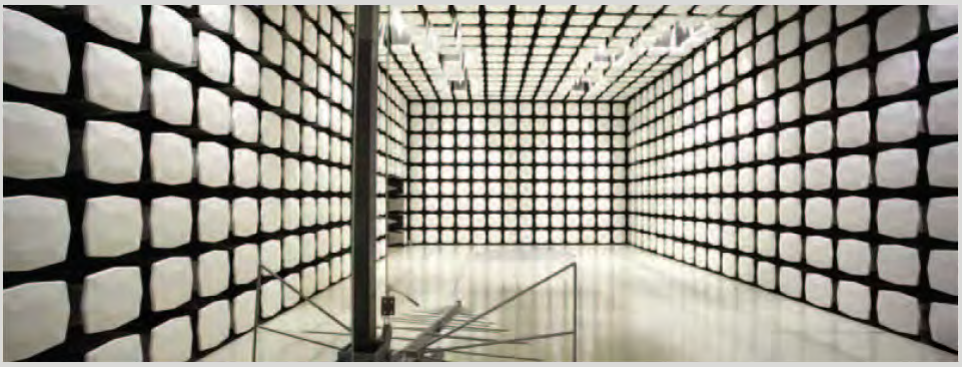
Masimo Corporation

Radius-7

FCC 15.247:2014

Report #: MASI0214 Rev. 1



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF TEST

Last Date of Test: June 18, 2014
Masimo Corporation
Model: Radius-7

Emissions

Test Description	Specification	Test Method	Pass/Fail
Duty Cycle	FCC 15.247:2014	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.247:2014	ANSI C63.10:2009	Pass
Output Power	FCC 15.247:2014	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247:2014	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247:2014	ANSI C63.10:2009	Pass
Band Edge Compliance Hopping Frequency	FCC 15.247:2014	ANSI C63.10:2009	Pass
Channel Separation	FCC 15.247:2014	ANSI C63.10:2009	Pass
Number of Hopping Channels	FCC 15.247:2014	ANSI C63.10:2009	Pass
Dwell Time	FCC 15.247:2014	ANSI C63.10:2009	Pass
Spurious Radiated Emissions	FCC 15.247:2014	ANSI C63.10:2009	Pass

Deviations From Test Standards

None

Approved By:

Victor Ratinoff, Operations 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.

REV 2012.08.02

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		
01	Corrected mistake on configurations page. Changed to no ferrite use.	**7-15-14**	**8**

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

NORTHWEST EMC

REV 2012.05.24

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

KCC / 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.

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.

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

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.

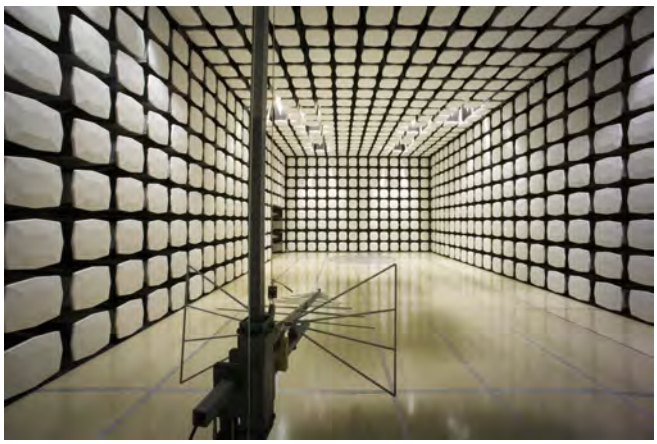
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.12	-0.01
Amplitude Accuracy (dB)	0.49	-0.49
Conducted Power (dB)	0.41	-0.41
Radiated Power via Substitution (dB)	0.69	-0.68
Temperature (degrees C)	0.81	-0.81
Humidity (% RH)	2.89	-2.89
Field Strength (dB)	3.80	-3.80
AC Powerline Conducted Emissions (dB)	2.94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

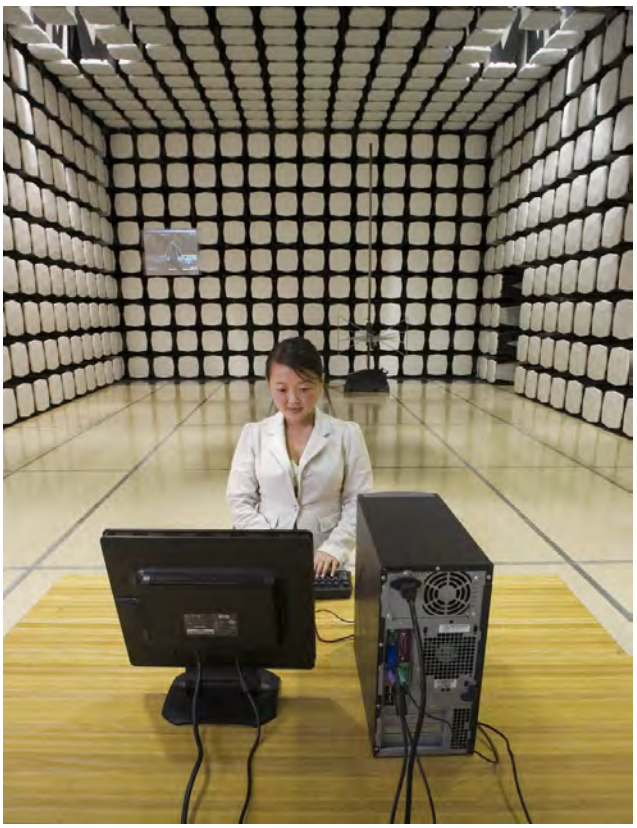
NORTHWEST EMC

REV 2013.06.28

FACILITIES

Oregon	California	New York	Minnesota	Washington
Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Labs NC01-05,SU02,SU07 19201 120th Ave. NE Bothell, WA 98011 (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

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:	Radius-7
First Date of Test:	June 13, 2014
Last Date of Test:	June 18, 2014
Receipt Date of Samples:	June 13, 2014
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Wearable Pulse Oximeter using a Bluetooth radio that operates only at the Bluetooth basic data rates. It does not utilize the EDR modes.

Testing Objective:
To demonstrate compliance to FCC Part 15.247 requirements.

CONFIGURATIONS

Configuration MASI0214- 4

Software/Firmware Running during test	
Description	**Version**
IB_BLUETOOTH_TST.bts	0000.1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wearable Pulse Oximeter	Masimo Corporation	Radius-7 Patient Module	AI000012
Battery	Masimo Corporation	Radius-7 Battery Module	AB000001

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
M-LNCS Sensor Cable	Yes	1.00m	No	Pulse Oximeter	Pulse/O2 Simulator
DC Cable	Yes	1.70m	Yes	Laptop	AC/DC Power Supply
AC Cable	No	1.60m	No	AC/DC Power Supply	AC Mains
USB Cable	No	1.0m	No	Wearable Pulse Oximeter	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

MODIFICATIONS

WTD 12.5.23

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	6/13/2014	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.
2	6/13/2014	Number of Hopping Frequencies	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	6/13/2014	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.
4	6/13/2014	Bandedge Compliance - Hopping	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	6/13/2014	Bandedge 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.
6	6/13/2014	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	6/13/2014	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.
8	6/13/2014	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.
9	6/13/2014	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.
10	6/18/2014	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

None

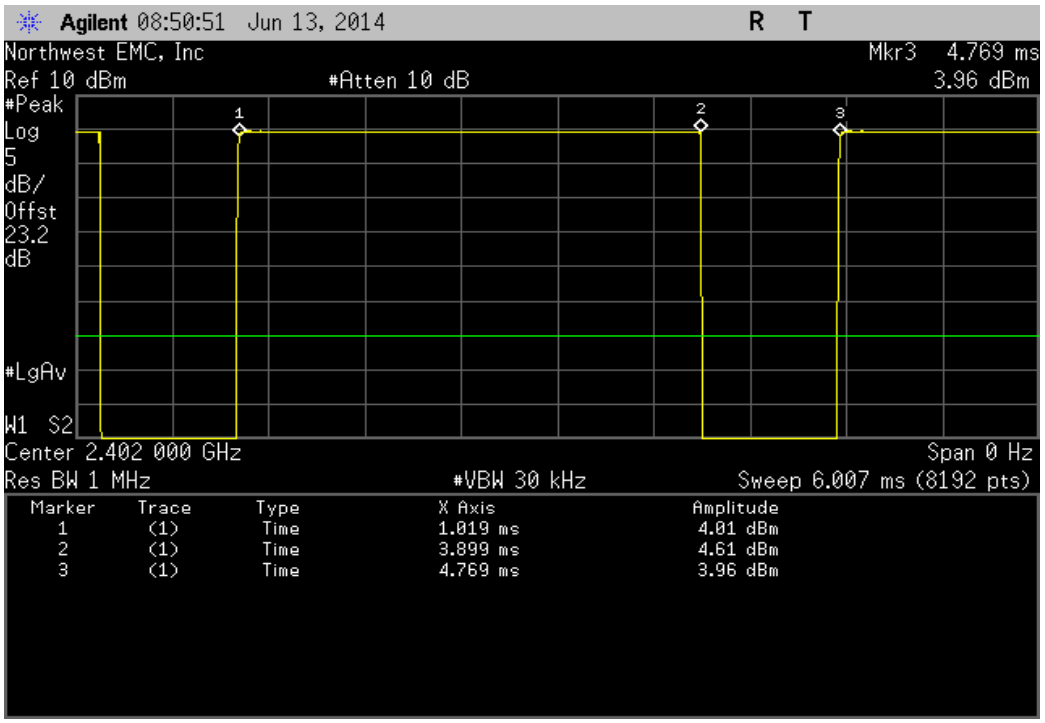
Configuration #	4	Signature

		Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
DH5							
	Low Channel 0, 2402 MHz	2.88 mS	3.75 mS	1	76.8	N/A	N/A
	Low Channel 0, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 39, 2441 MHz	2.882 mS	3.75 mS	1	76.9	N/A	N/A
	Mid Channel 39, 2441 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 78, 2480 MHz	2.883 mS	3.751 mS	1	76.9	N/A	N/A
	High Channel 78, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
DH3							
	Low Channel 0, 2402 MHz	1.632 mS	2.505 mS	1	65.1	N/A	N/A
	Low Channel 0, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 39, 2441 MHz	1.632 mS	2.504 mS	1	65.2	N/A	N/A
	Mid Channel 39, 2441 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 78, 2480 MHz	1.632 mS	2.506 mS	1	65.1	N/A	N/A
	High Channel 78, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
DH1							
	Low Channel 0, 2402 MHz	376.52 uS	1.252 mS	1	30.1	N/A	N/A
	Low Channel 0, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 39, 2441 MHz	375.487 uS	1.25 mS	1	30	N/A	N/A
	Mid Channel 39, 2441 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 78, 2480 MHz	375.453 uS	1.25 mS	1	30	N/A	N/A
	High Channel 78, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

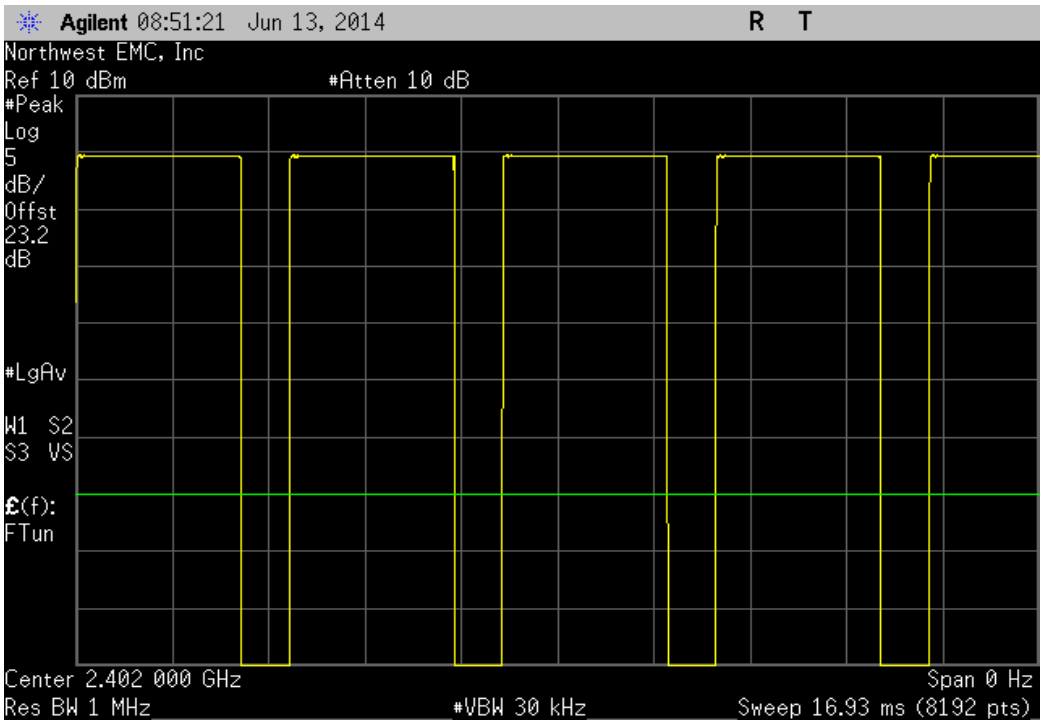
DH5, Low Channel, 2402 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
2.88 mS	3.75 mS	1	76.8	N/A	N/A



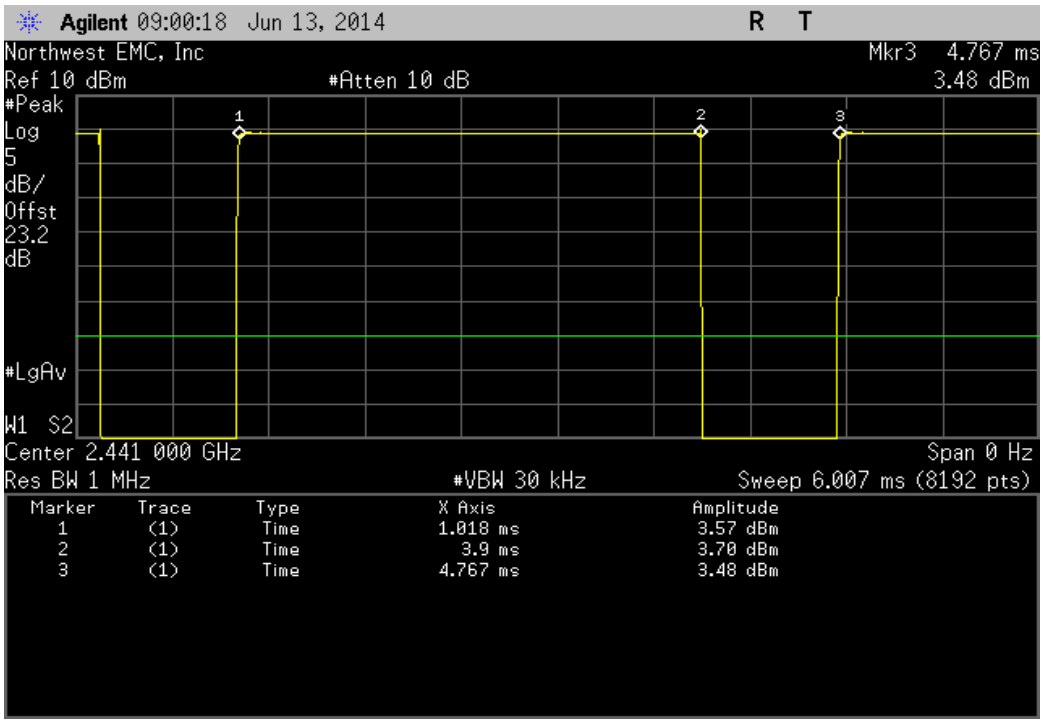
DH5, Low Channel, 2402 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



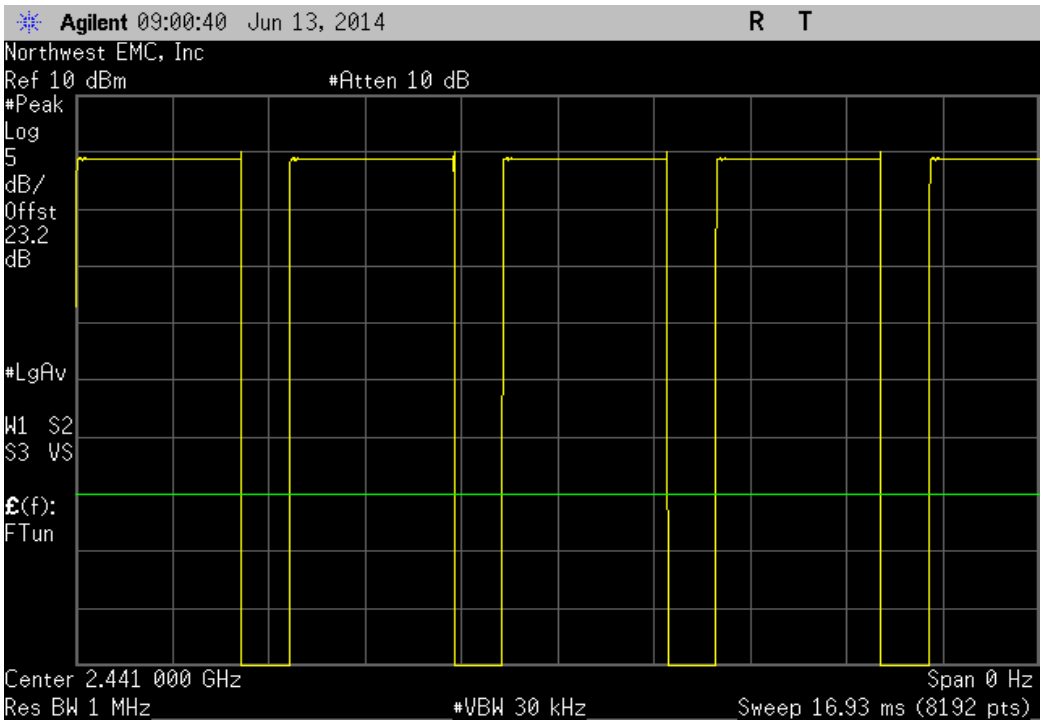
DH5, Mid Channel, 2441 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
2.882 mS	3.75 mS	1	76.9	N/A	N/A



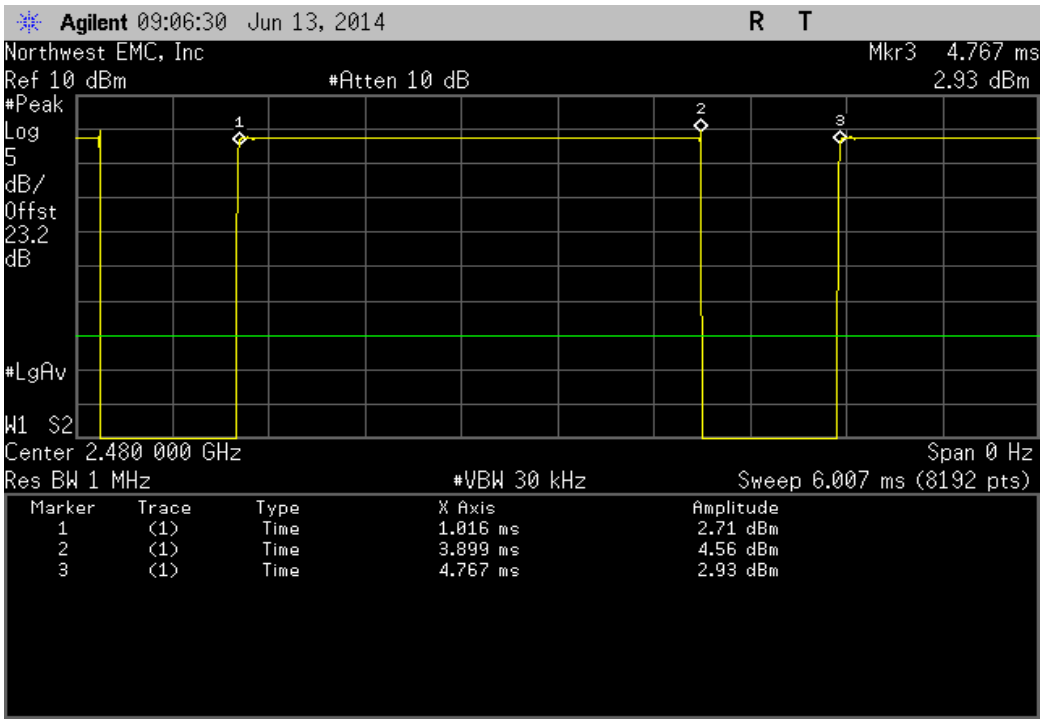
DH5, Mid Channel, 2441 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A

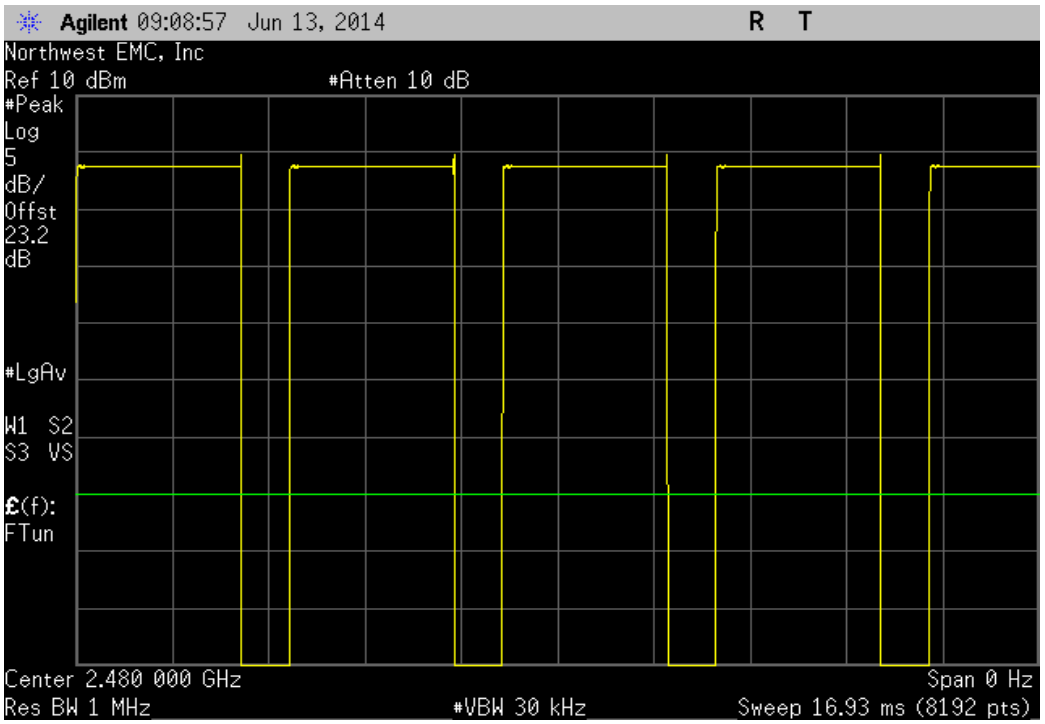


DUTY CYCLE

DH5, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	2.883 mS	3.751 mS	1	76.9	N/A	N/A



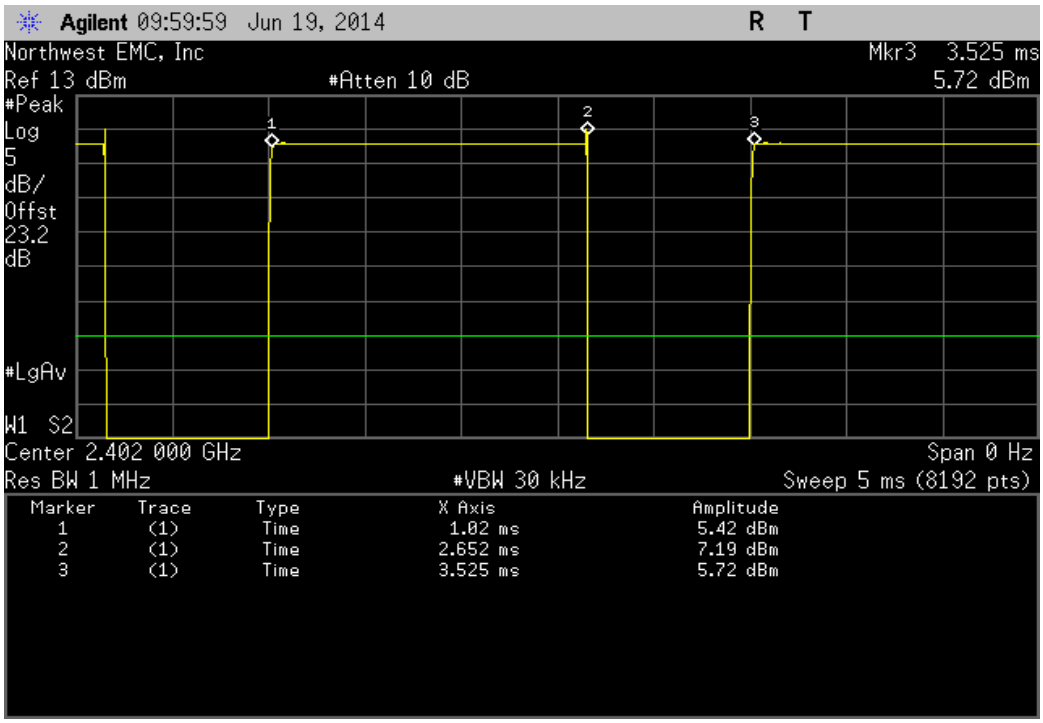
DH5, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

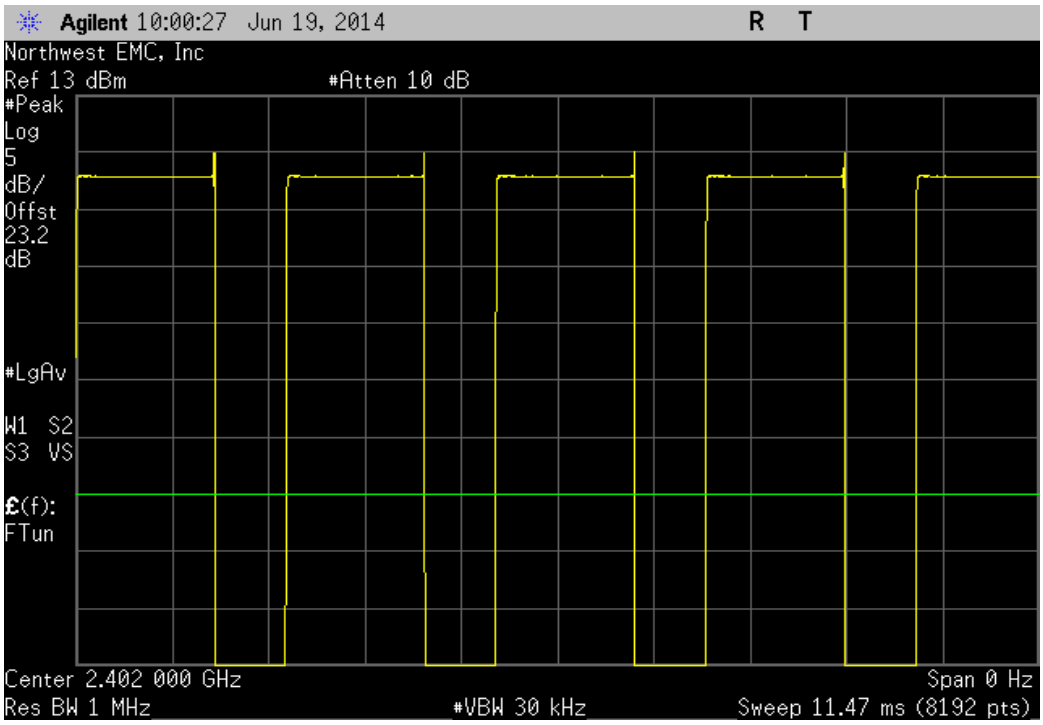
DH3, Low Channel, 2402 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
1.632 mS	2.505 mS	1	65.1	N/A	N/A



DH3, Low Channel, 2402 MHz

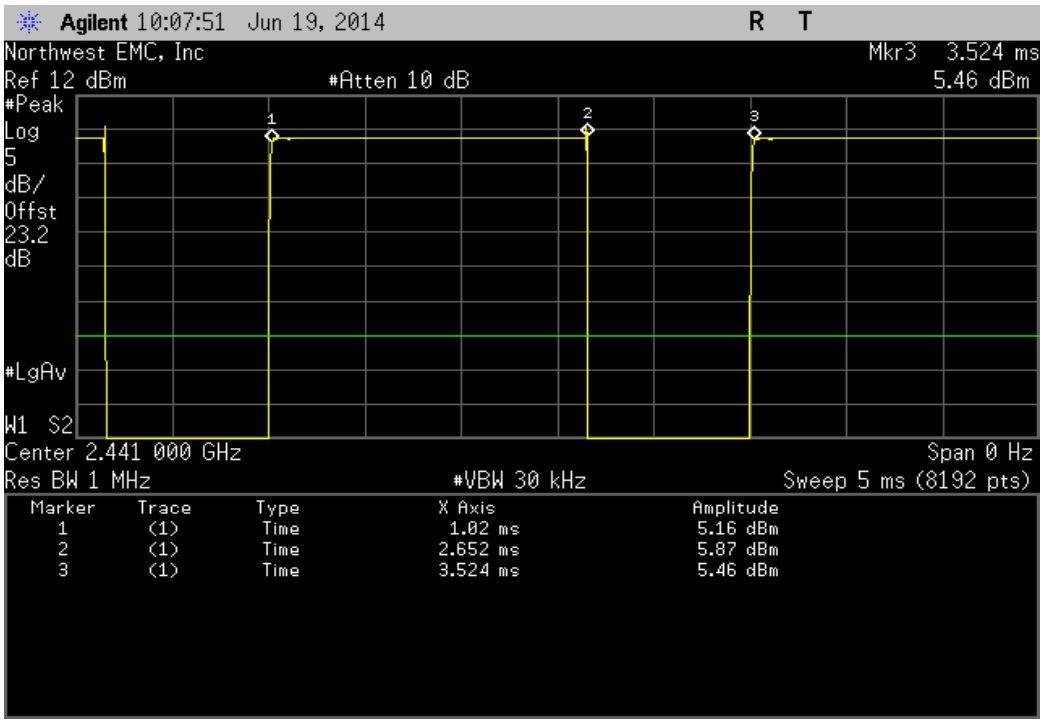
Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

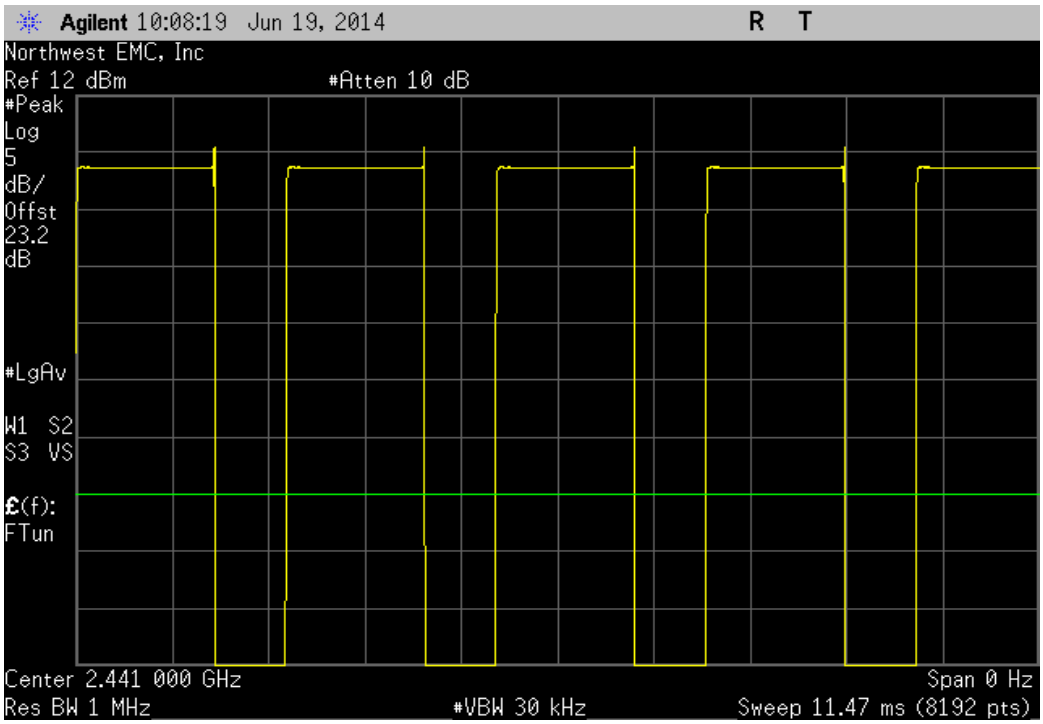
DH3, Mid Channel, 2441 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
1.632 mS	2.504 mS	1	65.2	N/A	N/A



DH3, Mid Channel, 2441 MHz

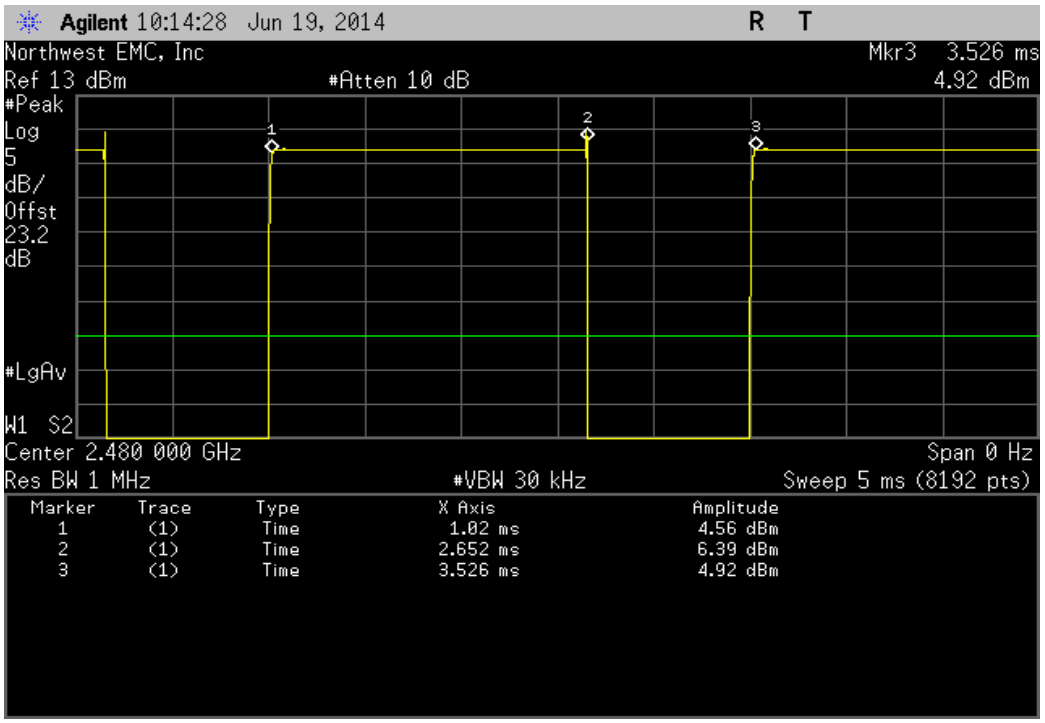
Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

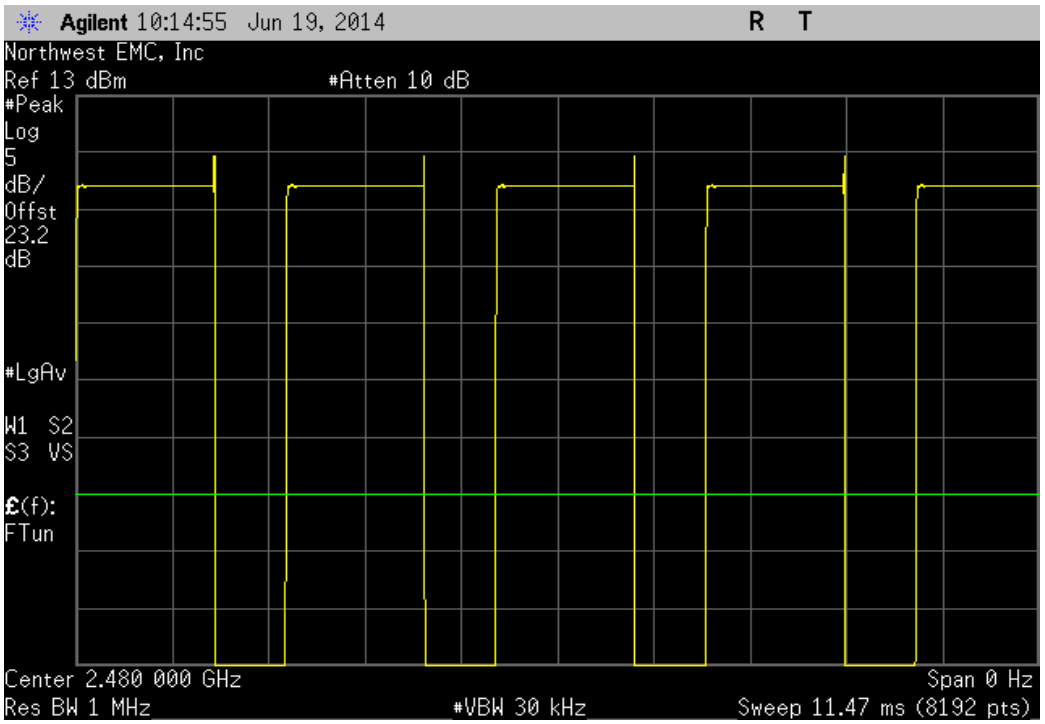
DH3, High Channel, 2480 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
1.632 mS	2.506 mS	1	65.1	N/A	N/A



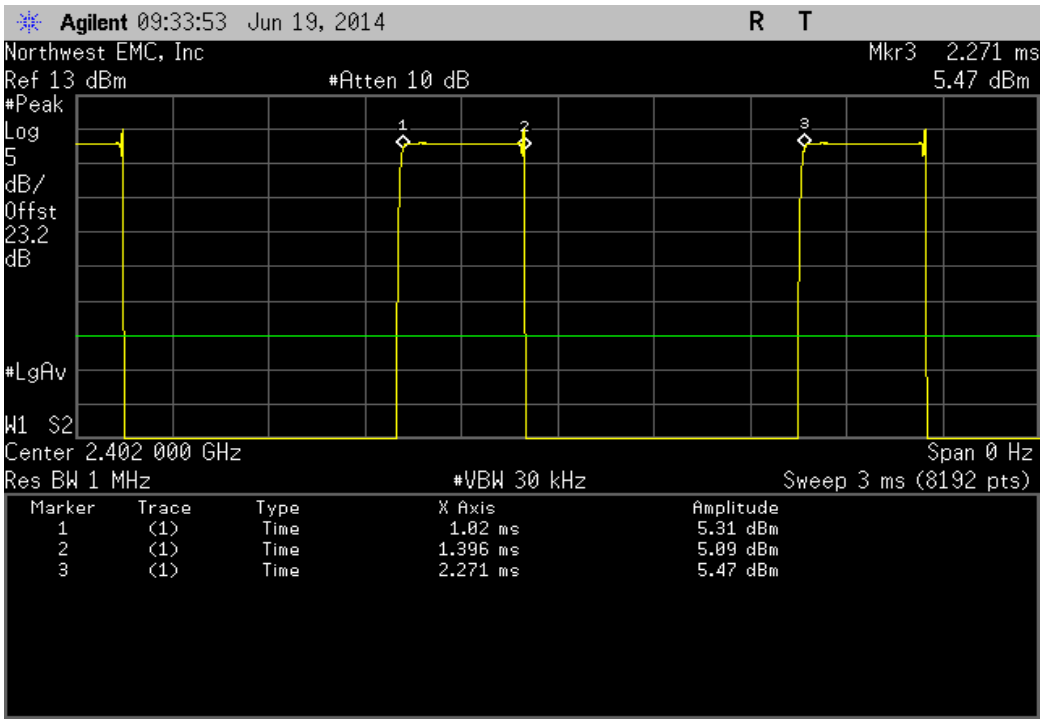
DH3, High Channel, 2480 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A

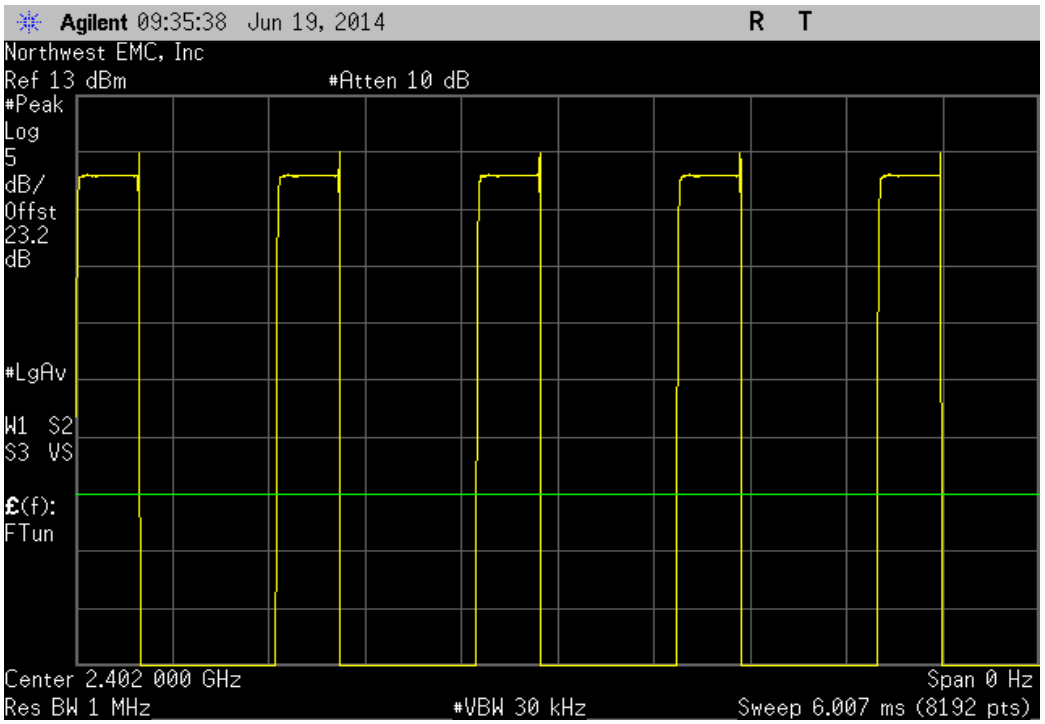


DUTY CYCLE

DH1, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	376.52 uS	1.252 mS	1	30.1	N/A	N/A



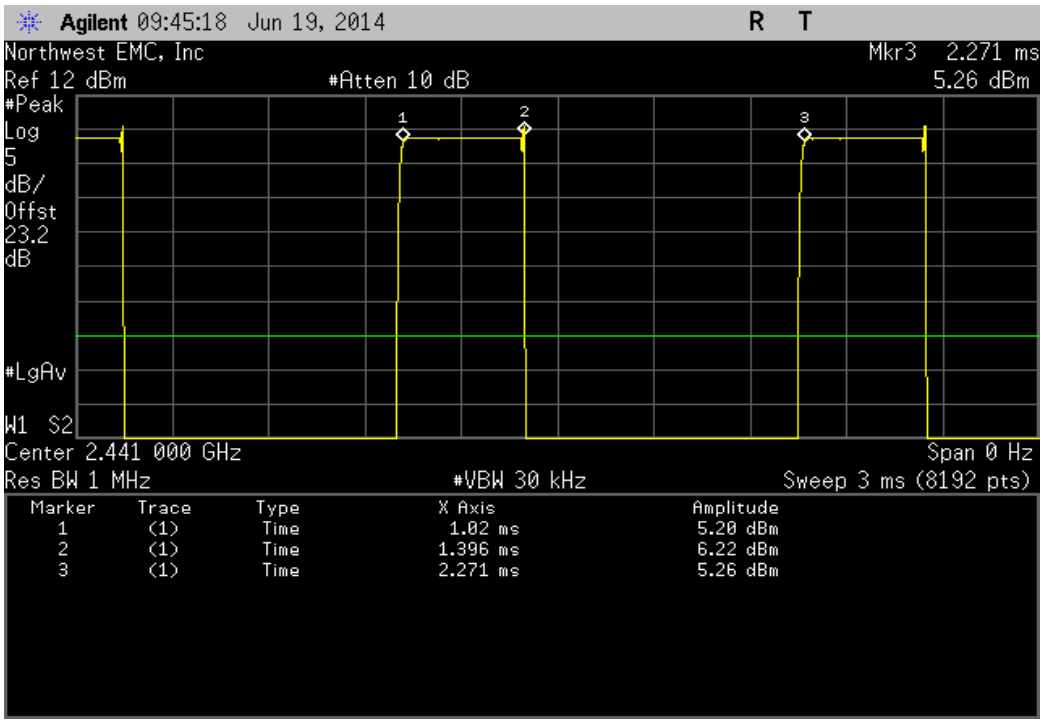
DH1, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

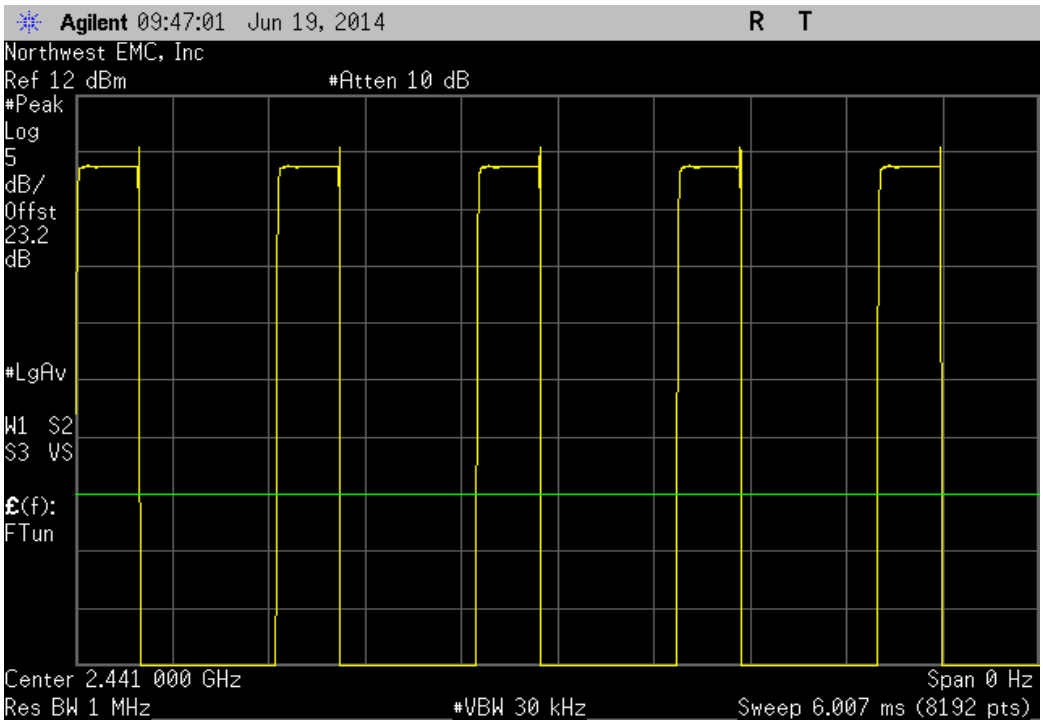
DH1, Mid Channel, 2441 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
375.487 uS	1.25 mS	1	30	N/A	N/A



DH1, Mid Channel, 2441 MHz

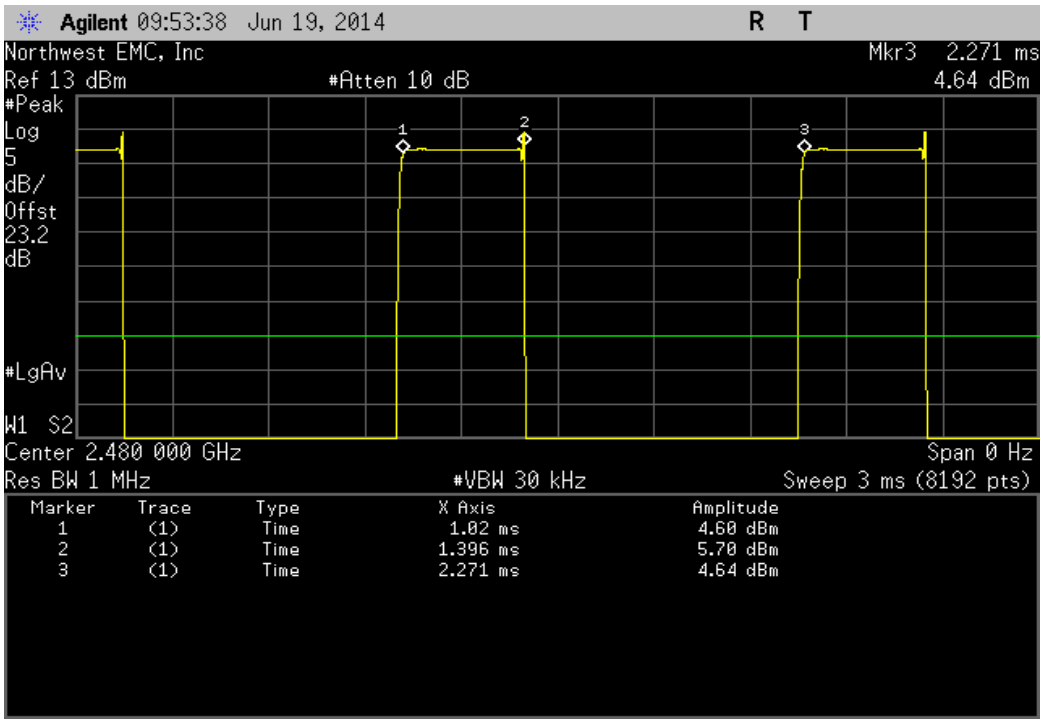
Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

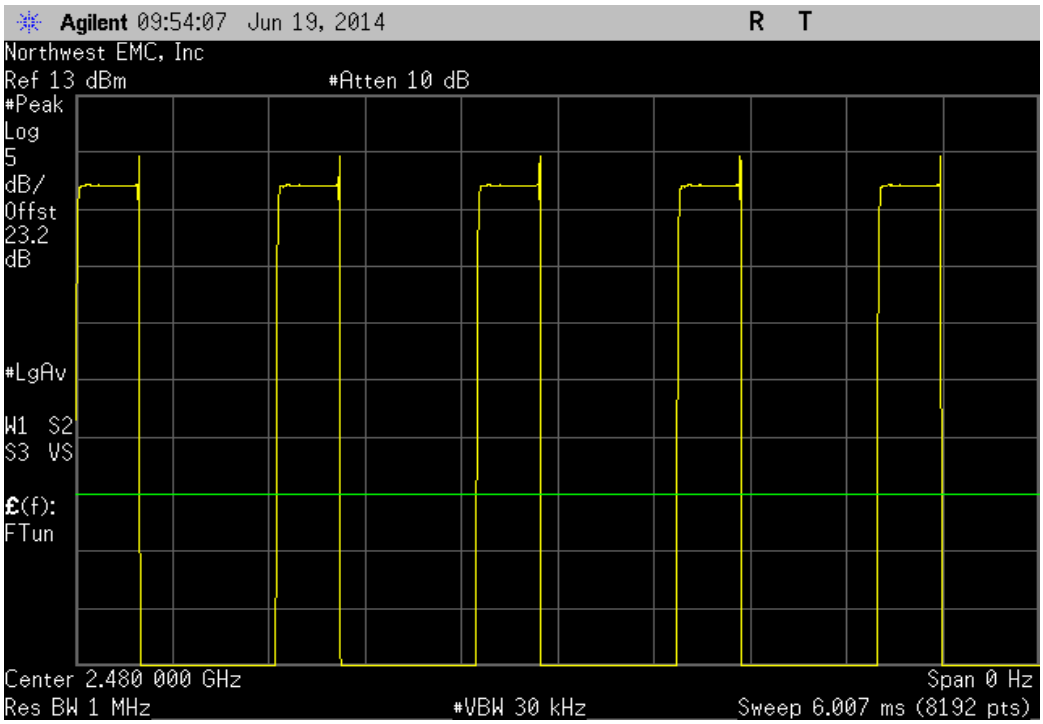
DH1, High Channel, 2480 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
375.453 uS	1.25 mS	1	30	N/A	N/A



DH1, High Channel, 2480 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

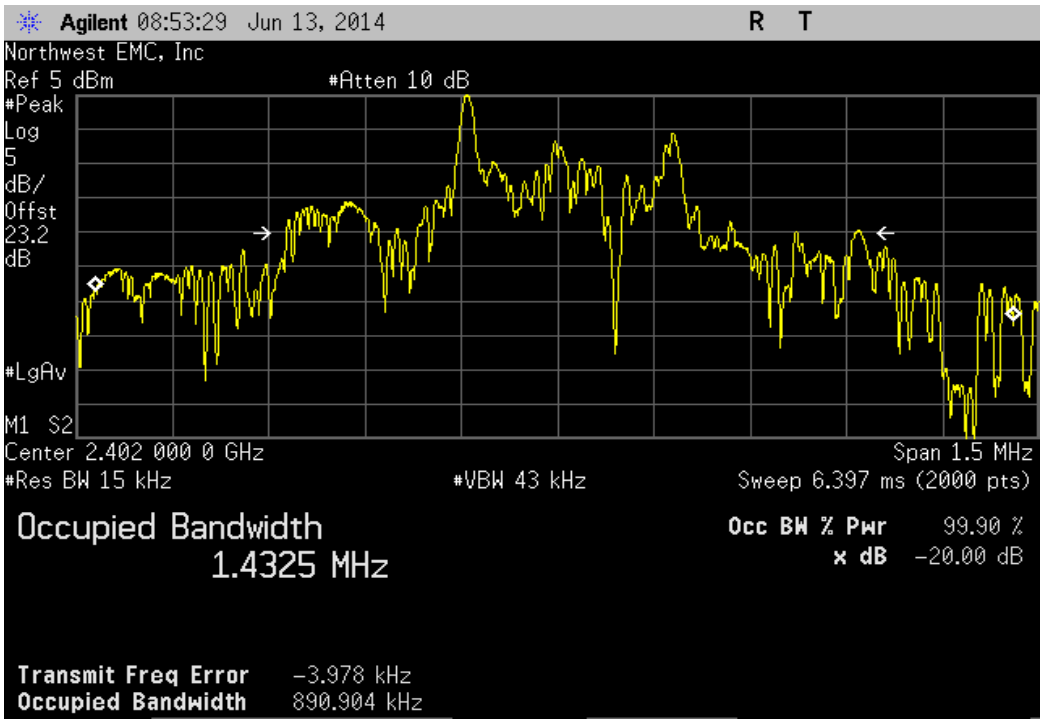
None

Configuration #	4	Signature

		Value	Limit	Result
DH5				
	Low Channel 0, 2402 MHz	890.904 kHz	< 1.5 MHz	Pass
	Mid Channel 39, 2441 MHz	537.788 kHz	< 1.5 MHz	Pass
	High Channel 78, 2480 MHz	515.902 kHz	< 1.5 MHz	Pass
DH3				
	Low Channel 0, 2402 MHz	533.865 kHz	< 1.5 MHz	Pass
	Mid Channel 39, 2441 MHz	720.056 kHz	< 1.5 MHz	Pass
	High Channel 78, 2480 MHz	563.046 kHz	< 1.5 MHz	Pass
DH1				
	Low Channel 0, 2402 MHz	496.175 kHz	< 1.5 MHz	Pass
	Mid Channel 39, 2441 MHz	980.211 kHz	< 1.5 MHz	Pass
	High Channel 78, 2480 MHz	531.629 kHz	< 1.5 MHz	Pass

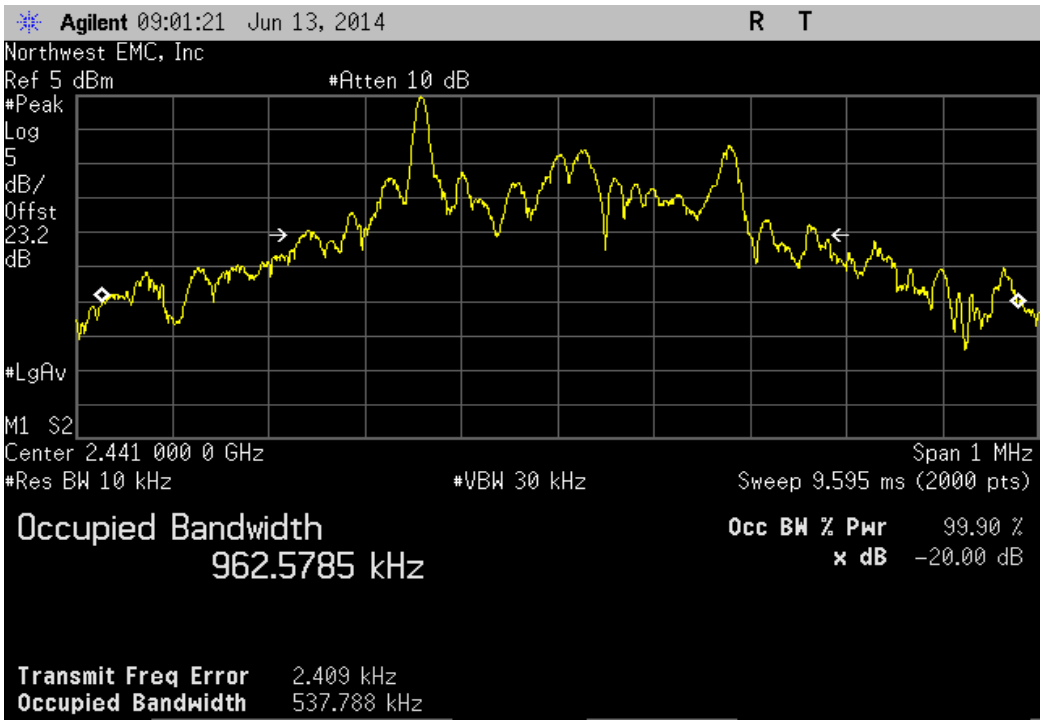
DH5, Low Channel, 2402 MHz

				Value	Limit	Result
				890.904 kHz	< 1.5 MHz	Pass



DH5, Mid Channel, 2441 MHz

				Value	Limit	Result
				537.788 kHz	< 1.5 MHz	Pass



DH5, High Channel, 2480 MHz

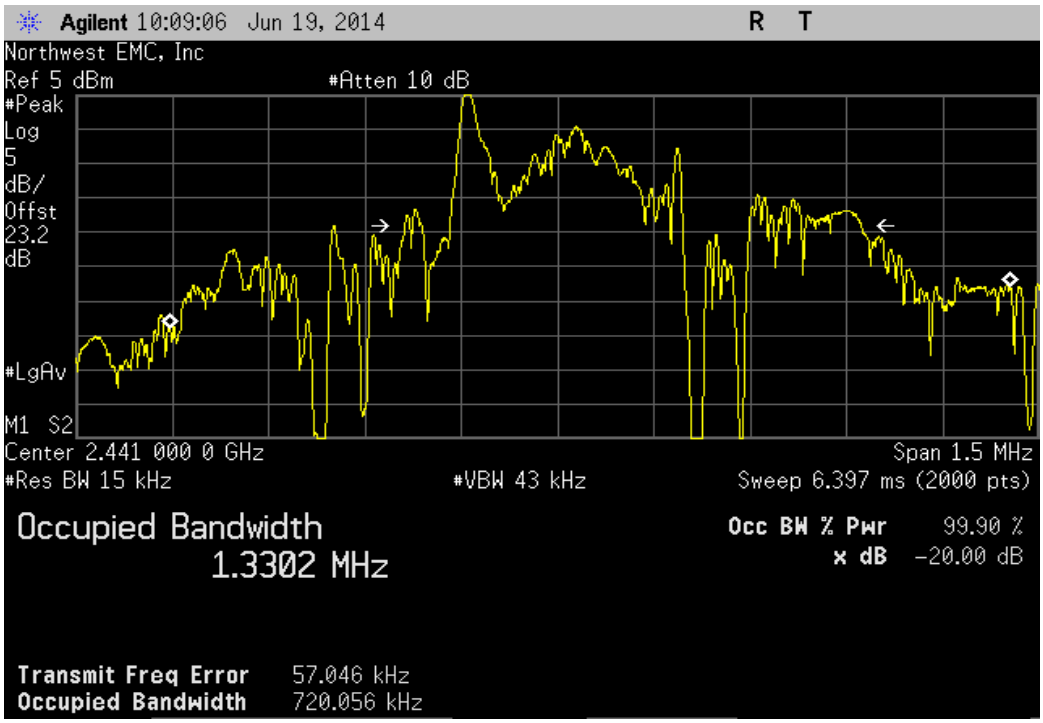
				Value	Limit	Result
				515.902 kHz	< 1.5 MHz	Pass

DH3, Low Channel, 2402 MHz

				Value	Limit	Result
				533.865 kHz	< 1.5 MHz	Pass

DH3, Mid Channel, 2441 MHz

				Value	Limit	Result
				720.056 kHz	< 1.5 MHz	Pass



DH3, High Channel, 2480 MHz

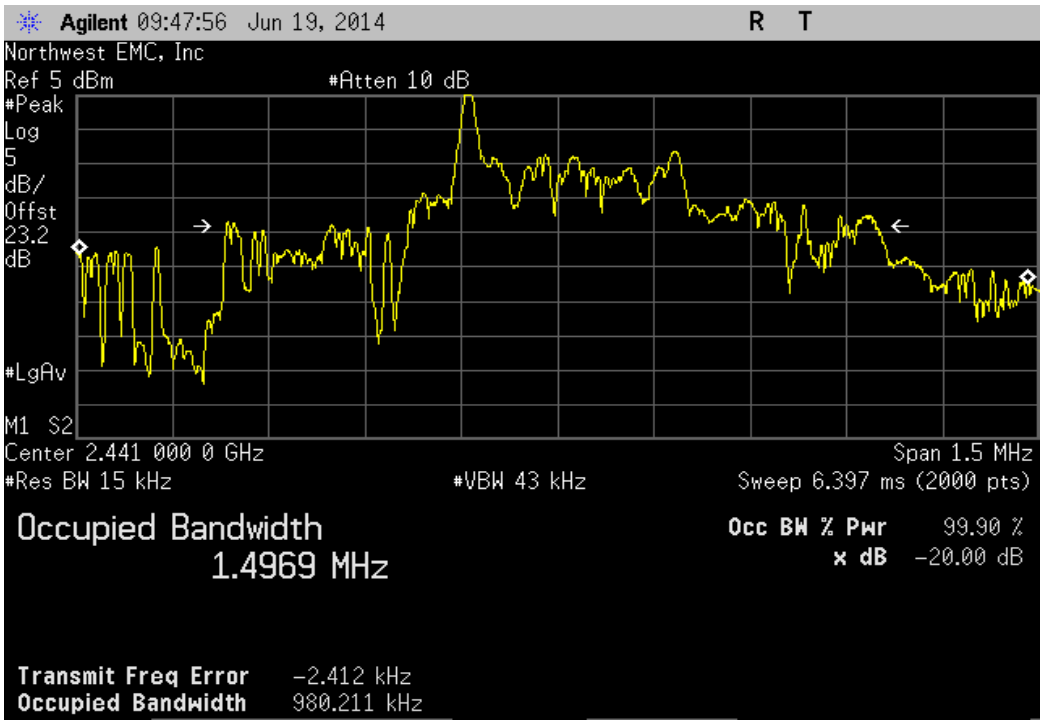
				Value	Limit	Result
				563.046 kHz	< 1.5 MHz	Pass

DH1, Low Channel, 2402 MHz

				Value	Limit	Result
				496.175 kHz	< 1.5 MHz	Pass

DH1, Mid Channel, 2441 MHz

				Value	Limit	Result
				980.211 kHz	< 1.5 MHz	Pass



OCCUPIED BANDWIDTH

DH1, High Channel, 2480 MHz

				Value	Limit	Result
				531.629 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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

None

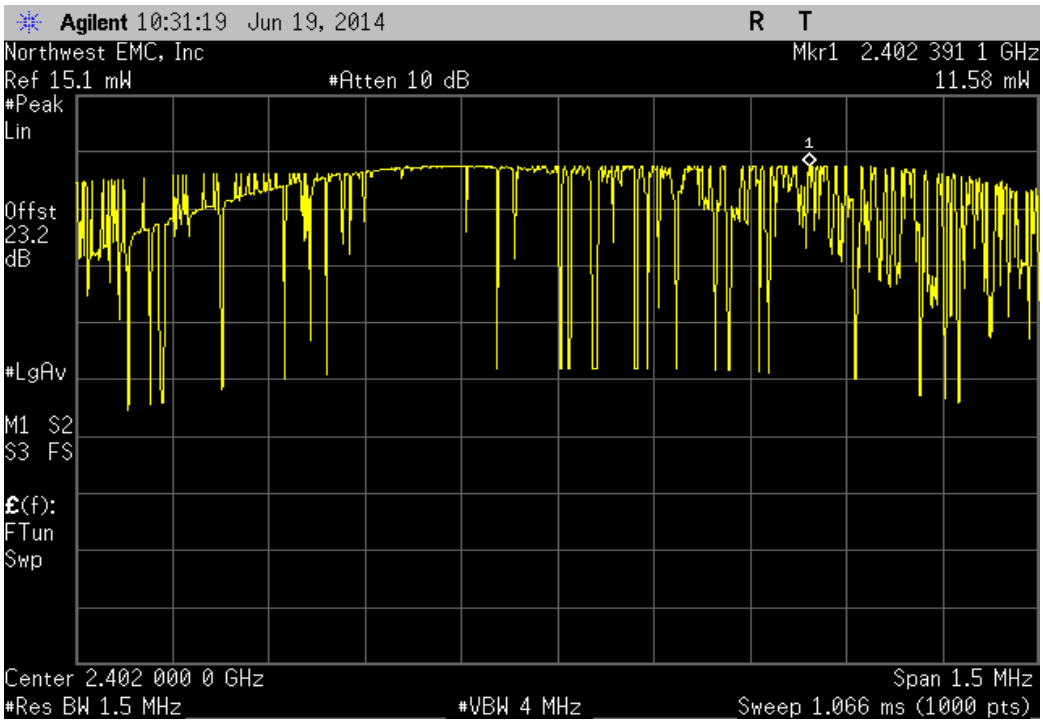
Configuration #	4	Signature

		Value	Limit	Result
DH5				
	Low Channel 0, 2402 MHz	11.582 mW	< 125 mW	Pass
	Mid Channel 39, 2441 MHz	11.727 mW	< 125 mW	Pass
	High Channel 78, 2480 MHz	11.337 mW	< 125 mW	Pass
DH3				
	Low Channel 0, 2402 MHz	11.615 mW	< 125 mW	Pass
	Mid Channel 39, 2441 MHz	11.779 mW	< 125 mW	Pass
	High Channel 78, 2480 MHz	11.363 mW	< 125 mW	Pass
DH1				
	Low Channel 0, 2402 MHz	11.660 mW	< 125 mW	Pass
	Mid Channel 39, 2441 MHz	11.877 mW	< 125 mW	Pass
	High Channel 78, 2480 MHz	11.474 mW	< 125 mW	Pass

OUTPUT POWER

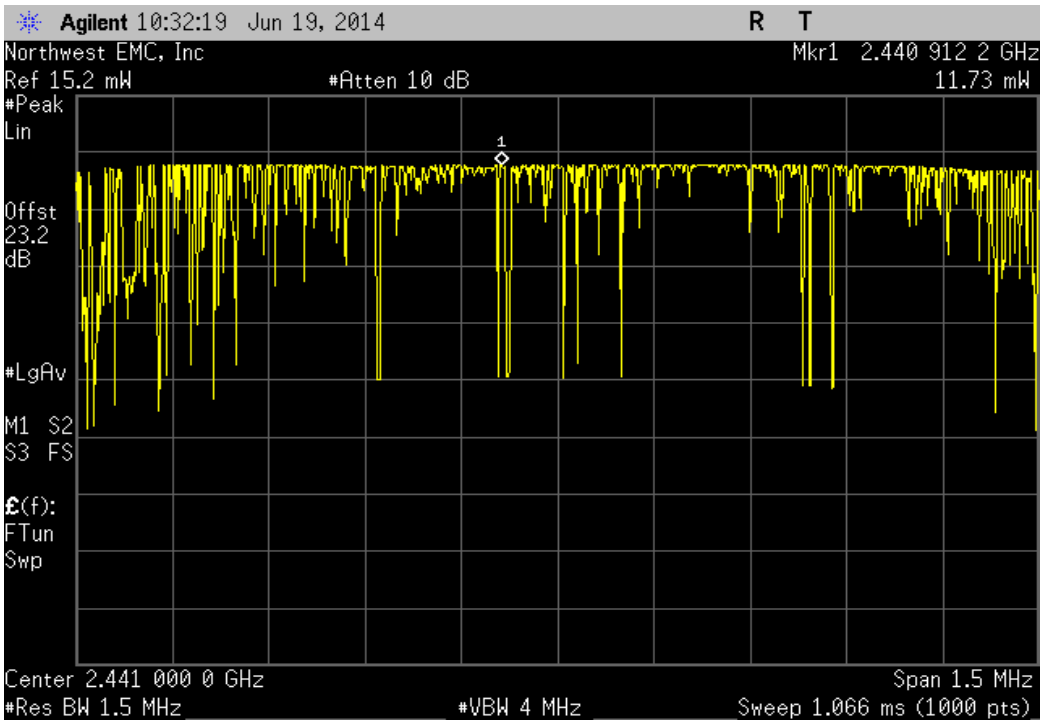
DH5, Low Channel, 2402 MHz

Value	Limit	Result
11.582 mW	< 125 mW	Pass



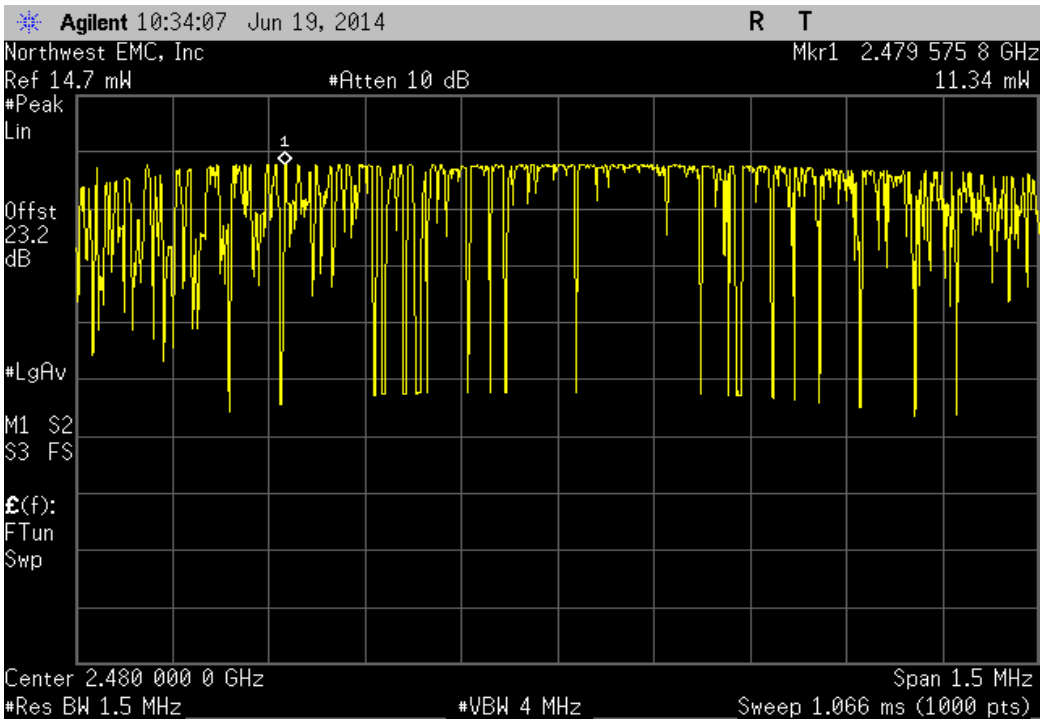
DH5, Mid Channel, 2441 MHz

Value	Limit	Result
11.727 mW	< 125 mW	Pass



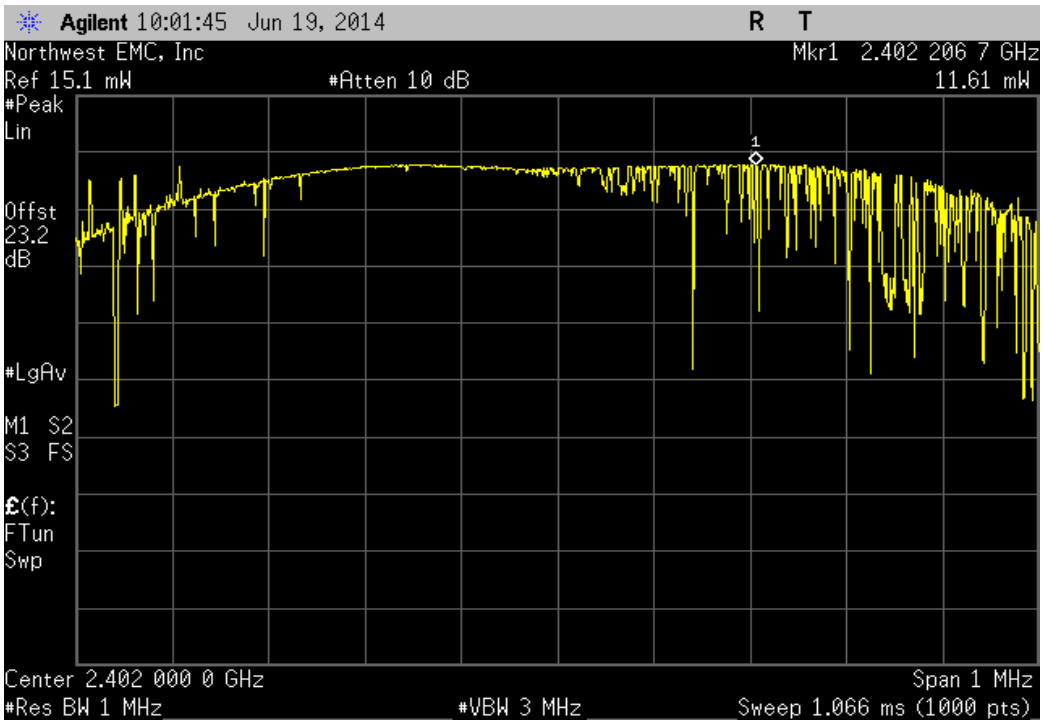
DH5, High Channel, 2480 MHz

Value	Limit	Result
11.337 mW	< 125 mW	Pass



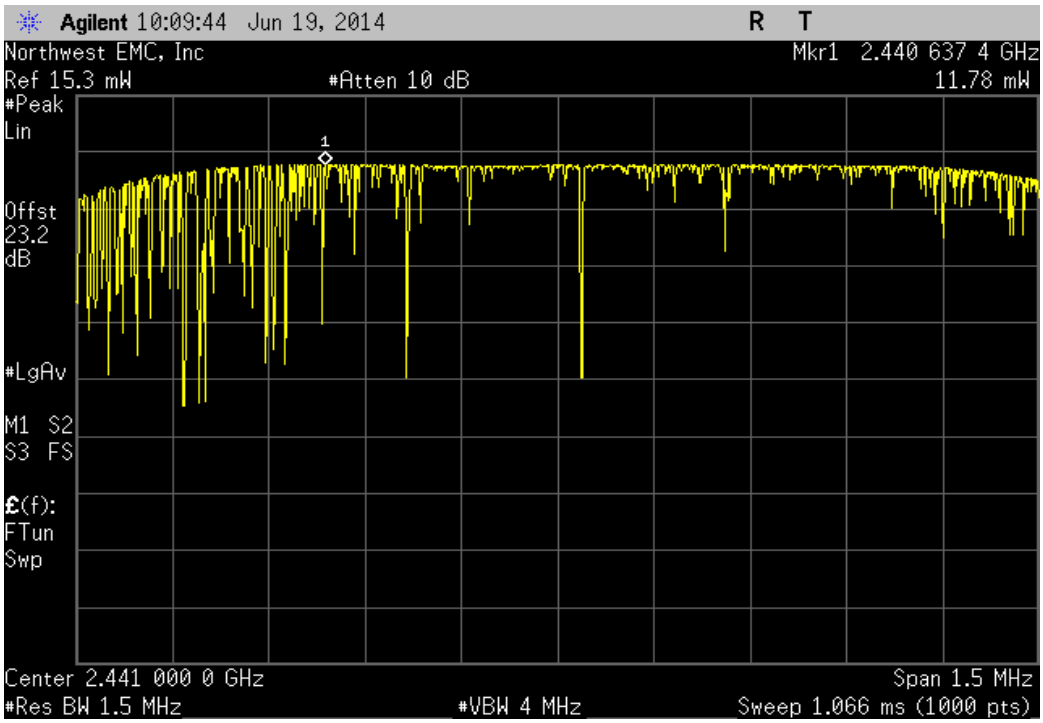
DH3, Low Channel, 2402 MHz

Value	Limit	Result
11.615 mW	< 125 mW	Pass



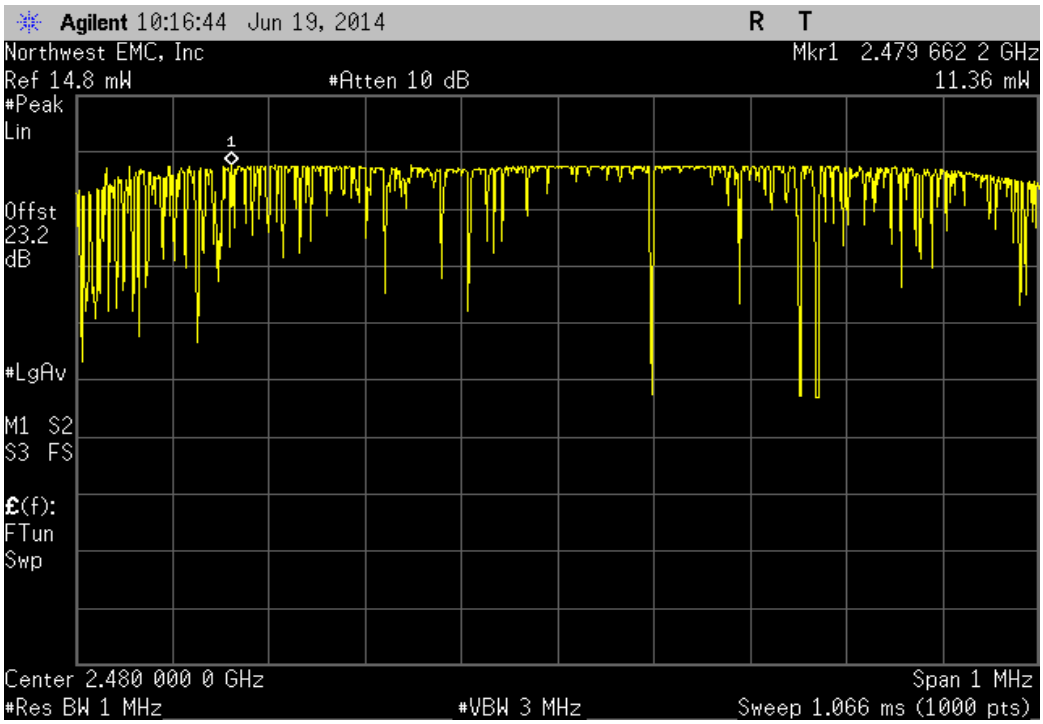
DH3, Mid Channel, 2441 MHz

				Value	Limit	Result
				11.779 mW	< 125 mW	Pass



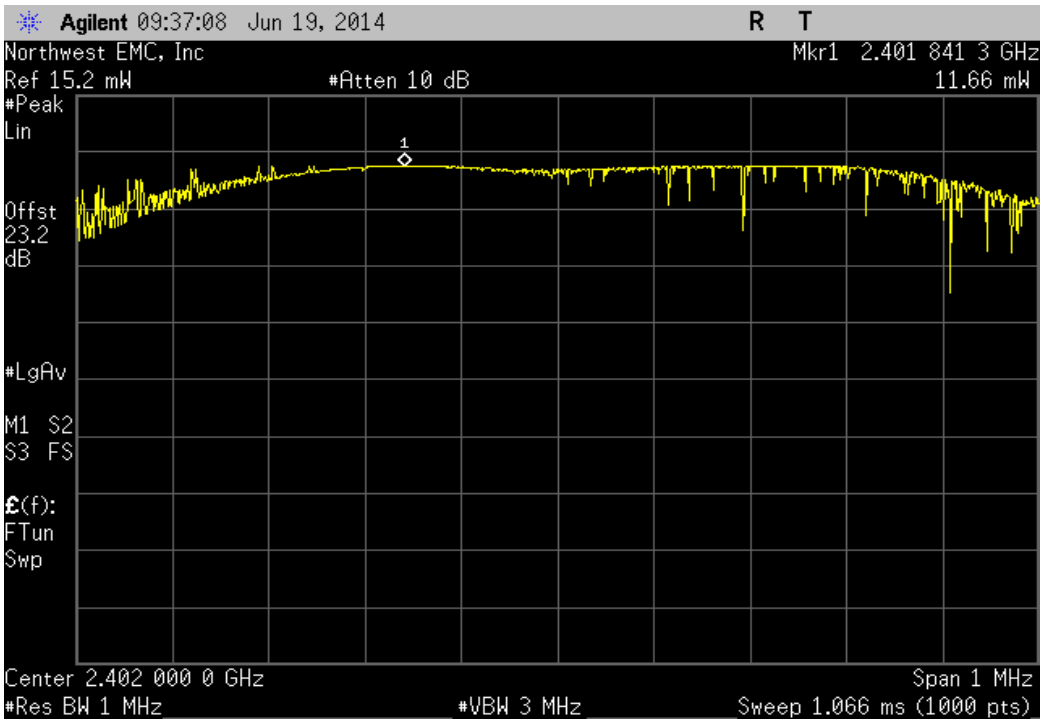
DH3, High Channel, 2480 MHz

				Value	Limit	Result
				11.363 mW	< 125 mW	Pass



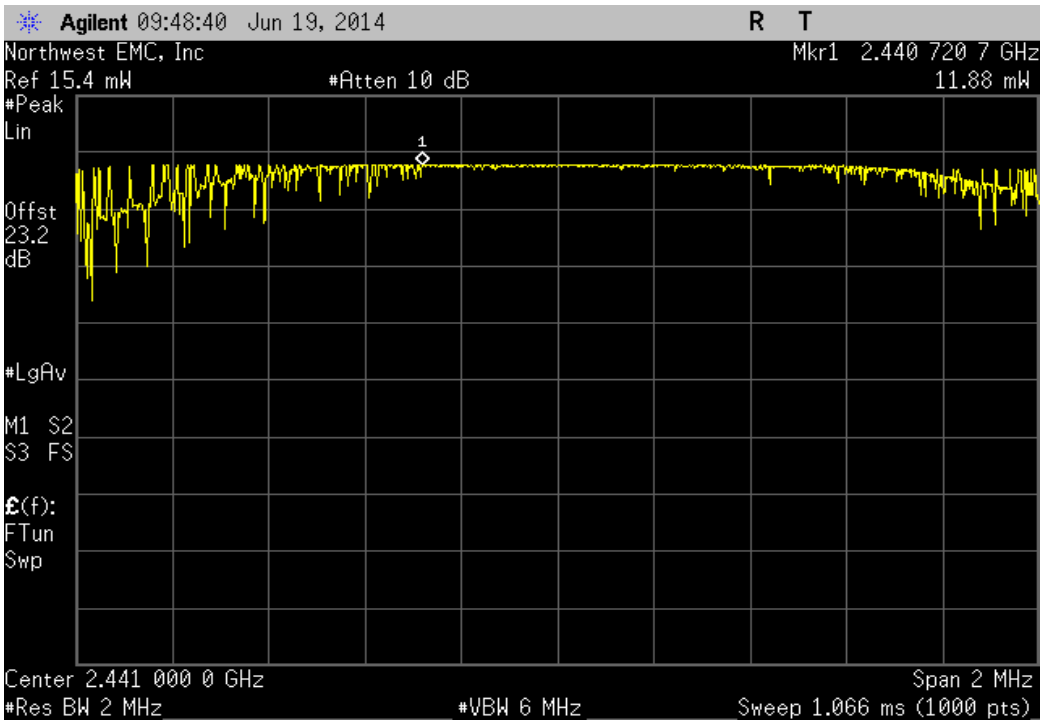
DH1, Low Channel, 2402 MHz

				Value	Limit	Result
				11.660 mW	< 125 mW	Pass



DH1, Mid Channel, 2441 MHz

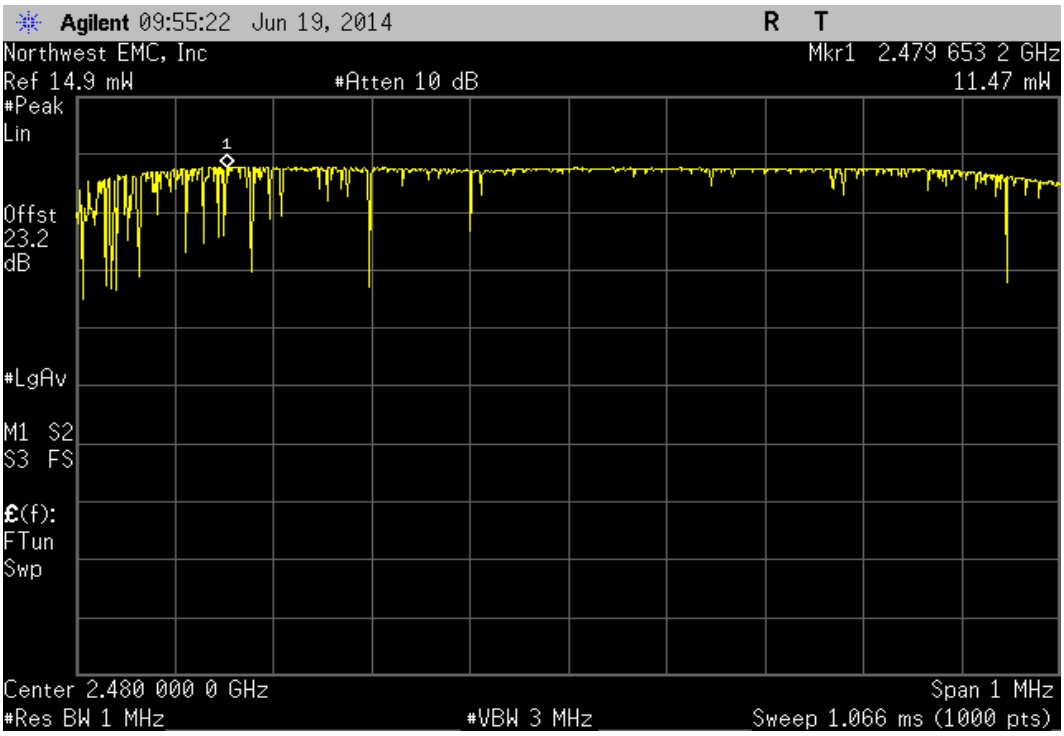
				Value	Limit	Result
				11.877 mW	< 125 mW	Pass



OUTPUT POWER

DH1, High Channel, 2480 MHz

				Value	Limit	Result
				11.474 mW	< 125 mW	Pass



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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

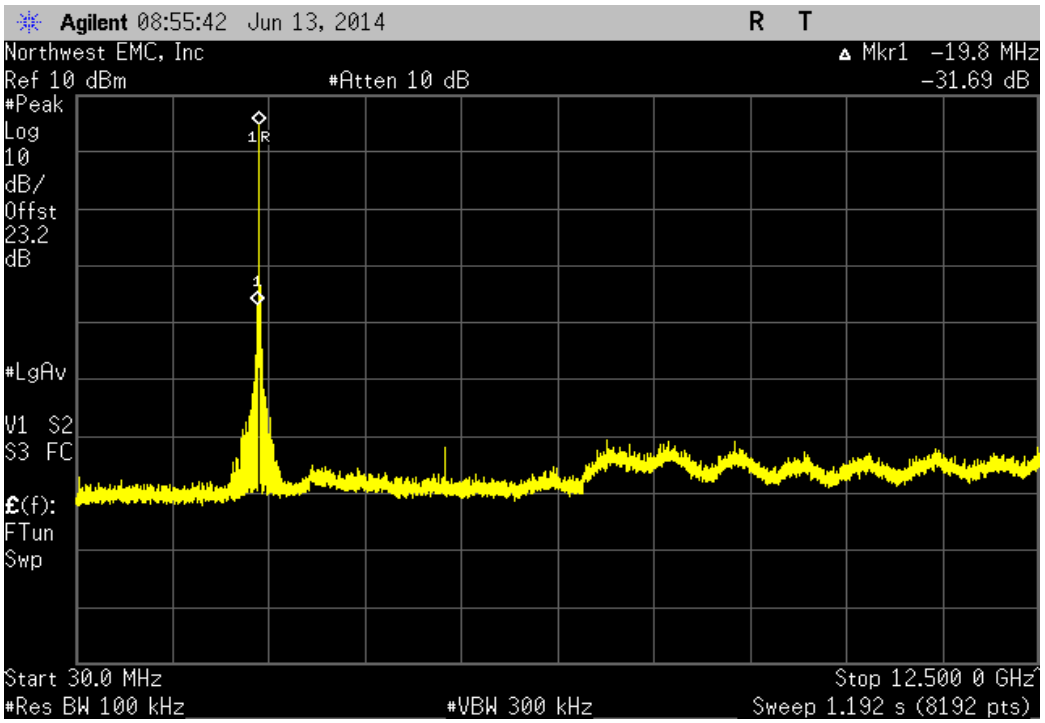
DEVIATIONS FROM TEST STANDARD

None

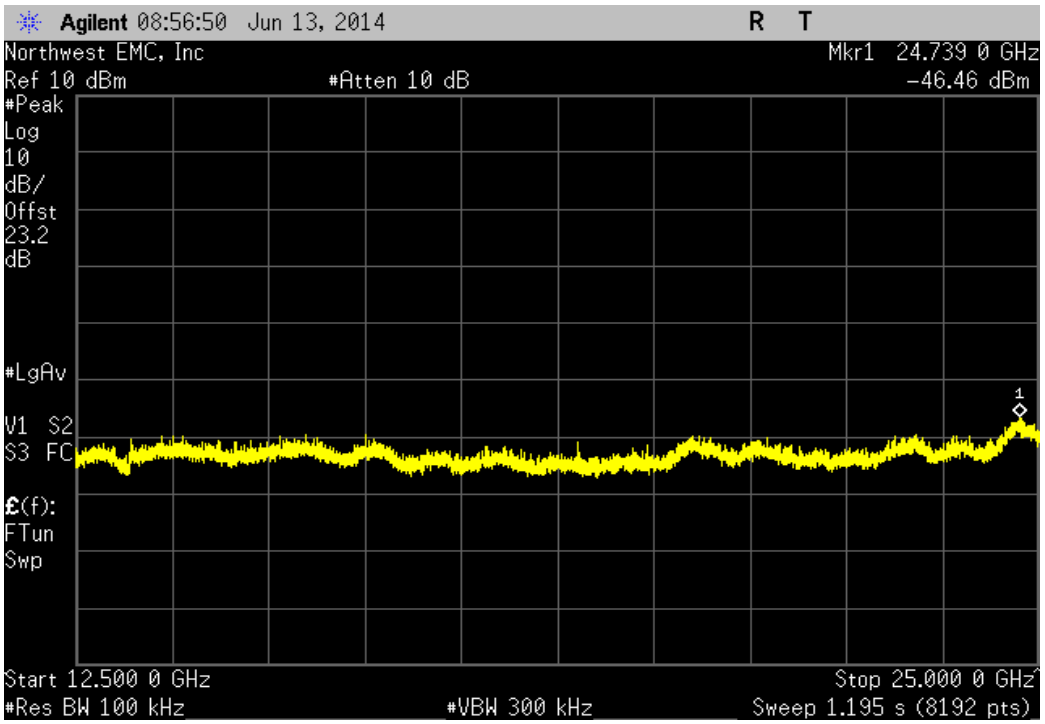
Configuration #	4	Signature

		Frequency Range	Value	Limit	Result
DH5					
	Low Channel 0, 2402 MHz	30 MHz - 12.5 GHz	-31.69 dBc	≤ -20 dBc	Pass
	Low Channel 0, 2402 MHz	12.5 GHz - 25 GHz	-51.32 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	30 MHz - 12.5 GHz	-48.35 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	12.5 GHz - 25 GHz	-50.71 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	30 MHz - 12.5 GHz	-39.41 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	12.5 GHz - 25 GHz	-50.59 dBc	≤ -20 dBc	Pass
DH3					
	Low Channel 0, 2402 MHz	30 MHz - 12.5 GHz	-27.24 dBc	≤ -20 dBc	Pass
	Low Channel 0, 2402 MHz	12.5 GHz - 25 GHz	-52.33 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	30 MHz - 12.5 GHz	-46.61 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	12.5 GHz - 25 GHz	-52.64 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	30 MHz - 12.5 GHz	-28.55 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	12.5 GHz - 25 GHz	-51.47 dBc	≤ -20 dBc	Pass
DH1					
	Low Channel 0, 2402 MHz	30 MHz - 12.5 GHz	-30.60 dBc	≤ -20 dBc	Pass
	Low Channel 0, 2402 MHz	12.5 GHz - 25 GHz	-52.46 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	30 MHz - 12.5 GHz	-45.94 dBc	≤ -20 dBc	Pass
	Mid Channel 39, 2441 MHz	12.5 GHz - 25 GHz	-52.41 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	30 MHz - 12.5 GHz	-27.45 dBc	≤ -20 dBc	Pass
	High Channel 78, 2480 MHz	12.5 GHz - 25 GHz	-51.53 dBc	≤ -20 dBc	Pass

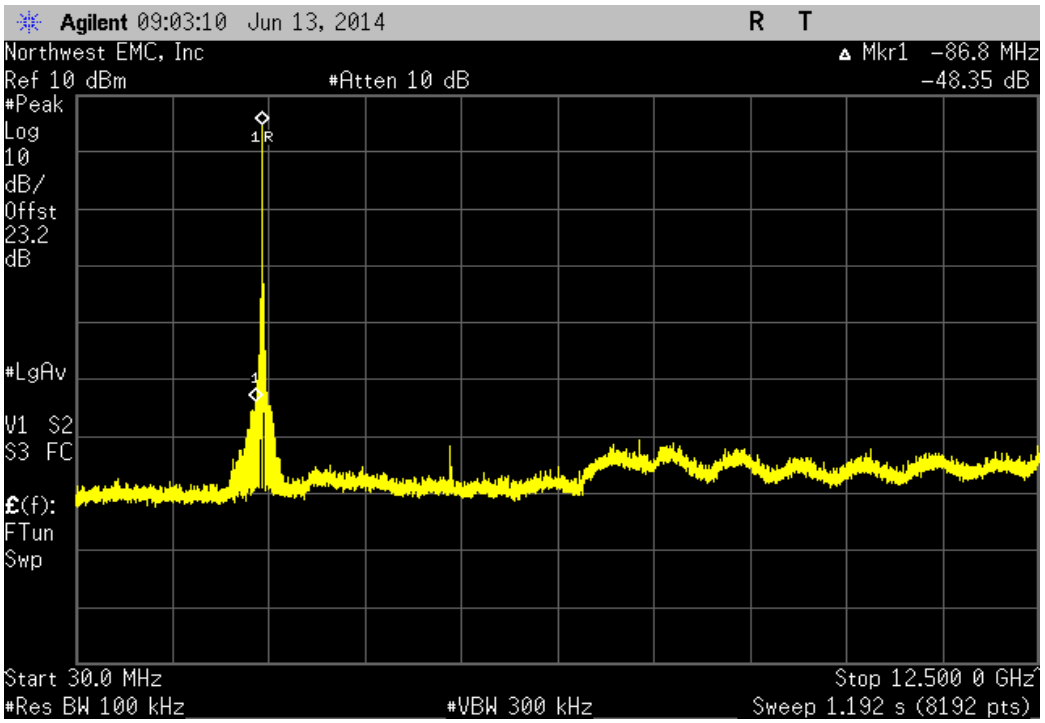
DH5, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-31.69 dBc	≤ -20 dBc	Pass



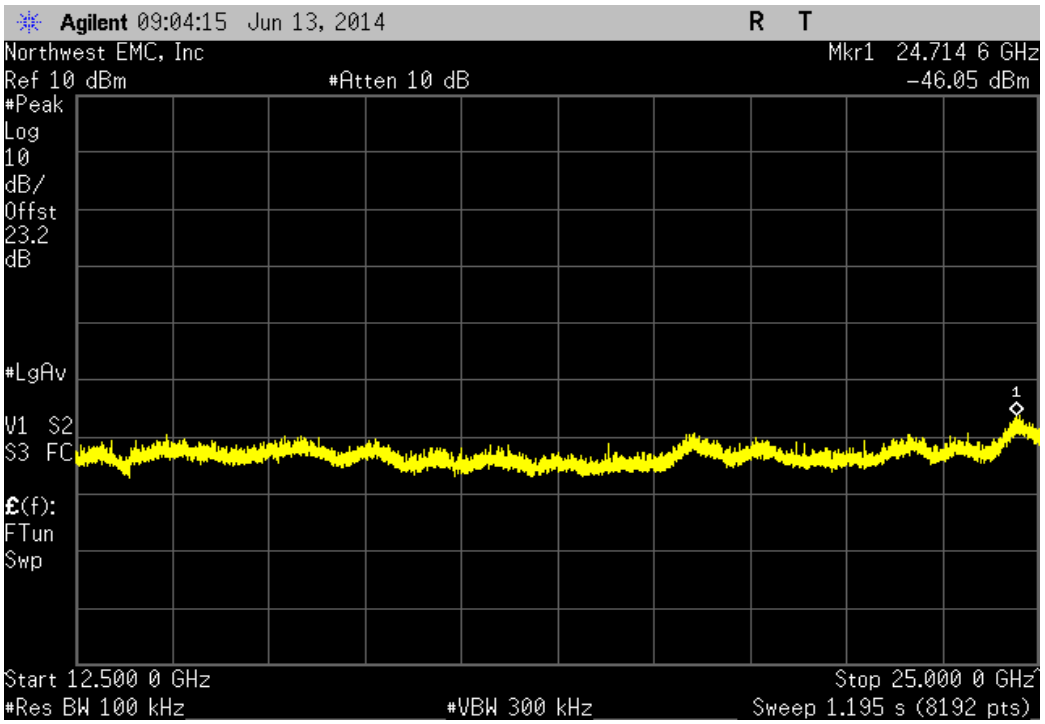
DH5, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-51.32 dBc	≤ -20 dBc	Pass



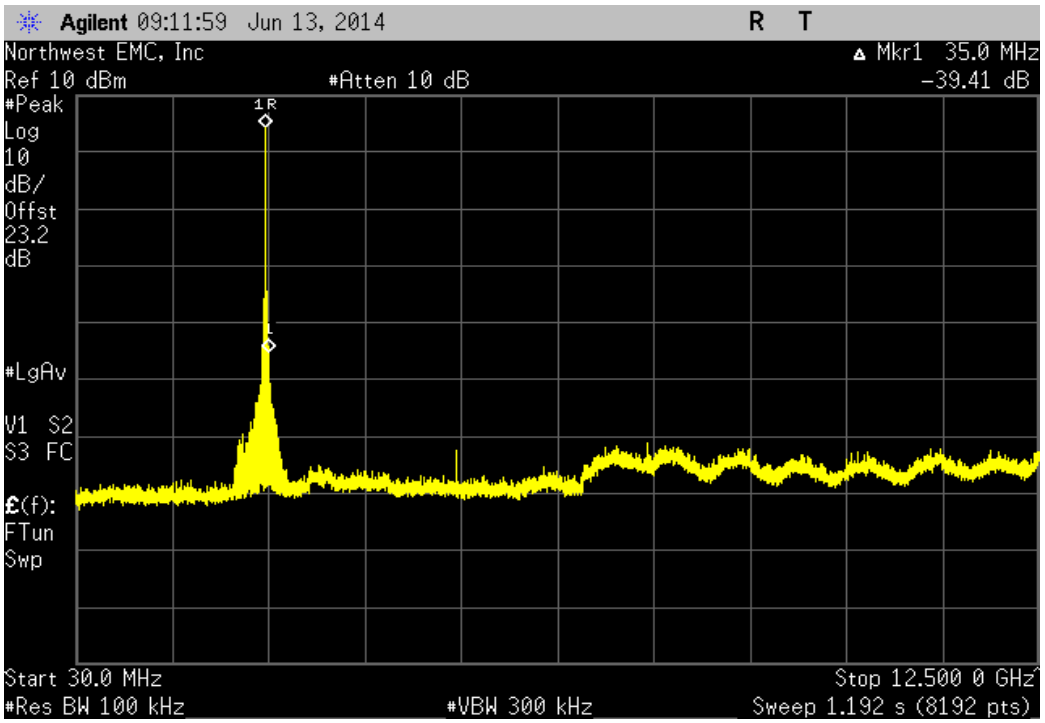
DH5, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-48.35 dBc	≤ -20 dBc	Pass



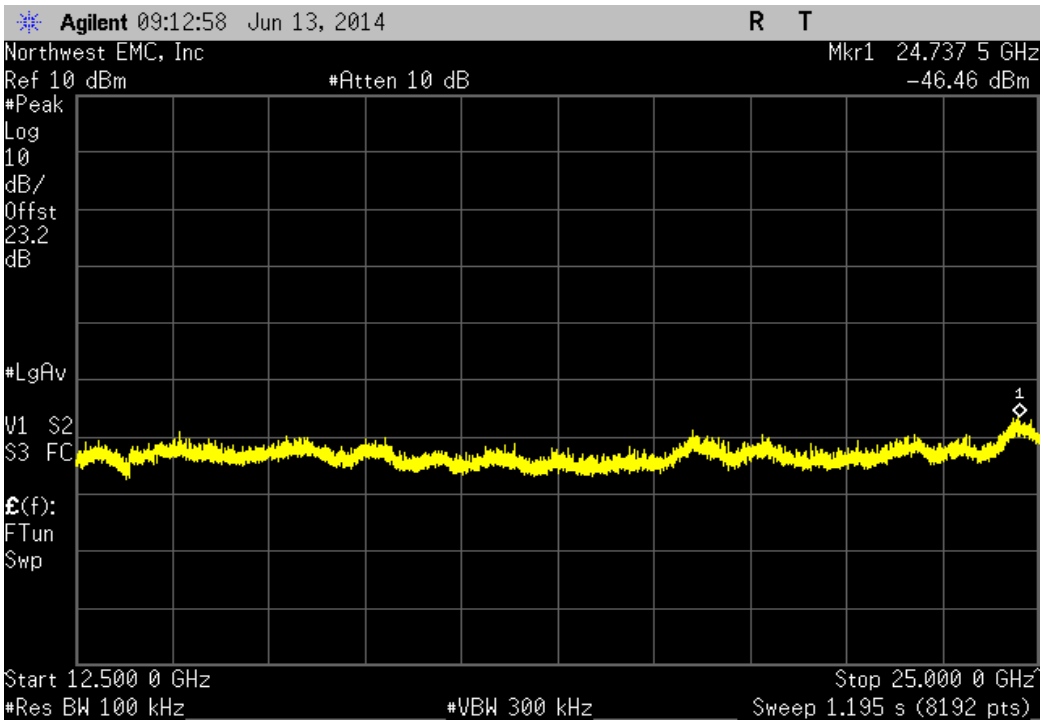
DH5, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-50.71 dBc	≤ -20 dBc	Pass



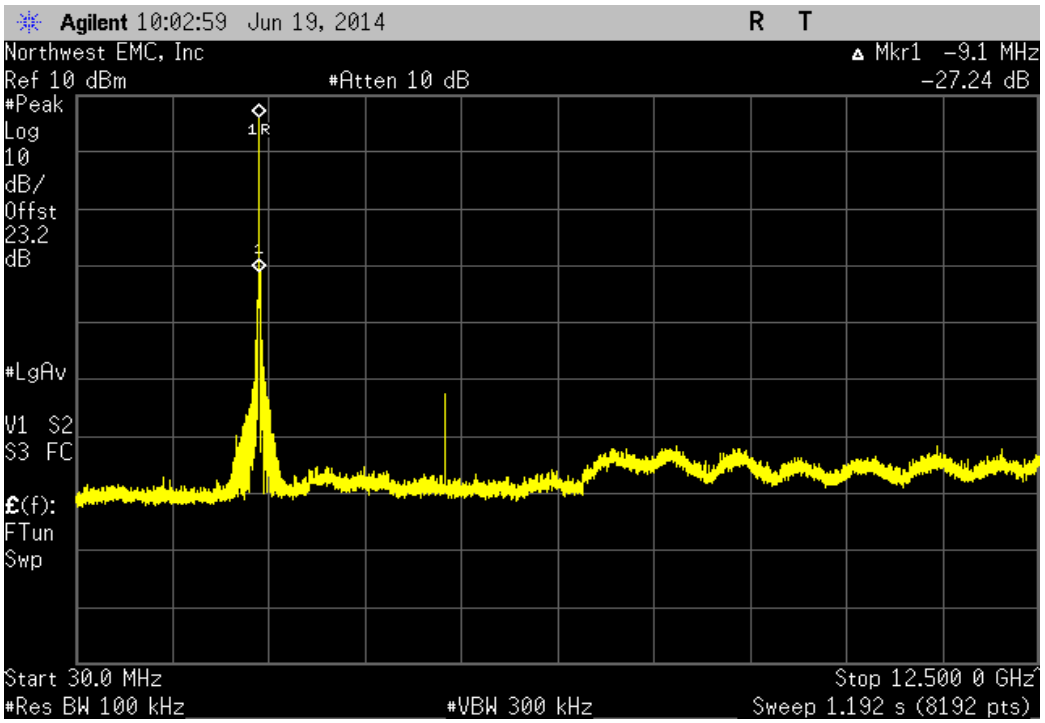
DH5, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-39.41 dBc	≤ -20 dBc	Pass



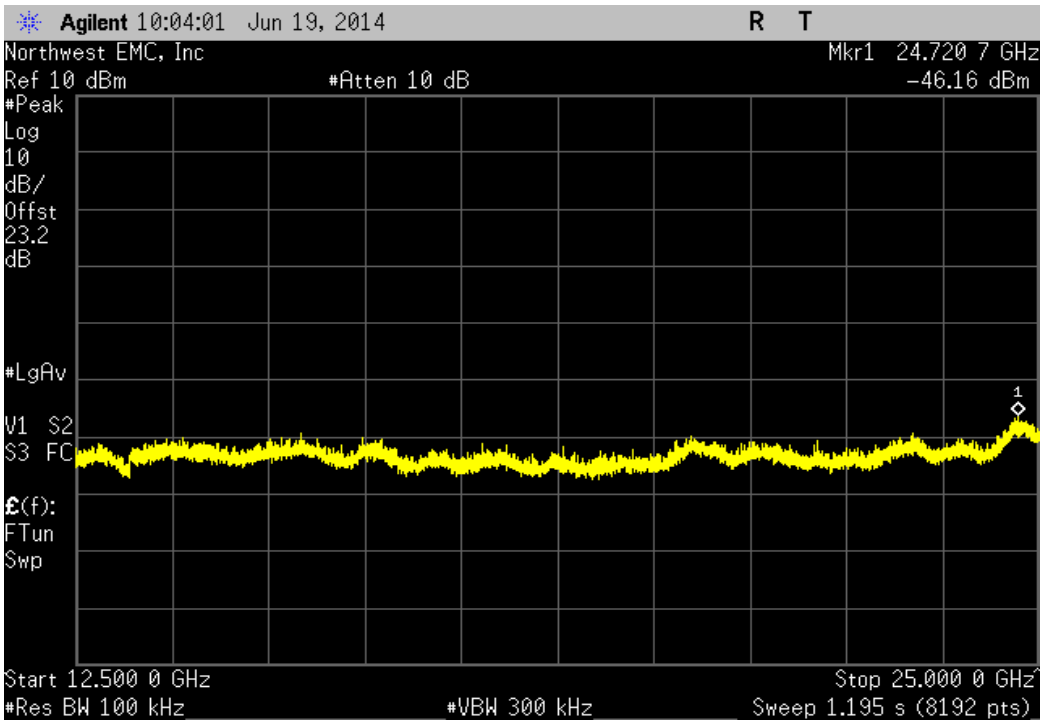
DH5, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-50.59 dBc	≤ -20 dBc	Pass



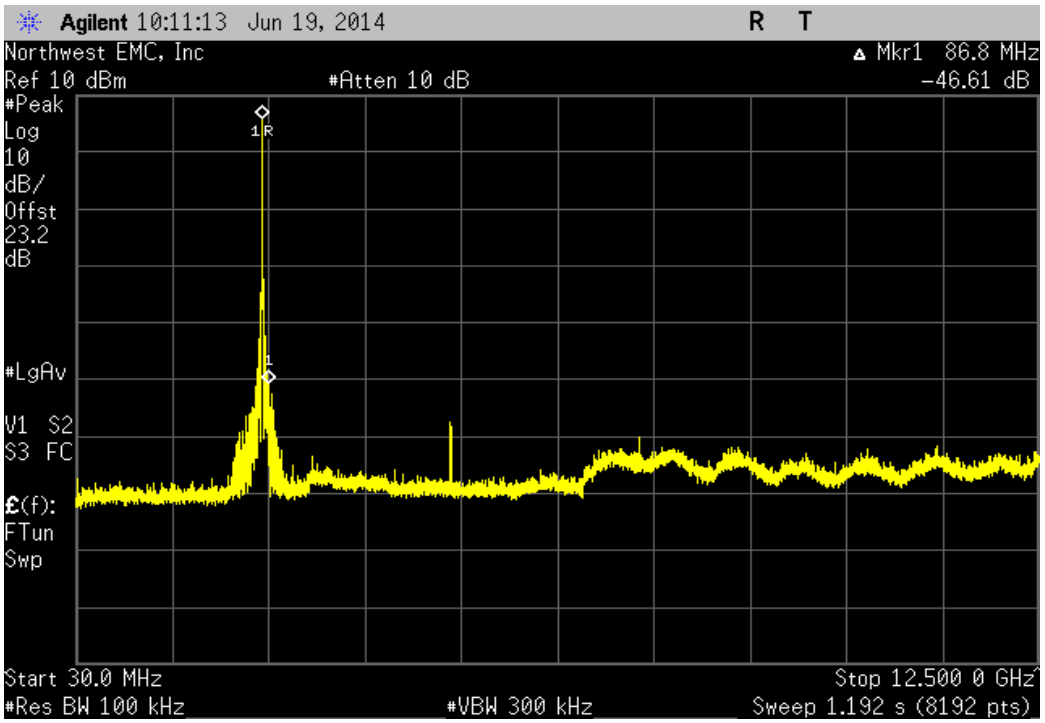
DH3, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-27.24 dBc	≤ -20 dBc	Pass



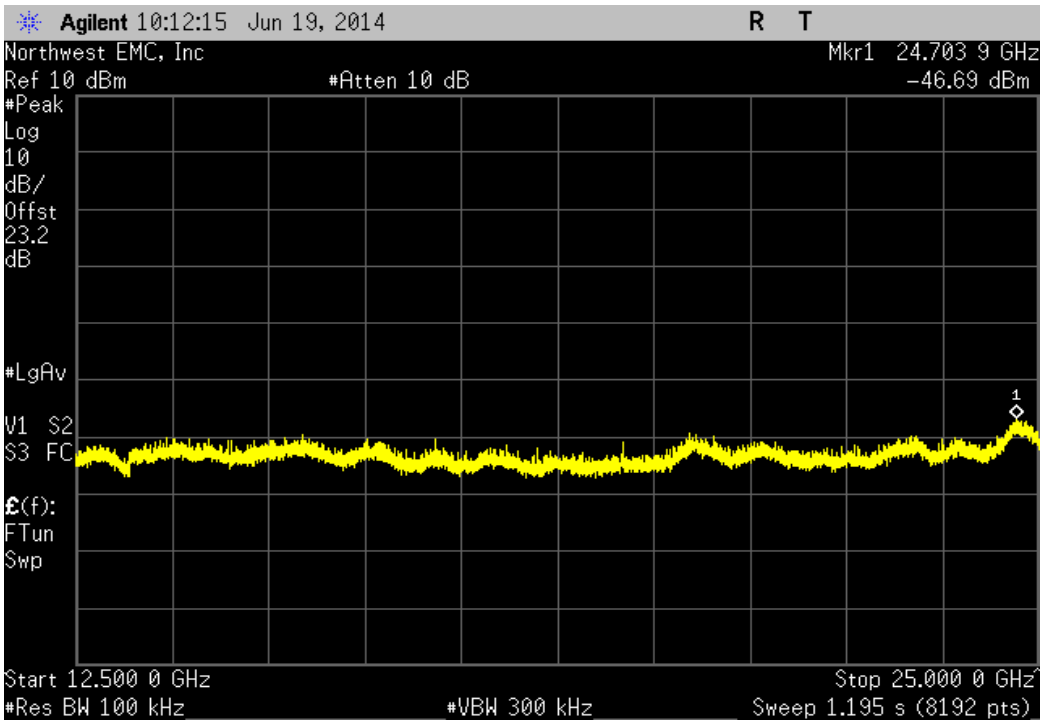
DH3, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.33 dBc	≤ -20 dBc	Pass



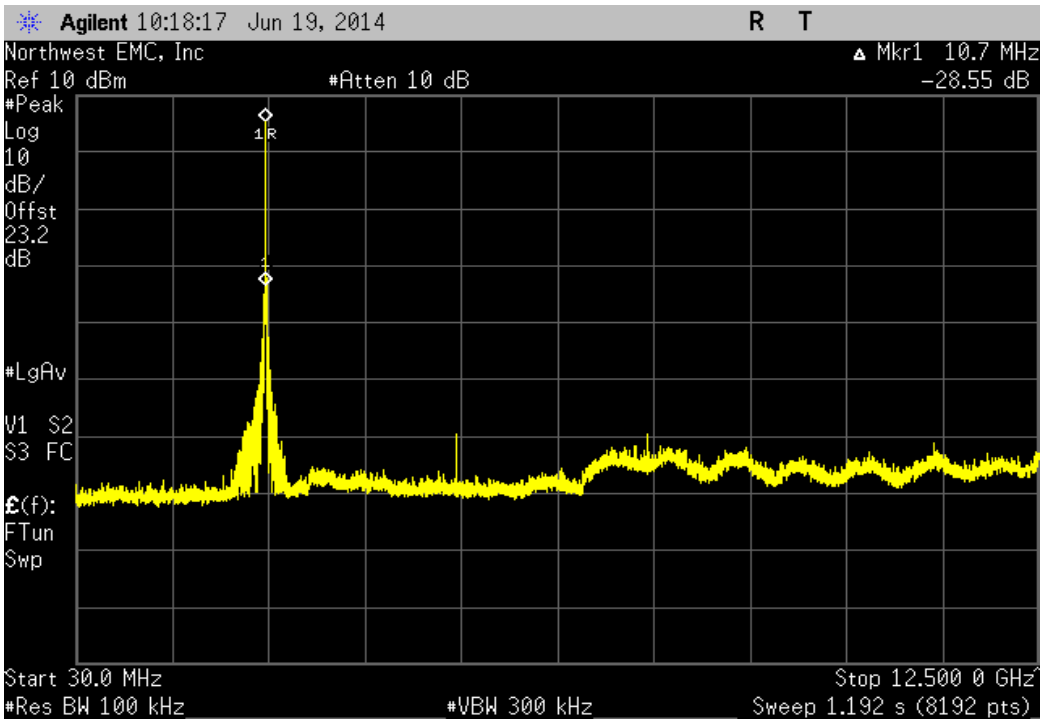
DH3, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-46.61 dBc	≤ -20 dBc	Pass



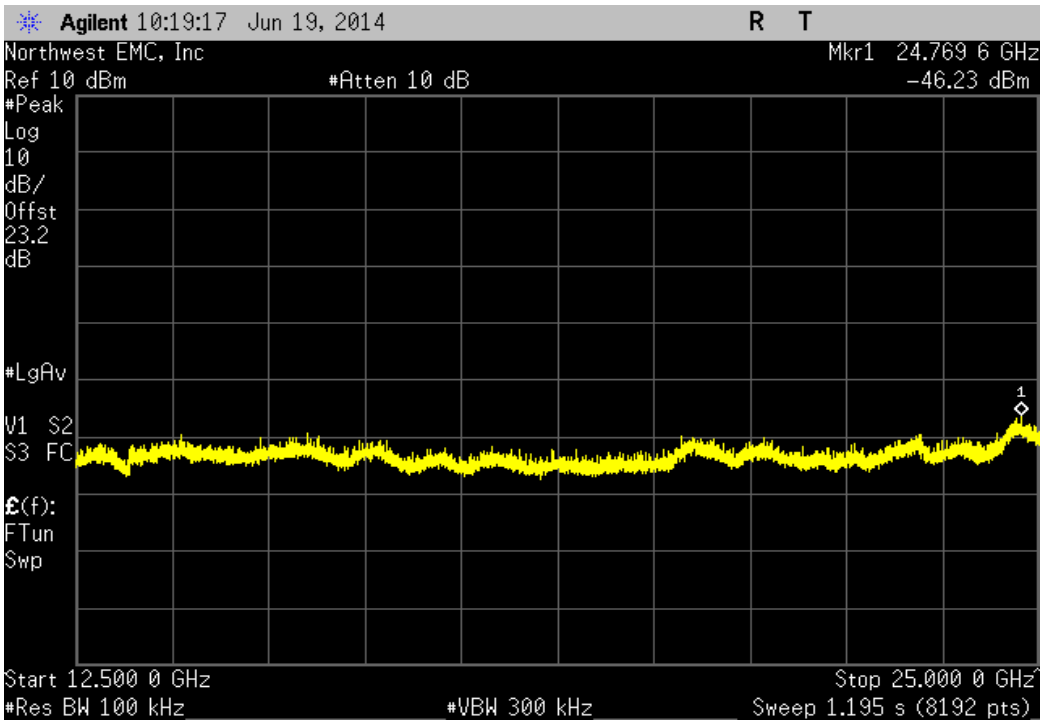
DH3, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.64 dBc	≤ -20 dBc	Pass



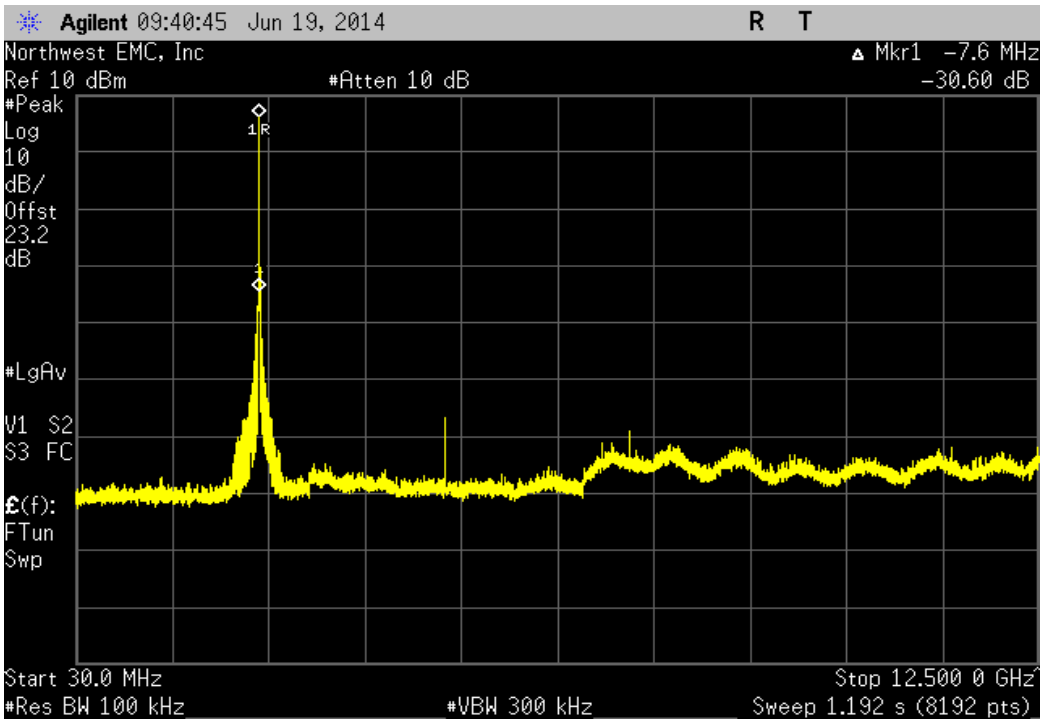
DH3, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-28.55 dBc	≤ -20 dBc	Pass



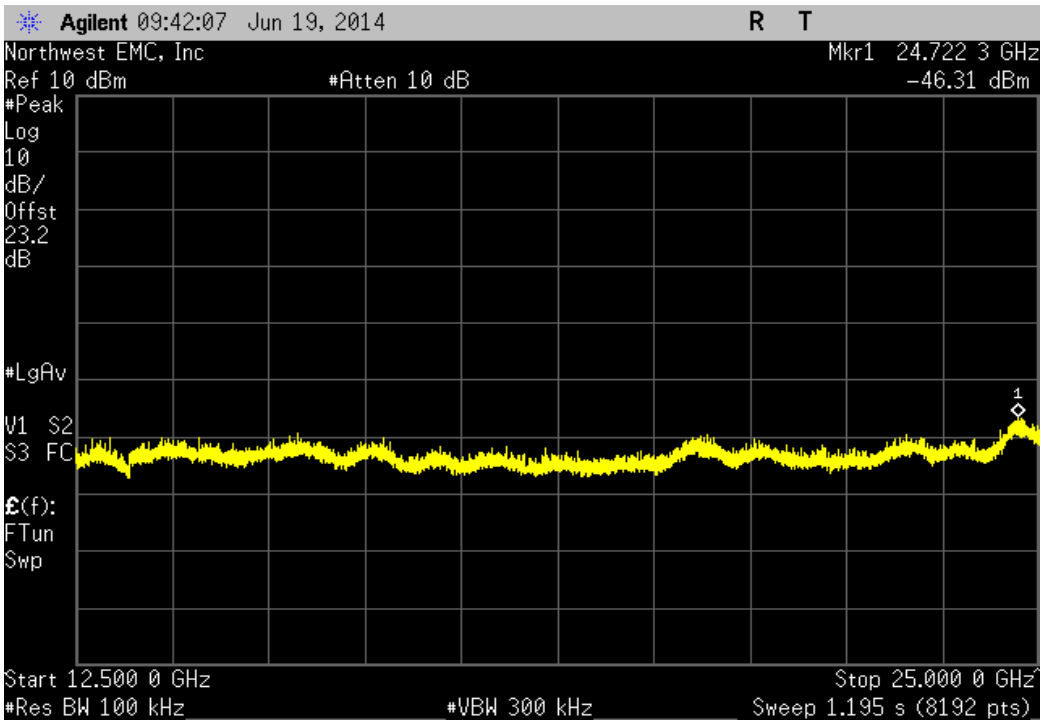
DH3, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-51.47 dBc	≤ -20 dBc	Pass



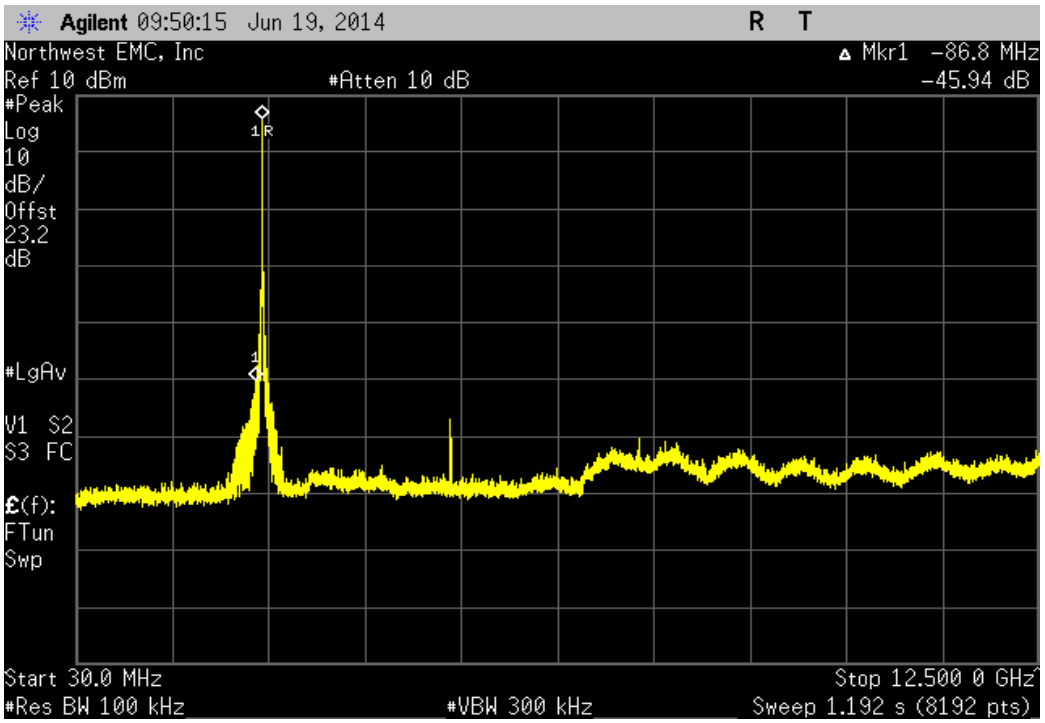
DH1, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-30.60 dBc	≤ -20 dBc	Pass



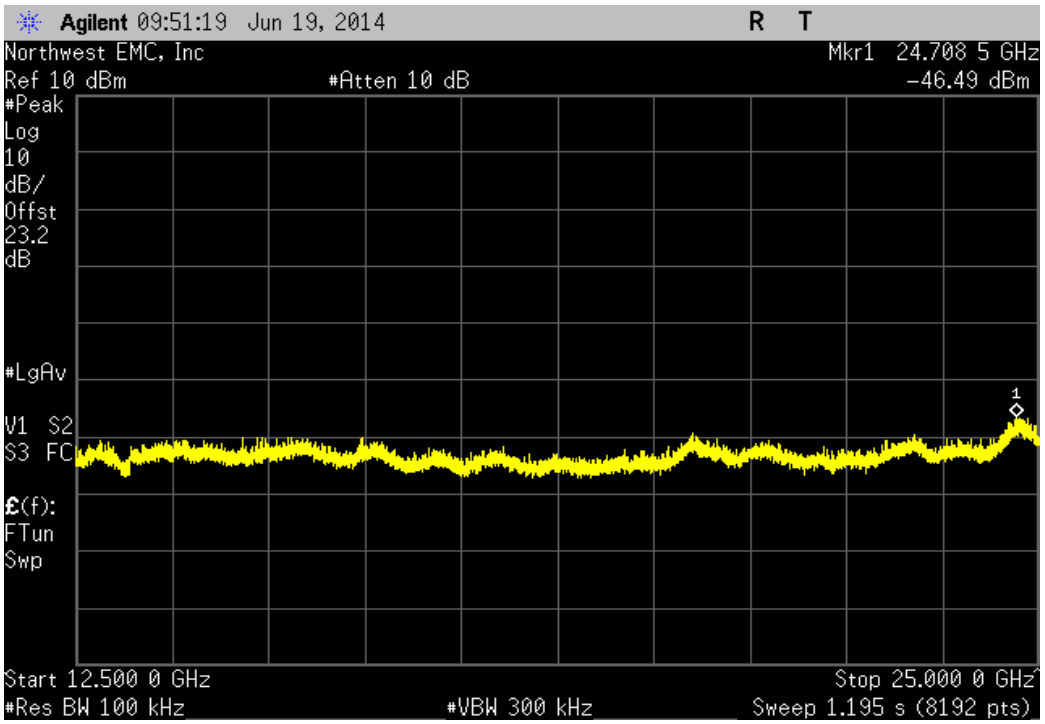
DH1, Low Channel, 2402 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.46 dBc	≤ -20 dBc	Pass



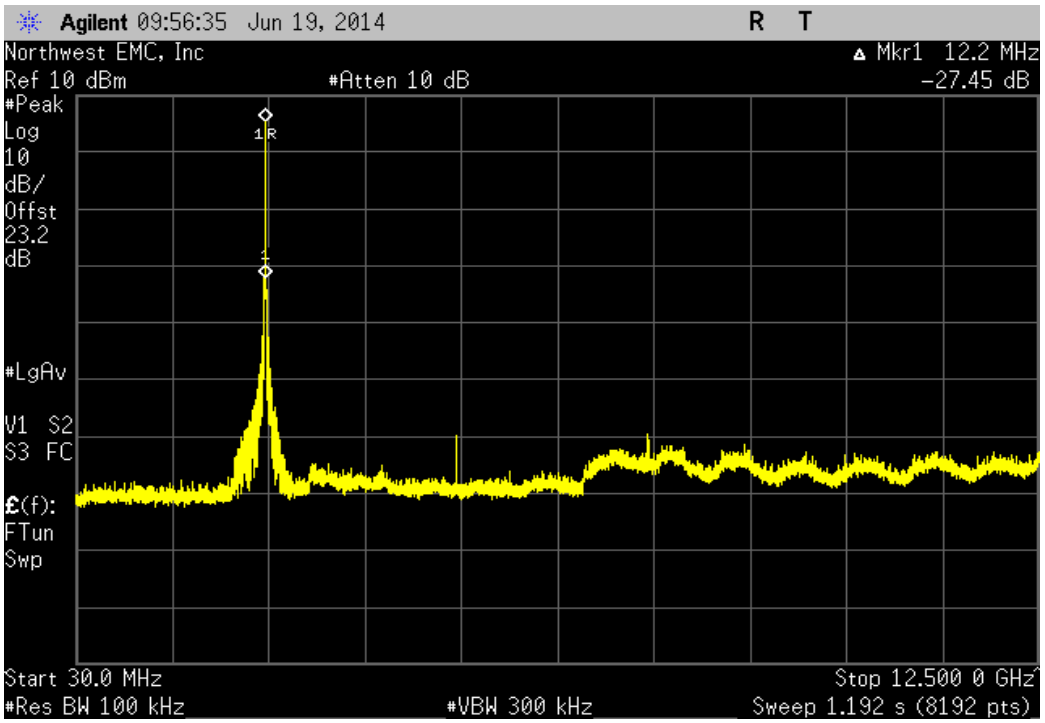
DH1, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-45.94 dBc	≤ -20 dBc	Pass



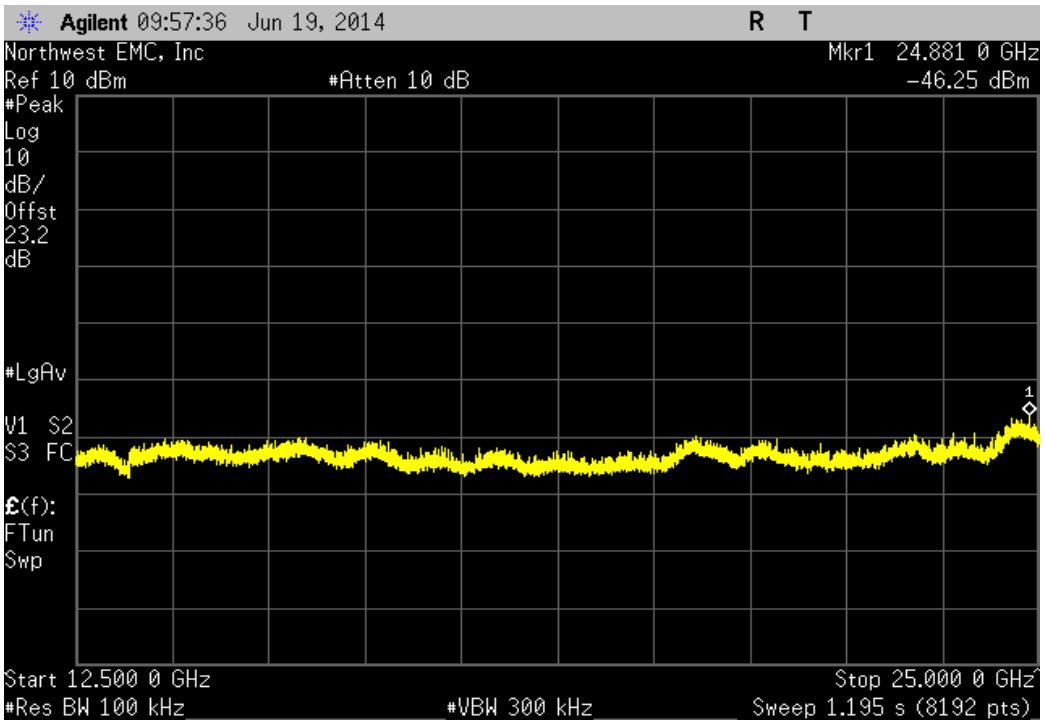
DH1, Mid Channel, 2441 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-52.41 dBc	≤ -20 dBc	Pass



DH1, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-27.45 dBc	≤ -20 dBc	Pass



DH1, High Channel, 2480 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-51.53 dBc	≤ -20 dBc	Pass



BANDEDGE 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 (mo.)
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	7/30/2013	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.

BANDEDGE COMPLIANCE

EUT:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

None

Configuration #	4	Signature

		Value	Limit	Result
DH5				
	Low Channel, 2402 MHz	-23.29 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-21.34 dBc	≤ -20 dBc	Pass
DH3				
	Low Channel, 2402 MHz	-25.65 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-20.63 dBc	≤ -20 dBc	Pass
DH1				
	Low Channel, 2402 MHz	-25.56 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-20.54 dBc	≤ -20 dBc	Pass

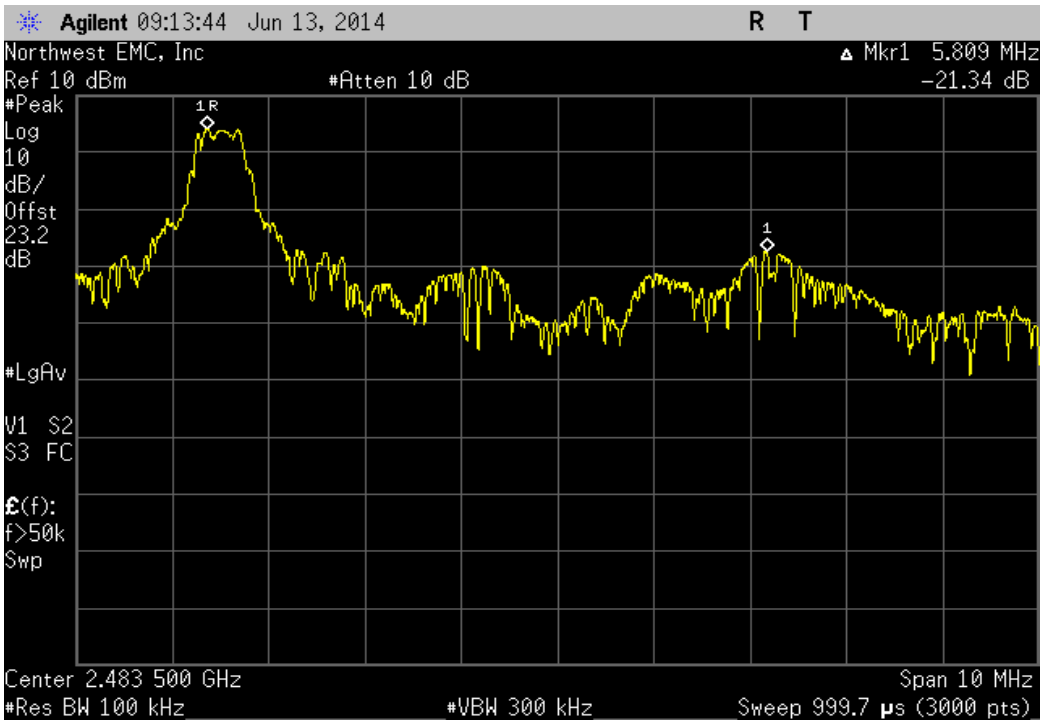
BANDEDGE COMPLIANCE

DH5, Low Channel, 2402 MHz

Value	Limit	Result
-23.29 dBc	≤ -20 dBc	Pass

DH5, High Channel, 2480 MHz

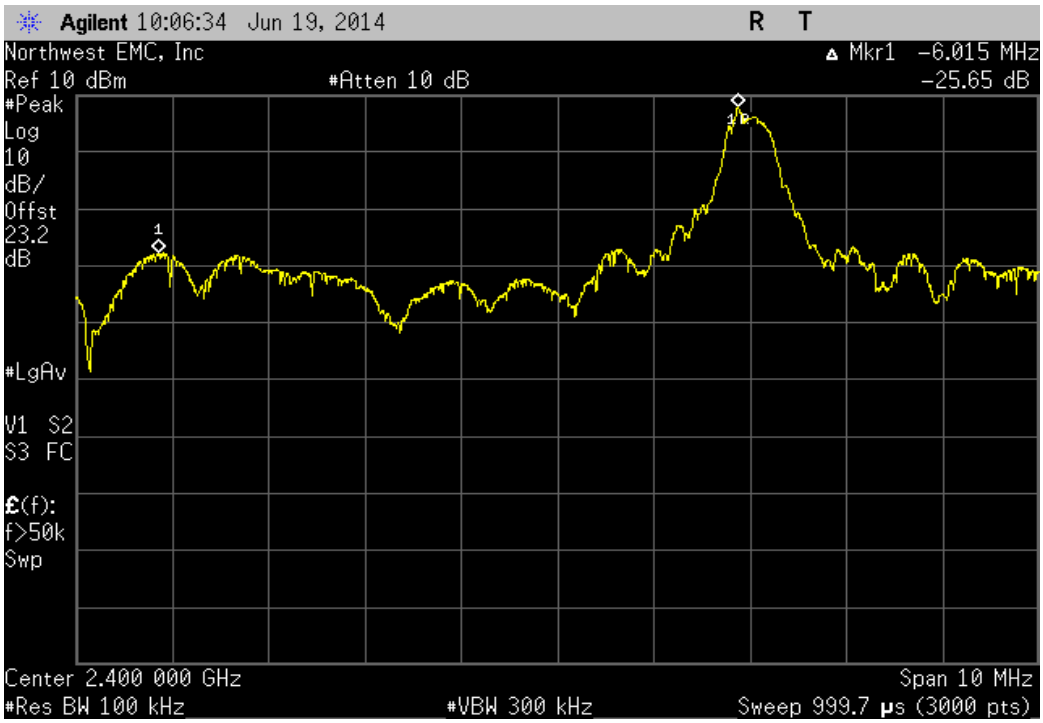
Value	Limit	Result
-21.34 dBc	≤ -20 dBc	Pass



BANDEDGE COMPLIANCE

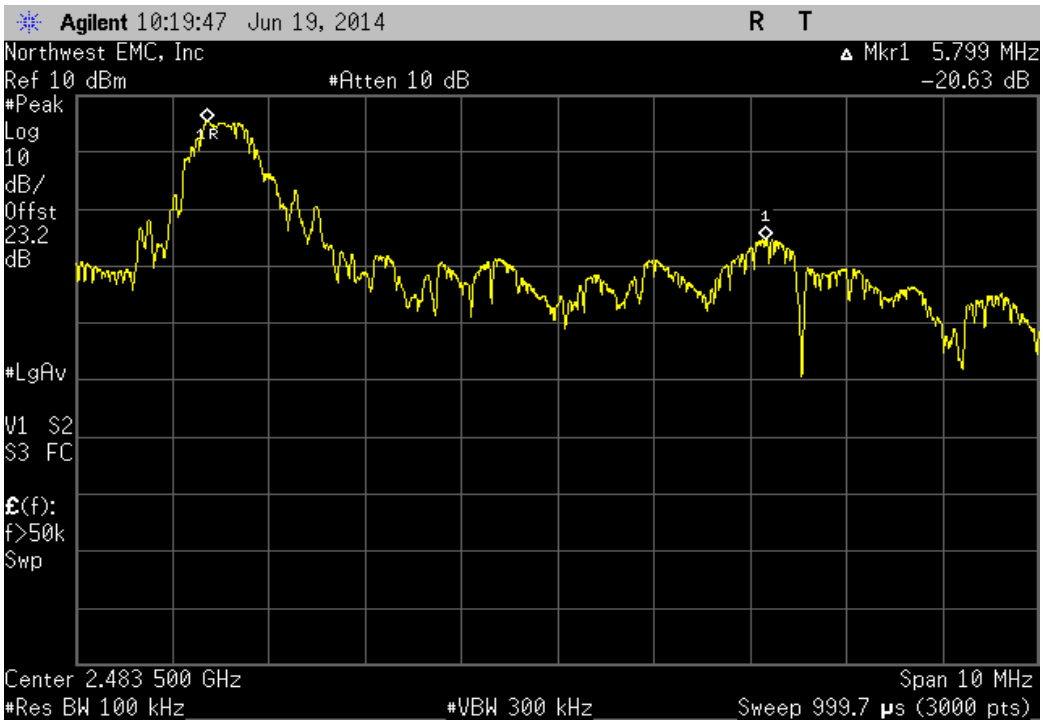
DH3, Low Channel, 2402 MHz

				Value	Limit	Result
				-25.65 dBc	≤ -20 dBc	Pass



DH3, High Channel, 2480 MHz

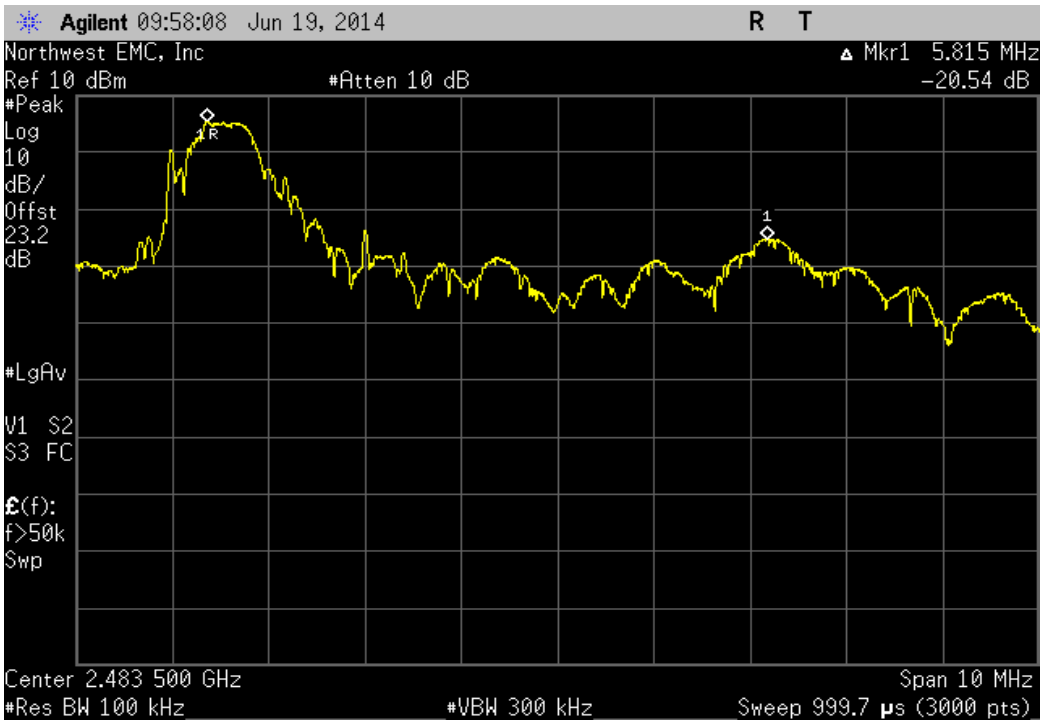
				Value	Limit	Result
				-20.63 dBc	≤ -20 dBc	Pass



BANDEDGE COMPLIANCE

DH1, Low Channel, 2402 MHz							
					Value	Limit	Result
					-25.56 dBc	≤ -20 dBc	Pass

DH1, High Channel, 2480 MHz							
					Value	Limit	Result
					-20.54 dBc	≤ -20 dBc	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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

None

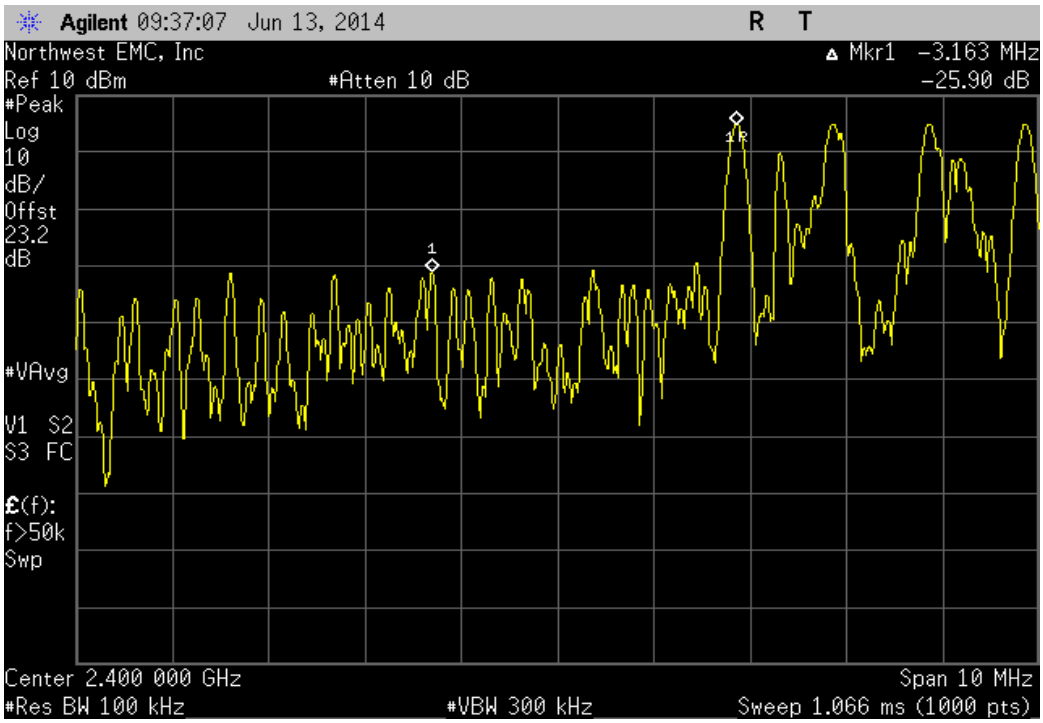
Configuration #	4	Signature

		Value	Limit	Result
Hopping Mode				
DH5				
	Low Channel, 2402 MHz	-25.9 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-25.54 dBc	≤ -20 dBc	Pass
DH3				
	Low Channel, 2402 MHz	-25.02 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-21.29 dBc	≤ -20 dBc	Pass
DH1				
	Low Channel, 2402 MHz	-25.7 dBc	≤ -20 dBc	Pass
	High Channel, 2480 MHz	-21.38 dBc	≤ -20 dBc	Pass

BAND EDGE COMPLIANCE - HOPPING

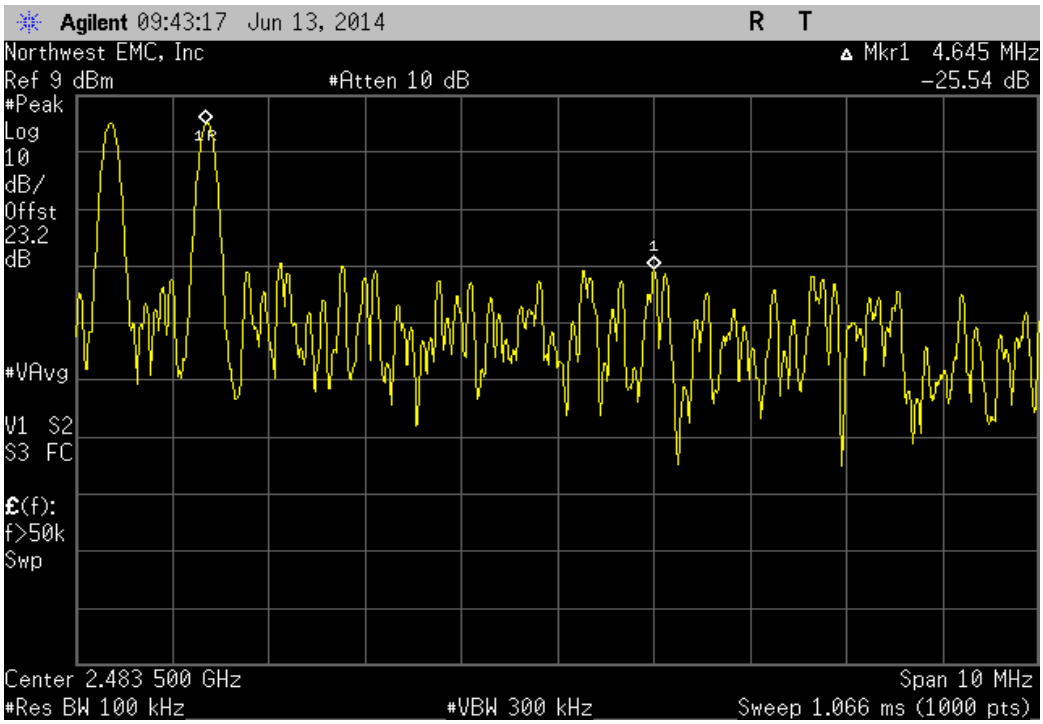
Hopping Mode, DH5, Low Channel, 2402 MHz

Value	Limit	Result
-25.9 dBc	≤ -20 dBc	Pass



Hopping Mode, DH5, High Channel, 2480 MHz

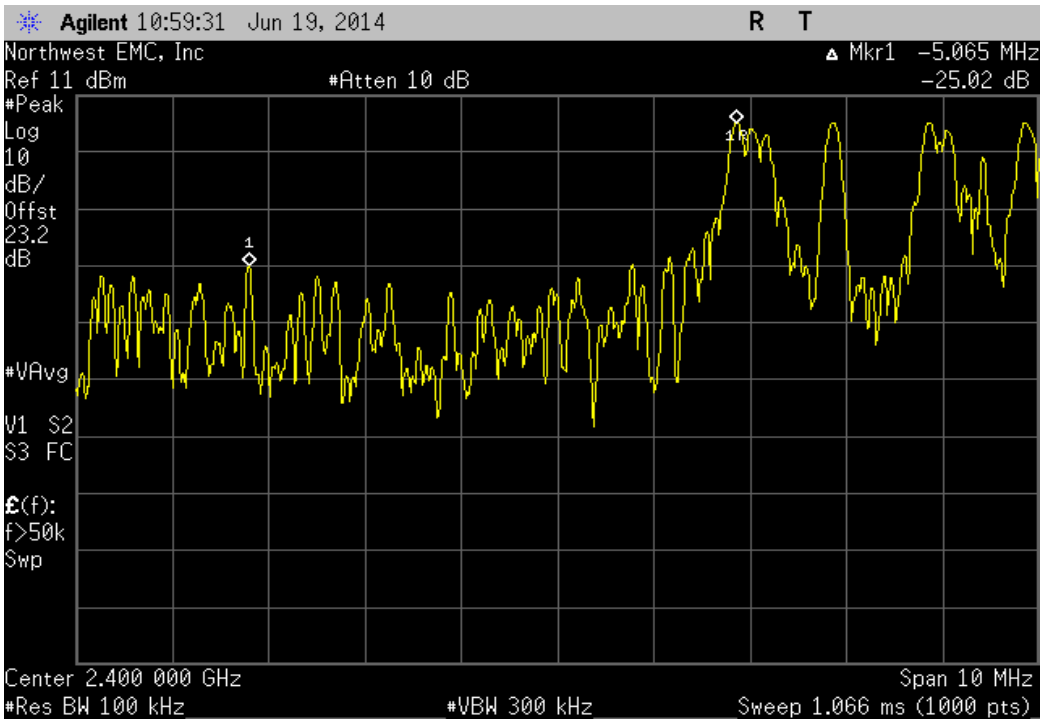
Value	Limit	Result
-25.54 dBc	≤ -20 dBc	Pass



BAND EDGE COMPLIANCE - HOPPING

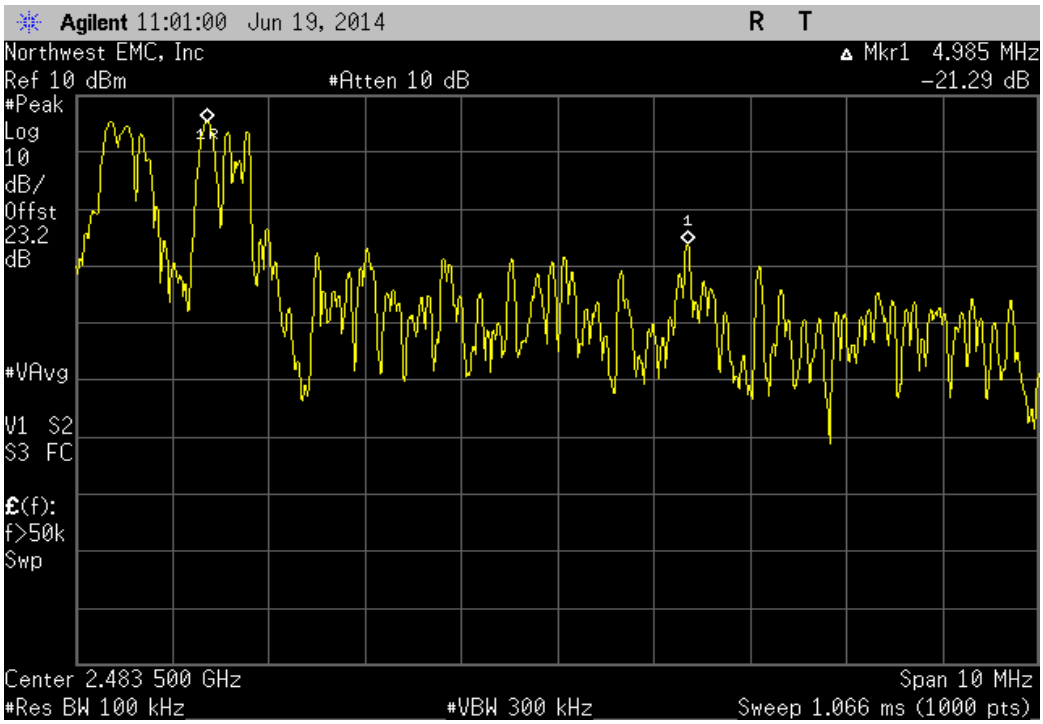
Hopping Mode, DH3, Low Channel, 2402 MHz

				Value	Limit	Result
				-25.02 dBc	≤ -20 dBc	Pass



Hopping Mode, DH3, High Channel, 2480 MHz

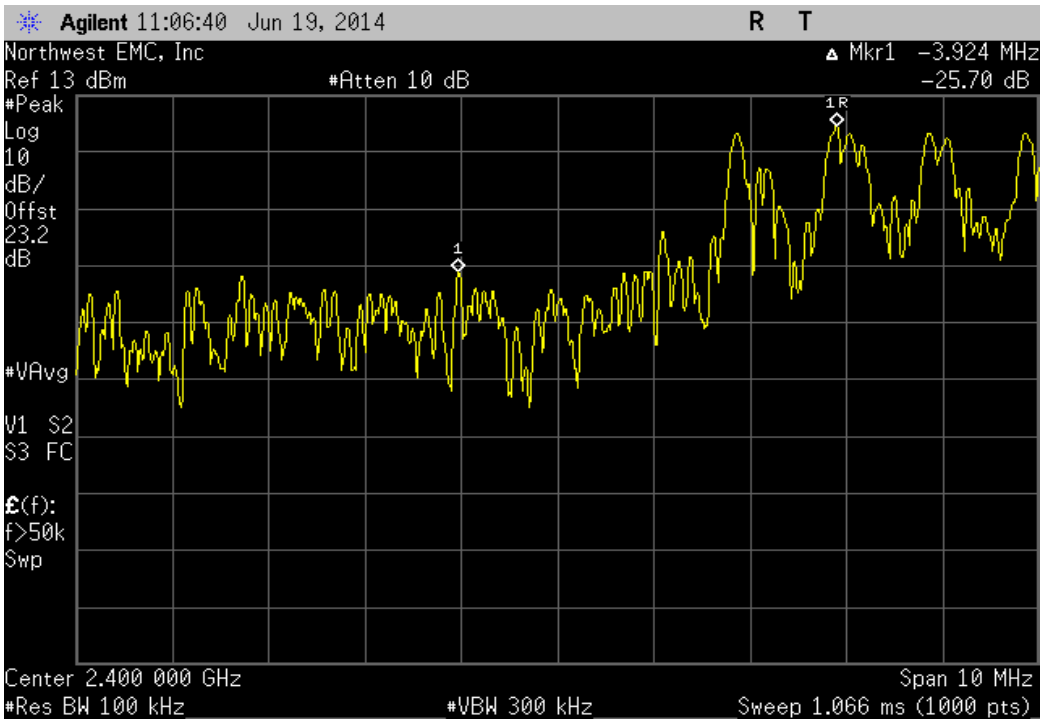
				Value	Limit	Result
				-21.29 dBc	≤ -20 dBc	Pass



BAND EDGE COMPLIANCE - HOPPING

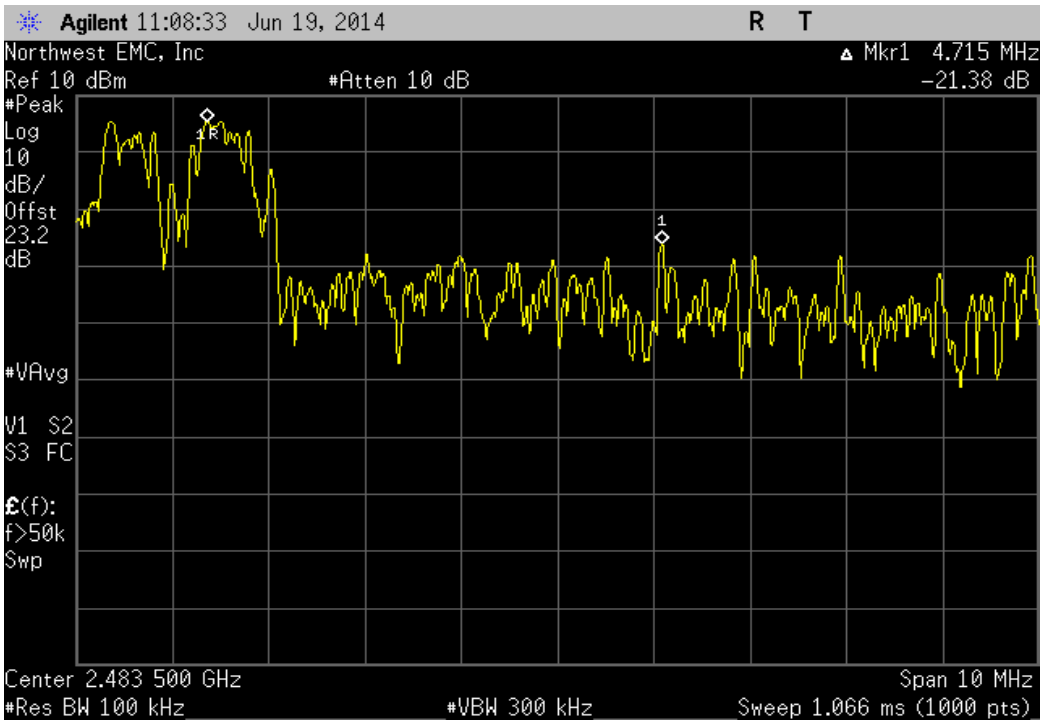
Hopping Mode, DH1, Low Channel, 2402 MHz

Value	Limit	Result
-25.7 dBc	≤ -20 dBc	Pass



Hopping Mode, DH1, High Channel, 2480 MHz

Value	Limit	Result
-21.38 dBc	≤ -20 dBc	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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

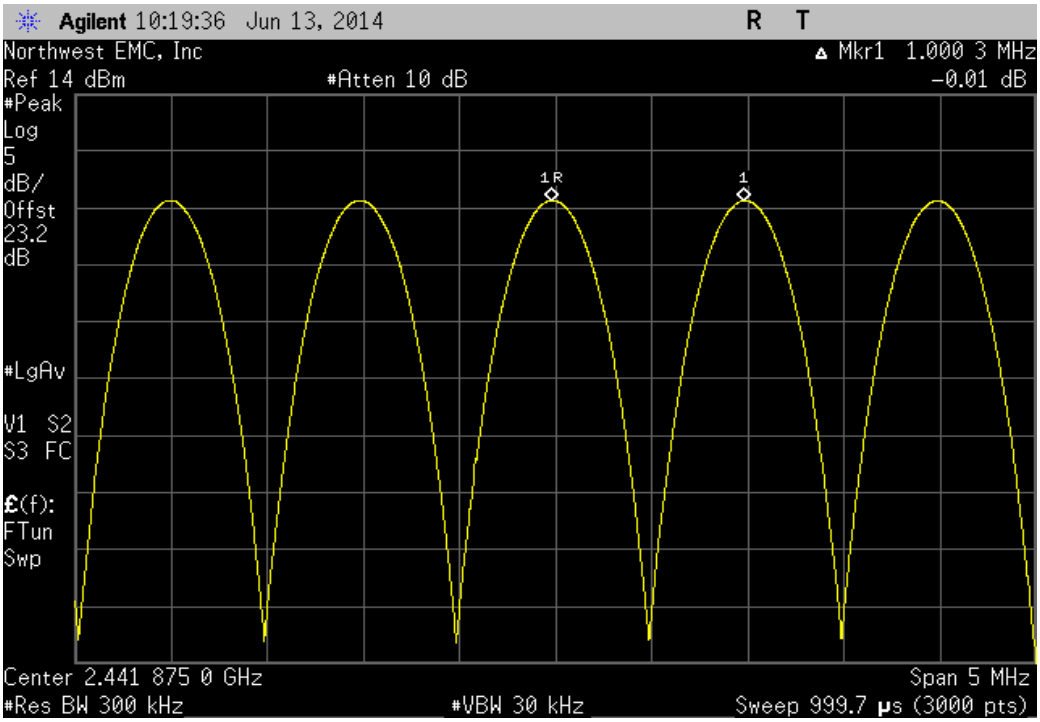
None

Configuration #	4	Signature

			Value	Limit	Result
Hopping Mode					
	DH5				
		Mid Channel, 2441 MHz	1000.3 kHz	≥ 25 kHz	Pass
	DH3				
		Mid Channel, 2441 MHz	1008.7 kHz	≥ 25 kHz	Pass
	DH1				
		Mid Channel, 2441 MHz	1008.7 kHz	≥ 25 kHz	Pass

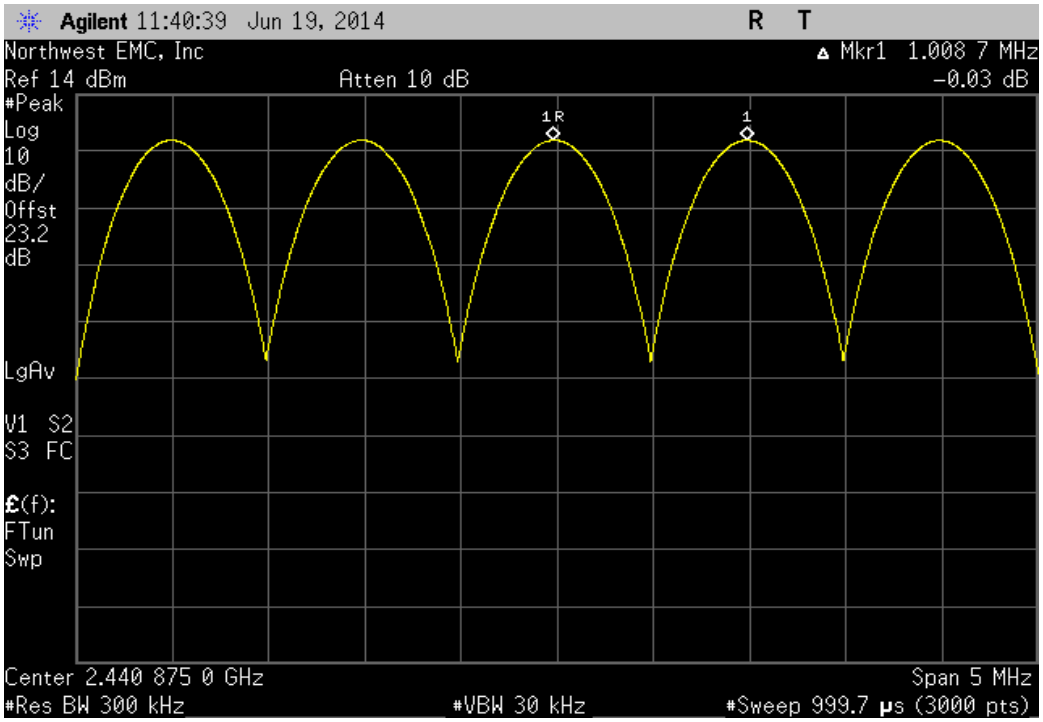
Hopping Mode, DH5, Mid Channel, 2441 MHz

				Value	Limit	Result
				1000.3 kHz	≥ 25 kHz	Pass



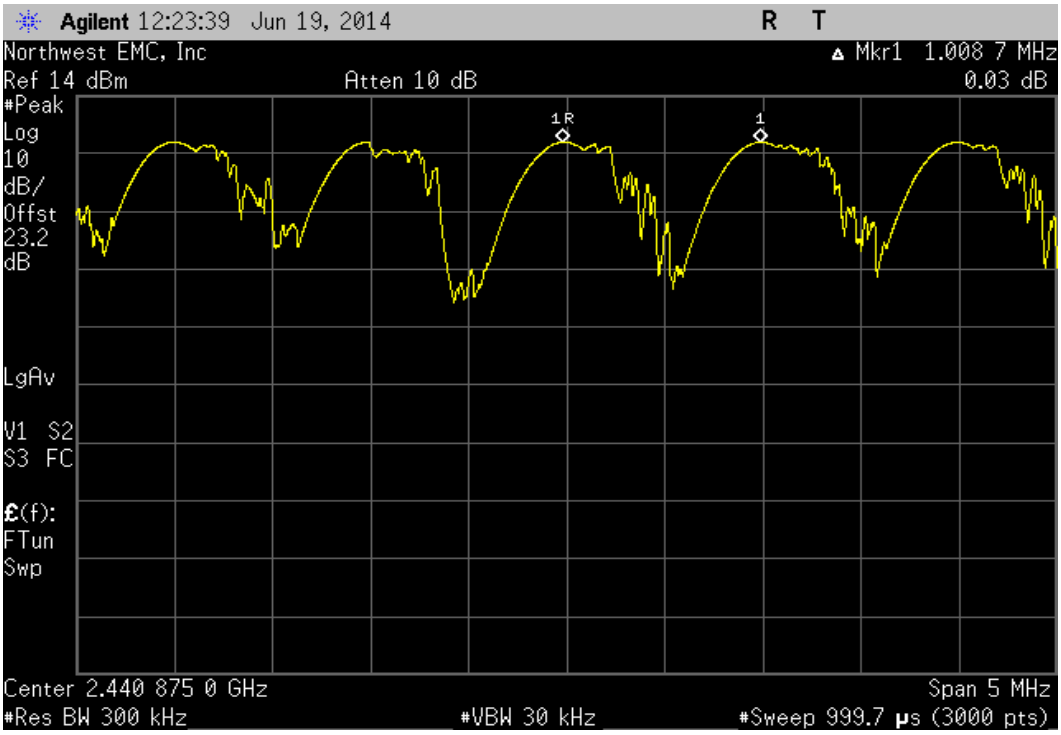
Hopping Mode, DH3, Mid Channel, 2441 MHz

				Value	Limit	Result
				1008.7 kHz	≥ 25 kHz	Pass



CHANNEL SEPARATION

Hopping Mode, DH1, Mid Channel, 2441 MHz						
				Value	Limit	Result
				1008.7 kHz	≥ 25 kHz	Pass



NUMBER OF HOPPING FREQUENCIES

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 (mo.)
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	7/30/2013	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 FREQUENCIES

EUT:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

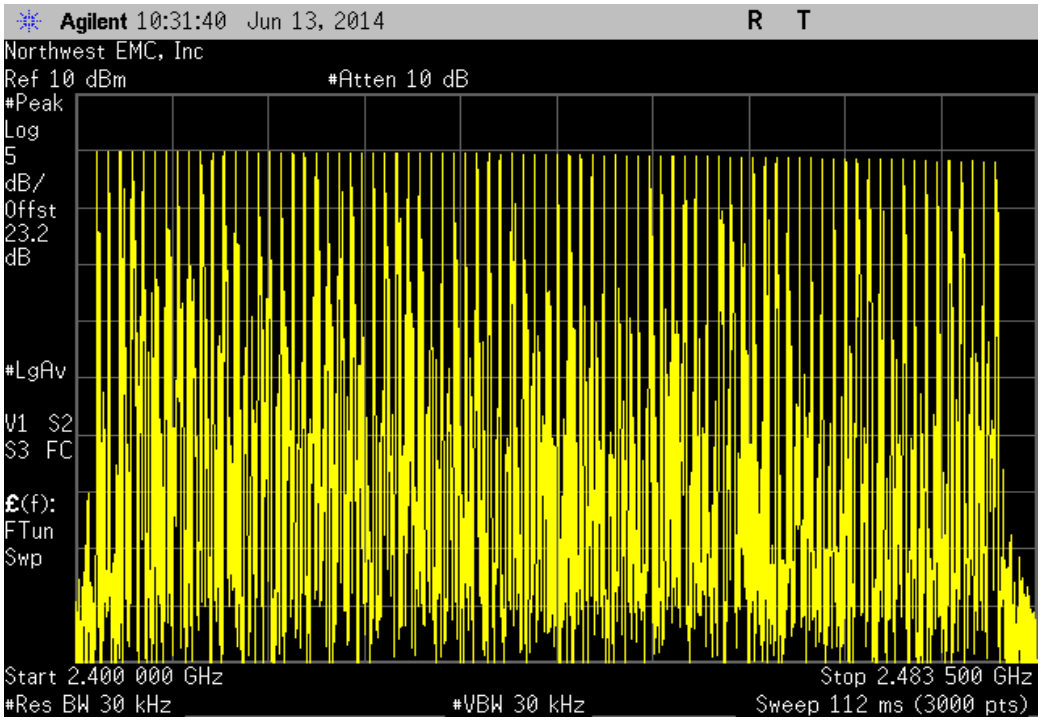
None

Configuration #	4	Signature

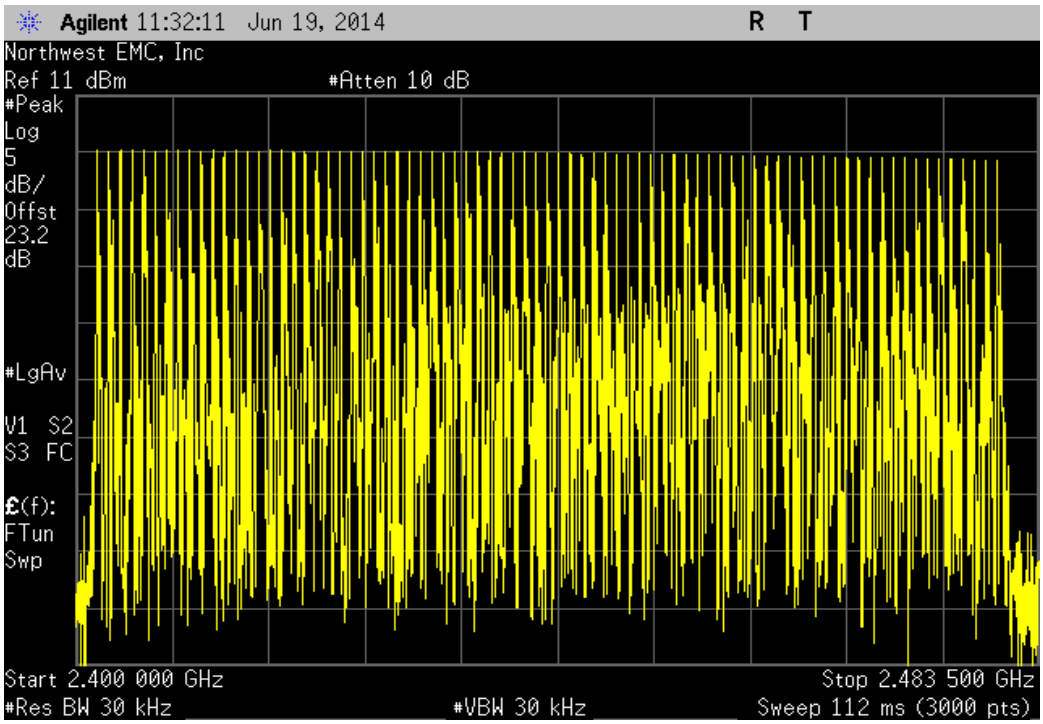
			Number of Channels	Limit	Result
Hopping Mode					
	DH5				
		Mid Channel, 2441 MHz	79	≥ 15	Pass
	DH3				
		Mid Channel, 2441 MHz	79	≥ 15	Pass
	DH1				
		Mid Channel, 2441 MHz	79	≥ 15	Pass

NUMBER OF HOPPING FREQUENCIES

Hopping Mode, DH5, Mid Channel, 2441 MHz						
				Number of Channels	Limit	Result
				79	≥ 15	Pass

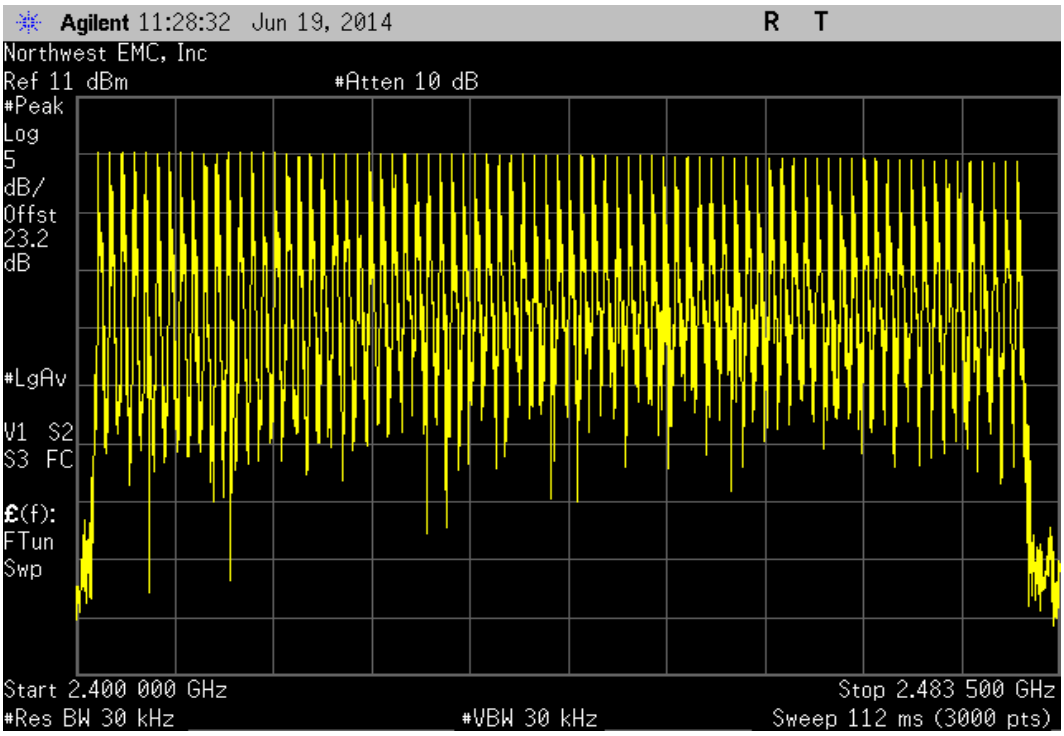


Hopping Mode, DH3, Mid Channel, 2441 MHz						
				Number of Channels	Limit	Result
				79	≥ 15	Pass



NUMBER OF HOPPING FREQUENCIES

Hopping Mode, DH1, Mid Channel, 2441 MHz						
				Number of Channels	Limit	Result
				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 (mo.)
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	7/30/2013	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:	Radius-7			**Work Order:**	MASI0214
Serial Number:	AI000012			**Date:**	06/13/14
Customer:	Masimo			**Temperature:**	23.9 C°C
Attendees:	Michael Clark			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1015
Tested by:	Adam Bruno & Johnny Candelas	**Power:**	Battery	**Job Site:**	OC13

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

COMMENTS

DC Block/20dB Attenuator (20.5dB) + coax cable (1.74dB) + client provided patch cable (1.0dB) = 23.24dB total offset
Using Power Setting 14

DEVIATIONS FROM TEST STANDARD

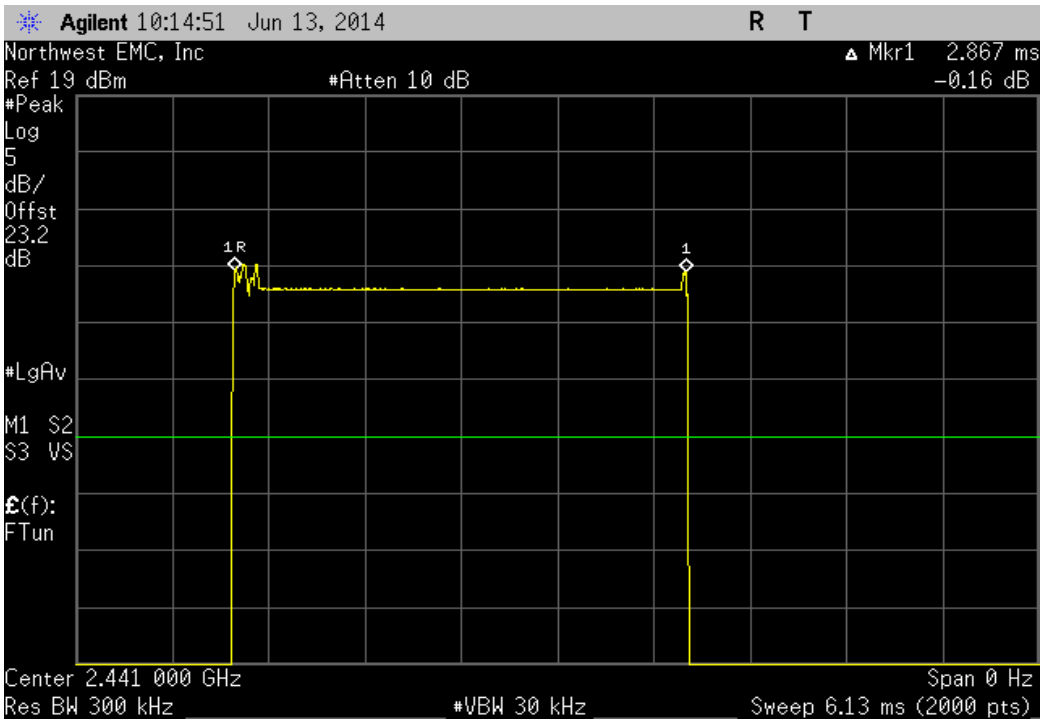
None

Configuration #	4	*Signature*

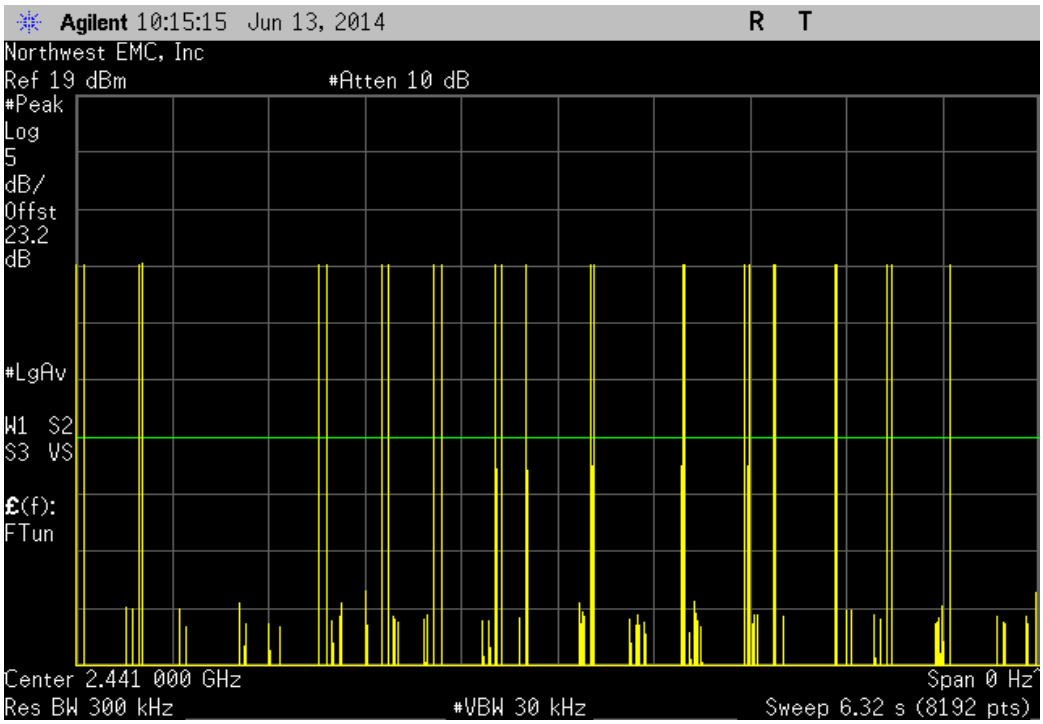
		Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
Hopping Mode								
	DH5							
	Mid Channel, 2441 MHz	2.867	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	26	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	15	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	22	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	28	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	2.867	N/A	22.75	5	326.12	400	Pass
	DH3							
	Mid Channel, 2441 MHz	1.622	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	33	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	37	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	31	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	33	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	1.622	N/A	33.5	5	271.69	400	Pass
	DH1							
	Mid Channel, 2441 MHz	0.359	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	64	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	64	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	64	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	N/A	64	N/A	N/A	N/A	N/A	N/A
	Mid Channel, 2441 MHz	0.359	N/A	64	5	114.88	400	Pass

DWELL TIME

Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
2.867	N/A	N/A	N/A	N/A	N/A	N/A

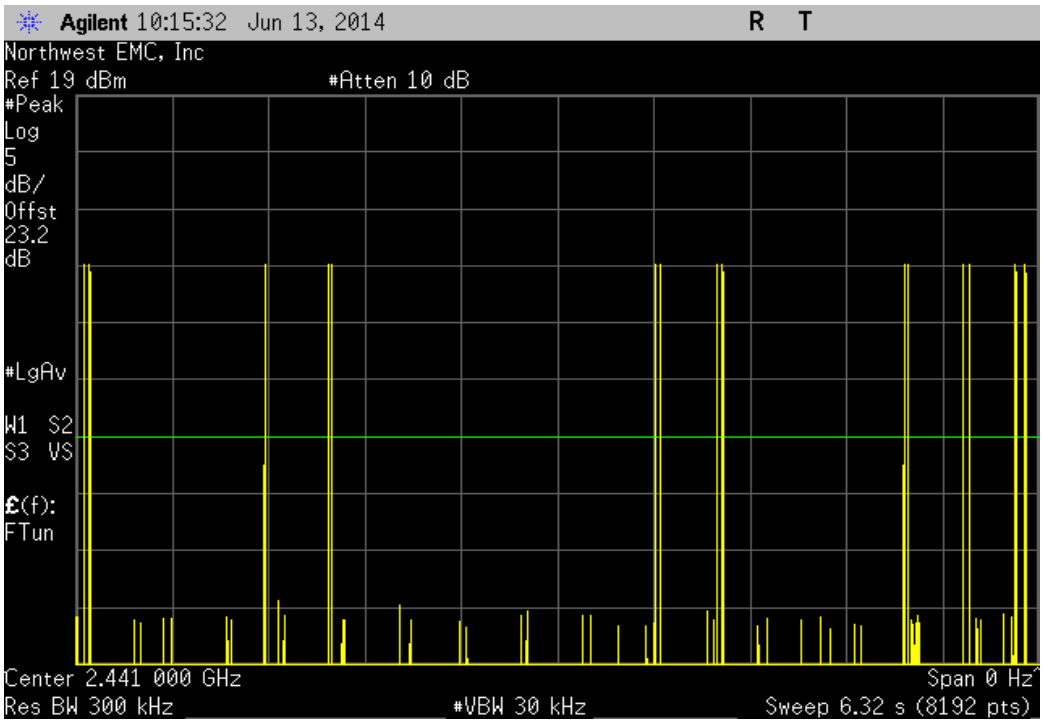


Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	26	N/A	N/A	N/A	N/A	N/A

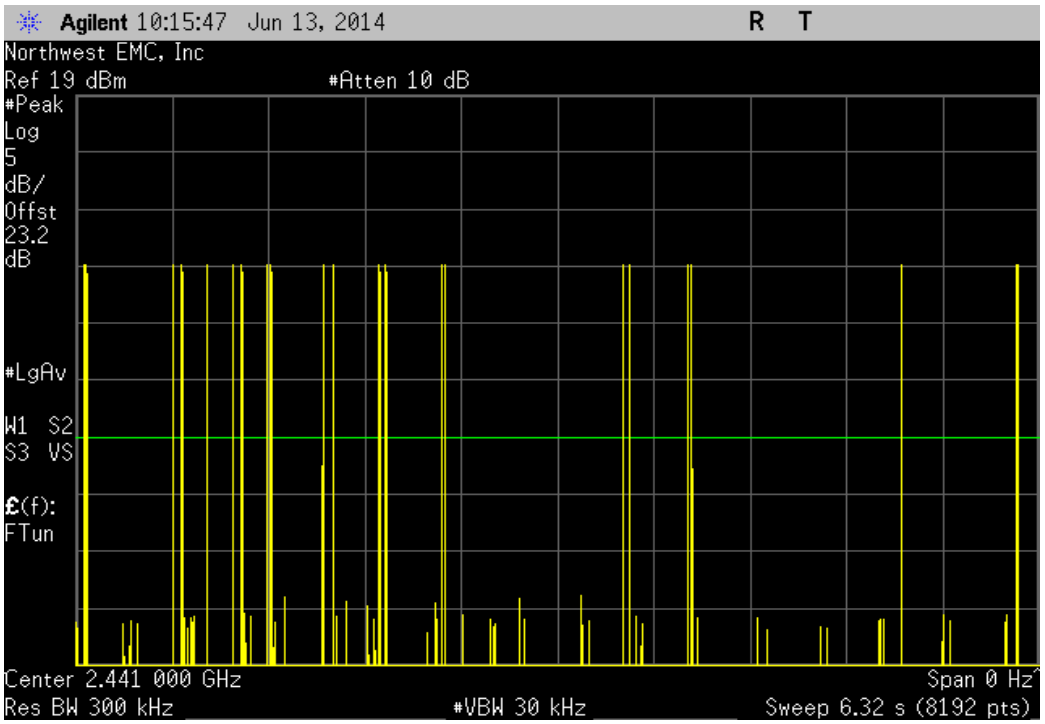


DWELL TIME

Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	15	N/A	N/A	N/A	N/A	N/A

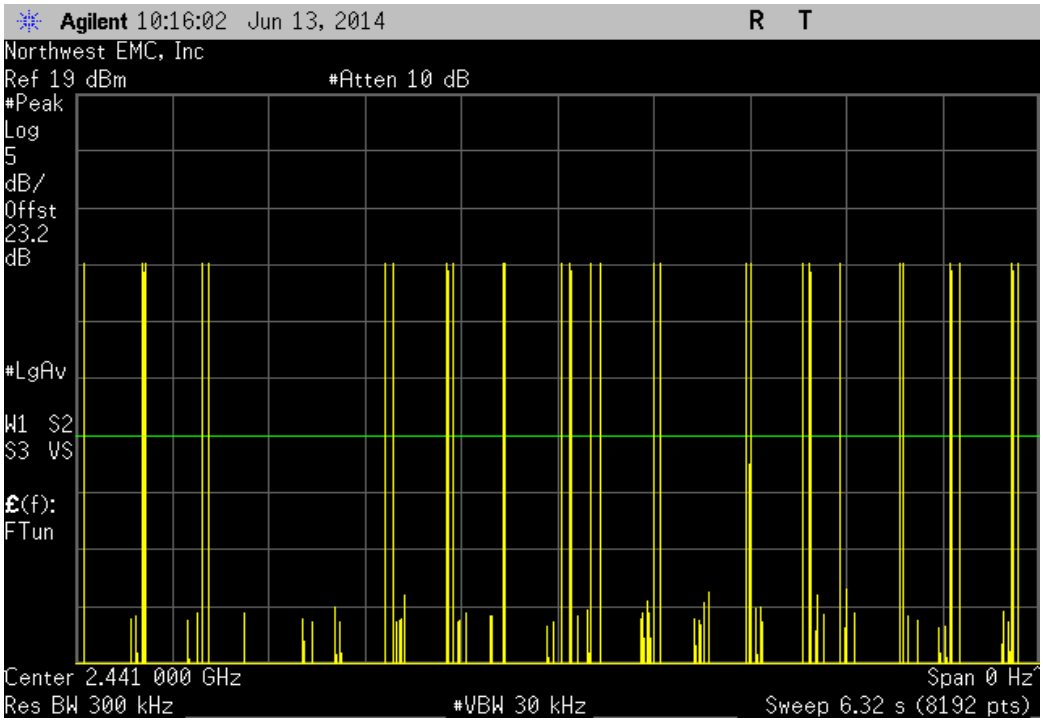


Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	22	N/A	N/A	N/A	N/A	N/A



DWELL TIME

Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	28	N/A	N/A	N/A	N/A	N/A



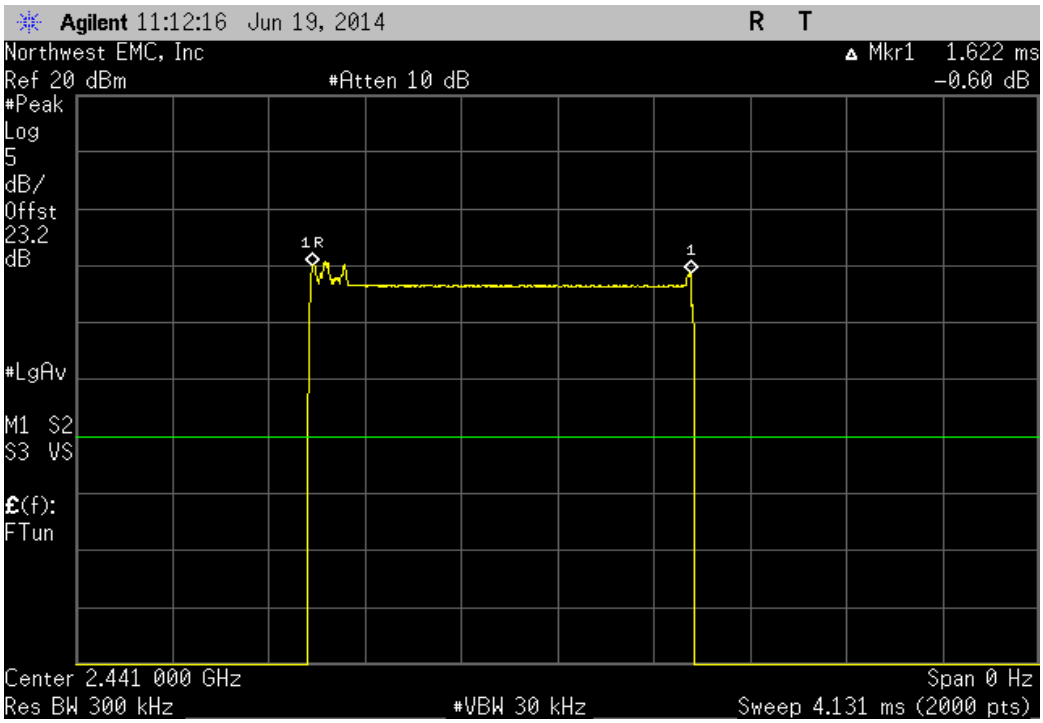
Hopping Mode, DH5, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
2.867	N/A	22.75	5	326.12	400	Pass

Calculation Only

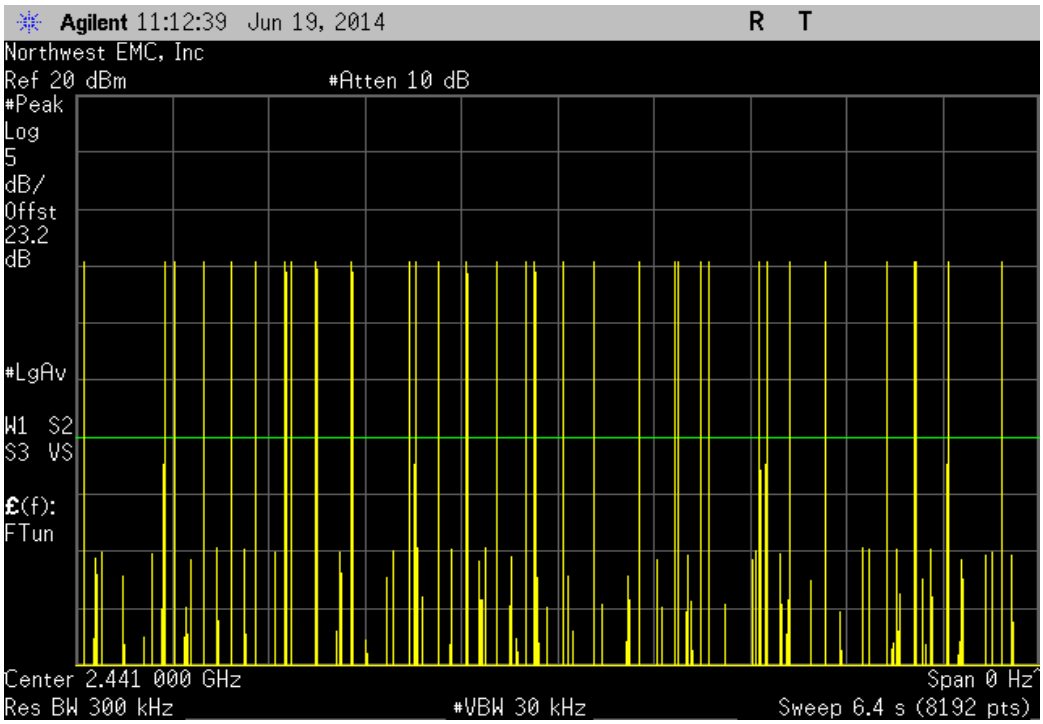
No Screen Capture Required

DWELL TIME

Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
1.622	N/A	N/A	N/A	N/A	N/A	N/A

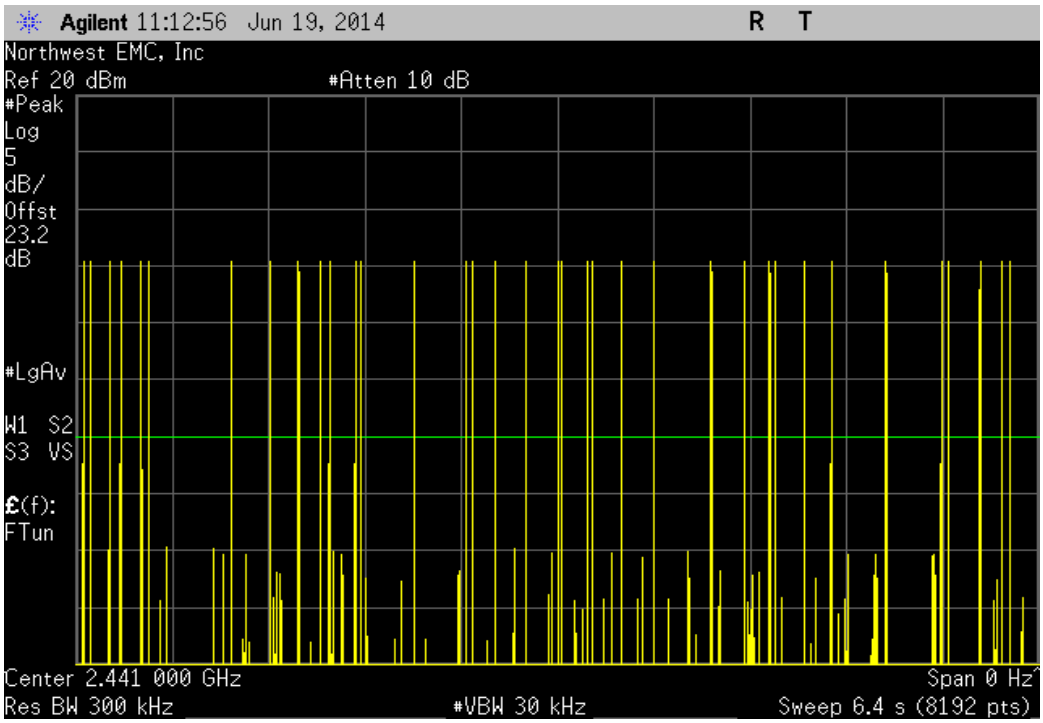


Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	33	N/A	N/A	N/A	N/A	N/A

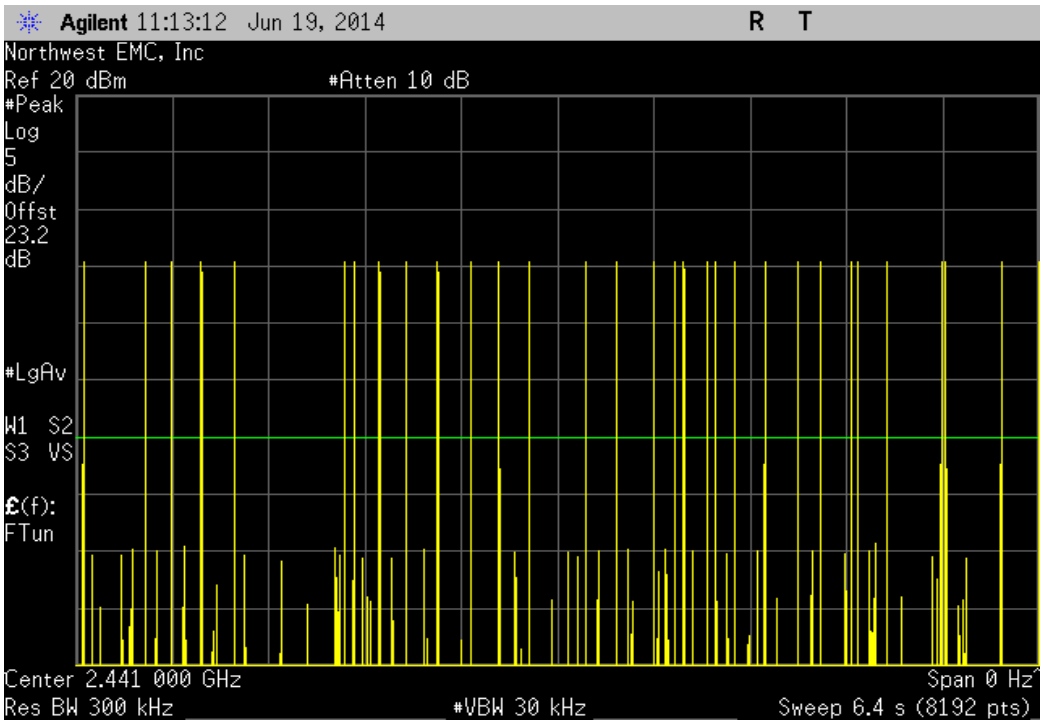


DWELL TIME

Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	37	N/A	N/A	N/A	N/A	N/A

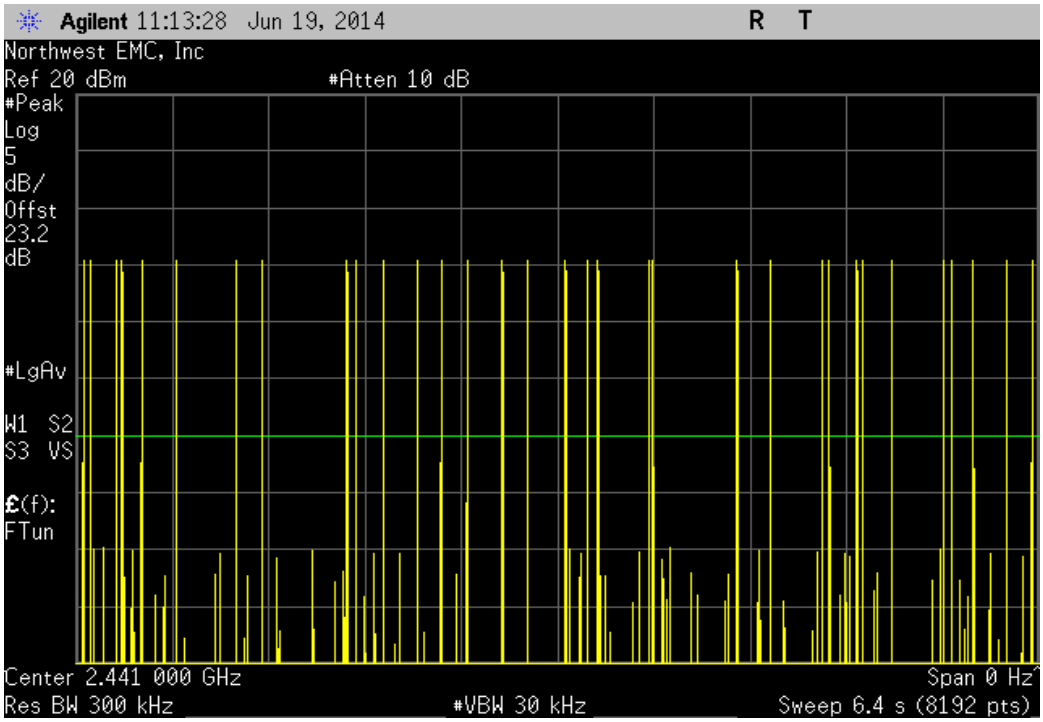


Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	31	N/A	N/A	N/A	N/A	N/A



DWELL TIME

Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	33	N/A	N/A	N/A	N/A	N/A



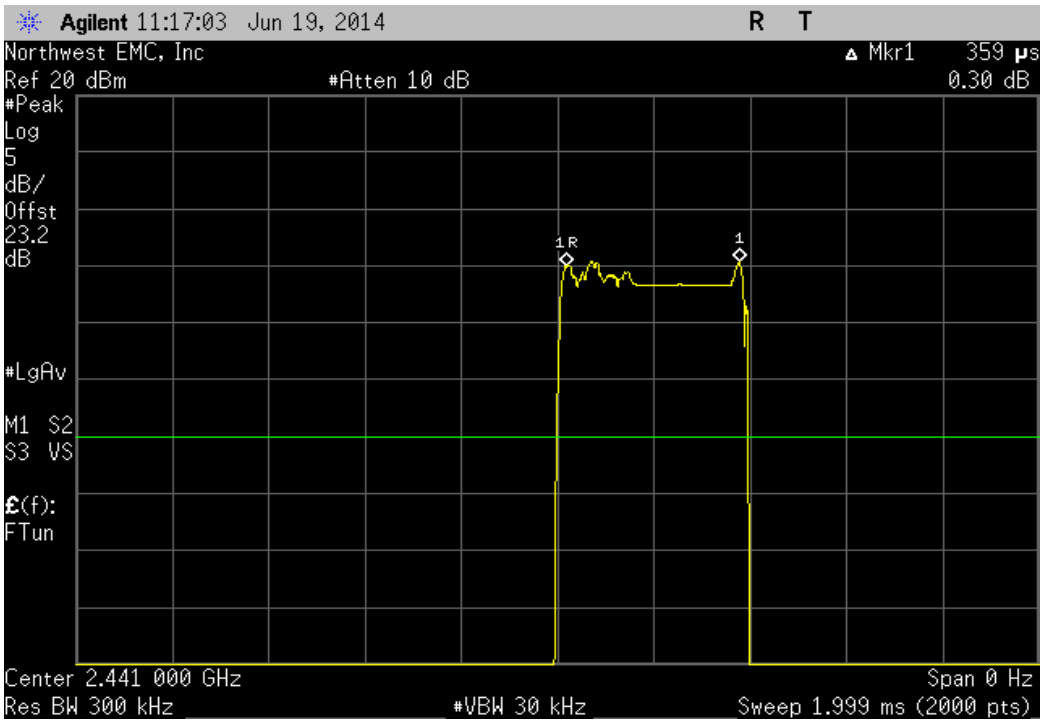
Hopping Mode, DH3, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
1.622	N/A	33.5	5	271.69	400	Pass

Calculation Only

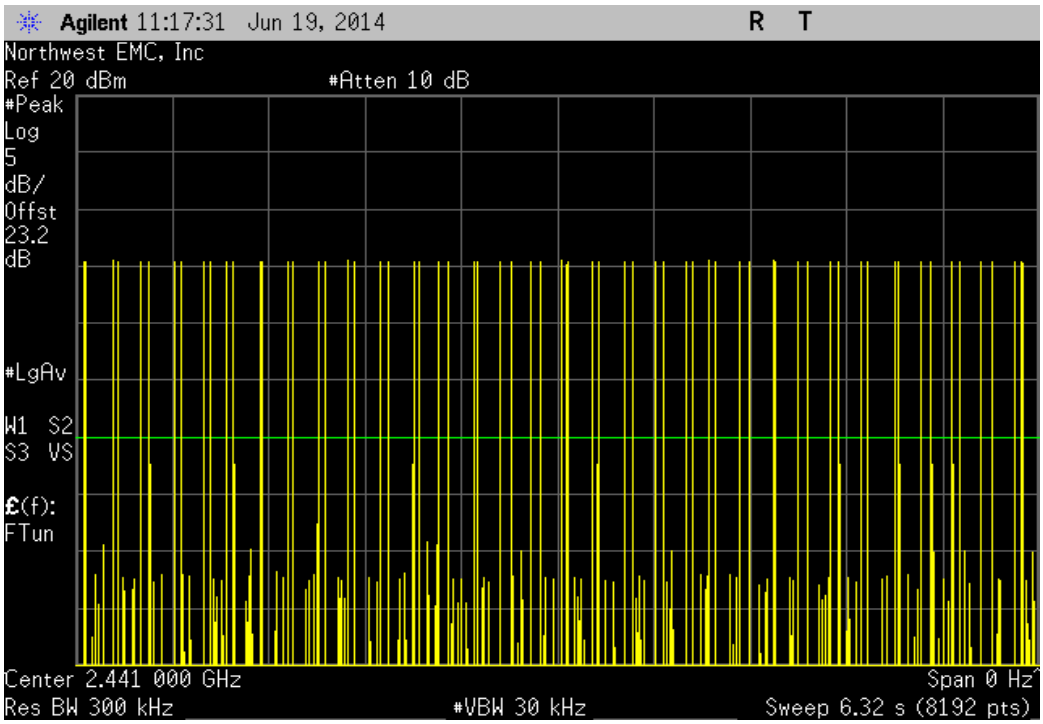
No Screen Capture Required

DWELL TIME

Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
0.359	N/A	N/A	N/A	N/A	N/A	N/A

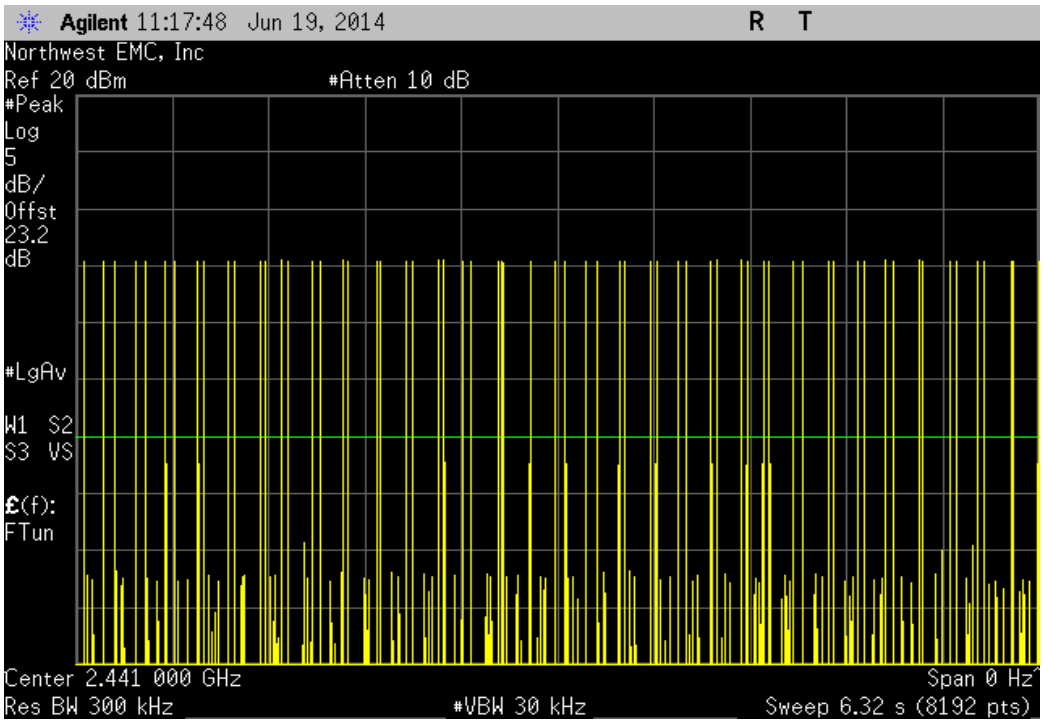


Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	64	N/A	N/A	N/A	N/A	N/A

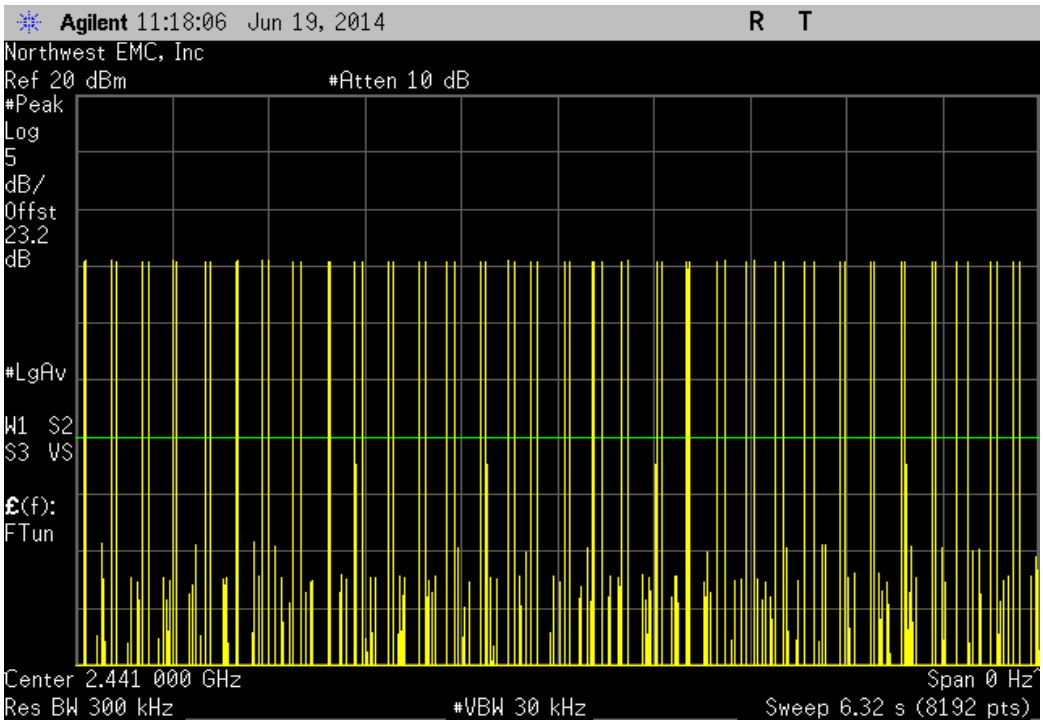


DWELL TIME

Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	64	N/A	N/A	N/A	N/A	N/A

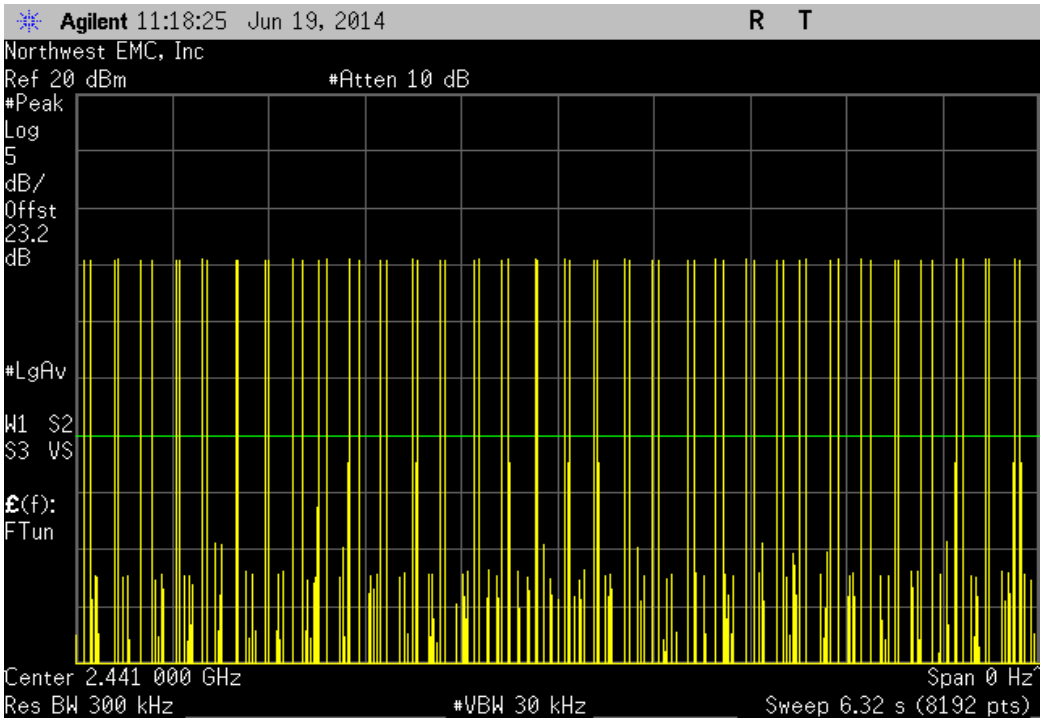


Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	64	N/A	N/A	N/A	N/A	N/A



DWELL TIME

Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
N/A	64	N/A	N/A	N/A	N/A	N/A



Hopping Mode, DH1, Mid Channel, 2441 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 31.6 S	Limit (mS)	Result
0.359	N/A	64	5	114.88	400	Pass

Calculation Only

No Screen Capture Required

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

TX Mode, Ch 0 - 2402 MHz, 39 - 2441 MHz, & 78 - 2480MHz

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

MASI0214 - 4

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

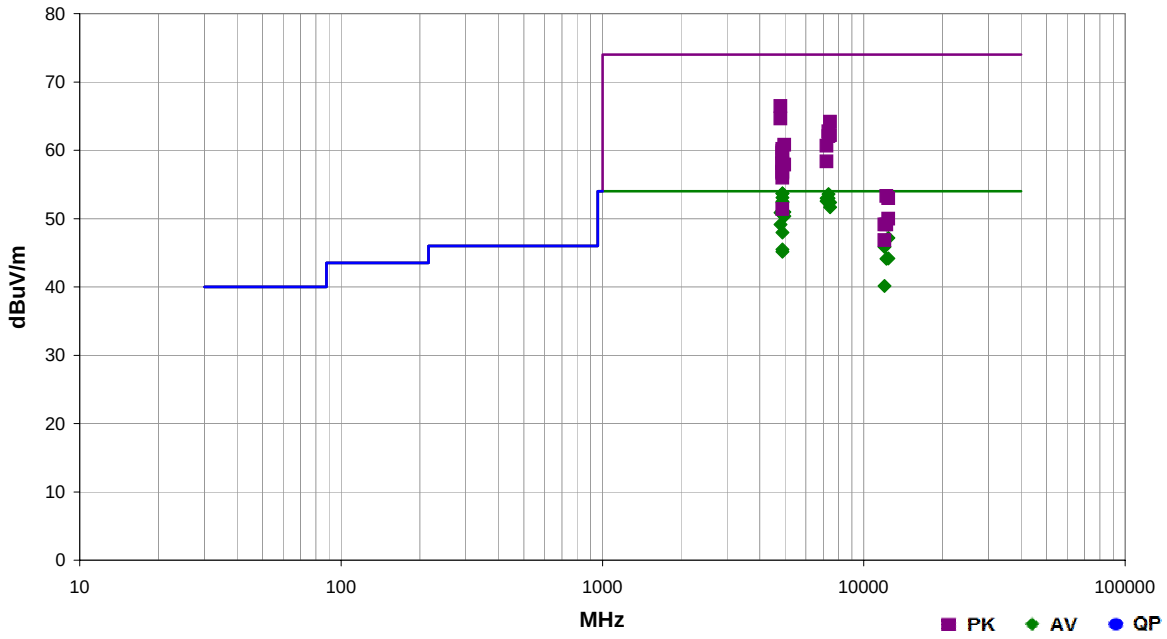
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify 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:	MASI0214	**Date:**	06/18/14		
Project:	None	**Temperature:**	23.1 °C		
Job Site:	OC07	**Humidity:**	48% RH		
Serial Number:	AI000012	**Barometric Pres.:**	1015 mbar	**Tested by:**	Adam Bruno / Johnny Candelas
EUT:	Radius-7				
Configuration:	4				
Customer:	Masimo				
Attendees:	Michael Clark				
EUT Power:	Battery				
Operating Mode:	TX Mode, Ch 0 - 2402 MHz, 39 - 2441 MHz, & 78 - 2480MHz				
Deviations:	None				
Comments:	Power set to 14				

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

Run #	31	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**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
4881.725	50.5	3.2	1.5	157.0	3.0	0.0	Vert	AV	0.0	53.7	54.0	-0.3	EUT Vert, Ch 39, DH5
4881.717	50.5	3.2	1.2	202.0	3.0	0.0	Horz	AV	0.0	53.7	54.0	-0.3	EUT Vert, Ch 39, DH5
7322.583	43.3	10.3	1.2	29.0	3.0	0.0	Horz	AV	0.0	53.6	54.0	-0.4	EUT Vert, Ch 39, DH5
4881.750	49.9	3.2	1.2	221.0	3.0	0.0	Horz	AV	0.0	53.1	54.0	-0.9	EUT Vert, Ch 39, DH3
7208.592	43.1	9.9	1.2	243.0	3.0	0.0	Vert	AV	0.0	53.0	54.0	-1.0	EUT Vert, Ch 0, DH5
7322.583	42.7	10.3	1.2	244.0	3.0	0.0	Vert	AV	0.0	53.0	54.0	-1.0	EUT Vert, Ch 39, DH5
7208.567	42.7	9.9	1.2	44.0	3.0	0.0	Horz	AV	0.0	52.6	54.0	-1.4	EUT Vert, Ch 0, DH5
4881.700	49.3	3.2	1.2	337.0	3.0	0.0	Horz	AV	0.0	52.5	54.0	-1.5	EUT Horiz, Ch 39, DH5
7439.567	42.0	10.4	1.2	246.0	3.0	0.0	Vert	AV	0.0	52.4	54.0	-1.6	EUT Vert, Ch 78, DH5
4881.733	49.2	3.2	1.2	184.0	3.0	0.0	Horz	AV	0.0	52.4	54.0	-1.6	EUT on Side, Ch 39, DH5
7439.567	41.3	10.4	1.2	264.0	3.0	0.0	Horz	AV	0.0	51.7	54.0	-2.3	EUT Vert, Ch 78, DH5
4881.700	48.0	3.2	1.5	240.0	3.0	0.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT on Side, Ch 39, DH5
4959.708	47.7	3.3	1.3	162.0	3.0	0.0	Vert	AV	0.0	51.0	54.0	-3.0	EUT Vert, Ch 78, DH5
4881.708	47.8	3.2	1.2	167.0	3.0	0.0	Vert	AV	0.0	51.0	54.0	-3.0	EUT Vert, Ch 39, DH3
4805.742	47.7	3.1	1.2	217.0	3.0	0.0	Horz	AV	0.0	50.8	54.0	-3.2	EUT Vert, Ch 0, DH5
4959.717	47.1	3.3	1.2	204.0	3.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	EUT Vert, Ch 78, DH5
4805.742	46.0	3.1	1.4	212.0	3.0	0.0	Vert	AV	0.0	49.1	54.0	-4.9	EUT Vert, Ch 0, DH5
12204.270	56.8	-7.7	1.2	228.0	3.0	0.0	Vert	AV	0.0	49.1	54.0	-4.9	EUT Vert, Ch 39, DH5
4881.792	44.8	3.2	1.2	194.0	3.0	0.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT Vert, Ch 39, DH1
12399.280	54.6	-7.4	1.2	219.0	3.0	0.0	Vert	AV	0.0	47.2	54.0	-6.8	EUT Vert, Ch 78, DH5
4804.508	63.3	3.1	1.2	217.0	3.0	0.0	Horz	PK	0.0	66.4	74.0	-7.6	EUT Vert, Ch 0, DH5
12014.250	53.8	-8.0	1.2	246.0	3.0	0.0	Vert	AV	0.0	45.8	54.0	-8.2	EUT Vert, Ch 0, DH5

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
4881.825	42.3	3.2	1.2	164.0	3.0	0.0	Vert	AV	0.0	45.5	54.0	-8.5	EUT Vert, Ch 39, DH1
4881.675	42.0	3.2	1.2	329.0	3.0	0.0	Vert	AV	0.0	45.2	54.0	-8.8	EUT Horiz, Ch 39, DH5
4804.417	61.5	3.1	1.4	212.0	3.0	0.0	Vert	PK	0.0	64.6	74.0	-9.4	EUT Vert, Ch 0, DH5
12399.280	51.6	-7.4	1.2	290.0	3.0	0.0	Horz	AV	0.0	44.2	54.0	-9.8	EUT Vert, Ch 78, DH5
7439.333	53.8	10.4	1.2	246.0	3.0	0.0	Vert	PK	0.0	64.2	74.0	-9.8	EUT Vert, Ch 78, DH5
12204.290	51.8	-7.7	1.2	291.0	3.0	0.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT Vert, Ch 39, DH5
7323.425	52.5	10.3	1.2	29.0	3.0	0.0	Horz	PK	0.0	62.8	74.0	-11.2	EUT Vert, Ch 39, DH5
7439.058	51.8	10.4	1.2	264.0	3.0	0.0	Horz	PK	0.0	62.2	74.0	-11.8	EUT Vert, Ch 78, DH5
7322.625	51.8	10.3	1.2	244.0	3.0	0.0	Vert	PK	0.0	62.1	74.0	-11.9	EUT Vert, Ch 39, DH5
4959.650	57.5	3.3	1.2	204.0	3.0	0.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT Vert, Ch 78, DH5
7208.617	50.8	9.9	1.2	44.0	3.0	0.0	Horz	PK	0.0	60.7	74.0	-13.3	EUT Vert, Ch 0, DH5
4881.692	57.0	3.2	1.5	157.0	3.0	0.0	Vert	PK	0.0	60.2	74.0	-13.8	EUT Vert, Ch 39, DH5
12014.280	48.1	-8.0	1.2	203.0	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT Vert, Ch 0, DH5
4881.717	56.7	3.2	1.2	202.0	3.0	0.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT Vert, Ch 39, DH5
4881.633	56.4	3.2	1.2	221.0	3.0	0.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT Vert, Ch 39, DH3
7208.600	48.5	9.9	1.2	243.0	3.0	0.0	Vert	PK	0.0	58.4	74.0	-15.6	EUT Vert, Ch 0, DH5
4882.025	55.0	3.2	1.2	337.0	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	EUT Horiz, Ch 39, DH5
4881.592	54.9	3.2	1.2	194.0	3.0	0.0	Horz	PK	0.0	58.1	74.0	-15.9	EUT Vert, Ch 39, DH1
4882.417	54.8	3.2	1.2	184.0	3.0	0.0	Horz	PK	0.0	58.0	74.0	-16.0	EUT on Side, Ch 39, DH5
4960.358	54.6	3.3	1.3	162.0	3.0	0.0	Vert	PK	0.0	57.9	74.0	-16.1	EUT Vert, Ch 78, DH5
4881.642	53.7	3.2	1.5	240.0	3.0	0.0	Vert	PK	0.0	56.9	74.0	-17.1	EUT on Side, Ch 39, DH5
4881.783	53.5	3.2	1.2	167.0	3.0	0.0	Vert	PK	0.0	56.7	74.0	-17.3	EUT Vert, Ch 39, DH3
4881.658	52.8	3.2	1.2	164.0	3.0	0.0	Vert	PK	0.0	56.0	74.0	-18.0	EUT Vert, Ch 39, DH1
12204.060	61.0	-7.7	1.2	228.0	3.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	EUT Vert, Ch 39, DH5
12398.460	60.4	-7.4	1.2	219.0	3.0	0.0	Vert	PK	0.0	53.0	74.0	-21.0	EUT Vert, Ch 78, DH5
4881.758	48.2	3.2	1.2	329.0	3.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horiz, Ch 39, DH5
12399.010	57.4	-7.4	1.2	290.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	EUT Vert, Ch 78, DH5
12009.500	57.1	-8.0	1.2	246.0	3.0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT Vert, Ch 0, DH5
12204.210	56.8	-7.7	1.2	291.0	3.0	0.0	Horz	PK	0.0	49.1	74.0	-24.9	EUT Vert, Ch 39, DH5
12011.120	54.8	-8.0	1.2	203.0	3.0	0.0	Horz	PK	0.0	46.8	74.0	-27.2	EUT Vert, Ch 0, DH5