0 | -16.0 | EUT on Side, High Ch |
| 2483.459 | 43.2 | -5.3 | 1.2 | 204.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.9 | 74.0 | -16.1 | EUT Horizontal, High Ch |
| 2483.452 | 43.2 | -5.3 | 1.2 | 33.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 57.9 | 74.0 | -16.1 | EUT Horizontal, High Ch |
| 2483.494 | 42.9 | -5.3 | 1.2 | 98.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.6 | 74.0 | -16.4 | EUT on Side, High Ch |
| 2389.965 | 42.9 | -5.7 | 1.2 | 15.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 57.2 | 74.0 | -16.8 | EUT Vertical, Low Ch |
| 2389.982 | 42.7 | -5.7 | 2.7 | 245.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 57.0 | 74.0 | -17.0 | EUT Vertical, Low Ch |

# SPURIOUS CONDUCTED EMISSIONS

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

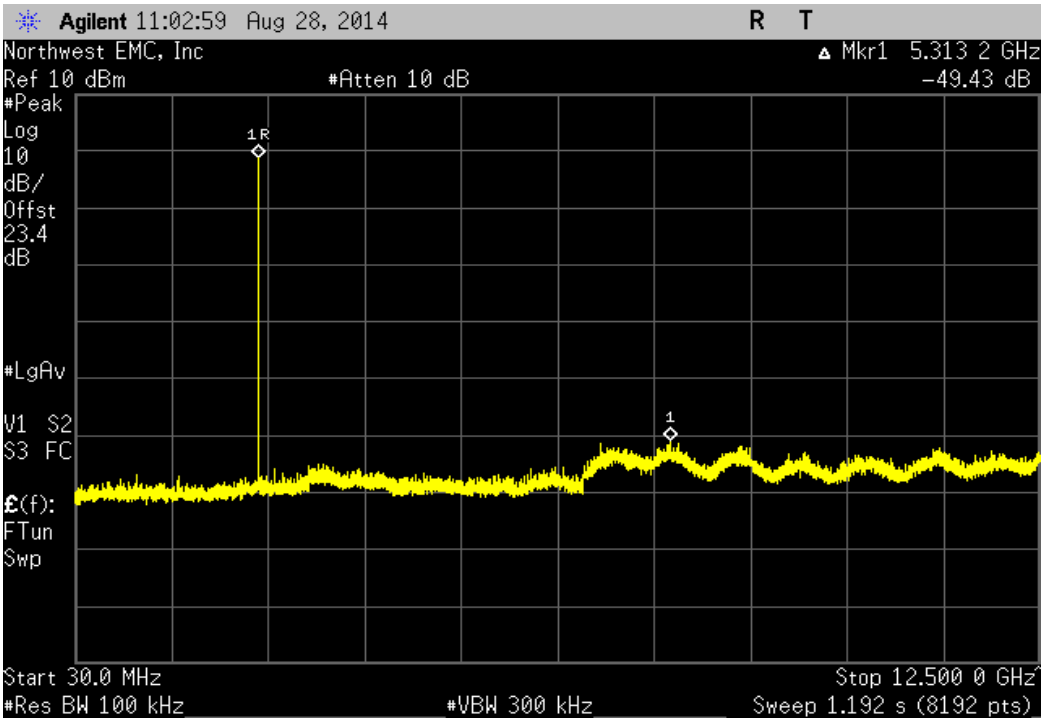
**DEVIATIONS FROM TEST STANDARD**

None

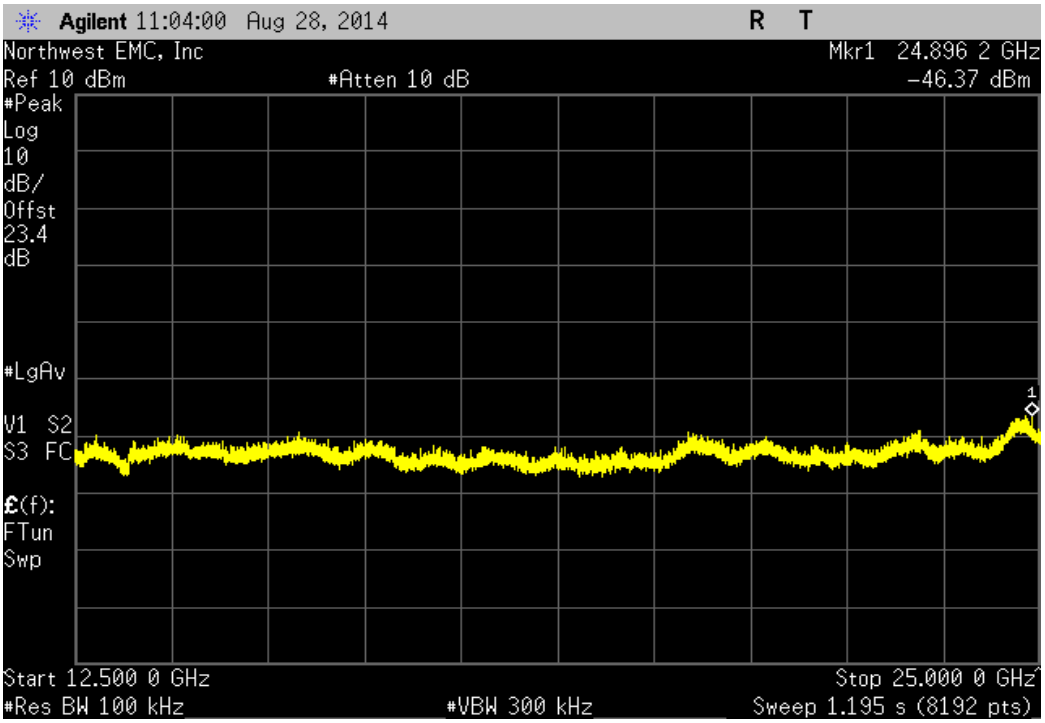
| Configuration # | 1 | Signature |
|---|---|---|

| | Frequency Range | Value (dBc) | Limit ≤ (dBc) | Result |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| Low Channel 0, 2402 MHz | 30 MHz - 12.5 GHz | -49.43 | -20 | Pass |
| Low Channel 0, 2402 MHz | 12.5 GHz - 25 GHz | -45.08 | -20 | Pass |
| Mid Channel 39, 2440 MHz | 30 MHz - 12.5 GHz | -51.63 | -20 | Pass |
| Mid Channel 39, 2440 MHz | 12.5 GHz - 25 GHz | -45.85 | -20 | Pass |
| High Channel 78, 2480 MHz | 30 MHz - 12.5 GHz | -51.74 | -20 | Pass |
| High Channel 78, 2480 MHz | 12.5 GHz - 25 GHz | -46.74 | -20 | Pass |

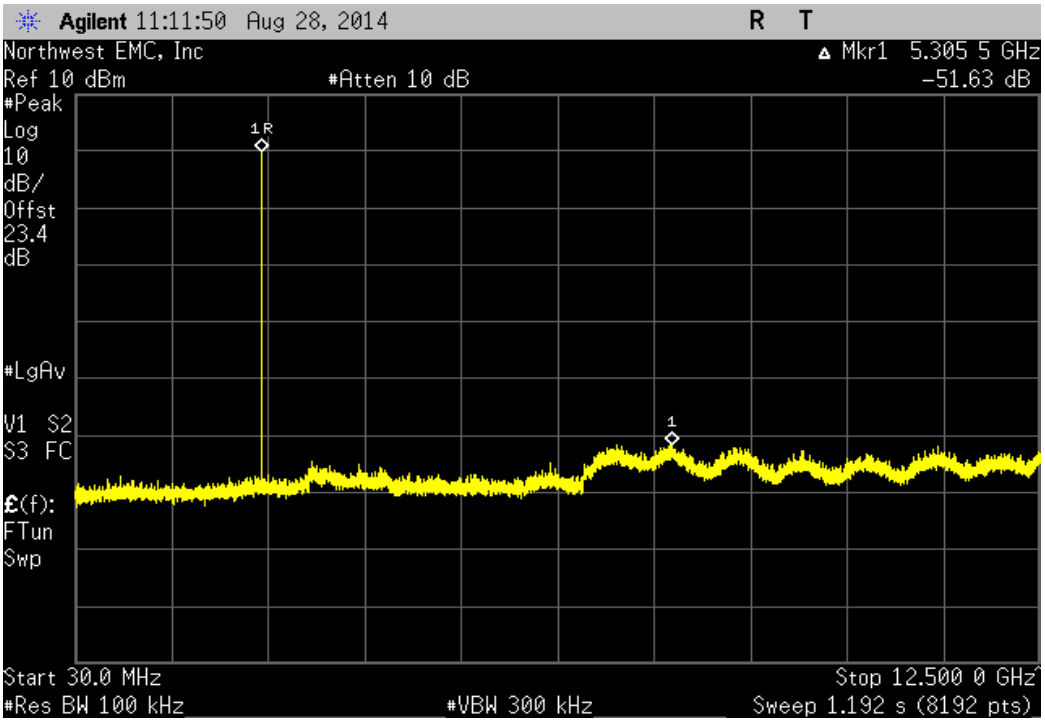
| DH5, GFSK, Low Channel 0, 2402 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | | Value (dBc) | Limit ≤ (dBc) | Result |
| 30 MHz - 12.5 GHz | | -49.43 | -20 | Pass |



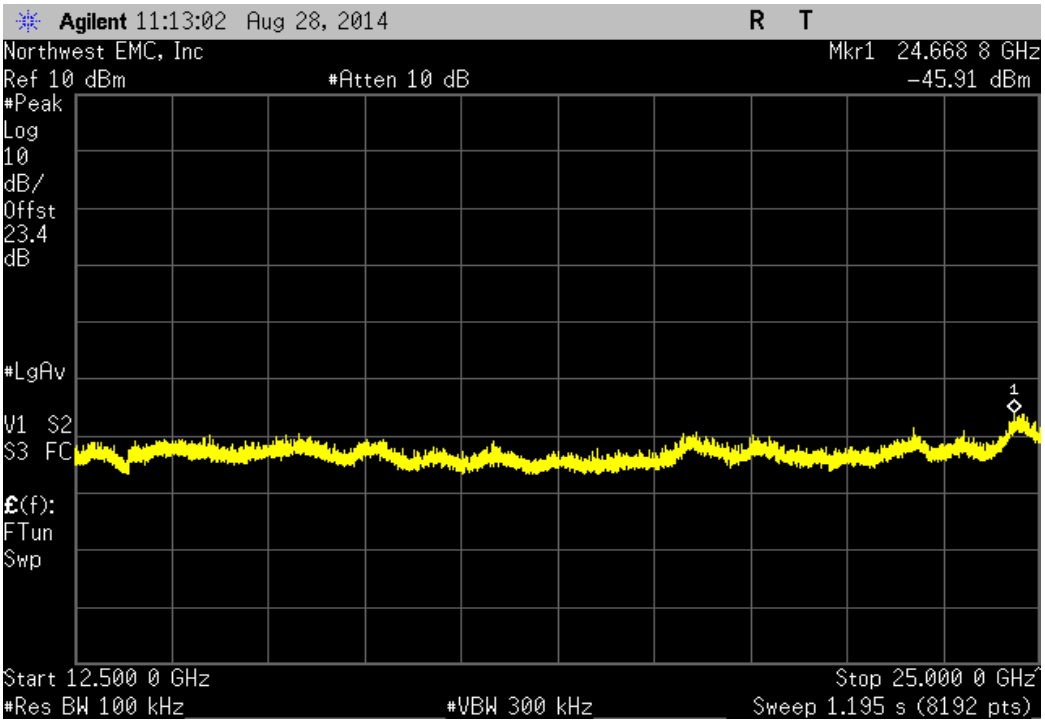

| DH5, GFSK, Low Channel 0, 2402 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | | Value (dBc) | Limit ≤ (dBc) | Result |
| 12.5 GHz - 25 GHz | | -45.08 | -20 | Pass |



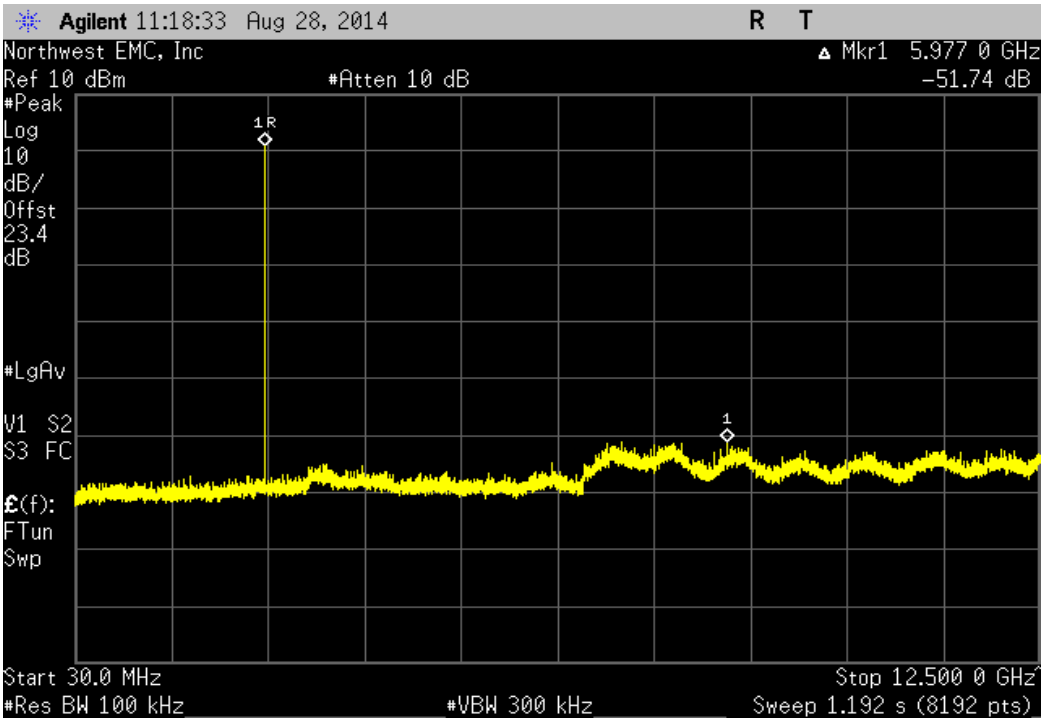
| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value (dBc)** | **Limit ≤ (dBc)** | **Result** |
| 30 MHz - 12.5 GHz | | -51.63 | -20 | Pass |



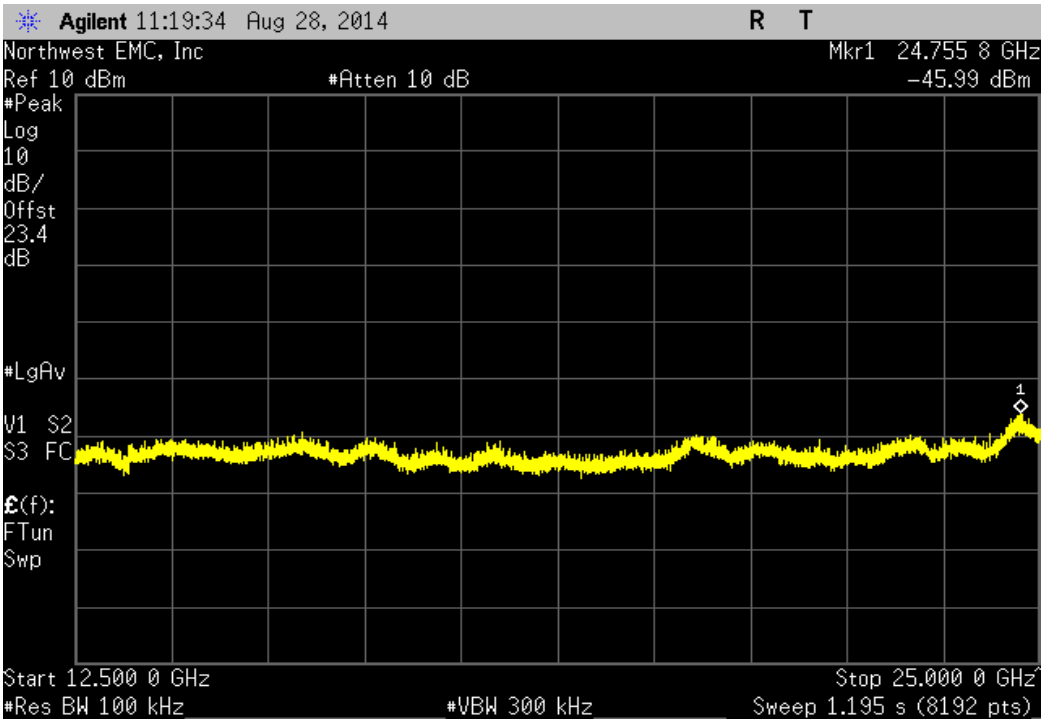

| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value (dBc)** | **Limit ≤ (dBc)** | **Result** |
| 12.5 GHz - 25 GHz | | -45.85 | -20 | Pass |



| DH5, GFSK, High Channel 78, 2480 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | | Value (dBc) | Limit ≤ (dBc) | Result |
| 30 MHz - 12.5 GHz | | -51.74 | -20 | Pass |




| DH5, GFSK, High Channel 78, 2480 MHz | | | | |
|---|---|---|---|---|
| Frequency Range | | Value (dBc) | Limit ≤ (dBc) | Result |
| 12.5 GHz - 25 GHz | | -46.74 | -20 | Pass |



# OCCUPIED BANDWIDTH

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

# OCCUPIED BANDWIDTH

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

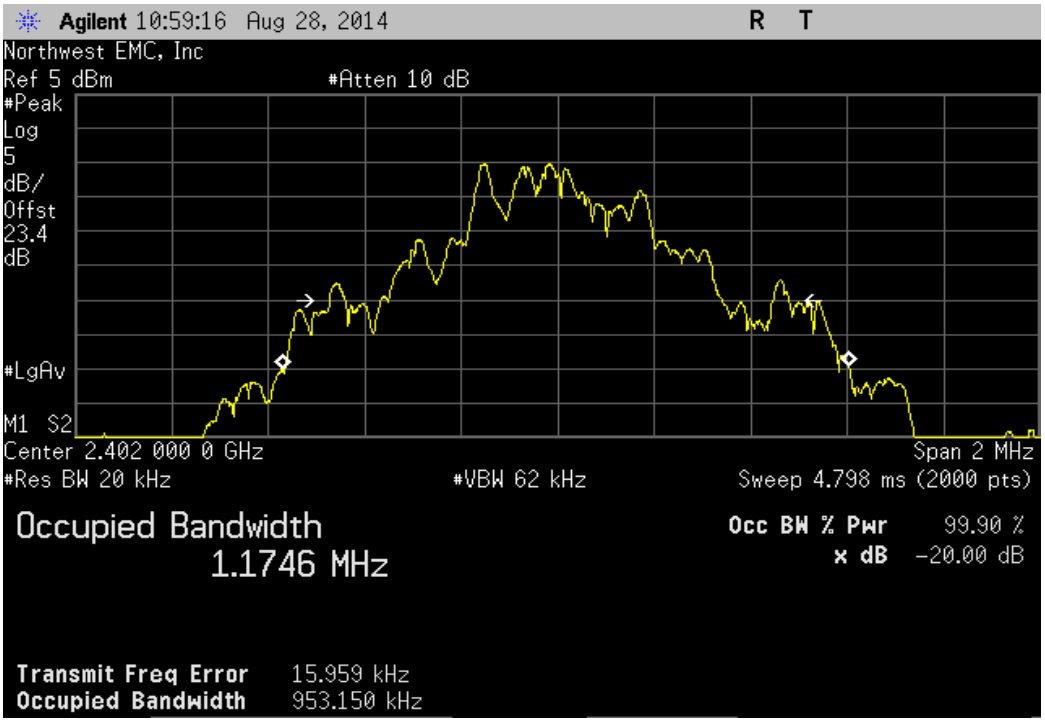
**DEVIATIONS FROM TEST STANDARD**

None

| Configuration # | 1 | Signature |
|---|---|---|

| | Value | Limit (<) | Result |
|---|---|---|---|
| DH5, GFSK | | | |
| Low Channel 0, 2402 MHz | 953.151 kHz | 1.5 MHz | Pass |
| Mid Channel 39, 2440 MHz | 1.003 MHz | 1.5 MHz | Pass |
| High Channel 78, 2480 MHz | 969.221 kHz | 1.5 MHz | Pass |

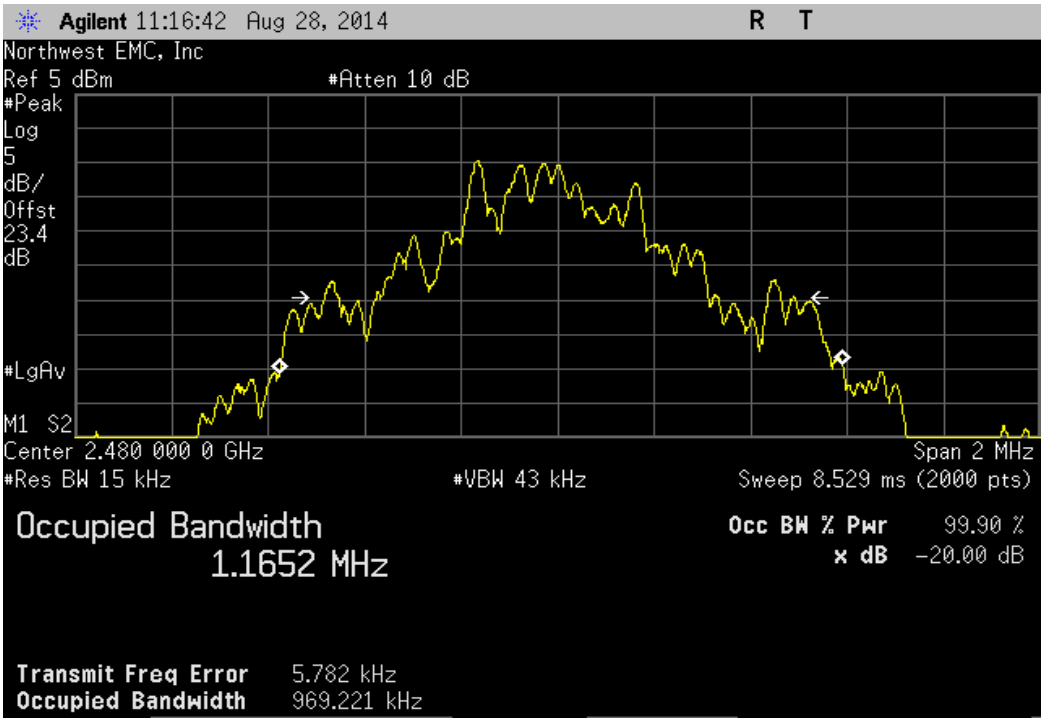
| DH5, GFSK, Low Channel 0, 2402 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit (<) | Result |
| | | | | | 953.151 kHz | 1.5 MHz | Pass |




| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit (<) | Result |
| | | | | | 1.003 MHz | 1.5 MHz | Pass |

# OCCUPIED BANDWIDTH

| DH5, GFSK, High Channel 78, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (<) | Result |
| | | | | 969.221 kHz | 1.5 MHz | Pass |



# OUTPUT POWER

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +27dBm.

# OUTPUT POWER

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

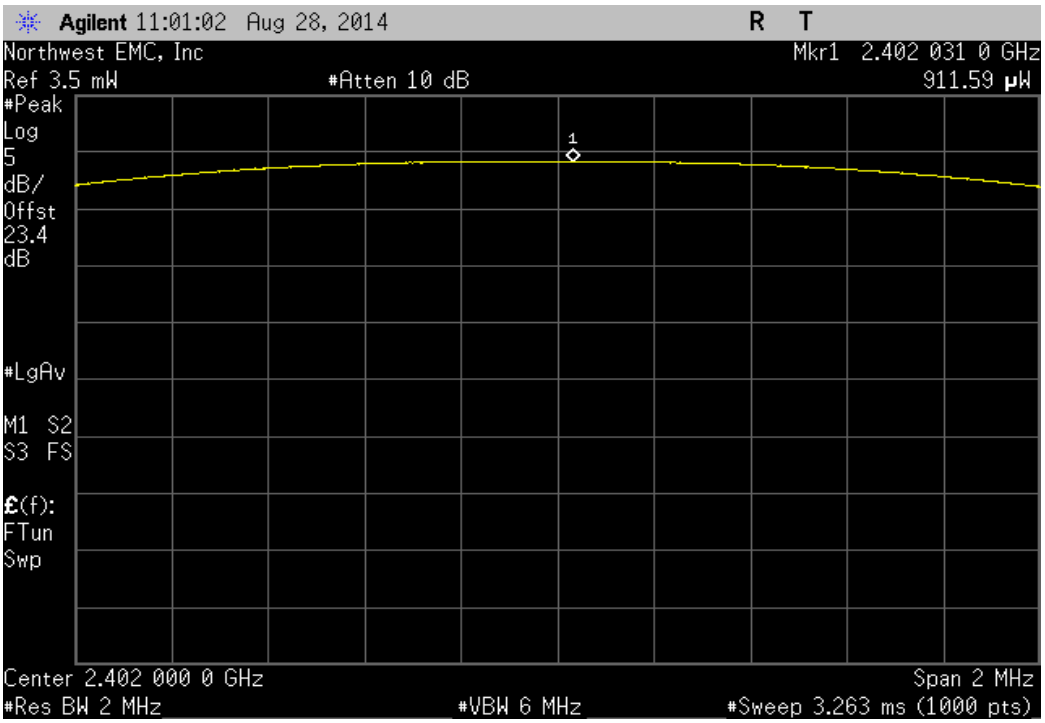
**DEVIATIONS FROM TEST STANDARD**

None

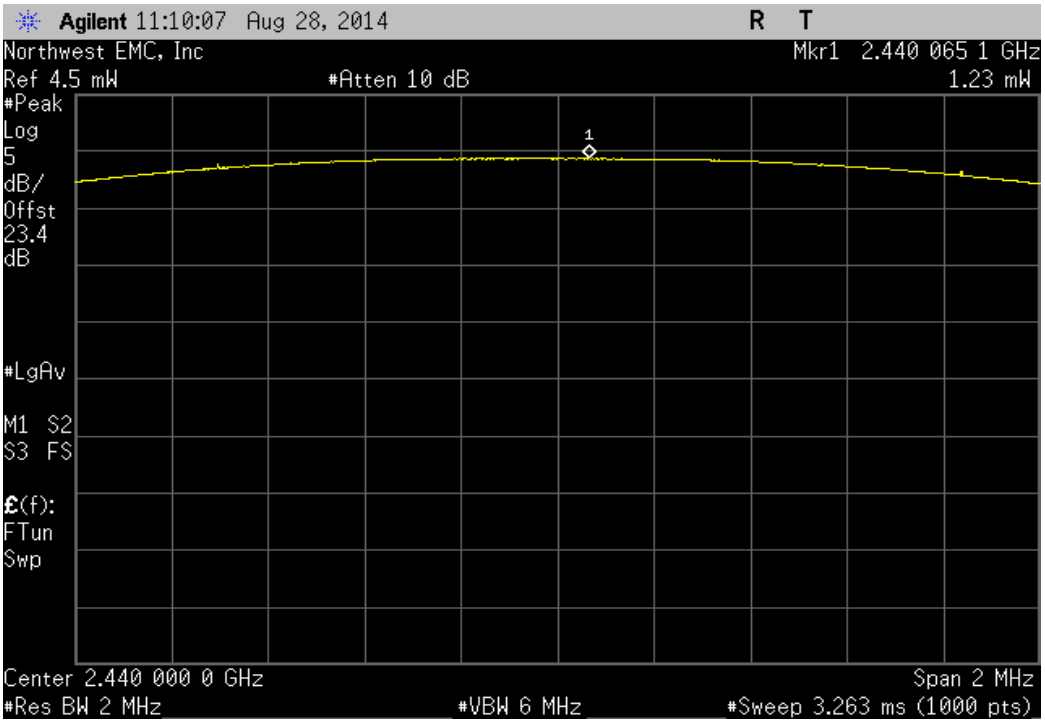
| Configuration # | 1 | Signature |
|---|---|---|

| | Value | Limit (<) | Result |
|---|---|---|---|
| DH5, GFSK | | | |
| Low Channel 0, 2402 MHz | 911.591 uW | 125 mW | Pass |
| Mid Channel 39, 2440 MHz | 1.228 mW | 125 mW | Pass |
| High Channel 78, 2480 MHz | 1.359 mW | 125 mW | Pass |

| DH5, GFSK, Low Channel 0, 2402 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (<) | Result |
| | | | | 911.591 uW | 125 mW | Pass |

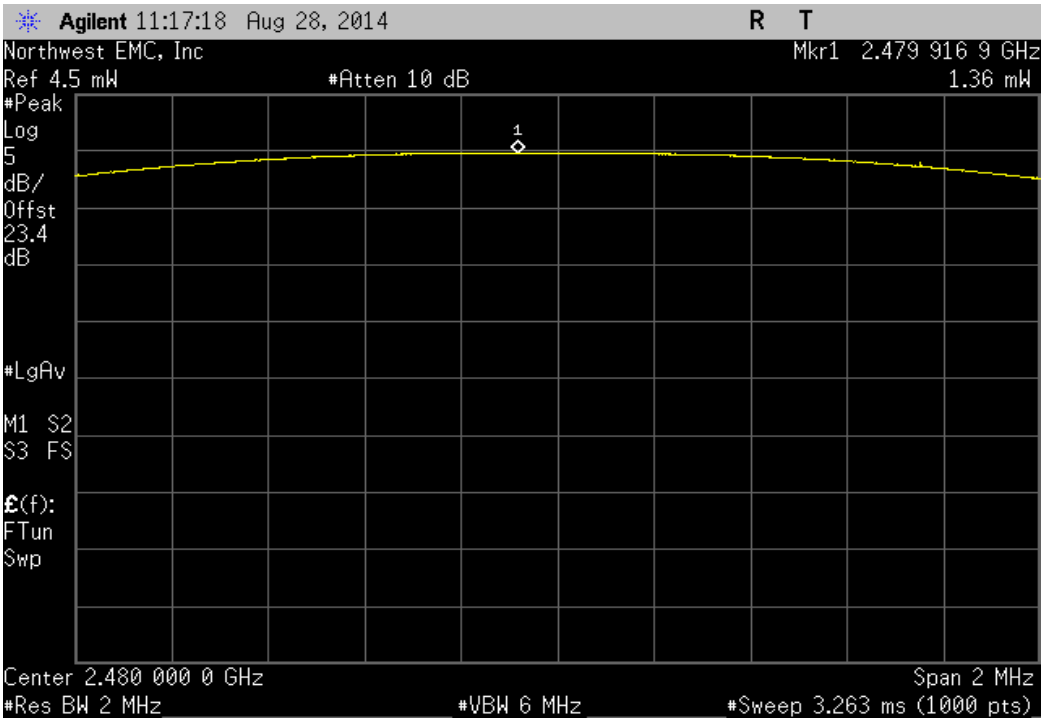



| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (<) | Result |
| | | | | 1.228 mW | 125 mW | Pass |



# OUTPUT POWER

| DH5, GFSK, High Channel 78, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (<) | Result |
| | | | | 1.359 mW | 125 mW | Pass |



# CHANNEL SEPARATION

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The channel carrier frequencies in the 2400-2483.5MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

# CHANNEL SEPARATION

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

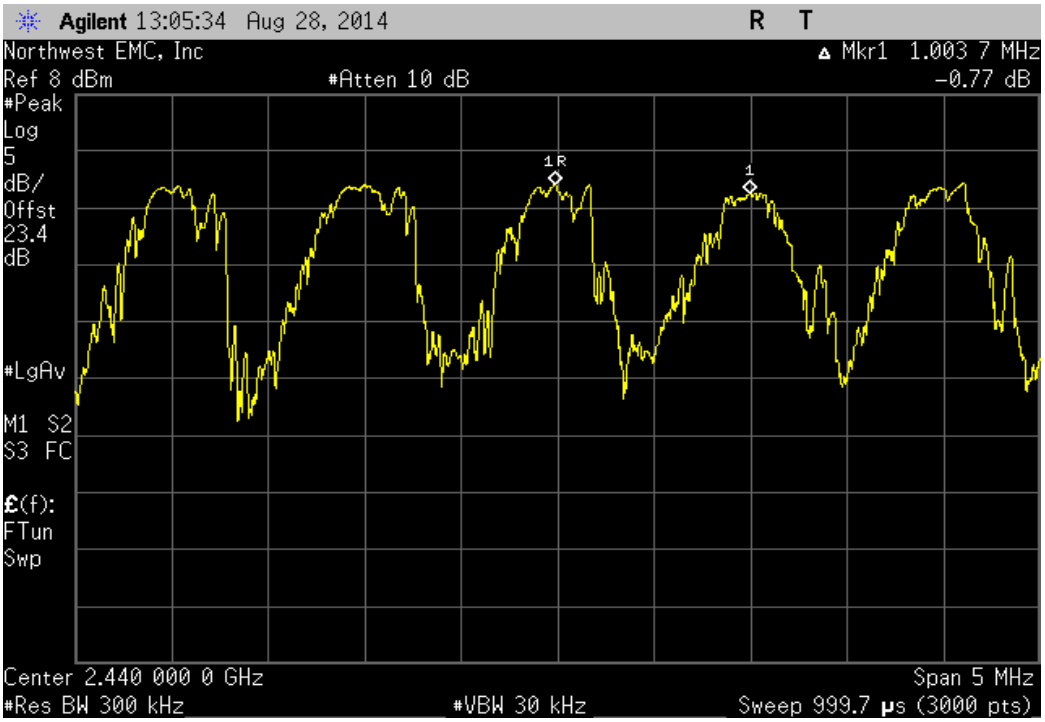
None

| Configuration # | 1 | Signature |
|---|---|---|

| | Value | Limit (≥) | Results |
|---|---|---|---|
| Hopping Mode | | | |
| Mid Channel 39, 2440 MHz | 1.0 MHz | 1 MHz | Pass |

# CHANNEL SEPARATION

| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit (≥) | Results |
| | | | | 1.0 MHz | 1 MHz | Pass |



# NUMBER OF HOPPING CHANNELS

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The number of hopping frequencies was measured across the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

# NUMBER OF HOPPING CHANNELS

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

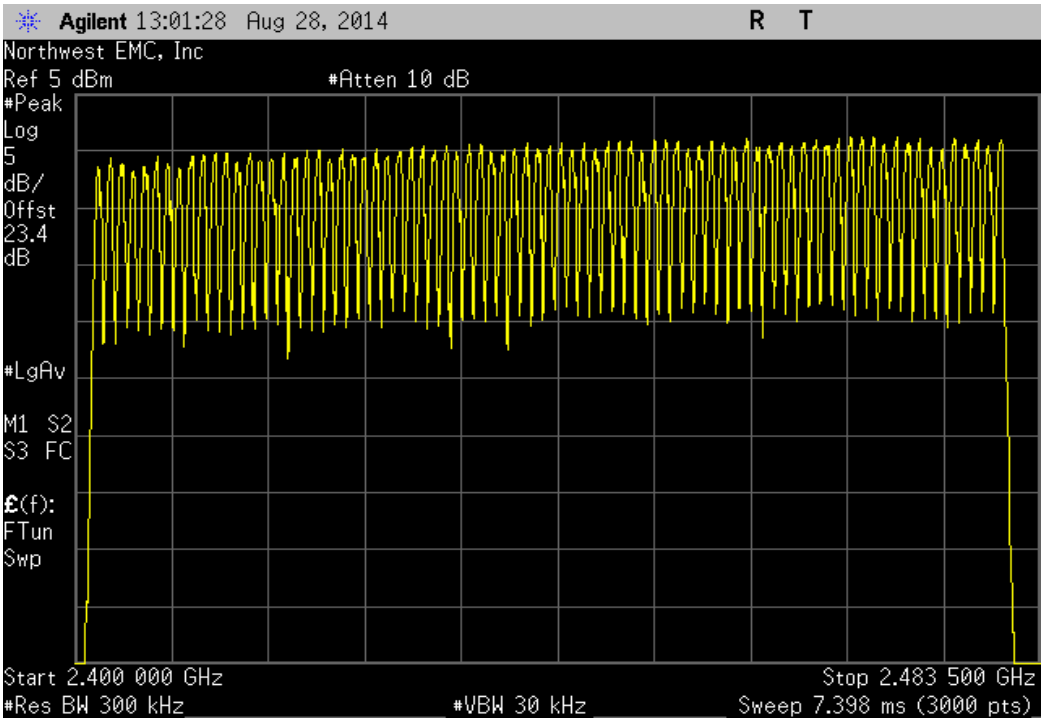
None

| Configuration # | 1 | Signature |
|---|---|---|

| | Number of Channels | Limit | Results |
|---|---|---|---|
| Hopping Mode | | | |
| Mid Channel 39, 2440 MHz | 79 | ≥ 15 | Pass |

# NUMBER OF HOPPING CHANNELS

| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Number of Channels | Limit | Results |
| | | | | 79 | ≥ 15 | Pass |



# DWELL TIME

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels * 400 mS. For Bluetooth this would be 79 Channels * 400mS = 31.6 Sec.

On Time During 31.6 Sec = Pulse Width * Average Number of Pulses * Scale Factor

- Average Number of Pulses is based on 4 samples.

- Scale Factor = 31.6 Sec / Screen Capture Sweep Time = 31.6 Sec / 6.32 Sec = 5

# DWELL TIME

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

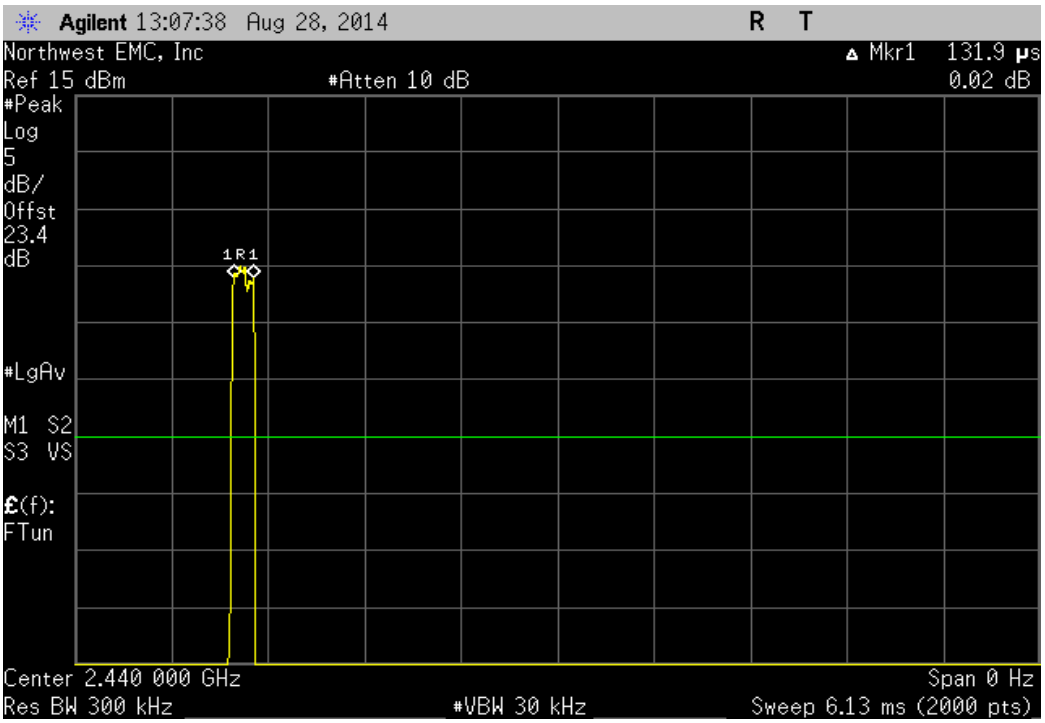
None

| Configuration # | 1 | *Signature* |
|---|---|---|

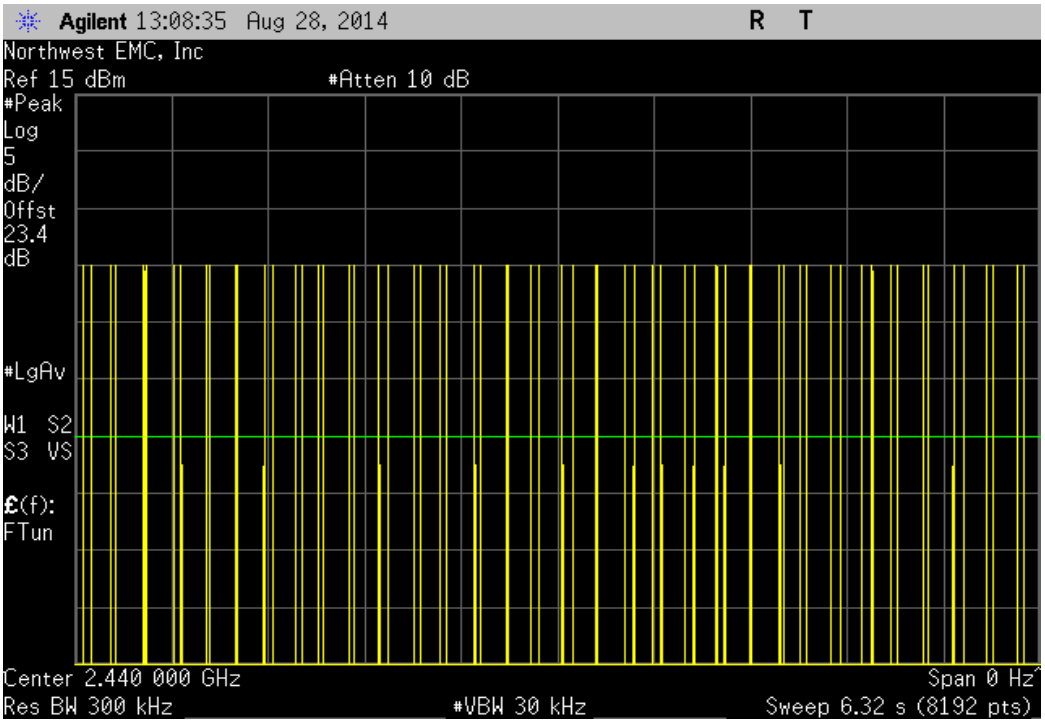
| | Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
|---|---|---|---|---|---|---|---|
| Hopping Mode | | | | | | | |
| Mid Channel 39, 2440 MHz | 0.132 | N/A | N/A | N/A | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | N/A | 64 | N/A | N/A | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | N/A | 64 | N/A | N/A | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | N/A | 64 | N/A | N/A | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | N/A | 63 | N/A | N/A | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | 0.132 | N/A | 63.75 | 5 | 42.08 | 400 | Pass |

# DWELL TIME

| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| 0.132 | N/A | N/A | N/A | N/A | N/A | N/A |

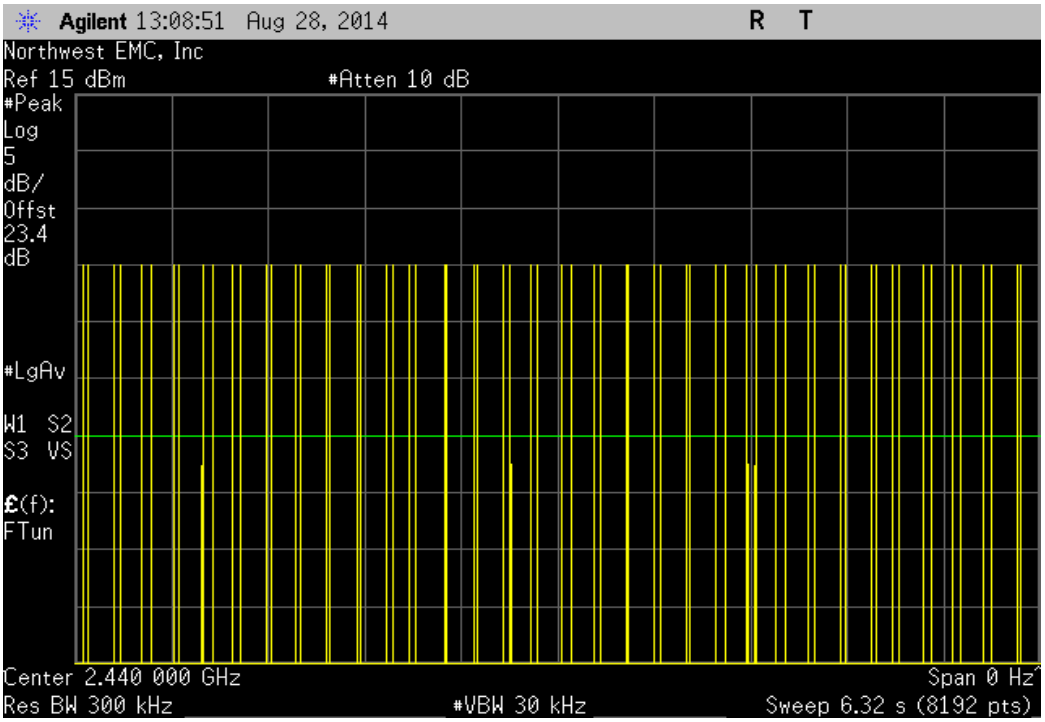



| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| N/A | 64 | N/A | N/A | N/A | N/A | N/A |

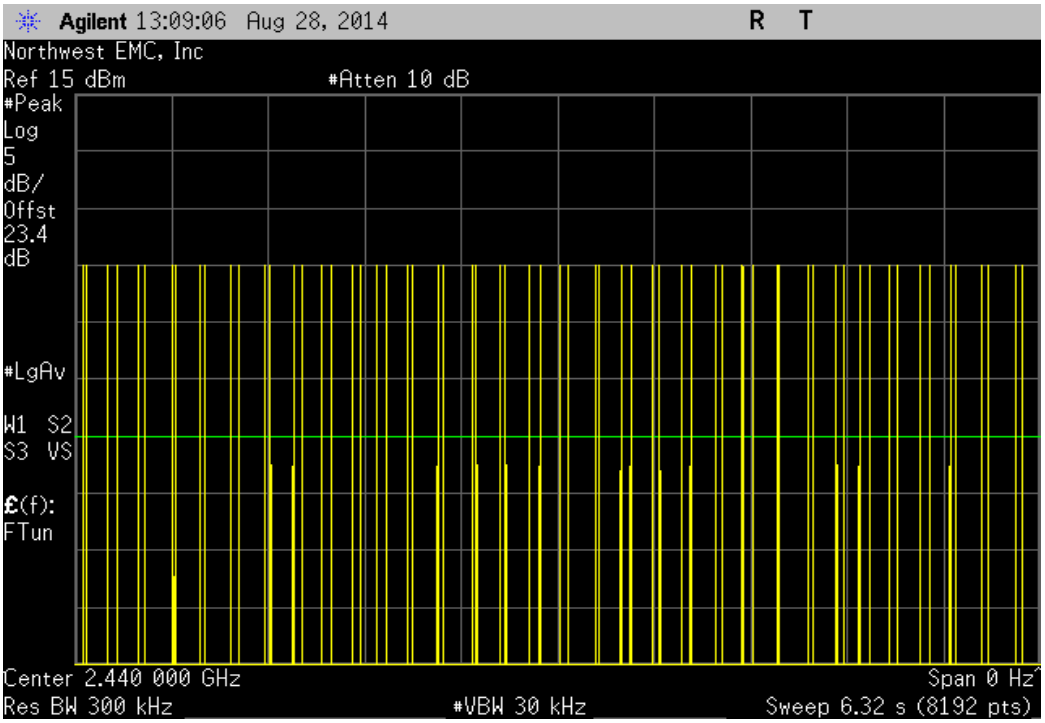


# DWELL TIME

| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| N/A | 64 | N/A | N/A | N/A | N/A | N/A |

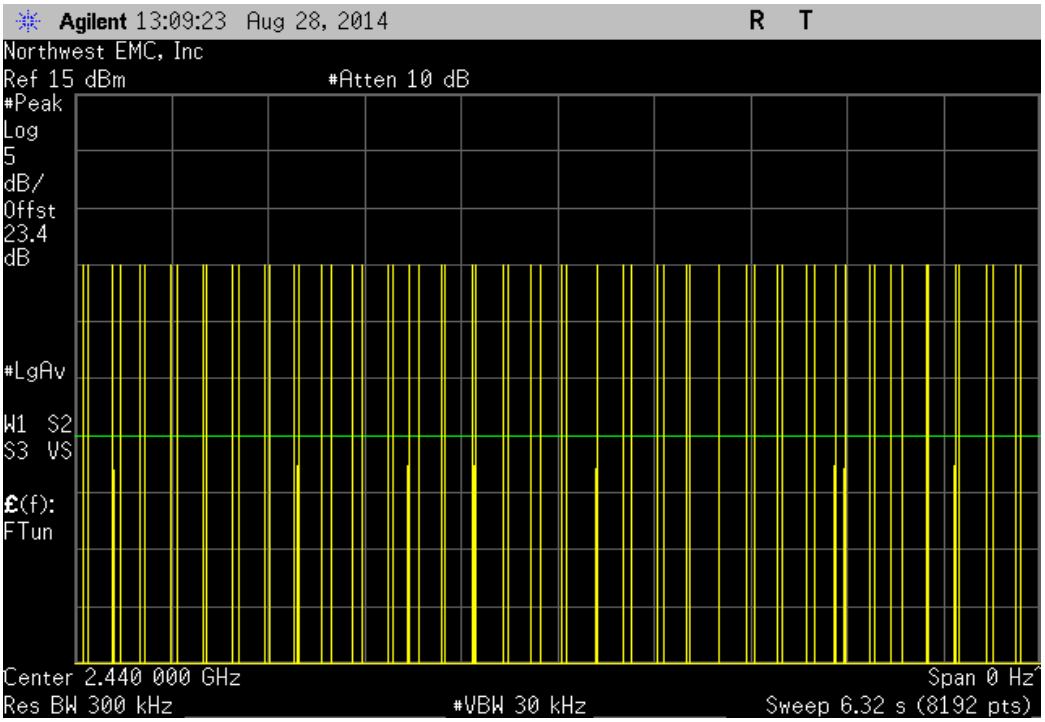



| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| N/A | 64 | N/A | N/A | N/A | N/A | N/A |



# DWELL TIME

| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| N/A | 63 | N/A | N/A | N/A | N/A | N/A |




| Hopping Mode, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Pulse Width (mS) | Number of Pulses | Average No. of Pulses | Scale Factor | On Time (mS) During 31.6 S | Limit (mS) | Results |
| 0.132 | N/A | 63.75 | 5 | 42.08 | 400 | Pass |

**Calculation Only**

**No Screen Capture Required**

# DUTY CYCLE

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

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

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used.

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

If the transmit duty cycle < 98 percent, burst gating was used during some of the other tests in this report to only measure during the burst duration.

# DUTY CYCLE

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412, Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

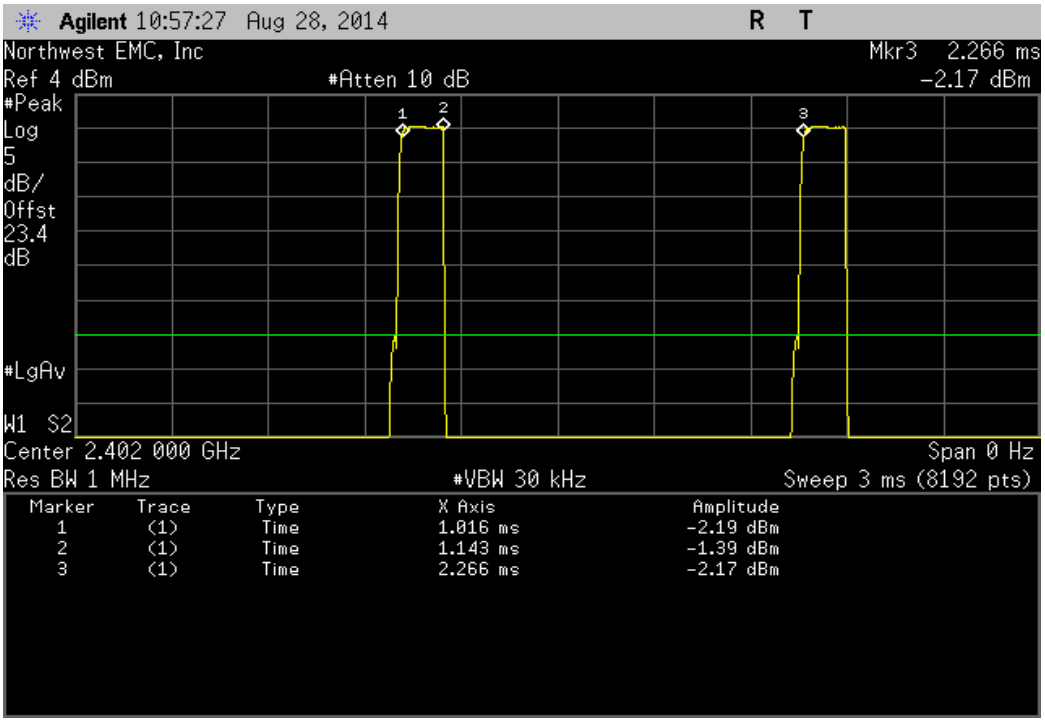
None

| Configuration # | 1 | Signature |
|---|---|---|

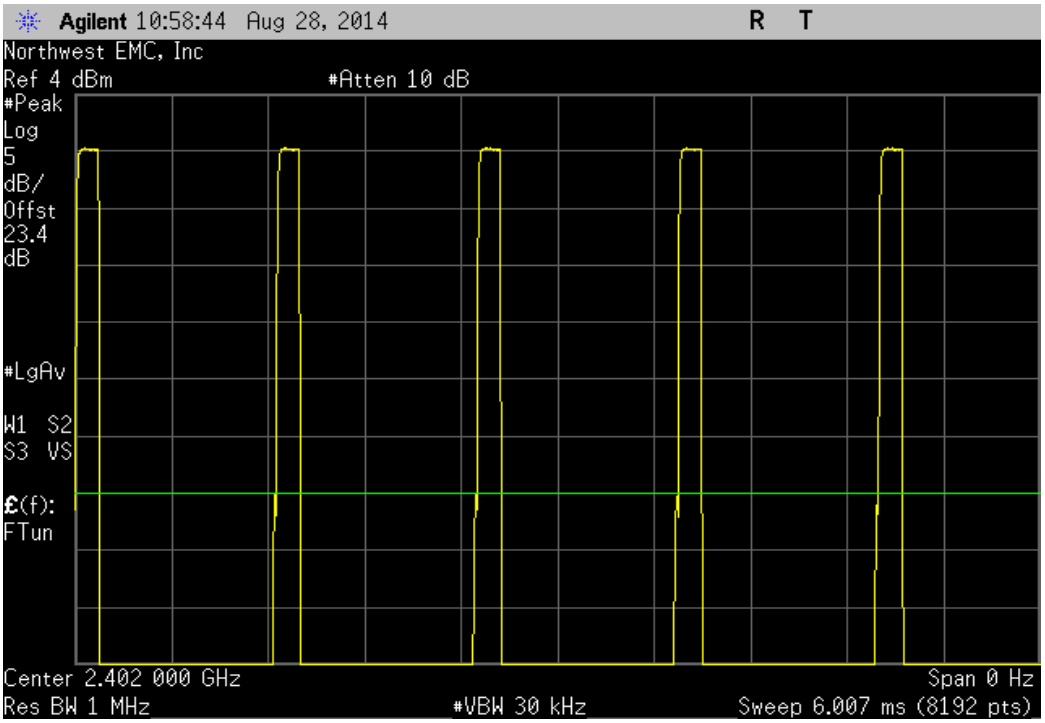
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
|---|---|---|---|---|---|---|
| DH5, GFSK | | | | | | |
| Low Channel 0, 2402 MHz | 126.788 uS | 1.25 mS | 1 | 10.1 | N/A | N/A |
| Low Channel 0, 2402 MHz | N/A | N/A | 6 | N/A | N/A | N/A |
| Mid Channel 39, 2440 MHz | 127.487 uS | 1.252 mS | 1 | 10.2 | N/A | N/A |
| Mid Channel 39, 2440 MHz | N/A | N/A | 5 | N/A | N/A | N/A |
| High Channel 78, 2480 MHz | 127.121 uS | 1.25 mS | 1 | 10.2 | N/A | N/A |
| High Channel 78, 2480 MHz | N/A | N/A | 5 | N/A | N/A | N/A |

# DUTY CYCLE

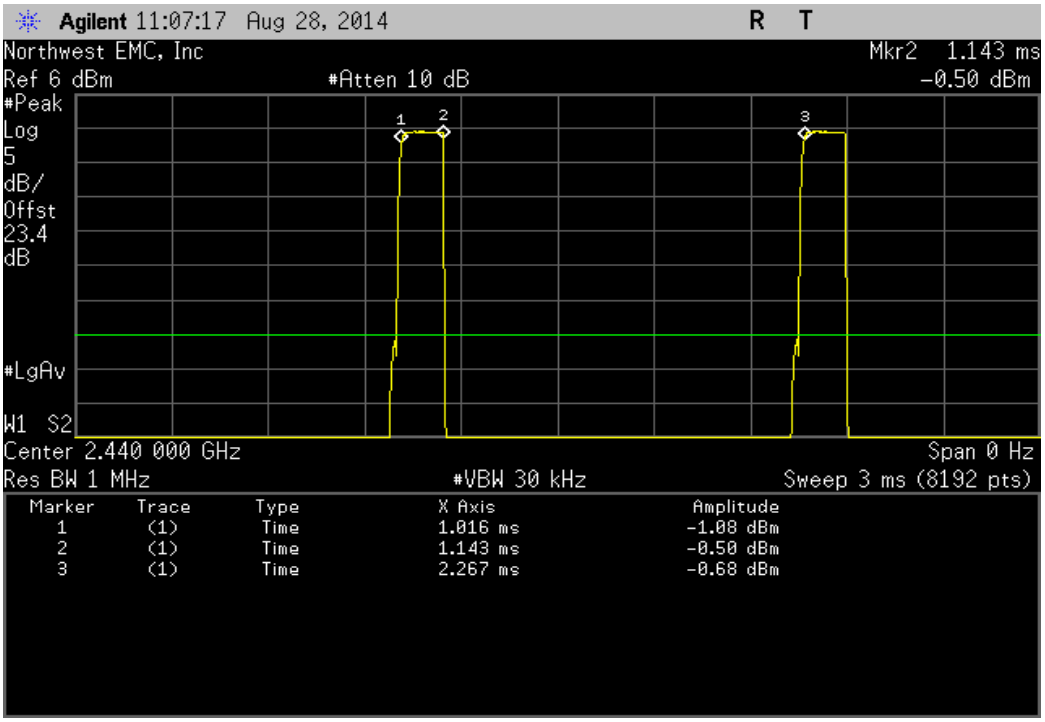
| DH5, GFSK, Low Channel 0, 2402 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | 126.788 uS | 1.25 mS | 1 | 10.1 | N/A | N/A |



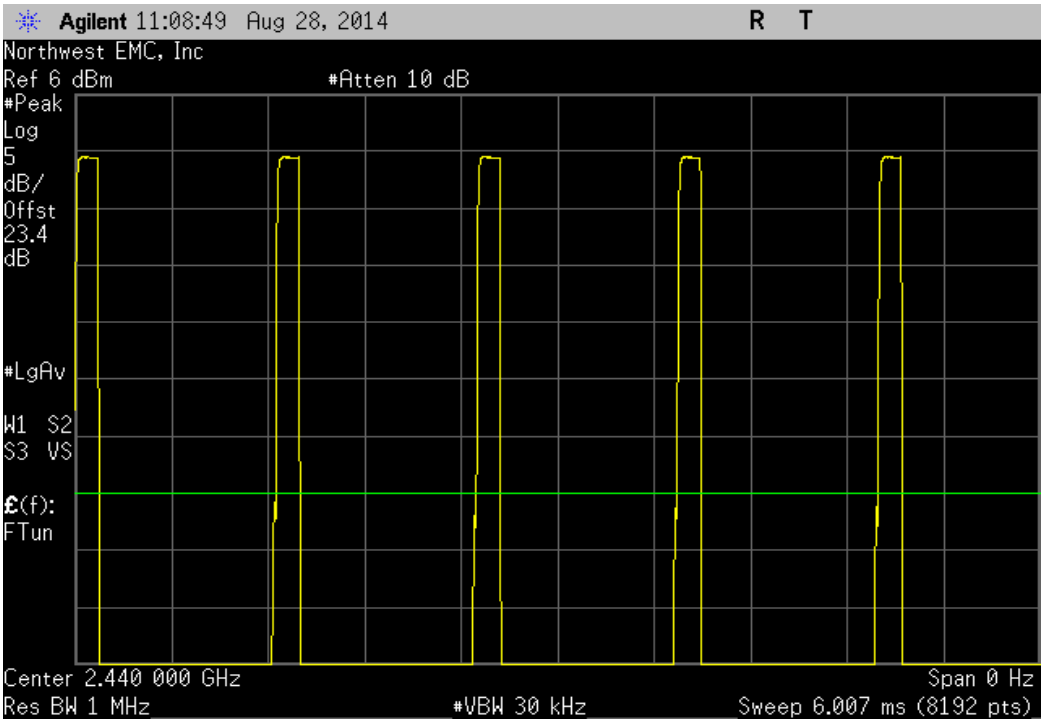

| DH5, GFSK, Low Channel 0, 2402 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | N/A | N/A | 6 | N/A | N/A | N/A |



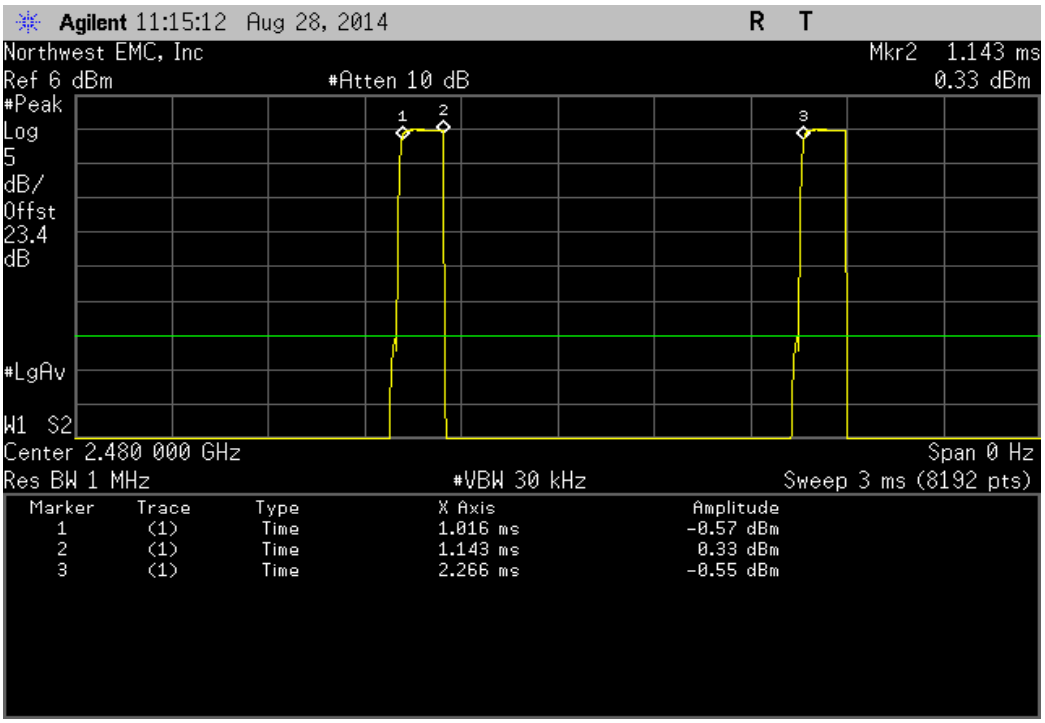
| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | 127.487 uS | 1.252 mS | 1 | 10.2 | N/A | N/A |



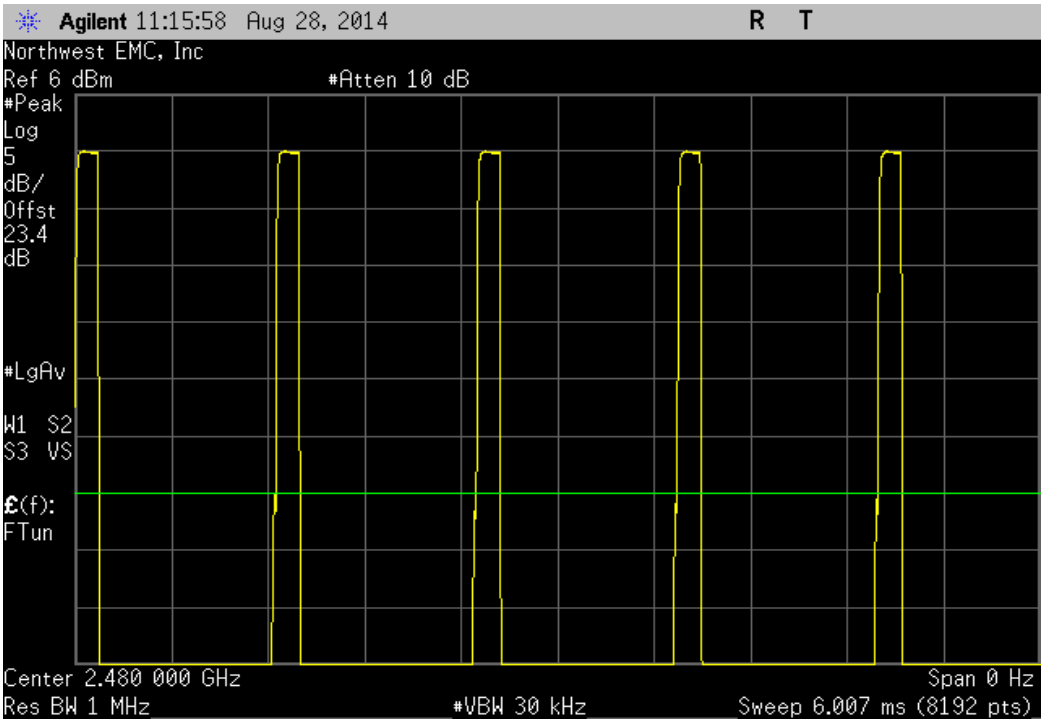

| DH5, GFSK, Mid Channel 39, 2440 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | N/A | N/A | 5 | N/A | N/A | N/A |



| DH5, GFSK, High Channel 78, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | 127.121 uS | 1.25 mS | 1 | 10.2 | N/A | N/A |




| DH5, GFSK, High Channel 78, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | Pulse Width | Period | Number of Pulses | Value (%) | Limit (%) | Results |
| | N/A | N/A | 5 | N/A | N/A | N/A |



# BAND EDGE COMPLIANCE

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

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

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

# BAND EDGE COMPLIANCE

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412 Rev B. Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

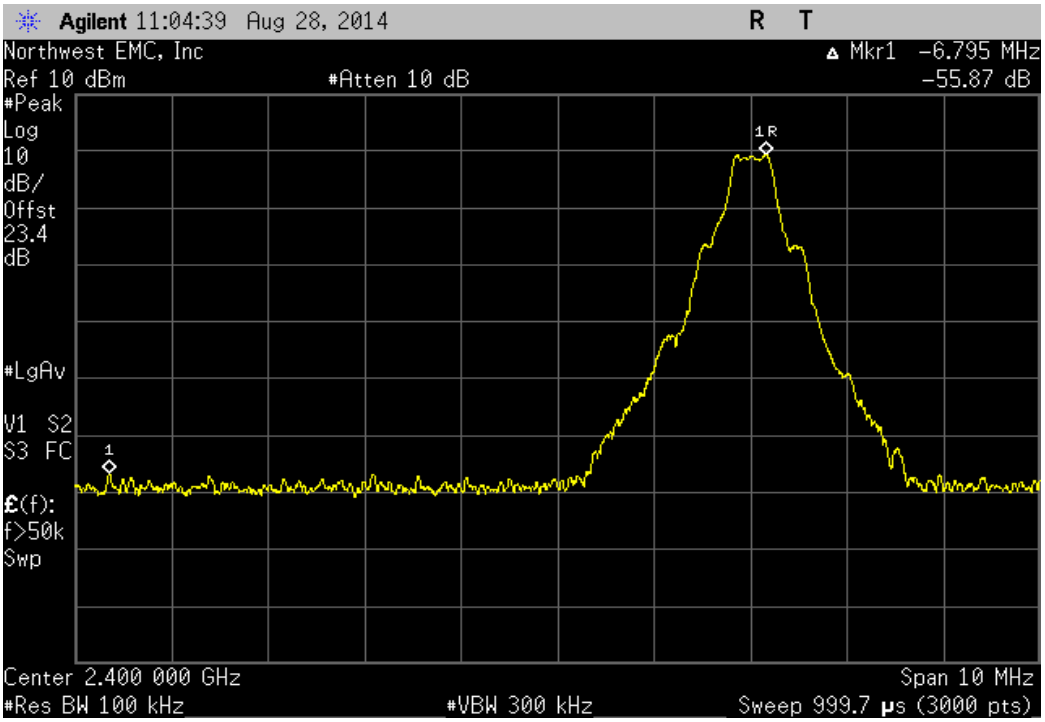
None

| Configuration # | 1 | Signature |
|---|---|---|

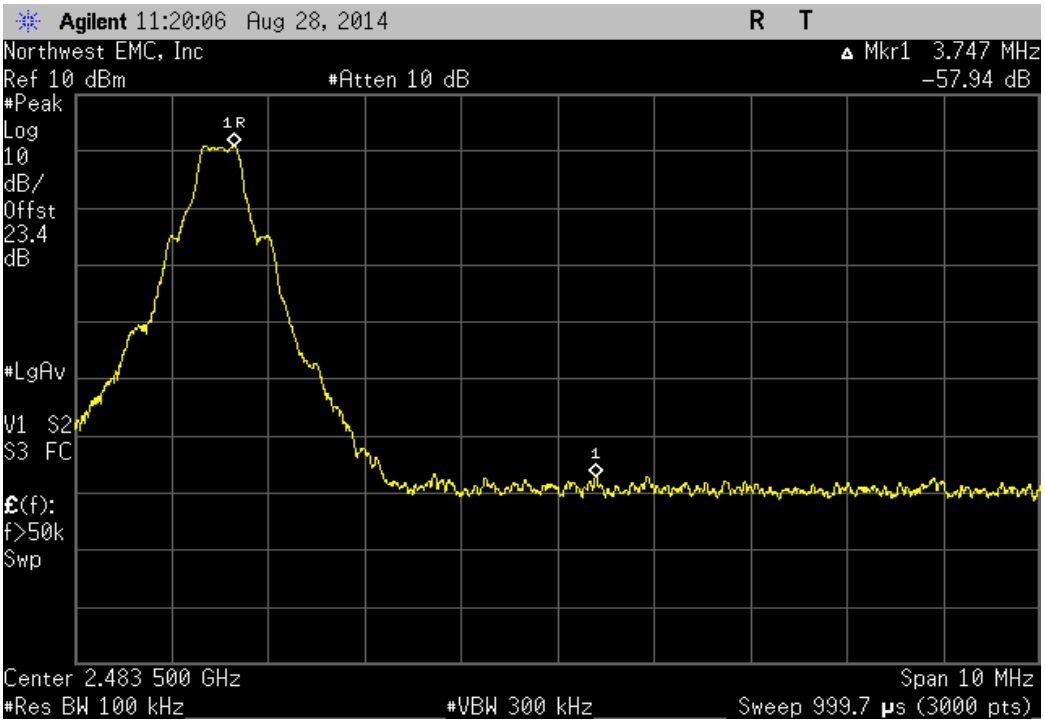
| | Value (dBc) | Limit ≤ (dBc) | Result |
|---|---|---|---|
| DH5, GFSK | | | |
| Low Channel 0, 2402 MHz | -55.87 | -20 | Pass |
| High Channel 78, 2480 MHz | -57.94 | -20 | Pass |

# BAND EDGE COMPLIANCE

| DH5, GFSK, Low Channel 0, 2402 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | | -55.87 | -20 | Pass |




| DH5, GFSK, High Channel 78, 2480 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | | -57.94 | -20 | Pass |



# BAND EDGE COMPLIANCE - HOPPING

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval (mos) |
|---|---|---|---|---|---|
| Attenuator, 6dB | S.M. Electronics | 18N-06 | AWN | 2/3/2014 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 36 |
| OC13 Cables | Fairview Microwave | SCA1814-0101-120 | OCZ | NCR | 0 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 7/30/2014 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 4/28/2014 | 12 |
| Spectrum Analyzer | Agilent | E4446A | AAY | 2/22/2013 | 24 |

**TEST DESCRIPTION**

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

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

# BAND EDGE COMPLIANCE - HOPPING

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | RAD7A/Radical 7 V2 | | | **Work Order:** | MASI0234 |
| **Serial Number:** | 1000000349 | | | **Date:** | 08/28/14 |
| **Customer:** | Masimo Corporation | | | **Temperature:** | 24.5°C |
| **Attendees:** | Michael Clark | | | **Humidity:** | 47% |
| **Project:** | None | | | **Barometric Pres.:** | 1017 |
| **Tested by:** | Johnny Candelas & Mike Tran | **Power:** | 120VAC/60Hz | **Job Site:** | OC13 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2014 | ANSI C63.10:2009 |
| | |

**COMMENTS**

DC Block/20dB Attenuator (20.5dB) + coax cable (1.85dB) + client provided patch cable (1.0dB) = 23.35dB total offset
Using Max Power Setting 20
RDS-1 Rev 1, MX-5 24494 C, Radio=24514, Radio Chip= 24412. Docking Station serial number 113674.

**DEVIATIONS FROM TEST STANDARD**

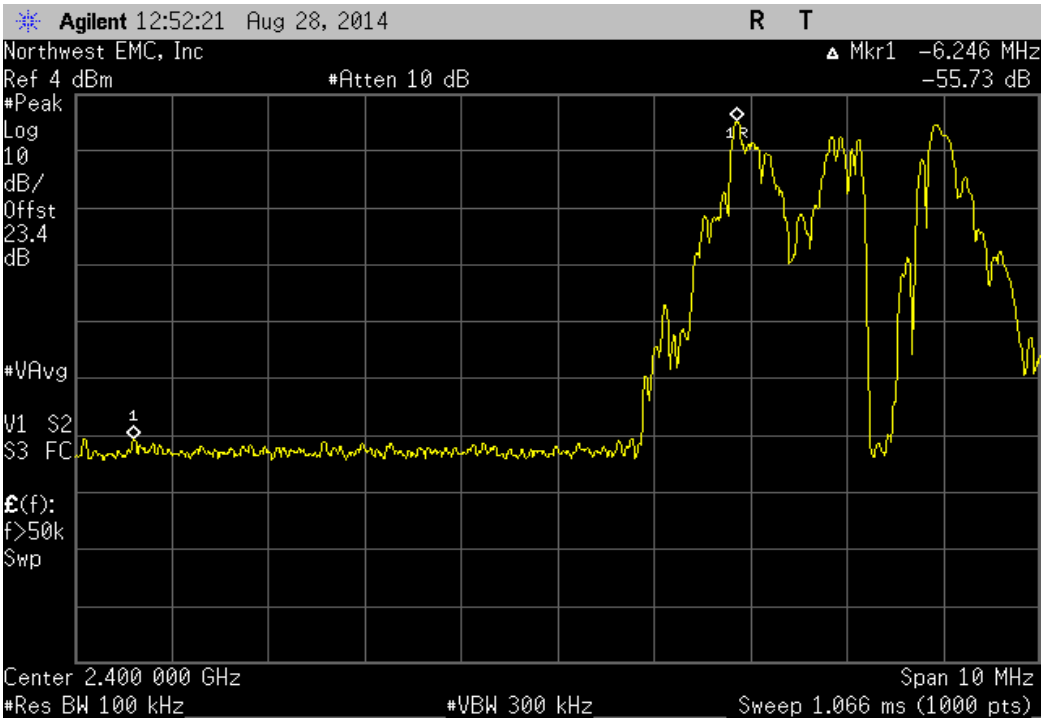
None

| Configuration # | 1 | Signature |
|---|---|---|

| | Value (dBc) | Limit ≤ (dBc) | Result |
|---|---|---|---|
| Hopping Mode | | | |
| Low Channel 0, 2402 MHz | -55.73 | -20 | Pass |
| High Channel 78, 2480 MHz | -57.01 | -20 | Pass |

# BAND EDGE COMPLIANCE - HOPPING

| Hopping Mode, Low Channel 0, 2402 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | -55.73 | -20 | Pass |




| Hopping Mode, High Channel 78, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value (dBc) | Limit ≤ (dBc) | Result |
| | | | | -57.01 | -20 | Pass |