

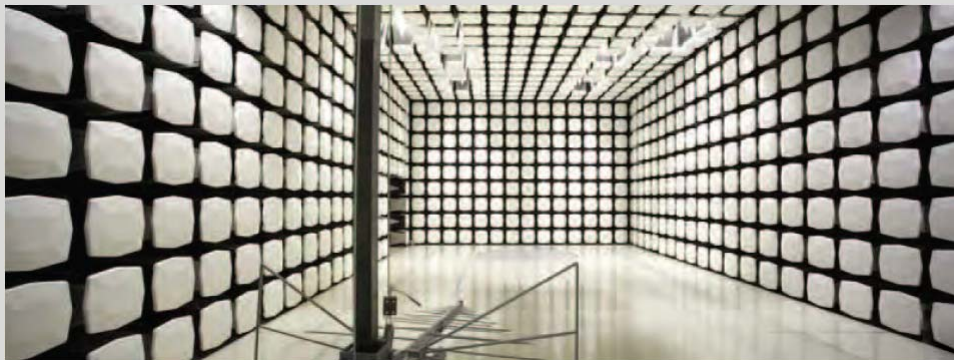


Starkey Laboratories, Inc.

24HALOXF13

FCC 15.247:2013

Report #: STAK0027



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: January 14, 2013
Starkey Laboratories, Inc.
Model: 24HALOXF13

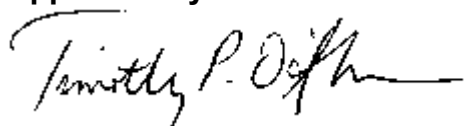
Emissions

Test Description	Specification	Test Method	Pass/Fail
Duty Cycle	FCC 15.247:2013	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.247:2013	ANSI C63.10:2009	Pass
Output Power	FCC 15.247:2013	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247:2013	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247:2013	ANSI C63.10:2009	Pass
Power Spectral Density	FCC 15.247:2013	ANSI C63.10:2009	Pass
Spurious Radiated Emissions	FCC 15.247:2013	ANSI C63.10:2009	Pass

Deviations From Test Standards

None

Approved By:



Tim O'Shea, Operations Manager



NVLAP Lab Code: 200881-0

Test Facility

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

Northwest EMC, Inc.
9349 W Broadway Ave.,
Brooklyn Park, MN 55445

Phone: (763) 425-2281 Fax: (763) 424-3469

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834E-1).

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 HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

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

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

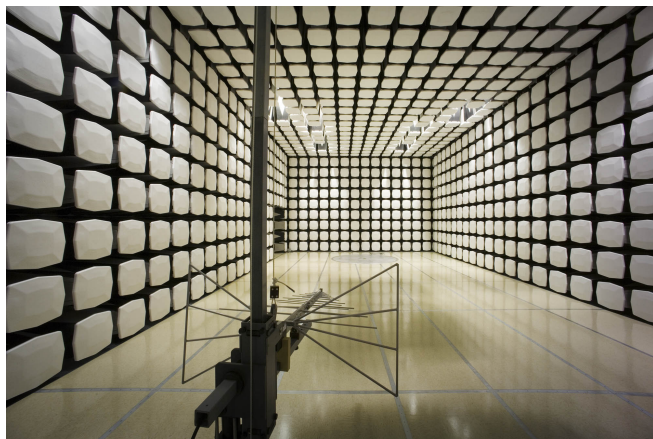
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-1 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)	4.00	-4.00
AC Powerline Conducted Emissions (dB)	2.70	-2.70



Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	New York Labs WA01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Minnesota Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Washington Labs NC01-05,SU02,SU07 19201 120 th 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	2834C-1



Client and Equipment Under Test (EUT) Information

Company Name:	Starkey Laboratories, Inc.
Address:	6600 Washington Ave. SO.
City, State, Zip:	Eden Prairie, MN 55344
Test Requested By:	Ken Meyer
Model:	24HALOXF13
First Date of Test:	January 14, 2013
Last Date of Test:	January 14, 2013
Receipt Date of Samples:	January 14, 2013
Equipment Design Stage:	Pre-Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Hearing aid containing Bluetooth LE radio module with 1 internal antenna.
Testing Objective:
To demonstrate compliance to FCC 15.247 requirements.

Configuration STAK0027- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Aid	Starkey Laboratories, Inc.	24HALOXF13	12826579

Configuration STAK0027- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Aid	Starkey Laboratories, Inc.	24HALOXF13	12826583

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/14/2013	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	1/14/2013	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.
3	1/14/2013	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.
4	1/14/2013	Power Spectral Density	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	1/14/2013	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.
6	1/14/2013	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.
7	1/14/2013	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
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	24

TEST DESCRIPTION

The Duty Cycle (x) were 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.

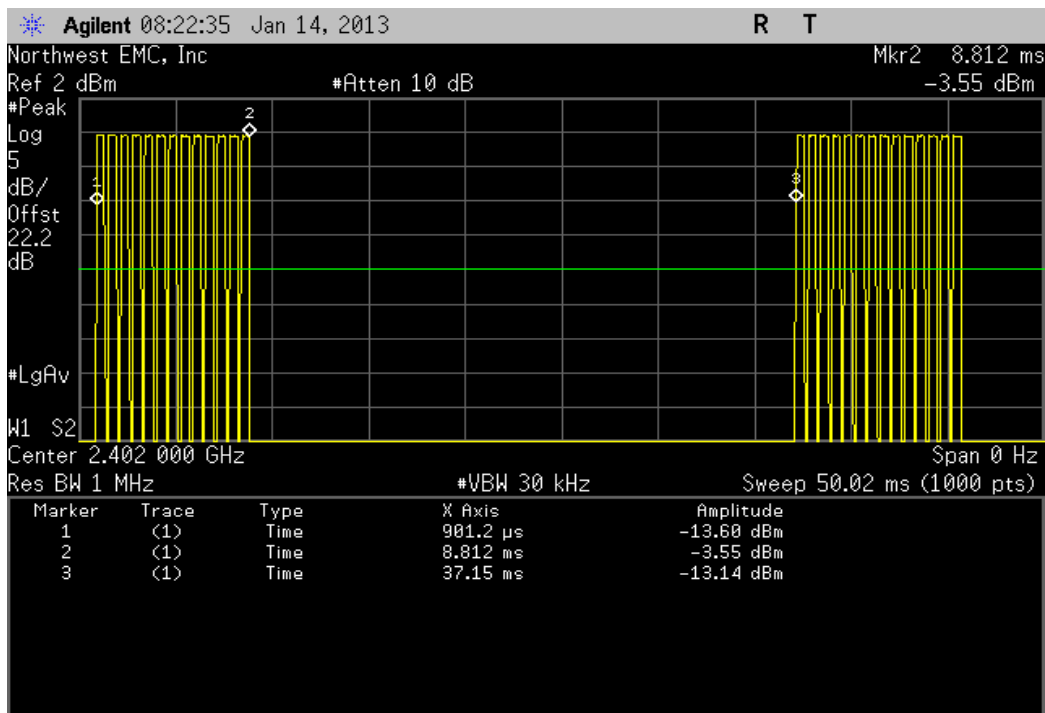


Duty Cycle

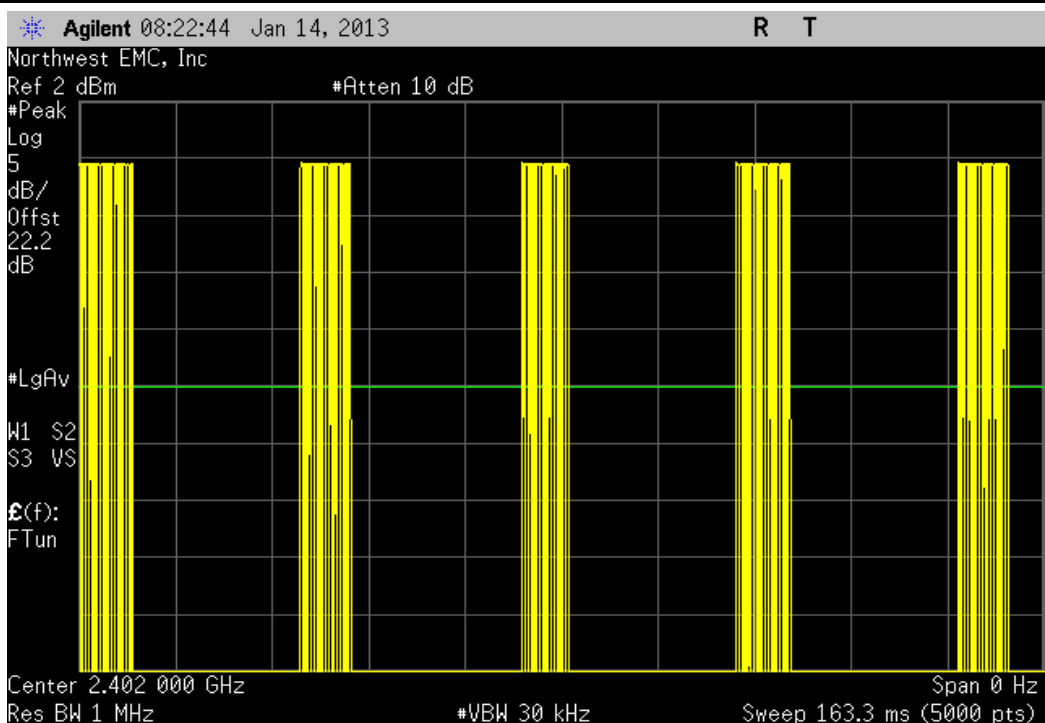
XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027					
Serial Number: 12826579		Date: 01/14/13					
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C					
Attendees: Larry McNabb		Humidity: 12%					
Project: None		Barometric Pres.: 1030					
Tested by: Trevor Buls		Power: Battery					
Job Site: MN08		Test Method					
FCC 15.247:2013		ANSI C63.10:2009					
COMMENTS							
None							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	1	Signature <i>Trevor Buls</i>					
		Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
BLE - Advertising							
	Low Channel, 2402 MHz	7.911 mS	36.248 mS	1	21.8	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2426 MHz	8.511 mS	37.5 mS	1	22.7	N/A	N/A
	Mid Channel, 2426 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	8.561 mS	37.5 mS	1	22.8	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
BLE - Data							
	Low Channel, 2404 MHz	9.163 mS	37.5 mS	1	24.4	N/A	N/A
	Low Channel, 2404 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2442 MHz	7.91 mS	36.248 mS	1	21.8	N/A	N/A
	Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2478 MHz	7.909 mS	36.248 mS	1	21.8	N/A	N/A
	High Channel, 2478 MHz	N/A	N/A	5	N/A	N/A	N/A

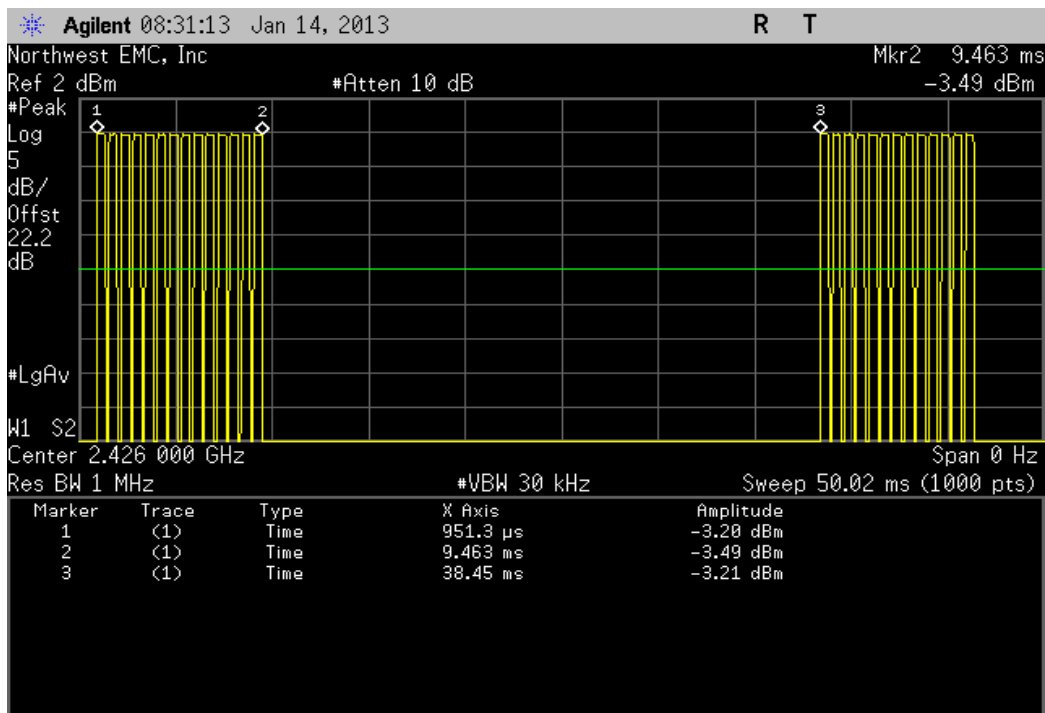
BLE - Advertising, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	7.911 mS	36.248 mS	1	21.8	N/A	N/A



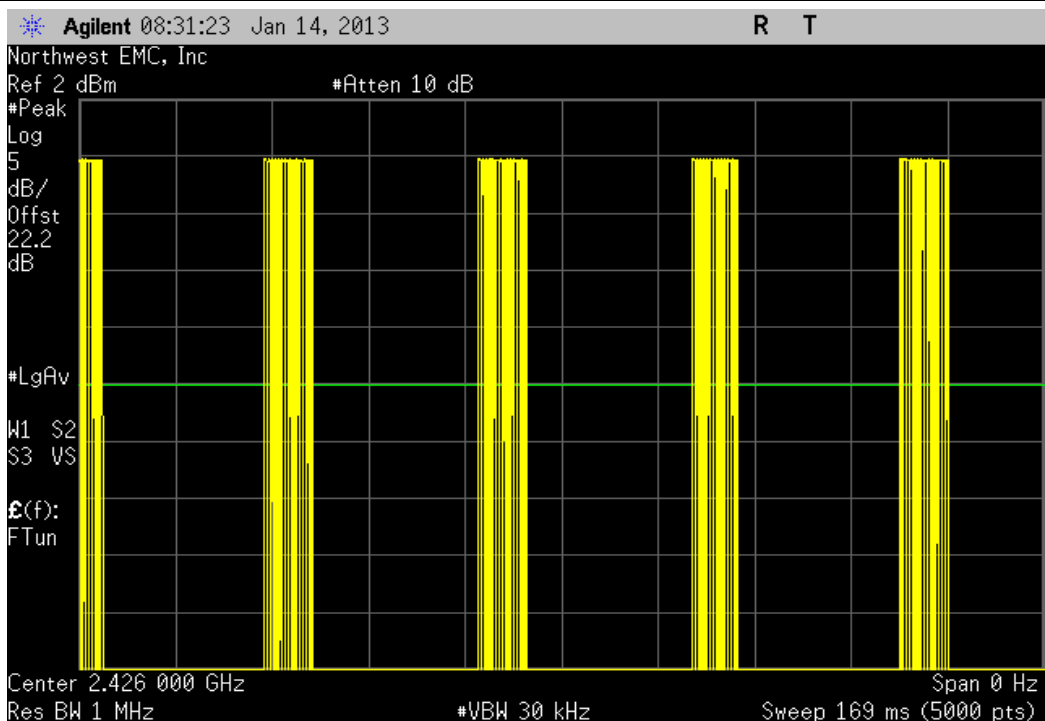
BLE - Advertising, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



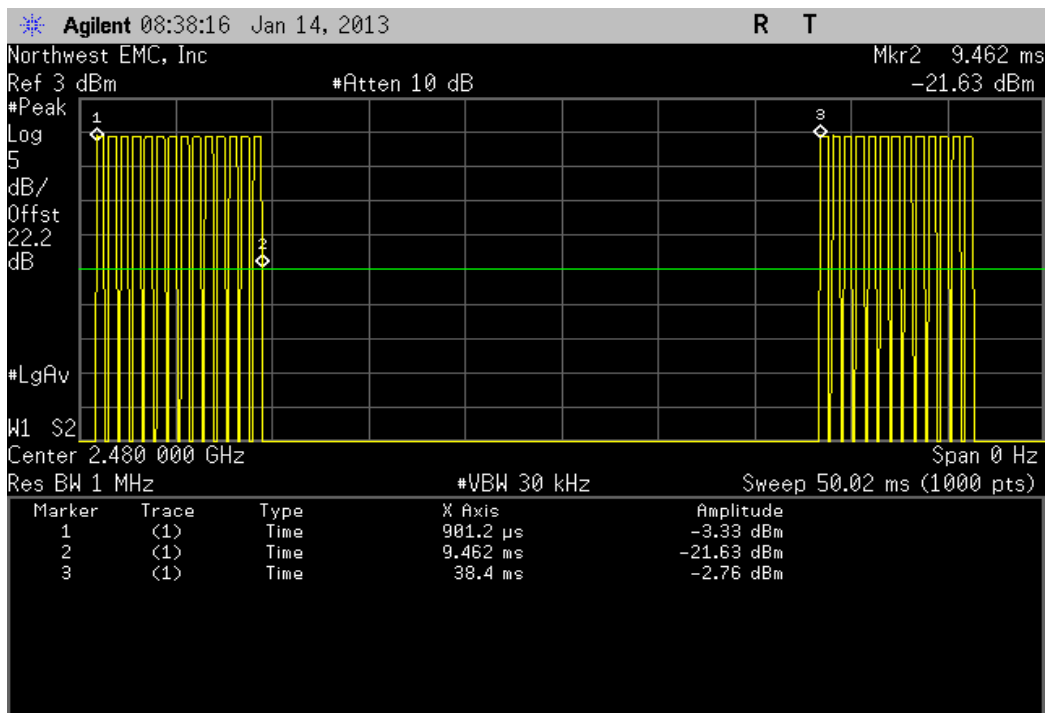
BLE - Advertising, Mid Channel, 2426 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	8.511 mS	37.5 mS	1	22.7	N/A	N/A



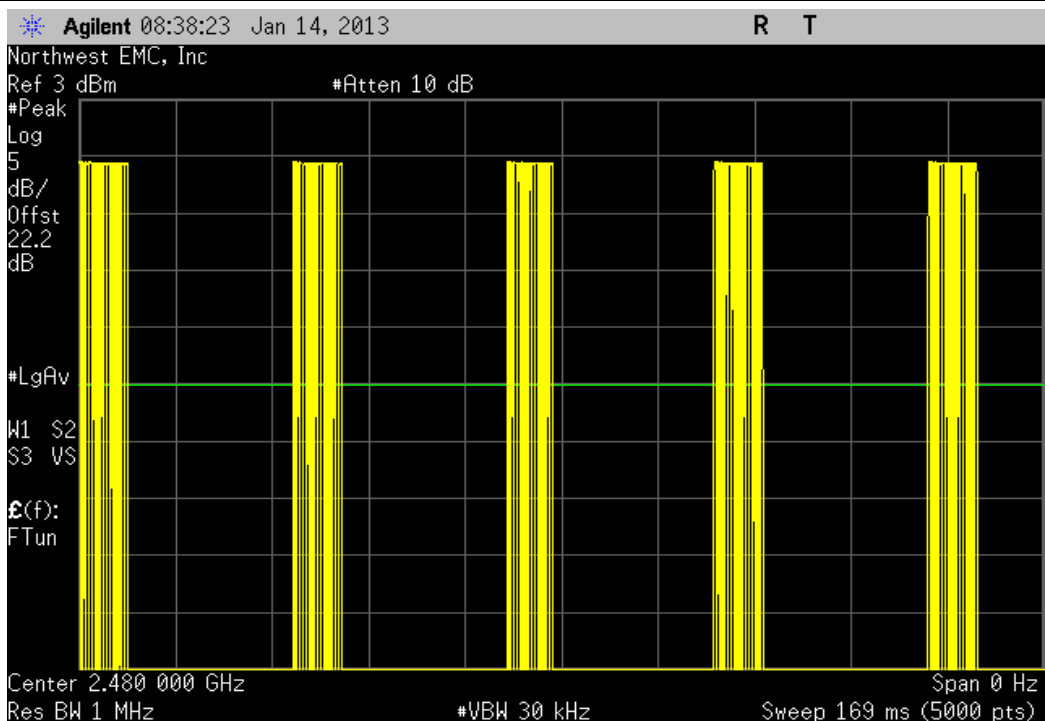
BLE - Advertising, Mid Channel, 2426 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



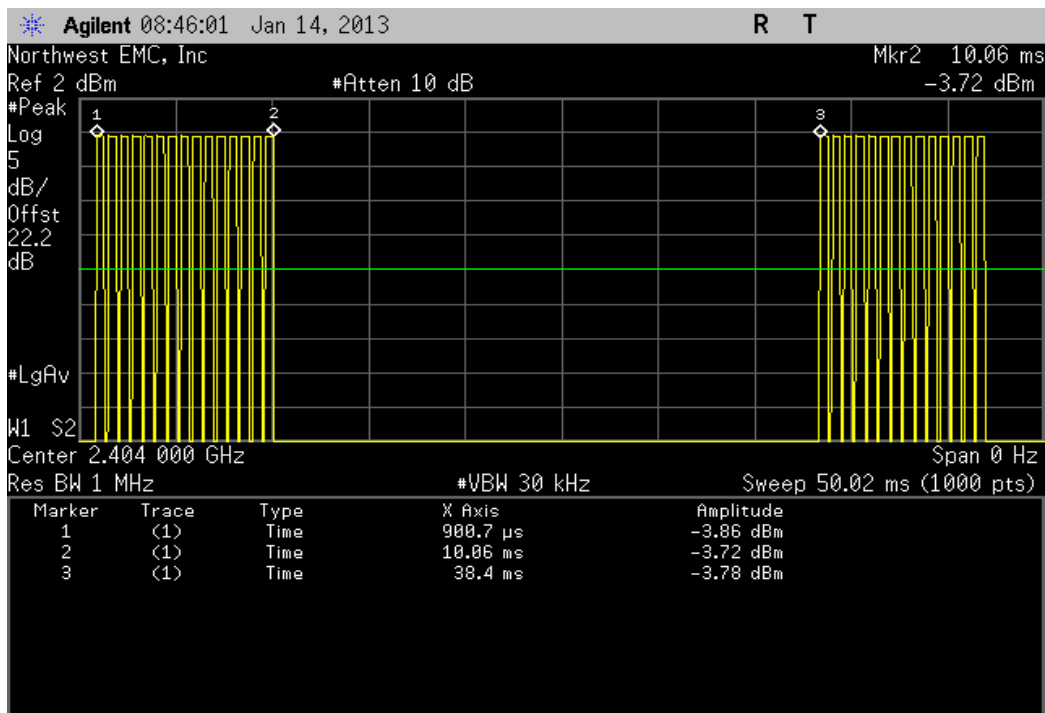
BLE - Advertising, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	8.561 mS	37.5 mS	1	22.8	N/A	N/A



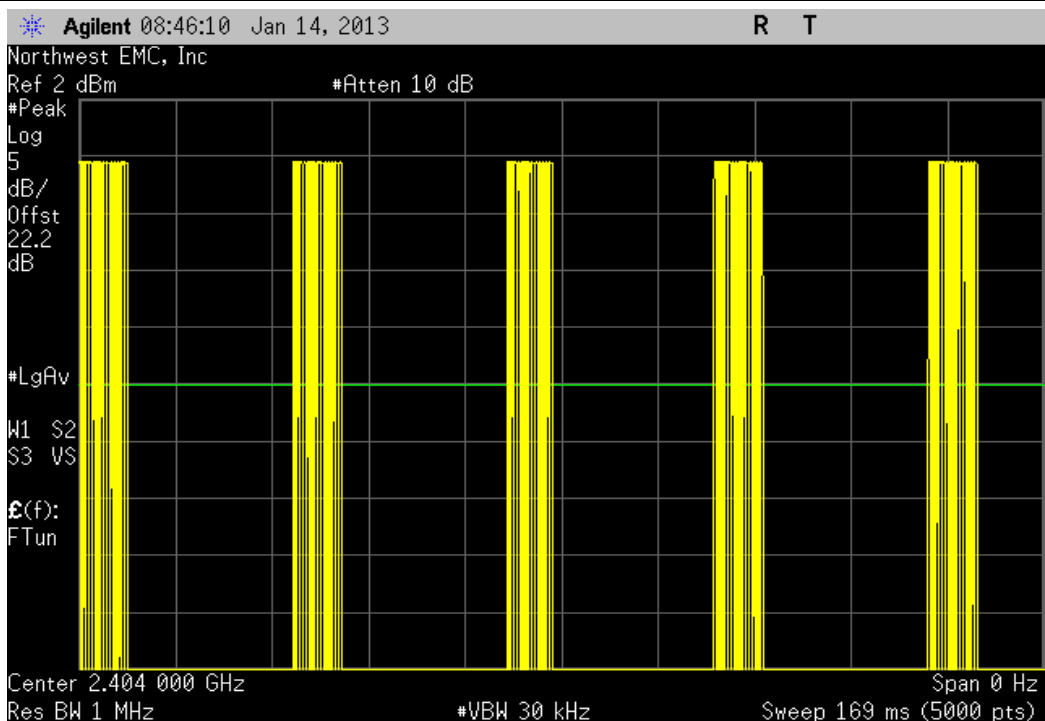
BLE - Advertising, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



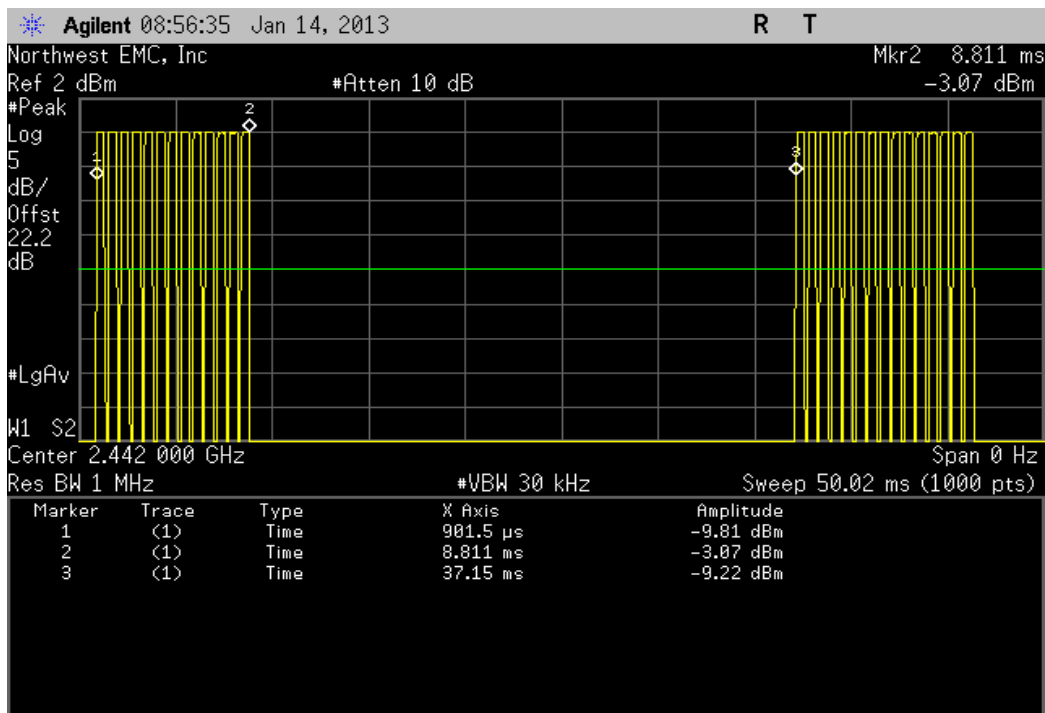
BLE - Data, Low Channel, 2404 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	9.163 mS	37.5 mS	1	24.4	N/A	N/A



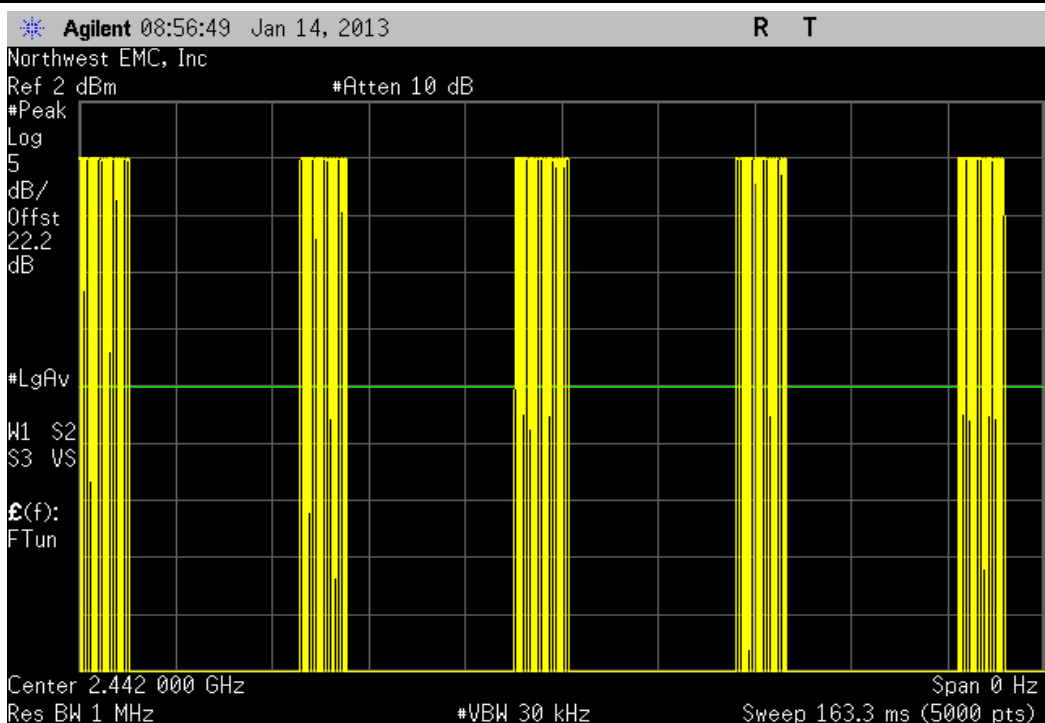
BLE - Data, Low Channel, 2404 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



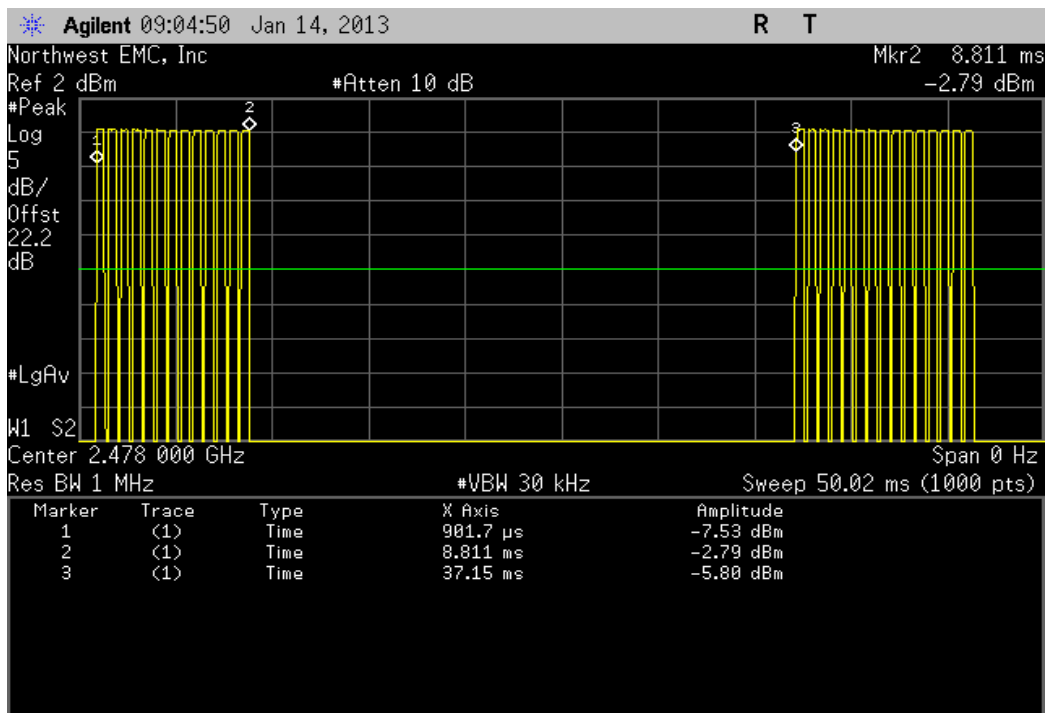
BLE - Data, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	7.91 mS	36.248 mS	1	21.8	N/A	N/A



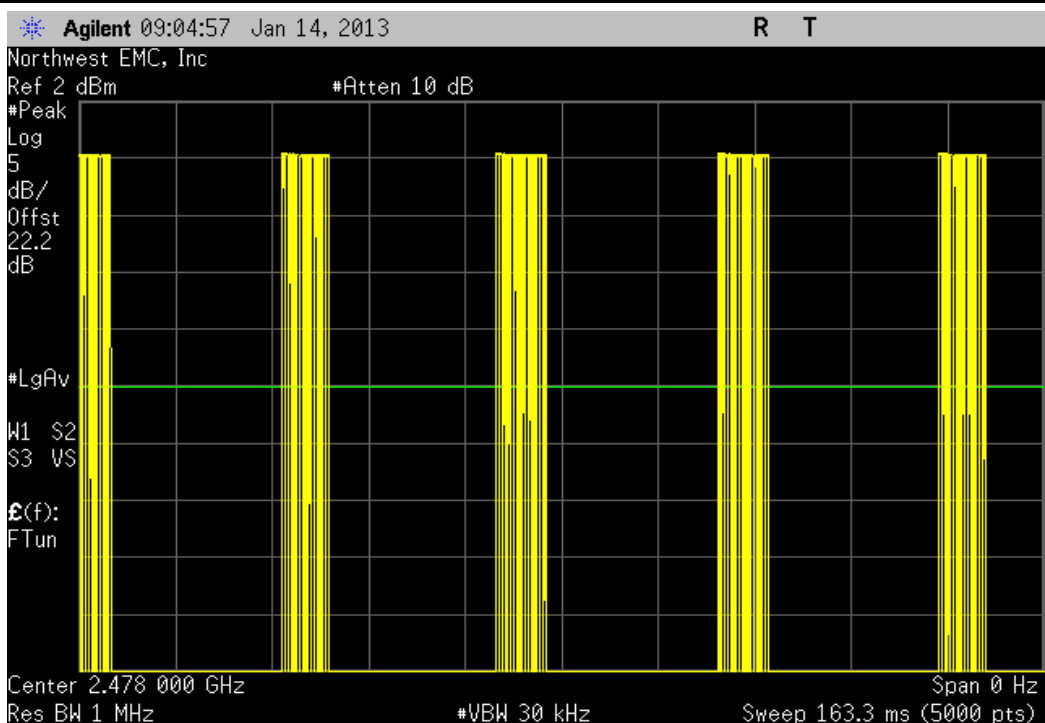
BLE - Data, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



BLE - Data, High Channel, 2478 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	7.909 mS	36.248 mS	1	21.8	N/A	N/A



BLE - Data, High Channel, 2478 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
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	24

TEST DESCRIPTION

The 6dB occupied bandwidth was measured. The 26 dB (99.9%) emission bandwidth (EBW) was also measured at the same time.

The EUT was 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.



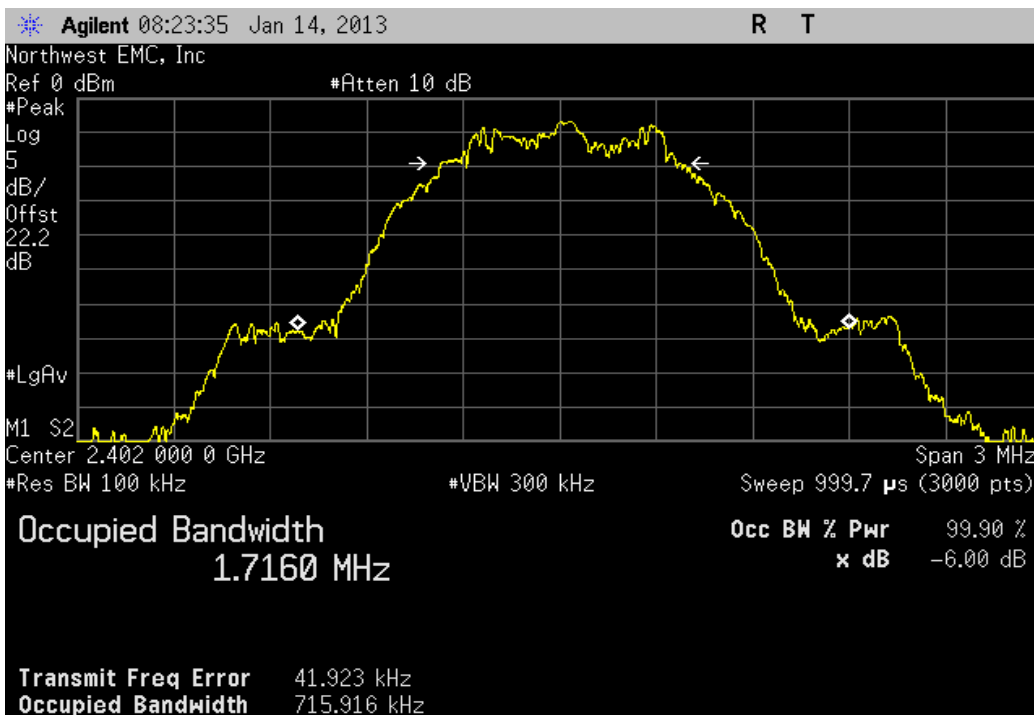
Occupied Bandwidth

XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027	
Serial Number: 12826579		Date: 01/14/13	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C	
Attendees: Larry McNabb		Humidity: 12%	
Project: None		Barometric Pres.: 1030	
Tested by: Trevor Buls		Power: Battery	
		Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2013		Test Method	
		ANSI C63.10:2009	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Trevor Buls</i>	
		Value	Limit
BLE - Advertising			Result
Low Channel, 2402 MHz		715.916 kHz	≥ 500 kHz
Mid Channel, 2426 MHz		732.356 kHz	≥ 500 kHz
High Channel, 2480 MHz		670.448 kHz	≥ 500 kHz
BLE - Data			
Low Channel, 2404 MHz		717.977 kHz	≥ 500 kHz
Mid Channel, 2442 MHz		688.496 kHz	≥ 500 kHz
High Channel, 2478 MHz		682.763 kHz	≥ 500 kHz

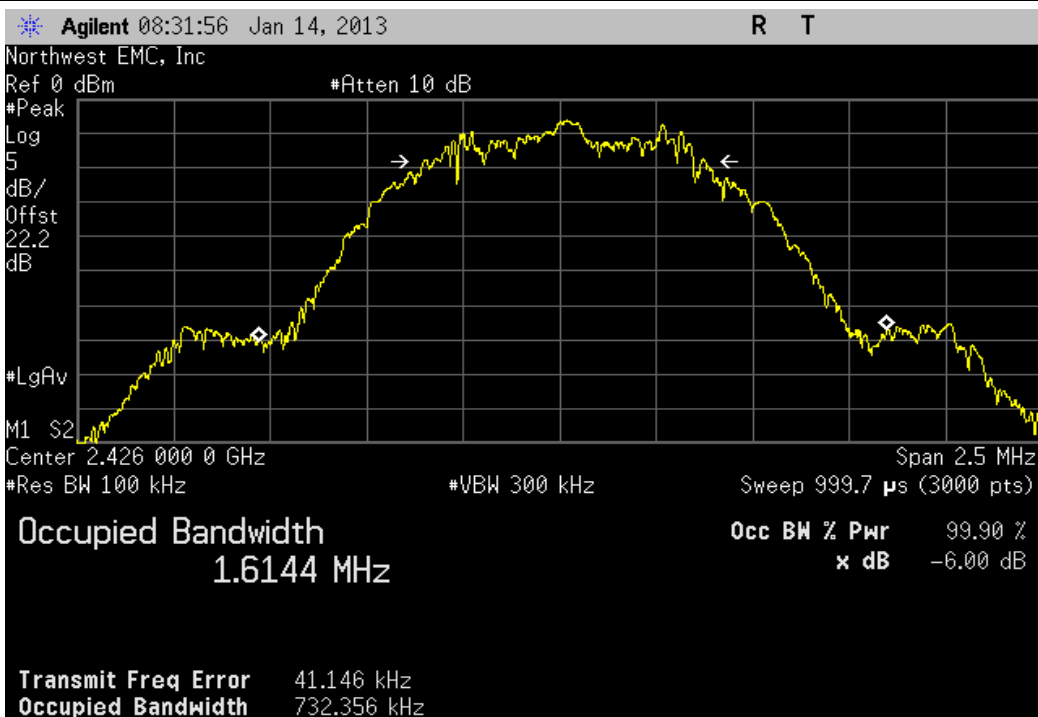
BLE - Advertising, Low Channel, 2402 MHz

				Value	Limit	Result
				715.916 kHz	≥ 500 kHz	Pass



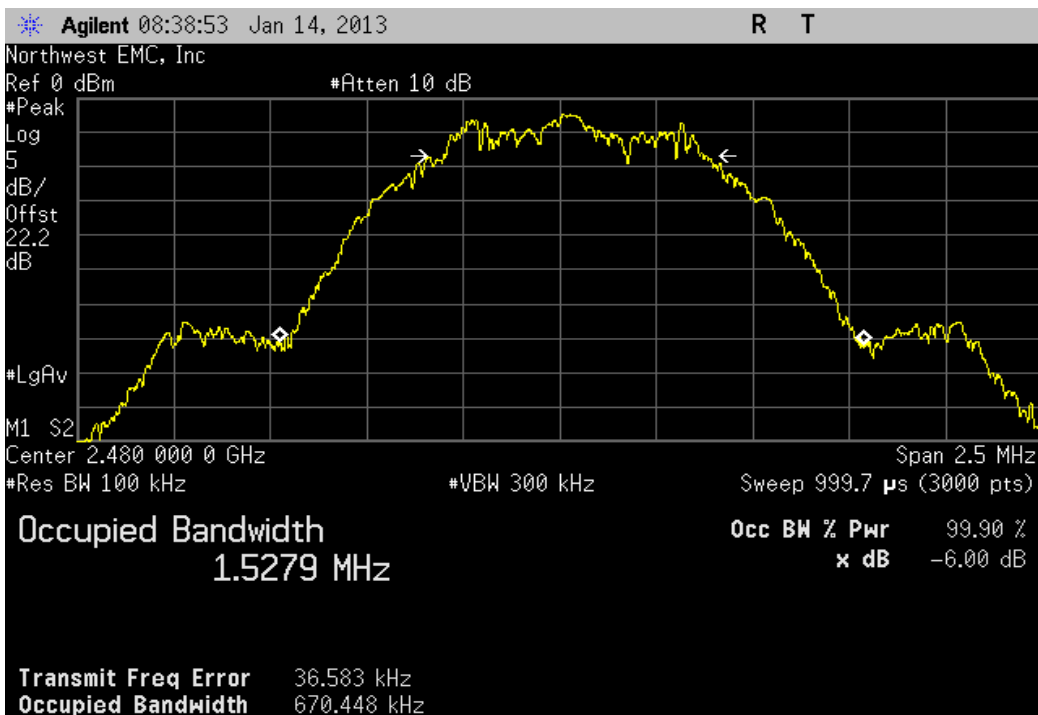
BLE - Advertising, Mid Channel, 2426 MHz

				Value	Limit	Result
				732.356 kHz	≥ 500 kHz	Pass



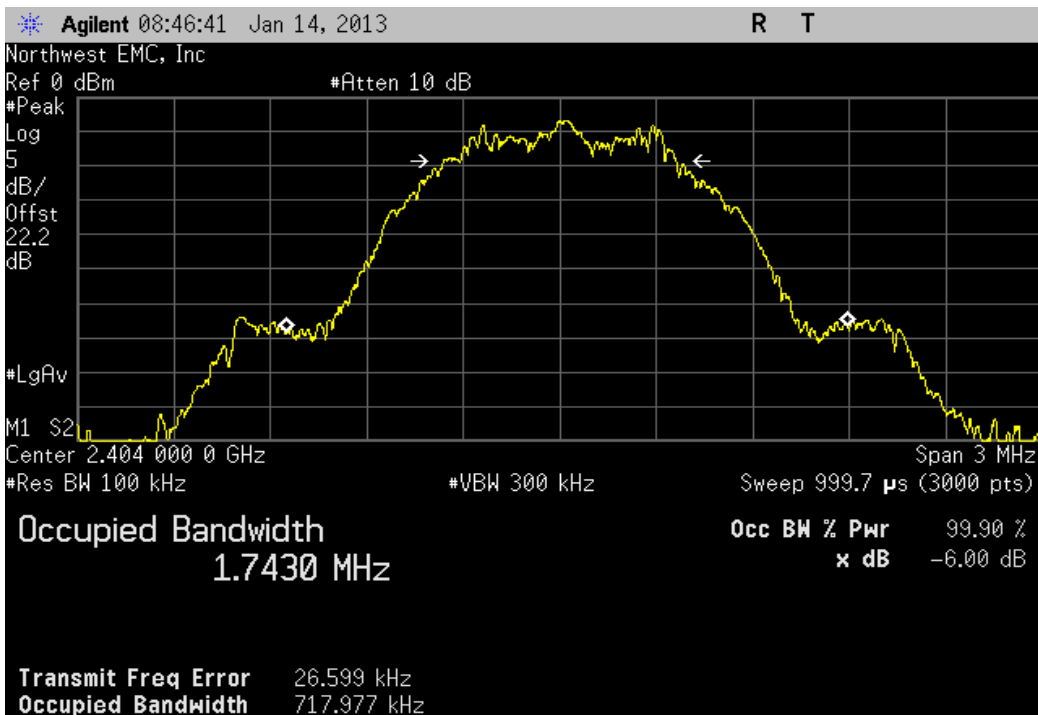
BLE - Advertising, High Channel, 2480 MHz

Value	Limit	Result
670.448 kHz	≥ 500 kHz	Pass



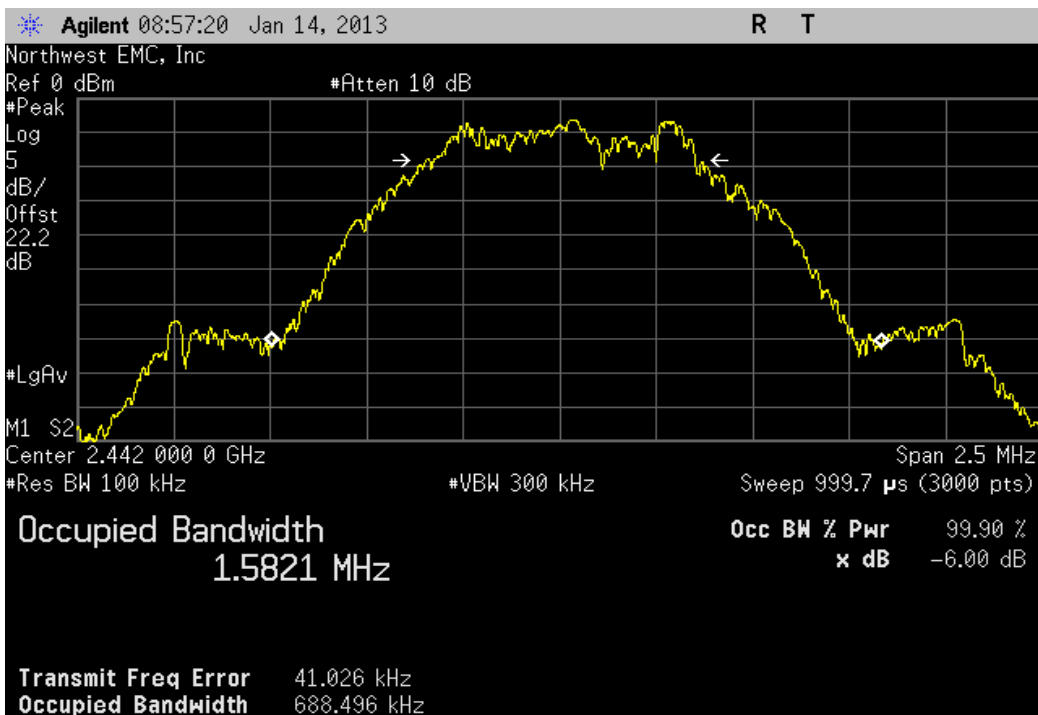
BLE - Data, Low Channel, 2404 MHz

Value	Limit	Result
717.977 kHz	≥ 500 kHz	Pass



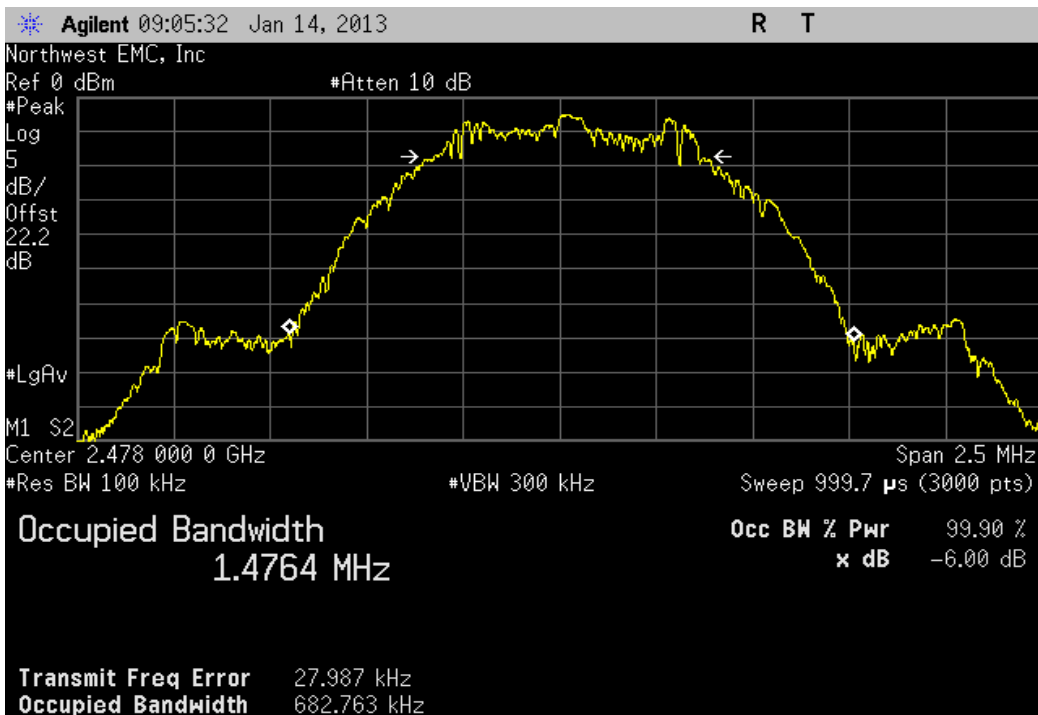
BLE - Data, Mid Channel, 2442 MHz

Value	Limit	Result
688.496 kHz	≥ 500 kHz	Pass



BLE - Data, High Channel, 2478 MHz

Value	Limit	Result
682.763 kHz	≥ 500 kHz	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
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	24

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. 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 reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Method Option 1 found in KDB 558074 DTS D01 Measurement Section 8.1.1 was used because the RBW on the analyzer was greater than the Emission Bandwidth of the radio.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.



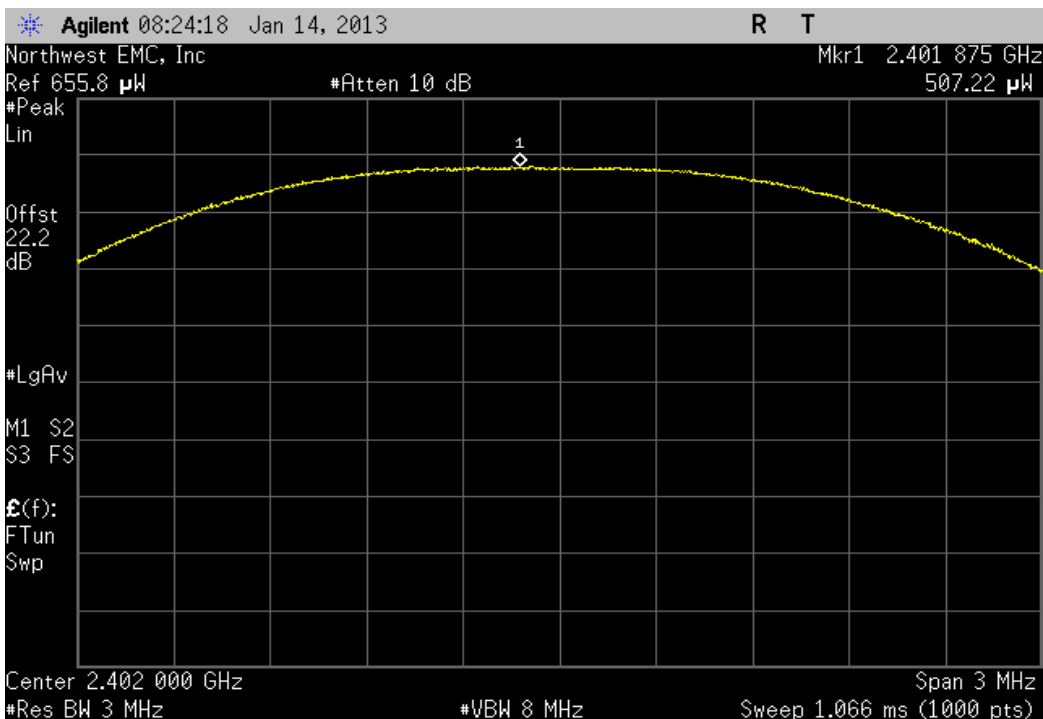
Output Power

XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027	
Serial Number: 12826579		Date: 01/14/13	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C	
Attendees: Larry McNabb		Humidity: 12%	
Project: None		Barometric Pres.: 1030	
Tested by: Trevor Buls		Power: Battery	
		Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2013		Test Method	
		ANSI C63.10:2009	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Trevor Buls</i>	
		Value	Limit
			Result
BLE - Advertising			
Low Channel, 2402 MHz		507.224 uW	< 1 W
Mid Channel, 2426 MHz		528.08 uW	< 1 W
High Channel, 2480 MHz		621.727 uW	< 1 W
BLE - Data			
Low Channel, 2404 MHz		506.524 uW	< 1 W
Mid Channel, 2442 MHz		565.067 uW	< 1 W
High Channel, 2478 MHz		612.632 uW	< 1 W

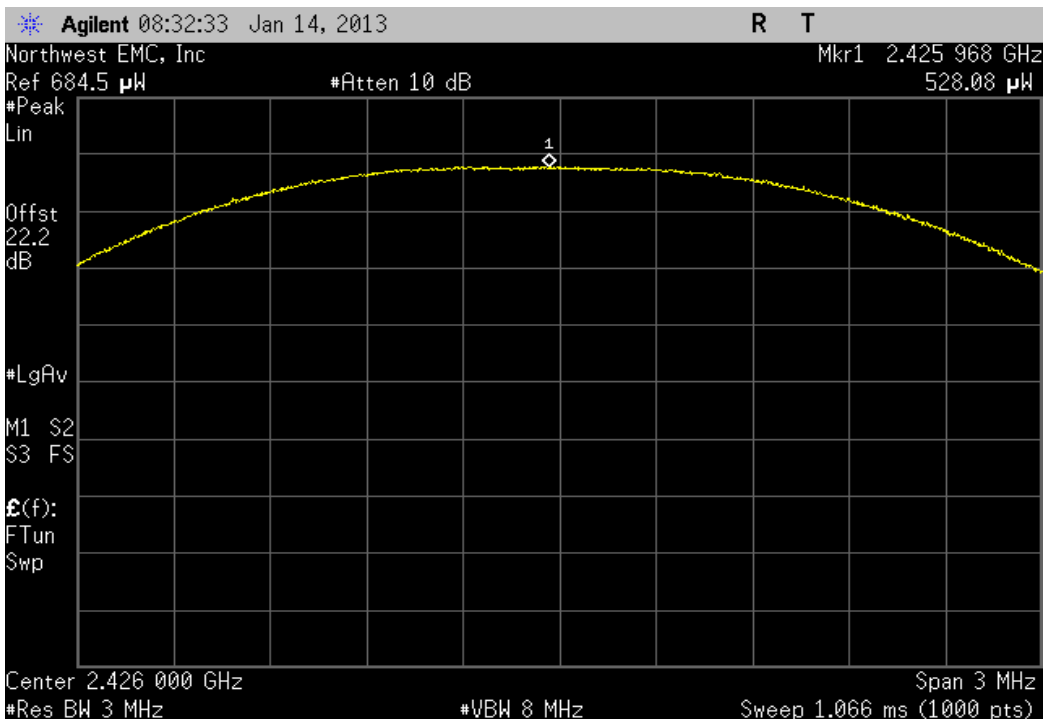
BLE - Advertising, Low Channel, 2402 MHz

Value	Limit	Result
507.224 uW	< 1 W	Pass



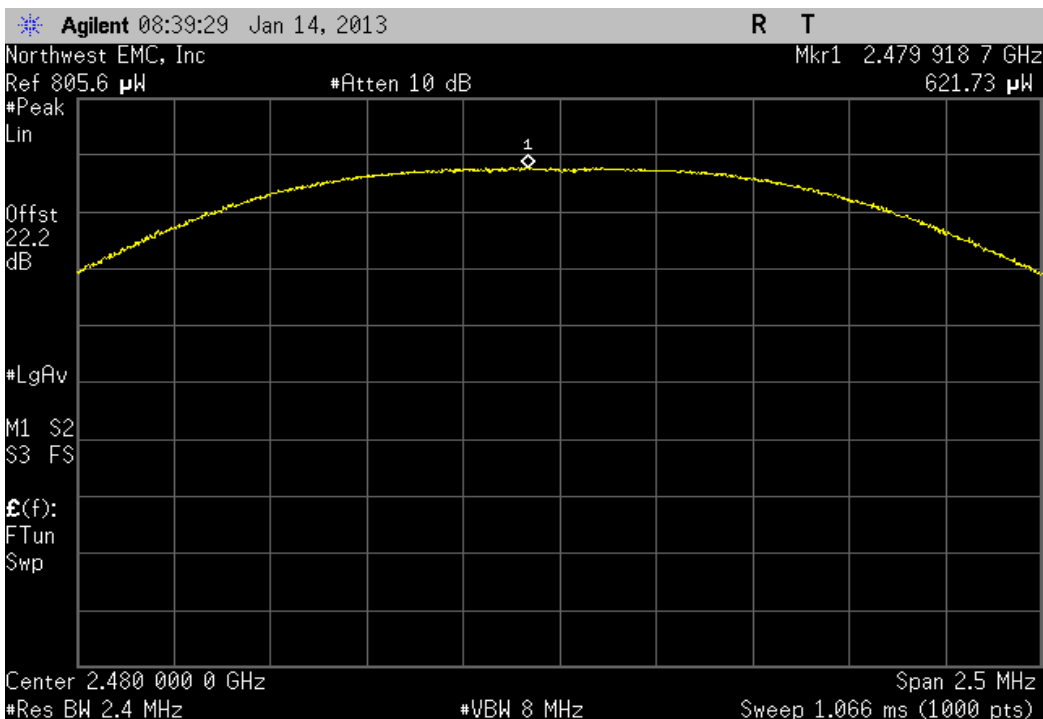
BLE - Advertising, Mid Channel, 2426 MHz

Value	Limit	Result
528.08 uW	< 1 W	Pass



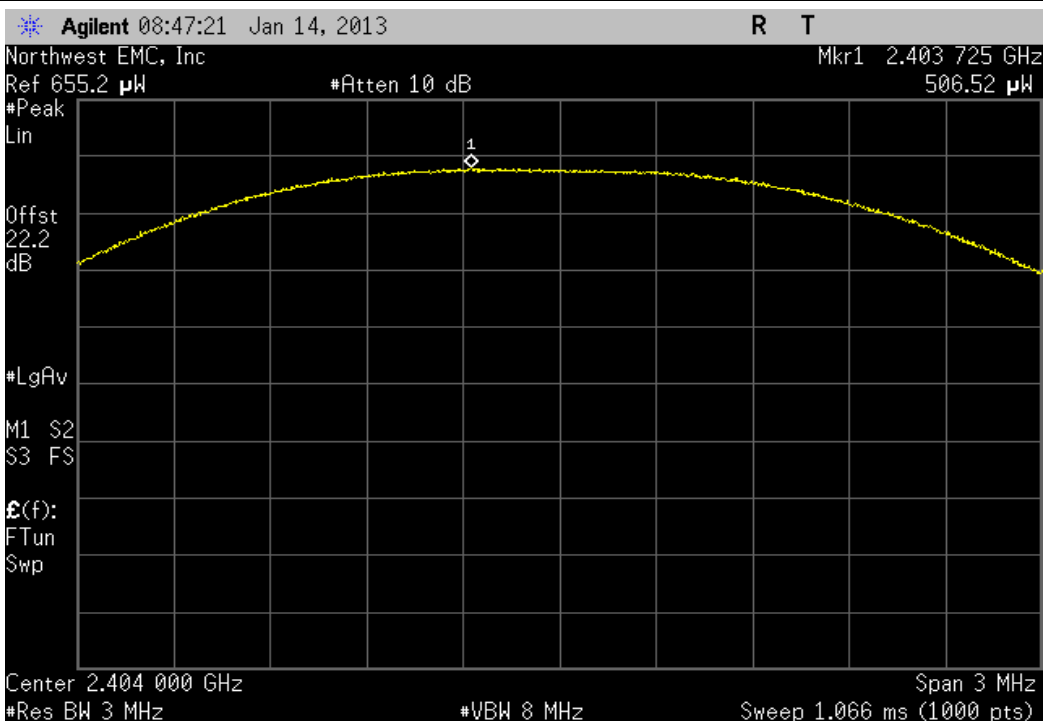
BLE - Advertising, High Channel, 2480 MHz

Value	Limit	Result
621.727 uW	< 1 W	Pass



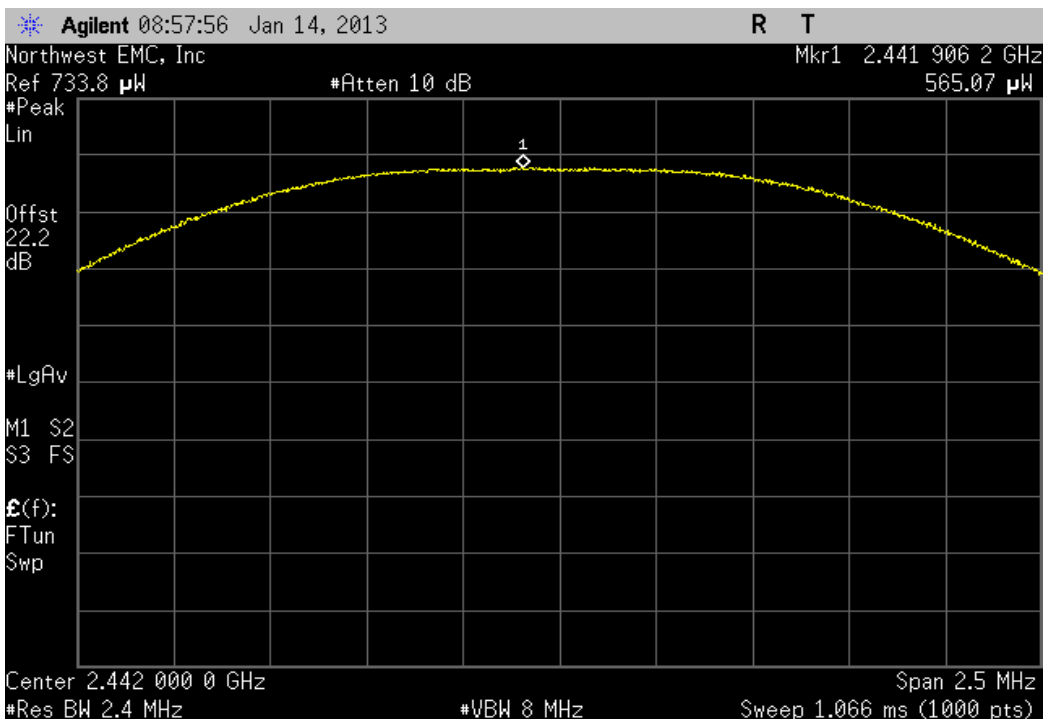
BLE - Data, Low Channel, 2404 MHz

Value	Limit	Result
506.524 uW	< 1 W	Pass



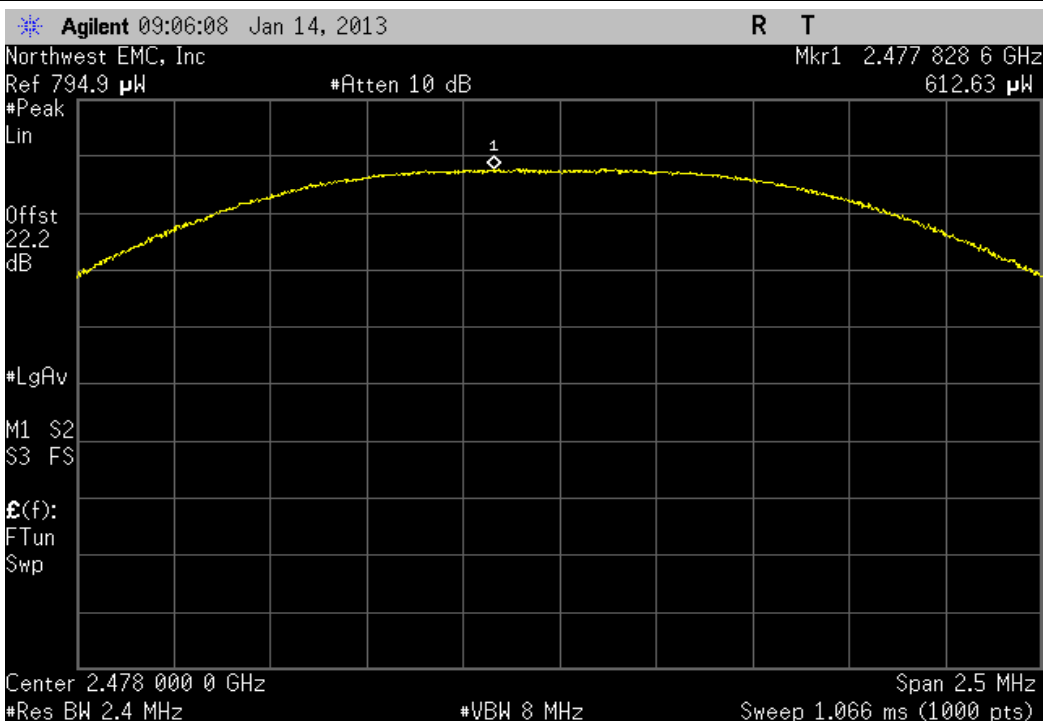
BLE - Data, Mid Channel, 2442 MHz

Value	Limit	Result
565.067 μ W	< 1 W	Pass



BLE - Data, High Channel, 2478 MHz

Value	Limit	Result
612.632 μ W	< 1 W	Pass



Band Edge Compliance

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	24

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. 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.



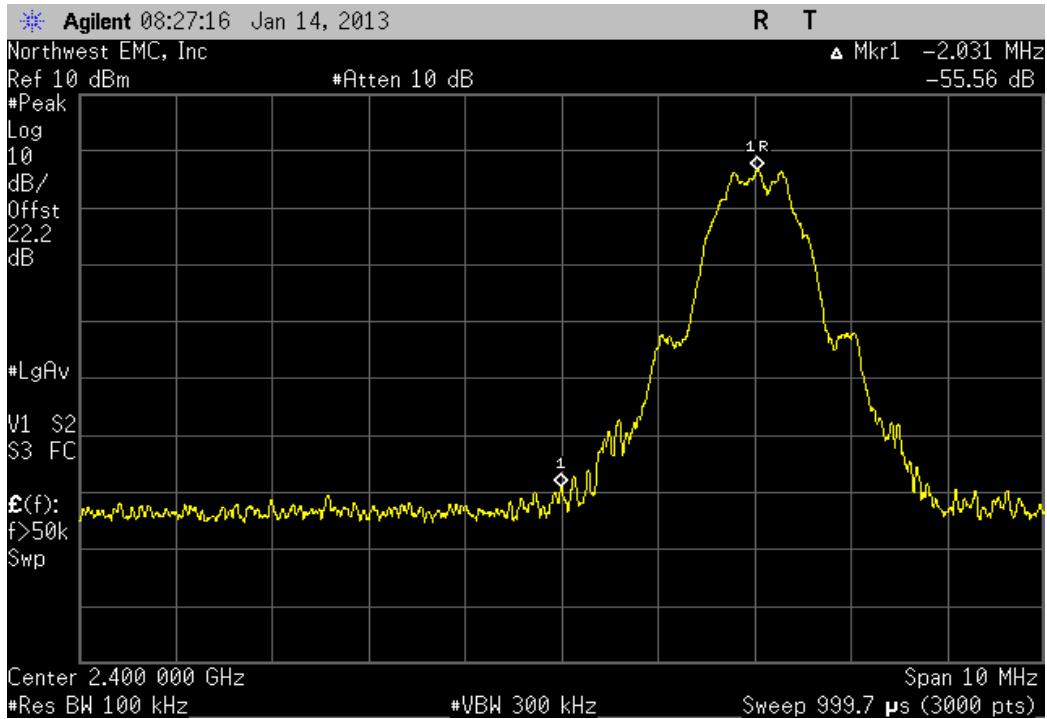
Band Edge Compliance

XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027	
Serial Number: 12826579		Date: 01/14/13	
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C	
Attendees: Larry McNabb		Humidity: 12%	
Project: None		Barometric Pres.: 1030	
Tested by: Trevor Buls		Power: Battery	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2013		ANSI C63.10:2009	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Trevor Buls</i>	
		Value	Limit
BLE - Advertising			Result
Low Channel, 2402 MHz		-55.57 dBc	≤ -20 dBc
High Channel, 2480 MHz		-57.71 dBc	≤ -20 dBc
BLE - Data			Result
Low Channel, 2404 MHz		-57.71 dBc	≤ -20 dBc
High Channel, 2478 MHz		-58.09 dBc	≤ -20 dBc

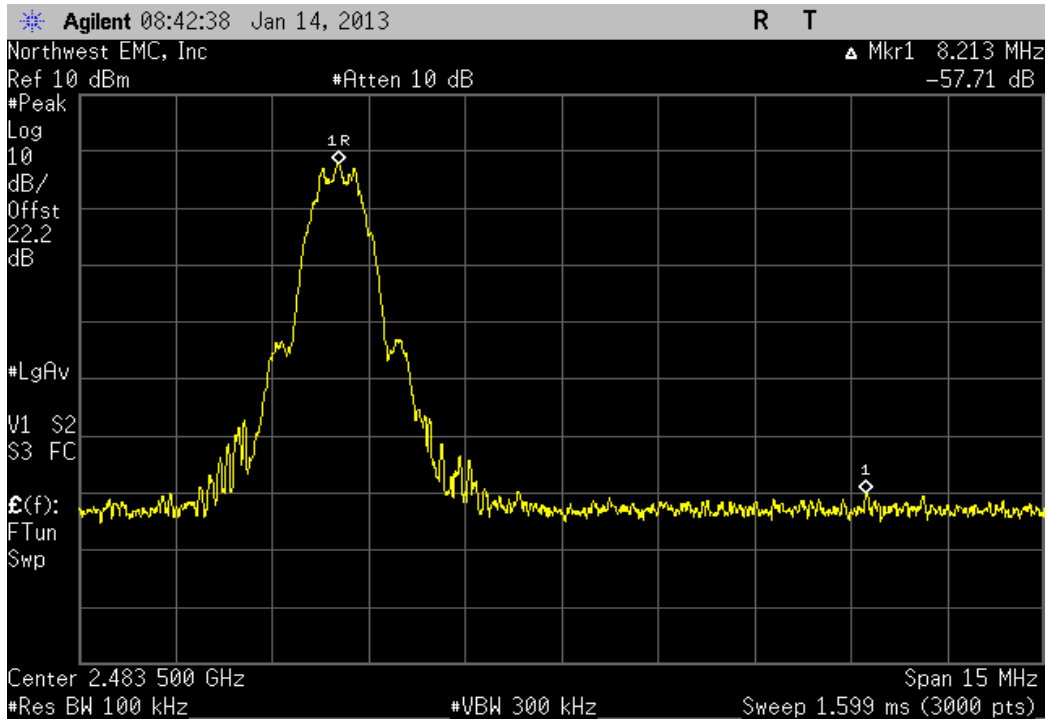
BLE - Advertising, Low Channel, 2402 MHz

Value	Limit	Result
-55.57 dBc	≤ -20 dBc	Pass



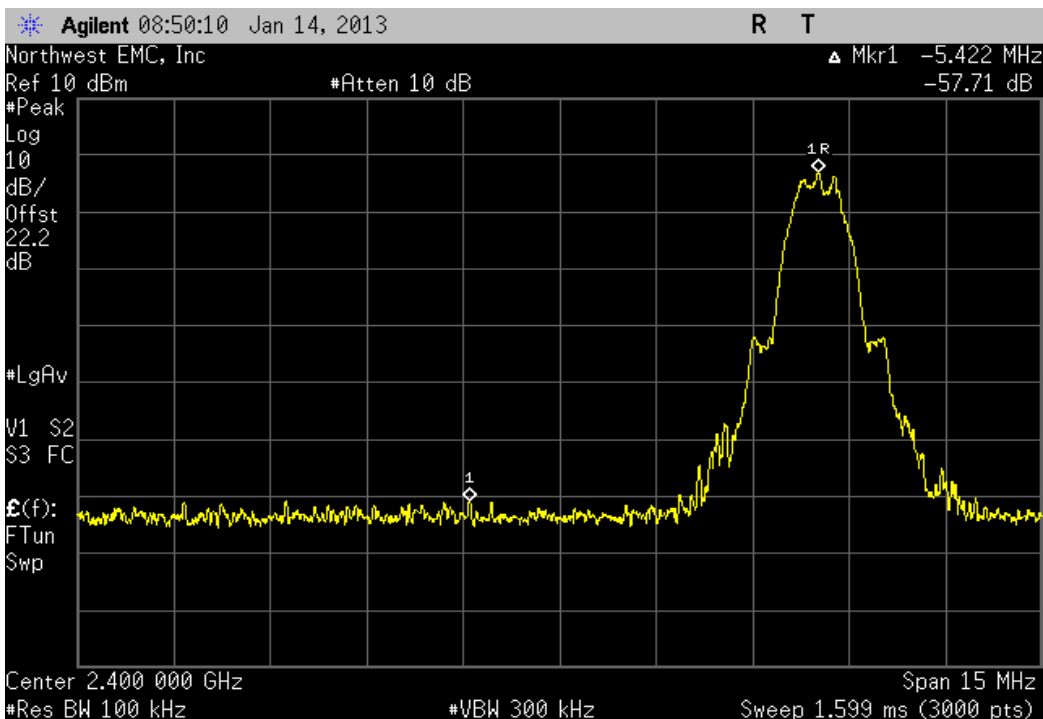
BLE - Advertising, High Channel, 2480 MHz

Value	Limit	Result
-57.71 dBc	≤ -20 dBc	Pass



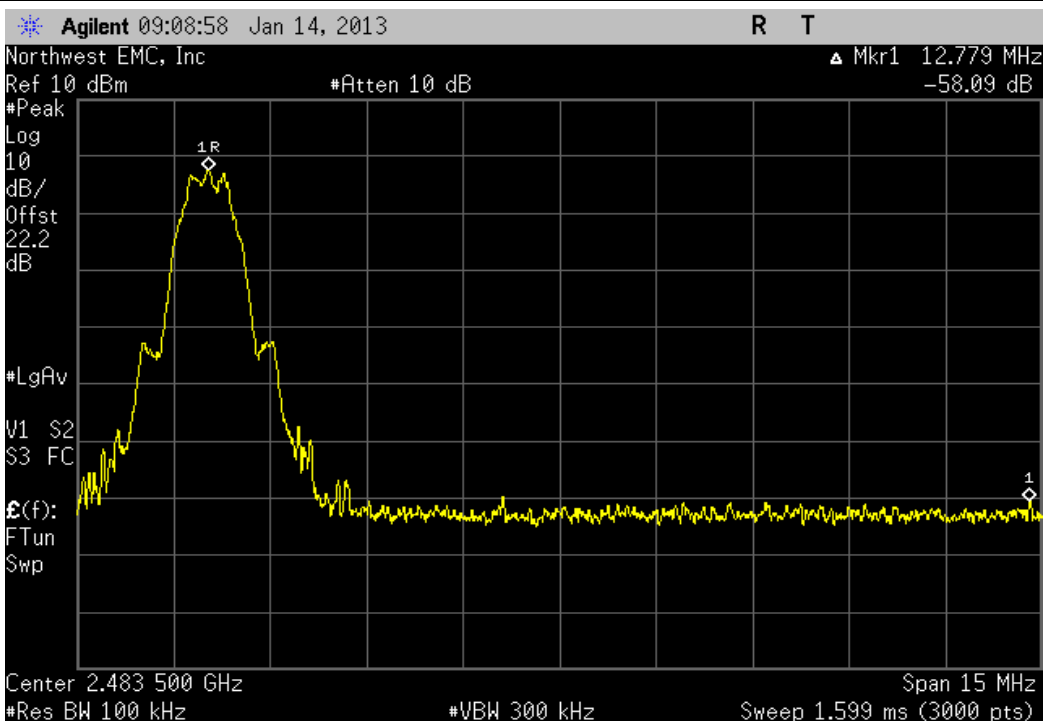
BLE - Data, Low Channel, 2404 MHz

Value	Limit	Result
-57.71 dBc	≤ -20 dBc	Pass



BLE - Data, High Channel, 2478 MHz

Value	Limit	Result
-58.09 dBc	≤ -20 dBc	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
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	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. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

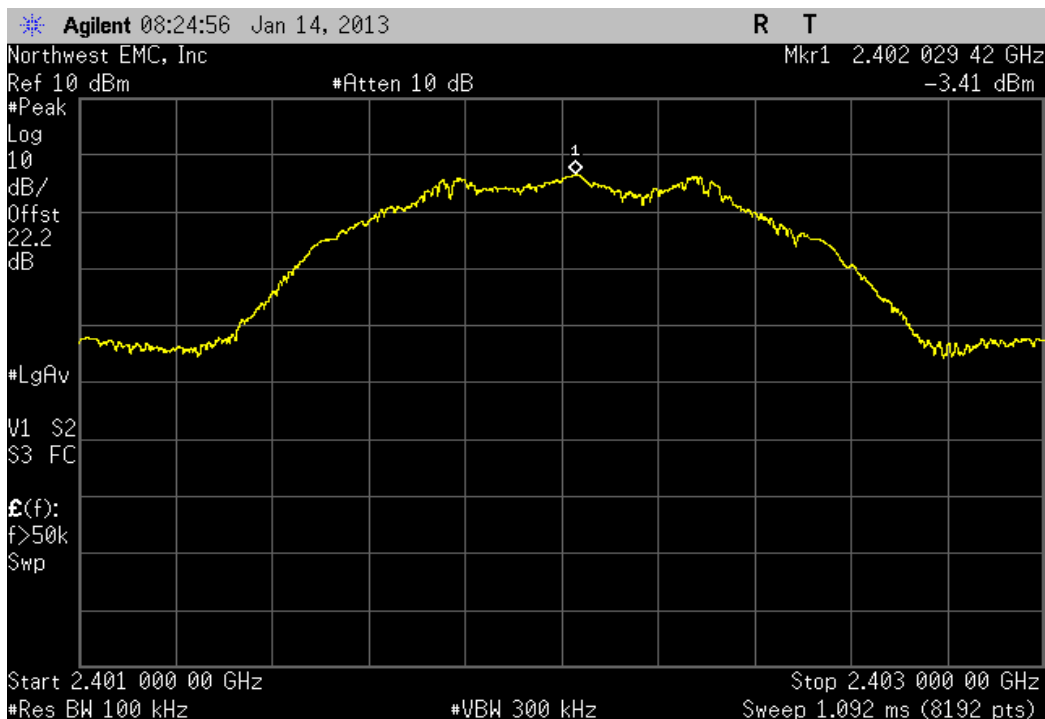


Spurious Conducted Emissions

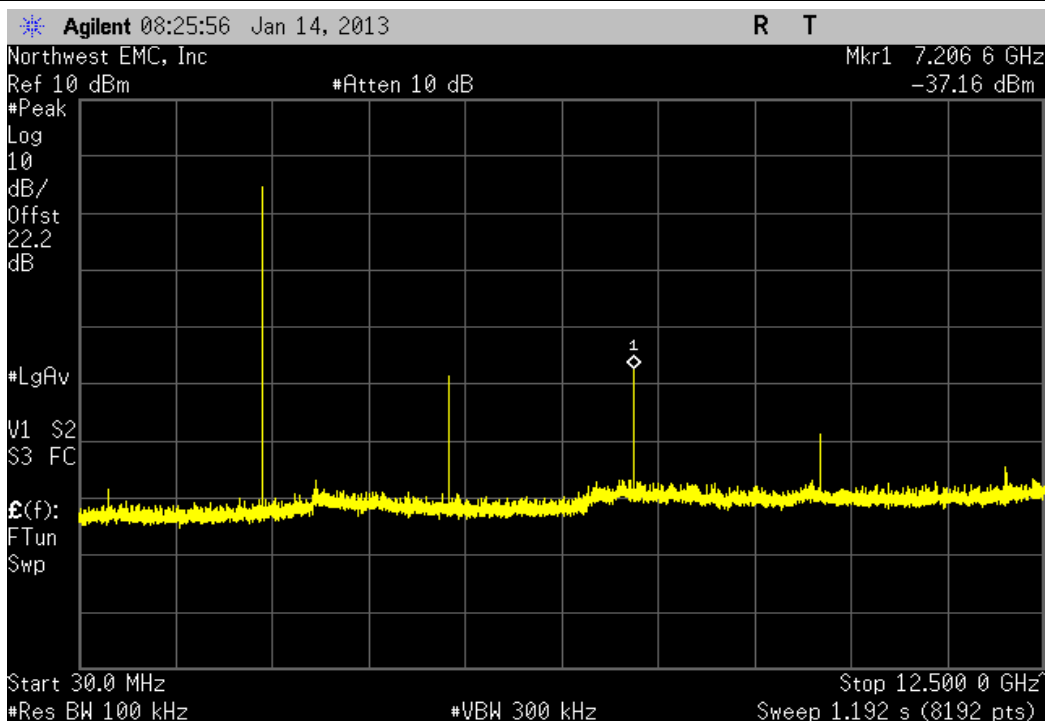
XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027			
Serial Number: 12826579		Date: 01/14/13			
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C			
Attendees: Larry McNabb		Humidity: 12%			
Project: None		Barometric Pres.: 1030			
Tested by: Trevor Buls		Power: Battery			
		Job Site: MN08			
TEST SPECIFICATIONS					
FCC 15.247:2013		Test Method			
		ANSI C63.10:2009			
COMMENTS					
None					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature <i>Trevor Buls</i>			
		Frequency Range	Value	Limit	Result
BLE - Advertising					
Low Channel, 2402 MHz		Fundamental	N/A	N/A	N/A
Low Channel, 2402 MHz		30 MHz - 12.5 GHz	-33.74 dBc	≤ -20 dBc	Pass
Low Channel, 2402 MHz		12.5 GHz - 25 GHz	-48.6 dBc	≤ -20 dBc	Pass
Mid Channel, 2426 MHz		Fundamental	N/A	N/A	N/A
Mid Channel, 2426 MHz		30 MHz - 12.5 GHz	-35.16 dBc	≤ -20 dBc	Pass
Mid Channel, 2426 MHz		12.5 GHz - 25 GHz	-49.34 dBc	≤ -20 dBc	Pass
High Channel, 2480 MHz		Fundamental	N/A	N/A	N/A
High Channel, 2480 MHz		30 MHz - 12.5 GHz	-37.98 dBc	≤ -20 dBc	Pass
High Channel, 2480 MHz		12.5 GHz - 25 GHz	-49.53 dBc	≤ -20 dBc	Pass
BLE - Data					
Low Channel, 2404 MHz		Fundamental	N/A	N/A	N/A
Low Channel, 2404 MHz		30 MHz - 12.5 GHz	-33.91 dBc	≤ -20 dBc	Pass
Low Channel, 2404 MHz		12.5 GHz - 25 GHz	-48.37 dBc	≤ -20 dBc	Pass
Mid Channel, 2442 MHz		Fundamental	N/A	N/A	N/A
Mid Channel, 2442 MHz		30 MHz - 12.5 GHz	-36.07 dBc	≤ -20 dBc	Pass
Mid Channel, 2442 MHz		12.5 GHz - 25 GHz	-48.89 dBc	≤ -20 dBc	Pass
High Channel, 2478 MHz		Fundamental	N/A	N/A	N/A
High Channel, 2478 MHz		30 MHz - 12.5 GHz	-40.4 dBc	≤ -20 dBc	Pass
High Channel, 2478 MHz		12.5 GHz - 25 GHz	-49.36 dBc	≤ -20 dBc	Pass

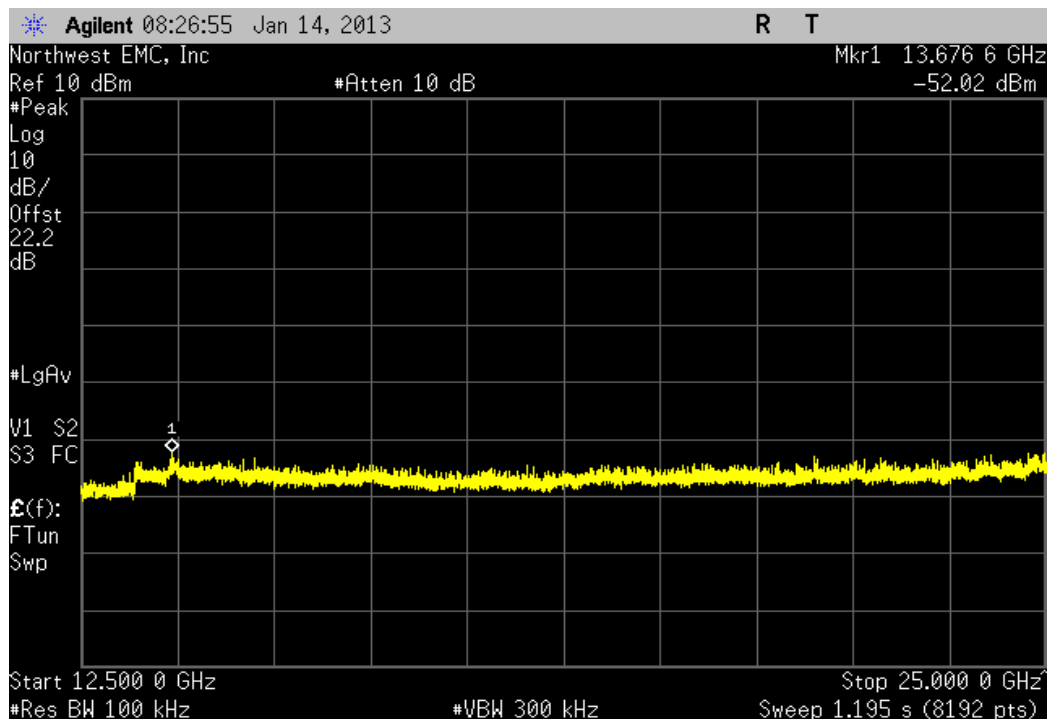
BLE - Advertising, Low Channel, 2402 MHz				
Frequency Range	Value	Limit	Result	
Fundamental	N/A	N/A	N/A	



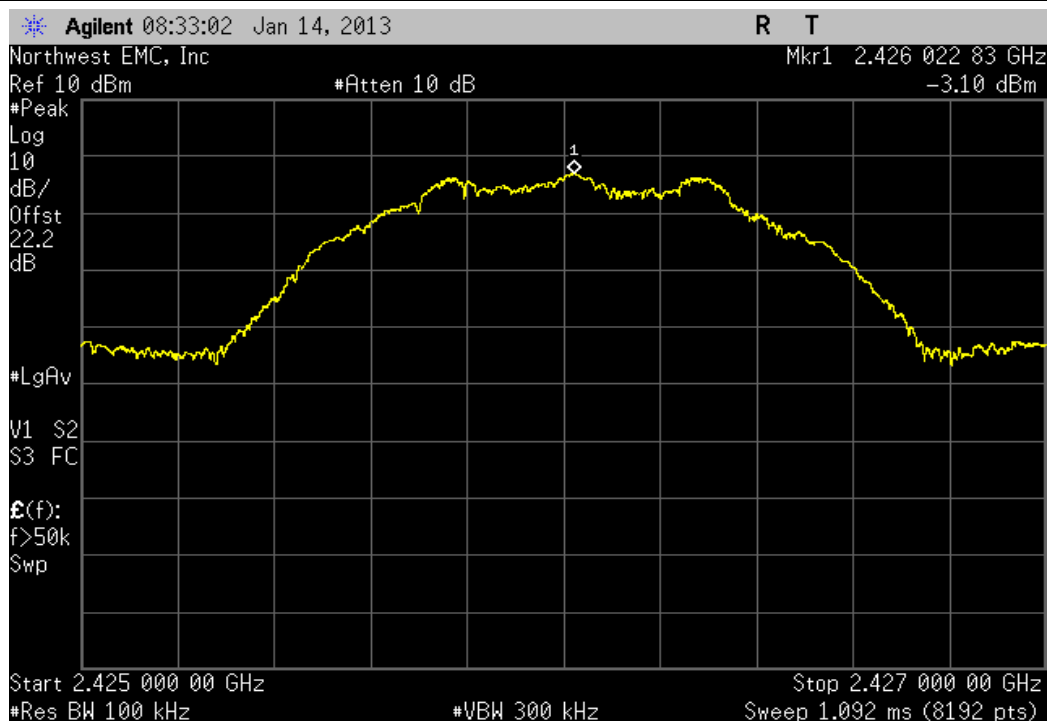
BLE - Advertising, Low Channel, 2402 MHz				
Frequency Range	Value	Limit	Result	
30 MHz - 12.5 GHz	-33.74 dBc	≤ -20 dBc	Pass	



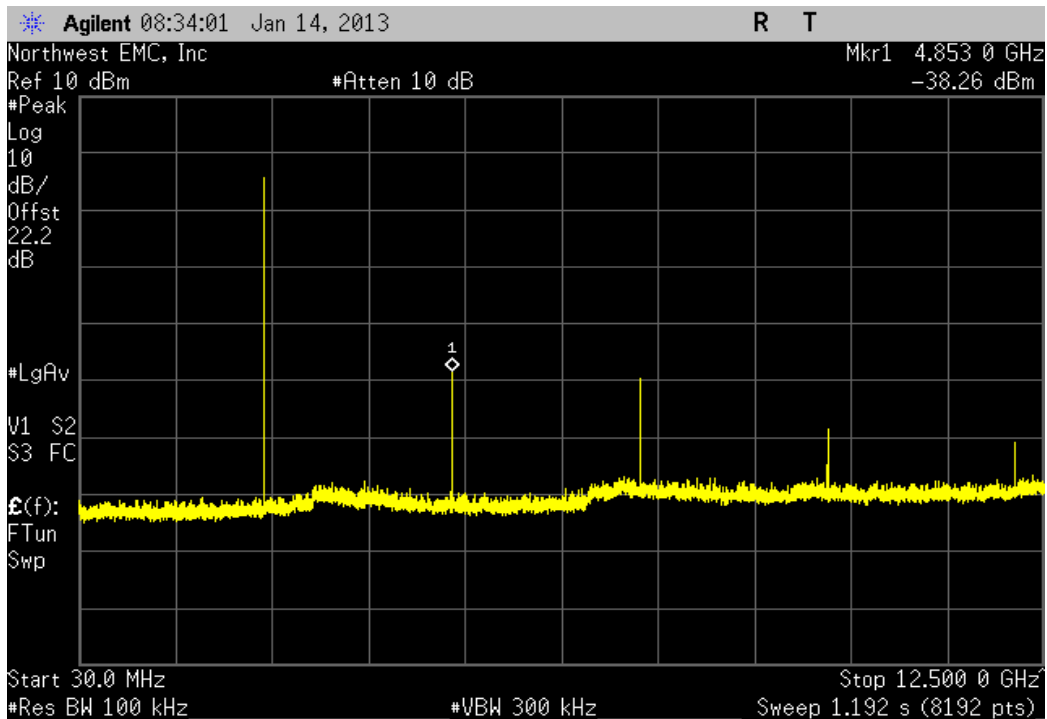
BLE - Advertising, Low Channel, 2402 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-48.6 dBc	≤ -20 dBc	Pass	



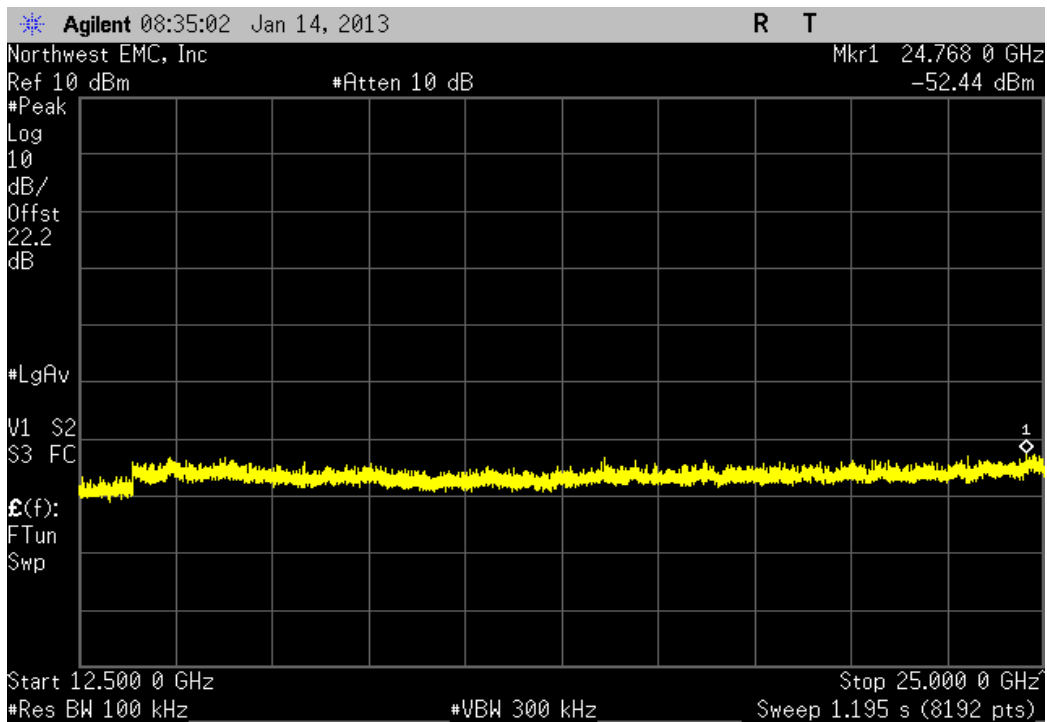
BLE - Advertising, Mid Channel, 2426 MHz				
Frequency Range	Value	Limit	Result	
Fundamental	N/A	N/A	N/A	



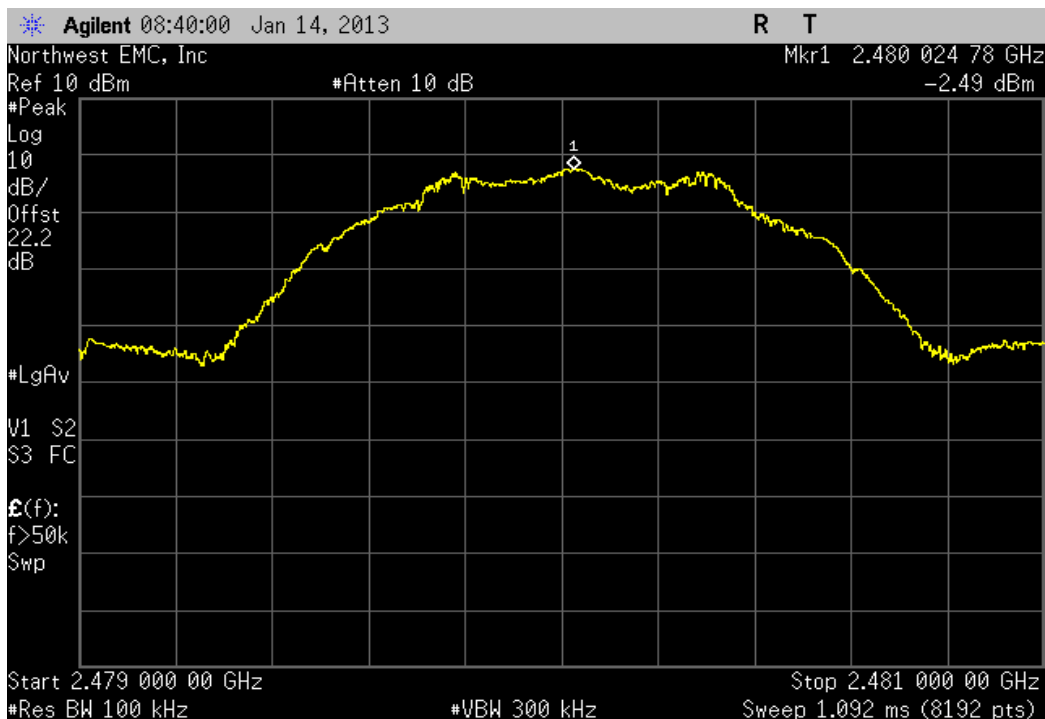
BLE - Advertising, Mid Channel, 2426 MHz				
Frequency Range	Value	Limit	Result	
30 MHz - 12.5 GHz	-35.16 dBc	≤ -20 dBc	Pass	



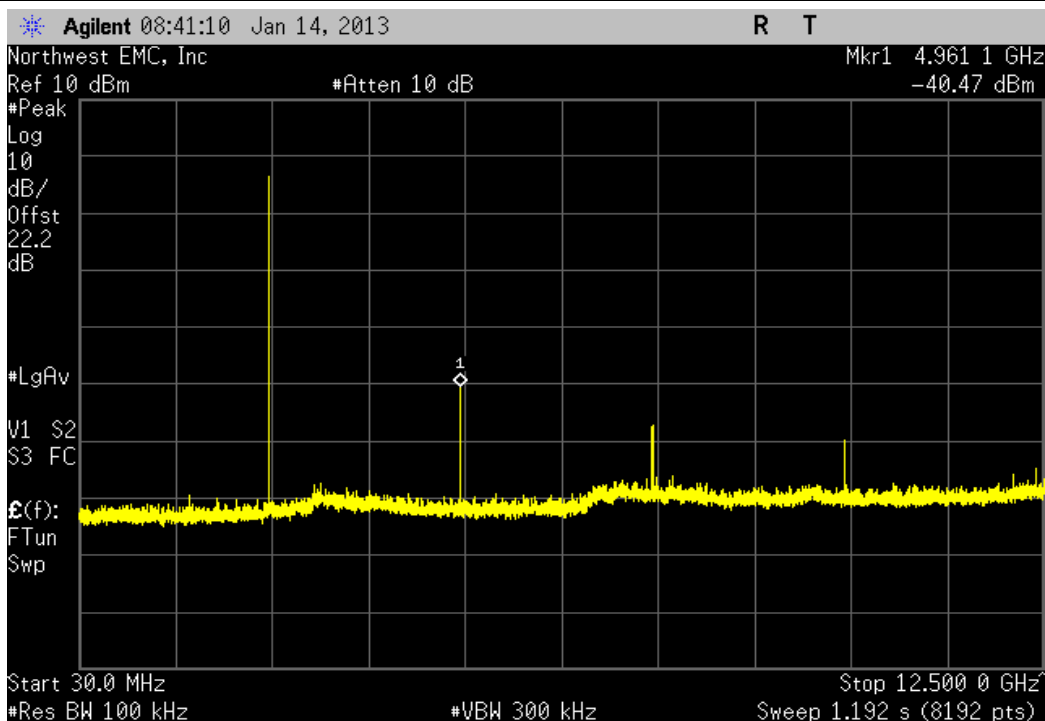
BLE - Advertising, Mid Channel, 2426 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-49.34 dBc	≤ -20 dBc	Pass	



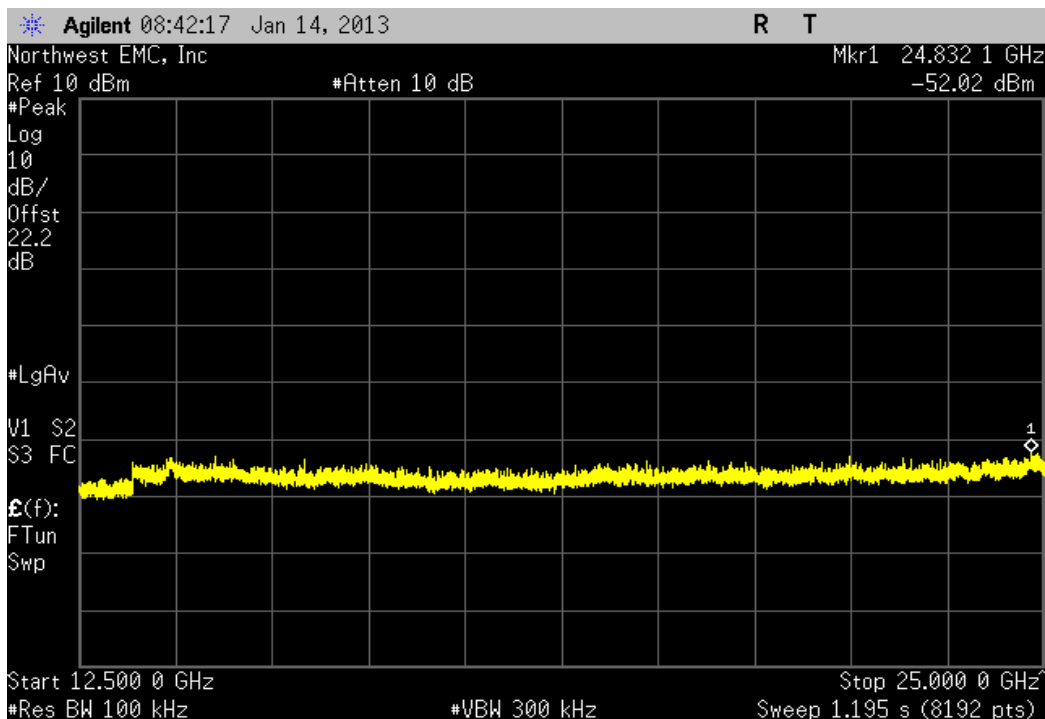
BLE - Advertising, High Channel, 2480 MHz				
Frequency Range	Value	Limit	Result	
Fundamental	N/A	N/A	N/A	



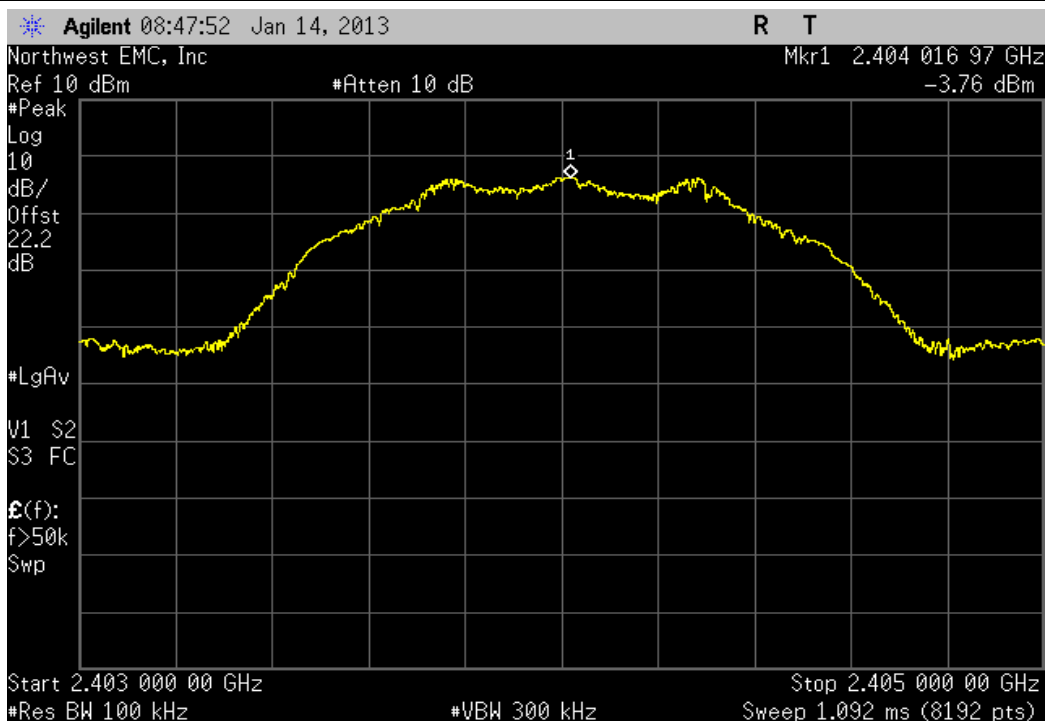
BLE - Advertising, High Channel, 2480 MHz				
Frequency Range	Value	Limit	Result	
30 MHz - 12.5 GHz	-37.98 dBc	≤ -20 dBc	Pass	



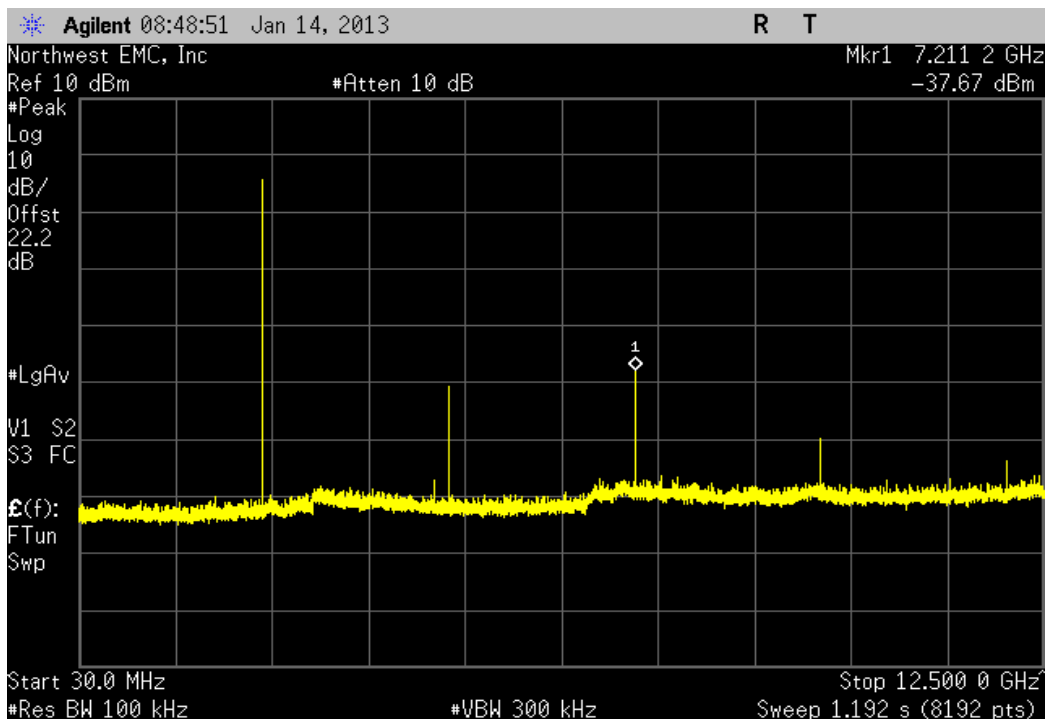
BLE - Advertising, High Channel, 2480 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-49.53 dBc	≤ -20 dBc	Pass	



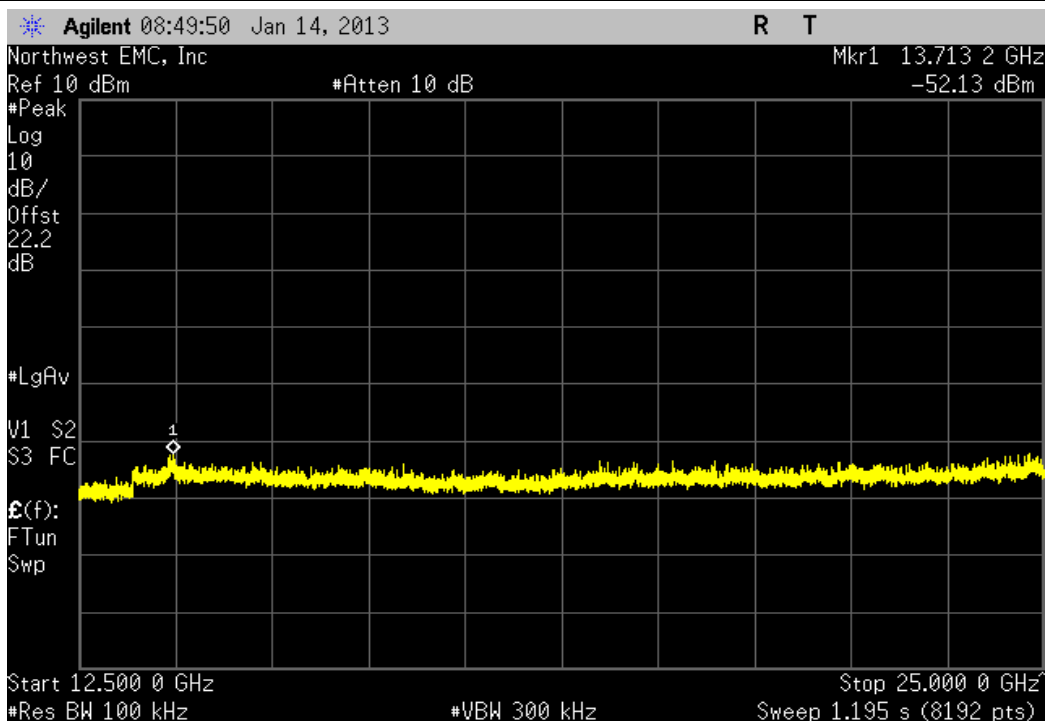
BLE - Data, Low Channel, 2404 MHz				
Frequency Range	Value	Limit	Result	
Fundamental	N/A	N/A	N/A	



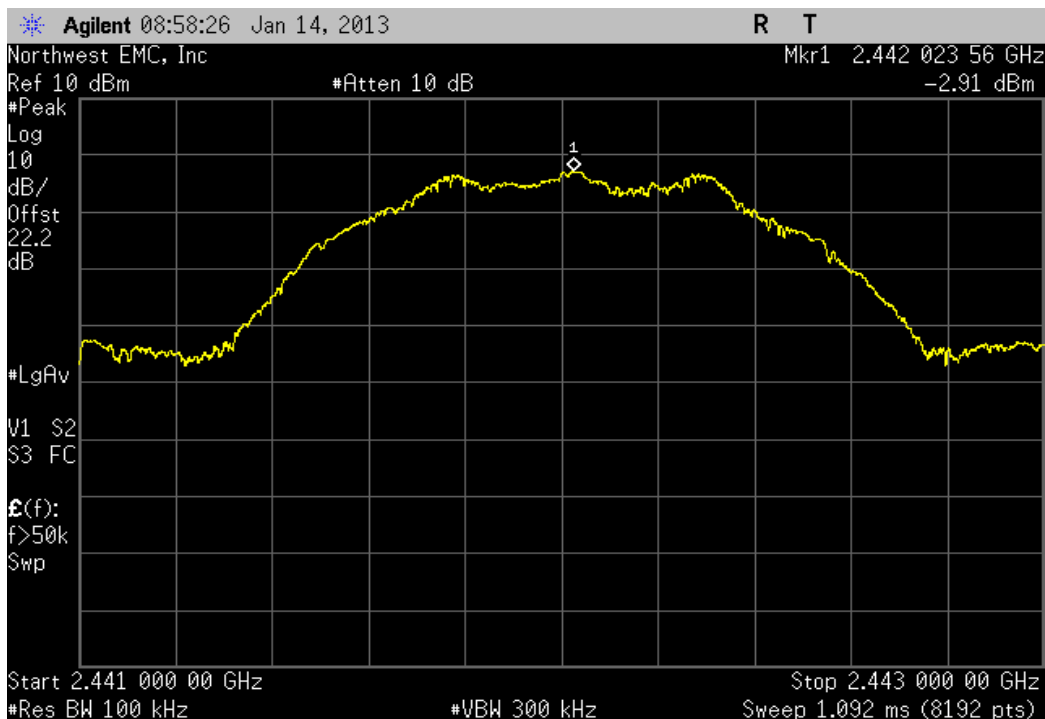
BLE - Data, Low Channel, 2404 MHz				
Frequency Range	Value	Limit	Result	
30 MHz - 12.5 GHz	-33.91 dBc	≤ -20 dBc	Pass	



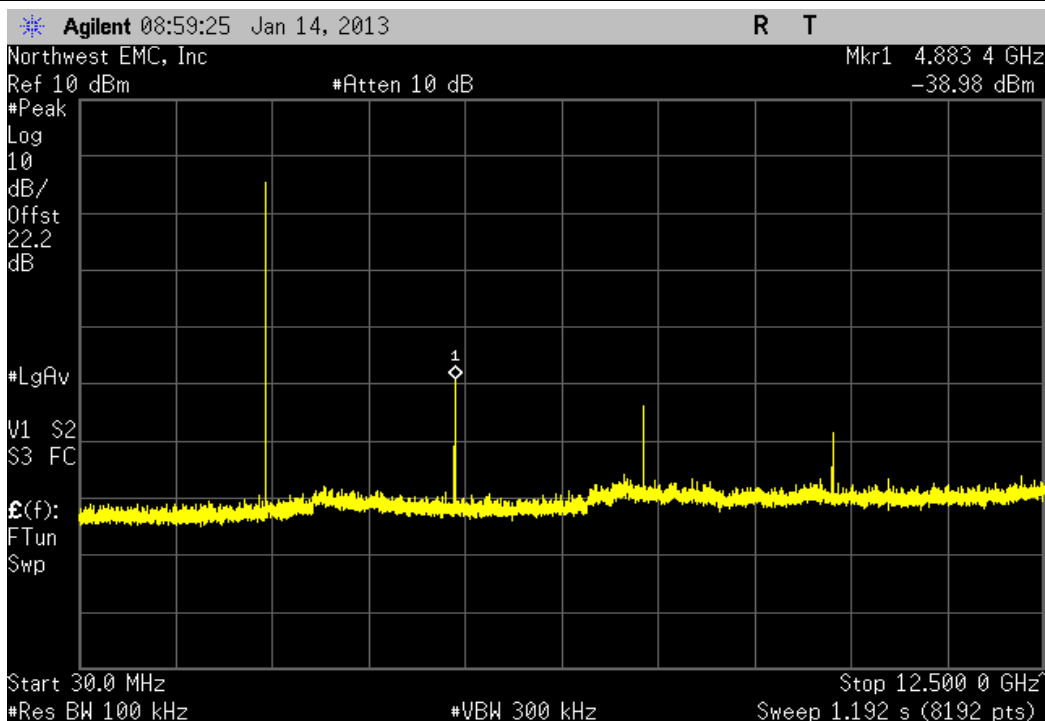
BLE - Data, Low Channel, 2404 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-48.37 dBc	≤ -20 dBc	Pass	



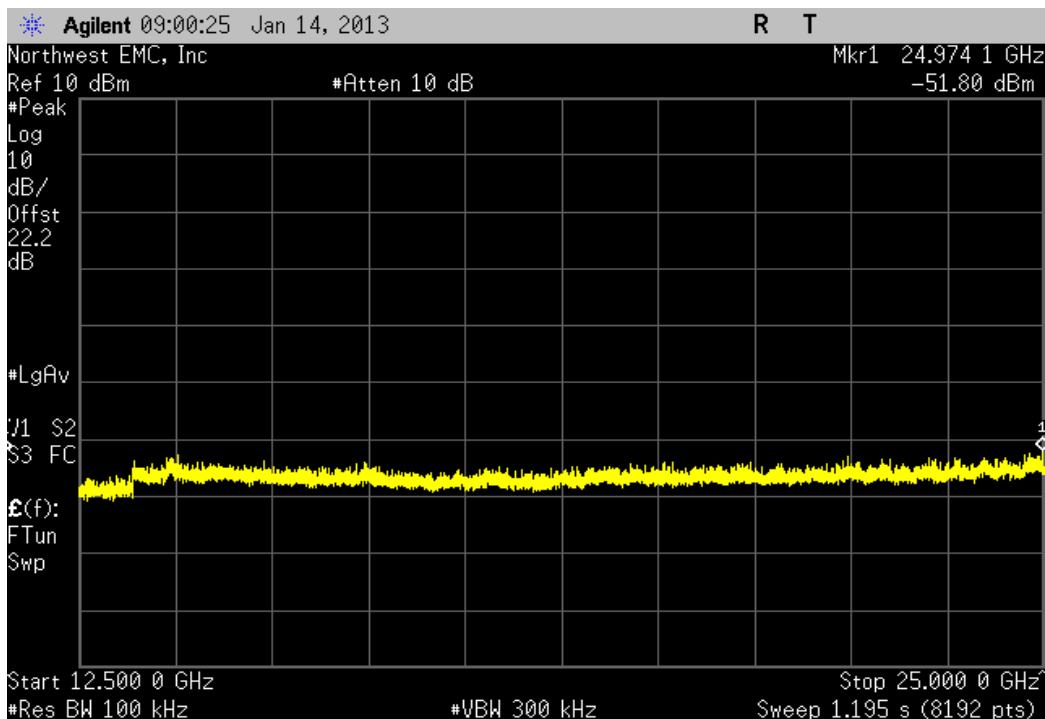
BLE - Data, Mid Channel, 2442 MHz				
Frequency Range		Value	Limit	Result
Fundamental		N/A	N/A	N/A



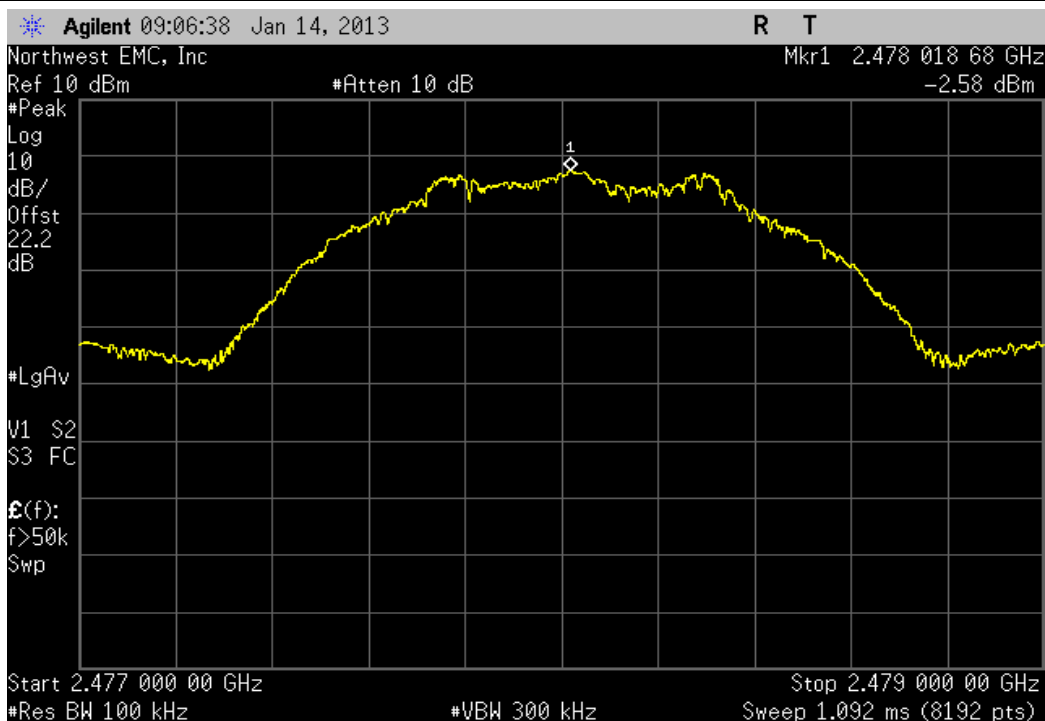
BLE - Data, Mid Channel, 2442 MHz				
Frequency Range		Value	Limit	Result
30 MHz - 12.5 GHz		-36.07 dBc	≤ -20 dBc	Pass



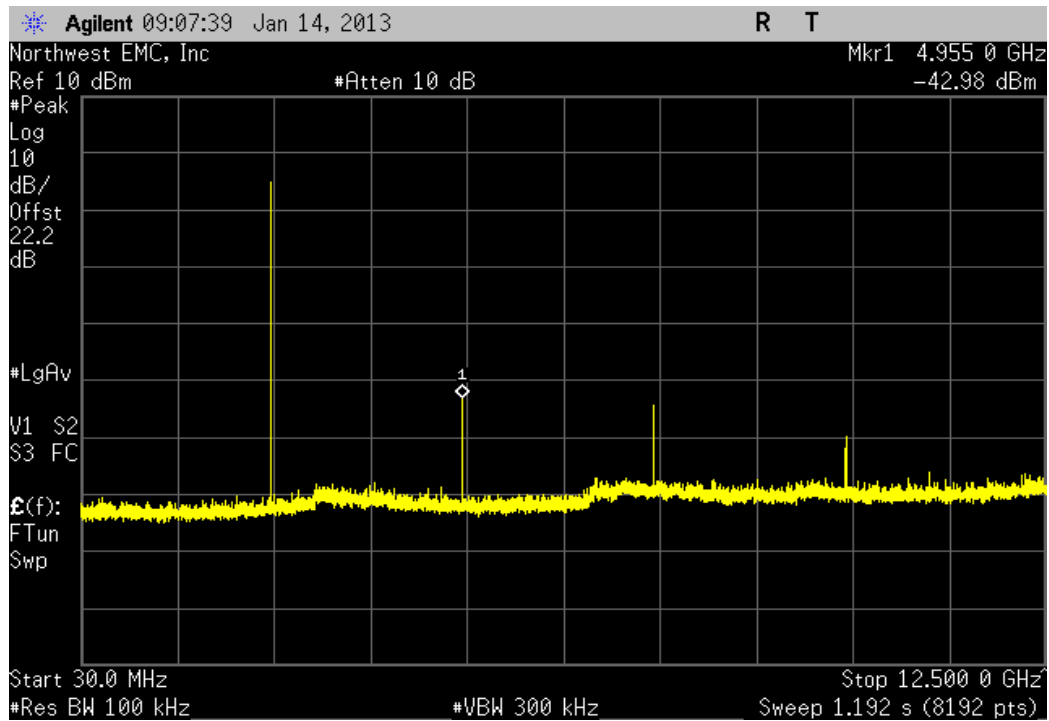
BLE - Data, Mid Channel, 2442 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-48.89 dBc	≤ -20 dBc	Pass	



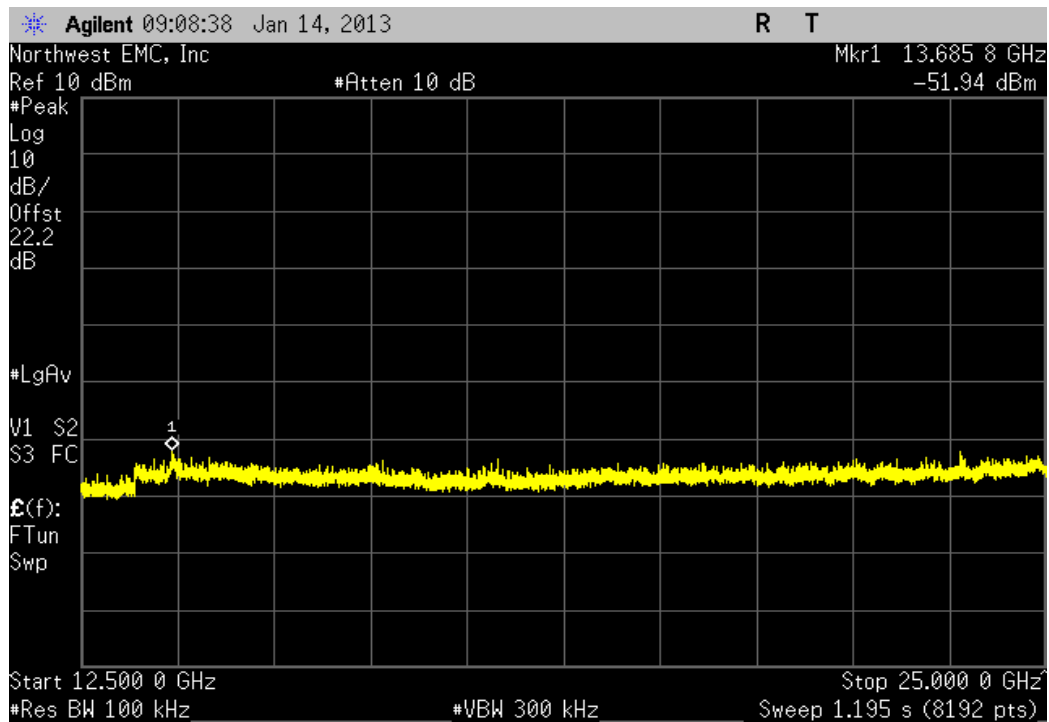
BLE - Data, High Channel, 2478 MHz				
Frequency Range	Value	Limit	Result	
Fundamental	N/A	N/A	N/A	



BLE - Data, High Channel, 2478 MHz				
Frequency Range	Value	Limit	Result	
30 MHz - 12.5 GHz	-40.4 dBc	≤ -20 dBc	Pass	



BLE - Data, High Channel, 2478 MHz				
Frequency Range	Value	Limit	Result	
12.5 GHz - 25 GHz	-49.36 dBc	≤ -20 dBc	Pass	



Power Spectral Density

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
Attenuator - 20db, 'SMA'	SM Electronics	SA26B-20	RFW	4/19/2012	12
40 GHz DC block	Fairview Microwave	SD3379	AMI	10/5/2012	12
Signal Generator MXG	Agilent	N5183A	TIK	6/7/2012	36
Spectrum Analyzer	Agilent	E4440A	AAX	5/15/2012	24

TEST DESCRIPTION

The maximum power spectral density measurements were measured with the EUT set to the required transmit frequencies in each band. 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 lowest, middle, and maximum data rate for each modulation type available.

Per the procedure outlined in FCC KDB 558074 D01 DTS Measurement Section 5.3.1, the spectrum analyzer was used as follows:

- RBW = 100 kHz
- VBW = 300 kHz
- Detector = Peak (to match method used for power measurement)
- Trace = Max hold

The observed power level is then scaled to an equivalent value in 3 kHz by adding a Bandwidth Correction Factor (BWCF) where:

$$BWCF = 10 \cdot \log(3 \text{ kHz} / 100 \text{ kHz}) = -15.2 \text{ dB}$$

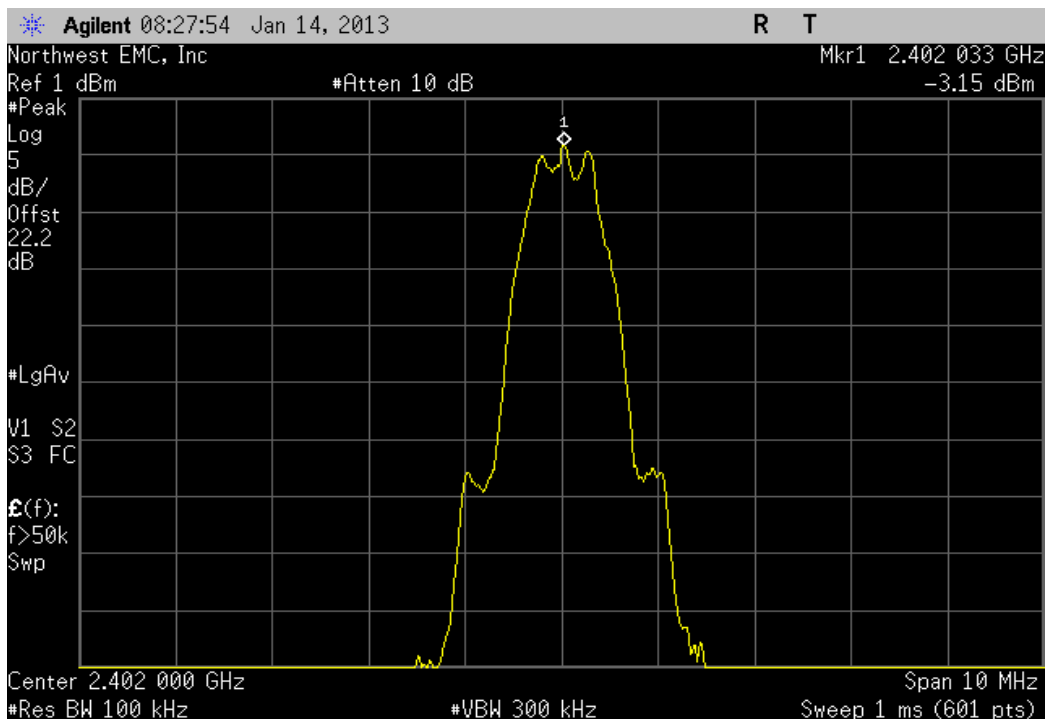


Power Spectral Density

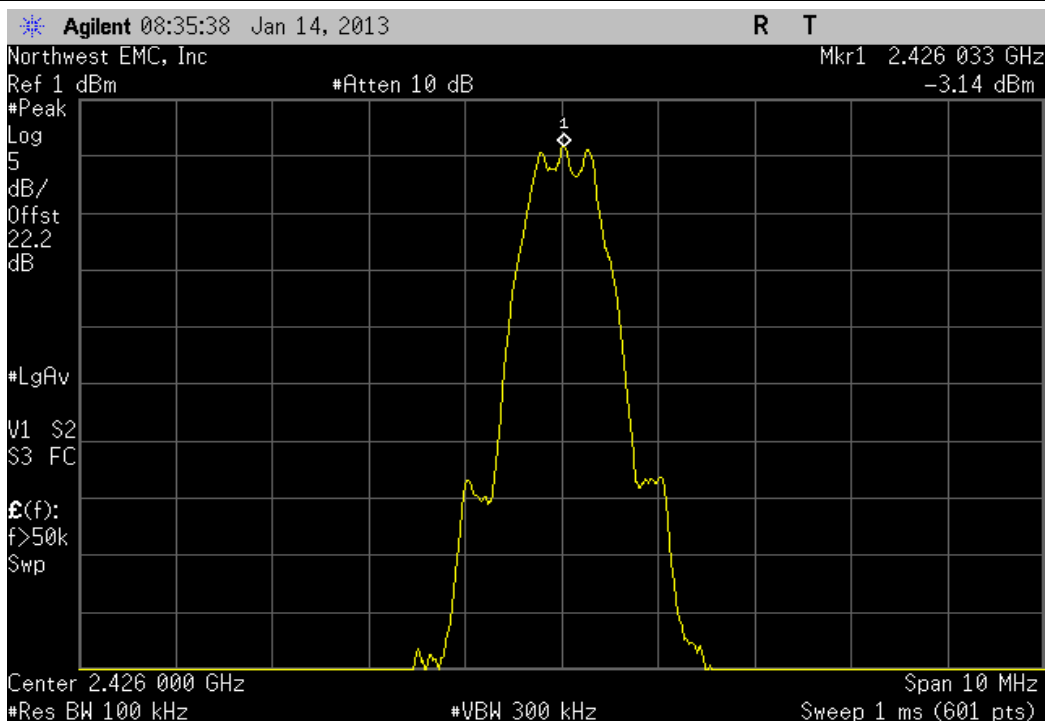
XMit 2012.09.20
PsaTx 2013.01.10

EUT: 24HALOXF13		Work Order: STAK0027				
Serial Number: 12826579		Date: 01/14/13				
Customer: Starkey Laboratories, Inc.		Temperature: 23.4°C				
Attendees: Larry McNabb		Humidity: 12%				
Project: None		Barometric Pres.: 1030				
Tested by: Trevor Buls		Power: Battery				
Job Site: MN08						
TEST SPECIFICATIONS		Test Method				
FCC 15.247:2013		ANSI C63.10:2009				
COMMENTS						
None						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature <i>Trevor Buls</i>				
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Result
BLE - Advertising						
Low Channel, 2402 MHz		-3.153	-15.2	-18.353	8	Pass
Mid Channel, 2426 MHz		-3.145	-15.2	-18.345	8	Pass
High Channel, 2480 MHz		-2.17	-15.2	-17.37	8	Pass
BLE - Data						
Low Channel, 2404 MHz		-3.156	-15.2	-18.356	8	Pass
Mid Channel, 2442 MHz		-2.987	-15.2	-18.187	8	Pass
High Channel, 2478 MHz		-2.199	-15.2	-17.399	8	Pass

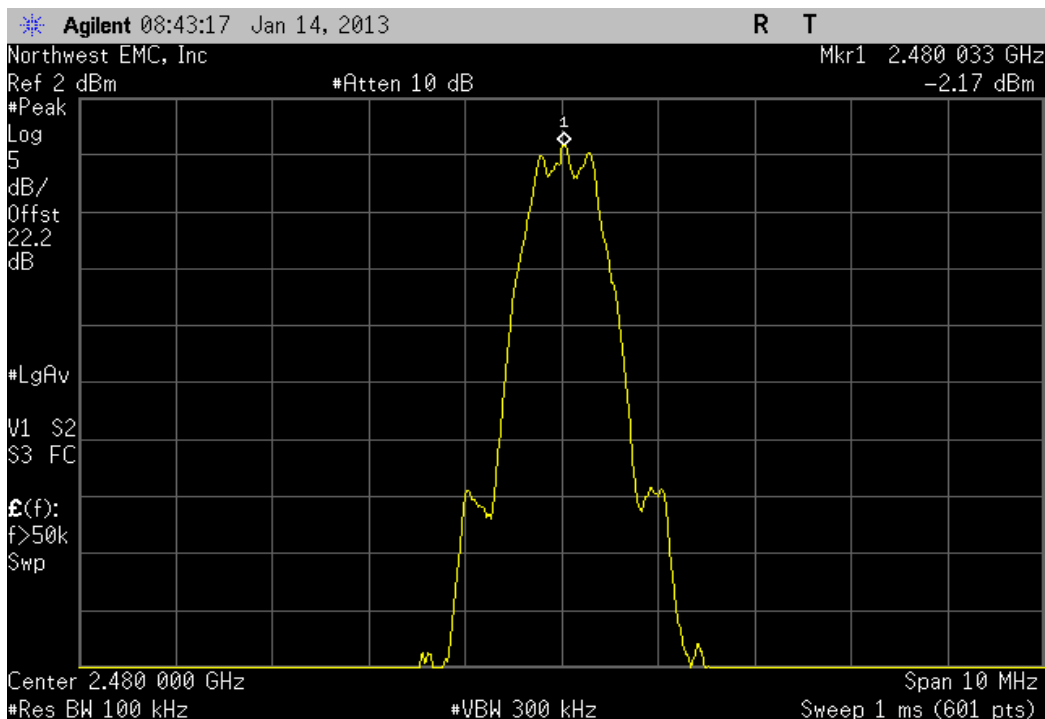
BLE - Advertising, Low Channel, 2402 MHz					
Value	dBm/100kHz	Value	Limit		
dBm/100kHz	To dBm/3kHz	dBm/3kHz	dBm/3kHz	Result	
-3.153	-15.2	-18.353	8	Pass	



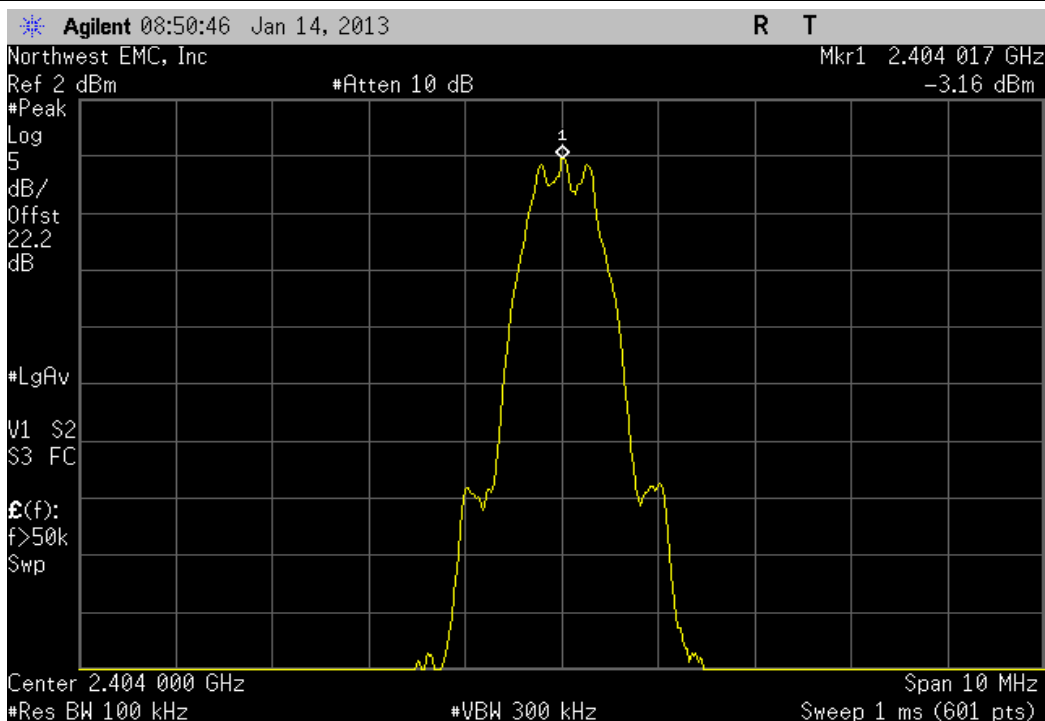
BLE - Advertising, Mid Channel, 2426 MHz					
Value	dBm/100kHz	Value	Limit		
dBm/100kHz	To dBm/3kHz	dBm/3kHz	dBm/3kHz	Result	
-3.145	-15.2	-18.345	8	Pass	



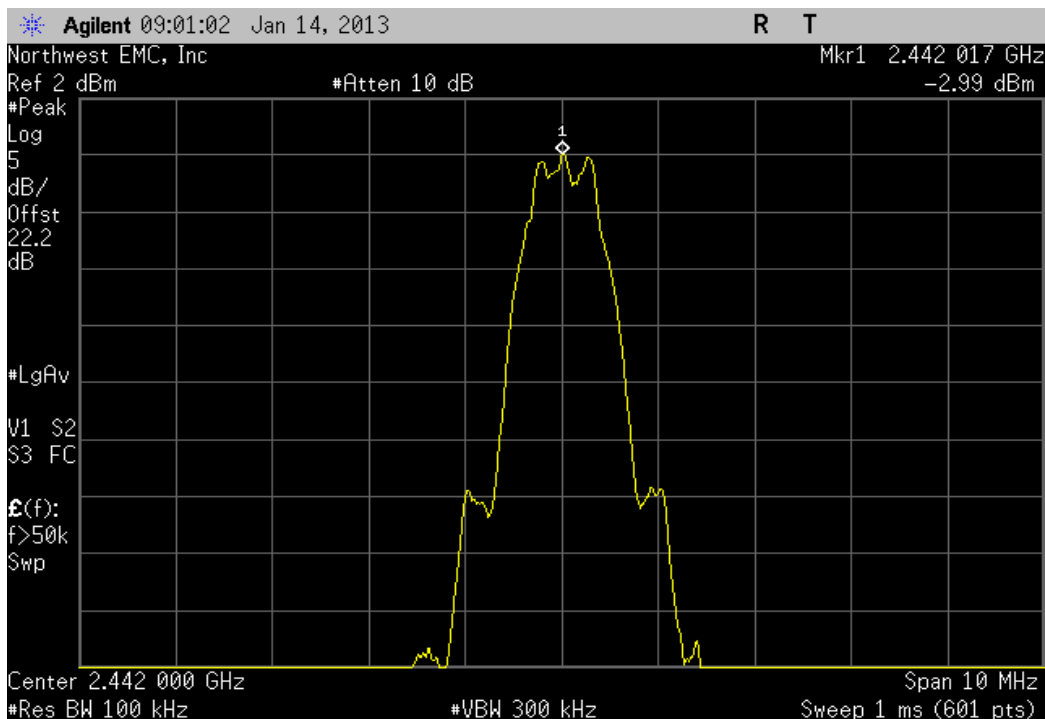
BLE - Advertising, High Channel, 2480 MHz					
Value	dBm/100kHz	Value	Limit		
dBm/100kHz	To dBm/3kHz	dBm/3kHz	dBm/3kHz	Result	
-2.17	-15.2	-17.37	8	Pass	



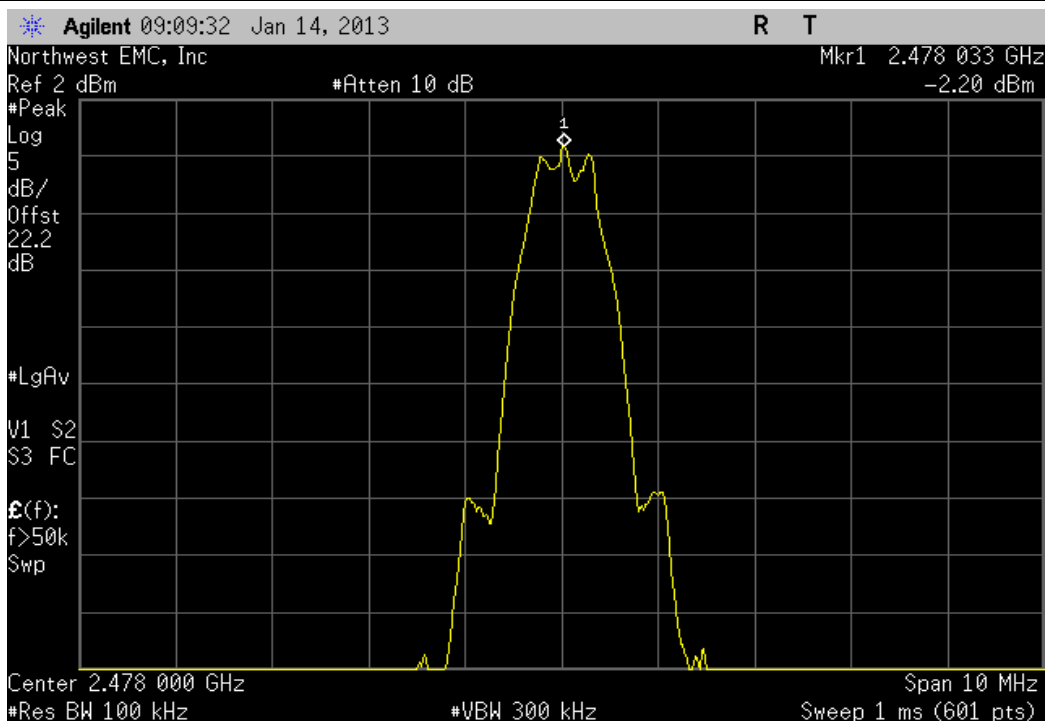
BLE - Data, Low Channel, 2404 MHz					
Value	dBm/100kHz	Value	Limit		
dBm/100kHz	To dBm/3kHz	dBm/3kHz	dBm/3kHz	Result	
-3.156	-15.2	-18.356	8	Pass	



BLE - Data, Mid Channel, 2442 MHz					
	Value	dBm/100kHz	Value	Limit	Result
		To dBm/3kHz	dBm/3kHz		
	-2.987	-15.2	-18.187	8	Pass



BLE - Data, High Channel, 2478 MHz					
	Value	dBm/100kHz	Value	Limit	Result
		To dBm/3kHz	dBm/3kHz		
	-2.199	-15.2	-17.399	8	Pass



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

Transmitting BLE, Low, Mid, High, Chan: Data: 2402, 2426, 2480 MHz, Advertising: 2404, 2442, 2478 MHz (See Comments)

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

STAK0027 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	25 GHz
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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
High Pass Filter	Micro-Tronics	HPM50111	HGQ	6/1/2012	24 mo
Low Pass Filter	Micro-Tronics	LPM50004	HGK	5/31/2012	24 mo
Attenuator, 20 dB, 'SMA'	SM Electronics	SA6-20	REO	5/31/2012	12 mo
MN05 Cables	N/A	18-26GHz Standard Gain Horn Cable	MNP	10/5/2012	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/5/2012	12 mo
Antenna, Horn	ETS	3160-09	AHG	NCR	0 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	5/30/2012	12 mo
Antenna, Horn	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	5/30/2012	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	5/30/2012	12 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	5/30/2012	12 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	5/30/2012	12 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	6/29/2011	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	8/28/2012	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	5/31/2012	12 mo
Antenna, Bilog	Teseq	CBL 6141B	AYD	12/17/2012	12 mo
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	24 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

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



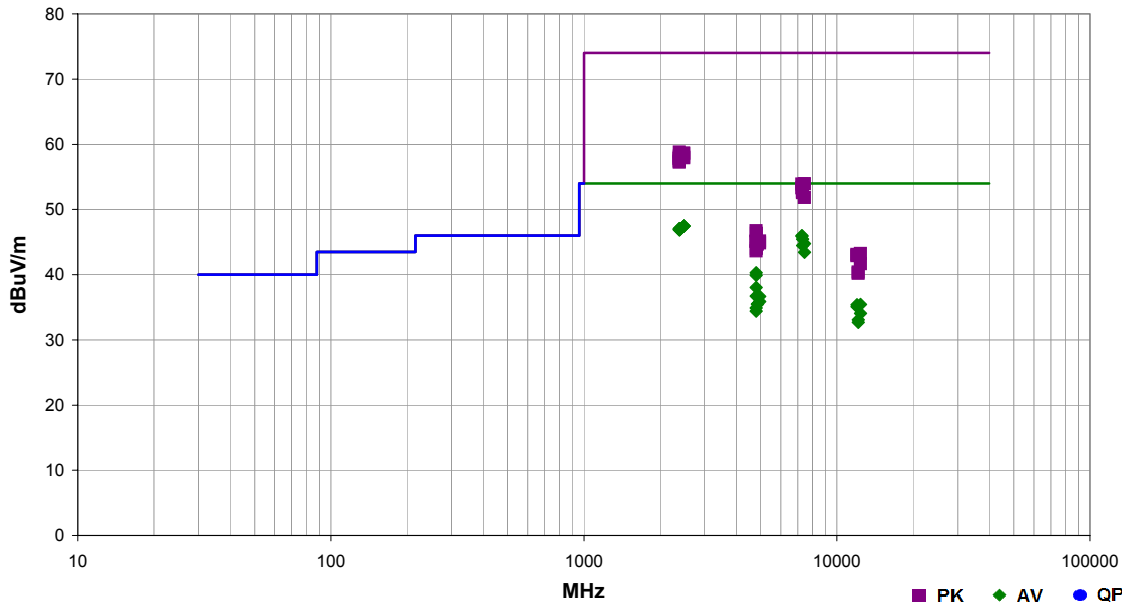
Spurious Radiated Emissions

PSA-ESCI 2012.12.14
PSA-ESCI Version 2011.12.21

Work Order:	STAK0027	Date:	01/14/13	<i>Trevor Buls</i>	
Project:	None	Temperature:	23.5 °C		
Job Site:	MN05	Humidity:	11.6% RH		
Serial Number:	12826583	Barometric Pres.:	1031.1 mbar		
				Tested by:	Trevor Buls
EUT:	24HALOXF13				
Configuration:	2				
Customer:	Starkey Laboratories, Inc.				
Attendees:	Larry McNabb				
EUT Power:	Battery				
Operating Mode:	Transmitting BLE, Low, Mid, High Chan: Data: 2402, 2426, 2480 MHz, Advertising: 2404, 2442, 2478 MHz (See Comments)				
Deviations:	None				
Comments:	None				

Test Specifications	Test Method
FCC 15.247:2013	ANSI C63.10:2009

Run #	1	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
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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
2487.925	31.2	-3.7	1.0	100.0	3.0	20.0	Vert	AV	0.0	47.5	54.0	-6.5	EUT Horizontal, BLE AV, High CH
2485.617	31.2	-3.8	2.4	232.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	EUT Vertical, BLE AV, High CH
2484.717	31.2	-3.8	3.2	320.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	EUT Vertical, BLE DATA, High CH
2484.708	31.2	-3.8	3.5	111.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	EUT Horizontal, BLE DATA, High CH
2386.225	31.1	-4.0	1.0	345.0	3.0	20.0	Horz	AV	0.0	47.1	54.0	-6.9	EUT Horizontal, BLE AV, Low CH
2386.717	31.1	-4.0	1.1	107.0	3.0	20.0	Horz	AV	0.0	47.1	54.0	-6.9	EUT Vertical, BLE AV, Low CH
2385.850	31.0	-4.0	1.0	215.0	3.0	20.0	Horz	AV	0.0	47.0	54.0	-7.0	EUT Vertical, BLE DATA, Low CH
2386.350	31.0	-4.0	1.0	36.0	3.0	20.0	Horz	AV	0.0	47.0	54.0	-7.0	EUT on Side, BLE AV, Low CH
2386.450	31.0	-4.0	1.0	127.0	3.0	20.0	Vert	AV	0.0	47.0	54.0	-7.0	EUT Horizontal, BLE DATA, Low CH
2387.117	31.0	-4.0	1.4	84.0	3.0	20.0	Vert	AV	0.0	47.0	54.0	-7.0	EUT on Side, BLE AV, Low CH
2385.417	30.9	-4.0	1.0	94.0	3.0	20.0	Vert	AV	0.0	46.9	54.0	-7.1	EUT Horizontal, BLE AV, Low CH
2387.775	30.9	-4.0	1.0	267.0	3.0	20.0	Vert	AV	0.0	46.9	54.0	-7.1	EUT Vertical, BLE AV, Low CH
7277.492	34.2	11.8	1.0	134.0	3.0	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT Horizontal, BLE AV, Mid CH
7277.500	34.1	11.8	1.6	84.0	3.0	0.0	Horz	AV	0.0	45.9	54.0	-8.1	EUT Vertical, BLE AV, Mid CH
7325.383	33.4	12.1	1.0	312.0	3.0	0.0	Vert	AV	0.0	45.5	54.0	-8.5	EUT Horizontal, BLE DATA, Mid CH
7439.600	32.1	12.6	1.5	57.0	3.0	0.0	Horz	AV	0.0	44.7	54.0	-9.3	EUT Vertical, BLE AV, High CH
7325.542	32.4	12.1	1.8	113.0	3.0	0.0	Horz	AV	0.0	44.5	54.0	-9.5	EUT Vertical, BLE DATA, Mid CH
7439.625	30.8	12.6	1.0	323.0	3.0	0.0	Vert	AV	0.0	43.4	54.0	-10.6	EUT Horizontal, BLE AV, High CH
4804.050	36.3	4.0	1.0	90.0	3.0	0.0	Horz	AV	0.0	40.3	54.0	-13.7	EUT Vertical, BLE AV, Low CH
4803.992	35.9	4.0	1.0	313.0	3.0	0.0	Vert	AV	0.0	39.9	54.0	-14.1	EUT Horizontal, BLE AV, Low CH
2385.067	42.8	-4.0	1.0	267.0	3.0	20.0	Vert	PK	0.0	58.8	74.0	-15.2	EUT Vertical, BLE AV, Low CH
2487.000	42.4	-3.8	2.4	232.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	EUT Vertical, BLE AV, High CH
2483.633	42.3	-3.8	3.5	111.0	3.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT Horizontal, BLE DATA, High CH
2386.958	42.2	-4.0	1.0	215.0	3.0	20.0	Horz	PK	0.0	58.2	74.0	-15.8	EUT Vertical, BLE DATA, Low CH
2484.017	41.8	-3.8	1.0	100.0	3.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	EUT Horizontal, BLE AV, High CH
4804.017	34.0	4.0	1.0	316.0	3.0	0.0	Horz	AV	0.0	38.0	54.0	-16.0	EUT on Side, BLE AV, Low CH
2484.417	41.7	-3.8	3.2	320.0	3.0	20.0	Horz	PK	0.0	57.9	74.0	-16.1	EUT Vertical, BLE DATA, High CH

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2385.625	41.9	-4.0	1.4	84.0	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	EUT on Side, BLE AV, Low CH
2387.967	41.9	-4.0	1.0	127.0	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	EUT Horizontal, BLE DATA, Low CH
2387.358	41.8	-4.0	1.0	94.0	3.0	20.0	Vert	PK	0.0	57.8	74.0	-16.2	EUT Horizontal, BLE AV, Low CH
2385.033	41.5	-4.0	1.0	36.0	3.0	20.0	Horz	PK	0.0	57.5	74.0	-16.5	EUT on Side, BLE AV, Low CH
2385.317	41.3	-4.0	1.1	107.0	3.0	20.0	Horz	PK	0.0	57.3	74.0	-16.7	EUT Vertical, BLE AV, Low CH
2386.133	41.3	-4.0	1.0	345.0	3.0	20.0	Horz	PK	0.0	57.3	74.0	-16.7	EUT Horizontal, BLE AV, Low CH
4803.942	32.7	4.0	1.0	56.0	3.0	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Horizontal, BLE AV, Low CH
4960.042	32.1	4.6	1.0	113.0	3.0	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Vertical, BLE AV, High CH
4959.983	31.3	4.6	1.0	275.0	3.0	0.0	Vert	AV	0.0	35.9	54.0	-18.1	EUT Horizontal, BLE AV, High CH
4852.150	31.3	4.2	1.0	102.0	3.0	0.0	Horz	AV	0.0	35.5	54.0	-18.5	EUT Vertical, BLE AV, Mid CH
4852.108	31.3	4.2	1.0	261.0	3.0	0.0	Vert	AV	0.0	35.5	54.0	-18.5	EUT Horizontal, BLE AV, Mid CH
12399.140	41.1	-5.6	1.1	320.0	3.0	0.0	Horz	AV	0.0	35.5	54.0	-18.5	EUT Vertical, BLE AV, High CH
12008.940	42.0	-6.6	1.1	92.0	3.0	0.0	Horz	AV	0.0	35.4	54.0	-18.6	EUT Vertical, BLE AV, Low CH
12008.960	41.7	-6.6	1.2	280.0	3.0	0.0	Vert	AV	0.0	35.1	54.0	-18.9	EUT Horizontal, BLE AV, Low CH
4803.933	30.9	4.0	1.0	249.0	3.0	0.0	Vert	AV	0.0	34.9	54.0	-19.1	EUT Vertical, BLE AV, Low CH
4804.108	30.4	4.0	1.0	260.0	3.0	0.0	Vert	AV	0.0	34.4	54.0	-19.6	EUT on Side, BLE AV, Low CH
12399.020	39.7	-5.6	1.2	271.0	3.0	0.0	Vert	AV	0.0	34.1	54.0	-19.9	EUT Horizontal, BLE AV, High CH
7440.842	41.3	12.7	1.5	57.0	3.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	EUT Vertical, BLE AV, High CH
7278.958	42.1	11.8	1.6	84.0	3.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	EUT Vertical, BLE AV, Mid CH
7277.400	41.5	11.8	1.0	134.0	3.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	EUT Horizontal, BLE AV, Mid CH
12129.020	39.4	-6.3	1.2	336.0	3.0	0.0	Horz	AV	0.0	33.1	54.0	-20.9	EUT Horizontal, BLE AV, Mid CH
7325.833	40.7	12.1	1.0	312.0	3.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Horizontal, BLE DATA, Mid CH
12128.900	39.0	-6.3	1.2	276.0	3.0	0.0	Vert	AV	0.0	32.7	54.0	-21.3	EUT Vertical, BLE AV, Mid CH
7326.967	40.5	12.1	1.8	113.0	3.0	0.0	Horz	PK	0.0	52.6	74.0	-21.4	EUT Vertical, BLE DATA, Mid CH
7439.650	39.2	12.6	1.0	323.0	3.0	0.0	Vert	PK	0.0	51.8	74.0	-22.2	EUT Horizontal, BLE AV, High CH
4804.092	42.7	4.0	1.0	90.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Vertical, BLE AV, Low CH
4804.367	42.3	4.0	1.0	313.0	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	EUT Horizontal, BLE AV, Low CH
4960.400	40.6	4.6	1.0	113.0	3.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	EUT Vertical, BLE AV, High CH
4803.758	41.1	4.0	1.0	56.0	3.0	0.0	Horz	PK	0.0	45.1	74.0	-28.9	EUT Horizontal, BLE AV, Low CH
4803.550	41.1	4.0	1.0	316.0	3.0	0.0	Horz	PK	0.0	45.1	74.0	-28.9	EUT on Side, BLE AV, Low CH
4852.308	40.8	4.2	1.0	102.0	3.0	0.0	Horz	PK	0.0	45.0	74.0	-29.0	EUT Vertical, BLE AV, Mid CH
4960.617	40.3	4.6	1.0	275.0	3.0	0.0	Vert	PK	0.0	44.9	74.0	-29.1	EUT Horizontal, BLE AV, High CH
4851.875	40.5	4.2	1.0	261.0	3.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	EUT Horizontal, BLE AV, Mid CH
4806.042	40.0	4.0	1.0	249.0	3.0	0.0	Vert	PK	0.0	44.0	74.0	-30.0	EUT Vertical, BLE AV, Low CH
4803.500	39.6	4.0	1.0	260.0	3.0	0.0	Vert	PK	0.0	43.6	74.0	-30.4	EUT on Side, BLE AV, Low CH
12399.000	48.9	-5.6	1.1	320.0	3.0	0.0	Horz	PK	0.0	43.3	74.0	-30.7	EUT Vertical, BLE AV, High CH
12011.760	49.7	-6.6	1.1	92.0	3.0	0.0	Horz	PK	0.0	43.1	74.0	-30.9	EUT Vertical, BLE AV, Low CH
12011.800	49.5	-6.6	1.2	280.0	3.0	0.0	Vert	PK	0.0	42.9	74.0	-31.1	EUT Horizontal, BLE AV, Low CH
12399.220	47.3	-5.6	1.2	271.0	3.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	EUT Horizontal, BLE AV, High CH
12128.640	46.7	-6.3	1.2	276.0	3.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	EUT Vertical, BLE AV, Mid CH
12131.270	46.5	-6.3	1.2	336.0	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	EUT Horizontal, BLE AV, Mid CH