

Masimo Corporation

Radical 7C+

Report No. MASI0057.2

Report Prepared By



www.nwemc.com
1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Last Date of Test: May 5, 2010
Masimo Corporation
Model: Radical 7C+

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.407:2010	ANSI C63.10:2009	Pass
AC Powerline Conducted Emissions	FCC 15.207:2010	ANSI C63.10:2009	Pass

Modifications made to the product

See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
41 Tesla Ave.
Irvine, CA 92618

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834B-2).

Approved By:

Don Fecteau, IS Manager



NVLAP Lab Code: 200676-0

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.

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. This Report may only be duplicated in its entirety. 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 Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



NVLAP

Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0
NVLAP LAB CODE 200881-0

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)



CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).



BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.



GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)



VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.



SCOPE

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

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



Northwest EMC Locations



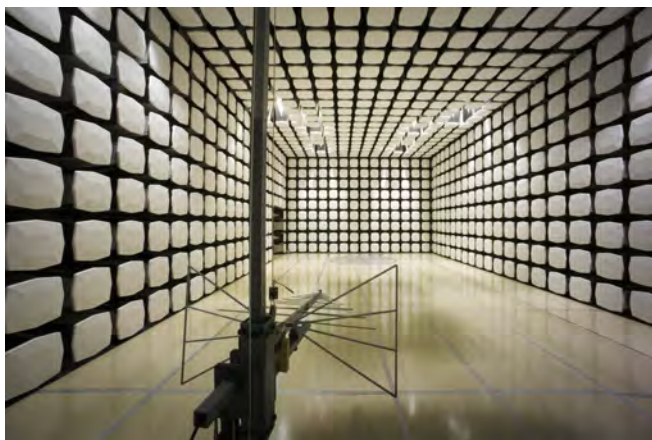
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Party Requesting the Test

Company Name:	Masimo Corporation
Address:	40 Parker
City, State, Zip:	Irvine, CA 92618
Test Requested By:	Paul Lewandowski
Model:	Radical 7C+
First Date of Test:	May 3, 2010
Last Date of Test:	May 5, 2010
Receipt Date of Samples:	May 3, 2010
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

One 802.11a/b/g radio module installed in a medical monitoring device that will be connected to hospital wireless network.

Testing Objective:

Seeking to demonstrate compliance under FCC 15E for operation in the 5.2 band

EUT Photo





CONFIGURATION 1 MASI0057**EUT**

Description	Manufacturer	Model/Part Number	Serial Number
Pulse Oximeter	Masimo	Radical 7C+	E00680

Peripherals in test setup boundary

Description	Manufacturer	Model/Part Number	Serial Number
SpO2 Cable Adapter	Masimo	None	E09H383

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Patient Cable	No	4.7m	No	SpO2 Cable Adapter	Unterminated
Patient Cable	No	4.0m	No	SpO2 Cable Adapter	Unterminated
AC Cable	No	1.8m	No	EUT	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	5/3/2010	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.
2	5/5/2010	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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.

CHANNELS INVESTIGATED

Channel 36, 5180 MHz

Channel 48, 5240 MHz

DATA RATES INVESTIGATED

6, 36, 54 Mbps

MODE USED FOR FINAL DATA

Channel 36, 5180 MHz

POWER SETTINGS INVESTIGATED

120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency

1000 MHz

Stop Frequency

40000 MHz

CLOCKS AND OSCILLATORS

5180 MHz, 5240 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
Signal Generator	Agilent	E8257D	TGU	12/20/2008	24
Antenna, Horn	EMCO	3115	AHA	10/22/2009	24
Power Meter	Hewlett Packard	E4418A	SPA	4/21/2010	13
Antenna, Dipole	EMCO	3121C -DB1, -DB2, -DB3, _DB4	ADF	NCR	0
High Pass Filter	Micro-Tronics	HPM50111	HGC	11/20/2009	13
Pre-Amplifier	Miteq	JS4-26004000-50-5A	AON	8/19/2009	13
Antenna, Horn	EMCO	3160-10	AHI	NCR	0
OC floating Cable	N/A	26-40 GHz RE Cable	OCU	8/19/2009	13
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	5/3/2010	13
Antenna, Horn	EMCO	3160-09	AHN	NCR	0
OC floating Cable	N/A	18-26GHz RE Cables	OCK	5/3/2010	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	12/21/2009	13
Antenna, Horn	EMCO	3160-08	AHK	NCR	0
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	4/11/2010	13
Antenna, Horn	ETS	3160-07	AHX	NCR	0
OC11 Cables	N/A	12-18GHz RE Cables	OCS	4/11/2010	13
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	9/10/2009	13
Antenna, Horn	EMCO	3115	AHB	9/11/2009	24
OC11 Cables	N/A	1-8GHz RE Cables	OCR	3/19/2010	13
Pre-Amplifier	Miteq	AM-1551	AOU	2/11/2009	24
Spectrum Analyzer	Agilent	E4440A	AFA	2/9/2010	13

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

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

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. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

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, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST

EMC

SPURIOUS RADIATED EMISSIONS

PSA 2008.07.21

EMI 2009.8.29

EUT:	Radical 7C+	Work Order:	MASI0057
Serial Number:	E00680	Date:	05/05/10
Customer:	Masimo Corporation	Temperature:	21.7
Attendees:	None	Humidity:	41%
Project:	None	Barometric Pres.:	1020.5mb
Tested by:	Jaemi Suh	Power:	120VAC/60Hz
		Job Site:	OC11

TEST SPECIFICATIONS	Test Method
FCC 15.407:2010	ANSI C63.10:2009

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Channel 36, Speed 6 mbps

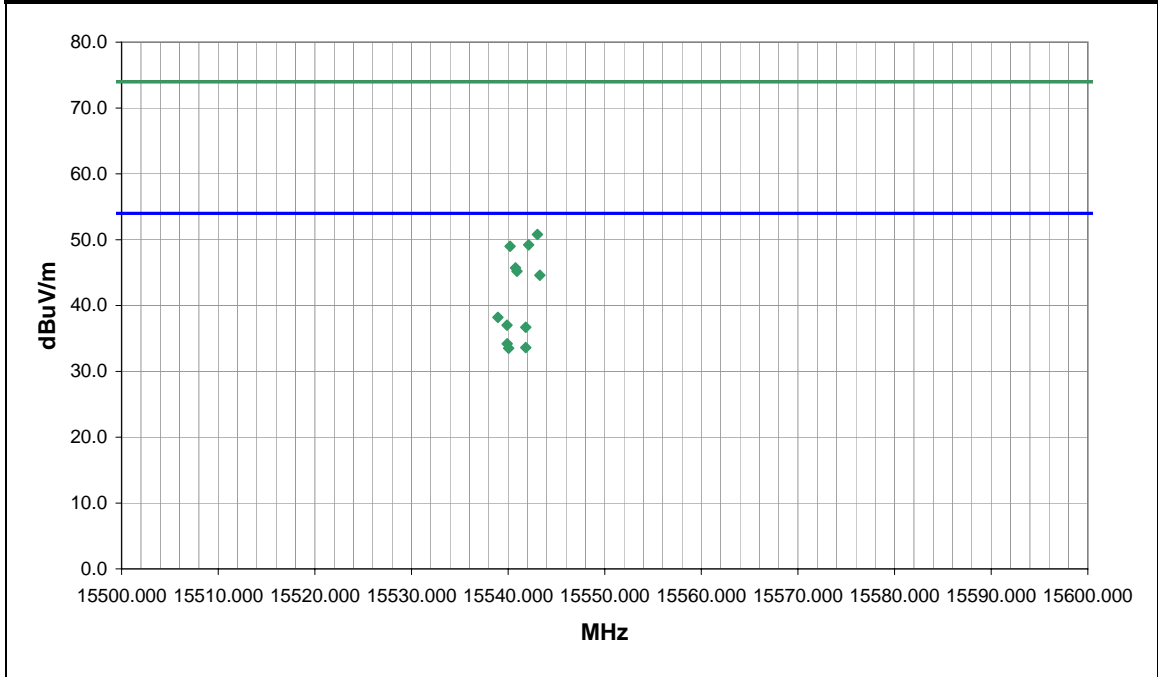
EUT OPERATING MODES

Ant 1, Transmit Mode

DEVIATIONS FROM TEST STANDARD


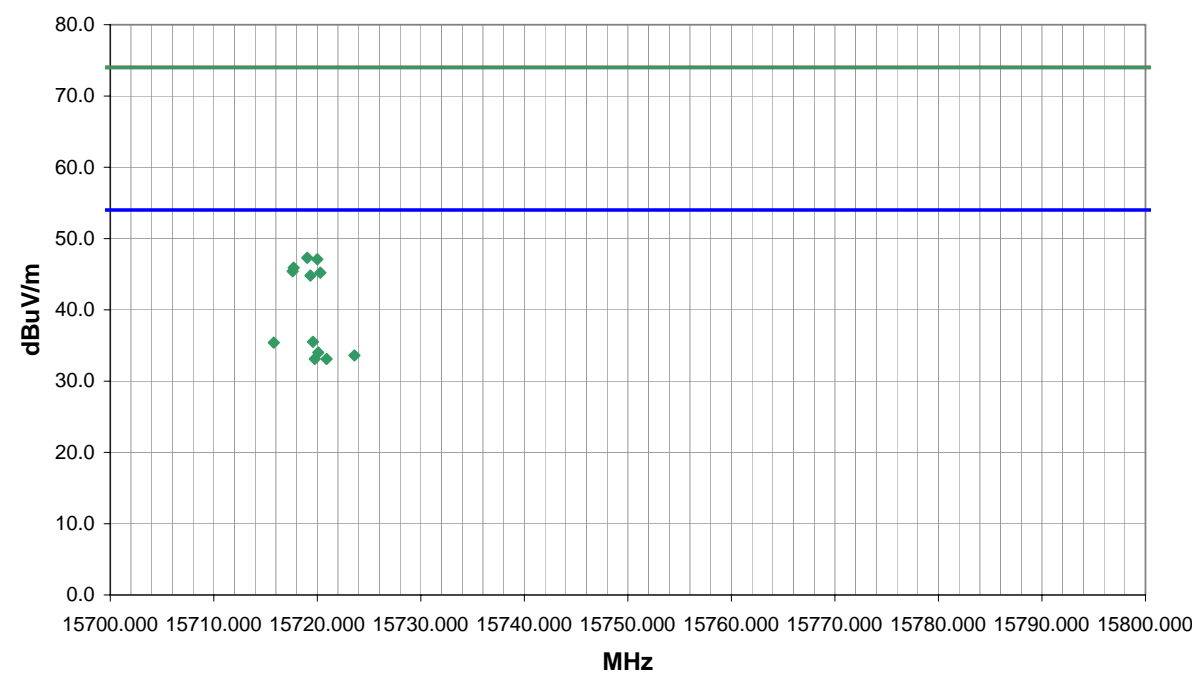
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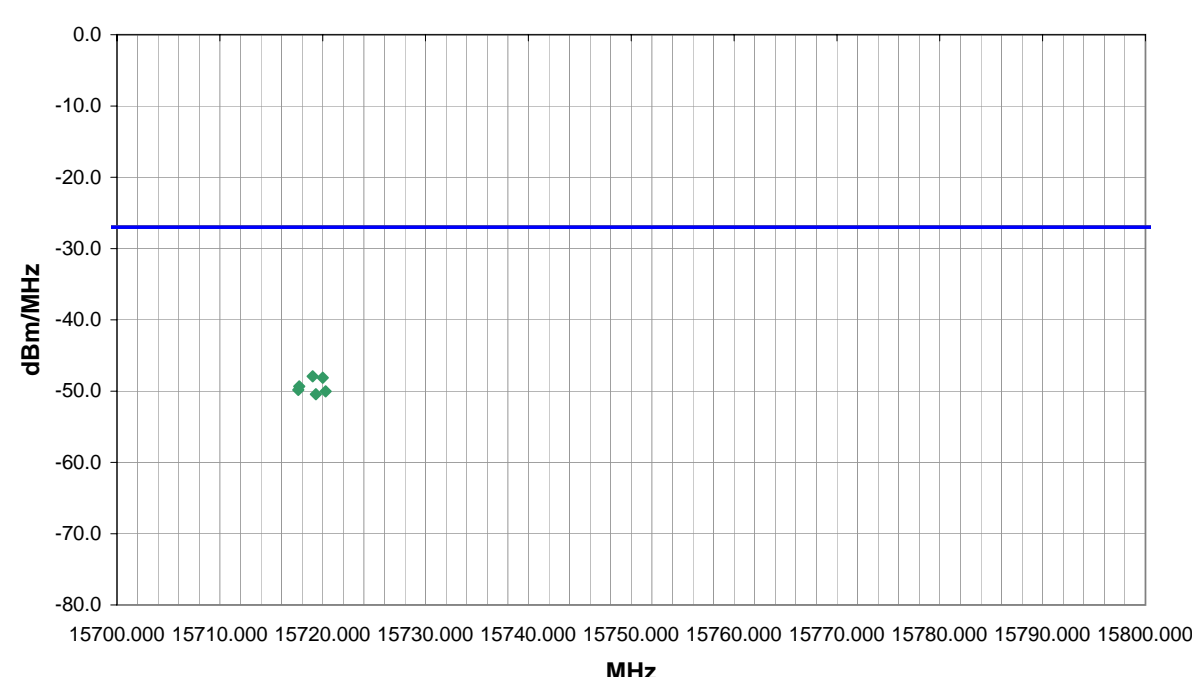
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Configuration #	1	
Results	Pass	


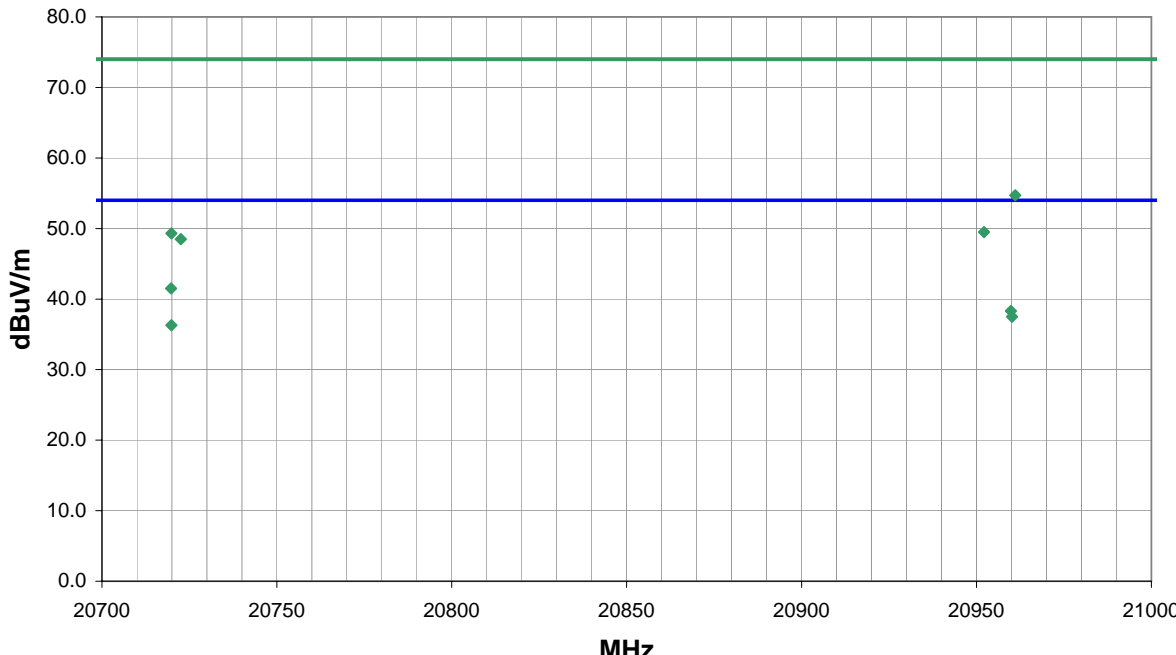


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
15538.950	34.9	3.3	122.0	1.0	3.0	0.0	H-Horn	AV	0.0	38.2	54.0	-15.8	6 Mbps
15539.890	33.7	3.3	118.0	1.0	3.0	0.0	H-Horn	AV	0.0	37.0	54.0	-17.0	36 Mbps
15541.830	33.4	3.3	120.0	1.0	3.0	0.0	H-Horn	AV	0.0	36.7	54.0	-17.3	54 Mbps
15539.910	30.9	3.3	103.0	1.0	3.0	0.0	V-Horn	AV	0.0	34.2	54.0	-19.8	36 Mbps
15541.820	30.3	3.3	101.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.6	54.0	-20.4	6 Mbps
15540.050	30.2	3.3	101.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.5	54.0	-20.5	54 Mbps
15543.040	47.5	3.3	122.0	1.0	3.0	0.0	H-Horn	PK	0.0	50.8	74.0	-23.2	6 Mbps
15542.130	45.9	3.3	118.0	1.0	3.0	0.0	H-Horn	PK	0.0	49.2	74.0	-24.8	36 Mbps
15540.200	45.7	3.3	120.0	1.0	3.0	0.0	H-Horn	PK	0.0	49.0	74.0	-25.0	54 Mbps
15540.770	42.4	3.3	103.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.7	74.0	-28.3	36 Mbps
15540.920	41.9	3.3	101.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.2	74.0	-28.8	6 Mbps
15543.290	41.3	3.3	101.0	1.0	3.0	0.0	V-Horn	PK	0.0	44.6	74.0	-29.4	54 Mbps

NORTHWEST		PSA 2008.07.21 EMI 2009.8.29									
EMC		SPURIOUS RADIATED EMISSIONS									
EUT: Radical 7C+		Work Order: MASI0057									
Serial Number: E00680		Date: 05/05/10									
Customer: Masimo Corporation		Temperature: 21.7									
Attendees: None		Humidity: 41%									
Project: None		Barometric Pres.: 1020.5mb									
Tested by: Jaemi Suh		Power: 120VAC/60Hz									
		Job Site: OC11									
TEST SPECIFICATIONS		Test Method									
FCC 15.407:2010		ANSI C63.10:2009									
TEST PARAMETERS											
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3								
COMMENTS											
Channel 36, Speed 6 mbps											
EUT OPERATING MODES											
Ant 1, Transmit Mode											
DEVIATIONS FROM TEST STANDARD											
No deviations.											
Run #	12	<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Signature</div> </div>									
Configuration #	1										
Results	Pass										
MHz											
Freq (MHz)		Azimuth (degrees)	Height (meters)		Polarity	Detector	EIRP (Watts)	EIRP (dBm.MHz)	Spec. Limit (dBm.MHz)	Compared to Spec. (dB)	Comments
15543.040		122.0	1.0		H-Horn	PK	3.61E-08	-44.4	-27.0	-17.4	6 Mbps
15542.130		118.0	1.0		H-Horn	PK	2.50E-08	-46.0	-27.0	-19.0	36 Mbps
15540.200		120.0	1.0		H-Horn	PK	2.38E-08	-46.2	-27.0	-19.2	54 Mbps
15540.770		103.0	1.0		V-Horn	PK	1.11E-08	-49.5	-27.0	-22.5	36 Mbps
15540.920		101.0	1.0		V-Horn	PK	9.93E-09	-50.0	-27.0	-23.0	6 Mbps
15543.290		101.0	1.0		V-Horn	PK	8.65E-09	-50.6	-27.0	-23.6	54 Mbps

NORTHWEST EMC										PSA 2008.07.21 EMI 2009.8.29			
SPURIOUS RADIATED EMISSIONS													
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Serial Number: E00680					Date: 05/05/10								
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Project: None					Barometric Pres.: 1020.5mb								
Tested by: Jaemi Suh			Power: 120VAC/60Hz		Job Site: OC11								
TEST SPECIFICATIONS					Test Method								
FCC 15.407:2010					ANSI C63.10:2009								
TEST PARAMETERS													
Antenna Height(s) (m)			1 - 4		Test Distance (m)			3					
COMMENTS													
Channel 48, Speed 6 mbps													
EUT OPERATING MODES													
Ant 1, Transmit Mode													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		13		<div style="text-align: right;">  Signature </div>									
Configuration #		1											
Results		Pass											
													
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	
15719.580	31.5	4.0	124.0	1.0	3.0	0.0	H-Horn	AV	0.0	35.5	54.0	-18.5	
15715.790	31.4	4.0	123.0	1.0	3.0	0.0	H-Horn	AV	0.0	35.4	54.0	-18.6	
15720.100	30.0	4.0	96.0	1.0	3.0	0.0	H-Horn	AV	0.0	34.0	54.0	-20.0	
15723.580	29.6	4.0	126.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.6	54.0	-20.4	
15719.750	29.1	4.0	72.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.1	54.0	-20.9	
15720.890	29.1	4.0	106.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.1	54.0	-20.9	
15719.030	43.3	4.0	124.0	1.0	3.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	
15720.000	43.1	4.0	123.0	1.0	3.0	0.0	H-Horn	PK	0.0	47.1	74.0	-26.9	
15717.720	41.9	4.0	96.0	1.0	3.0	0.0	H-Horn	PK	0.0	45.9	74.0	-28.1	
15717.620	41.4	4.0	106.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.4	74.0	-28.6	
15720.290	41.2	4.0	126.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.2	74.0	-28.8	
15719.340	40.8	4.0	72.0	1.0	3.0	0.0	V-Horn	PK	0.0	44.8	74.0	-29.2	

NORTHWEST		SPURIOUS RADIATED EMISSIONS		PSA 2008.07.21																																																																																					
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<table border="1"> <thead> <tr> <th>Freq (MHz)</th> <th></th> <th></th> <th>Azimuth (degrees)</th> <th>Height (meters)</th> <th></th> <th>Polarity</th> <th>Detector</th> <th>EIRP (Watts)</th> <th>EIRP (dBm.MHz)</th> <th>Spec. Limit (dBm.MHz)</th> <th>Compared to Spec. (dB)</th> </tr> </thead> <tbody> <tr> <td>15719.030</td> <td></td> <td></td> <td>124.0</td> <td>1.0</td> <td></td> <td>H-Horn</td> <td>PK</td> <td>1.61E-08</td> <td>-47.9</td> <td>-27.0</td> <td>-20.9</td> </tr> <tr> <td>15720.000</td> <td></td> <td></td> <td>123.0</td> <td>1.0</td> <td></td> <td>H-Horn</td> <td>PK</td> <td>1.54E-08</td> <td>-48.1</td> <td>-27.0</td> <td>-21.1</td> </tr> <tr> <td>15717.720</td> <td></td> <td></td> <td>96.0</td> <td>1.0</td> <td></td> <td>H-Horn</td> <td>PK</td> <td>1.17E-08</td> <td>-49.3</td> <td>-27.0</td> <td>-22.3</td> </tr> <tr> <td>15717.620</td> <td></td> <td></td> <td>106.0</td> <td>1.0</td> <td></td> <td>V-Horn</td> <td>PK</td> <td>1.04E-08</td> <td>-49.8</td> <td>-27.0</td> <td>-22.8</td> </tr> <tr> <td>15720.290</td> <td></td> <td></td> <td>126.0</td> <td>1.0</td> <td></td> <td>V-Horn</td> <td>PK</td> <td>9.93E-09</td> <td>-50.0</td> <td>-27.0</td> <td>-23.0</td> </tr> <tr> <td>15719.340</td> <td></td> <td></td> <td>72.0</td> <td>1.0</td> <td></td> <td>V-Horn</td> <td>PK</td> <td>9.06E-09</td> <td>-50.4</td> <td>-27.0</td> <td>-23.4</td> </tr> </tbody> </table>						Freq (MHz)			Azimuth (degrees)	Height (meters)		Polarity	Detector	EIRP (Watts)	EIRP (dBm.MHz)	Spec. Limit (dBm.MHz)	Compared to Spec. (dB)	15719.030			124.0	1.0		H-Horn	PK	1.61E-08	-47.9	-27.0	-20.9	15720.000			123.0	1.0		H-Horn	PK	1.54E-08	-48.1	-27.0	-21.1	15717.720			96.0	1.0		H-Horn	PK	1.17E-08	-49.3	-27.0	-22.3	15717.620			106.0	1.0		V-Horn	PK	1.04E-08	-49.8	-27.0	-22.8	15720.290			126.0	1.0		V-Horn	PK	9.93E-09	-50.0	-27.0	-23.0	15719.340			72.0	1.0		V-Horn	PK	9.06E-09	-50.4	-27.0	-23.4
Freq (MHz)			Azimuth (degrees)	Height (meters)		Polarity	Detector	EIRP (Watts)	EIRP (dBm.MHz)	Spec. Limit (dBm.MHz)	Compared to Spec. (dB)																																																																														
15719.030			124.0	1.0		H-Horn	PK	1.61E-08	-47.9	-27.0	-20.9																																																																														
15720.000			123.0	1.0		H-Horn	PK	1.54E-08	-48.1	-27.0	-21.1																																																																														
15717.720			96.0	1.0		H-Horn	PK	1.17E-08	-49.3	-27.0	-22.3																																																																														
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15719.340			72.0	1.0		V-Horn	PK	9.06E-09	-50.4	-27.0	-23.4																																																																														

NORTHWEST		PSA 2008.07.21										
EMC		SPURIOUS RADIATED EMISSIONS										
EMI 2009.8.29												
EUT: Radical 7C+		Work Order: MASI0057										
Serial Number: E00680		Date: 05/05/10										
Customer: Masimo Corporation		Temperature: 21.7										
Attendees: None		Humidity: 41%										
Project: None		Barometric Pres.: 1020.5mb										
Tested by: Jaemi Suh		Power: 120VAC/60Hz	Job Site: OC11									
TEST SPECIFICATIONS		Test Method										
FCC 15.407:2010		ANSI C63.10:2009										
TEST PARAMETERS												
Antenna Height(s) (m)	1 - 4	Test Distance (m)	1									
COMMENTS												
Channel 36, 48. Speed 6 mbps												
EUT OPERATING MODES												
Ant 1. Transmit Mode												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #	18	 Signature										
Configuration #	1											
Results	Pass											
												
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted unknown units	Spec. Limit unknown units	Compared to Spec. (dB)
20719.78	41.2	0.3	19.0	1.0	1.0	0.0	-I-High Horr	AV	0.0	41.5	54.0	-12.5
20959.83	38.0	0.3	20.0	1.0	1.0	0.0	-I-High Horr	AV	0.0	38.3	54.0	-15.7
20960.17	37.2	0.3	204.0	1.0	1.0	0.0	√-High Horr	AV	0.0	37.5	54.0	-16.5
20719.83	36.0	0.3	203.0	1.0	1.0	0.0	√-High Horr	AV	0.0	36.3	54.0	-17.7
20961.08	54.4	0.3	20.0	1.0	1.0	0.0	-I-High Horr	PK	0.0	54.7	74.0	-19.3
20952.17	49.2	0.3	204.0	1.0	1.0	0.0	√-High Horr	PK	0.0	49.5	74.0	-24.5
20719.83	49.0	0.3	203.0	1.0	1.0	0.0	√-High Horr	PK	0.0	49.3	74.0	-24.7
20722.53	48.2	0.3	19.0	1.0	1.0	0.0	-I-High Horr	PK	0.0	48.5	74.0	-25.5

EUT: Radical 7C+	Work Order: MASI0057
Serial Number: E00680	Date: 05/05/10
Customer: Masimo Corporation	Temperature: 21.7
Attendees: None	Humidity: 41%
Project: None	Barometric Pres.: 1020.5mb
Tested by: Jaemi Suh	Power: 120VAC/60Hz
	Job Site: OC11

TEST SPECIFICATIONS	Test Method
FCC 15.407:2010	ANSI C63.10:2009

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	1

COMMENTS
Channel 36, 48. Speed 6 mbps

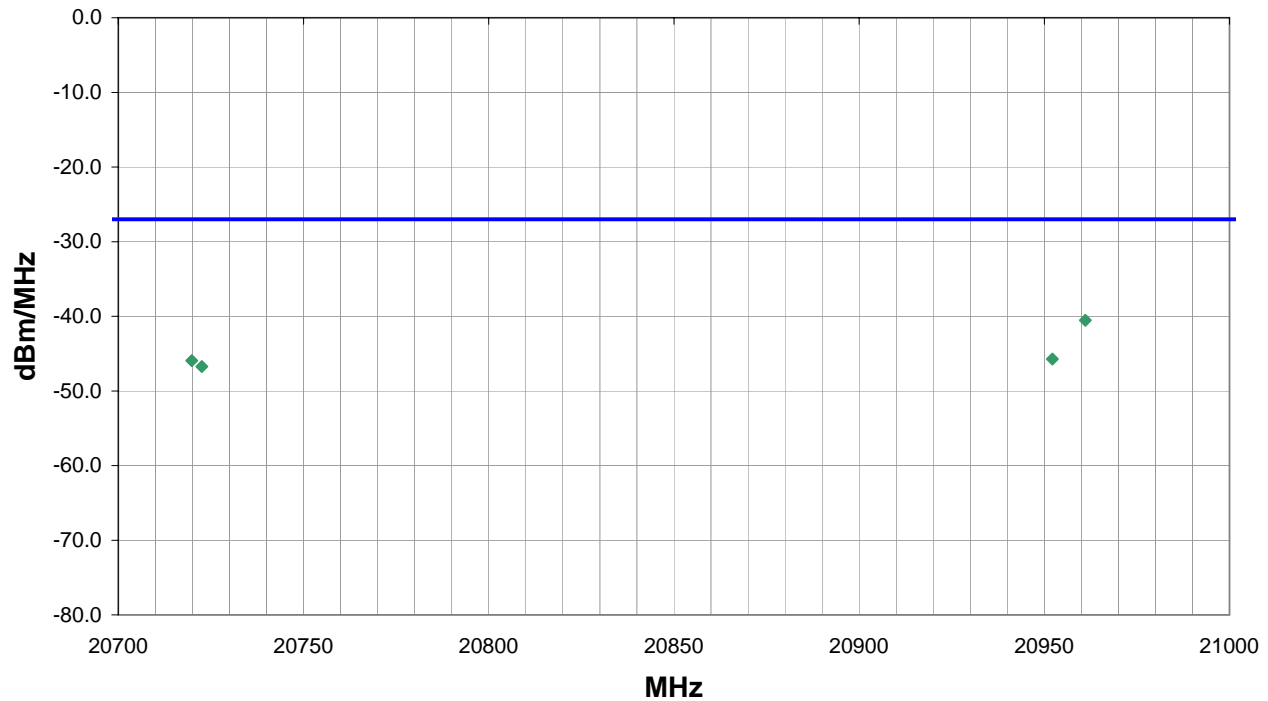
EUT OPERATING MODES

Ant 1. Transmit Mode


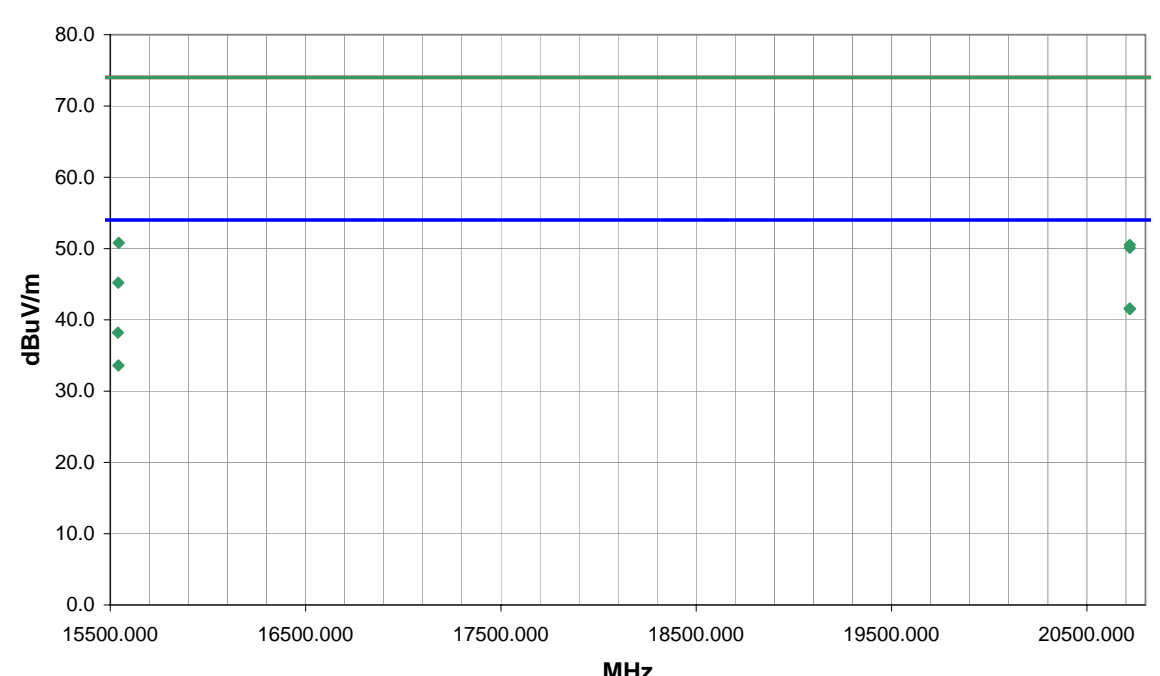
DEVIATIONS FROM TEST STANDARD


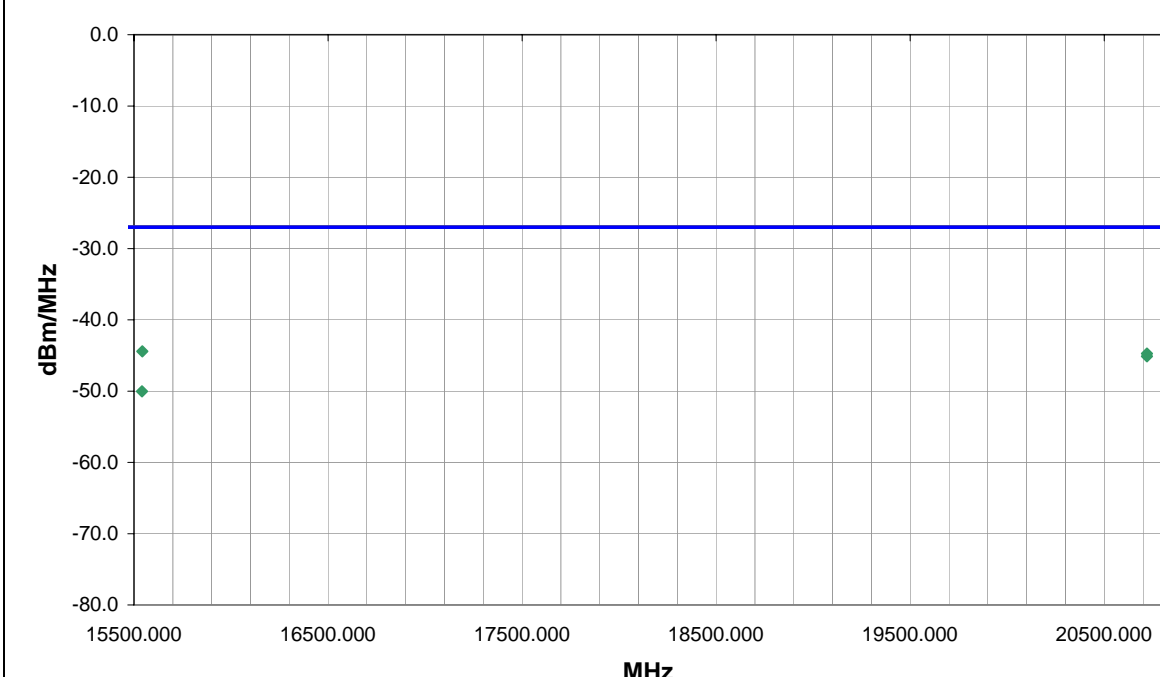
No deviations.

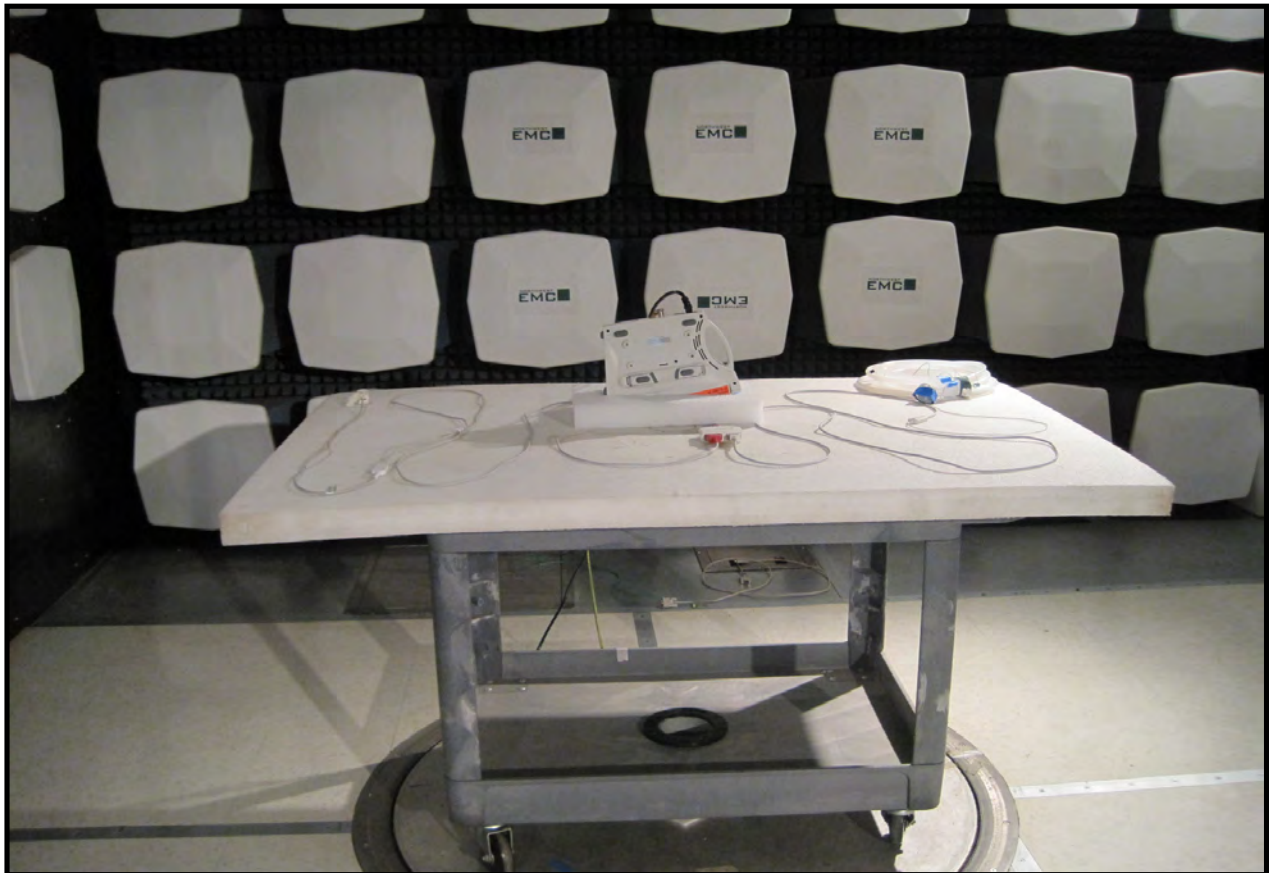
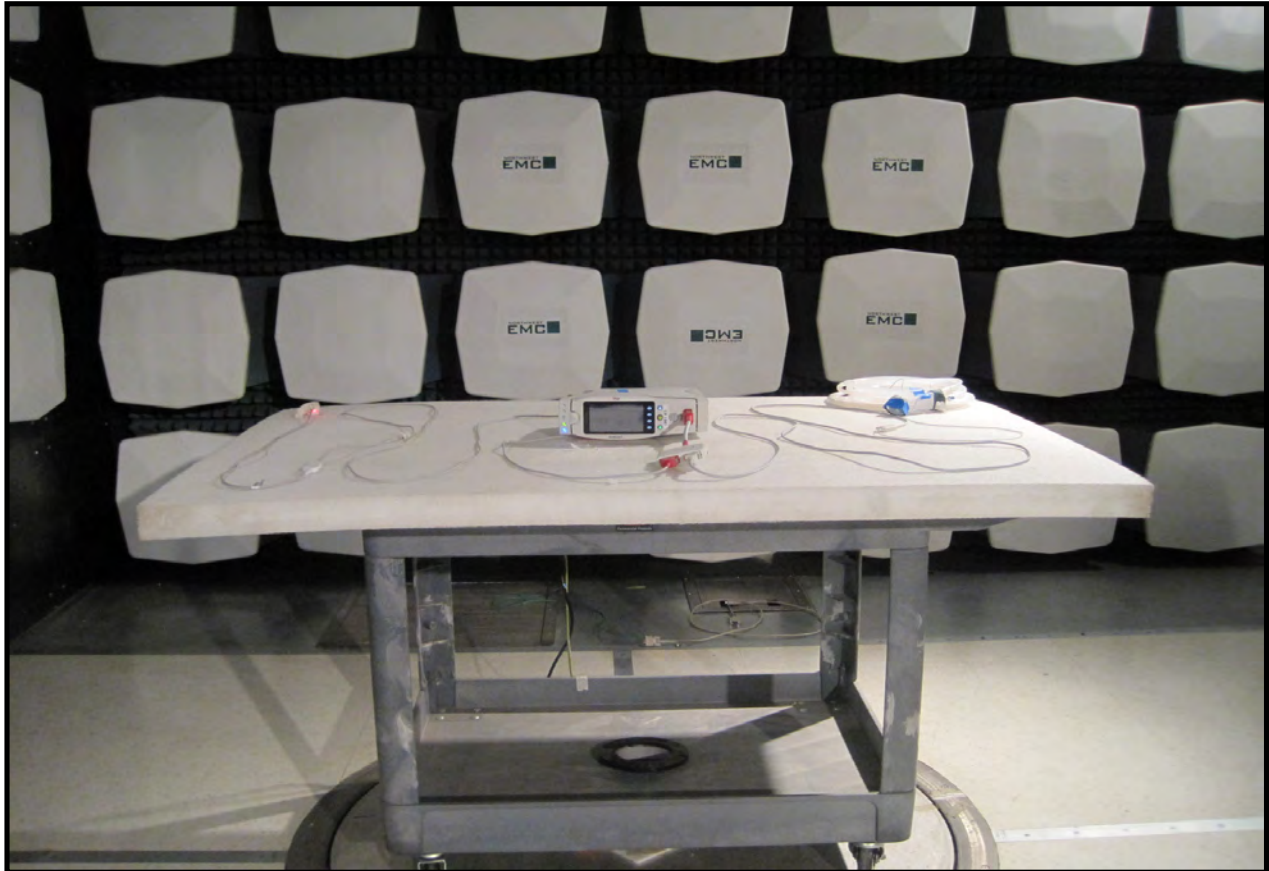
Run #	18	Signature 
Configuration #	1	
Results	Pass	

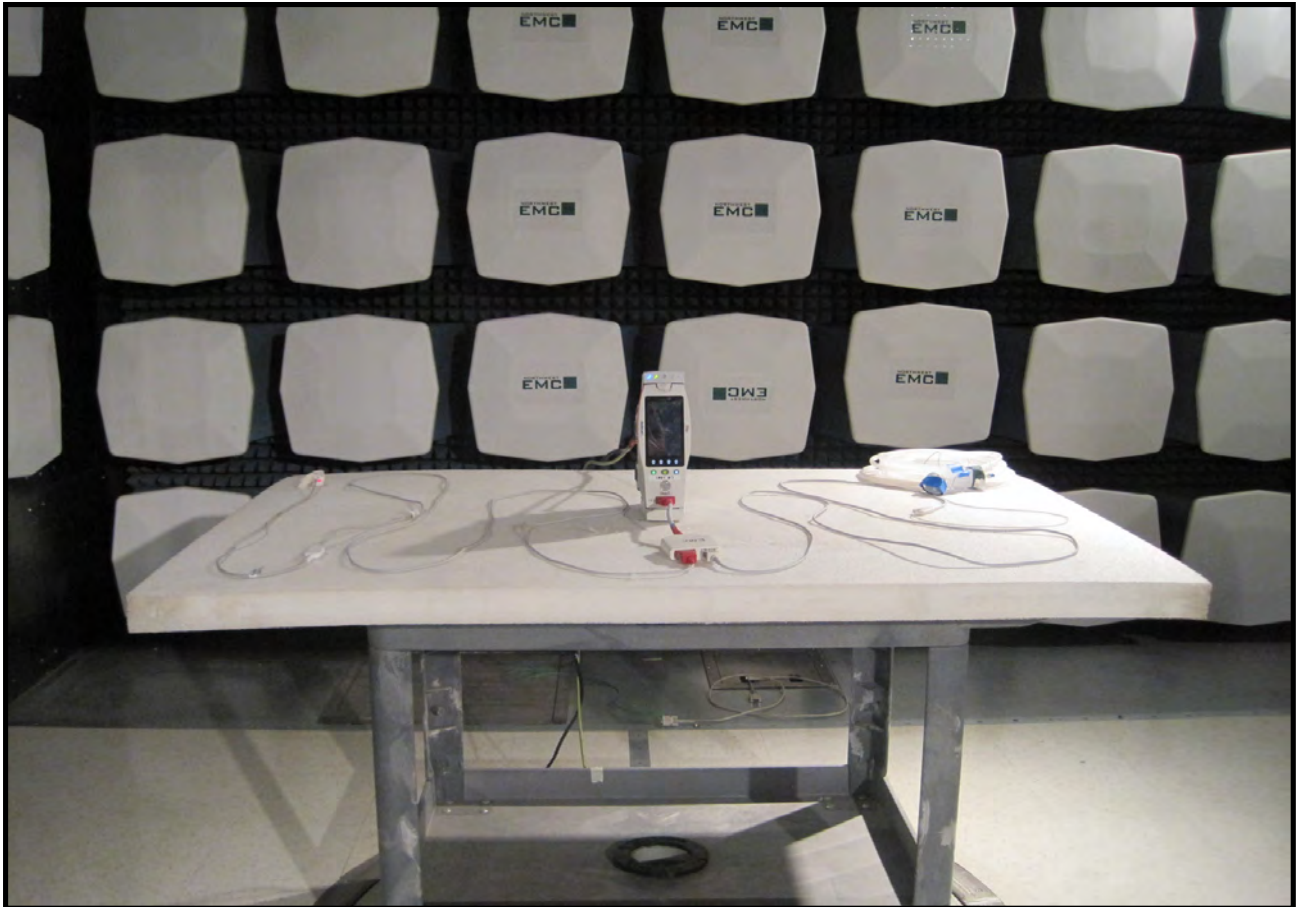


Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm.MHz)	Spec. Limit (dBm.MHz)	Compared to Spec. (dB)
20961.08			20.0	1.0			H-High Horr	PK	8.85E-08	-40.5	-27.0	-13.5
20952.17			204.0	1.0			V-High Horr	PK	2.67E-08	-45.7	-27.0	-18.7
20719.83			203.0	1.0			V-High Horr	PK	2.55E-08	-45.9	-27.0	-18.9
20722.53			19.0	1.0			H-High Horr	PK	2.12E-08	-46.7	-27.0	-19.7

NORTHWEST		SPURIOUS RADIATED EMISSIONS		PSA 2008.07.21								
EMC				EMI 2009.8.29								
EUT: Radical 7C+			Work Order: MASI0057									
Serial Number: E00680			Date: 05/05/10									
Customer: Masimo Corporation			Temperature: 21.7									
Attendees: None			Humidity: 41%									
Project: None			Barometric Pres.: 1020.5mb									
Tested by: Jaemi Suh		Power: 120VAC/60Hz		Job Site: OC11								
TEST SPECIFICATIONS			Test Method									
FCC 15.407:2010			ANSI C63.10:2009									
TEST PARAMETERS												
Antenna Height(s) (m)		1 - 4		Test Distance (m) 3								
COMMENTS												
Channel 149, Speed 6 mbps												
EUT OPERATING MODES												
Ant 2. Transmit Mode												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #	20	<div style="text-align: right;">  Signature </div>										
Configuration #	1											
Results	Pass											
												
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
20719.780	41.3	0.3	0.0	1.2	3.0	0.0	√-High Horr	AV	0.0	41.6	54.0	-12.4
20719.780	41.2	0.3	0.0	1.2	3.0	0.0	-I-High Horr	AV	0.0	41.5	54.0	-12.5
15538.950	34.9	3.3	122.0	1.0	3.0	0.0	H-Horn	AV	0.0	38.2	54.0	-15.8
15541.820	30.3	3.3	101.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.6	54.0	-20.4
15543.040	47.5	3.3	122.0	1.0	3.0	0.0	H-Horn	PK	0.0	50.8	74.0	-23.2
20719.780	50.2	0.3	0.0	1.2	3.0	0.0	√-High Horr	PK	0.0	50.5	74.0	-23.5
20719.780	49.8	0.3	0.0	1.2	3.0	0.0	-I-High Horr	PK	0.0	50.1	74.0	-23.9
15540.920	41.9	3.3	101.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.2	74.0	-28.8

NORTHWEST		SPURIOUS RADIATED EMISSIONS		PSA 2008.07.21							
EMC				EMI 2009.8.29							
EUT: Radical 7C+			Work Order: MASI0057								
Serial Number: E00680			Date: 05/05/10								
Customer: Masimo Corporation			Temperature: 21.7								
Attendees: None			Humidity: 41%								
Project: None			Barometric Pres.: 1020.5mb								
Tested by: Jaemi Suh		Power: 120VAC/60Hz		Job Site: OC11							
TEST SPECIFICATIONS			Test Method								
FCC 15.407:2010			ANSI C63.10:2009								
TEST PARAMETERS											
Antenna Height(s) (m)		1 - 4		Test Distance (m) 3							
COMMENTS											
Channel 149, Speed 6 mbps											
EUT OPERATING MODES											
Ant 2. Transmit Mode											
DEVIATIONS FROM TEST STANDARD											
No deviations.											
Run #		20		<div style="text-align: right;">  Signature </div>							
Configuration #		1									
Results		Pass									
											
Freq (MHz)			Azimuth (degrees)	Height (meters)		Polarity	Detector	EIRP (Watts)	EIRP (dBm.MHz)	Spec. Limit (dBm.MHz)	Compared to Spec. (dB)
15543.040			122.0	1.0		H-Horn	PK	3.61E-08	-44.4	-27.0	-17.4
20719.780			0.0	1.2		V-High Horr	PK	3.37E-08	-44.7	-27.0	-17.7
20719.780			0.0	1.2		H-High Horr	PK	3.07E-08	-45.1	-27.0	-18.1
15540.920			101.0	1.0		V-Horn	PK	9.93E-09	-50.0	-27.0	-23.0





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.

CHANNELS INVESTIGATED

Channel 36, 5180 MHz

Channel 48, 5240 MHz

DATA RATES INVESTIGATED

6 Mbps

POWER SETTINGS INVESTIGATED

120V/60Hz

CONFIGURATIONS INVESTIGATED

MASI0057-1

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	LIA	4/29/2009	13 mo
Attenuator	Pasternack	6N10W-20	AWC	1/27/2010	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFP	3/8/2010	13 mo
OC06 Cables	N/A	CE Cables	OCM	3/8/2010	13 mo
Receiver	Rohde & Schwarz	ESCI	ARF	3/30/2010	13 mo

MEASUREMENT BANDWIDTHS

Frequency Range	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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


Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

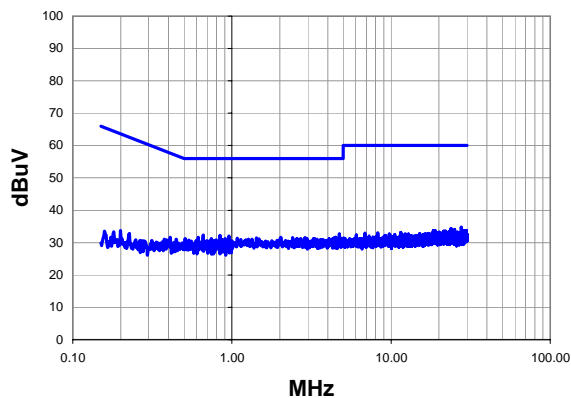
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

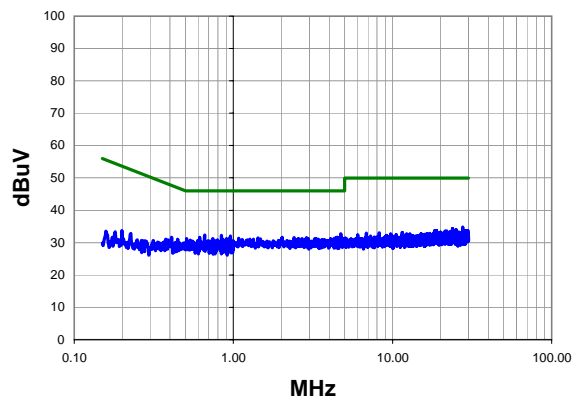
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 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. 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.

Work Order:	MA5I0057	Date:	05/03/10		
Project:	None	Temperature:	21.38		
Job Site:	OC06	Humidity:	41.88		
Serial Number:	113683	Barometric Pres.:	1020.5mb		
EUT:	Radical 7C+				
Configuration:	MA5I0057-1				
Customer:	Masimo Corporation				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Transmit Mode				
Deviations:	None				
Comments:	Channel 36, Speed 6mbps				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	8	Line:	High Line	Ext. Attenuation:	20
Results				Pass	

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit




Peak Data - vs - Quasi Peak Limit

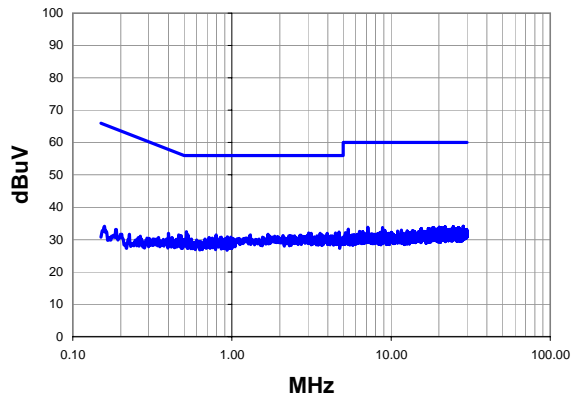
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
4.736	12.5	20.2	32.7	56.0	-23.3
0.660	12.2	20.1	32.3	56.0	-23.7
0.842	12.1	20.1	32.2	56.0	-23.8
0.959	11.9	20.1	32.0	56.0	-24.0
0.614	11.6	20.1	31.7	56.0	-24.3
2.032	11.6	20.1	31.7	56.0	-24.3
4.496	11.5	20.2	31.7	56.0	-24.3
2.880	11.4	20.2	31.6	56.0	-24.4
4.400	11.4	20.2	31.6	56.0	-24.4
2.408	11.4	20.1	31.5	56.0	-24.5
1.424	11.4	20.1	31.5	56.0	-24.5
0.951	11.3	20.1	31.4	56.0	-24.6
1.080	11.3	20.1	31.4	56.0	-24.6
0.509	11.2	20.1	31.3	56.0	-24.7
0.743	11.2	20.1	31.3	56.0	-24.7
0.905	11.2	20.1	31.3	56.0	-24.7
3.248	11.1	20.2	31.3	56.0	-24.7
0.857	11.0	20.1	31.1	56.0	-24.9
0.796	10.8	20.1	30.9	56.0	-25.1
0.534	10.7	20.1	30.8	56.0	-25.2

Peak Data - vs - Average Limit

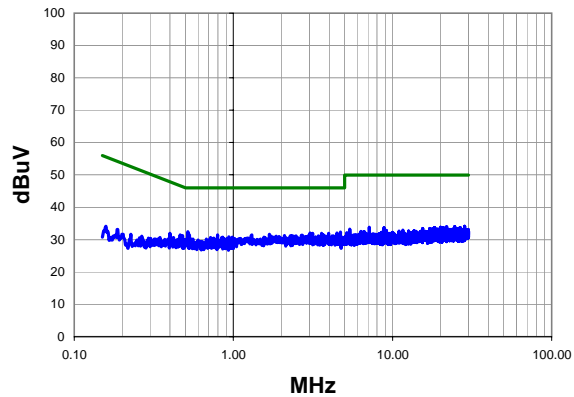
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
4.736	12.5	20.2	32.7	46.0	-13.3
0.660	12.2	20.1	32.3	46.0	-13.7
0.842	12.1	20.1	32.2	46.0	-13.8
0.959	11.9	20.1	32.0	46.0	-14.0
0.614	11.6	20.1	31.7	46.0	-14.3
2.032	11.6	20.1	31.7	46.0	-14.3
4.496	11.5	20.2	31.7	46.0	-14.3
2.880	11.4	20.2	31.6	46.0	-14.4
4.400	11.4	20.2	31.6	46.0	-14.4
2.408	11.4	20.1	31.5	46.0	-14.5
1.424	11.4	20.1	31.5	46.0	-14.5
0.951	11.3	20.1	31.4	46.0	-14.6
1.080	11.3	20.1	31.4	46.0	-14.6
0.509	11.2	20.1	31.3	46.0	-14.7
0.743	11.2	20.1	31.3	46.0	-14.7
0.905	11.2	20.1	31.3	46.0	-14.7
3.248	11.1	20.2	31.3	46.0	-14.7
0.857	11.0	20.1	31.1	46.0	-14.9
0.796	10.8	20.1	30.9	46.0	-15.1
0.534	10.7	20.1	30.8	46.0	-15.2

Work Order:	MA5I0057	Date:	05/03/10		
Project:	None	Temperature:	21.38		
Job Site:	OC06	Humidity:	41.88		
Serial Number:	113683	Barometric Pres.:	1020.5mb		
EUT:	Radical 7C+				
Configuration:	MA5I0057-1				
Customer:	Masimo Corporation				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Transmit Mode				
Deviations:	None				
Comments:	Channel 36, Speed 6mbps				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	9	Line:	Neutral	Ext. Attenuation:	20
Results				Pass	

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit




Peak Data - vs - Quasi Peak Limit

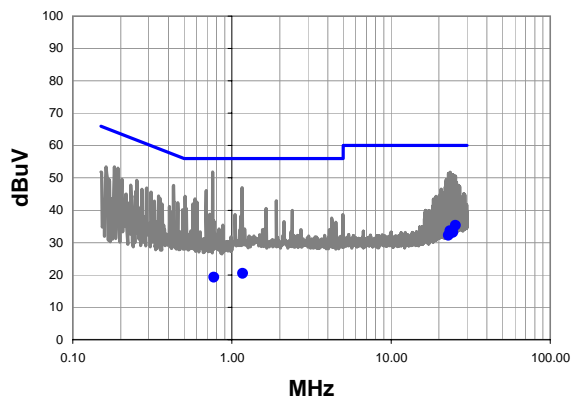
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.517	12.3	20.1	32.4	56.0	-23.6
4.704	12.1	20.2	32.3	56.0	-23.7
3.040	11.8	20.2	32.0	56.0	-24.0
4.472	11.8	20.2	32.0	56.0	-24.0
3.576	11.7	20.2	31.9	56.0	-24.1
3.960	11.7	20.2	31.9	56.0	-24.1
1.688	11.6	20.1	31.7	56.0	-24.3
3.648	11.4	20.2	31.6	56.0	-24.4
0.529	11.4	20.1	31.5	56.0	-24.5
0.794	11.4	20.1	31.5	56.0	-24.5
1.304	11.4	20.1	31.5	56.0	-24.5
2.328	11.2	20.1	31.3	56.0	-24.7
2.280	11.1	20.1	31.2	56.0	-24.8
0.478	11.2	20.1	31.3	56.4	-25.1
0.937	10.8	20.1	30.9	56.0	-25.1
0.463	11.4	20.1	31.5	56.6	-25.1
0.983	10.7	20.1	30.8	56.0	-25.2
0.718	10.6	20.1	30.7	56.0	-25.3
0.752	10.4	20.1	30.5	56.0	-25.5
0.864	10.3	20.1	30.4	56.0	-25.6

Peak Data - vs - Average Limit

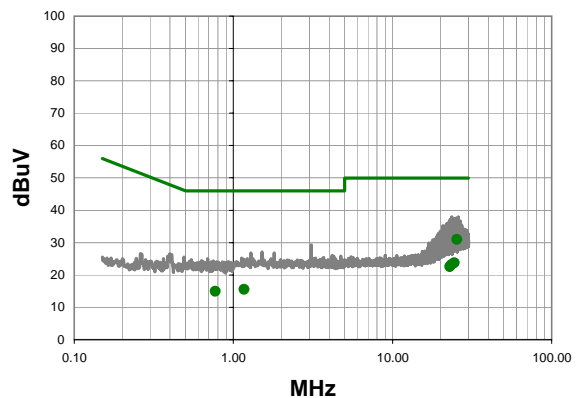
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.517	12.3	20.1	32.4	46.0	-13.6
4.704	12.1	20.2	32.3	46.0	-13.7
3.040	11.8	20.2	32.0	46.0	-14.0
4.472	11.8	20.2	32.0	46.0	-14.0
3.576	11.7	20.2	31.9	46.0	-14.1
3.960	11.7	20.2	31.9	46.0	-14.1
1.688	11.6	20.1	31.7	46.0	-14.3
3.648	11.4	20.2	31.6	46.0	-14.4
0.529	11.4	20.1	31.5	46.0	-14.5
0.794	11.4	20.1	31.5	46.0	-14.5
1.304	11.4	20.1	31.5	46.0	-14.5
2.328	11.2	20.1	31.3	46.0	-14.7
2.280	11.1	20.1	31.2	46.0	-14.8
0.478	11.2	20.1	31.3	46.4	-15.1
0.937	10.8	20.1	30.9	46.0	-15.1
0.463	11.4	20.1	31.5	46.6	-15.1
0.983	10.7	20.1	30.8	46.0	-15.2
0.718	10.6	20.1	30.7	46.0	-15.3
0.752	10.4	20.1	30.5	46.0	-15.5
0.864	10.3	20.1	30.4	46.0	-15.6

Work Order:	MA5I0057	Date:	05/03/10		
Project:	None	Temperature:	21.38		
Job Site:	OC06	Humidity:	41.88		
Serial Number:	113683	Barometric Pres.:	1020.5mb		
EUT:	Radical 7C+				
Configuration:	MA5I0057-1				
Customer:	Masimo Corporation				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Transmit Mode				
Deviations:	None				
Comments:	Channel 54, Speed 6mbps				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	10	Line:	High Line	Ext. Attenuation:	20
Results				Pass	


Quasi Peak Data - vs - Quasi Peak Limit



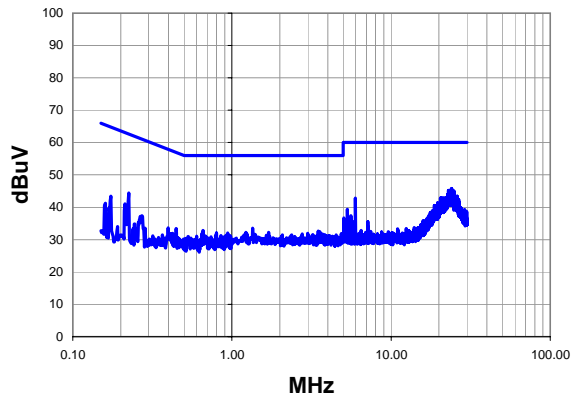
Average Data - vs - Average Limit



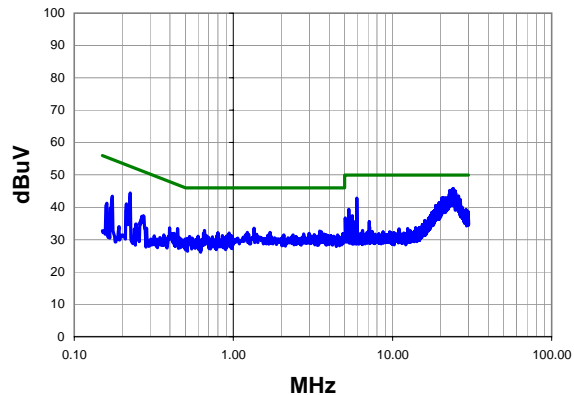
Quasi Peak Data - vs - Quasi Peak Limit						Average Data - vs - Average Limit					
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)	Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
25.422	14.0	21.3	35.3	60.0	-24.7	25.422	9.6	21.3	30.9	50.0	-19.1
23.454	12.3	21.3	33.6	60.0	-26.4	24.532	2.4	21.4	23.8	50.0	-26.2
24.532	11.8	21.4	33.2	60.0	-26.8	23.454	1.8	21.3	23.1	50.0	-26.9
22.928	10.9	21.3	32.2	60.0	-27.8	22.928	1.3	21.3	22.6	50.0	-27.4
1.168	0.4	20.1	20.5	56.0	-35.5	1.168	-4.6	20.1	15.5	46.0	-30.5
0.769	-0.8	20.1	19.3	56.0	-36.7	0.769	-5.2	20.1	14.9	46.0	-31.1

Work Order:	MASI0057	Date:	05/03/10				
Project:	None	Temperature:	21.38				
Job Site:	OC06	Humidity:	41.88				
Serial Number:	113683	Barometric Pres.:	1020.5mb				
EUT: Radical 7C+				Tested by: Mark Baytan			
Configuration: MASI0057-1							
Customer: Masimo Corporation							
Attendees: None							
EUT Power: 120V/60Hz							
Operating Mode: Transmit Mode							
Deviations: None							
Comments: Channel 54, Speed 6mbps							
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009				
Run #	11	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
24.020	24.4	21.4	45.8	60.0	-14.2
23.600	24.0	21.3	45.3	60.0	-14.7
22.900	23.9	21.3	45.2	60.0	-14.8
23.320	23.9	21.3	45.2	60.0	-14.8
24.840	23.7	21.3	45.0	60.0	-15.0
23.720	23.5	21.3	44.8	60.0	-15.2
24.790	23.2	21.3	44.5	60.0	-15.5
24.570	23.1	21.4	44.5	60.0	-15.5
24.980	23.1	21.3	44.4	60.0	-15.6
22.750	22.7	21.3	44.0	60.0	-16.0
23.930	22.5	21.4	43.9	60.0	-16.1
24.280	22.5	21.4	43.9	60.0	-16.1
26.030	22.1	21.3	43.4	60.0	-16.6
25.410	21.8	21.3	43.1	60.0	-16.9
21.060	21.7	21.2	42.9	60.0	-17.1
22.170	21.6	21.3	42.9	60.0	-17.1
5.970	22.5	20.3	42.8	60.0	-17.2
20.400	21.6	21.2	42.8	60.0	-17.2
20.740	21.6	21.2	42.8	60.0	-17.2
21.590	21.5	21.3	42.8	60.0	-17.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
24.020	24.4	21.4	45.8	50.0	-4.2
23.600	24.0	21.3	45.3	50.0	-4.7
22.900	23.9	21.3	45.2	50.0	-4.8
23.320	23.9	21.3	45.2	50.0	-4.8
24.840	23.7	21.3	45.0	50.0	-5.0
23.720	23.5	21.3	44.8	50.0	-5.2
24.790	23.2	21.3	44.5	50.0	-5.5
24.570	23.1	21.4	44.5	50.0	-5.5
24.980	23.1	21.3	44.4	50.0	-5.6
22.750	22.7	21.3	44.0	50.0	-6.0
23.930	22.5	21.4	43.9	50.0	-6.1
24.280	22.5	21.4	43.9	50.0	-6.1
26.030	22.1	21.3	43.4	50.0	-6.6
25.410	21.8	21.3	43.1	50.0	-6.9
21.060	21.7	21.2	42.9	50.0	-7.1
22.170	21.6	21.3	42.9	50.0	-7.1
5.970	22.5	20.3	42.8	50.0	-7.2
20.400	21.6	21.2	42.8	50.0	-7.2
20.740	21.6	21.2	42.8	50.0	-7.2
21.590	21.5	21.3	42.8	50.0	-7.2

