FreeWave Technologies, Inc.

MM2

FCC 15.247:2013

915 MHz FHS Radio Module

Report #: FREW0015

Report Prepared By Northwest EMC Inc.

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

California – Minnesota – Oregon – New York – Washington

Certificate Of Test

WTD 12.5.23

Last Date of Test: November 20, 2013
FreeWave Technologies, Inc.
Model: MM2

Emissions

Test Description	Specification	Test Method	Pass/Fail
Duty Cycle	FCC 15.247:2013	ANSI C63.10:2009	Pass
Output Power	FCC 15.247:2013	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.247:2013	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247:2013	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247:2013	ANSI C63.10:2009	Pass
Band Edge Compliance-Hopping	FCC 15.247:2013	ANSI C63.10:2009	Pass
Channel Separation	FCC 15.247:2013	ANSI C63.10:2009	Pass
Number of Hopping Frequencies	FCC 15.247:2013	ANSI C63.10:2009	Pass
Dwell Time	FCC 15.247:2013	ANSI C63.10:2009	Pass
Spurious Radiated Emissions	FCC 15.247:2013	ANSI C63.10:2009	Pass
AC Powerline Conducted Emissions	FCC 15.207:2013	ANSI C63.10:2009	Pass

Deviations From Test Standards

None

Approved By:

Rod Munro, Operations Manager

NVLAP Lab Code: 200629-0

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.

NORTHWEST EMC
REV 2012.08.02

Revision History

Revision Number	Description	Date	Page Number
00	None		

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.

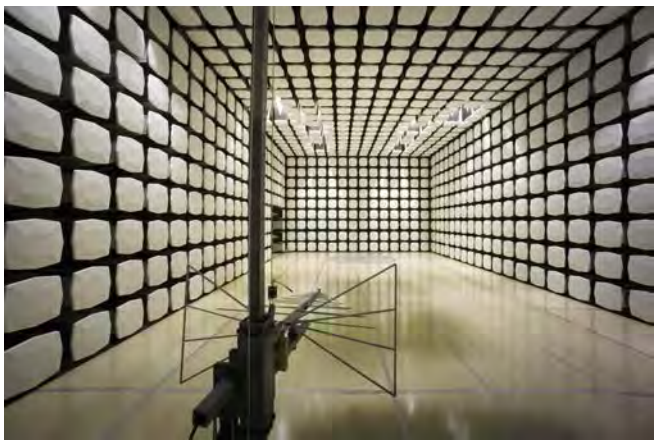
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

Facilities

REV 2013.06.28

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	2834C-1
NVLAP				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0



Product Description

WTD 12.5.23

Client and Equipment Under Test (EUT) Information

Company Name:	FreeWave Technologies, Inc.
Address:	5395 Pearl Parkway Suite 100
City, State, Zip:	Boulder, CO 80301
Test Requested By:	Dean Busch
Model:	MM2
First Date of Test:	November 6, 2013
Last Date of Test:	November 20, 2013
Receipt Date of Samples:	November 6, 2013
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
915 MHz FHSS radio module with 2 antennas.

Testing Objective:
To demonstrate compliance to FCC 15.247 requirements.

Configurations

Configuration FREW0015- 1

Software/Firmware Running during test	
Description	**Version**
D2AES	V.10.6.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Industrial Radio	FreeWave Technologies, Inc.	MM2	861-2469

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adaptor	None	KSAC1200080W1US	None
Development Board	FreeWave Technologies, Inc.	MM2-DEVKIT-LT	856-9418
Remote Laptop	Dell	E6520	1GZRDV1

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.8m	Yes	AC Adapter	Development Board
MMCX to SMA Jumper Cable	Yes	0.1m	No	Industrial Radio	Coaxial Connection
Serial to USB	Yes	1.7m	No	Development Board	Remote Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration FREW0015- 3

Software/Firmware Running during test	
Description	**Version**
D2AES	V.10.6.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Industrial Radio	FreeWave Technologies, Inc.	MM2	861-2469

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adaptor	None	KSAC1200080W1US	None
Development Board	FreeWave Technologies, Inc.	MM2-DEVKIT-LT	856-9418
12dB Gain Yagi Antenna	WaveLink	PRO890-12-40F02N4	None
6dB Attenuator	Mini Circuits	VAT-6+	15542

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.8m	Yes	AC Adapter	Development Board
MMCX to SMA Jumper Cable	Yes	0.1m	No	Industrial Radio	Coaxial Connection
Serial to USB	Yes	1.7m	No	Development Board	Unterminated
Coaxial Cable	Yes	6m	No	MMCX to SMA Jumper Cable	12dB Gain Yagi Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration FREW0015- 4

Software/Firmware Running during test	
Description	**Version**
D2AES	V.10.6.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Industrial Radio	FreeWave Technologies, Inc.	MM2	861-2469

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adaptor	None	KSAC1200080W1US	None
Development Board	FreeWave Technologies, Inc.	MM2-DEVKIT-LT	856-9418
6 dBd (8.15 dBi) Gain Omni-Directional Antenna	Laird	FG9026	05091306

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.8m	Yes	AC Adapter	Development Board
MMCX to SMA Jumper Cable	Yes	0.1m	No	Industrial Radio	Coaxial Connection
Serial to USB	Yes	1.7m	No	Development Board	Unterminated
Coaxial Cable	Yes	6m	No	MMCX to SMA Jumper Cable	6dB Gain Omni-Directional Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration FREW0015- 6

Software/Firmware Running during test	
Description	**Version**
D2AES	V.10.6.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Industrial Radio	FreeWave Technologies, Inc.	MM2	861-2469

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Development Board	FreeWave Technologies, Inc.	MM2-DEVKIT-LT	856-9418
12dB Gain Yagi Antenna	WaveLink	PRO890-12-40F02N4	None
6dB Attenuator	Mini Circuits	VAT-6+	15542
DC Power Supply	Kikusui	PWC0620	1930492

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
MMCX to SMA Jumper Cable	Yes	0.1m	No	Industrial Radio	Coaxial Connection
Coaxial Cable	Yes	6m	No	MMCX to SMA Jumper Cable	12dB Gain Yagi Antenna
DC Power Leads	No	1.9m	No	DC Power Supply	Development Board
AC Power Leads	Yes	1.6m	No	AC Mains	DC Power Supply
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATIONS

Configuration FREW0015- 7

Software/Firmware Running during test	
Description	**Version**
D2AES	V.10.6.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Industrial Radio	FreeWave Technologies, Inc.	MM2	861-2469

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Development Board	FreeWave Technologies, Inc.	MM2-DEVKIT-LT	856-9418
6 dBd (8.15 dBi) Gain Omni-Directional Antenna	Laird	FG9026	05091306
DC Power Supply	Kikusui	PWC0620	1930492

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
MMCX to SMA Jumper Cable	Yes	0.1m	No	Industrial Radio	Coaxial Connection
Coaxial Cable	Yes	6m	No	MMCX to SMA Jumper Cable	6dB Gain Omni-Directional Antenna
DC Power Leads	No	1.9m	No	DC Power Supply	Development Board
AC Power Leads	Yes	1.6m	No	AC Mains	DC Power Supply
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	11/6/2013	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.
2	11/6/2013	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	11/6/2013	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	11/6/2013	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.
5	11/6/2013	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.
6	11/6/2013	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.
7	11/6/2013	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.
8	11/6/2013	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.
9	11/6/2013	Band Edge Compliance-Hopping Mode	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
10	11/8/2013	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
11	11/20/2013	AC Powerline Conducted 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	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

Duty Cycle

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

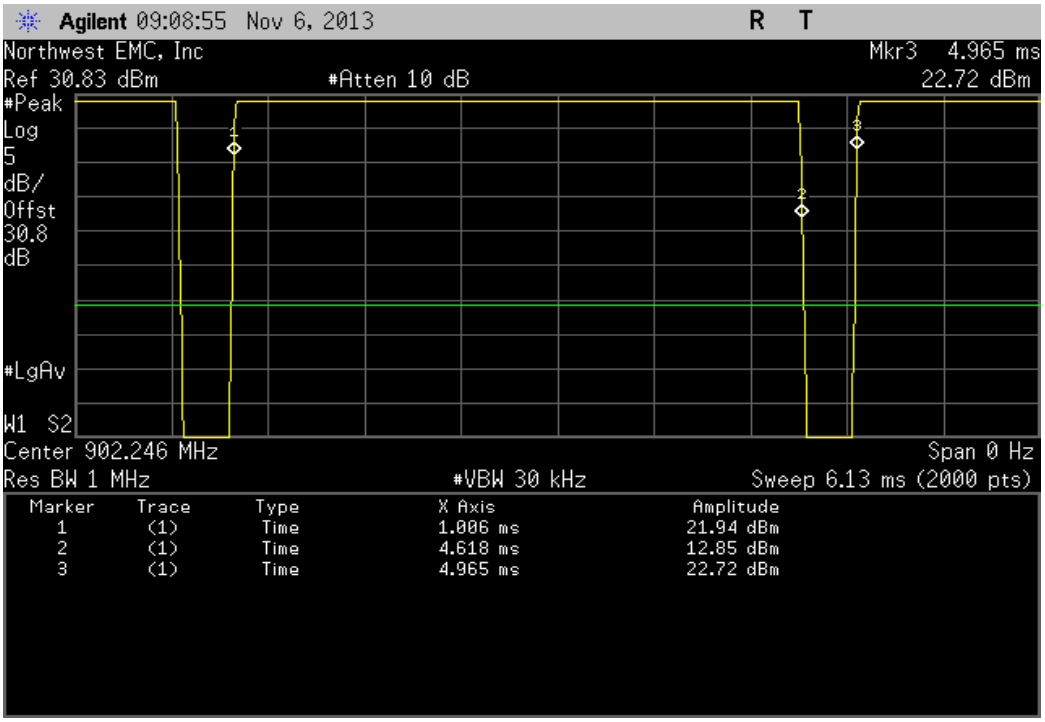
None

Configuration #	1	Signature

		Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
115.2 kbps, GFSK							
	Low Channel 76, 902.2464 MHz	3.612 mS	3.959 mS	1	91.2	N/A	N/A
	Low Channel 76, 902.2464 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	3.616 mS	3.959 mS	1	91.3	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 187, 927.8208	3.612 mS	3.959 mS	1	91.2	N/A	N/A
	High Channel 187, 927.8208	N/A	N/A	5	N/A	N/A	N/A
153.6 kbps, GFSK							
	Low Channel 76, 902.2464 MHz	3.612 mS	3.959 mS	1	91.2	N/A	N/A
	Low Channel 76, 902.2464 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	3.616 mS	3.959 mS	1	91.3	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 187, 927.8208	3.612 mS	3.959 mS	1	91.2	N/A	N/A
	High Channel 187, 927.8208	N/A	N/A	5	N/A	N/A	N/A

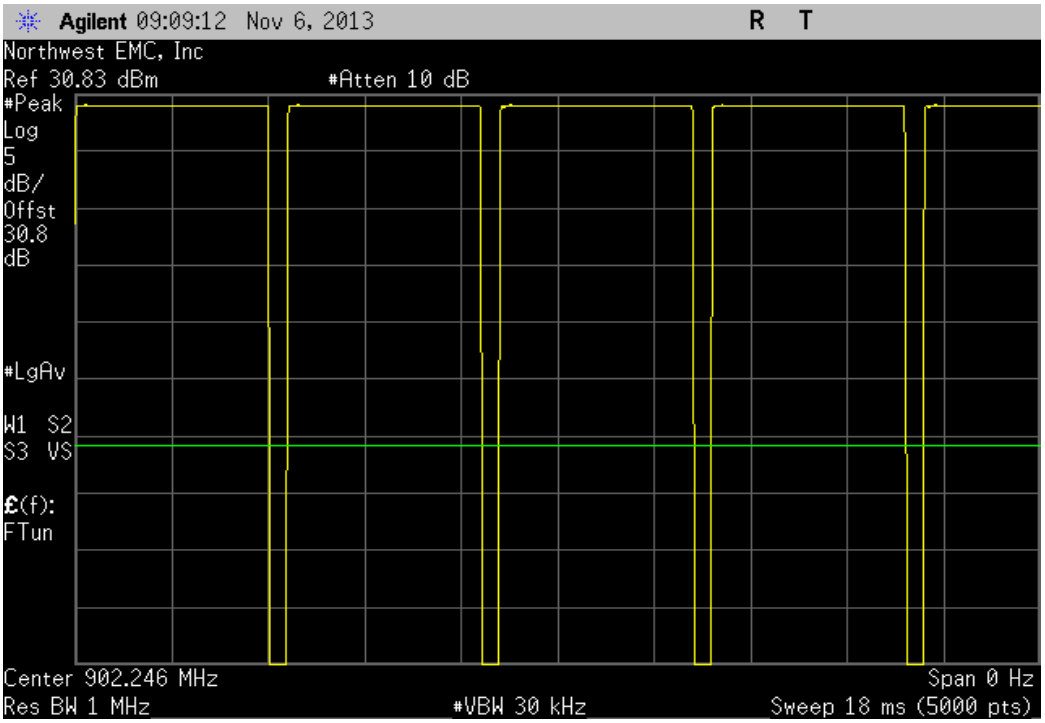
115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
3.612 mS	3.959 mS	1	91.2	N/A	N/A



115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

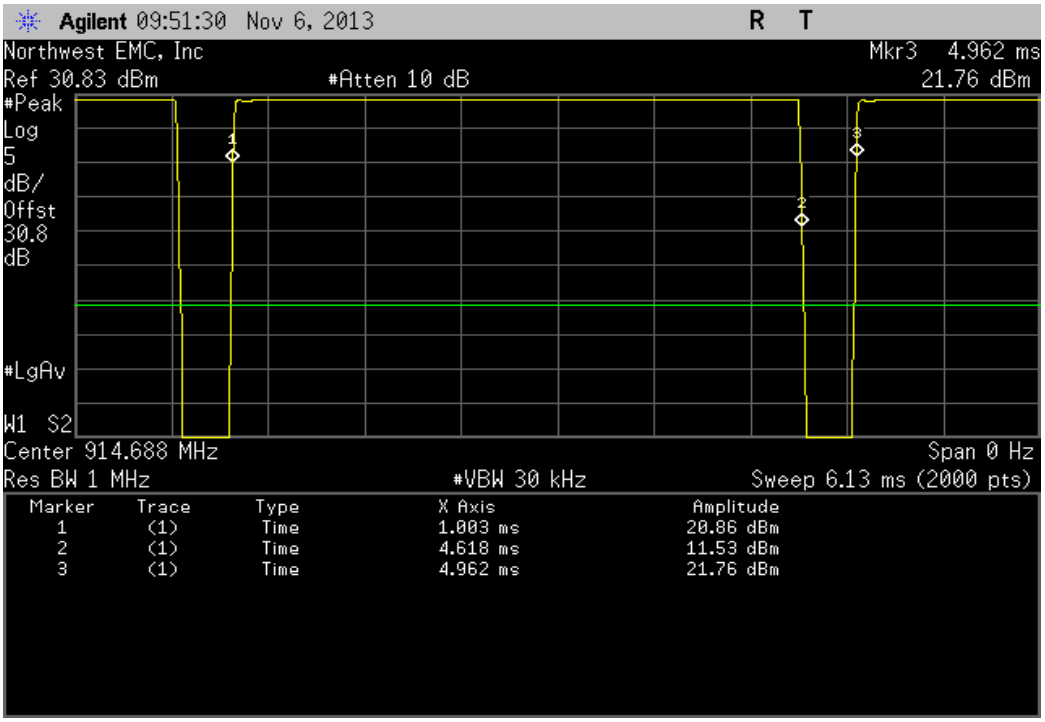
Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



Duty Cycle

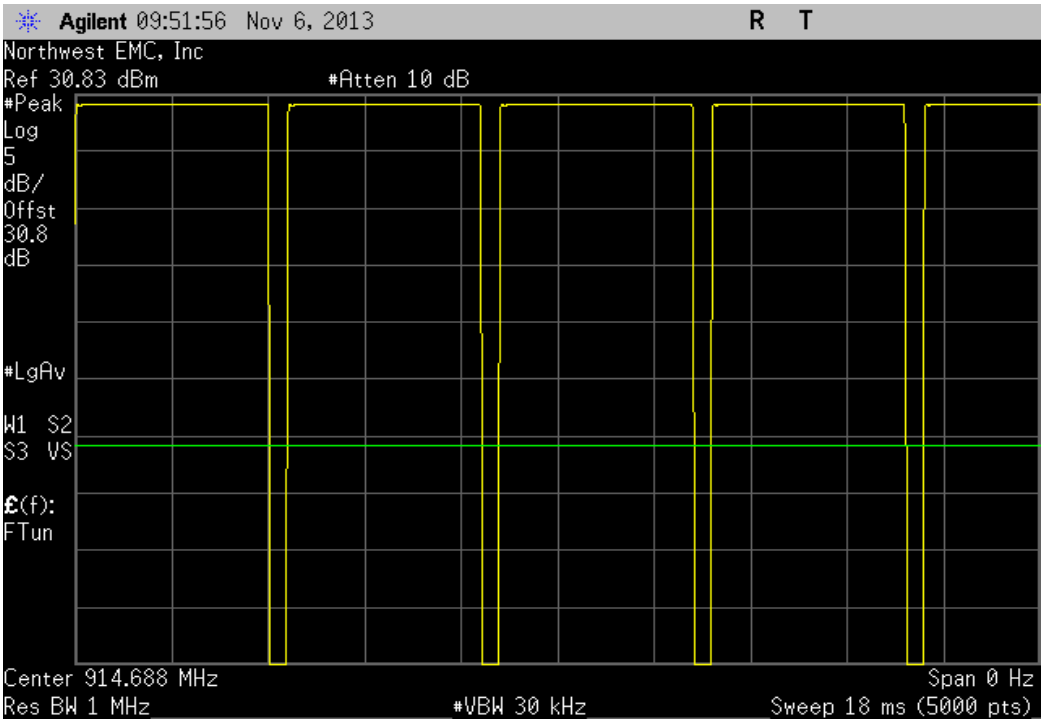
115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz

	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	3.616 mS	3.959 mS	1	91.3	N/A	N/A



115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz

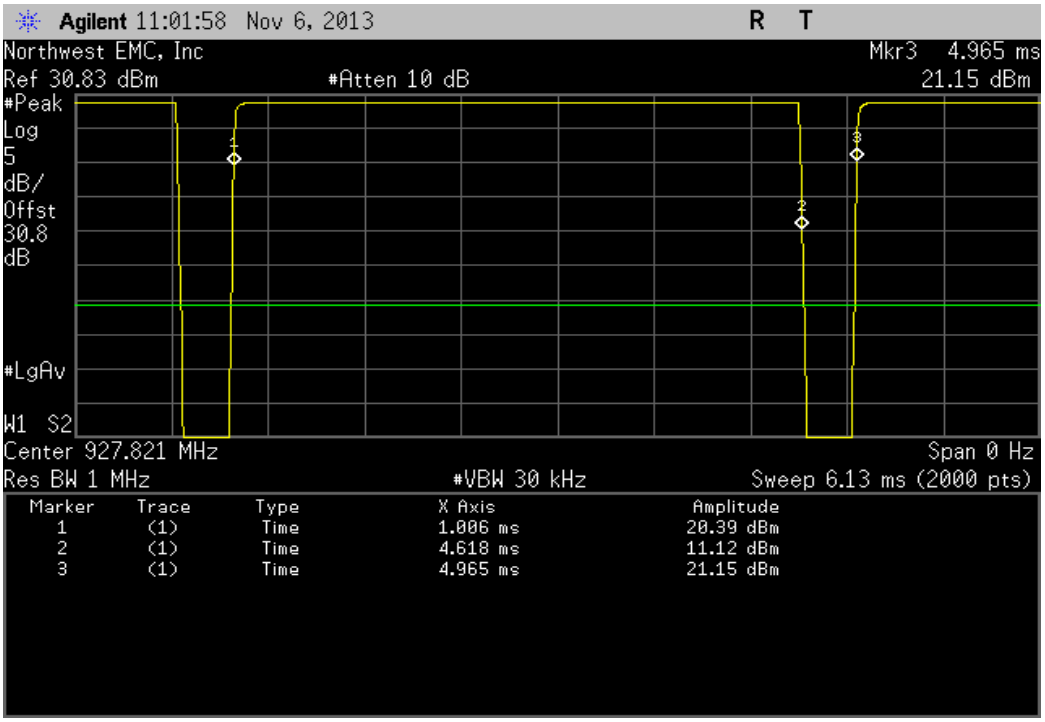
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



Duty Cycle

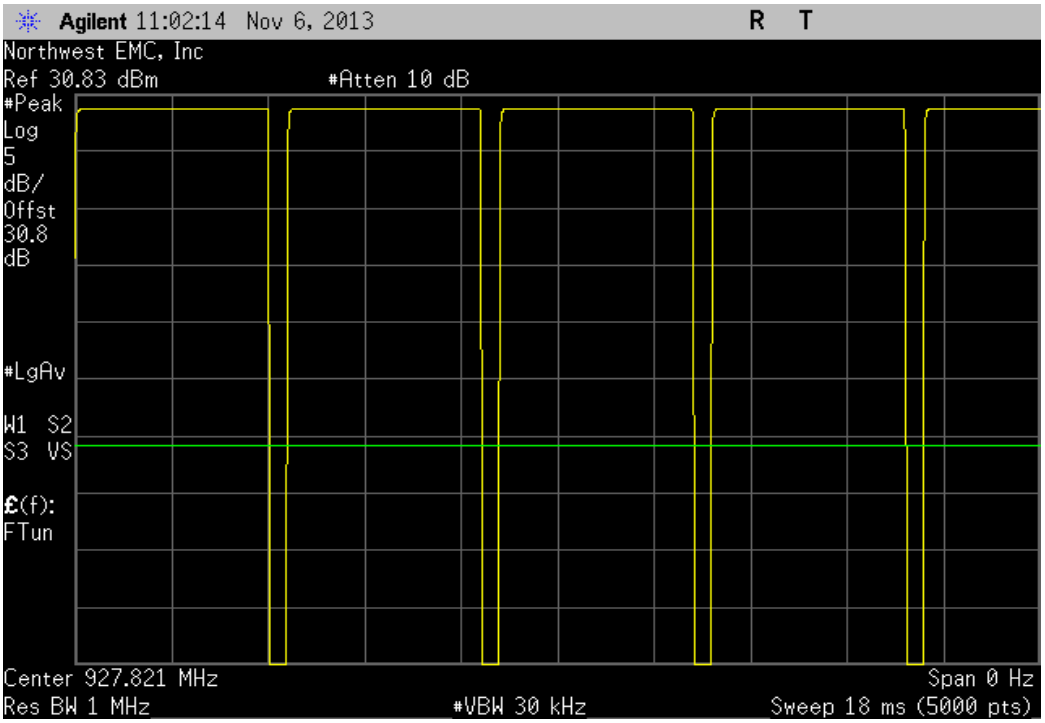
115.2 kbps, GFSK, High Channel 187, 927.8208

	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	3.612 mS	3.959 mS	1	91.2	N/A	N/A



115.2 kbps, GFSK, High Channel 187, 927.8208

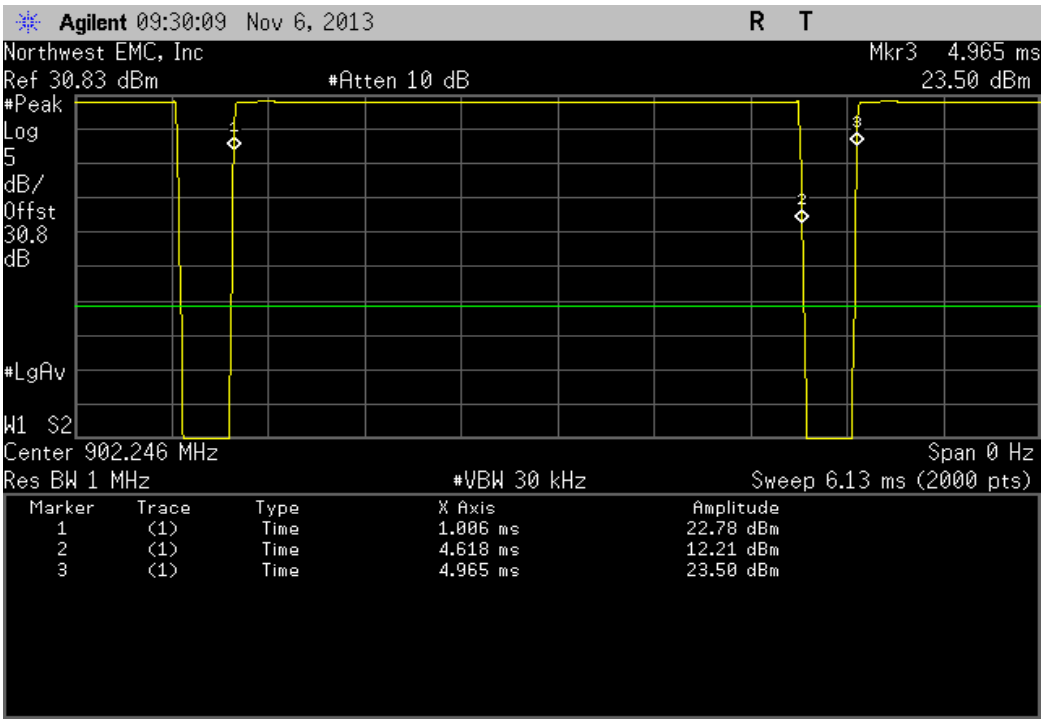
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



Duty Cycle

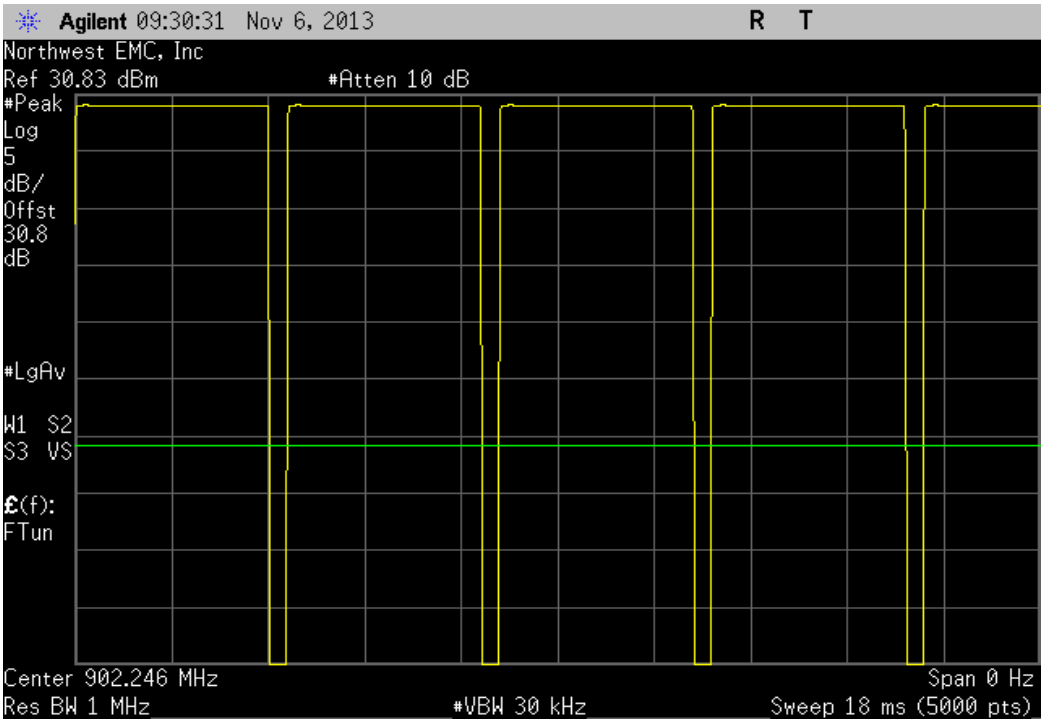
153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
3.612 mS	3.959 mS	1	91.2	N/A	N/A



153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz

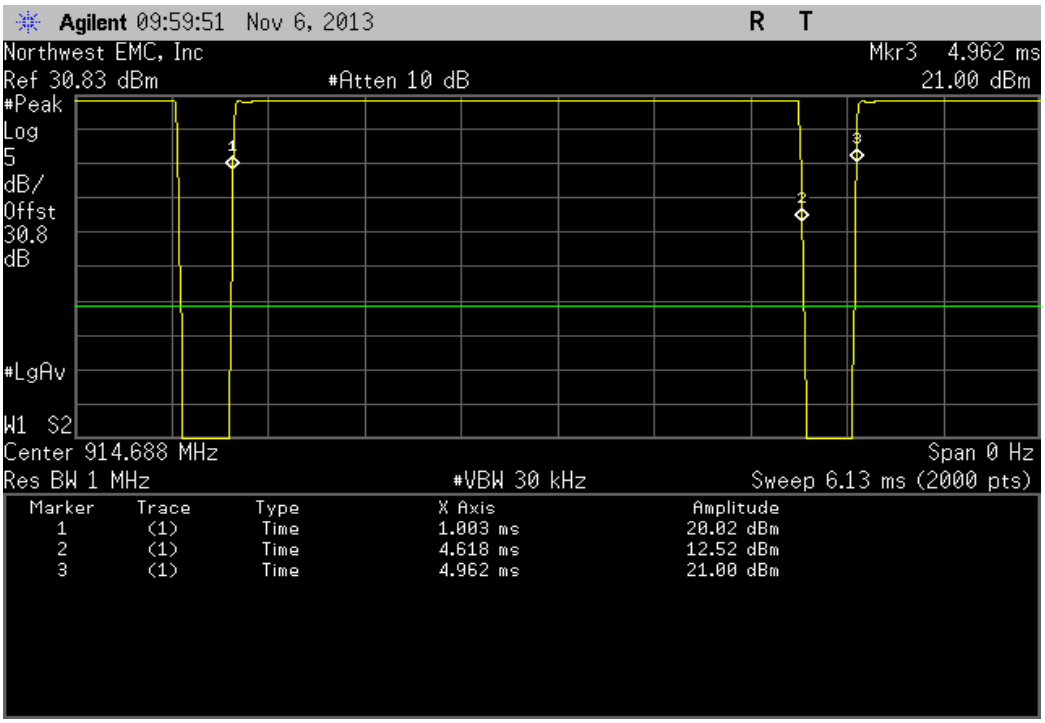
Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
N/A	N/A	5	N/A	N/A	N/A



Duty Cycle

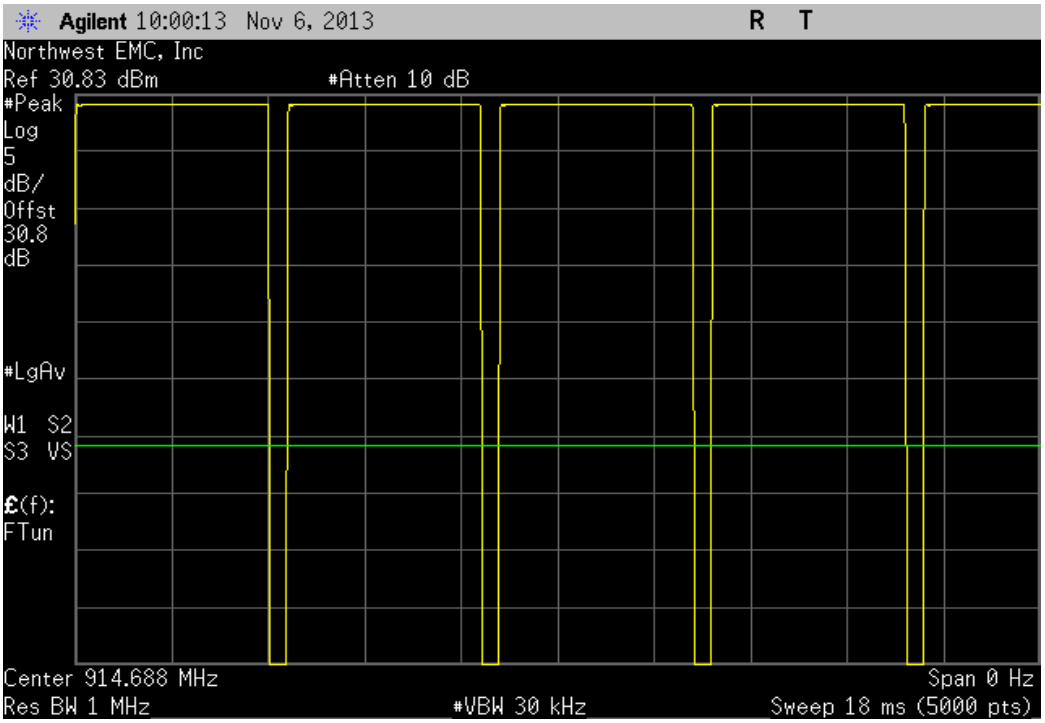
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz

	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	3.616 mS	3.959 mS	1	91.3	N/A	N/A



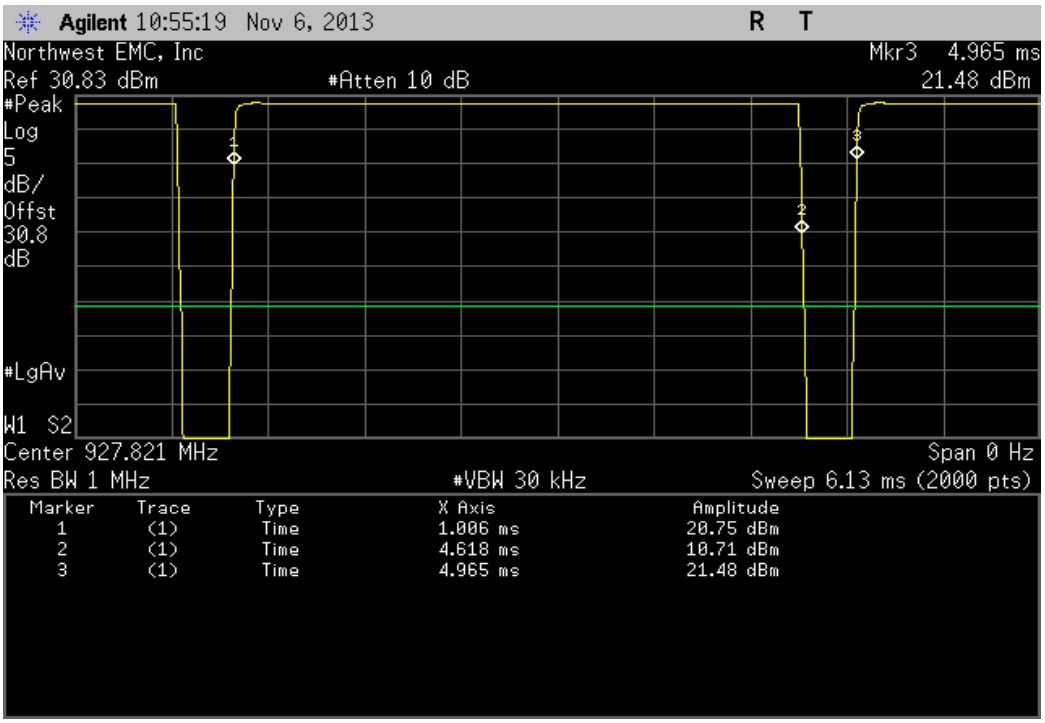
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz

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

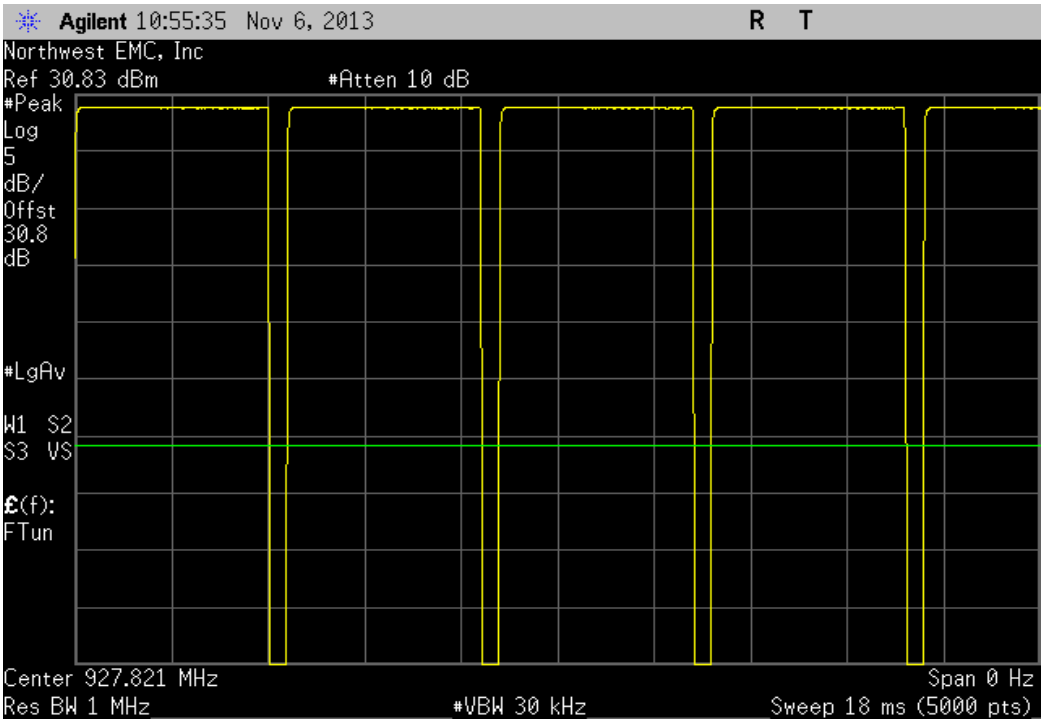


Duty Cycle

153.6 kbps, GFSK, High Channel 187, 927.8208						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	3.612 mS	3.959 mS	1	91.2	N/A	N/A



153.6 kbps, GFSK, High Channel 187, 927.8208						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit	Result
	N/A	N/A	5	N/A	N/A	N/A



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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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 +36 dBm.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

Output Power

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

None

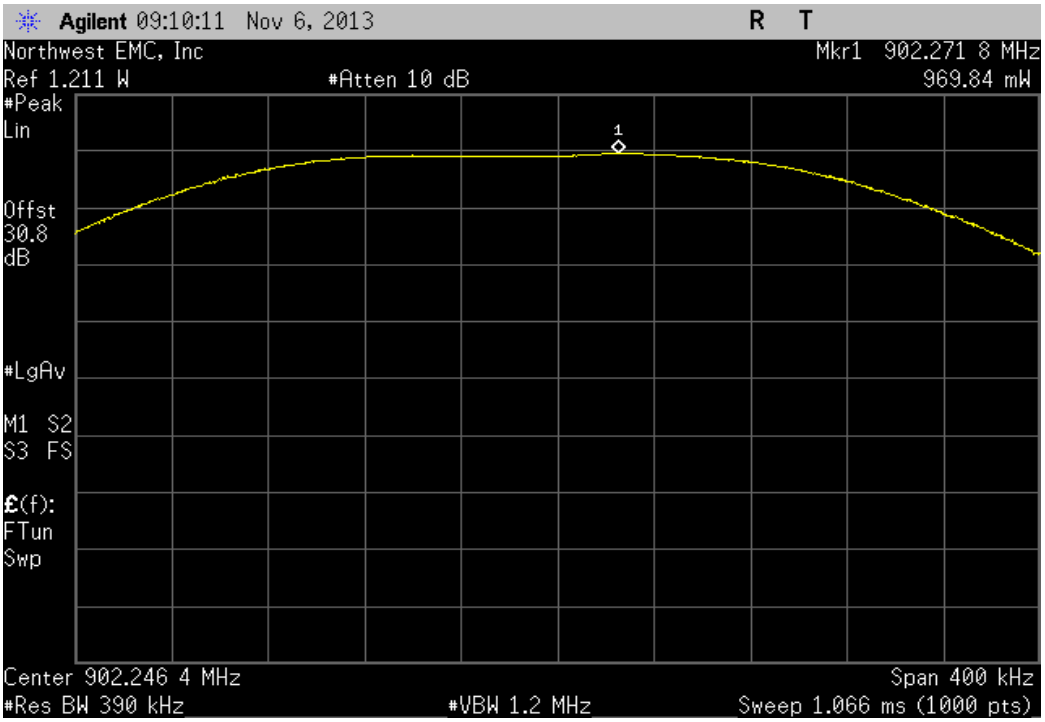
Configuration #	1	Signature

		Value	Limit	Result
115.2 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	969.84 mW	< 1 W	Pass
	Mid Channel 130, 914.688 MHz	989.236 mW	< 1 W	Pass
	High Channel 187, 927.8208	907.821 mW	< 1 W	Pass
153.6 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	970.957 mW	< 1 W	Pass
	Mid Channel 130, 914.688 MHz	991.06 mW	< 1 W	Pass
	High Channel 187, 927.8208	948.855 mW	< 1 W	Pass

Output Power

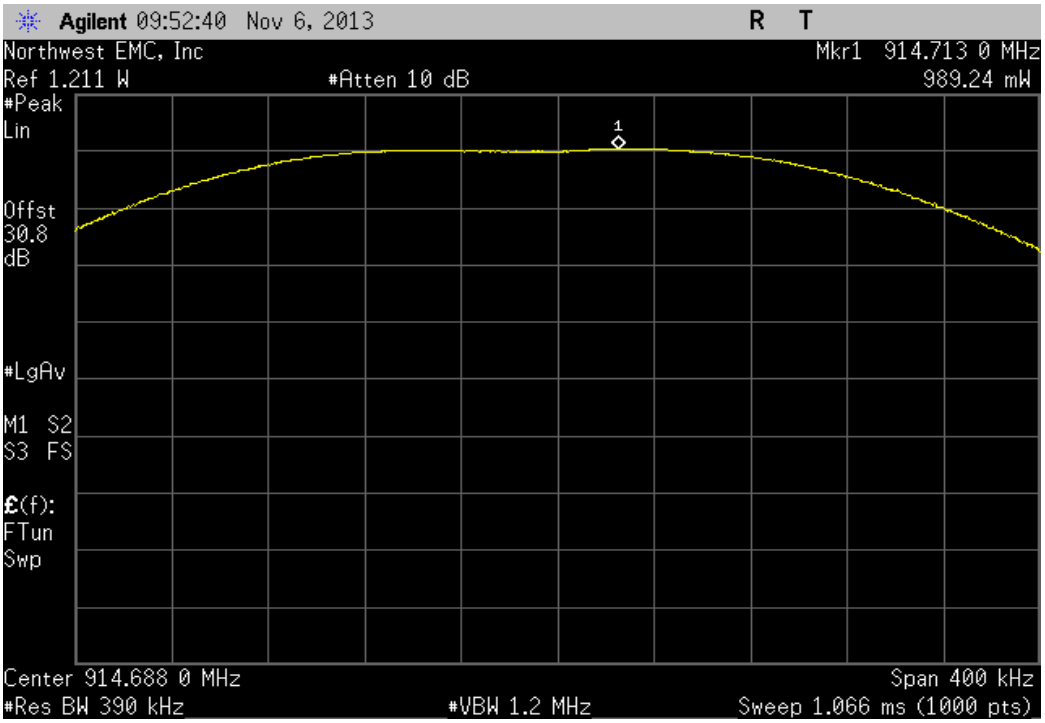
115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

Value	Limit	Result
969.84 mW	< 1 W	Pass



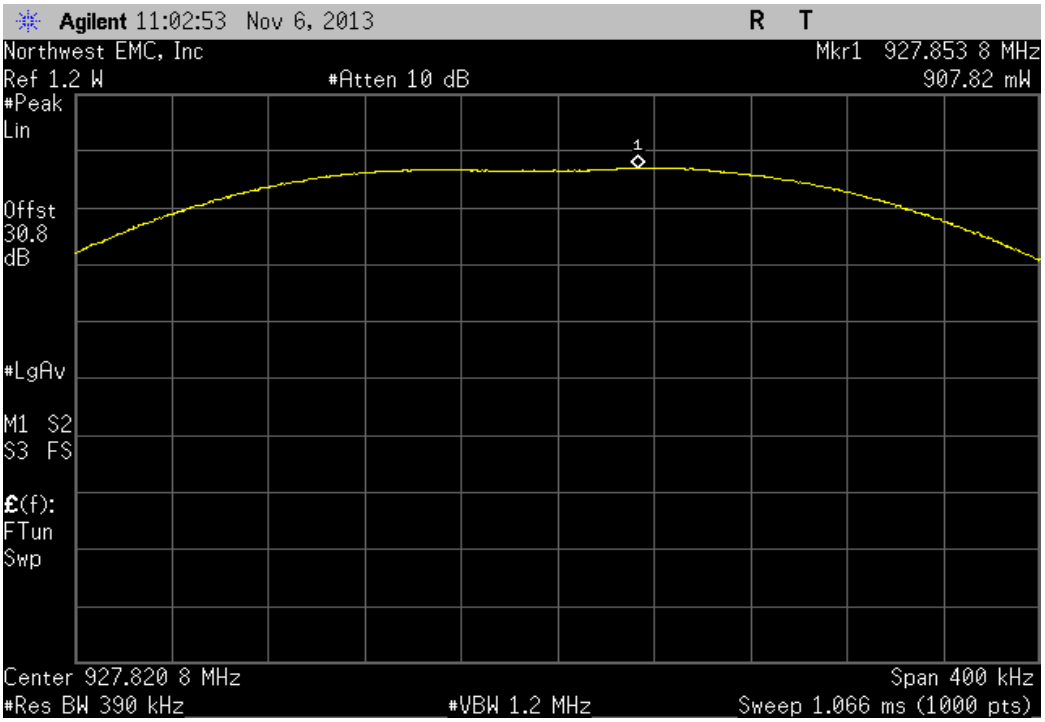
115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz

Value	Limit	Result
989.236 mW	< 1 W	Pass



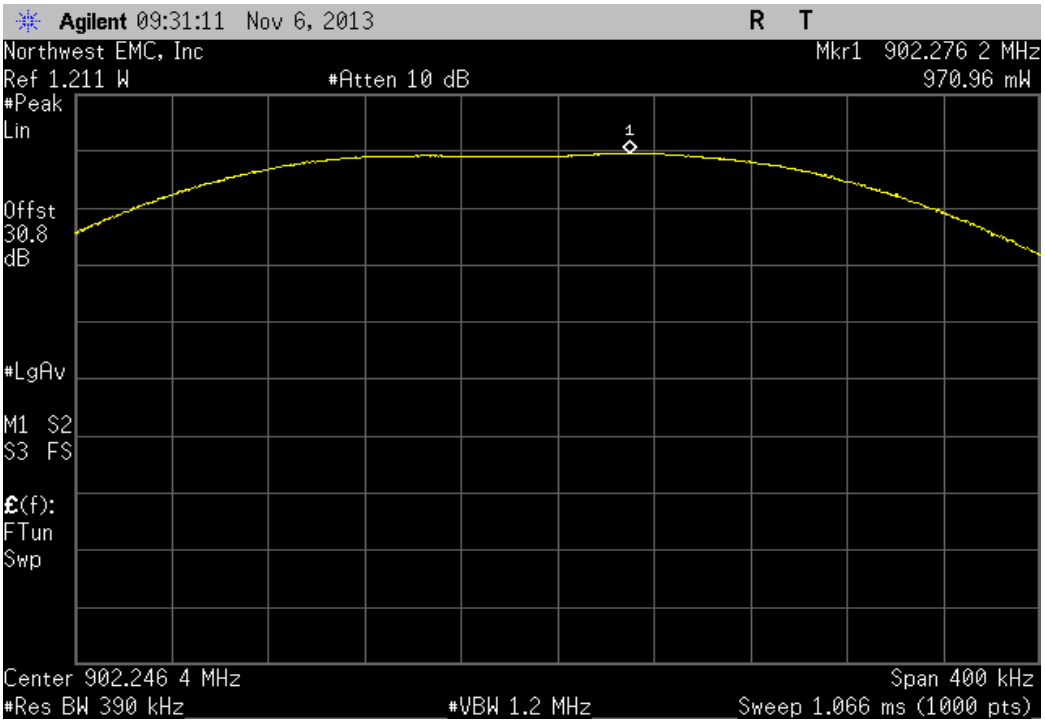
115.2 kbps, GFSK, High Channel 187, 927.8208

				Value	Limit	Result
				907.821 mW	< 1 W	Pass



153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz

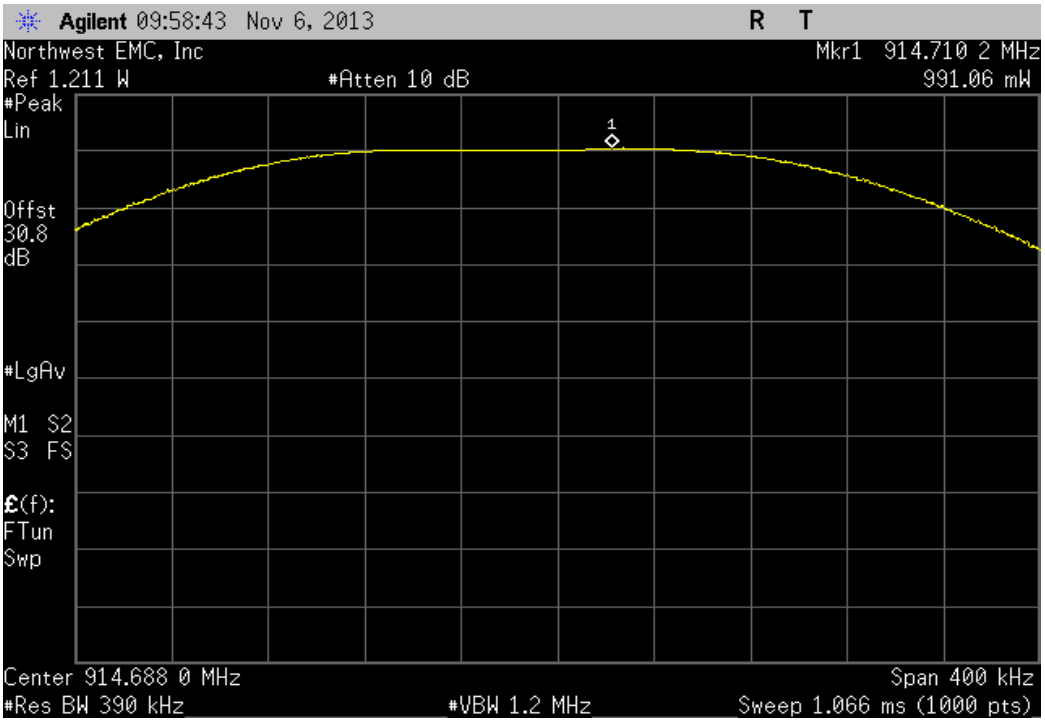
				Value	Limit	Result
				970.957 mW	< 1 W	Pass



Output Power

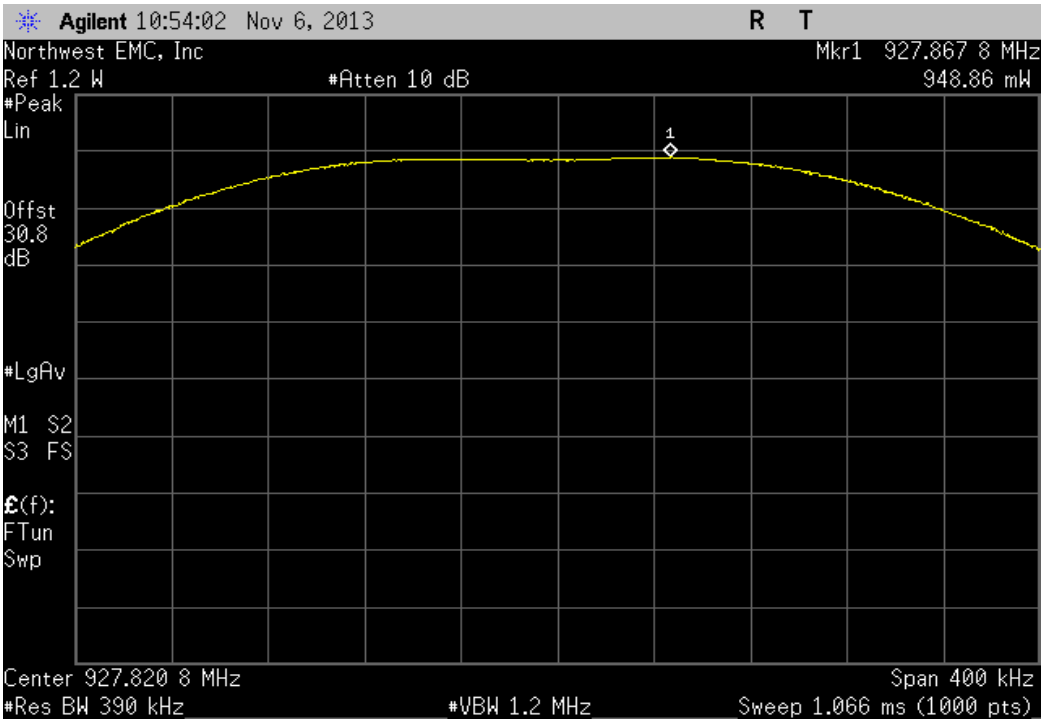
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz

				Value	Limit	Result
				991.06 mW	< 1 W	Pass



153.6 kbps, GFSK, High Channel 187, 927.8208

				Value	Limit	Result
				948.855 mW	< 1 W	Pass



Occupied Bandwidth

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

Occupied Bandwidth

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

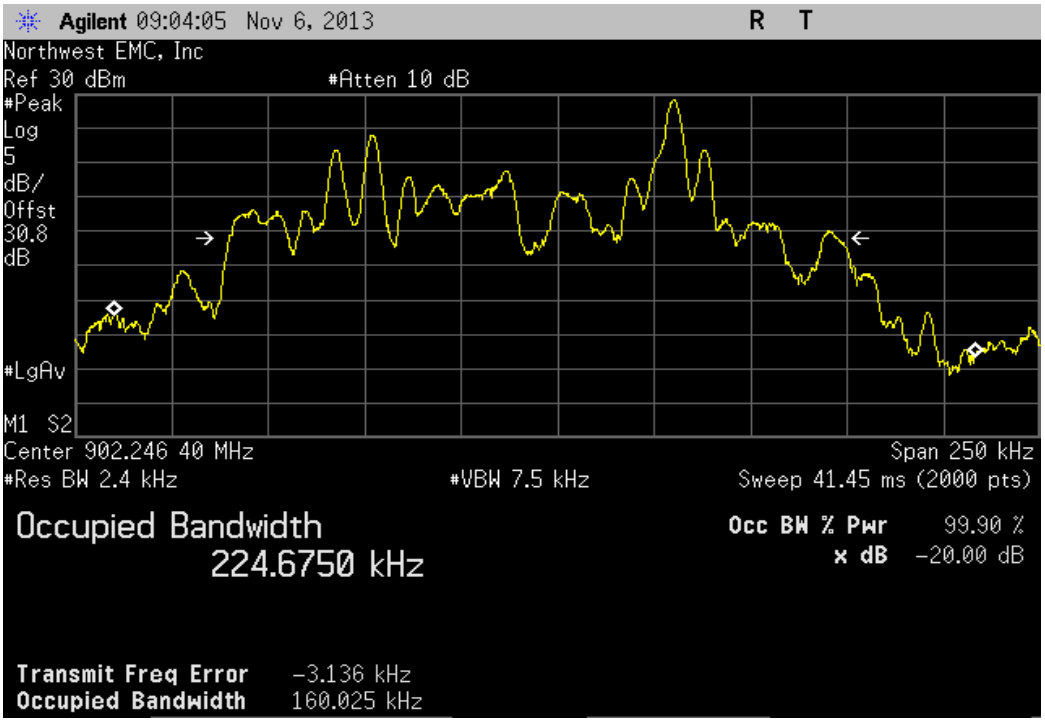
None

Configuration #	1	Signature

		Value	Limit	Result
115.2 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	160.025 kHz	< 226 kHz	Pass
	Mid Channel 130, 914.688 MHz	157.593 kHz	< 226 kHz	Pass
	High Channel 187, 927.8208	154.567 kHz	< 226 kHz	Pass
153.6 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	123.028 kHz	< 226 kHz	Pass
	Mid Channel 130, 914.688 MHz	123.11 kHz	< 226 kHz	Pass
	High Channel 187, 927.8208	122.611 kHz	< 226 kHz	Pass

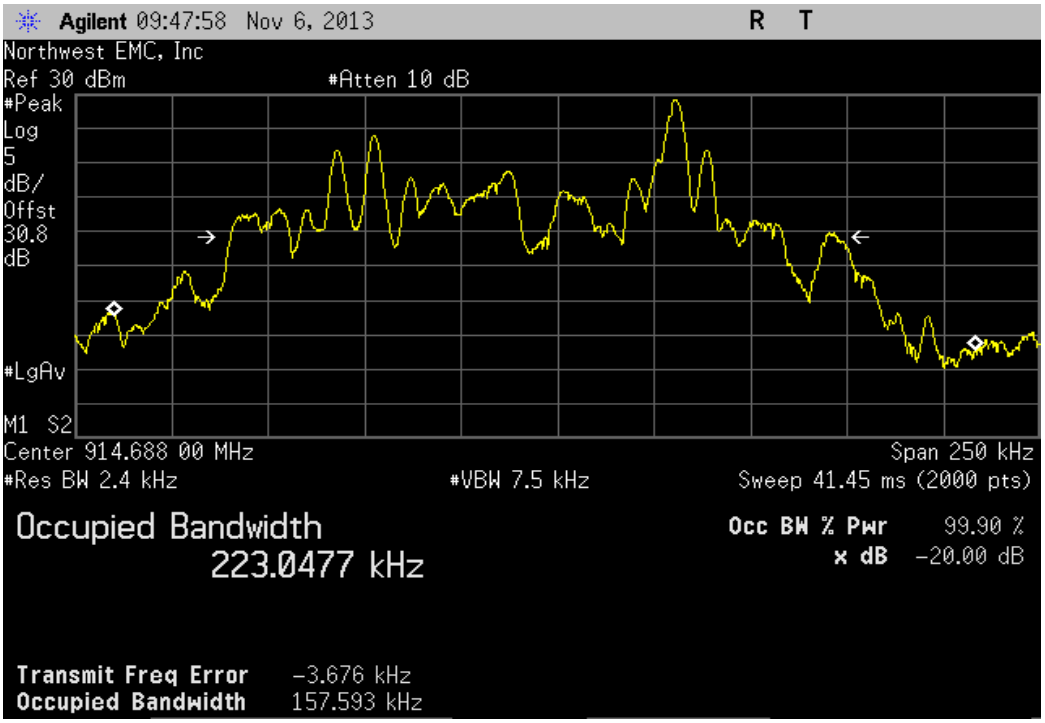
115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

				Value	Limit	Result
				160.025 kHz	< 226 kHz	Pass



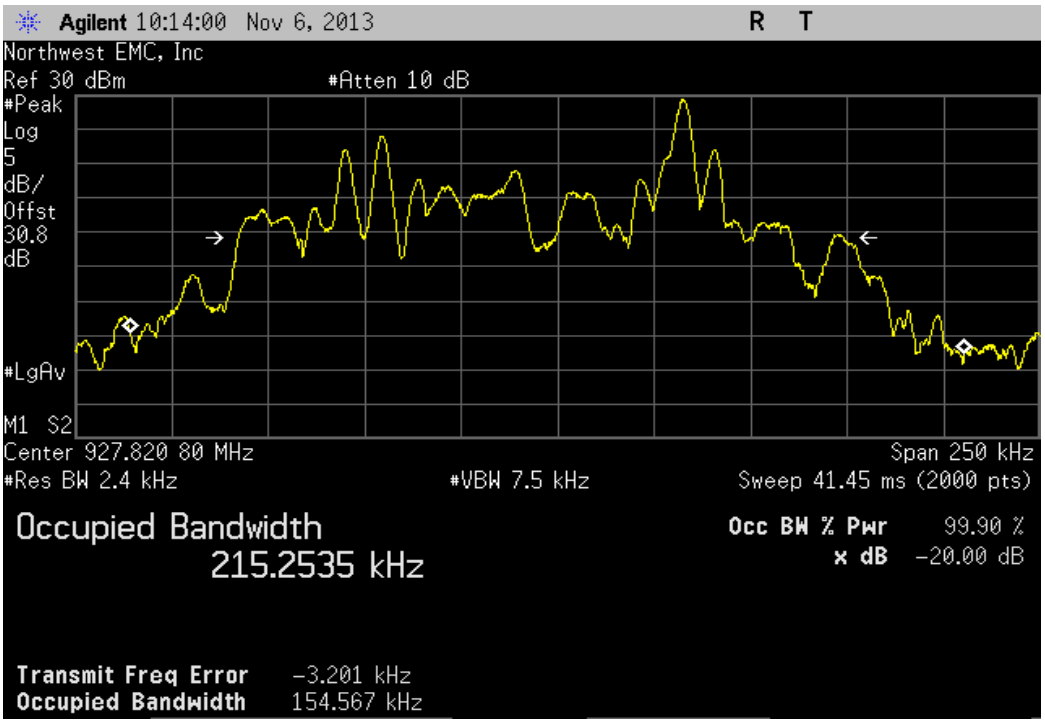
115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz

				Value	Limit	Result
				157.593 kHz	< 226 kHz	Pass



115.2 kbps, GFSK, High Channel 187, 927.8208

Value	Limit	Result
154.567 kHz	< 226 kHz	Pass

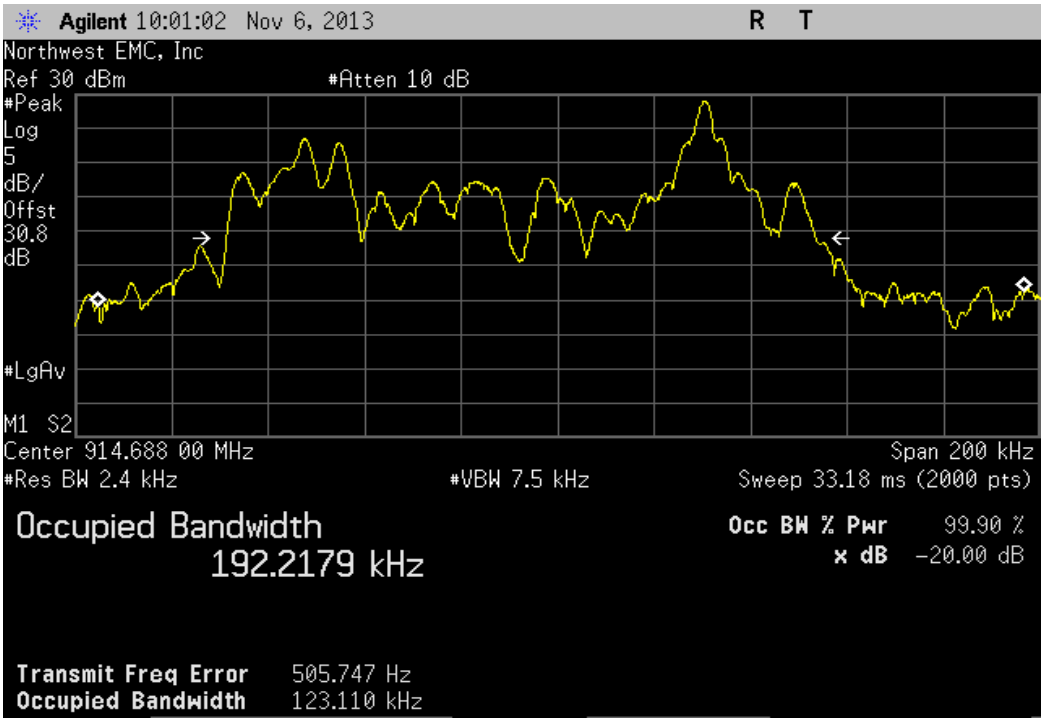


153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz

Value	Limit	Result
123.028 kHz	< 226 kHz	Pass

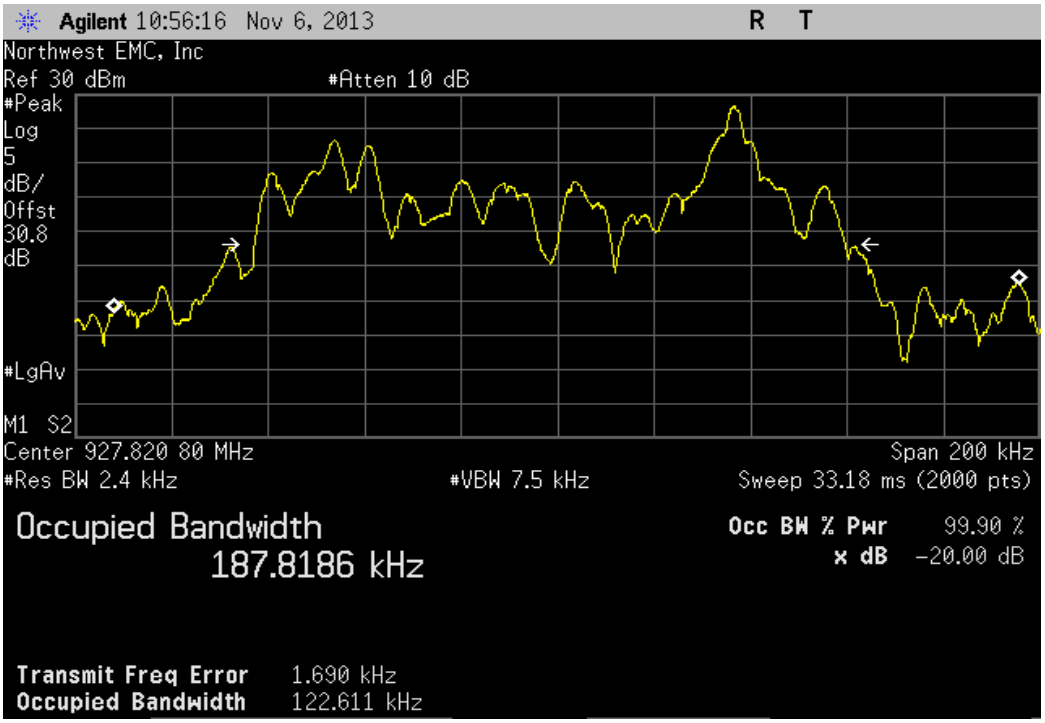
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz

				Value	Limit	Result
				123.11 kHz	< 226 kHz	Pass



153.6 kbps, GFSK, High Channel 187, 927.8208

				Value	Limit	Result
				122.611 kHz	< 226 kHz	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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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 in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

Spurious Conducted Emissions

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

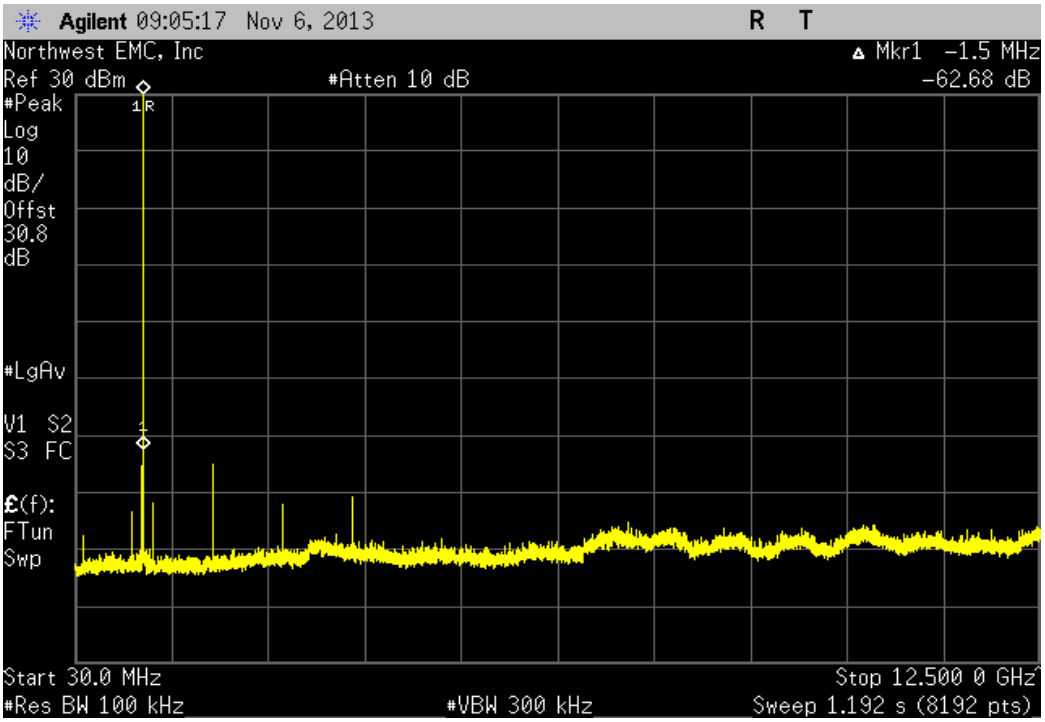
DEVIATIONS FROM TEST STANDARD

None

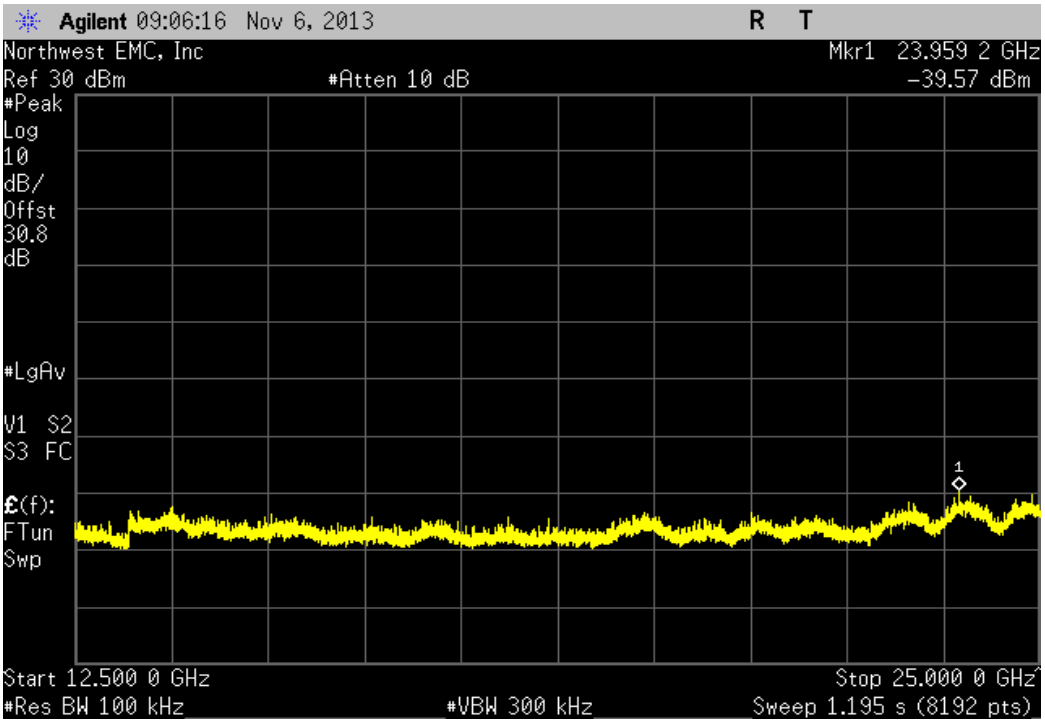
Configuration #	1	Signature

		Frequency Range	Value	Limit	Result
115.2 kbps, GFSK					
	Low Channel 76, 902.2464 MHz	30 MHz - 12.5 GHz	-62.68 dBc	≤ -20 dBc	Pass
	Low Channel 76, 902.2464 MHz	12.5 GHz - 25 GHz	-69.75 dBc	≤ -20 dBc	Pass
	Mid Channel 130, 914.688 MHz	30 MHz - 12.5 GHz	-58.53 dBc	≤ -20 dBc	Pass
	Mid Channel 130, 914.688 MHz	12.5 GHz - 25 GHz	-71.07 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	30 MHz - 12.5 GHz	-49.08 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	12.5 GHz - 25 GHz	-70.88 dBc	≤ -20 dBc	Pass
153.6 kbps, GFSK					
	Low Channel 76, 902.2464 MHz	30 MHz - 12.5 GHz	-63.32 dBc	≤ -20 dBc	Pass
	Low Channel 76, 902.2464 MHz	12.5 GHz - 25 GHz	-71.03 dBc	≤ -20 dBc	Pass
	Mid Channel 130, 914.688 MHz	30 MHz - 12.5 GHz	-57.84 dBc	≤ -20 dBc	Pass
	Mid Channel 130, 914.688 MHz	12.5 GHz - 25 GHz	-70.43 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	30 MHz - 12.5 GHz	-50.78 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	12.5 GHz - 25 GHz	-68.89 dBc	≤ -20 dBc	Pass

115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-62.68 dBc	≤ -20 dBc	Pass

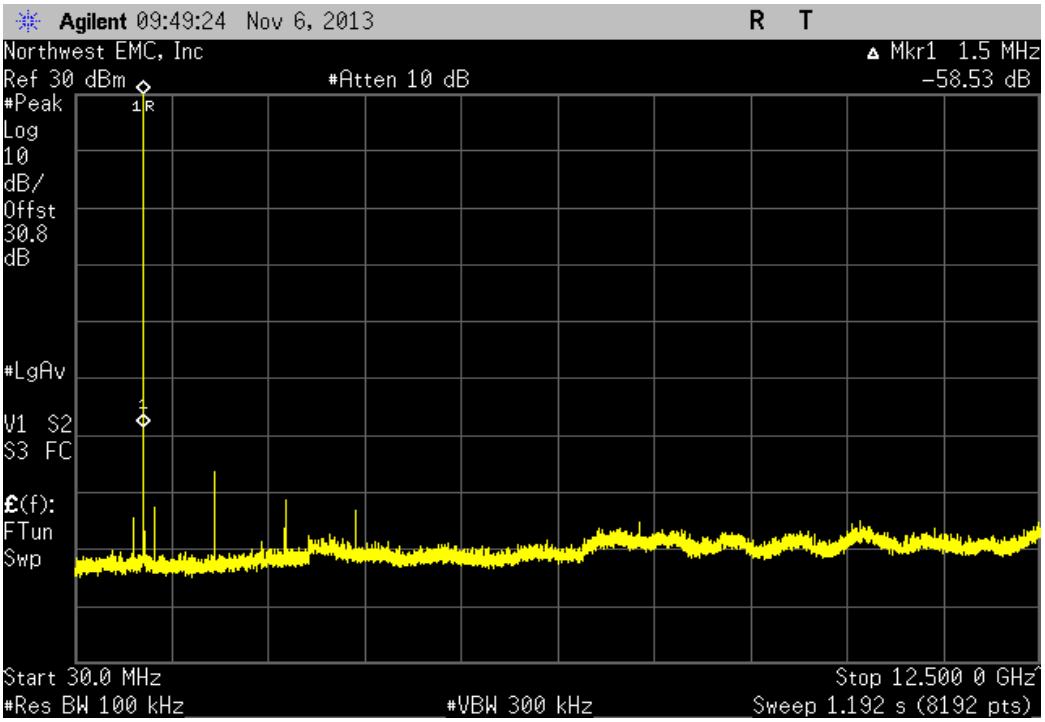


115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-69.75 dBc	≤ -20 dBc	Pass

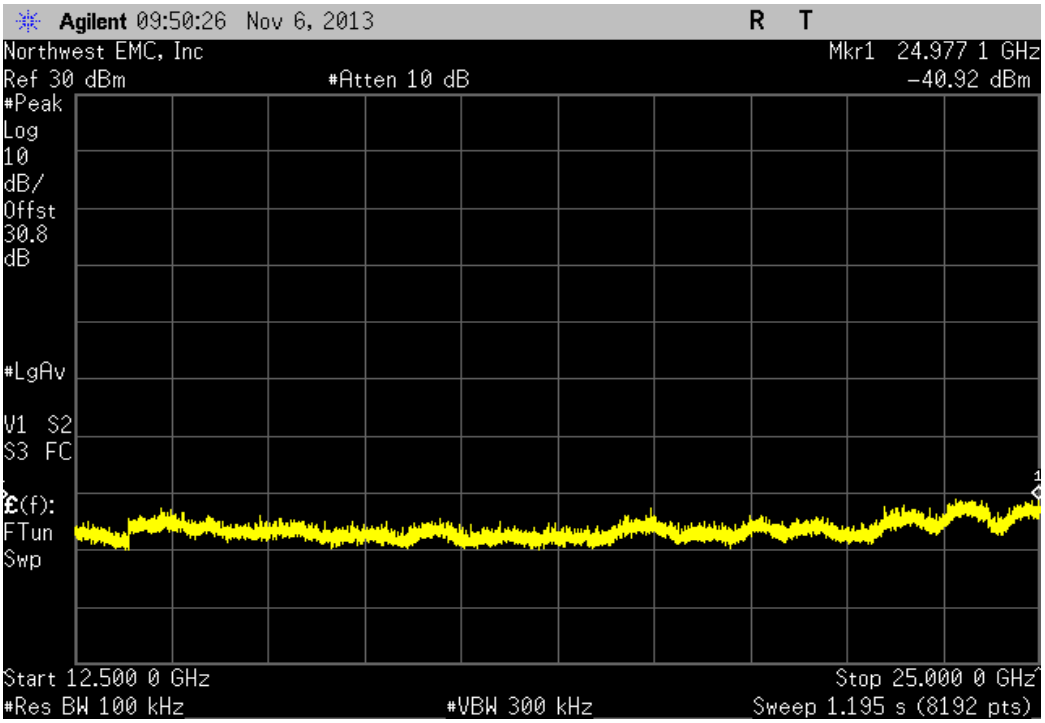


Spurious Conducted Emissions

115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-58.53 dBc	≤ -20 dBc	Pass

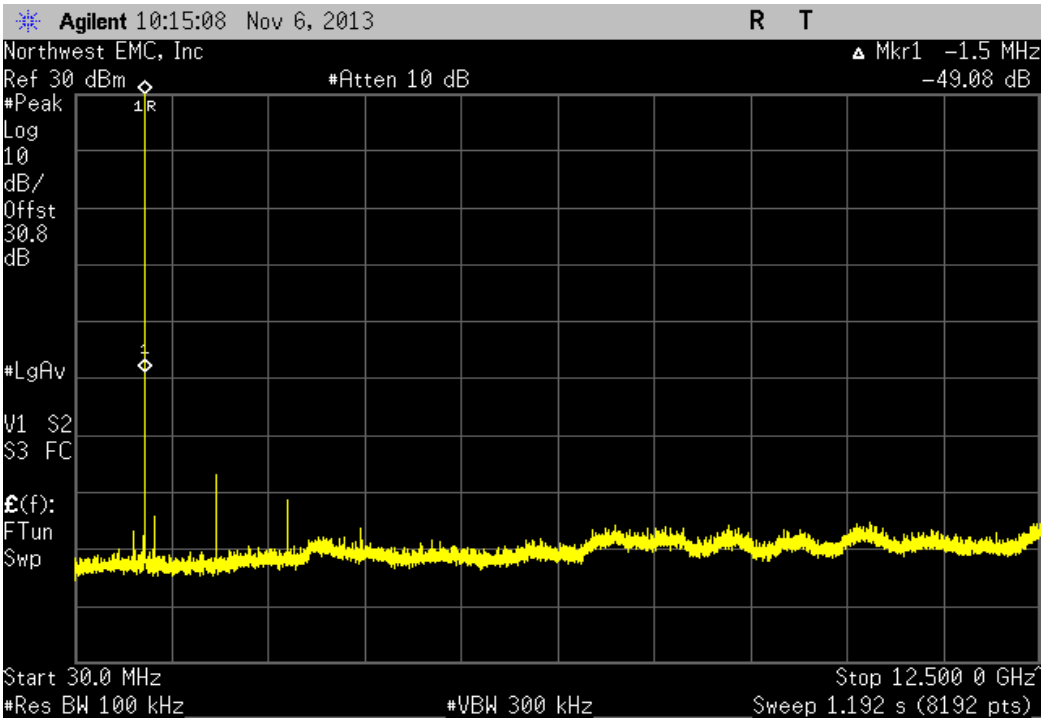


115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-71.07 dBc	≤ -20 dBc	Pass

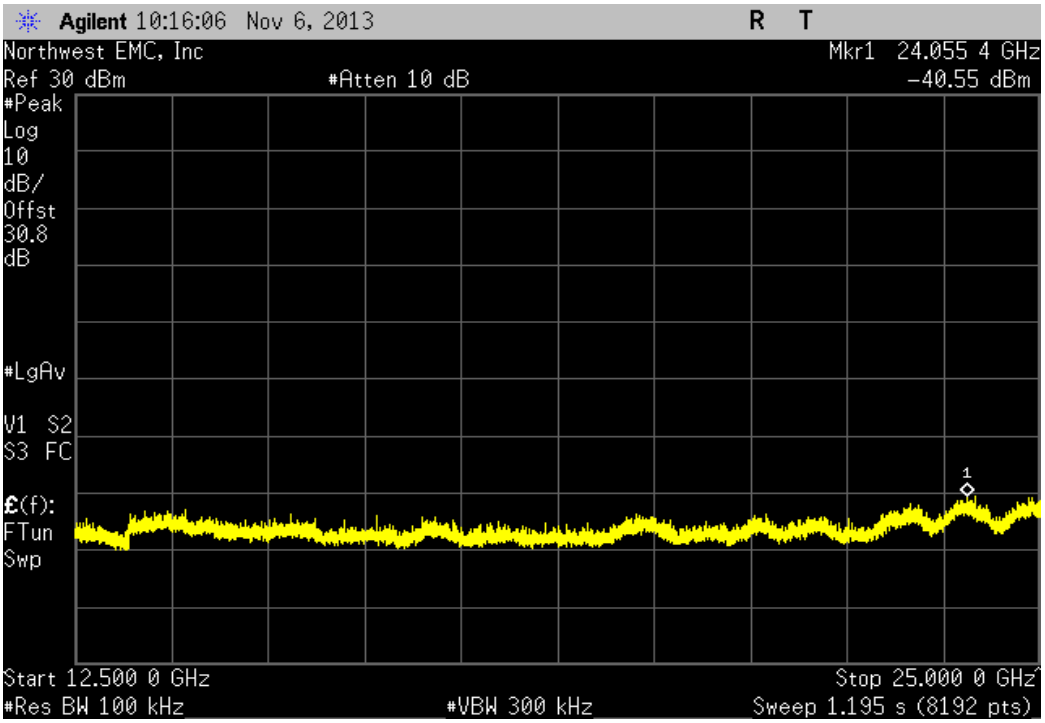


Spurious Conducted Emissions

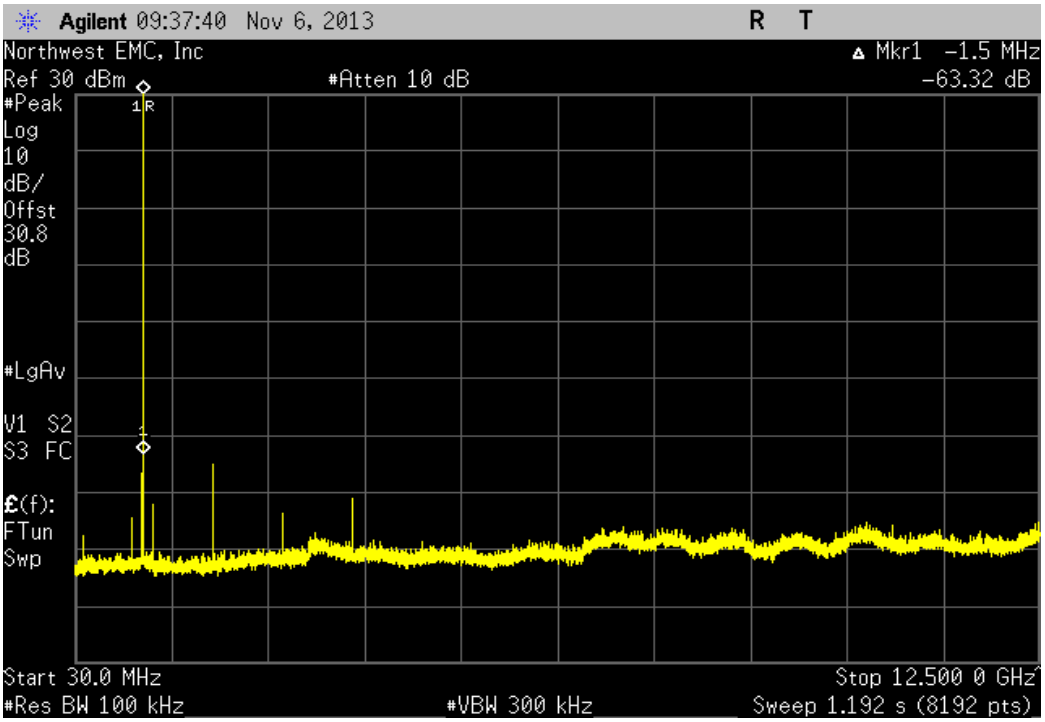
115.2 kbps, GFSK, High Channel 187, 927.8208				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-49.08 dBc	≤ -20 dBc	Pass



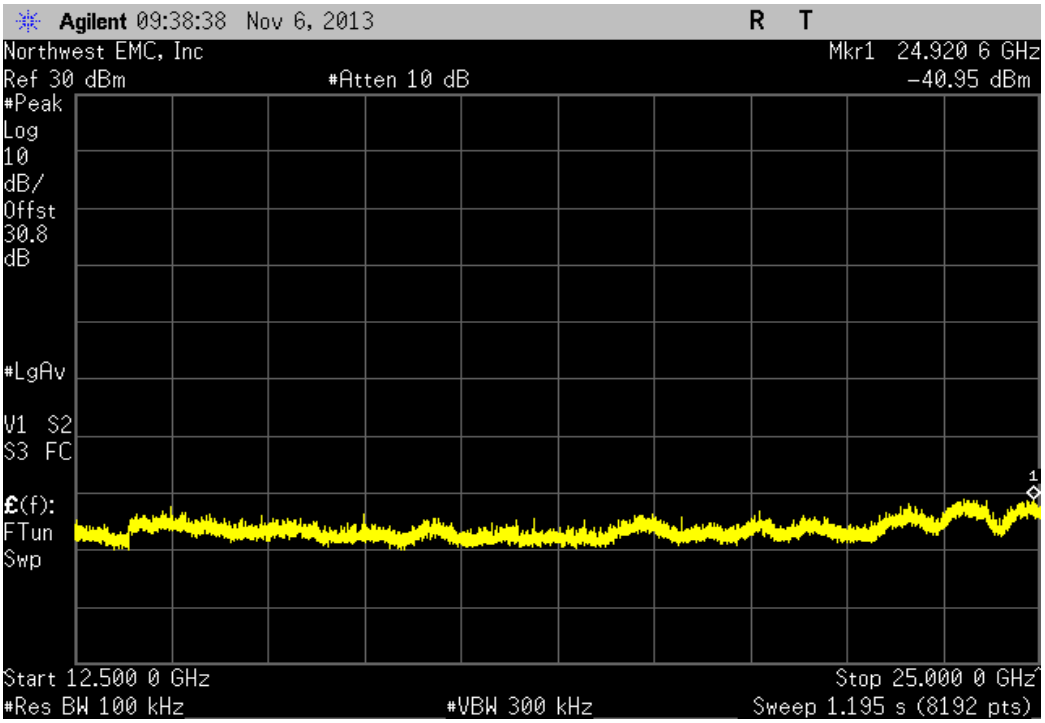
115.2 kbps, GFSK, High Channel 187, 927.8208				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-70.88 dBc	≤ -20 dBc	Pass



153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-63.32 dBc	≤ -20 dBc	Pass

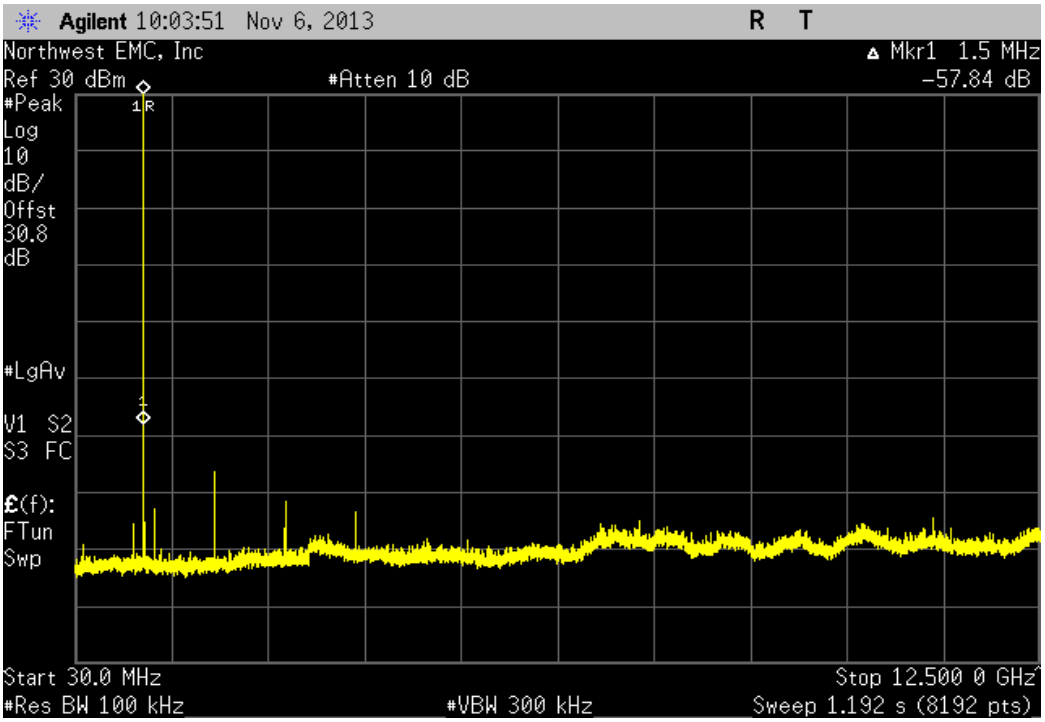


153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-71.03 dBc	≤ -20 dBc	Pass

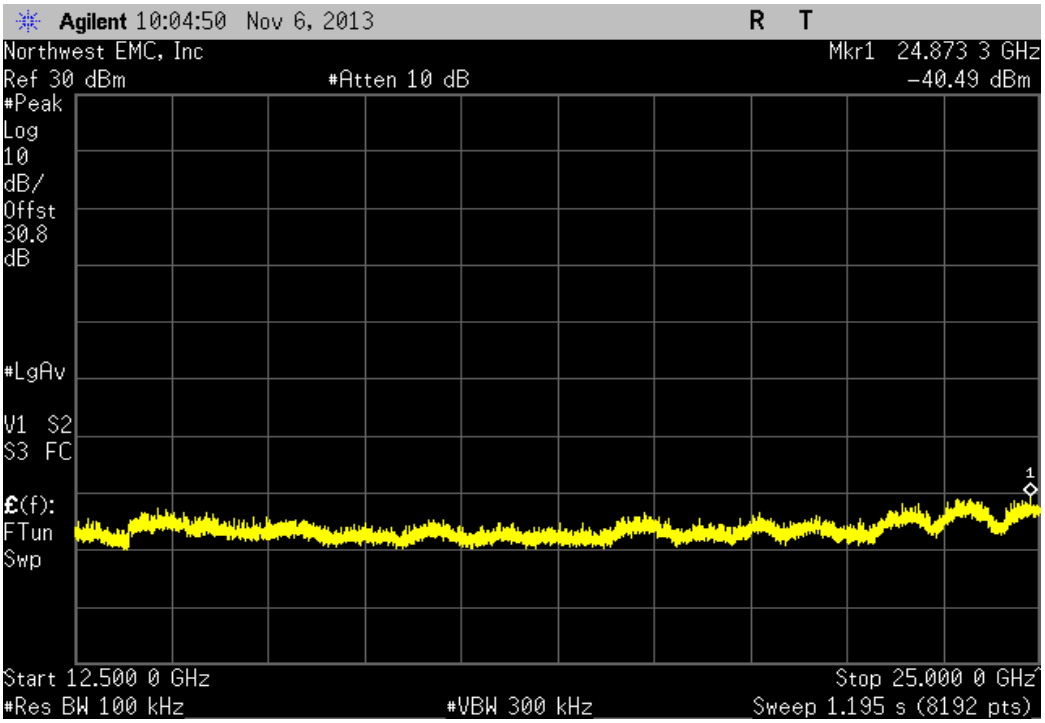


Spurious Conducted Emissions

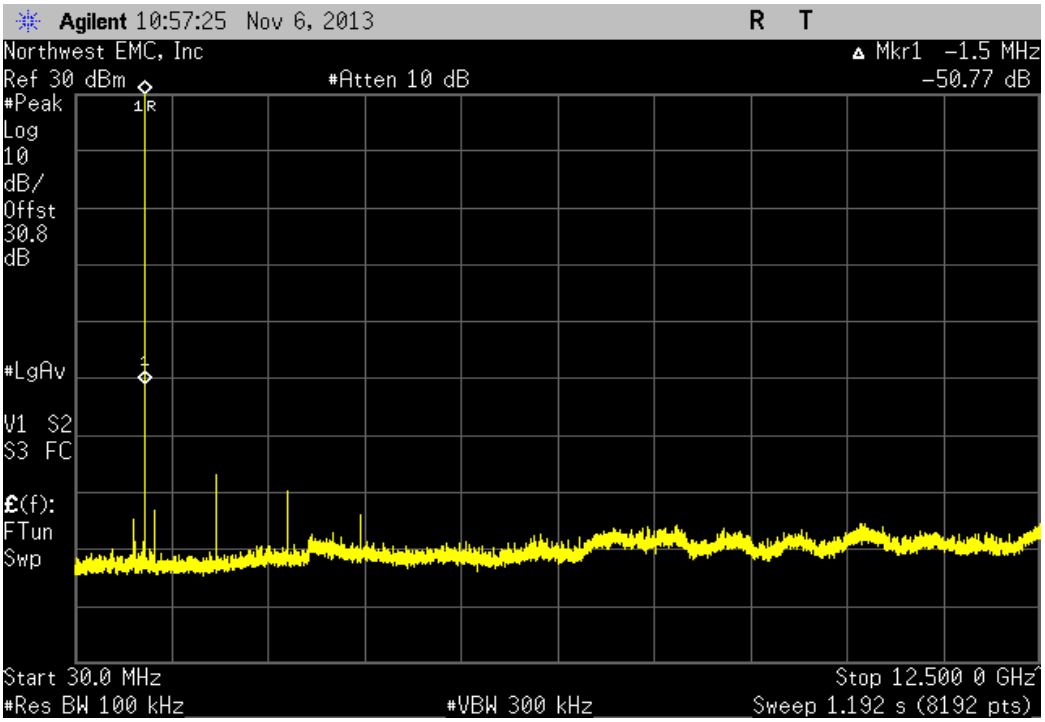
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-57.84 dBc	≤ -20 dBc	Pass



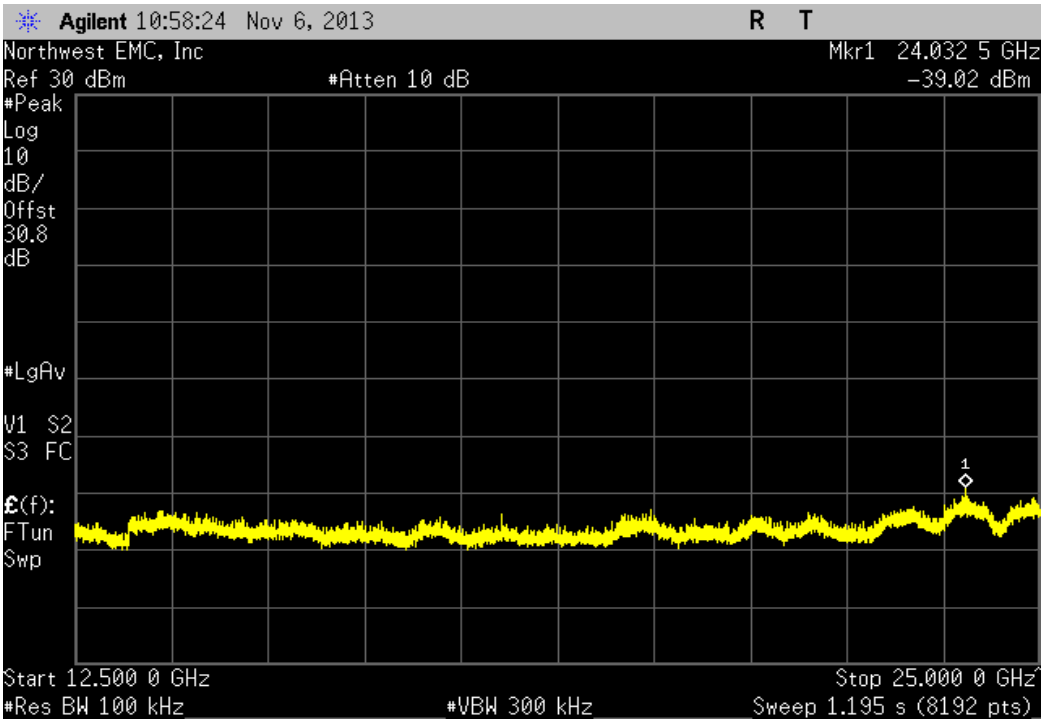
153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-70.43 dBc	≤ -20 dBc	Pass



153.6 kbps, GFSK, High Channel 187, 927.8208				
Frequency Range		**Value**	**Limit**	**Result**
30 MHz - 12.5 GHz		-50.78 dBc	≤ -20 dBc	Pass



153.6 kbps, GFSK, High Channel 187, 927.8208				
Frequency Range		**Value**	**Limit**	**Result**
12.5 GHz - 25 GHz		-68.89 dBc	≤ -20 dBc	Pass



Band Edge Compliance - Non Hopping Mode

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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

The measurement method as called out in FCC Public Notice DA 00-705, March 30th, 2000 was used.

Band Edge Compliance - Non Hopping Mode

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

None

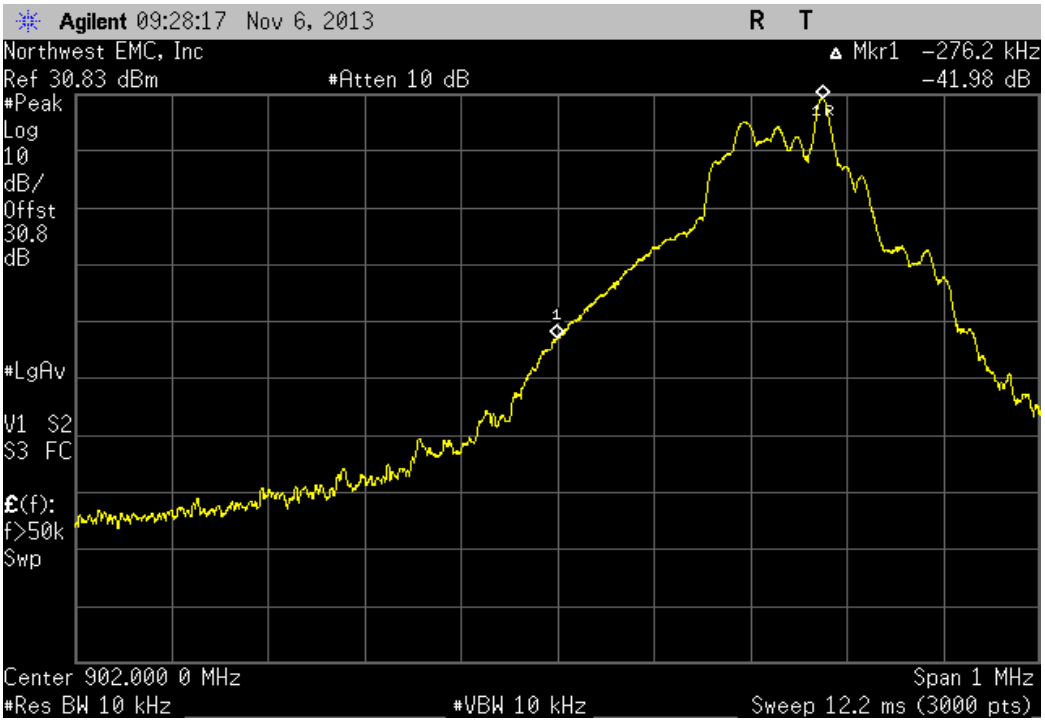
Configuration #	1	Signature

		Value	Limit	Result
115.2 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	-41.98 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	-41.40 dBc	≤ -20 dBc	Pass
153.6 kbps, GFSK				
	Low Channel 76, 902.2464 MHz	-42.18 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208	-43.34 dBc	≤ -20 dBc	Pass

Band Edge Compliance - Non Hopping Mode

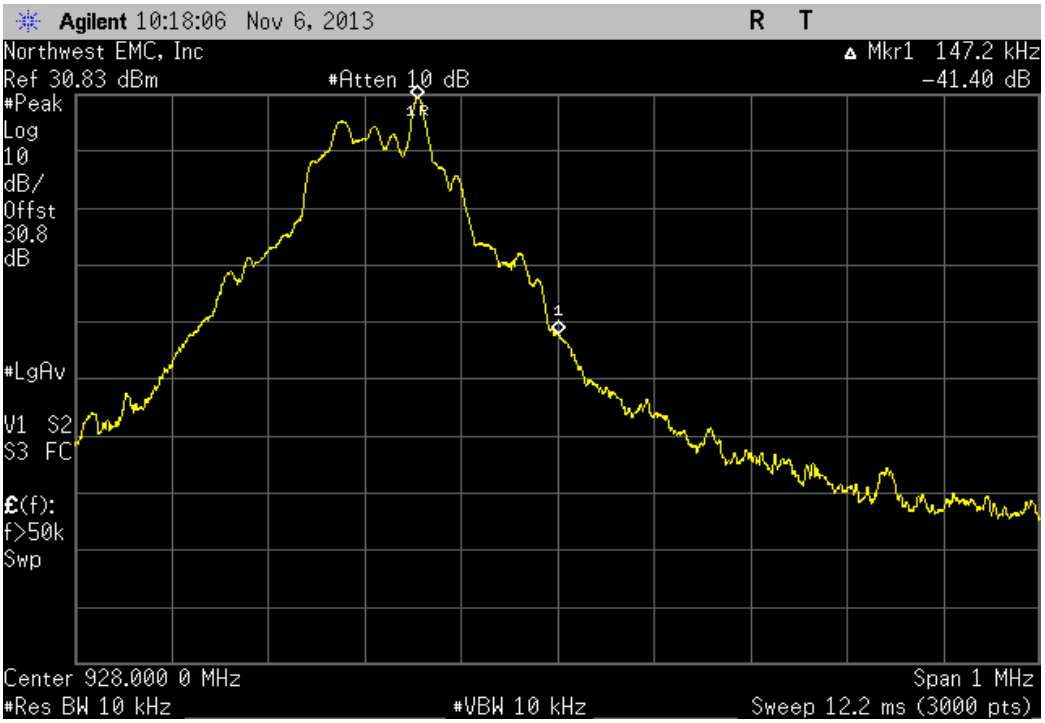
115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

				Value	Limit	Result
				-41.98 dBc	≤ -20 dBc	Pass



115.2 kbps, GFSK, High Channel 187, 927.8208

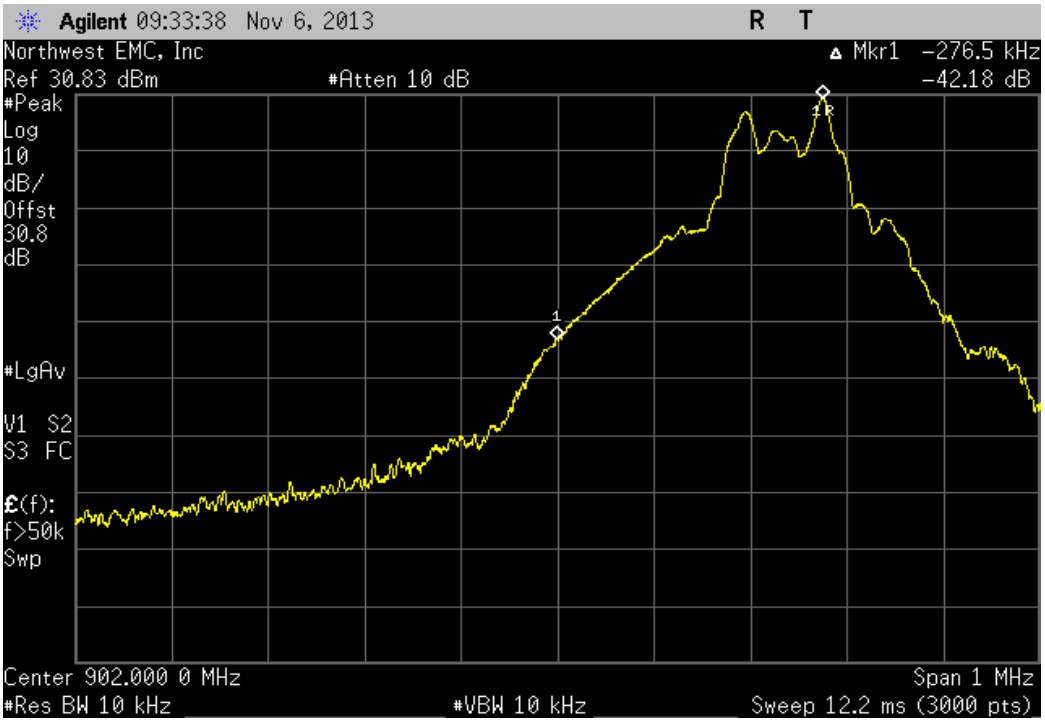
				Value	Limit	Result
				-41.40 dBc	≤ -20 dBc	Pass



Band Edge Compliance - Non Hopping Mode

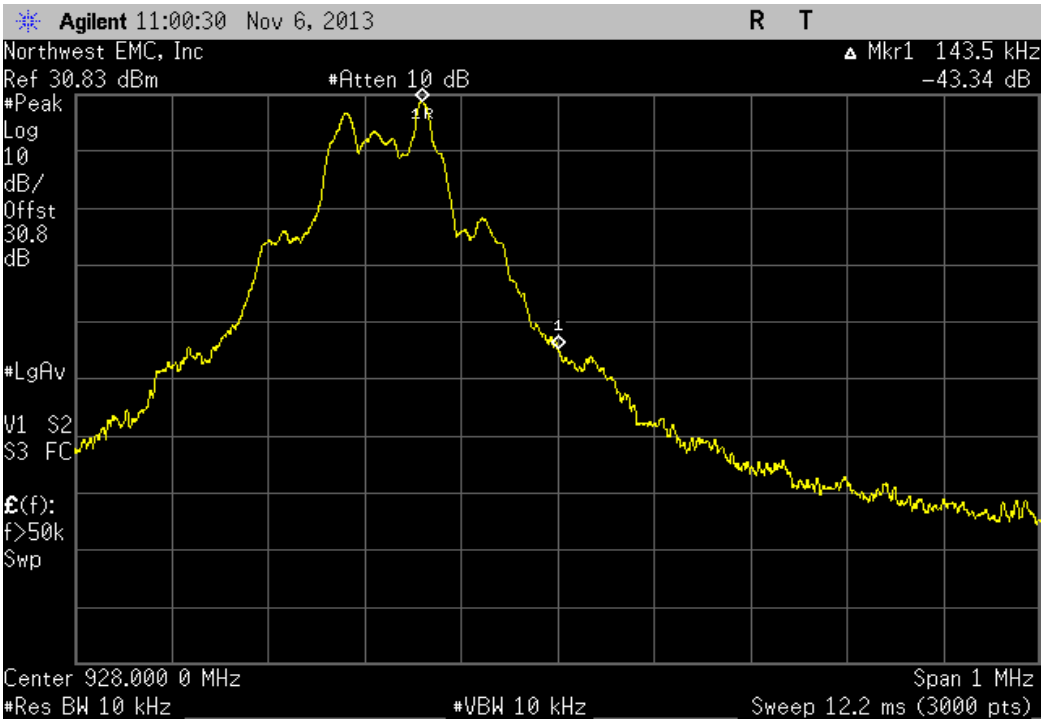
153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz

				Value	Limit	Result
				-42.18 dBc	≤ -20 dBc	Pass



153.6 kbps, GFSK, High Channel 187, 927.8208

				Value	Limit	Result
				-43.34 dBc	≤ -20 dBc	Pass



Band Edge Compliance - Hopping Mode

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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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. EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

The measurement method as called out in FCC Public Notice DA 00-705, March 30th, 2000 was used.

Band Edge Compliance - Hopping Mode

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

None

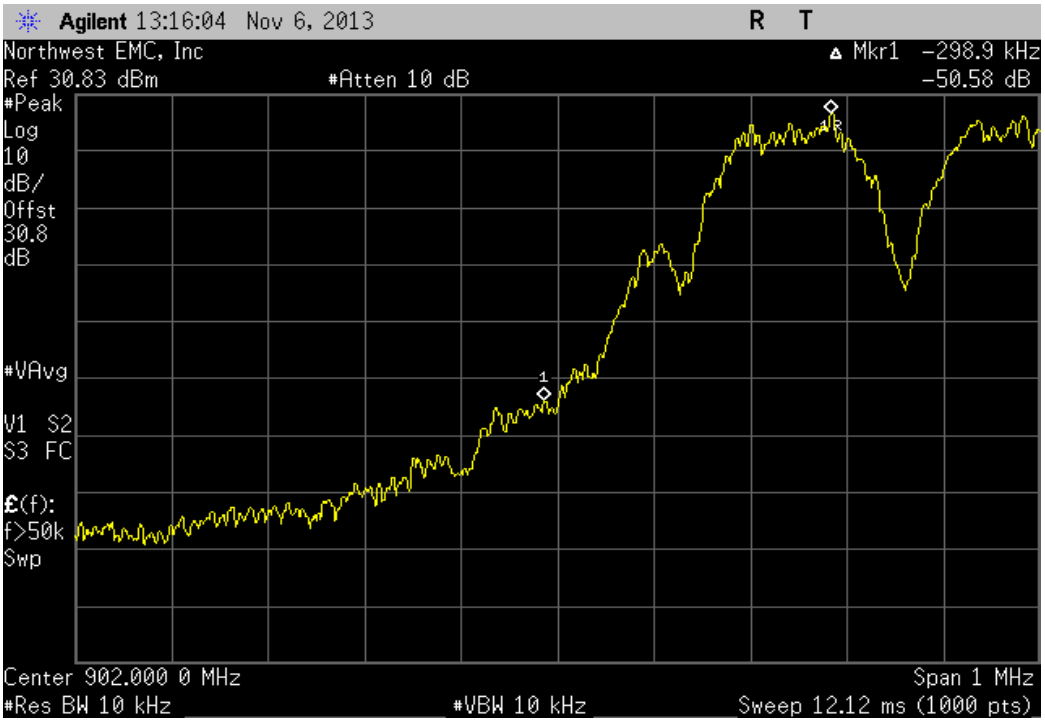
Configuration #	1	Signature

		Value	Limit	Result
Hopping Pattern 0				
	115.2 kbps, GFSK			
	Low Channel 76, 902.2464 MHz, 80 Hopping Channels	-50.58 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208 MHz, 80 Hopping Channels	-36.43 dBc	≤ -20 dBc	Pass
	153.6 kbps, GFSK			
	Low Channel 76, 902.2464 MHz, 80 Hopping Channels	-50.04 dBc	≤ -20 dBc	Pass
	High Channel 187, 927.8208 MHz, 80 Hopping Channels	-42.15 dBc	≤ -20 dBc	Pass

Band Edge Compliance - Hopping Mode

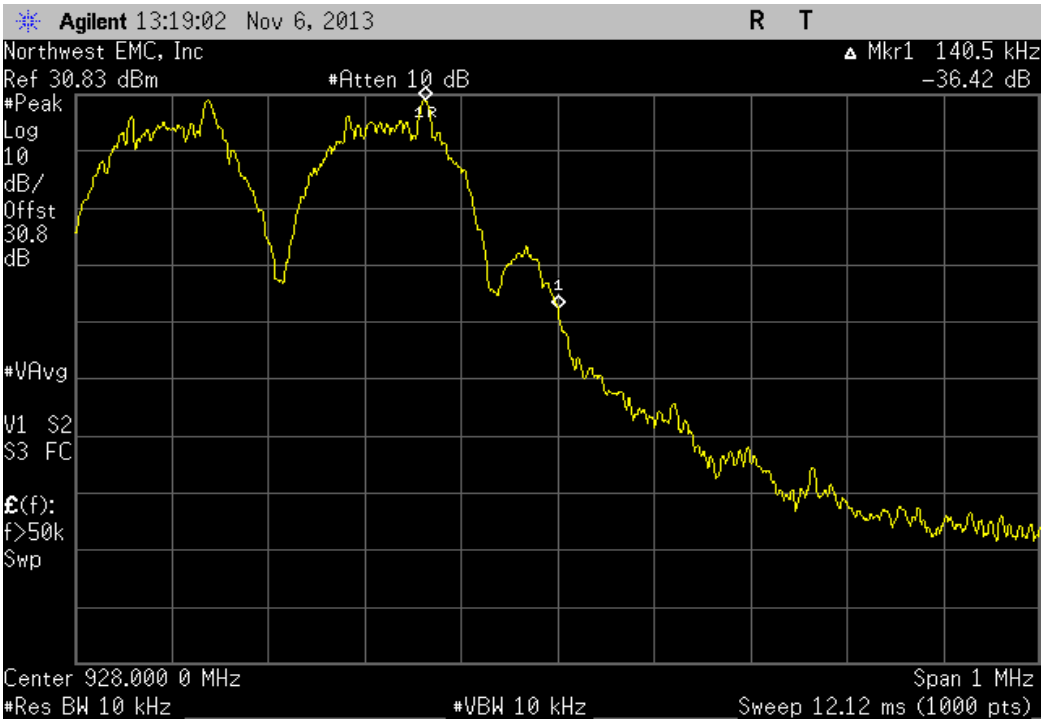
Hopping Pattern 0, 115.2 kbps, GFSK, Low Channel 76, 902.2464 MHz

				Value	Limit	Result
				-50.58 dBc	≤ -20 dBc	Pass



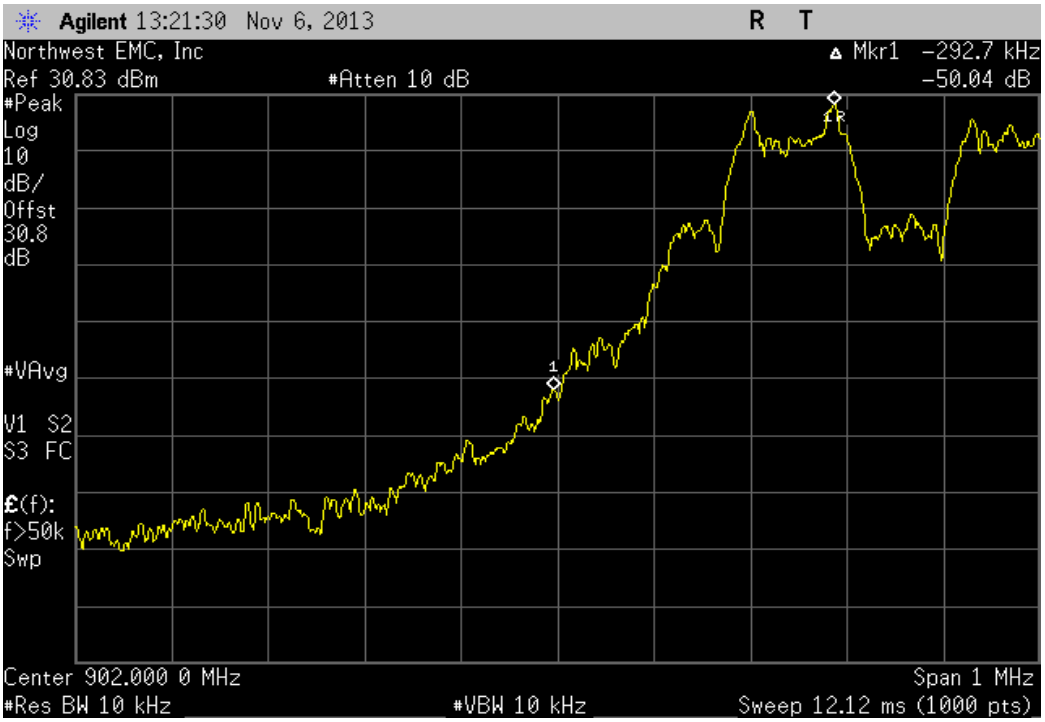
Hopping Pattern 0, 115.2 kbps, GFSK, High Channel 187, 927.8208 MHz

				Value	Limit	Result
				-36.43 dBc	≤ -20 dBc	Pass

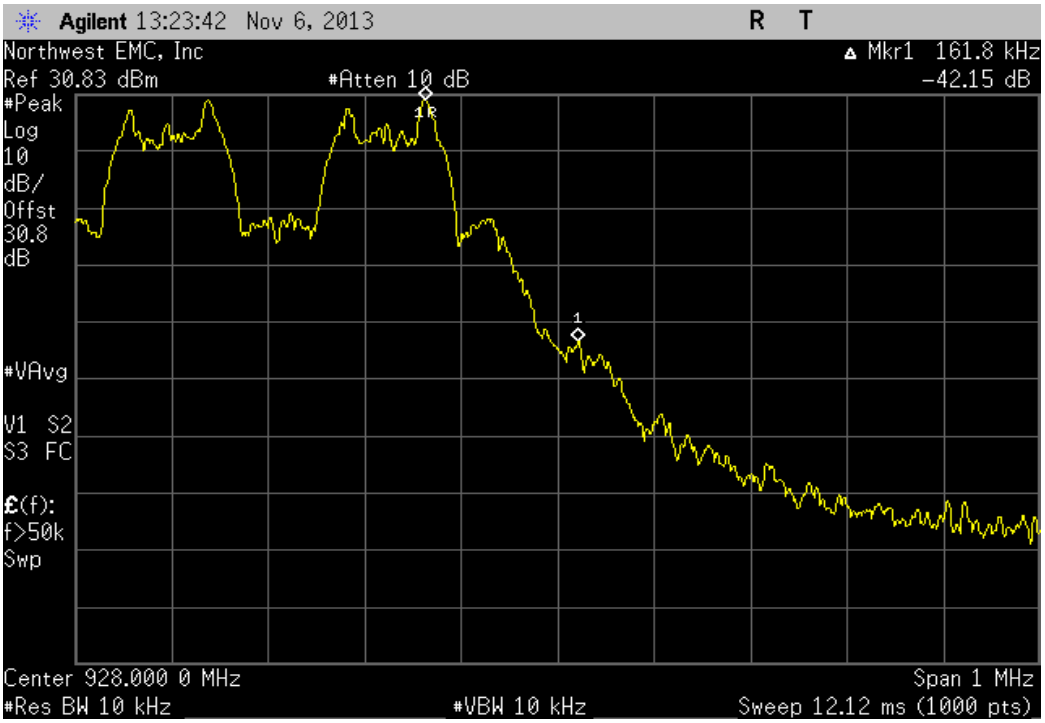


Band Edge Compliance - Hopping Mode

Hopping Pattern 0, 153.6 kbps, GFSK, Low Channel 76, 902.2464 MHz						
				Value	Limit	Result
				-50.04 dBc	≤ -20 dBc	Pass



Hopping Pattern 0, 153.6 kbps, GFSK, High Channel 187, 927.8208 MHz						
				Value	Limit	Result
				-42.15 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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	24
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12

TEST DESCRIPTION

The channel carrier frequencies in the 902-928 MHz 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.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements

Channel Separation

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	245-3960			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

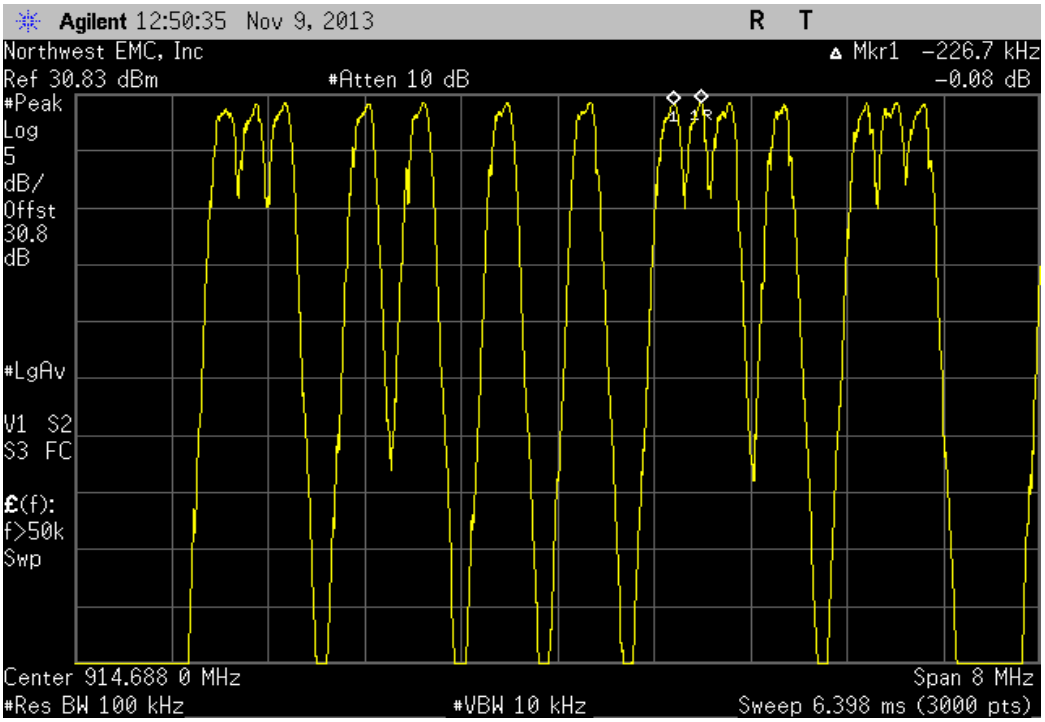
None

Configuration #	1	Signature

	Value	Limit	Result
Hopping Pattern 0			
115.2 kbps, GFSK			
Mid Channel 130, 914.688 MHz, 50 Hopping Channels	226.7 kHz	≥ 160 kHz	Pass
Mid Channel 130, 914.688 MHz, 80 Hopping Channels	229.4 kHz	≥ 160 kHz	Pass
Mid Channel 130, 914.688 MHz, 112 Hopping Channels	242.7 kHz	≥ 160 kHz	Pass
153.6 kbps, GFSK			
Mid Channel 130, 914.688 MHz, 50 Hopping Channels	232.1 kHz	≥ 160 kHz	Pass
Mid Channel 130, 914.688 MHz, 80 Hopping Channels	226.7 kHz	≥ 160 kHz	Pass
Mid Channel 130, 914.688 MHz, 112 Hopping Channels	232.1 kHz	≥ 160 kHz	Pass

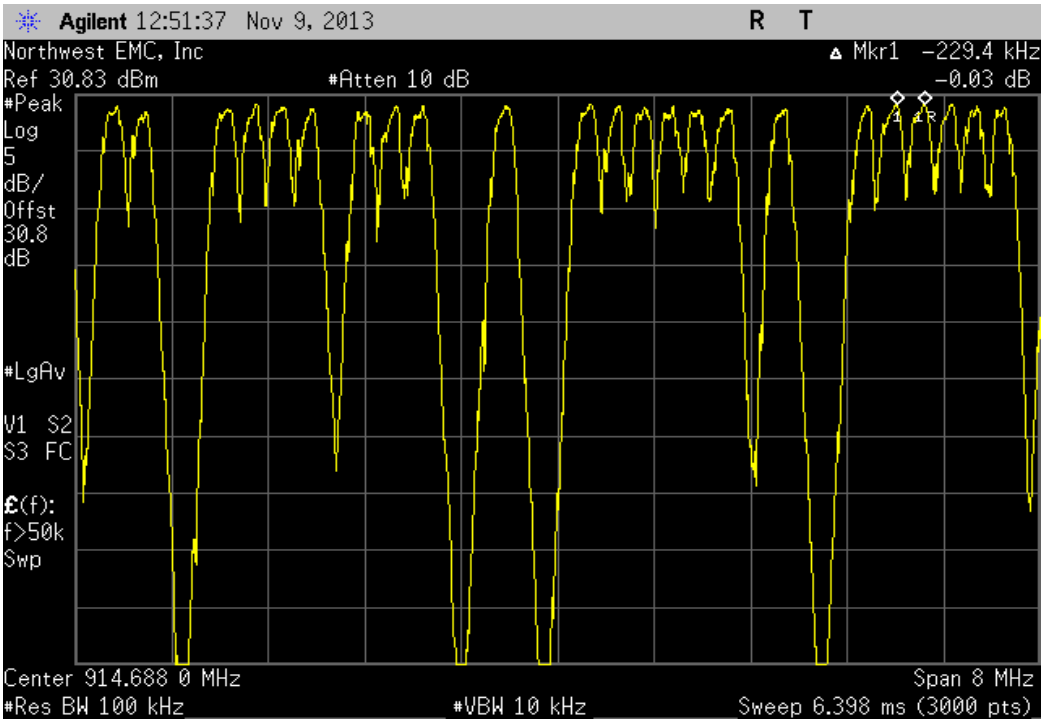
Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping Channels

				Value	Limit	Result
				226.7 kHz	≥ 160 kHz	Pass



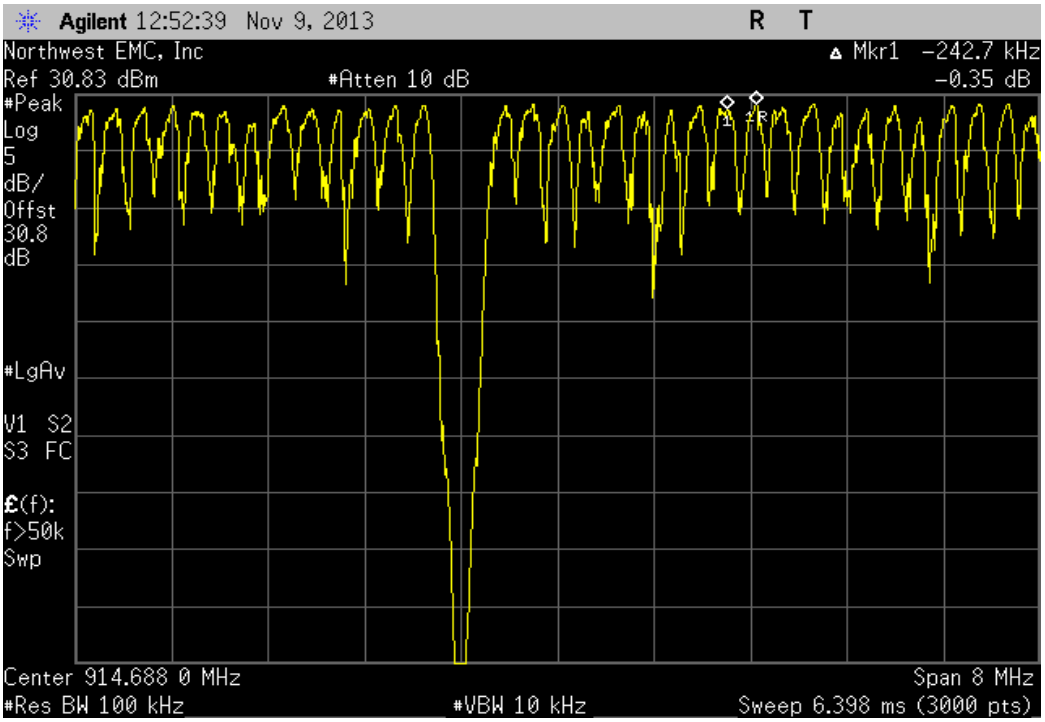
Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping Channels

				Value	Limit	Result
				229.4 kHz	≥ 160 kHz	Pass



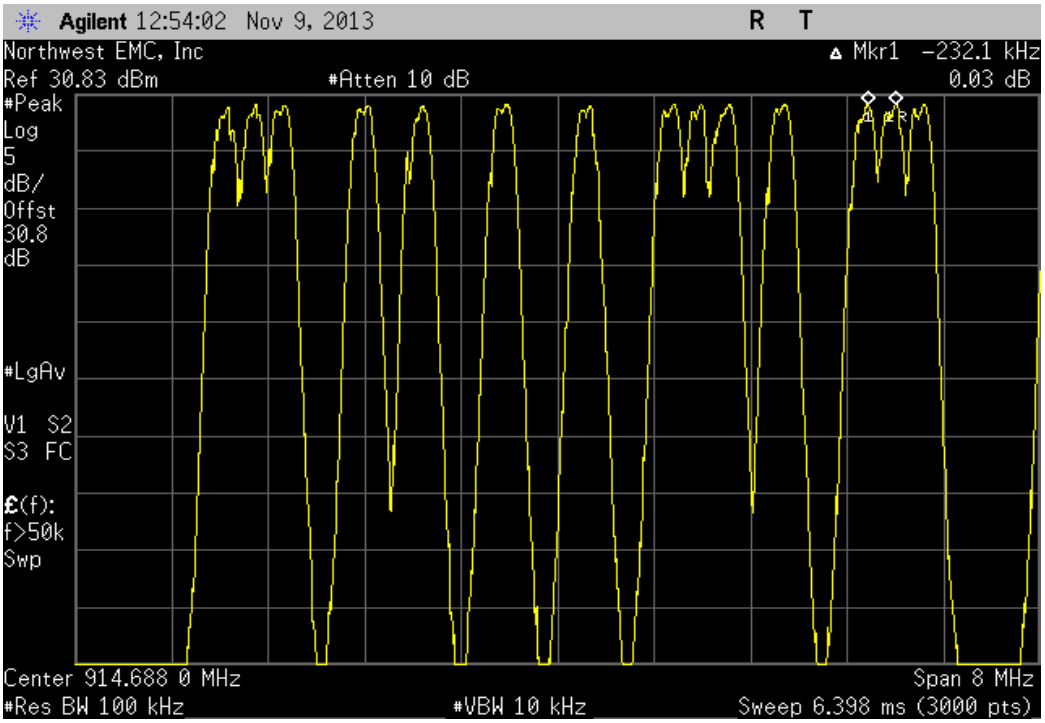
Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping Channels

				Value	Limit	Result
				242.7 kHz	≥ 160 kHz	Pass



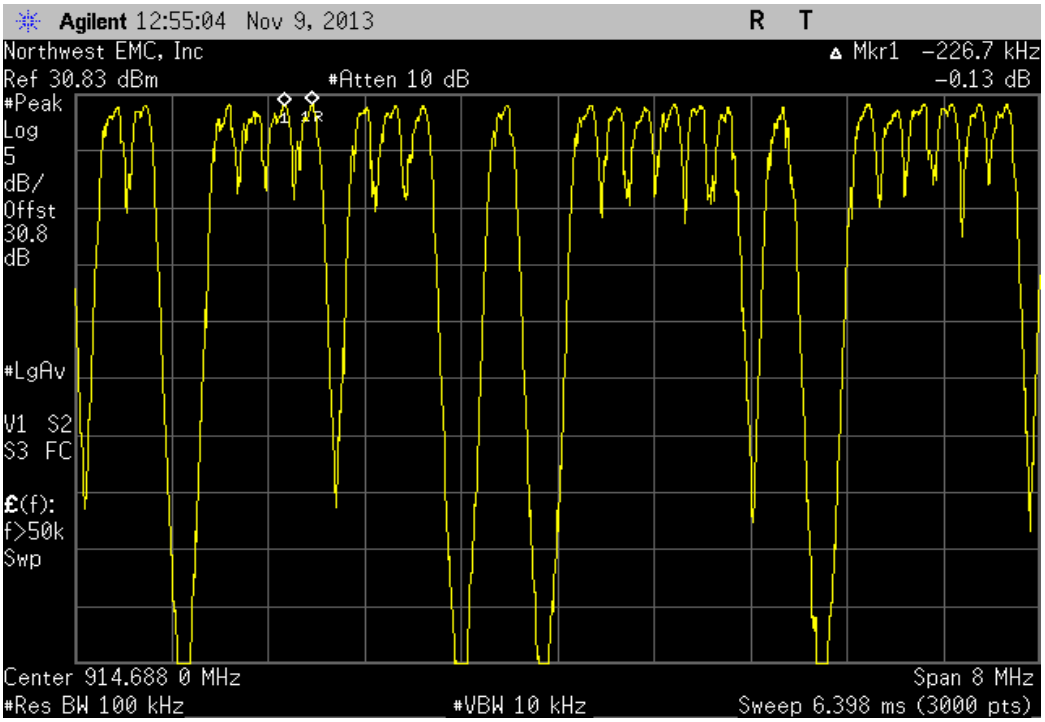
Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping Channels

				Value	Limit	Result
				232.1 kHz	≥ 160 kHz	Pass



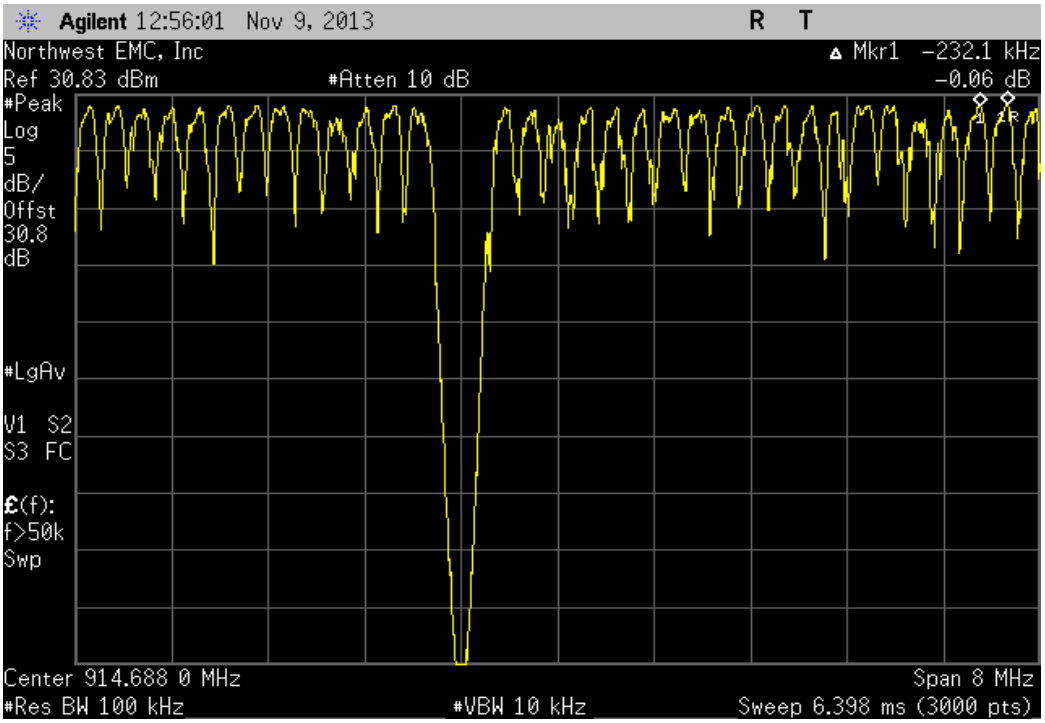
Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping Channels

Value	Limit	Result
226.7 kHz	≥ 160 kHz	Pass



Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping Channels

Value	Limit	Result
232.1 kHz	≥ 160 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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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.

The EUT is user configurable with one of 15 hopping patterns and between a minumum of 50 and a maximum of 112 hopping channels.

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

Number of Hopping Frequencies

EUT:	MM2	**Work Order:**	FREW0015
Serial Number:	245-3960	**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.	**Temperature:**	21°C
Attendees:	Dean Busch	**Humidity:**	41%
Project:	None	**Barometric Pres.:**	1020
Tested by:	Richard Mellroth	**Power:** 110VAC/60Hz	**Job Site:** NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

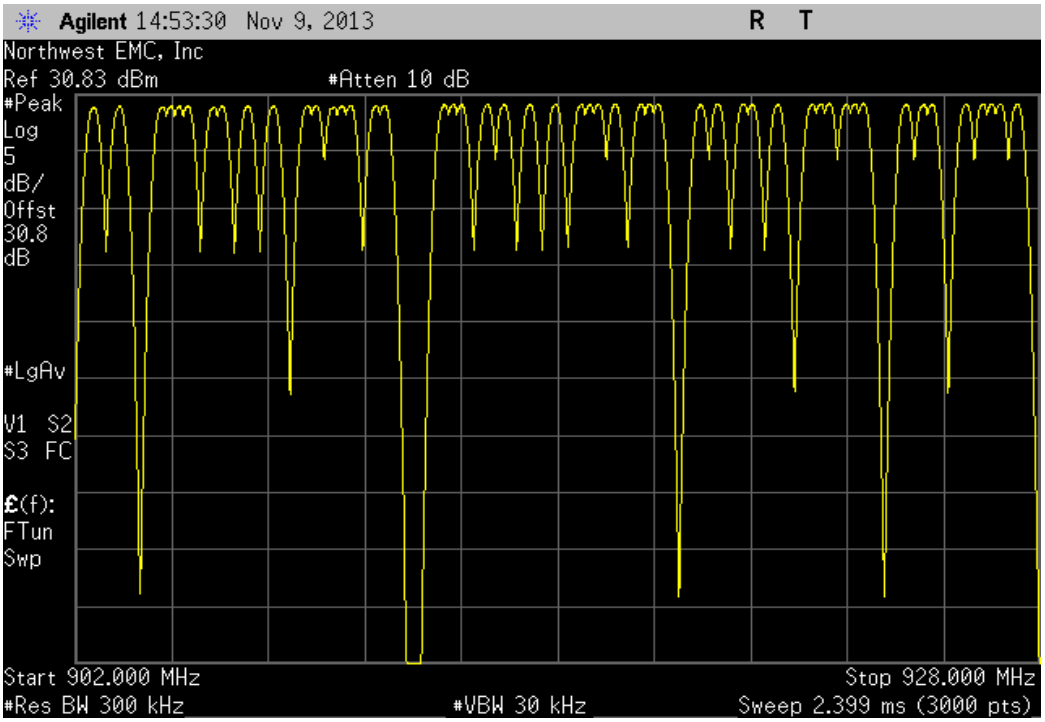
None

Configuration #	1	Signature

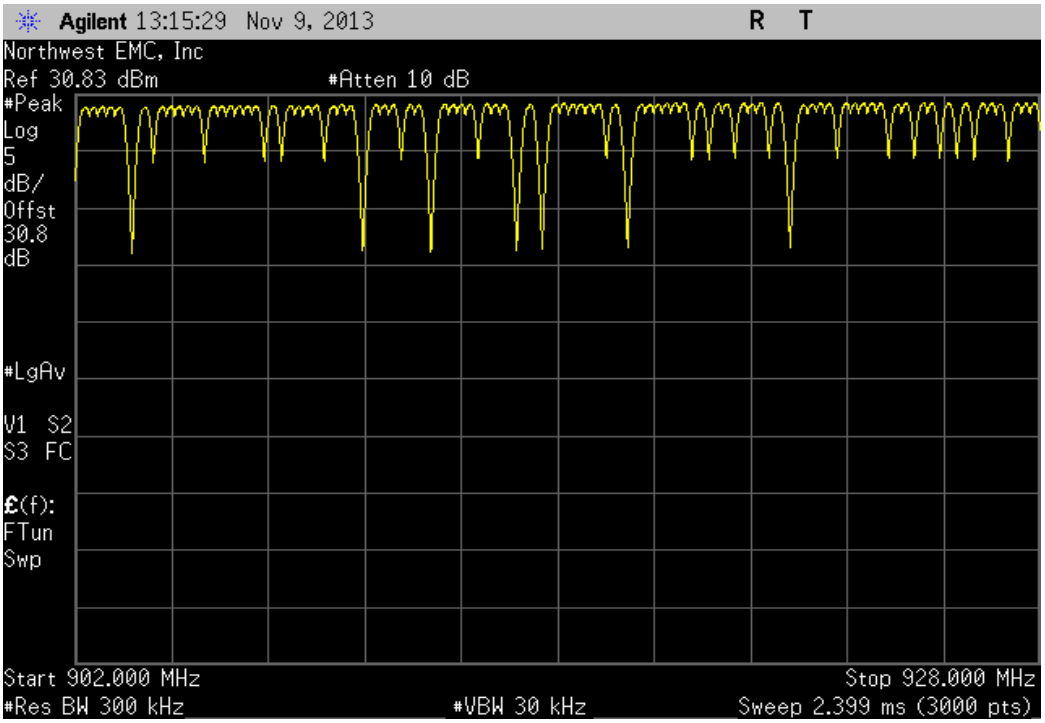
		Number of Channels	Limit	Result
Hopping Pattern 0				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 1				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	109	≥ 50	Pass
Hopping Pattern 2				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 3				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 4				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 5				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 6				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 7				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 8				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern 9				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	109	≥ 50	Pass
Hopping Pattern A				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern B				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern C				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass
Hopping Pattern D				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 15	Pass
Hopping Pattern E				
	153.6 kbps, GFSK			
	Mid Channel 130, 914.688 MHz, 50 Hopping	50	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 80 Hopping	80	≥ 50	Pass
	Mid Channel 130, 914.688 MHz, 112 Hopping	112	≥ 50	Pass

Number of Hopping Frequencies

Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

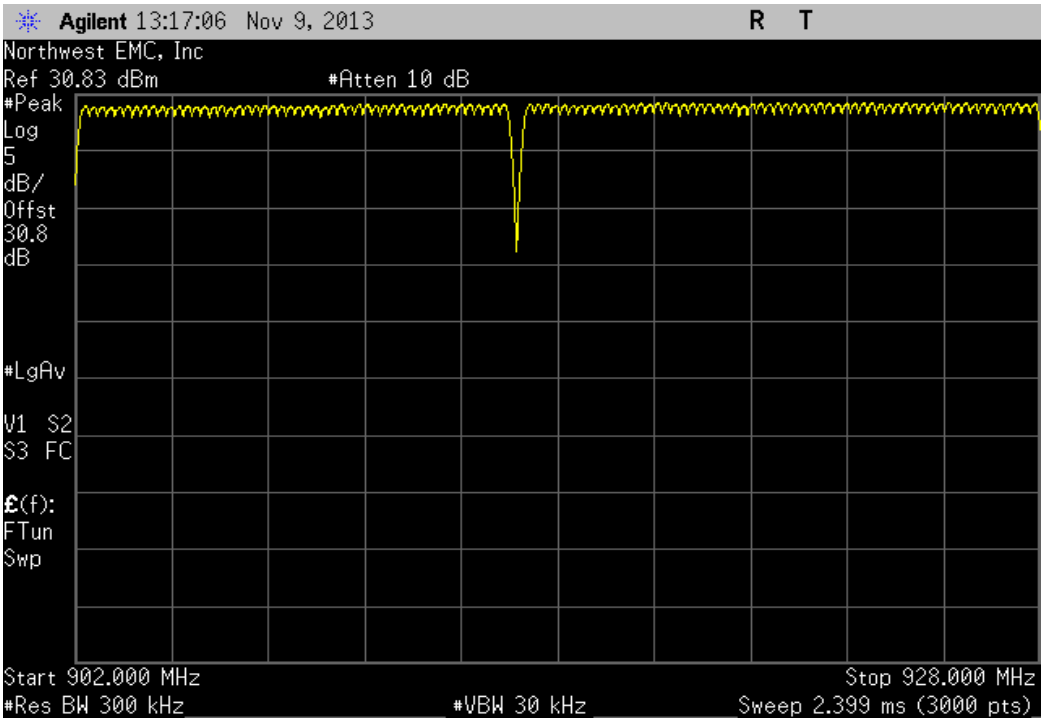


Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

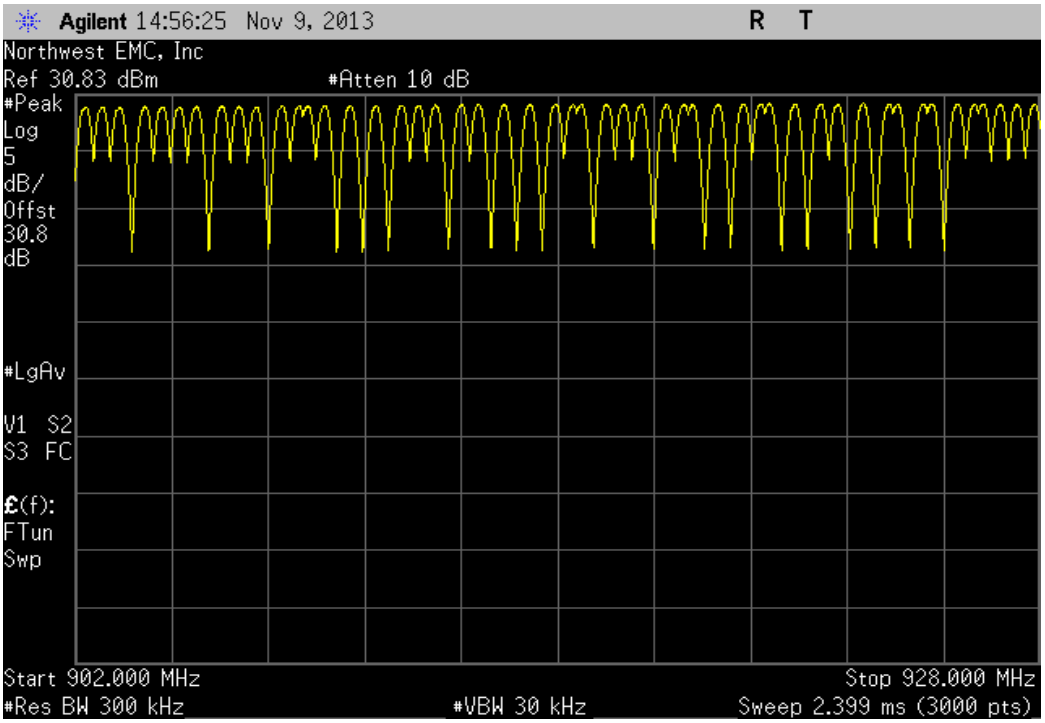


Number of Hopping Frequencies

Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

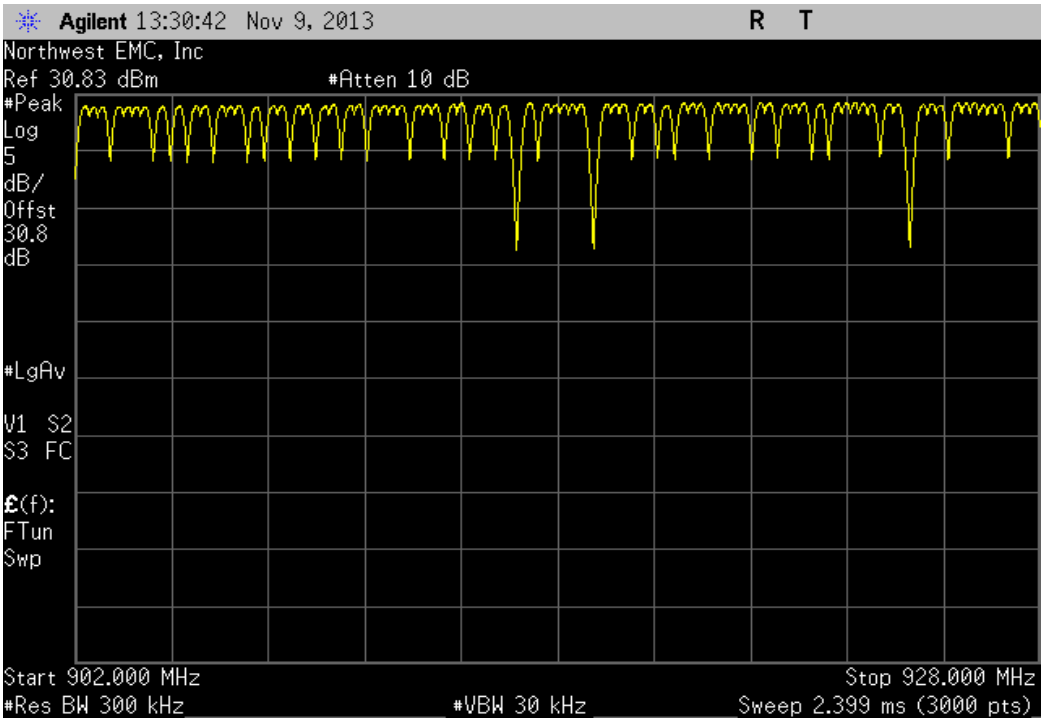


Hopping Pattern 1, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

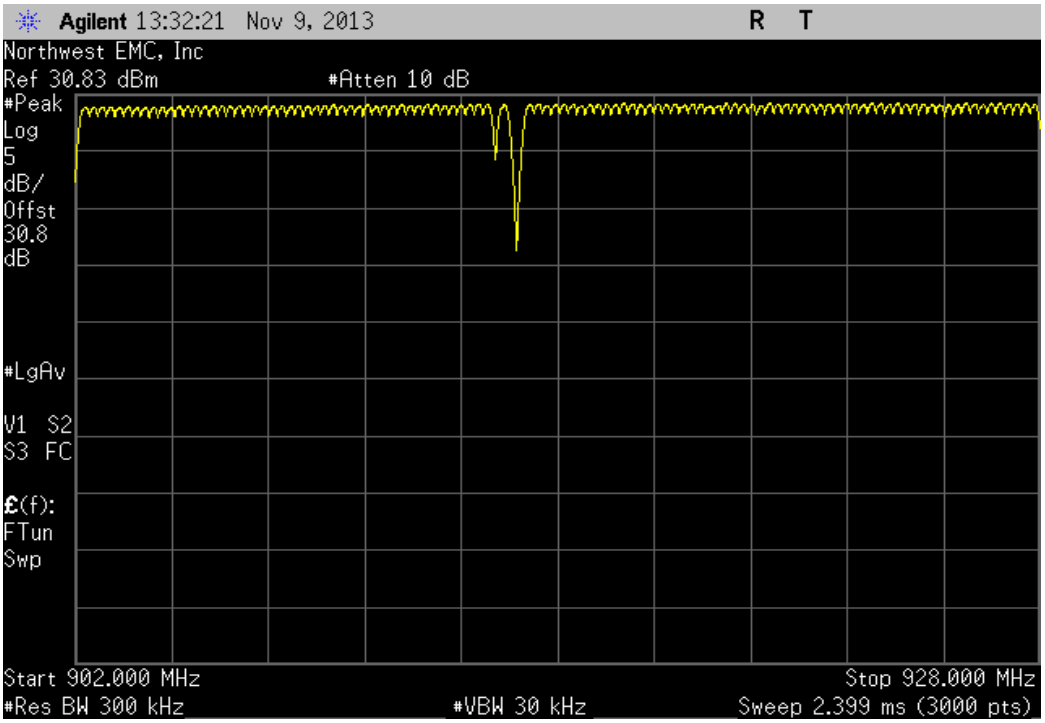


Number of Hopping Frequencies

Hopping Pattern 1, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

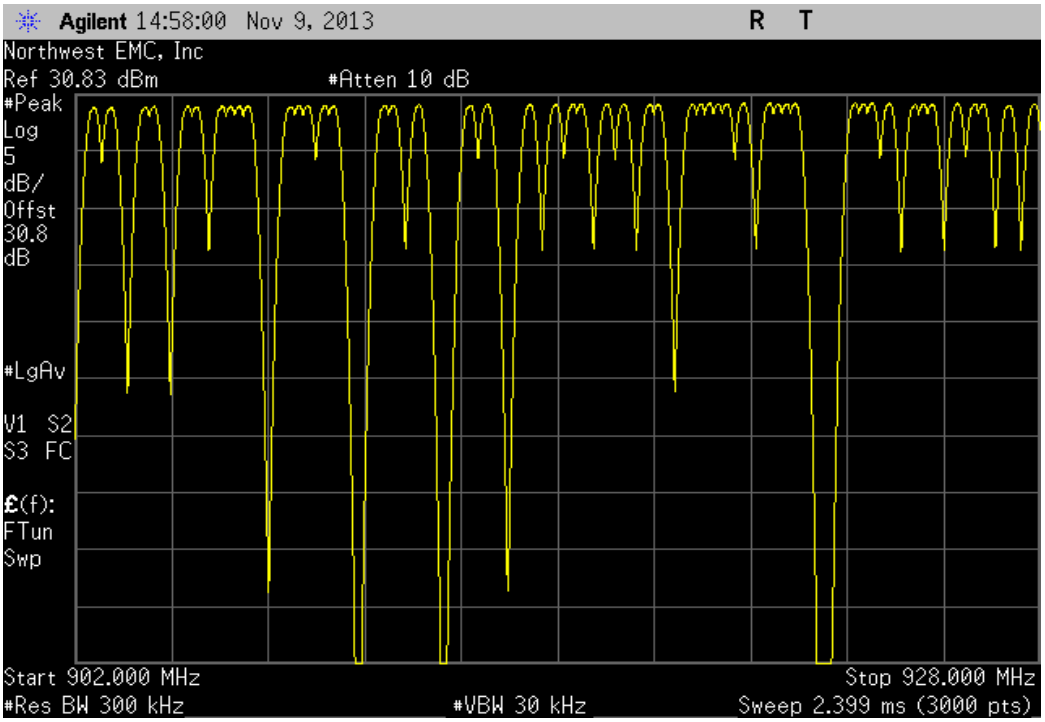


Hopping Pattern 1, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				109	≥ 50	Pass

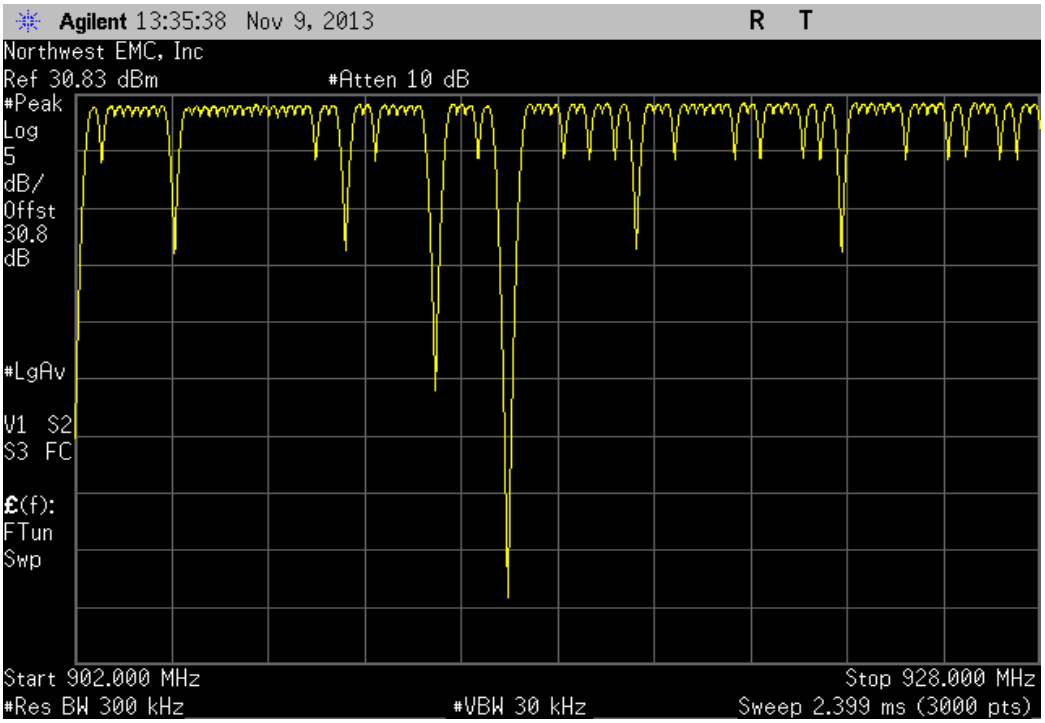


Number of Hopping Frequencies

Hopping Pattern 2, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

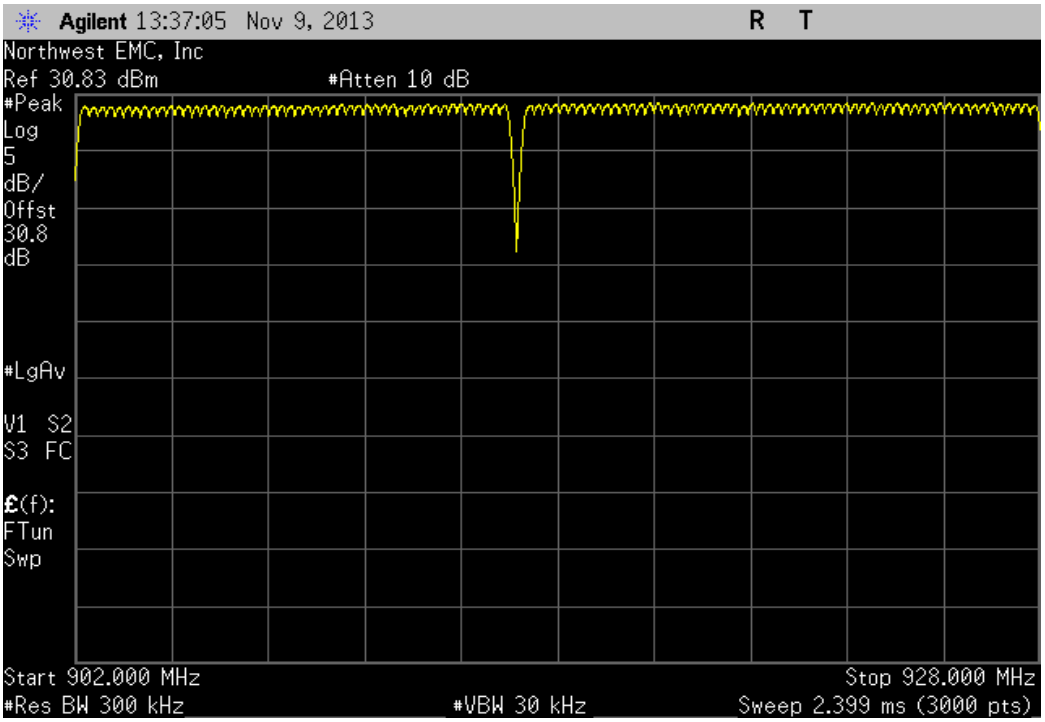


Hopping Pattern 2, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

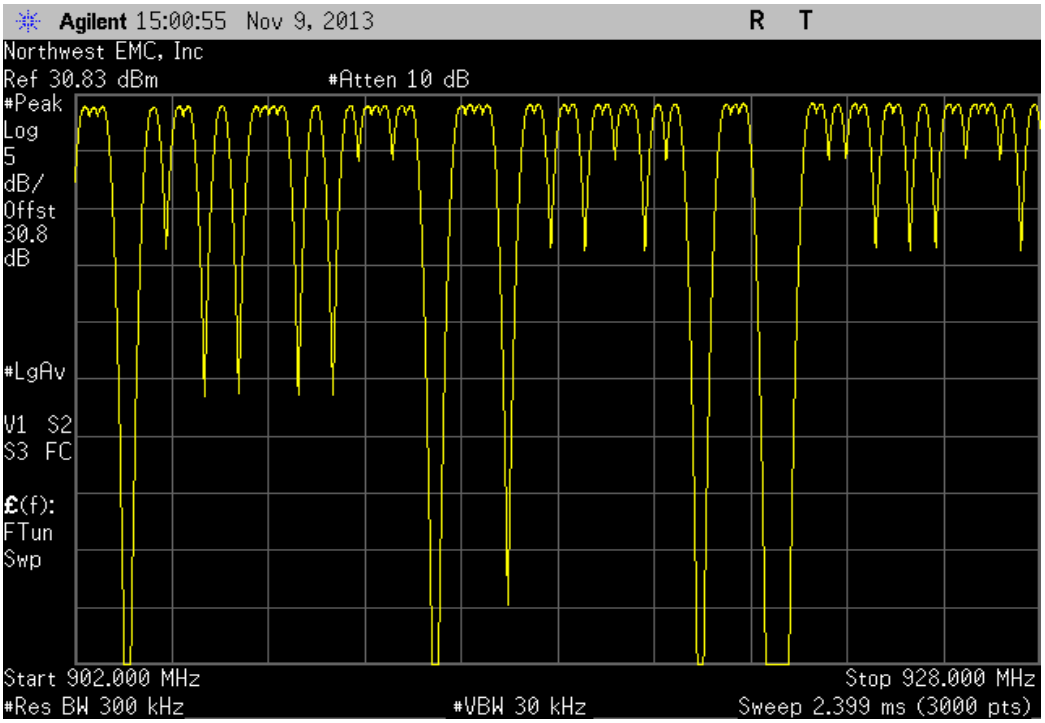


Number of Hopping Frequencies

Hopping Pattern 2, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

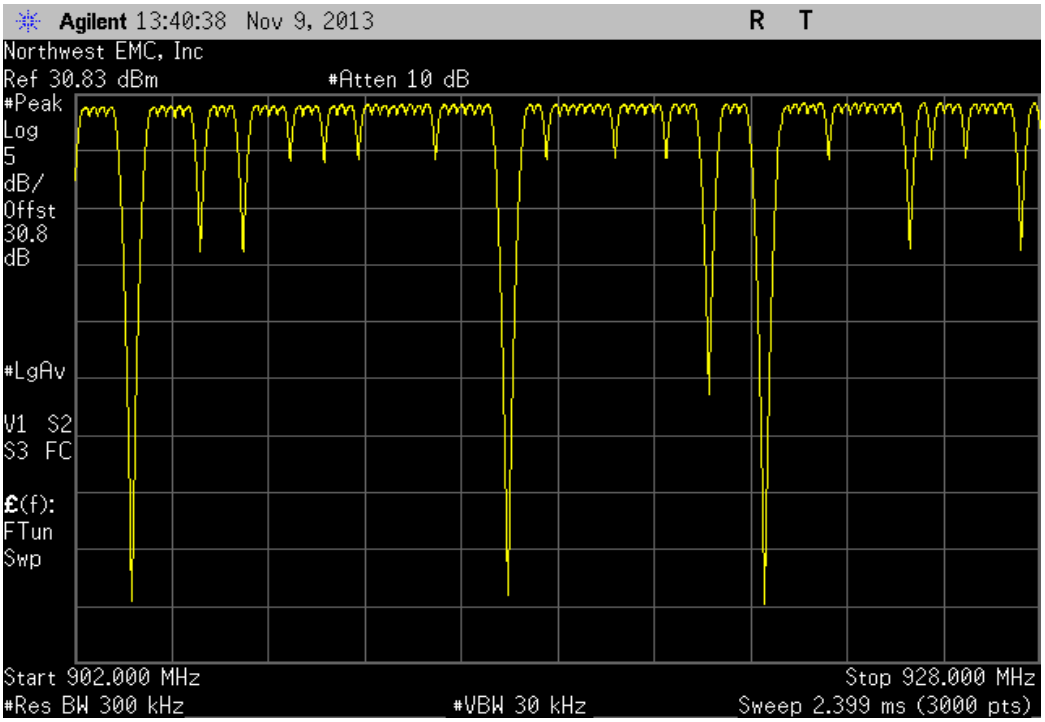


Hopping Pattern 3, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

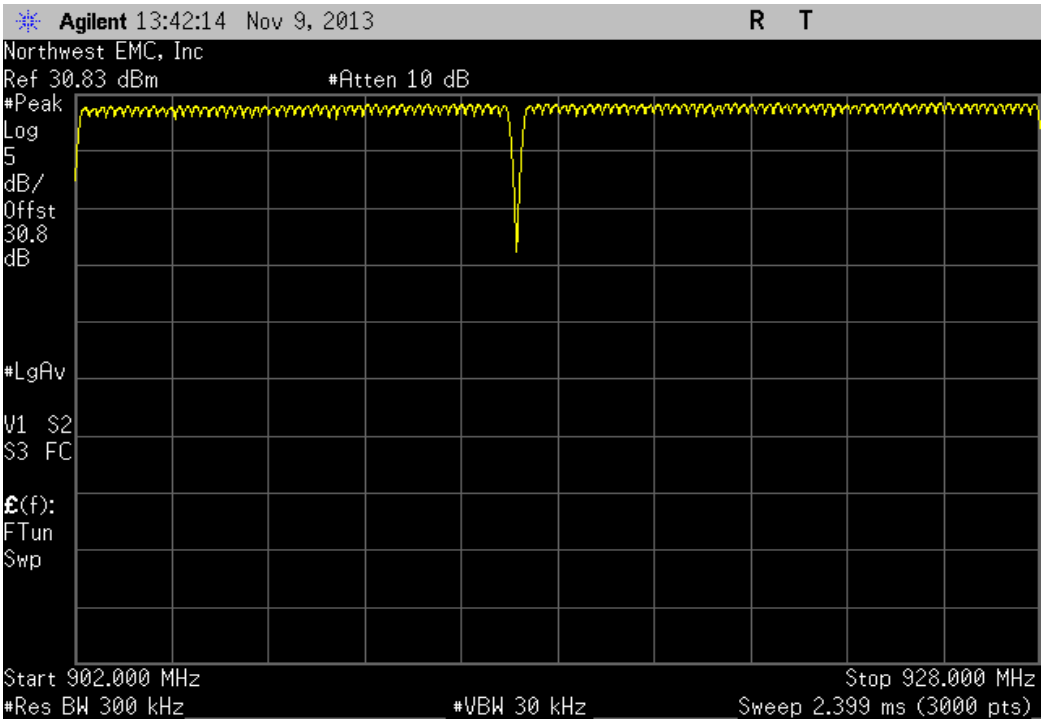


Number of Hopping Frequencies

Hopping Pattern 3, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

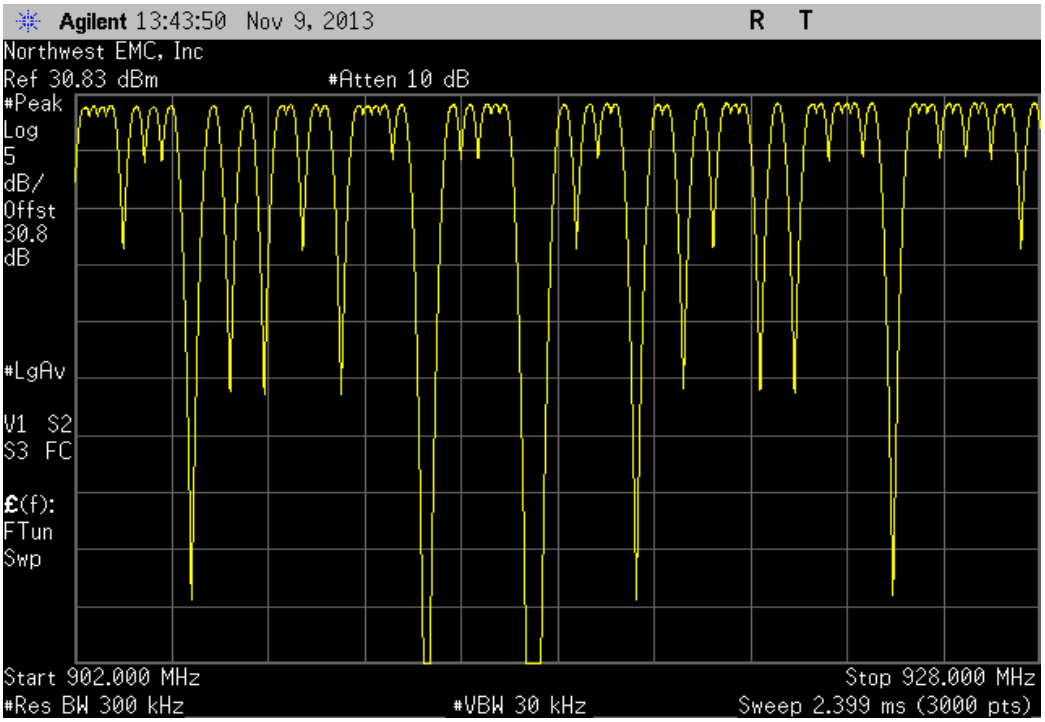


Hopping Pattern 3, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

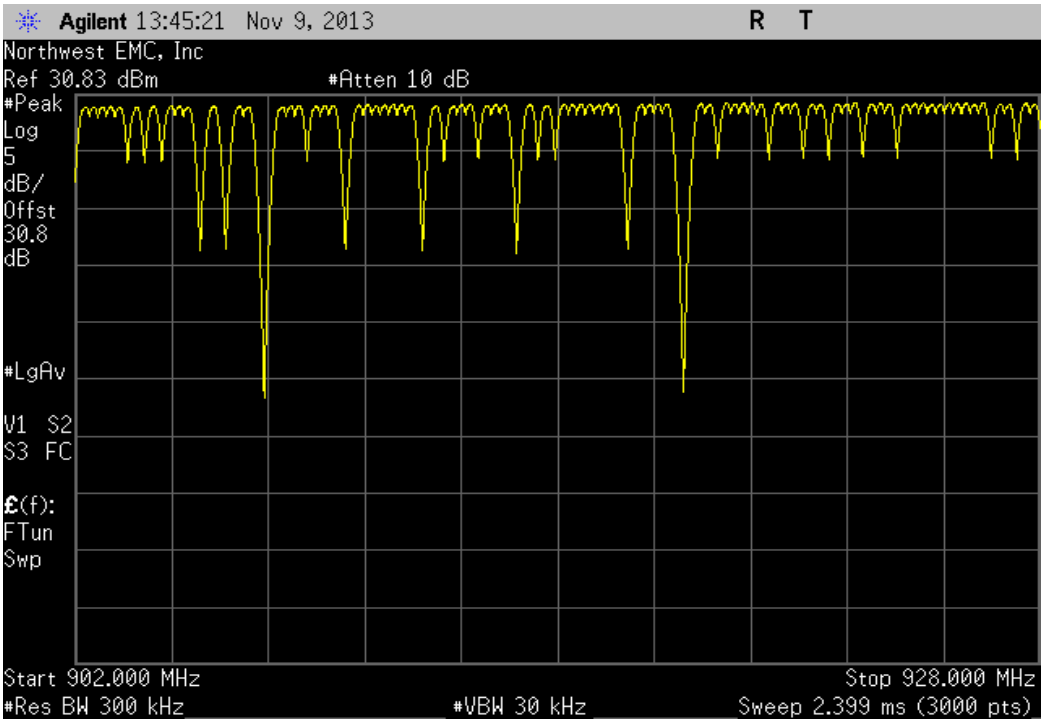


Number of Hopping Frequencies

Hopping Pattern 4, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

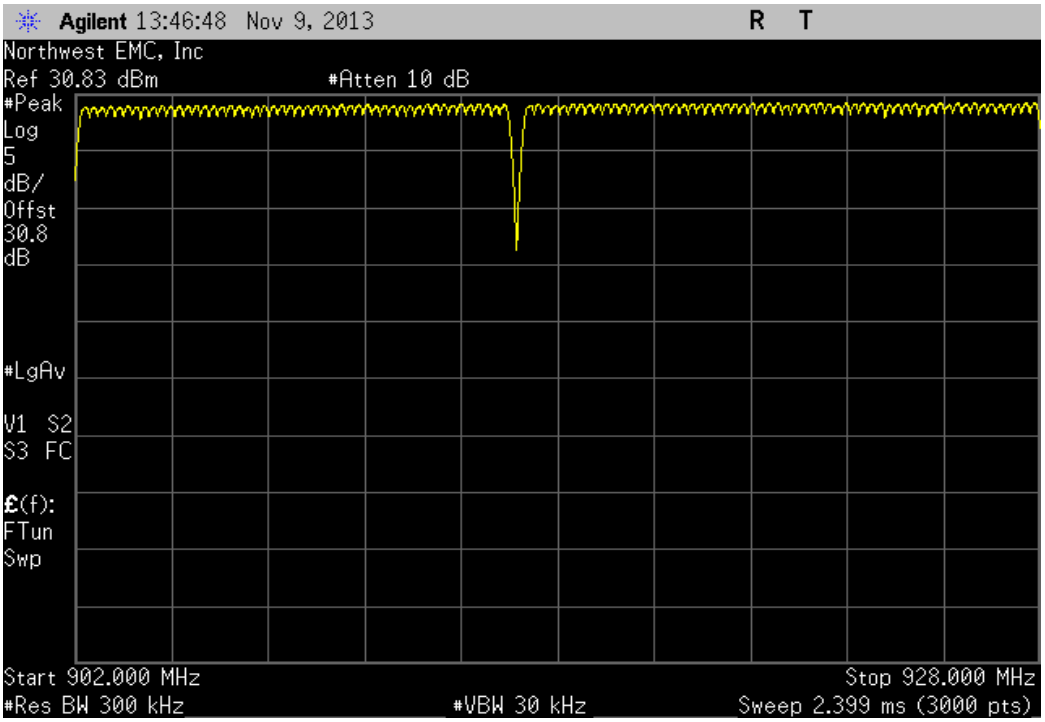


Hopping Pattern 4, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

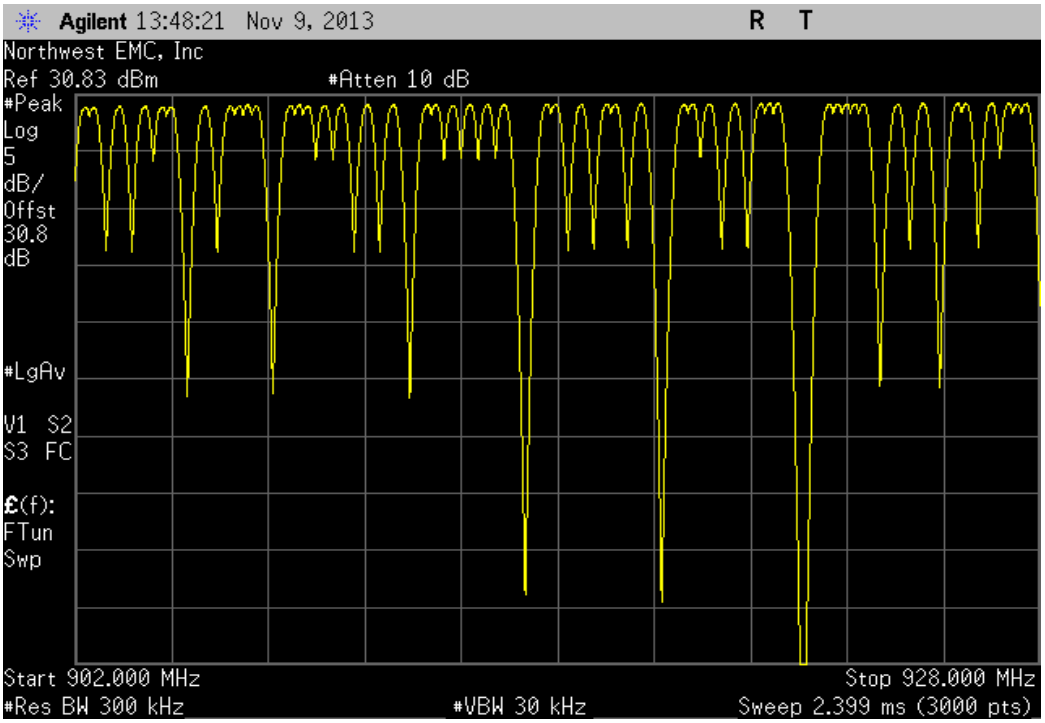


Number of Hopping Frequencies

Hopping Pattern 4, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

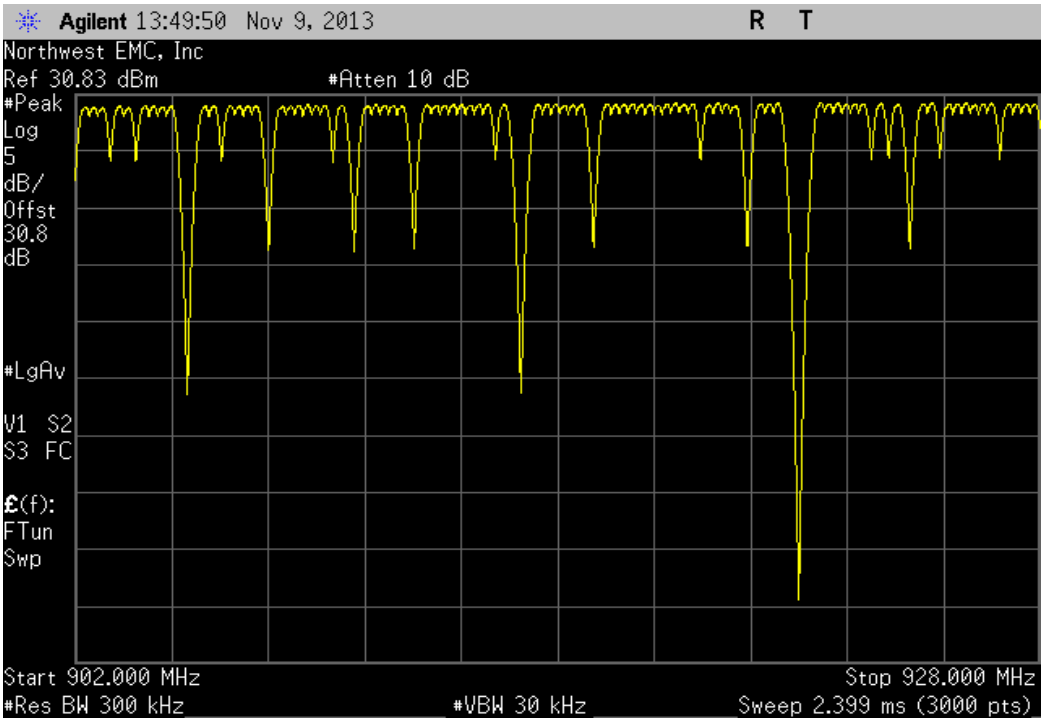


Hopping Pattern 5, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

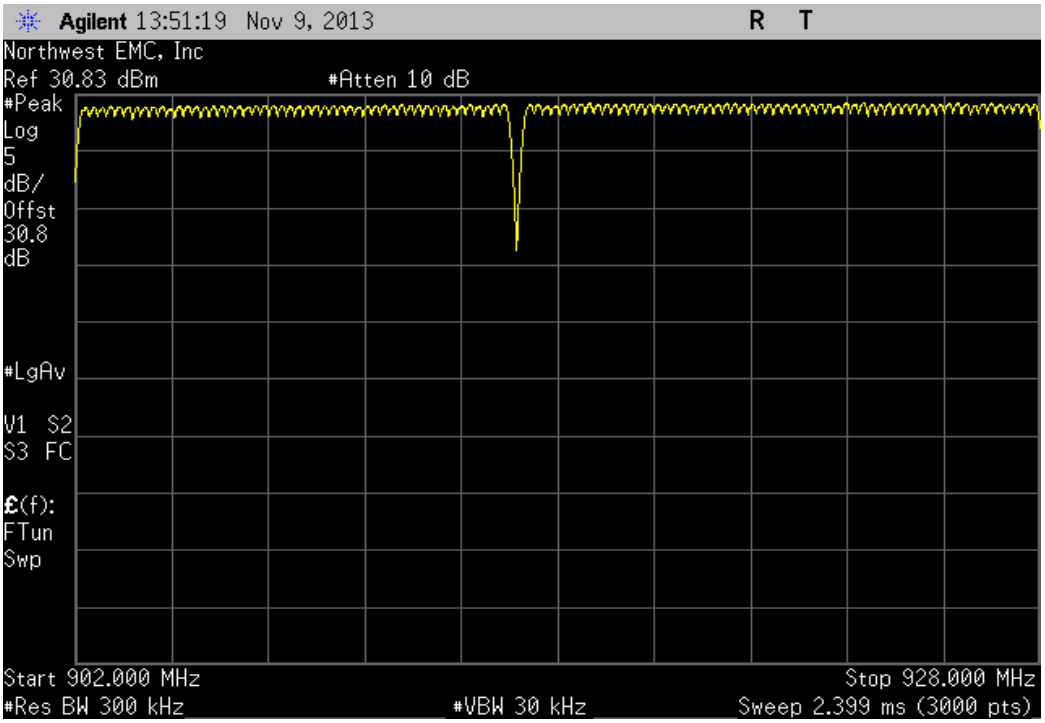


Number of Hopping Frequencies

Hopping Pattern 5, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

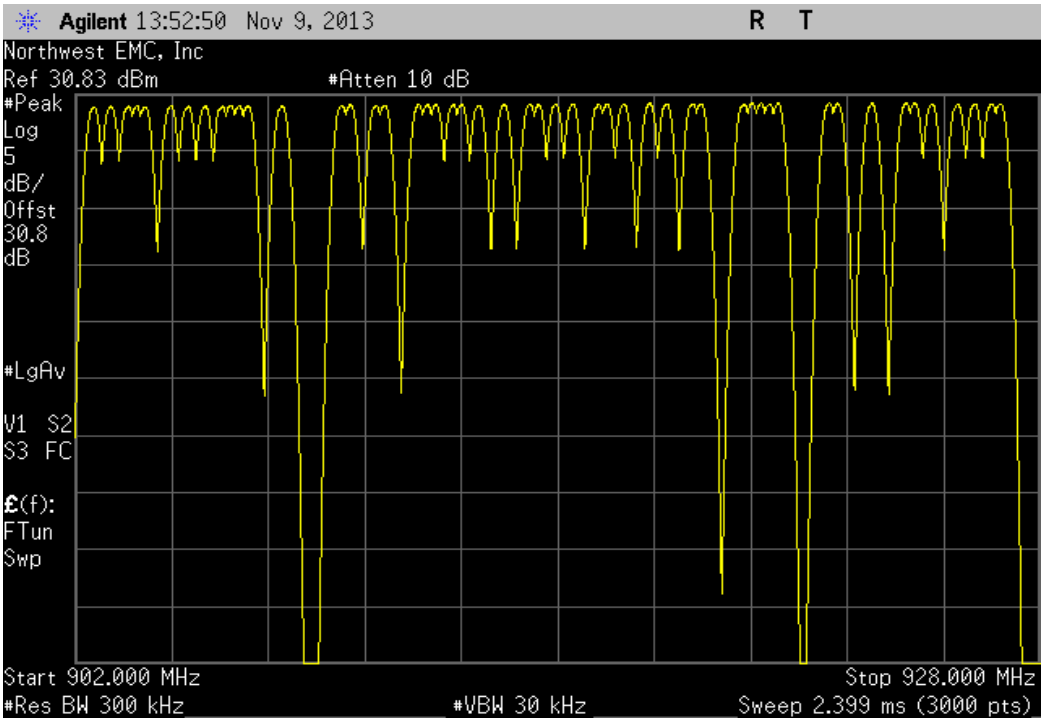


Hopping Pattern 5, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

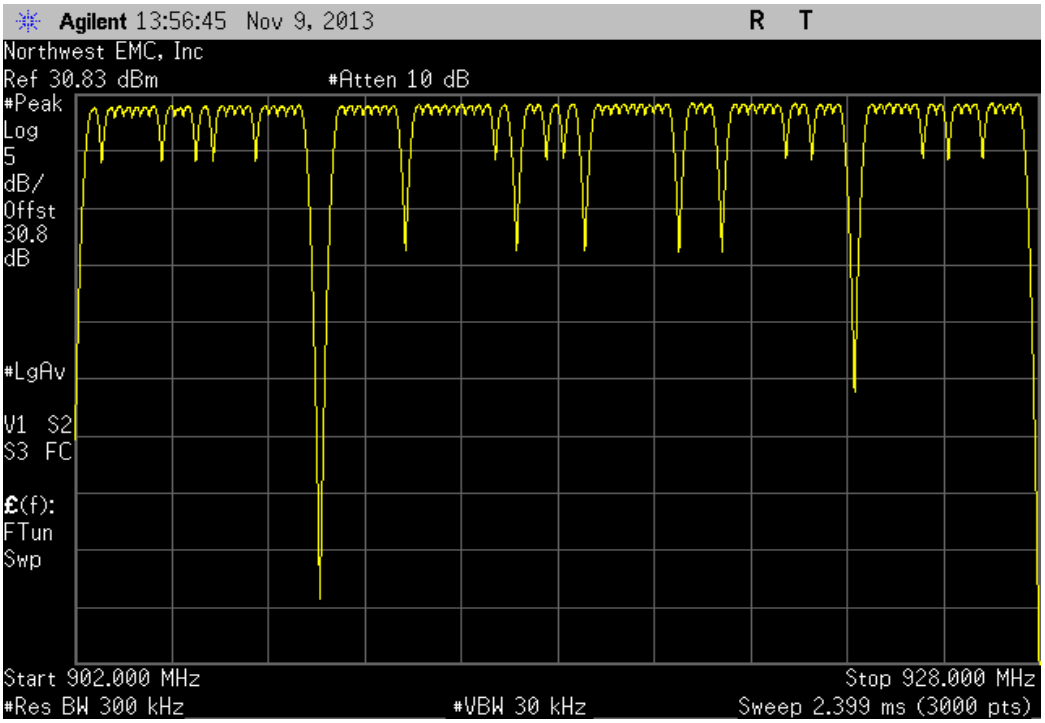


Number of Hopping Frequencies

Hopping Pattern 6, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

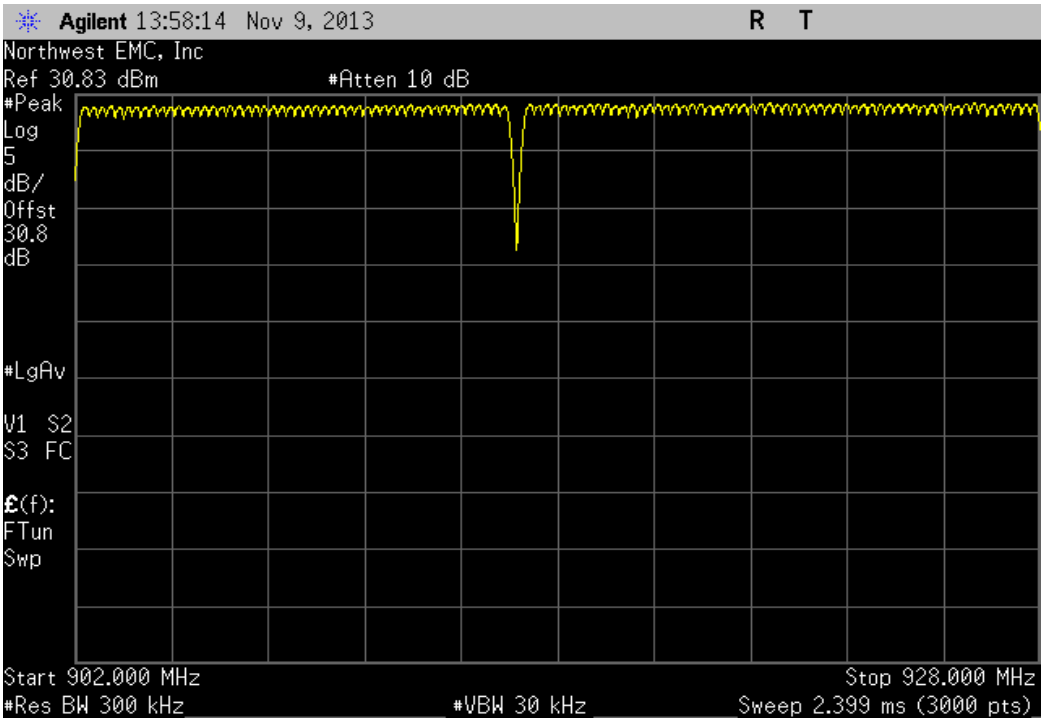


Hopping Pattern 6, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

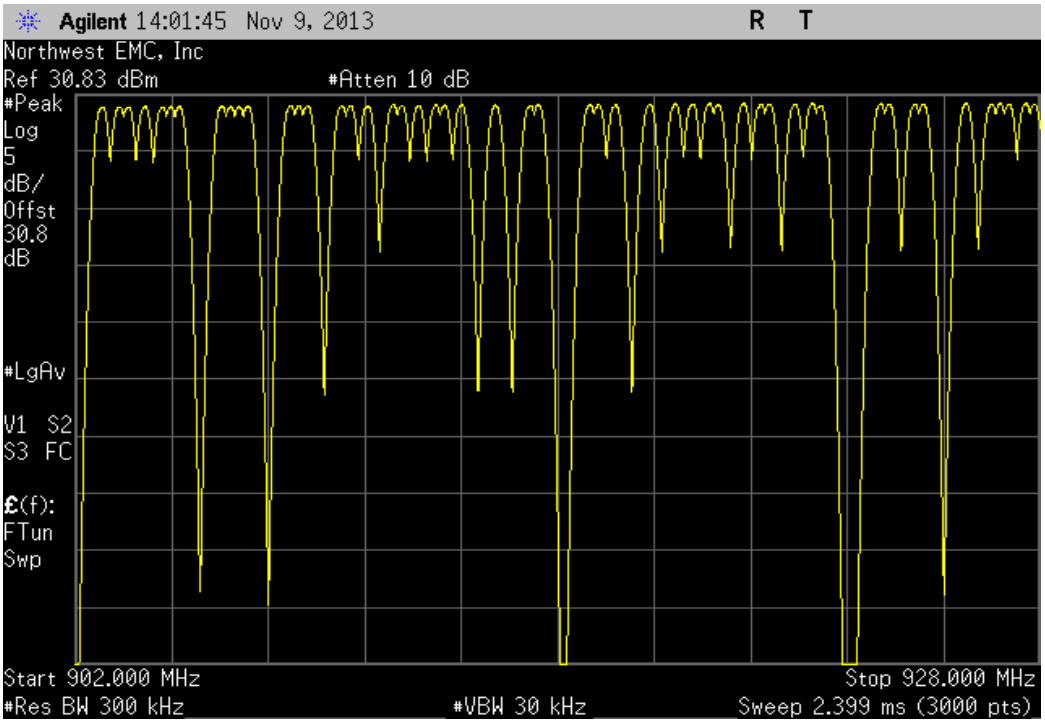


Number of Hopping Frequencies

Hopping Pattern 6, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

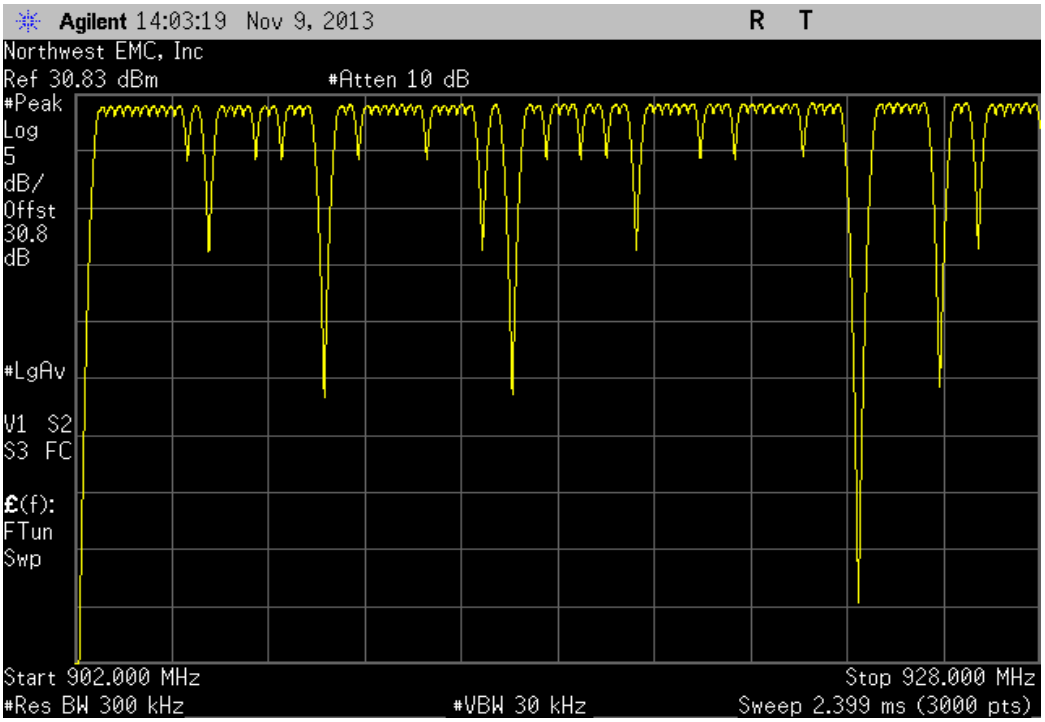


Hopping Pattern 7, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

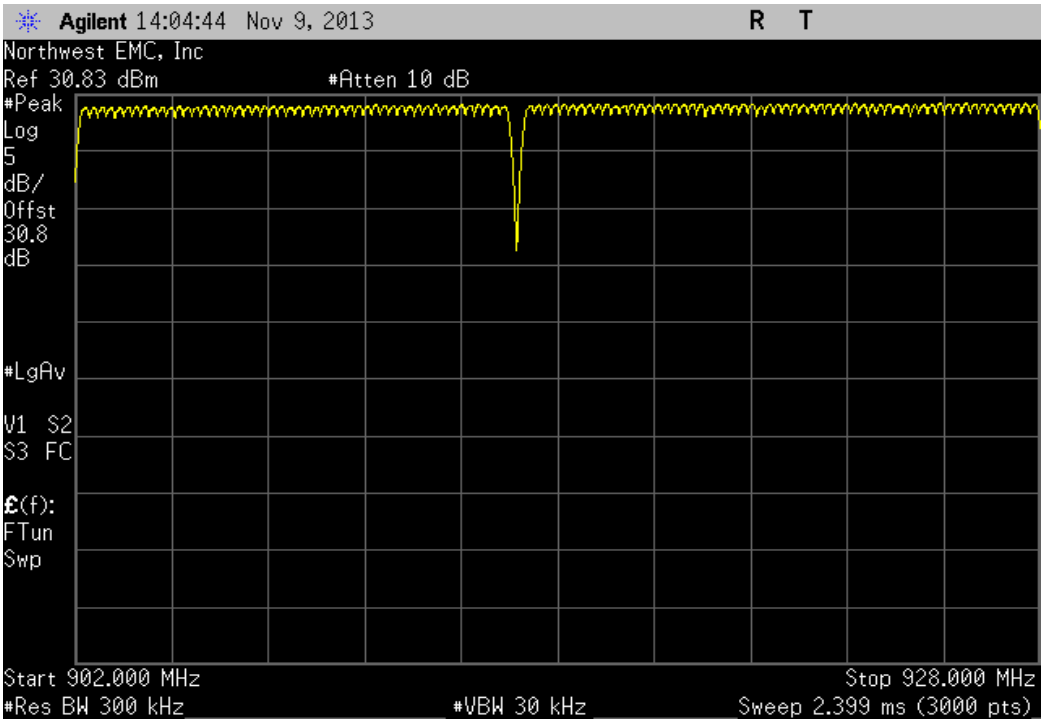


Number of Hopping Frequencies

Hopping Pattern 7, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

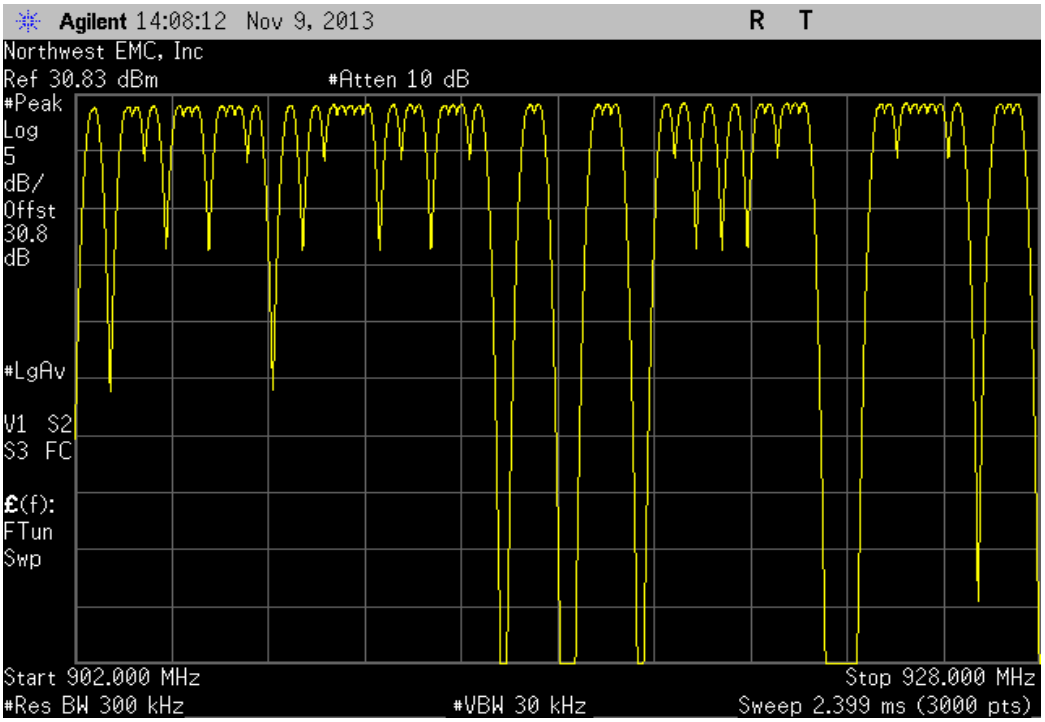


Hopping Pattern 7, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

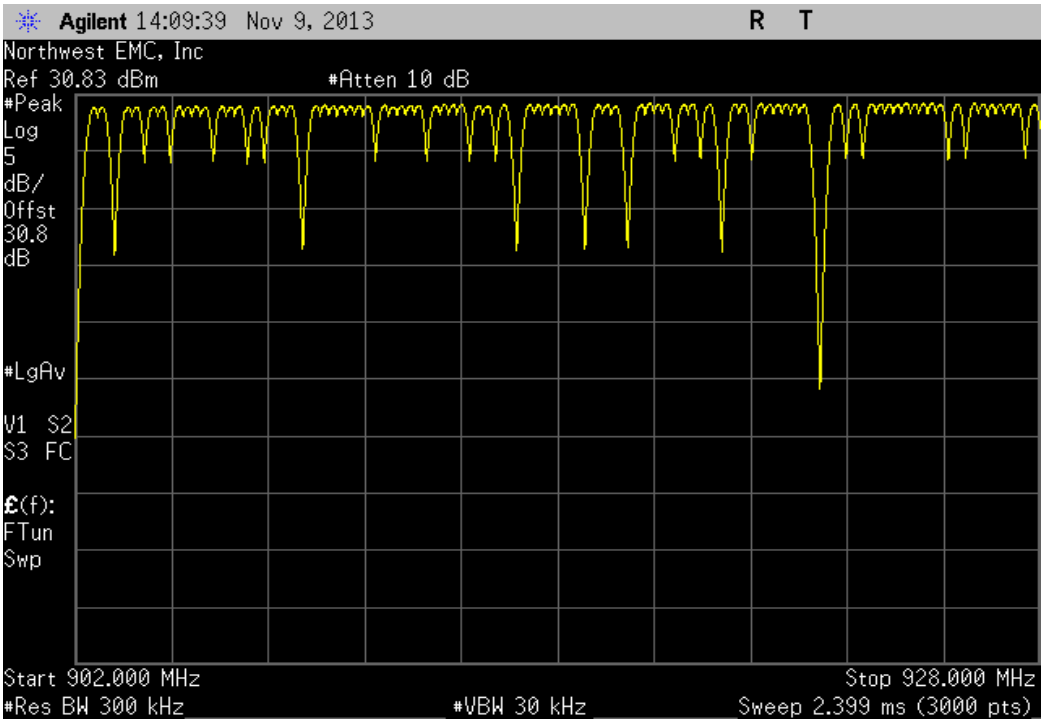


Number of Hopping Frequencies

Hopping Pattern 8, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

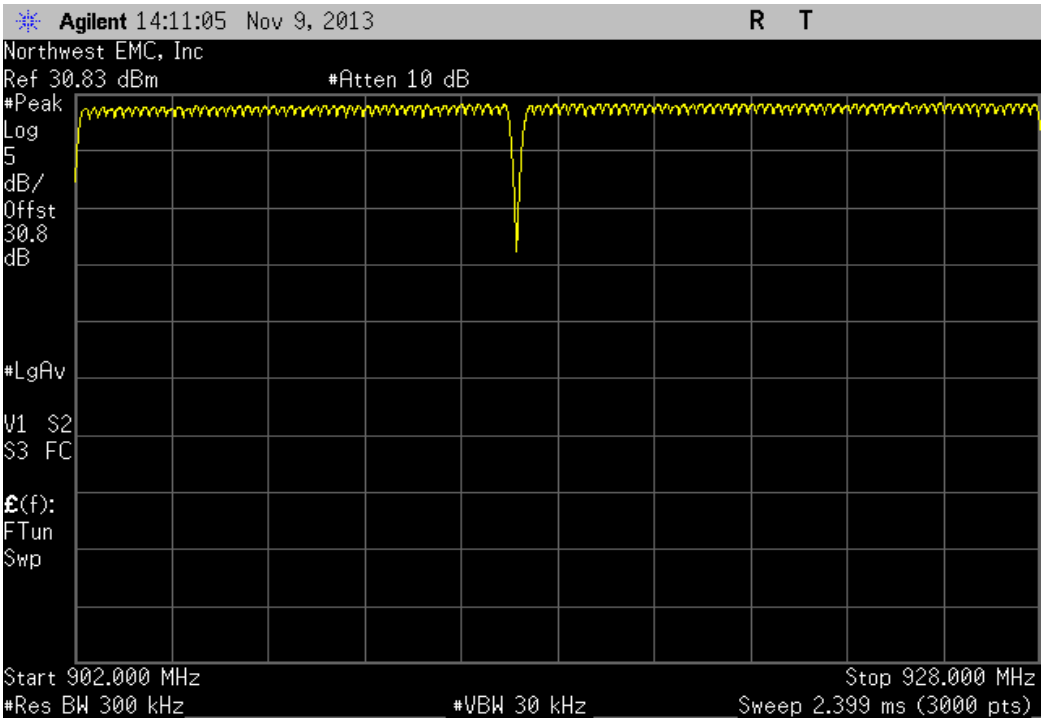


Hopping Pattern 8, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

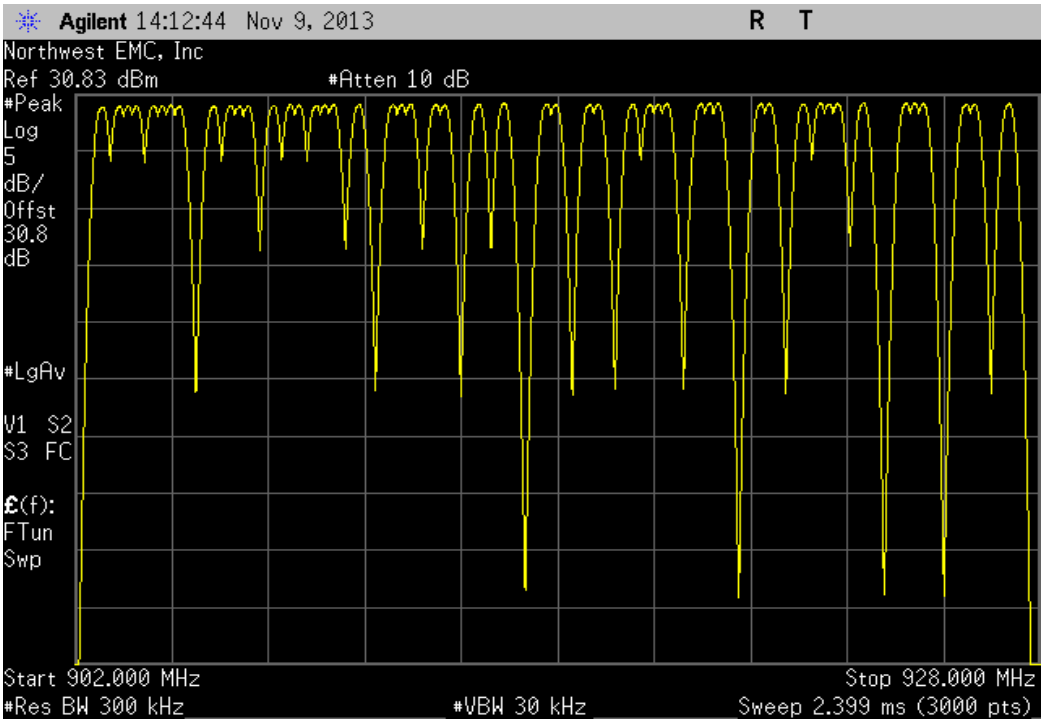


Number of Hopping Frequencies

Hopping Pattern 8, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

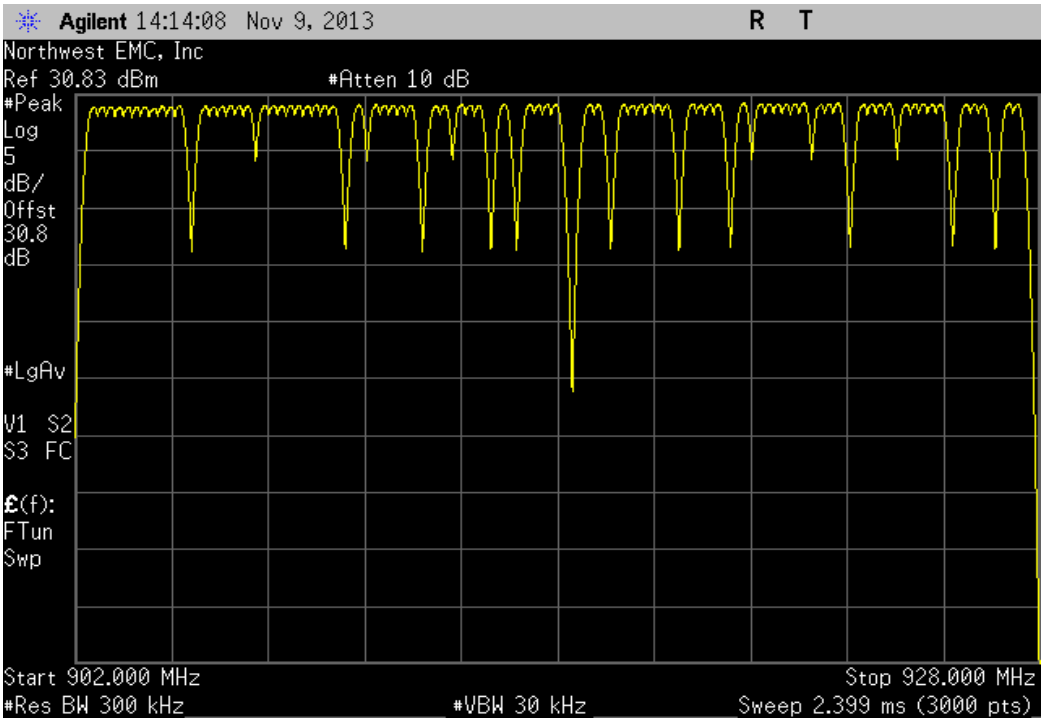


Hopping Pattern 9, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

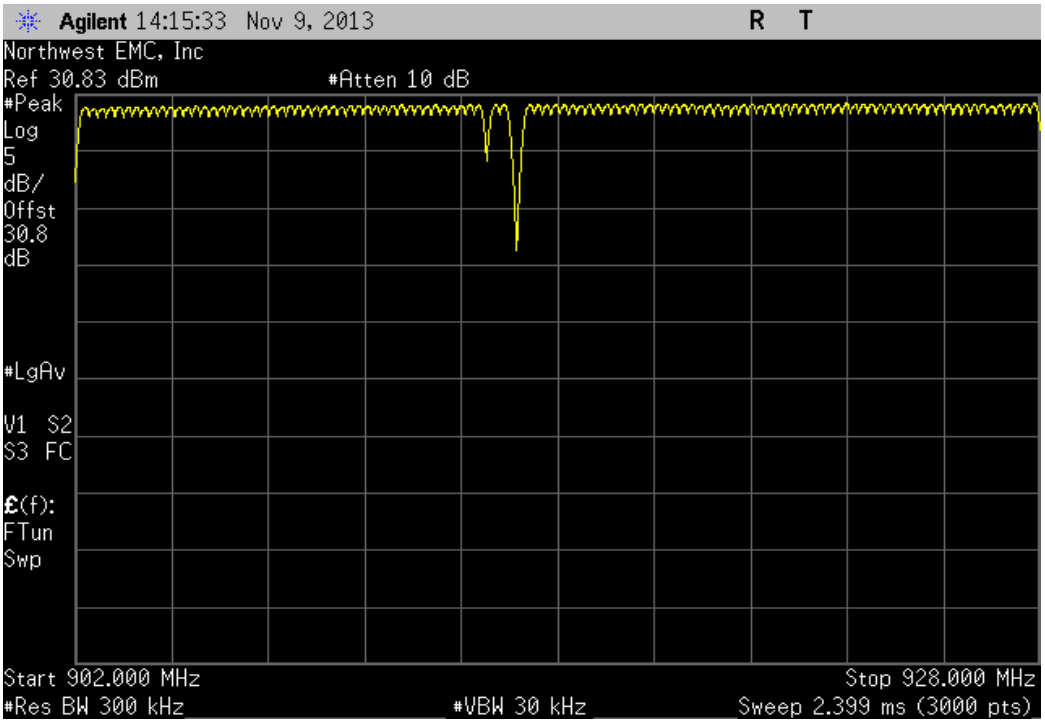


Number of Hopping Frequencies

Hopping Pattern 9, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

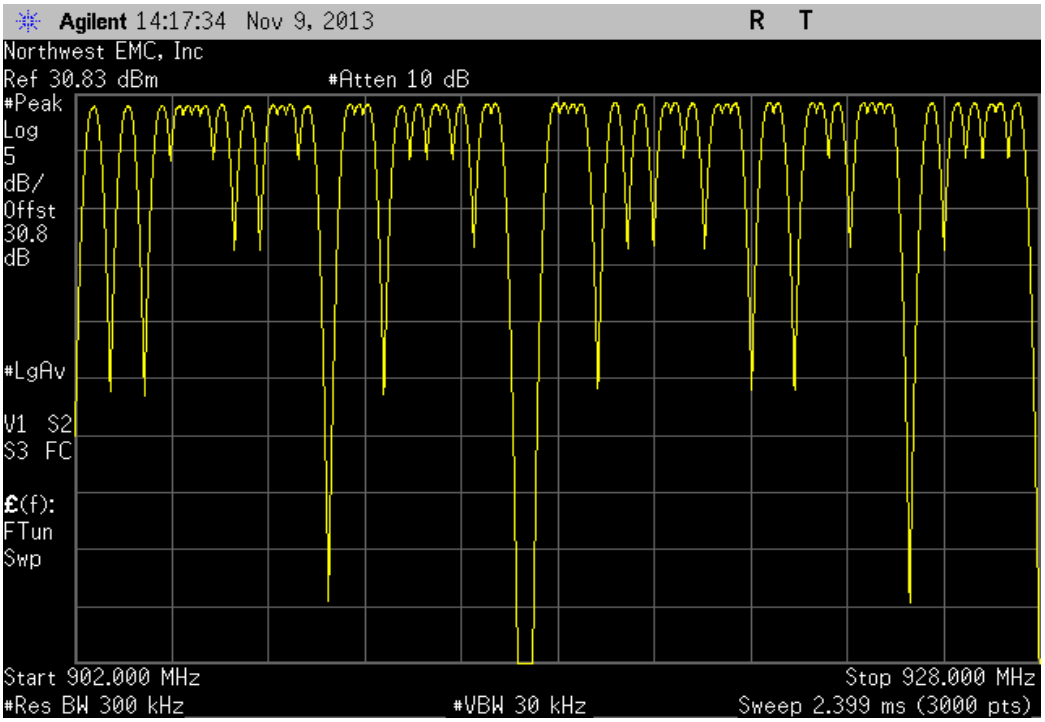


Hopping Pattern 9, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				109	≥ 50	Pass

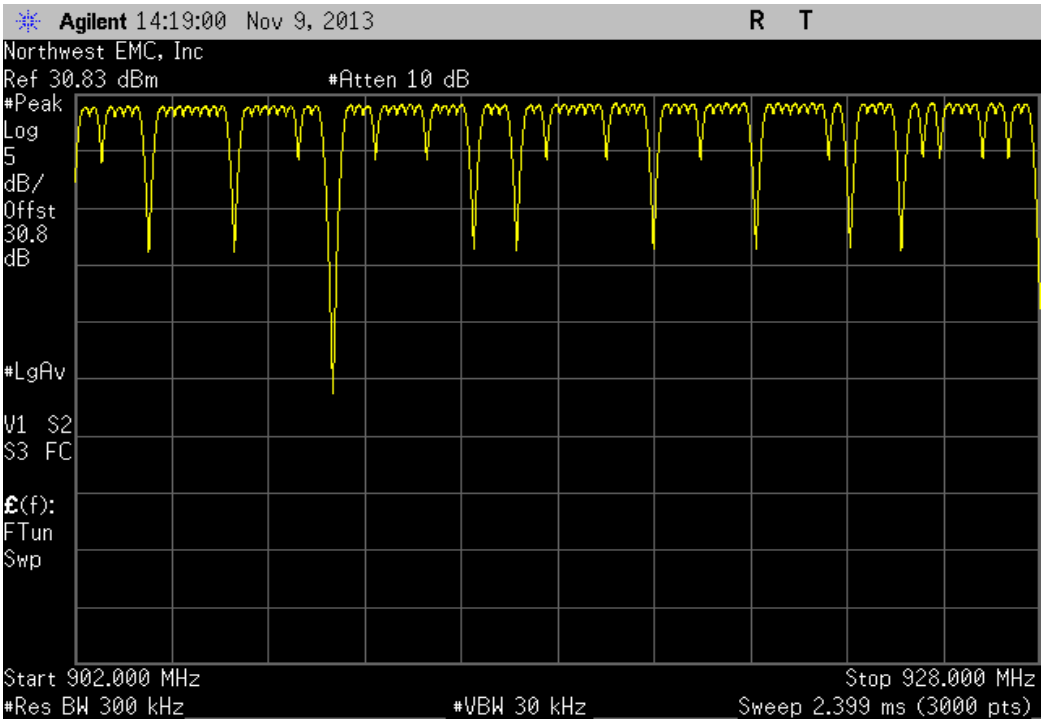


Number of Hopping Frequencies

Hopping Pattern A, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

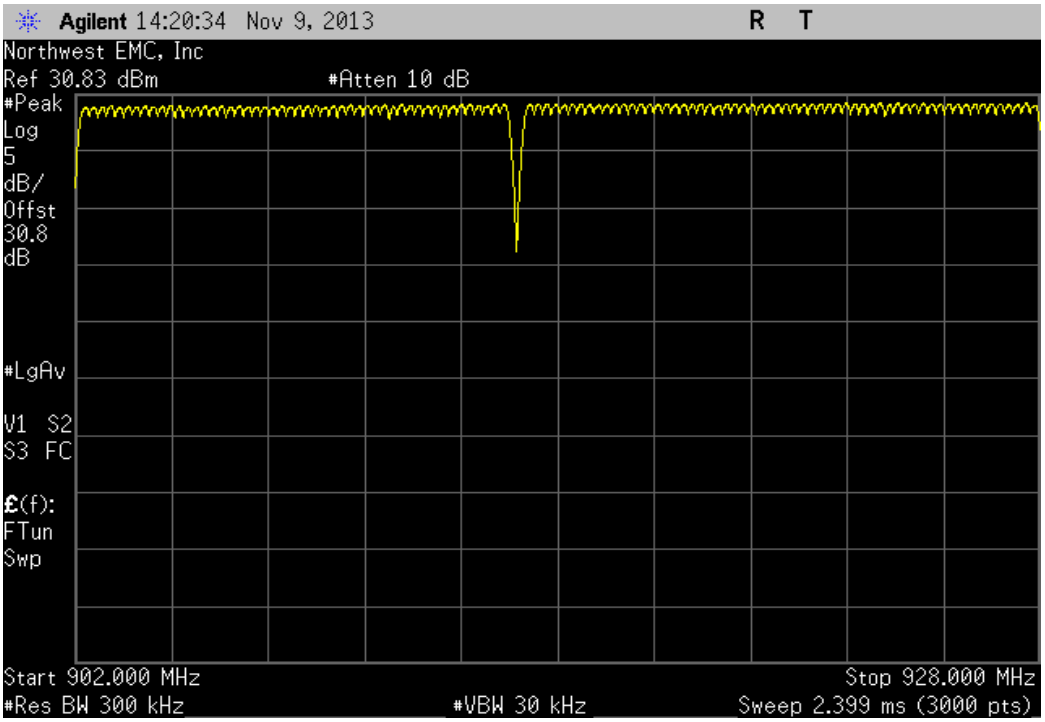


Hopping Pattern A, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

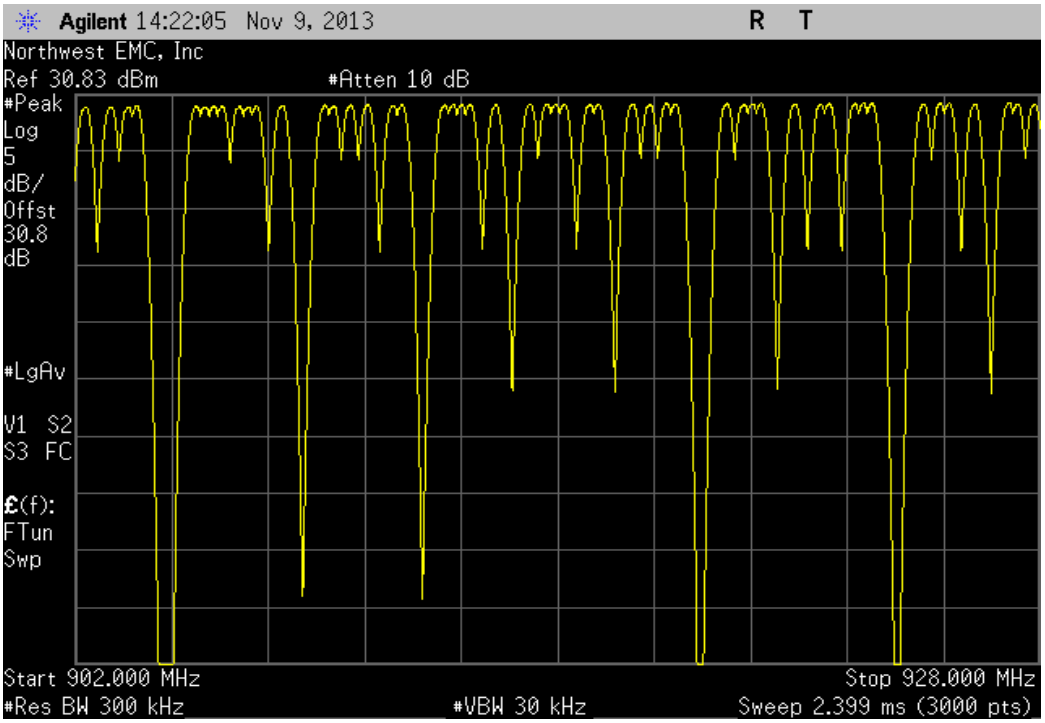


Number of Hopping Frequencies

Hopping Pattern A, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

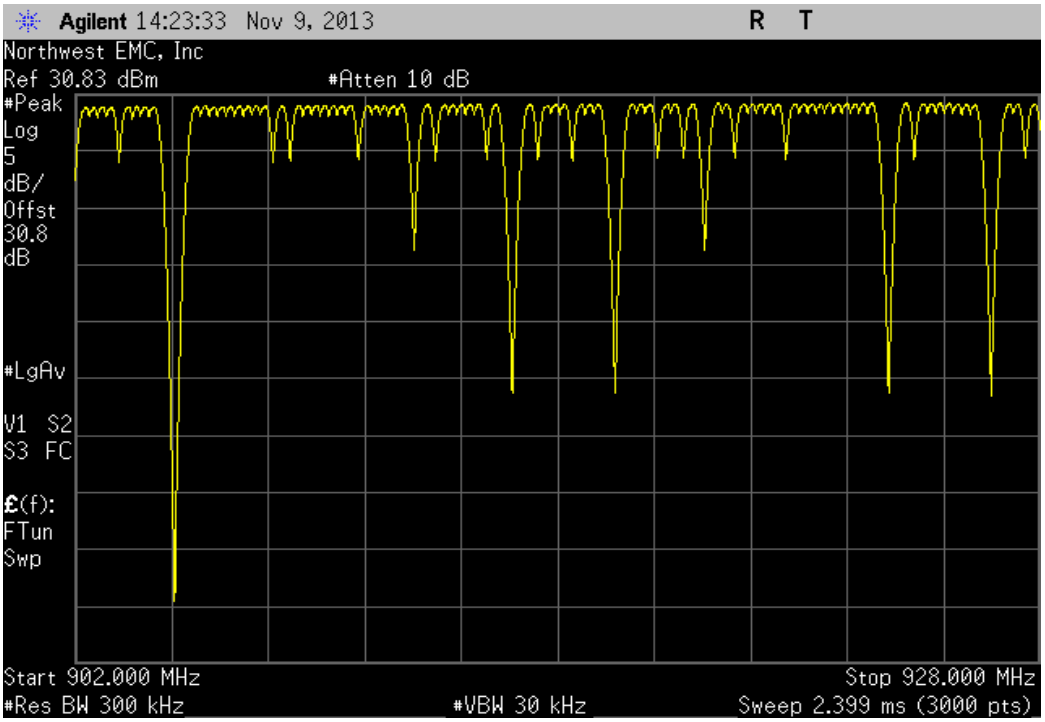


Hopping Pattern B, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

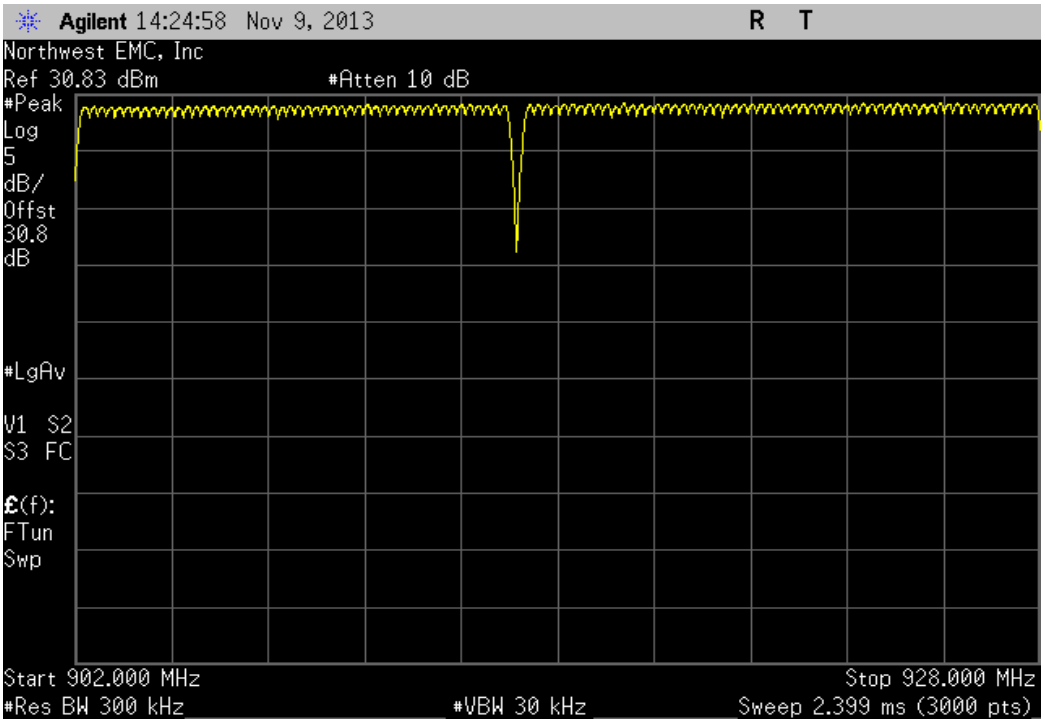


Number of Hopping Frequencies

Hopping Pattern B, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

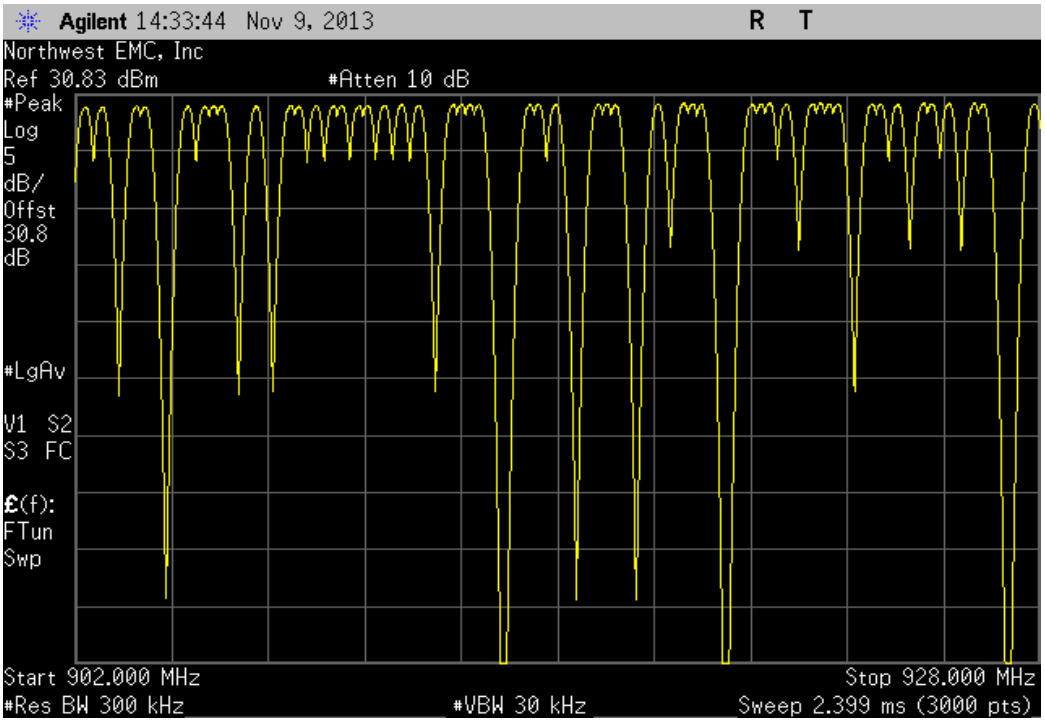


Hopping Pattern B, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

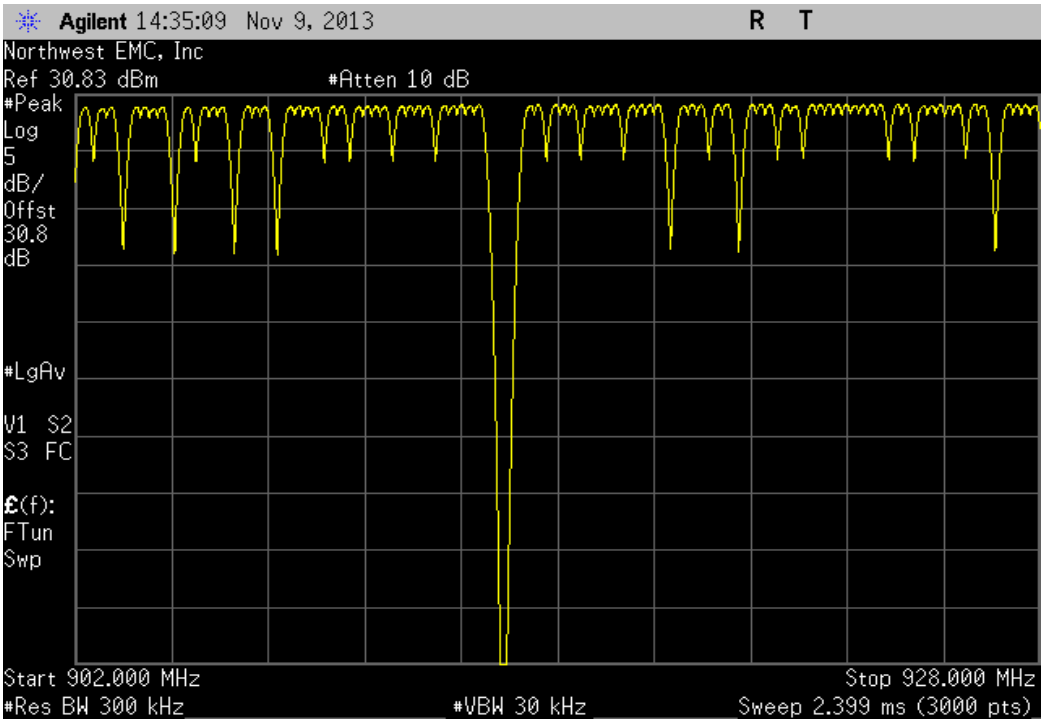


Number of Hopping Frequencies

Hopping Pattern C, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

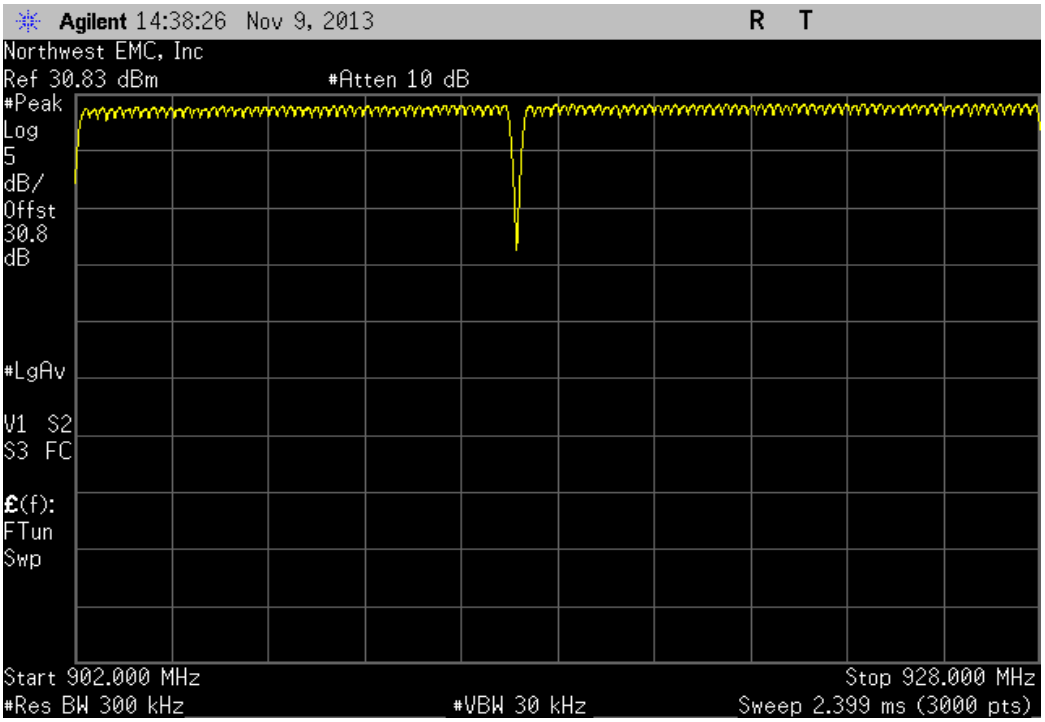


Hopping Pattern C, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

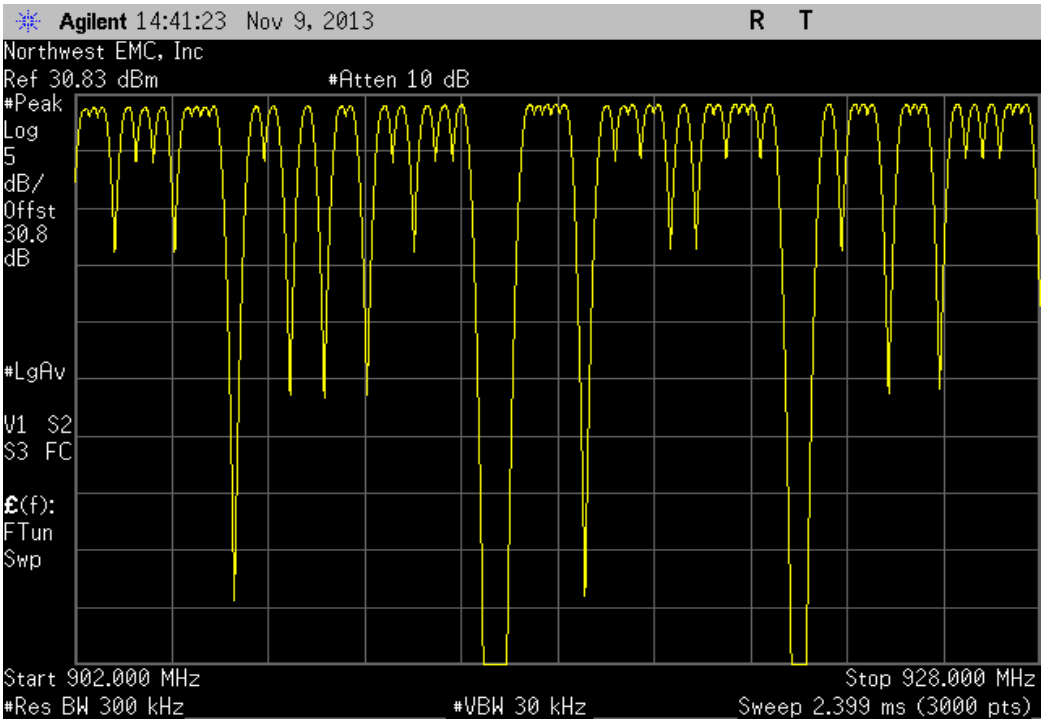


Number of Hopping Frequencies

Hopping Pattern C, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	Pass

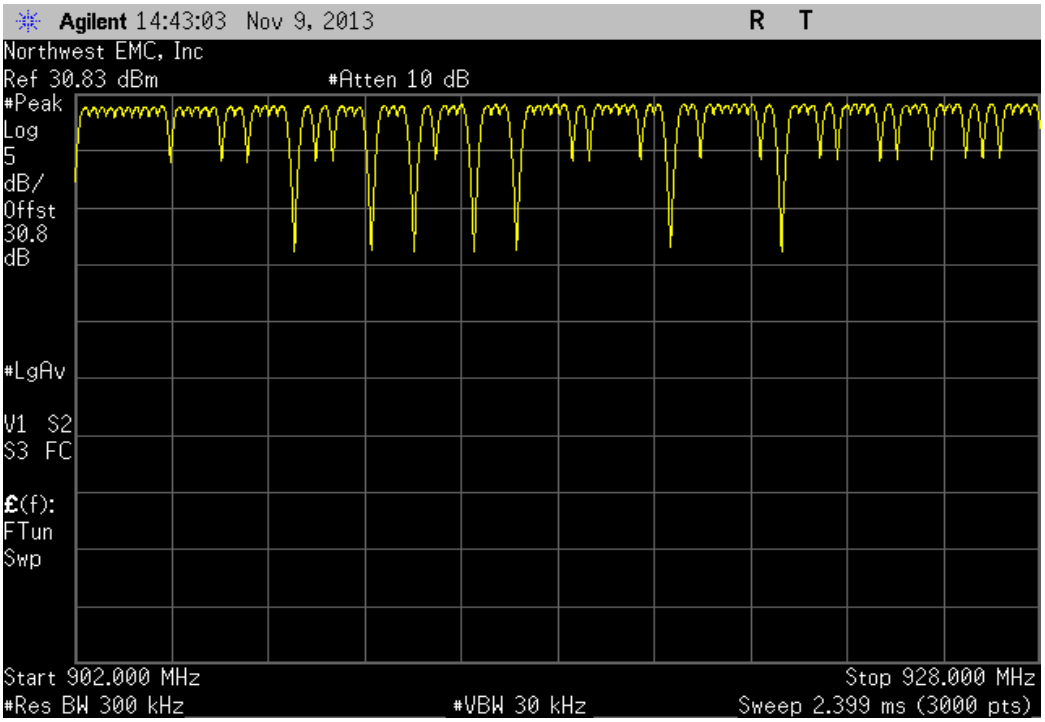


Hopping Pattern D, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

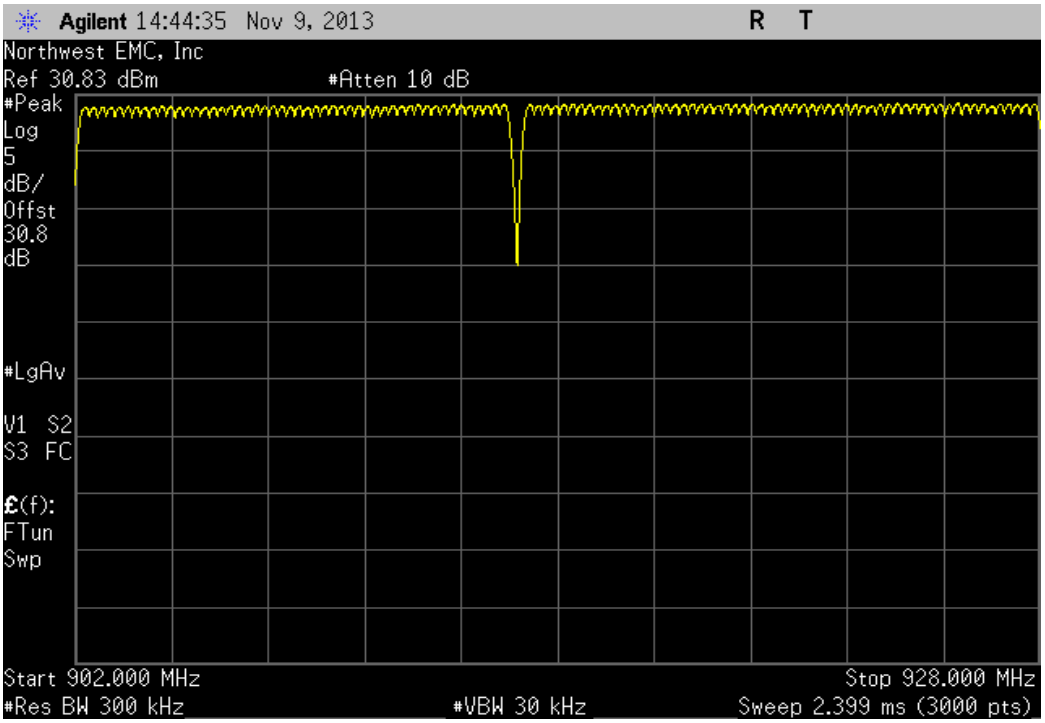


Number of Hopping Frequencies

Hopping Pattern D, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass

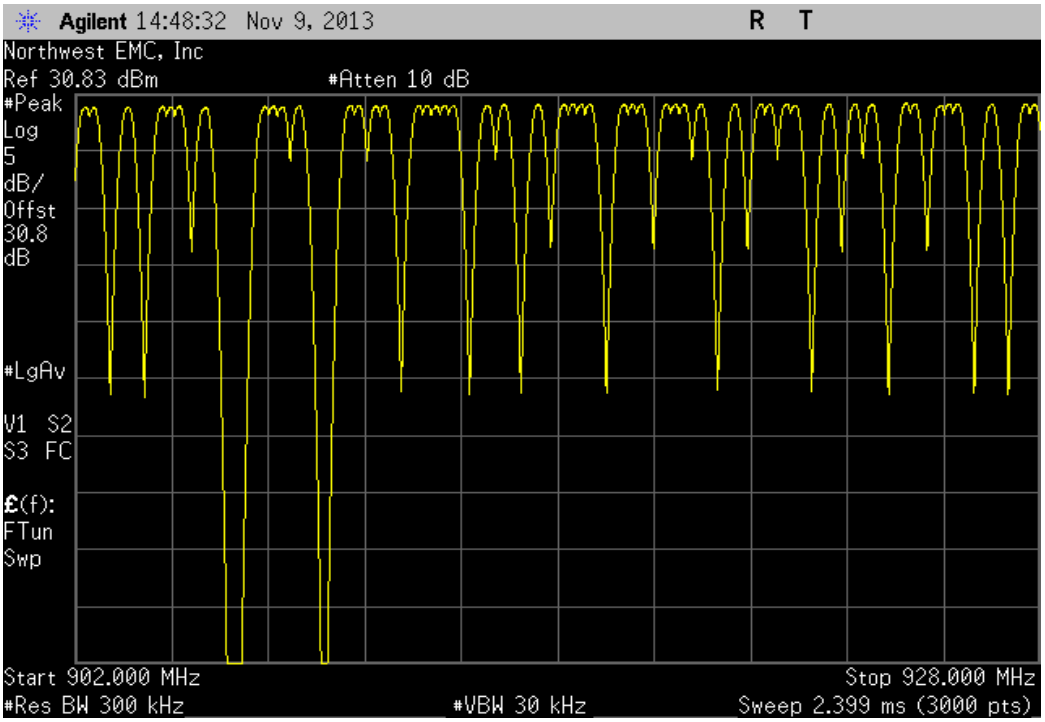


Hopping Pattern D, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 15	Pass

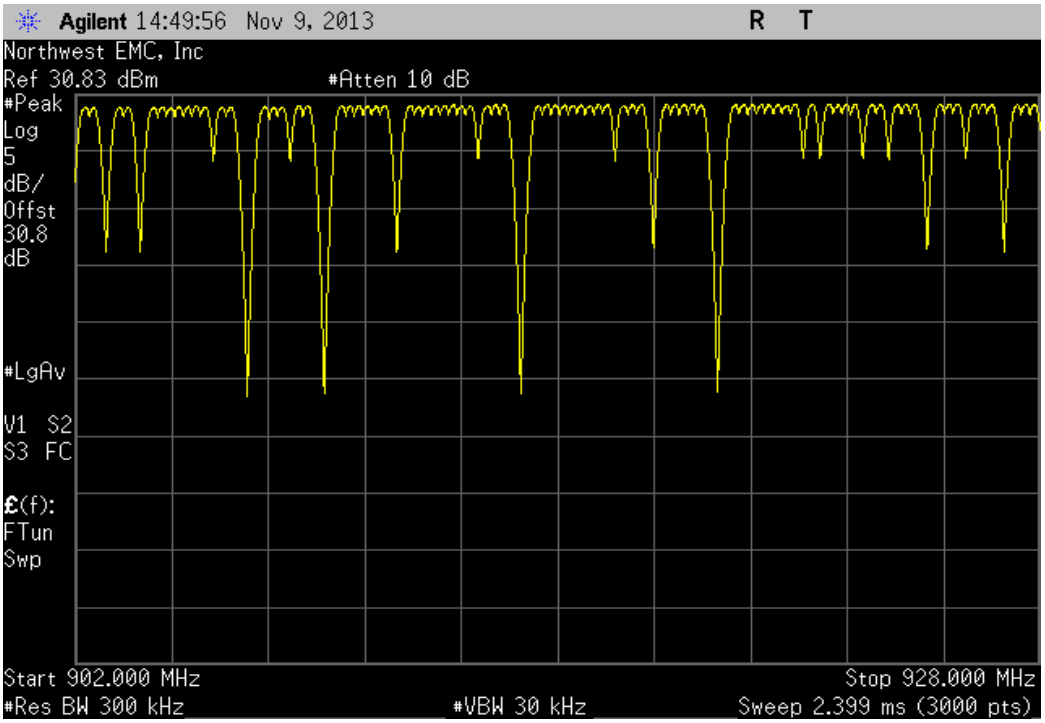


Number of Hopping Frequencies

Hopping Pattern E, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 50 Hopping						
				Number of Channels	Limit	Result
				50	≥ 50	Pass

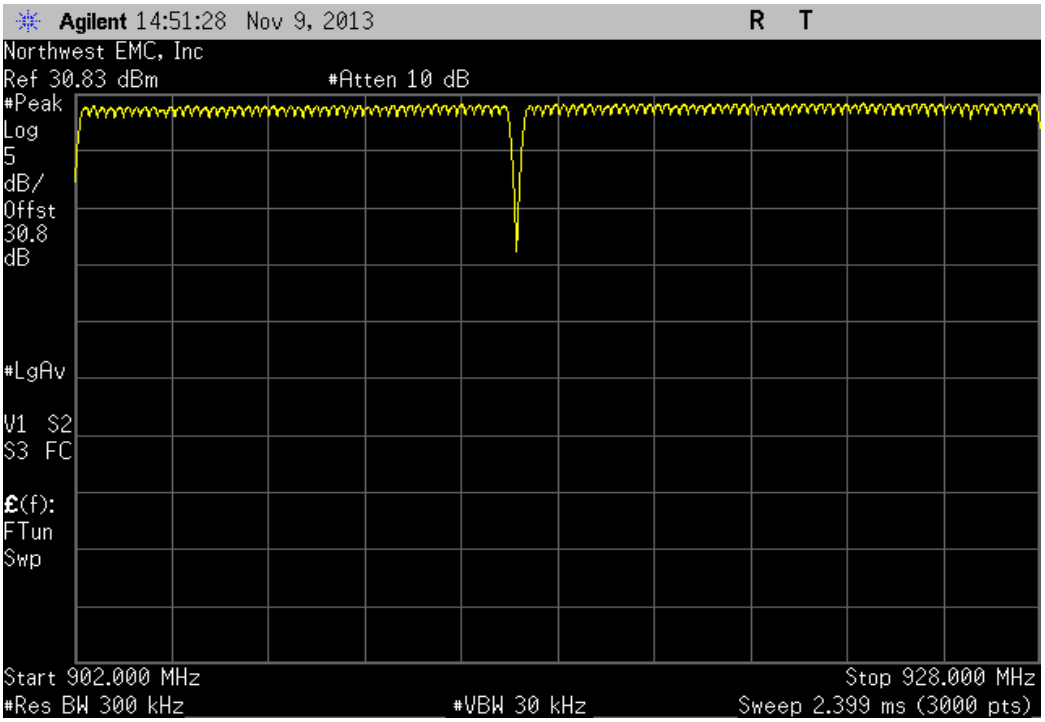


Hopping Pattern E, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 80 Hopping						
				Number of Channels	Limit	Result
				80	≥ 50	Pass



Number of Hopping Frequencies

Hopping Pattern E, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz, 112 Hopping						
				Number of Channels	Limit	Result
				112	≥ 50	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
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	7/3/2013	12
Attenuator	Fairview Microwave	SA4014-20	TKE	2/12/2013	12
Signal Generator	Agilent	N5183A	TIA	1/27/2012	36
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	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 example, 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

EUT Output Power was set to 30dBm, and an attenuator and DC block were in line for all measurements.

The minor pulses displayed on the graphs are due to adjacent hopping channels and were not evaluated as part of the dwell time on a single channel.

Dwell Time

EUT:	MM2			**Work Order:**	FREW0015
Serial Number:	861-2469			**Date:**	11/06/13
Customer:	FreeWave Technologies, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	41%
Project:	None			**Barometric Pres.:**	1026
Tested by:	Richard Mellroth	**Power:**	110VAC/60Hz	**Job Site:**	NC02

TEST SPECIFICATIONS	Test Method
FCC 15.247:2013	ANSI C63.10:2009

COMMENTS

Transmitting at maximum duty cycle. EUT output power set at 30dBm. EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains. Adapter cable loss of 0.34dB added to reference level offset.

DEVIATIONS FROM TEST STANDARD

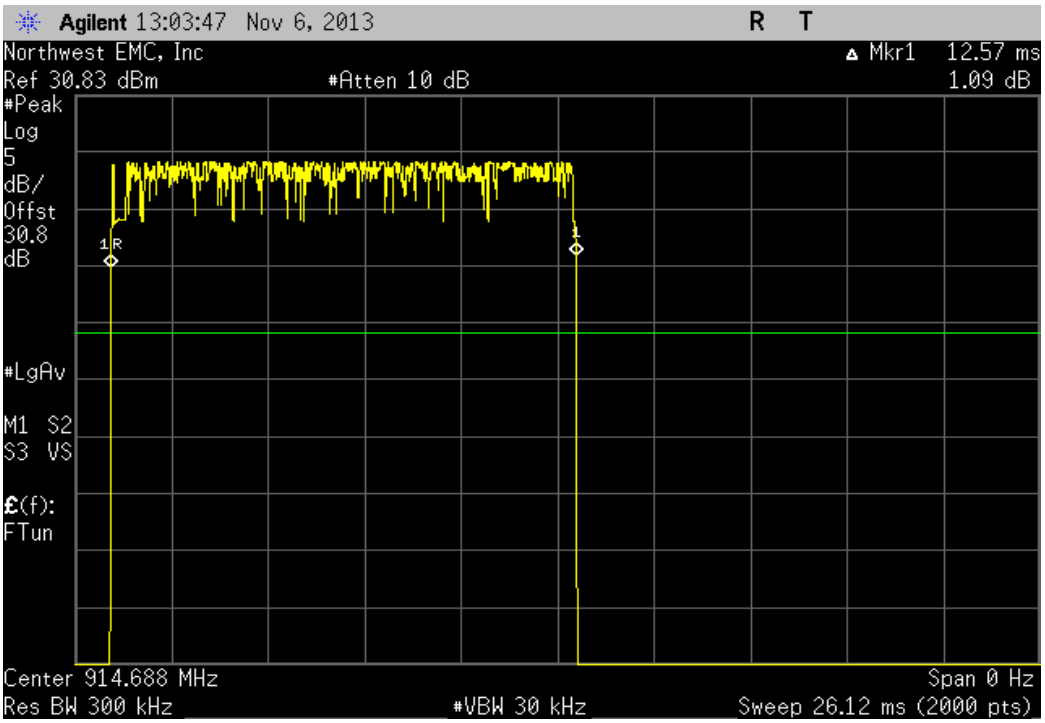
None

Configuration #	1	Signature

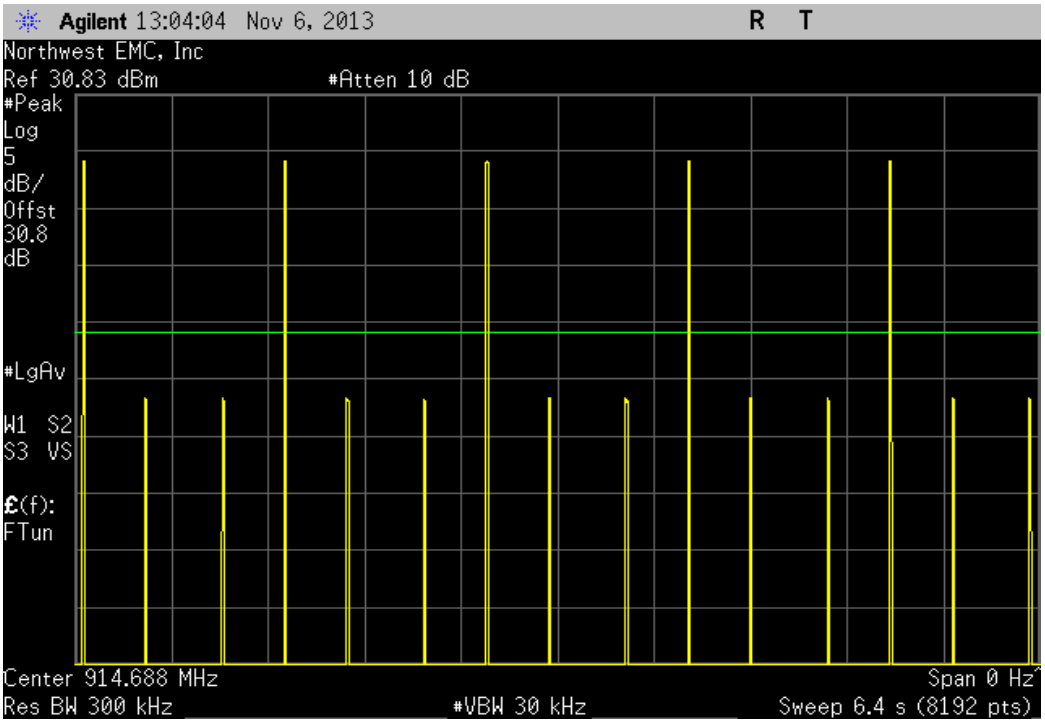
		Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
Hopping Pattern 0								
	115.2 kbps, GFSK							
	Mid Channel 130, 914.688 MHz	12.57	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	12.57	N/A	5	5	314.25	400	Pass
	153.6 kbps, GFSK							
	Mid Channel 130, 914.688 MHz	12.701	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	N/A	5	N/A	N/A	N/A	N/A	N/A
	Mid Channel 130, 914.688 MHz	12.701	N/A	5	5	317.53	400	Pass

Dwell Time

Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
12.57	N/A	N/A	N/A	N/A	N/A	N/A

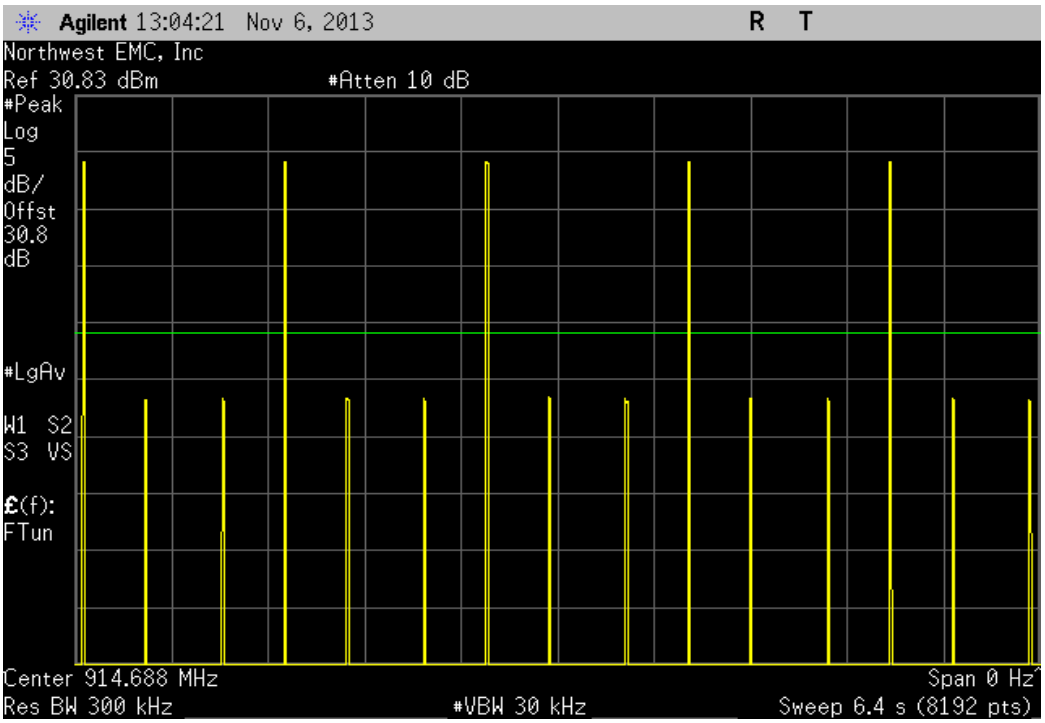


Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A

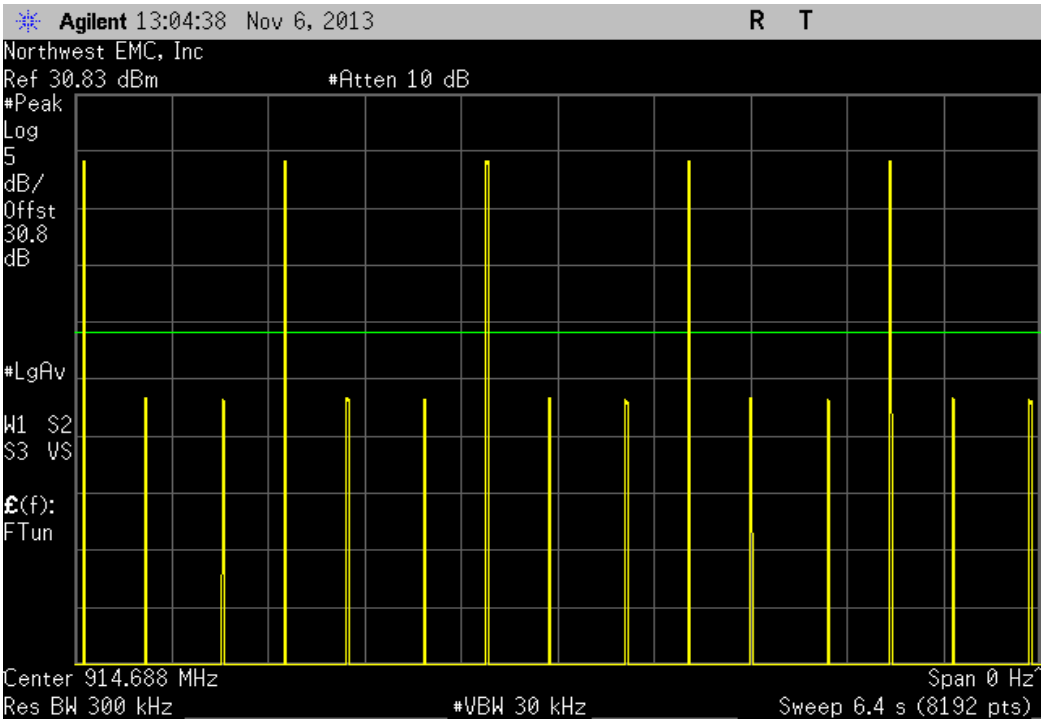


Dwell Time

Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A

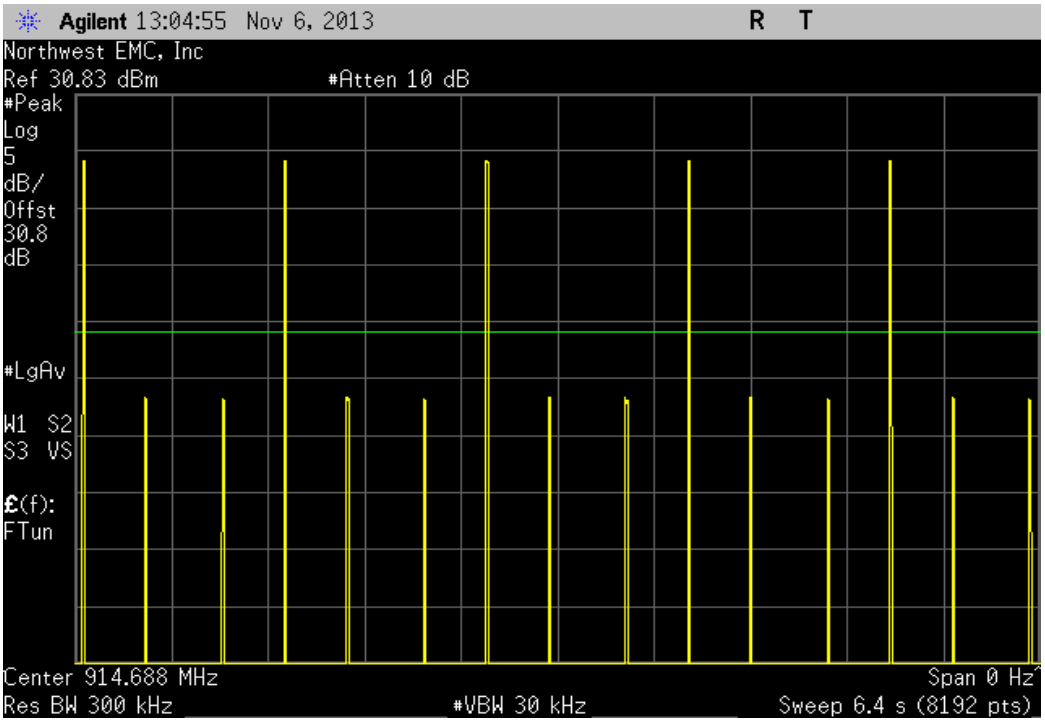


Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A



Dwell Time

Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A



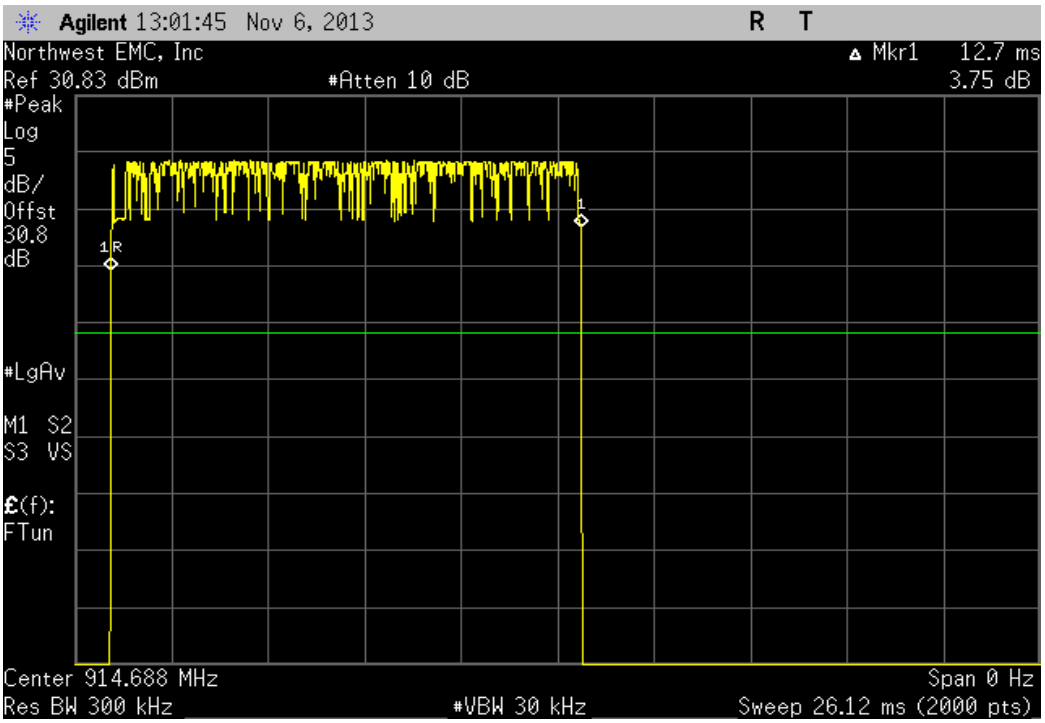
Hopping Pattern 0, 115.2 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
12.57	N/A	5	5	314.25	400	Pass

Calculation Only

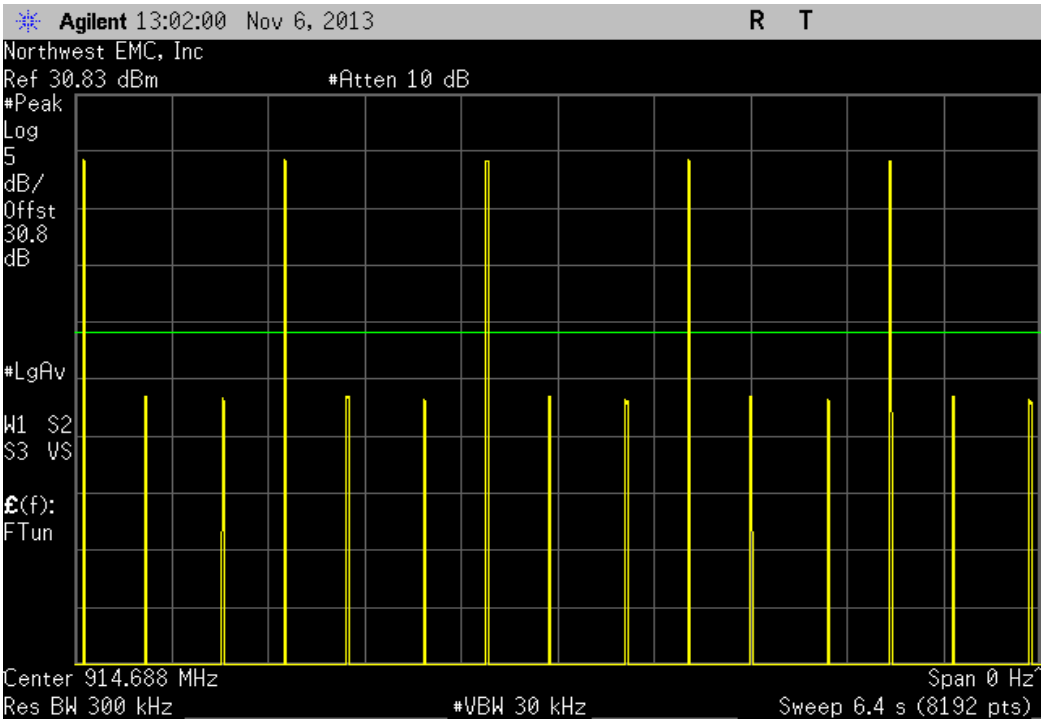
No Screen Capture Required

Dwell Time

Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
12.701	N/A	N/A	N/A	N/A	N/A	N/A

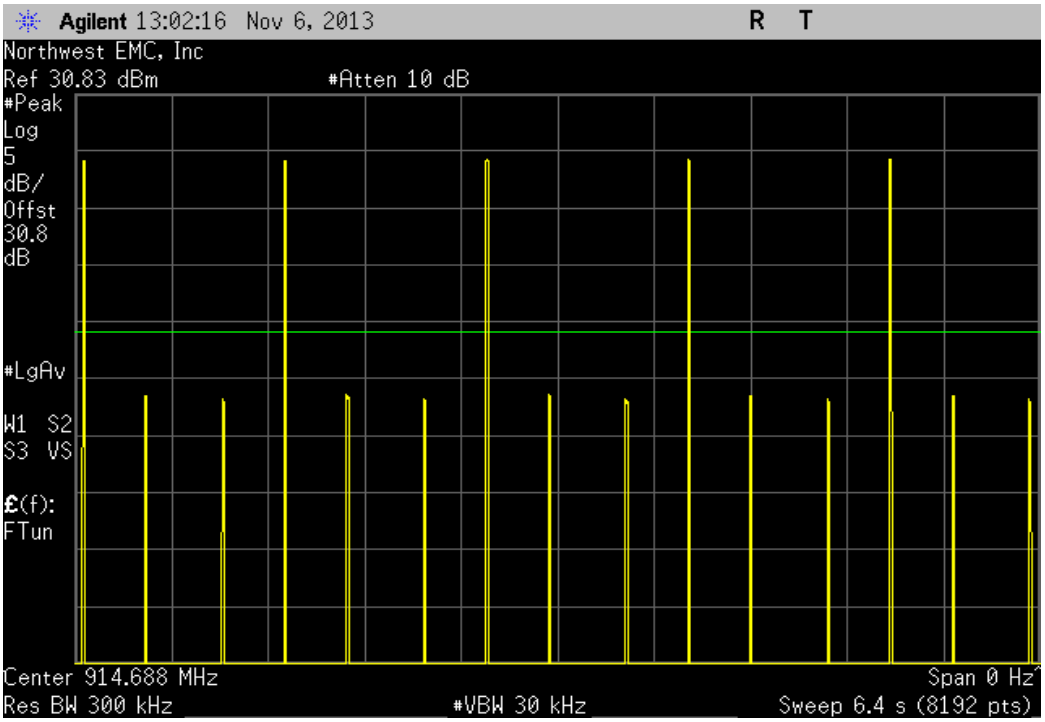


Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A

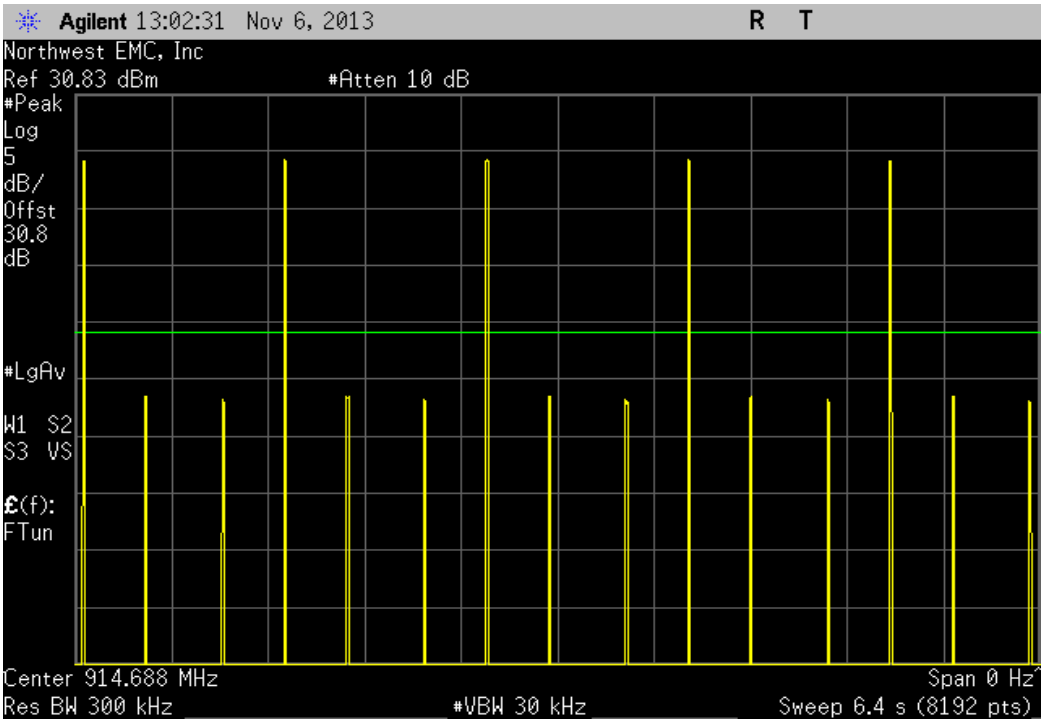


Dwell Time

Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A

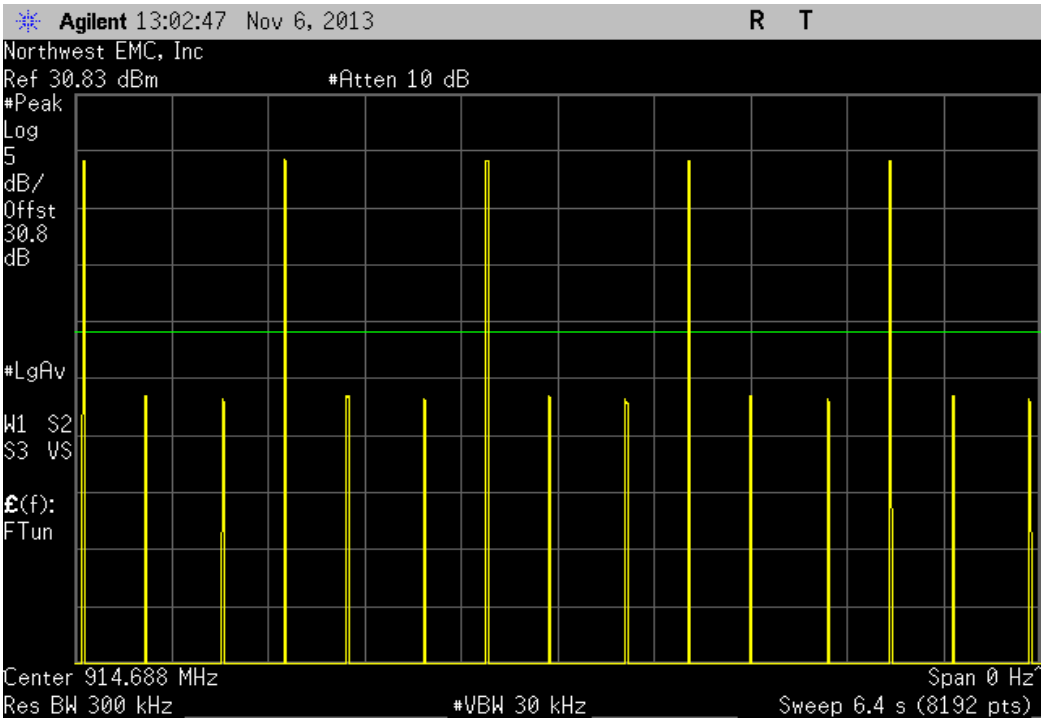


Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A



Dwell Time

Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
N/A	5	N/A	N/A	N/A	N/A	N/A



Hopping Pattern 0, 153.6 kbps, GFSK, Mid Channel 130, 914.688 MHz						
Pulse Width (mS)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (mS) During 32 S	Limit (mS)	Result
12.701	N/A	5	5	317.53	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, 900 MHz Band

115.2 kbps, GFSK
153.6 kbps, GFSK

Channels Tested, 900 MHz Band

Low Channel 76, 902.2464 MHz
Mid Channel 130, 914.688 MHz
High Channel 187, 927.8208 MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

FREW0015 - 3
FREW0015 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12400 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
HP Filter	Micro-Tronics	HPM50114	HFN	1/18/2013	36 mo
Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HHO	8/28/2013	12 mo
LP Filter	Micro-Tronics	LPM50003	LFE	1/18/2013	24 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	12/14/2012	12 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	10/24/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAB	10/24/2013	12 mo
NC01 Cables	N/A	Standard Gain Horn Cable	NC3	12/14/2012	12 mo
NC01 Cables	N/A	3115 Horn Cable	NC2	10/24/2013	12 mo
NC01 Cables	N/A	Bilog Cables	NC1	10/24/2013	12 mo
Antenna, Horn	EMCO	3160-07	AHP	NCR	0 mo
Antenna, Horn	EMCO	3115	AHM	6/19/2012	24 mo
Antenna, Biconilog	EMCO	3142	AXJ	5/16/2012	36 mo
Spectrum Analyzer	Agilent	E4440A	AAW	2/21/2013	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

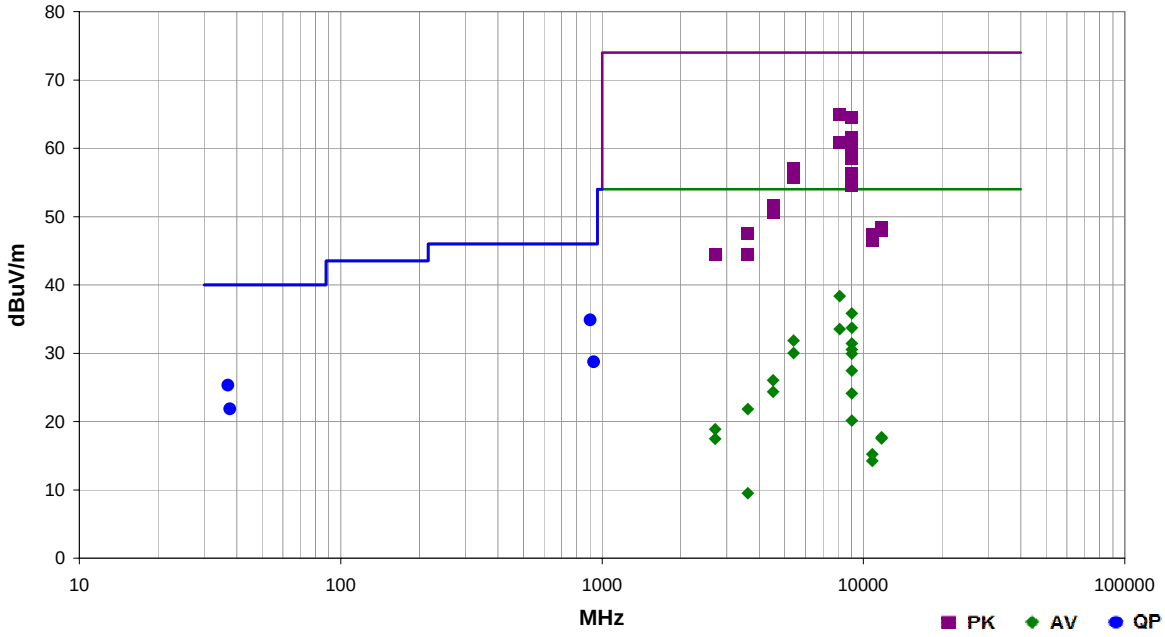
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify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

Work Order:	FREW0015	**Date:**	11/07/13		
Project:	None	**Temperature:**	22 °C		
Job Site:	NC01	**Humidity:**	44% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1010 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	3				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 12dBi antenna. Low channel 76, 902.2464 MHz. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	21-22,29-30	**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	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8117.735	51.7	13.3	1.2	244.0	3.0	0.0	Vert	PK	0.0	65.0	74.0	-9.0	Ch 76, EUT Flat, 153.6 kbps
9020.485	70.2	-5.8	1.3	218.0	3.0	0.0	Vert	PK	0.0	64.4	74.0	-9.6	Ch 76, EUT Flat, 153.6 kbps
901.980	22.0	12.8	1.0	0.0	3.0	0.0	Horz	QP	0.0	34.8	46.0	-11.2	Ch 76, EUT Flat, 153.6 kbps
9020.675	67.4	-5.8	1.1	215.0	3.0	0.0	Vert	PK	0.0	61.6	74.0	-12.4	Ch 76, EUT Horz, 153.6 kbps
8118.445	47.6	13.3	1.4	147.0	3.0	0.0	Vert	PK	0.0	60.9	74.0	-13.1	Ch 76, EUT Horz, 153.6 kbps
9020.030	66.5	-5.8	1.2	331.0	3.0	0.0	Vert	PK	0.0	60.7	74.0	-13.3	Ch 76, EUT Vert, 153.6 kbps
9020.870	65.2	-5.8	1.0	222.0	3.0	0.0	Vert	PK	0.0	59.4	74.0	-14.6	Ch 76, EUT Flat, 115.2 kbps
9020.630	65.2	-5.8	1.2	230.0	3.0	0.0	Horz	PK	0.0	59.4	74.0	-14.6	Ch 76, EUT Horz, 153.6 kbps
37.118	26.7	-1.4	1.0	304.0	3.0	0.0	Vert	QP	0.0	25.3	40.0	-14.7	Ch 76, EUT Flat, 153.6 kbps
9020.445	64.3	-5.8	1.2	159.0	3.0	0.0	Horz	PK	0.0	58.5	74.0	-15.5	Ch 76, EUT Flat, 153.6 kbps
8118.045	43.1	13.3	1.2	244.0	3.0	0.0	Vert	AV	18.0	38.4	54.0	-15.6	Ch 76, EUT Flat, 153.6 kbps
5411.775	48.4	8.6	1.0	196.0	3.0	0.0	Vert	PK	0.0	57.0	74.0	-17.0	Ch 76, EUT Flat, 153.6 kbps
929.768	16.3	12.4	3.4	241.0	3.0	0.0	Horz	QP	0.0	28.7	46.0	-17.3	Ch 76, EUT Flat, 153.6 kbps
9020.575	62.1	-5.8	1.2	186.0	3.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	Ch 76, EUT Horz, 115.2 kbps
37.733	23.4	-1.6	1.4	191.0	3.0	0.0	Vert	QP	0.0	21.8	40.0	-18.2	Ch 76, EUT Flat, 153.6 kbps
9020.190	59.6	-5.8	1.3	218.0	3.0	0.0	Vert	AV	18.0	35.8	54.0	-18.2	Ch 76, EUT Flat, 153.6 kbps
5412.185	47.1	8.6	1.0	201.0	3.0	0.0	Horz	PK	0.0	55.7	74.0	-18.3	Ch 76, EUT Horz, 153.6 kbps
9020.250	60.3	-5.8	1.2	131.0	3.0	0.0	Horz	PK	0.0	54.5	74.0	-19.5	Ch 76, EUT Vert, 153.6 kbps
9020.190	57.5	-5.8	1.1	215.0	3.0	0.0	Vert	AV	18.0	33.7	54.0	-20.3	Ch 76, EUT Horz, 153.6 kbps
8118.085	38.3	13.3	1.4	147.0	3.0	0.0	Vert	AV	18.0	33.6	54.0	-20.4	Ch 76, EUT Horz, 153.6 kbps
5412.045	41.2	8.6	1.0	196.0	3.0	0.0	Vert	AV	18.0	31.8	54.0	-22.2	Ch 76, EUT Flat, 153.6 kbps
4510.375	46.1	5.6	1.0	242.0	3.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	Ch 76, EUT Flat, 153.6 kbps

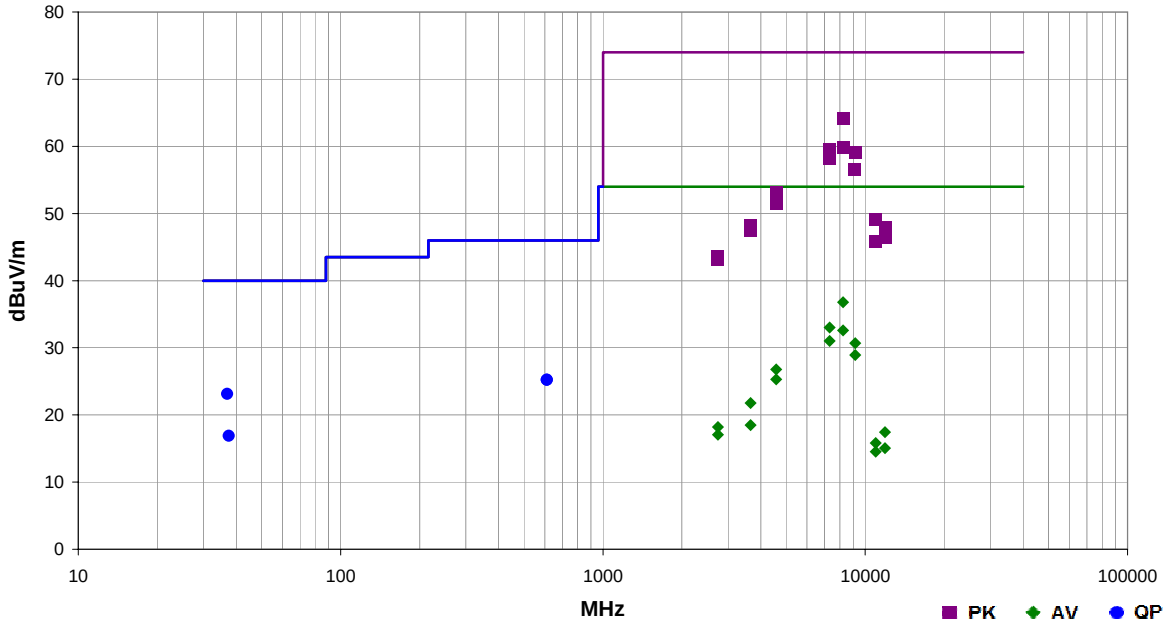
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
9020.205	55.2	-5.8	1.2	230.0	3.0	0.0	Horz	AV	18.0	31.4	54.0	-22.6	Ch 76, EUT Horz, 153.6 kbps
4510.325	45.0	5.6	1.2	236.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	Ch 76, EUT Horz, 153.6 kbps
9020.160	54.3	-5.8	1.2	159.0	3.0	0.0	Horz	AV	18.0	30.5	54.0	-23.5	Ch 76, EUT Flat, 153.6 kbps
5412.055	39.4	8.6	1.0	201.0	3.0	0.0	Horz	AV	18.0	30.0	54.0	-24.0	Ch 76, EUT Horz, 153.6 kbps
9020.170	53.7	-5.8	1.0	222.0	3.0	0.0	Vert	AV	18.0	29.9	54.0	-24.1	Ch 76, EUT Flat, 115.2 kbps
11725.700	51.4	-3.1	1.3	217.0	3.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	Ch 76, EUT Horz, 153.6 kbps
11726.790	51.1	-3.1	1.0	210.0	3.0	0.0	Vert	PK	0.0	48.0	74.0	-26.0	Ch 76, EUT Flat, 153.6 kbps
3607.750	45.8	1.8	1.2	178.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	Ch 76, EUT Horz, 153.6 kbps
9020.135	51.2	-5.8	1.2	186.0	3.0	0.0	Horz	AV	18.0	27.4	54.0	-26.6	Ch 76, EUT Horz, 115.2 kbps
10825.010	50.5	-3.1	1.0	202.0	3.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	Ch 76, EUT Horz, 153.6 kbps
10825.290	49.6	-3.1	1.2	225.0	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	Ch 76, EUT Flat, 153.6 kbps
4510.065	38.5	5.6	1.0	242.0	3.0	0.0	Vert	AV	18.0	26.1	54.0	-27.9	Ch 76, EUT Flat, 153.6 kbps
3608.105	42.7	1.8	1.2	222.0	3.0	0.0	Vert	PK	0.0	44.5	74.0	-29.5	Ch 76, EUT Flat, 153.6 kbps
2706.055	46.0	-1.5	1.2	109.0	3.0	0.0	Horz	PK	0.0	44.5	74.0	-29.5	Ch 76, EUT Horz, 153.6 kbps
4510.000	36.8	5.6	1.2	236.0	3.0	0.0	Horz	AV	18.0	24.4	54.0	-29.6	Ch 76, EUT Horz, 153.6 kbps
9020.155	47.9	-5.8	1.2	331.0	3.0	0.0	Vert	AV	18.0	24.1	54.0	-29.9	Ch 76, EUT Vert, 153.6 kbps
2706.150	44.8	-1.5	1.2	124.0	3.0	0.0	Vert	PK	0.0	43.3	74.0	-30.7	Ch 76, EUT Flat, 153.6 kbps
3608.035	38.0	1.8	1.2	178.0	3.0	0.0	Horz	AV	18.0	21.8	54.0	-32.2	Ch 76, EUT Horz, 153.6 kbps
9020.175	43.9	-5.8	1.2	131.0	3.0	0.0	Horz	AV	18.0	20.1	54.0	-33.9	Ch 76, EUT Vert, 153.6 kbps
2706.025	38.4	-1.5	1.2	109.0	3.0	0.0	Horz	AV	18.0	18.9	54.0	-35.1	Ch 76, EUT Horz, 153.6 kbps
11726.220	38.8	-3.1	1.3	217.0	3.0	0.0	Horz	AV	18.0	17.7	54.0	-36.3	Ch 76, EUT Horz, 153.6 kbps
11726.220	38.6	-3.1	1.0	210.0	3.0	0.0	Vert	AV	18.0	17.5	54.0	-36.5	Ch 76, EUT Flat, 153.6 kbps
2706.015	37.0	-1.5	1.2	124.0	3.0	0.0	Vert	AV	18.0	17.5	54.0	-36.5	Ch 76, EUT Flat, 153.6 kbps
10824.200	36.3	-3.1	1.0	202.0	3.0	0.0	Horz	AV	18.0	15.2	54.0	-38.8	Ch 76, EUT Horz, 153.6 kbps
10824.190	35.3	-3.1	1.2	225.0	3.0	0.0	Vert	AV	18.0	14.2	54.0	-39.8	Ch 76, EUT Flat, 153.6 kbps
3608.065	25.7	1.8	1.2	222.0	3.0	0.0	Vert	AV	18.0	9.5	54.0	-44.5	Ch 76, EUT Flat, 153.6 kbps

Spurious Radiated Emissions

Work Order:	FREW0015	**Date:**	11/07/13		
Project:	None	**Temperature:**	22 °C		
Job Site:	NC01	**Humidity:**	44% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1010 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	3				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 12dBi antenna. Mid channel 130, 914.688 MHz. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	23-24,28,31	**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	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8231.945	71.0	-6.8	1.2	217.0	3.0	0.0	Horz	PK	0.0	64.2	74.0	-9.8	Ch 130, EUT Horz, 153.6 kbps
8232.115	66.7	-6.8	1.0	233.0	3.0	0.0	Vert	PK	0.0	59.9	74.0	-14.1	Ch 130, EUT Flat, 153.6 kbps
7317.905	47.3	12.2	1.6	199.0	3.0	0.0	Vert	PK	0.0	59.5	74.0	-14.5	Ch 130, EUT Flat, 153.6 kbps
9146.900	64.1	-5.0	1.2	193.0	3.0	0.0	Horz	PK	0.0	59.1	74.0	-14.9	Ch 130, EUT Horz, 153.6 kbps
7317.145	46.0	12.2	1.2	208.0	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	Ch 130, EUT Horz, 153.6 kbps
37.065	24.5	-1.4	1.5	225.0	3.0	0.0	Vert	QP	0.0	23.1	40.0	-16.9	Ch 130, EUT Flat, 153.6 kbps
8232.195	61.6	-6.8	1.2	217.0	3.0	0.0	Horz	AV	18.0	36.8	54.0	-17.2	Ch 130, EUT Horz, 153.6 kbps
9146.585	61.6	-5.0	1.1	220.0	3.0	0.0	Vert	PK	0.0	56.6	74.0	-17.4	Ch 130, EUT Flat, 153.6 kbps
612.162	16.5	8.7	3.8	292.0	3.0	0.0	Vert	QP	0.0	25.2	46.0	-20.8	Ch 130, EUT Flat, 153.6 kbps
612.124	16.5	8.7	1.1	25.0	3.0	0.0	Horz	QP	0.0	25.2	46.0	-20.8	Ch 130, EUT Flat, 153.6 kbps
4573.660	47.1	6.0	1.1	195.0	3.0	0.0	Horz	PK	0.0	53.1	74.0	-20.9	Ch 130, EUT Horz, 153.6 kbps
7317.495	38.8	12.2	1.6	199.0	3.0	0.0	Vert	AV	18.0	33.0	54.0	-21.0	Ch 130, EUT Flat, 153.6 kbps
8232.170	57.4	-6.8	1.0	233.0	3.0	0.0	Vert	AV	18.0	32.6	54.0	-21.4	Ch 130, EUT Flat, 153.6 kbps
4573.760	45.4	6.0	1.2	240.0	3.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	Ch 130, EUT Flat, 153.6 kbps
7317.460	36.8	12.2	1.2	208.0	3.0	0.0	Horz	AV	18.0	31.0	54.0	-23.0	Ch 130, EUT Horz, 153.6 kbps
37.592	18.4	-1.5	1.6	220.0	3.0	0.0	Horz	QP	0.0	16.9	40.0	-23.1	Ch 130, EUT Flat, 153.6 kbps
9146.845	53.7	-5.0	1.2	193.0	3.0	0.0	Horz	AV	18.0	30.7	54.0	-23.3	Ch 130, EUT Horz, 153.6 kbps
10977.160	52.6	-3.6	1.0	224.0	3.0	0.0	Vert	PK	0.0	49.0	74.0	-25.0	Ch 130, EUT Flat, 153.6 kbps
9146.825	51.9	-5.0	1.1	220.0	3.0	0.0	Vert	AV	18.0	28.9	54.0	-25.1	Ch 130, EUT Flat, 153.6 kbps
3659.050	46.0	2.2	1.7	324.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	Ch 130, EUT Flat, 153.6 kbps
11890.670	51.3	-3.4	1.0	153.0	3.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	Ch 130, EUT Flat, 153.6 kbps
3659.090	45.3	2.2	1.0	178.0	3.0	0.0	Horz	PK	0.0	47.5	74.0	-26.5	Ch 130, EUT Horz, 153.6 kbps
4573.425	38.8	6.0	1.1	195.0	3.0	0.0	Horz	AV	18.0	26.8	54.0	-27.2	Ch 130, EUT Horz, 153.6 kbps
11890.930	49.7	-3.4	1.2	219.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	Ch 130, EUT Horz, 153.6 kbps

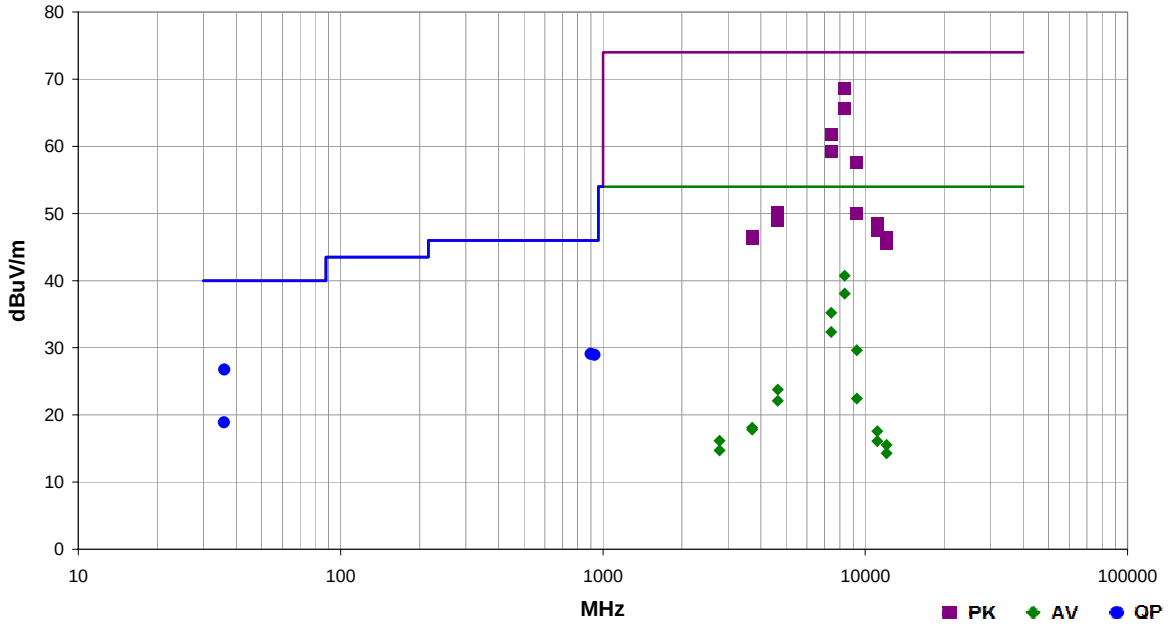
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
10976.920	49.4	-3.6	1.2	116.0	3.0	0.0	Horz	PK	0.0	45.8	74.0	-28.2	Ch 130, EUT Horz, 153.6 kbps
4573.430	37.3	6.0	1.2	240.0	3.0	0.0	Vert	AV	18.0	25.3	54.0	-28.7	Ch 130, EUT Flat, 153.6 kbps
2743.840	45.1	-1.5	1.2	228.0	3.0	0.0	Horz	PK	0.0	43.6	74.0	-30.4	Ch 130, EUT Horz, 153.6 kbps
2744.010	44.7	-1.5	1.2	229.0	3.0	0.0	Vert	PK	0.0	43.2	74.0	-30.8	Ch 130, EUT Flat, 153.6 kbps
3658.760	37.6	2.2	1.0	178.0	3.0	0.0	Horz	AV	18.0	21.8	54.0	-32.2	Ch 130, EUT Horz, 153.6 kbps
3658.740	34.3	2.2	1.7	324.0	3.0	0.0	Vert	AV	18.0	18.5	54.0	-35.5	Ch 130, EUT Flat, 153.6 kbps
2744.055	37.7	-1.5	1.2	228.0	3.0	0.0	Horz	AV	18.0	18.2	54.0	-35.8	Ch 130, EUT Horz, 153.6 kbps
11890.930	38.8	-3.4	1.0	153.0	3.0	0.0	Vert	AV	18.0	17.4	54.0	-36.6	Ch 130, EUT Flat, 153.6 kbps
2744.080	36.6	-1.5	1.2	229.0	3.0	0.0	Vert	AV	18.0	17.1	54.0	-36.9	Ch 130, EUT Flat, 153.6 kbps
10976.230	37.4	-3.6	1.0	224.0	3.0	0.0	Vert	AV	18.0	15.8	54.0	-38.2	Ch 130, EUT Flat, 153.6 kbps
11890.940	36.4	-3.4	1.2	219.0	3.0	0.0	Horz	AV	18.0	15.0	54.0	-39.0	Ch 130, EUT Horz, 153.6 kbps
10976.230	36.1	-3.6	1.2	116.0	3.0	0.0	Horz	AV	18.0	14.5	54.0	-39.5	Ch 130, EUT Horz, 153.6 kbps

Spurious Radiated Emissions

Work Order:	FREW0015	**Date:**	11/07/13		
Project:	None	**Temperature:**	22 °C		
Job Site:	NC01	**Humidity:**	44% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1010 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	3				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 12dBi antenna. High channel 187, 927.8208 MHz. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	25-27, 32	**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	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8350.730	75.3	-6.7	1.1	199.0	3.0	0.0	Horz	PK	0.0	68.6	74.0	-5.4	Ch 187, EUT Horz, 153.6 kbps
8349.880	72.3	-6.7	1.0	220.0	3.0	0.0	Vert	PK	0.0	65.6	74.0	-8.4	Ch 187, EUT Flat, 153.6 kbps
7422.385	49.0	12.7	1.8	200.0	3.0	0.0	Horz	PK	0.0	61.7	74.0	-12.3	Ch 187, EUT Horz, 153.6 kbps
8350.335	65.5	-6.7	1.1	199.0	3.0	0.0	Horz	AV	18.0	40.8	54.0	-13.2	Ch 187, EUT Horz, 153.6 kbps
36.142	27.8	-1.1	1.0	299.0	3.0	0.0	Vert	QP	0.0	26.7	40.0	-13.3	Ch 187, EUT Flat, 153.6 kbps
7422.785	46.5	12.7	1.0	213.0	3.0	0.0	Vert	PK	0.0	59.2	74.0	-14.8	Ch 187, EUT Flat, 153.6 kbps
8350.410	62.8	-6.7	1.0	220.0	3.0	0.0	Vert	AV	18.0	38.1	54.0	-15.9	Ch 187, EUT Flat, 153.6 kbps
9278.005	62.0	-4.4	1.0	218.0	3.0	0.0	Vert	PK	0.0	57.6	74.0	-16.4	Ch 187, EUT Flat, 153.6 kbps
900.395	16.4	12.7	1.0	54.0	3.0	0.0	Horz	QP	0.0	29.1	46.0	-16.9	Ch 187, EUT Flat, 153.6 kbps
929.859	16.5	12.4	2.7	344.0	3.0	0.0	Horz	QP	0.0	28.9	46.0	-17.1	Ch 187, EUT Flat, 153.6 kbps
7422.550	40.5	12.7	1.8	200.0	3.0	0.0	Horz	AV	18.0	35.2	54.0	-18.8	Ch 187, EUT Horz, 153.6 kbps
36.032	19.9	-1.0	1.7	242.0	3.0	0.0	Horz	QP	0.0	18.9	40.0	-21.1	Ch 187, EUT Flat, 153.6 kbps
7422.525	37.6	12.7	1.0	213.0	3.0	0.0	Vert	AV	18.0	32.3	54.0	-21.7	Ch 187, EUT Flat, 153.6 kbps
4639.245	43.6	6.5	1.2	200.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	Ch 187, EUT Horz, 153.6 kbps
9278.605	54.4	-4.4	1.0	231.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Ch 187, EUT Horz, 153.6 kbps
9278.180	52.0	-4.4	1.0	218.0	3.0	0.0	Vert	AV	18.0	29.6	54.0	-24.4	Ch 187, EUT Flat, 153.6 kbps
4639.385	42.5	6.5	1.2	248.0	3.0	0.0	Vert	PK	0.0	49.0	74.0	-25.0	Ch 187, EUT Flat, 153.6 kbps
11134.180	51.8	-3.3	1.2	197.0	3.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	Ch 187, EUT Horz, 153.6 kbps
11134.520	50.7	-3.3	1.0	228.0	3.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	Ch 187, EUT Flat, 153.6 kbps
3710.300	43.7	2.8	1.0	111.0	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	Ch 187, EUT Flat, 153.6 kbps
12062.040	50.0	-3.6	1.0	173.0	3.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	Ch 187, EUT Flat, 153.6 kbps
3711.265	43.5	2.8	1.2	216.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	Ch 187, EUT Horz, 153.6 kbps
12062.240	49.1	-3.6	1.2	214.0	3.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	Ch 187, EUT Horz, 153.6 kbps
4639.080	35.3	6.5	1.2	200.0	3.0	0.0	Horz	AV	18.0	23.8	54.0	-30.2	Ch 187, EUT Horz, 153.6 kbps

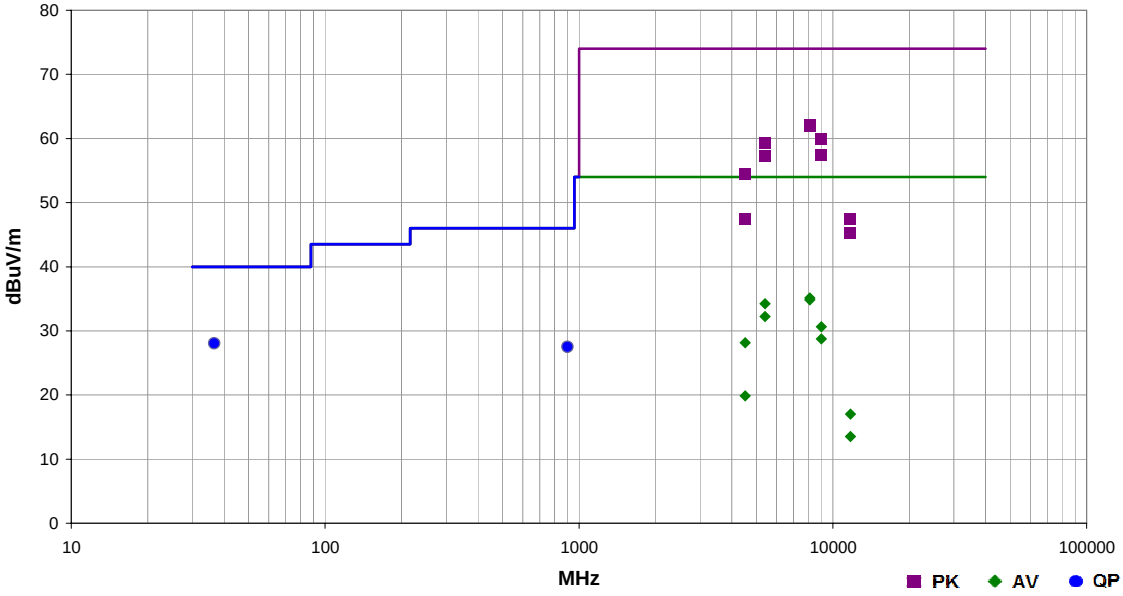
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2783.720	44.3	-1.6	1.0	232.0	3.0	0.0	Vert	PK	0.0	42.7	74.0	-31.3	Ch 187, EUT Flat, 153.6 kbps
9278.220	44.8	-4.4	1.0	231.0	3.0	0.0	Horz	AV	18.0	22.4	54.0	-31.6	Ch 187, EUT Horz, 153.6 kbps
4639.115	33.6	6.5	1.2	248.0	3.0	0.0	Vert	AV	18.0	22.1	54.0	-31.9	Ch 187, EUT Flat, 153.6 kbps
2783.745	43.5	-1.6	1.0	247.0	3.0	0.0	Horz	PK	0.0	41.9	74.0	-32.1	Ch 187, EUT Horz, 153.6 kbps
3711.265	33.3	2.8	1.2	216.0	3.0	0.0	Horz	AV	18.0	18.1	54.0	-35.9	Ch 187, EUT Horz, 153.6 kbps
3711.305	33.0	2.8	1.0	111.0	3.0	0.0	Vert	AV	18.0	17.8	54.0	-36.2	Ch 187, EUT Flat, 153.6 kbps
11133.830	38.9	-3.3	1.2	197.0	3.0	0.0	Horz	AV	18.0	17.6	54.0	-36.4	Ch 187, EUT Horz, 153.6 kbps
2783.450	35.7	-1.6	1.0	232.0	3.0	0.0	Vert	AV	18.0	16.1	54.0	-37.9	Ch 187, EUT Flat, 153.6 kbps
11133.820	37.4	-3.3	1.0	228.0	3.0	0.0	Vert	AV	18.0	16.1	54.0	-37.9	Ch 187, EUT Flat, 153.6 kbps
12061.660	37.1	-3.6	1.0	173.0	3.0	0.0	Vert	AV	18.0	15.5	54.0	-38.5	Ch 187, EUT Flat, 153.6 kbps
2783.440	34.3	-1.6	1.0	247.0	3.0	0.0	Horz	AV	18.0	14.7	54.0	-39.3	Ch 187, EUT Horz, 153.6 kbps
12061.660	35.9	-3.6	1.2	214.0	3.0	0.0	Horz	AV	18.0	14.3	54.0	-39.7	Ch 187, EUT Horz, 153.6 kbps

Spurious Radiated Emissions

Work Order:	FREW0015	**Date:**	11/08/13		
Project:	None	**Temperature:**	21 °C		
Job Site:	NC01	**Humidity:**	43% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1020 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	4				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna. Low channel 76, 902.2464 MHz. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	37-38,51-52	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



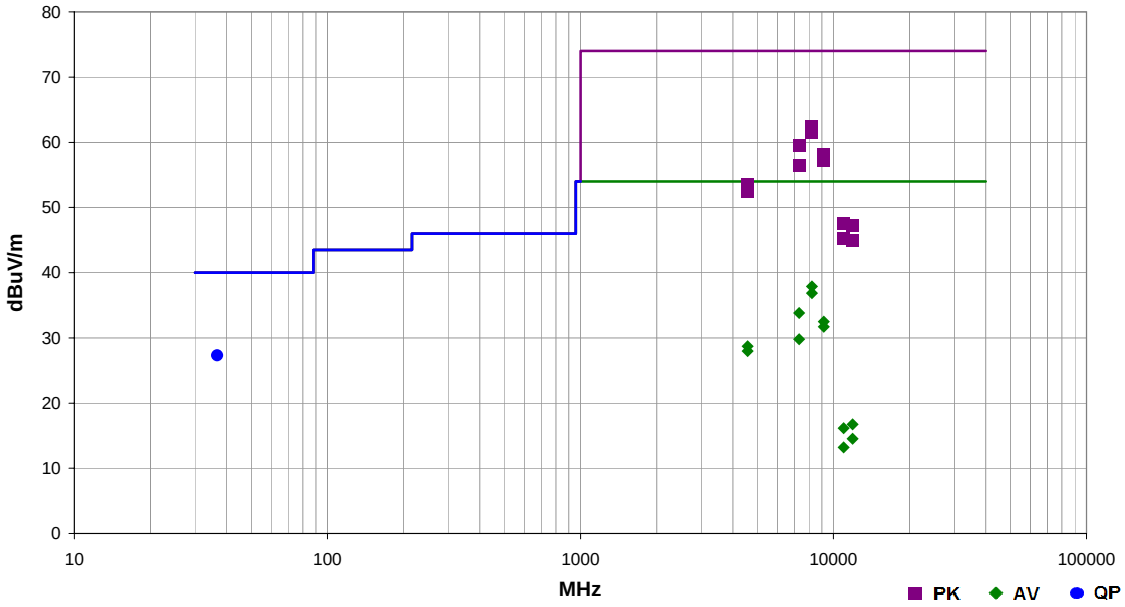
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
36.563	29.3	-1.2	1.4	300.0	3.0	0.0	Vert	QP	0.0	28.1	40.0	-11.9	Ch 76, EUT Flat, 153.6 kbps
8119.805	48.8	13.3	1.6	191.0	3.0	0.0	Horz	PK	0.0	62.1	74.0	-11.9	Ch 76, EUT Horz, 153.6 kbps
8120.520	48.7	13.3	1.0	205.0	3.0	0.0	Vert	PK	0.0	62.0	74.0	-12.0	Ch 76, EUT Vert, 153.6 kbps
9023.180	65.7	-5.8	1.0	200.0	3.0	0.0	Vert	PK	0.0	59.9	74.0	-14.1	Ch 76, EUT Vert, 153.6 kbps
5413.585	50.6	8.6	1.3	294.0	3.0	0.0	Horz	PK	0.0	59.2	74.0	-14.8	Ch 76, EUT Horz, 153.6 kbps
9023.080	63.2	-5.8	1.0	194.0	3.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Ch 76, EUT Horz, 153.6 kbps
5413.235	48.7	8.6	1.0	187.0	3.0	0.0	Vert	PK	0.0	57.3	74.0	-16.7	Ch 76, EUT Vert, 153.6 kbps
901.483	14.7	12.8	1.0	239.0	3.0	0.0	Horz	QP	0.0	27.5	46.0	-18.5	Ch 76, EUT Flat, 153.6 kbps
8120.205	39.9	13.3	1.6	191.0	3.0	0.0	Horz	AV	18.0	35.2	54.0	-18.8	Ch 76, EUT Horz, 153.6 kbps
8120.195	39.6	13.3	1.0	205.0	3.0	0.0	Vert	AV	18.0	34.9	54.0	-19.1	Ch 76, EUT Vert, 153.6 kbps
4511.585	48.9	5.6	1.0	217.0	3.0	0.0	Horz	PK	0.0	54.5	74.0	-19.5	Ch 76, EUT Horz, 153.6 kbps
5413.445	43.6	8.6	1.3	294.0	3.0	0.0	Horz	AV	18.0	34.2	54.0	-19.8	Ch 76, EUT Horz, 153.6 kbps
5413.460	41.6	8.6	1.0	187.0	3.0	0.0	Vert	AV	18.0	32.2	54.0	-21.8	Ch 76, EUT Vert, 153.6 kbps
9022.455	54.4	-5.8	1.0	200.0	3.0	0.0	Vert	AV	18.0	30.6	54.0	-23.4	Ch 76, EUT Vert, 153.6 kbps
9022.455	52.5	-5.8	1.0	194.0	3.0	0.0	Horz	AV	18.0	28.7	54.0	-25.3	Ch 76, EUT Horz, 153.6 kbps
4511.225	40.6	5.6	1.0	217.0	3.0	0.0	Horz	AV	18.0	28.2	54.0	-25.8	Ch 76, EUT Horz, 153.6 kbps
11729.910	50.6	-3.1	1.2	142.0	3.0	0.0	Horz	PK	0.0	47.5	74.0	-26.5	Ch 76, EUT Horz, 153.6 kbps
4510.960	41.9	5.6	1.0	220.0	3.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	Ch 76, EUT Vert, 153.6 kbps
11729.620	48.4	-3.1	1.0	175.0	3.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	Ch 76, EUT Vert, 153.6 kbps
4511.265	32.3	5.6	1.0	220.0	3.0	0.0	Vert	AV	18.0	19.9	54.0	-34.1	Ch 76, EUT Vert, 153.6 kbps
11729.190	38.1	-3.1	1.2	142.0	3.0	0.0	Horz	AV	18.0	17.0	54.0	-37.0	Ch 76, EUT Horz, 153.6 kbps
11729.180	34.6	-3.1	1.0	175.0	3.0	0.0	Vert	AV	18.0	13.5	54.0	-40.5	Ch 76, EUT Vert, 153.6 kbps

Spurious Radiated Emissions

Work Order:	FREW0015	**Date:**	11/08/13		
Project:	None	**Temperature:**	21 °C		
Job Site:	NC01	**Humidity:**	43% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1020 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	4				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna. Mid channel 130, 914.688 MHz. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	35, 49-50	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



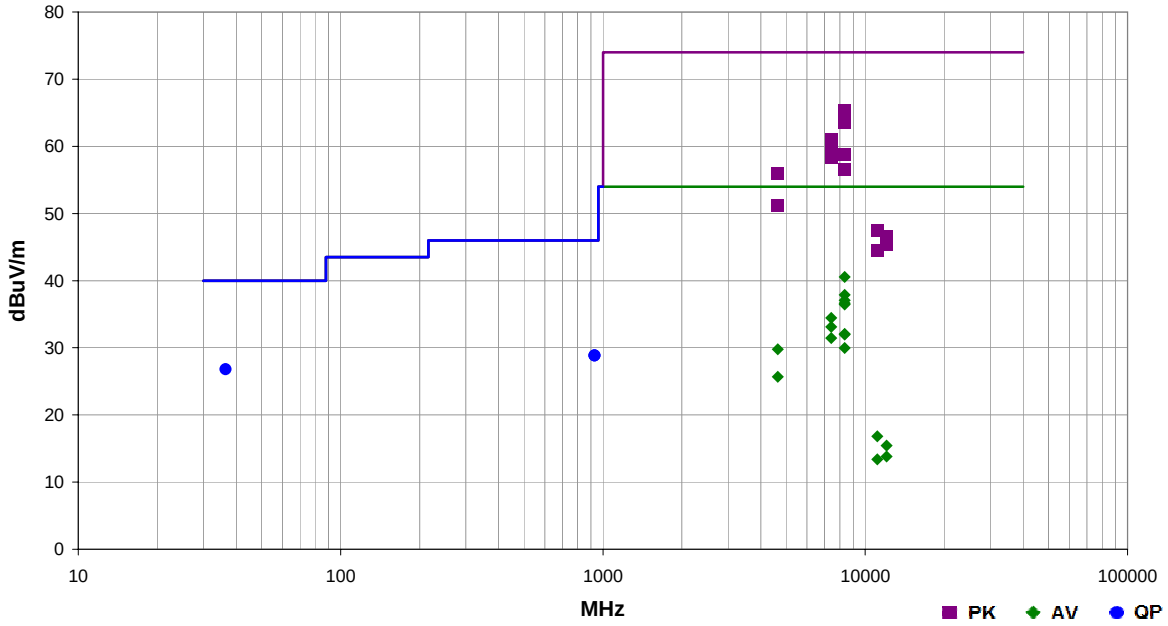
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8232.580	69.2	-6.8	1.2	169.0	3.0	0.0	Horz	PK	0.0	62.4	74.0	-11.6	Ch 130, EUT Horz, 153.6 kbps
8232.415	68.3	-6.8	1.2	183.0	3.0	0.0	Vert	PK	0.0	61.5	74.0	-12.5	Ch 130, EUT Vert, 153.6 kbps
36.745	28.6	-1.3	1.5	314.0	3.0	0.0	Vert	QP	0.0	27.3	40.0	-12.7	Ch 130, EUT Flat, 153.6 kbps
7317.640	47.3	12.2	1.0	204.0	3.0	0.0	Vert	PK	0.0	59.5	74.0	-14.5	Ch 130, EUT Vert, 153.6 kbps
9147.265	63.1	-5.0	1.1	192.0	3.0	0.0	Horz	PK	0.0	58.1	74.0	-15.9	Ch 130, EUT Horz, 153.6 kbps
8232.190	62.7	-6.8	1.2	169.0	3.0	0.0	Horz	AV	18.0	37.9	54.0	-16.1	Ch 130, EUT Horz, 153.6 kbps
9146.715	62.2	-5.0	1.2	211.0	3.0	0.0	Vert	PK	0.0	57.2	74.0	-16.8	Ch 130, EUT Vert, 153.6 kbps
8232.235	61.7	-6.8	1.2	183.0	3.0	0.0	Vert	AV	18.0	36.9	54.0	-17.1	Ch 130, EUT Vert, 153.6 kbps
7317.900	44.3	12.2	1.3	189.0	3.0	0.0	Horz	PK	0.0	56.5	74.0	-17.5	Ch 130, EUT Horz, 153.6 kbps
7317.520	39.6	12.2	1.0	204.0	3.0	0.0	Vert	AV	18.0	33.8	54.0	-20.2	Ch 130, EUT Vert, 153.6 kbps
4573.935	47.5	6.0	1.0	217.0	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Ch 130, EUT Horz, 153.6 kbps
9146.905	55.5	-5.0	1.1	192.0	3.0	0.0	Horz	AV	18.0	32.5	54.0	-21.5	Ch 130, EUT Horz, 153.6 kbps
4573.895	46.4	6.0	1.0	148.0	3.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	Ch 130, EUT Vert, 153.6 kbps
9146.905	54.7	-5.0	1.2	211.0	3.0	0.0	Vert	AV	18.0	31.7	54.0	-22.3	Ch 130, EUT Vert, 153.6 kbps
7317.520	35.6	12.2	1.3	189.0	3.0	0.0	Horz	AV	18.0	29.8	54.0	-24.2	Ch 130, EUT Horz, 153.6 kbps
4573.435	40.7	6.0	1.0	217.0	3.0	0.0	Horz	AV	18.0	28.7	54.0	-25.3	Ch 130, EUT Horz, 153.6 kbps
4573.445	40.0	6.0	1.0	148.0	3.0	0.0	Vert	AV	18.0	28.0	54.0	-26.0	Ch 130, EUT Vert, 153.6 kbps
10977.190	51.2	-3.6	1.0	203.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	Ch 130, EUT Horz, 153.6 kbps
11890.570	50.6	-3.4	1.2	211.0	3.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	Ch 130, EUT Horz, 153.6 kbps
10977.220	48.8	-3.6	1.8	200.0	3.0	0.0	Vert	PK	0.0	45.2	74.0	-28.8	Ch 130, EUT Vert, 153.6 kbps
11890.520	48.3	-3.4	1.0	175.0	3.0	0.0	Vert	PK	0.0	44.9	74.0	-29.1	Ch 130, EUT Vert, 153.6 kbps
11890.960	38.1	-3.4	1.2	211.0	3.0	0.0	Horz	AV	18.0	16.7	54.0	-37.3	Ch 130, EUT Horz, 153.6 kbps
10976.270	37.7	-3.6	1.0	203.0	3.0	0.0	Horz	AV	18.0	16.1	54.0	-37.9	Ch 130, EUT Horz, 153.6 kbps
11891.340	35.9	-3.4	1.0	175.0	3.0	0.0	Vert	AV	18.0	14.5	54.0	-39.5	Ch 130, EUT Vert, 153.6 kbps
10976.610	34.8	-3.6	1.8	200.0	3.0	0.0	Vert	AV	18.0	13.2	54.0	-40.8	Ch 130, EUT Vert, 153.6 kbps

Spurious Radiated Emissions

Work Order:	FREW0015	**Date:**	11/08/13		
Project:	None	**Temperature:**	21 °C		
Job Site:	NC01	**Humidity:**	43% RH		
Serial Number:	861-2469	**Barometric Pres.:**	1020 mbar	**Tested by:**	Richard Mellroth
EUT:	MM2				
Configuration:	4				
Customer:	FreeWave Technologies, Inc.				
Attendees:	Dean Busch				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna. High channel 187, 927.8208. 153.6 kbps. See comments below for EUT data rate and orientation.				
Deviations:	None				
Comments:	EUT connected to development board. EUT powered by 5 VDC supplied by development board via AC mains.				

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

Run #	33-34,47-48	**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	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
8350.800	72.0	-6.7	1.0	203.0	3.0	0.0	Horz	PK	0.0	65.3	74.0	-8.7	Ch 187, EUT Horz, 153.6 kbps
8350.205	71.8	-6.7	1.1	190.0	3.0	0.0	Horz	PK	0.0	65.1	74.0	-8.9	Ch 187, EUT Horz, 115.2 kbps
8350.715	71.4	-6.7	1.0	200.0	3.0	0.0	Vert	PK	0.0	64.7	74.0	-9.3	Ch 187, EUT Vert, 115.2 kbps
8350.745	70.7	-6.7	1.0	200.0	3.0	0.0	Vert	PK	0.0	64.0	74.0	-10.0	Ch 187, EUT Vert, 153.6 kbps
8350.760	70.3	-6.7	1.0	220.0	3.0	0.0	Vert	PK	0.0	63.6	74.0	-10.4	Ch 187, EUT Flat, 153.6 kbps
7422.320	48.2	12.7	1.1	207.0	3.0	0.0	Vert	PK	0.0	60.9	74.0	-13.1	Ch 187, EUT Vert, 153.6 kbps
36.493	28.0	-1.2	1.0	321.0	3.0	0.0	Vert	QP	0.0	26.8	40.0	-13.2	Ch 187, EUT Flat, 153.6 kbps
8350.415	65.3	-6.7	1.1	190.0	3.0	0.0	Horz	AV	18.0	40.6	54.0	-13.4	Ch 187, EUT Horz, 115.2 kbps
7422.935	47.1	12.7	1.0	219.0	3.0	0.0	Vert	PK	0.0	59.8	74.0	-14.2	Ch 187, EUT Vert, 115.2 kbps
8350.715	65.5	-6.7	1.2	174.0	3.0	0.0	Horz	PK	0.0	58.8	74.0	-15.2	Ch 187, EUT Vert, 153.6 kbps
8349.940	65.5	-6.7	1.0	136.0	3.0	0.0	Vert	PK	0.0	58.8	74.0	-15.2	Ch 187, EUT Horz, 153.6 kbps
7422.105	45.6	12.7	1.8	204.0	3.0	0.0	Horz	PK	0.0	58.3	74.0	-15.7	Ch 187, EUT Horz, 153.6 kbps
8350.375	62.6	-6.7	1.0	203.0	3.0	0.0	Horz	AV	18.0	37.9	54.0	-16.1	Ch 187, EUT Horz, 153.6 kbps
8350.355	61.8	-6.7	1.0	200.0	3.0	0.0	Vert	AV	18.0	37.1	54.0	-16.9	Ch 187, EUT Vert, 115.2 kbps
929.792	16.4	12.4	3.7	304.0	3.0	0.0	Vert	QP	0.0	28.8	46.0	-17.2	Ch 187, EUT Flat, 153.6 kbps
929.575	16.4	12.4	1.0	178.0	3.0	0.0	Horz	QP	0.0	28.8	46.0	-17.2	Ch 187, EUT Flat, 153.6 kbps
8350.360	61.4	-6.7	1.0	200.0	3.0	0.0	Vert	AV	18.0	36.7	54.0	-17.3	Ch 187, EUT Vert, 153.6 kbps
8349.880	63.3	-6.7	1.0	157.0	3.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	Ch 187, EUT Flat, 153.6 kbps
8350.430	61.2	-6.7	1.0	220.0	3.0	0.0	Vert	AV	18.0	36.5	54.0	-17.5	Ch 187, EUT Flat, 153.6 kbps
4639.200	49.4	6.5	1.4	296.0	3.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	Ch 187, EUT Horz, 153.6 kbps
7422.540	39.7	12.7	1.1	207.0	3.0	0.0	Vert	AV	18.0	34.4	54.0	-19.6	Ch 187, EUT Vert, 153.6 kbps
7422.585	38.4	12.7	1.0	219.0	3.0	0.0	Vert	AV	18.0	33.1	54.0	-20.9	Ch 187, EUT Vert, 115.2 kbps
8350.370	56.8	-6.7	1.2	174.0	3.0	0.0	Horz	AV	18.0	32.1	54.0	-21.9	Ch 187, EUT Vert, 153.6 kbps
8350.395	56.7	-6.7	1.0	136.0	3.0	0.0	Vert	AV	18.0	32.0	54.0	-22.0	Ch 187, EUT Horz, 153.6 kbps

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction Factor (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7422.555	36.7	12.7	1.8	204.0	3.0	0.0	Horz	AV	18.0	31.4	54.0	-22.6	Ch 187, EUT Horz, 153.6 kbps
4638.870	44.7	6.5	1.2	141.0	3.0	0.0	Vert	PK	0.0	51.2	74.0	-22.8	Ch 187, EUT Vert, 153.6 kbps
8350.370	54.7	-6.7	1.0	157.0	3.0	0.0	Horz	AV	18.0	30.0	54.0	-24.0	Ch 187, EUT Flat, 153.6 kbps
4639.125	41.3	6.5	1.4	296.0	3.0	0.0	Horz	AV	18.0	29.8	54.0	-24.2	Ch 187, EUT Horz, 153.6 kbps
11133.630	50.8	-3.3	1.2	111.0	3.0	0.0	Horz	PK	0.0	47.5	74.0	-26.5	Ch 187, EUT Horz, 115.2 kbps
12061.170	50.2	-3.6	1.0	212.0	3.0	0.0	Horz	PK	0.0	46.6	74.0	-27.4	Ch 187, EUT Horz, 115.2 kbps
4639.075	37.2	6.5	1.2	141.0	3.0	0.0	Vert	AV	18.0	25.7	54.0	-28.3	Ch 187, EUT Vert, 153.6 kbps
12062.240	48.9	-3.6	1.2	178.0	3.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	Ch 187, EUT Vert, 115.2 kbps
11133.510	47.8	-3.3	1.1	197.0	3.0	0.0	Vert	PK	0.0	44.5	74.0	-29.5	Ch 187, EUT Vert, 115.2 kbps
11133.810	38.1	-3.3	1.2	111.0	3.0	0.0	Horz	AV	18.0	16.8	54.0	-37.2	Ch 187, EUT Horz, 115.2 kbps
12061.670	37.0	-3.6	1.0	212.0	3.0	0.0	Horz	AV	18.0	15.4	54.0	-38.6	Ch 187, EUT Horz, 115.2 kbps
12061.700	35.4	-3.6	1.2	178.0	3.0	0.0	Vert	AV	18.0	13.8	54.0	-40.2	Ch 187, EUT Vert, 115.2 kbps
11133.880	34.7	-3.3	1.1	197.0	3.0	0.0	Vert	AV	18.0	13.4	54.0	-40.6	Ch 187, EUT Vert, 115.2 kbps

AC Powerline Conducted Emissions

TEST DESCRIPTION

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIM	01/16/2013	12 mo
NC05 Cables	N/A	Conducted / NF Probe Cable	NC4	12/14/2012	12 mo
Attenuator	Fairview Microwave	SA03B-20	RKD	11/12/2013	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HHF	02/01/2012	24 mo
Receiver	Rohde & Schwarz	ESCI	ARE	05/30/2013	12 mo

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.94 dB	-2.94 dB

CONFIGURATIONS INVESTIGATED

FREW0015-6
FREW0015-7

MODES INVESTIGATED

Tx Mode, Low Channel 76, 902.2464 MHz, 153.6 kbps - 12dBi Yagi Antenna
Tx Mode, Mid Channel 130, 914.688 MHz, 153.6 kbps - 12dBi Yagi Antenna
Tx Mode, High Channel 187, 927.8208 MHz, 153.6 kbps - 12dBi Yagi Antenna
Tx Mode, Low Channel 76, 902.2464 MHz, 153.6 kbps - 6 dBd (8.15 dBi) Omni Antenna
Tx Mode, Mid Channel 130, 914.688 MHz, 153.6 kbps - 6 dBd (8.15 dBi) Omni Antenna
Tx Mode, High Channel 187, 927.8208 MHz, 153.6 kbps - 6 dBd (8.15 dBi) Omni Antenna

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	73	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

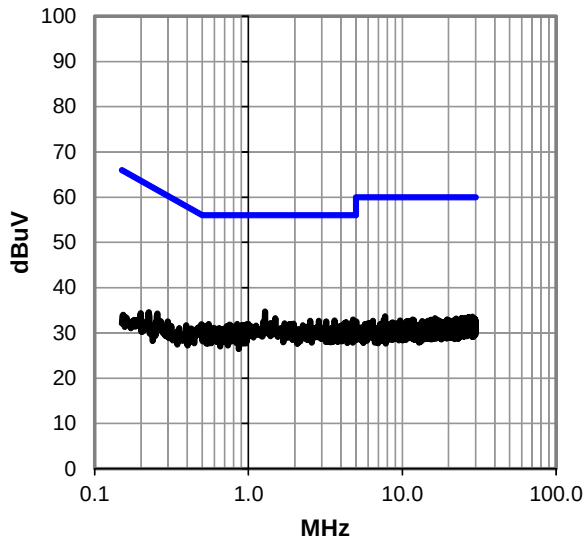
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, Low Channel 76, 902.2464 MHz, 153.6 kbps.

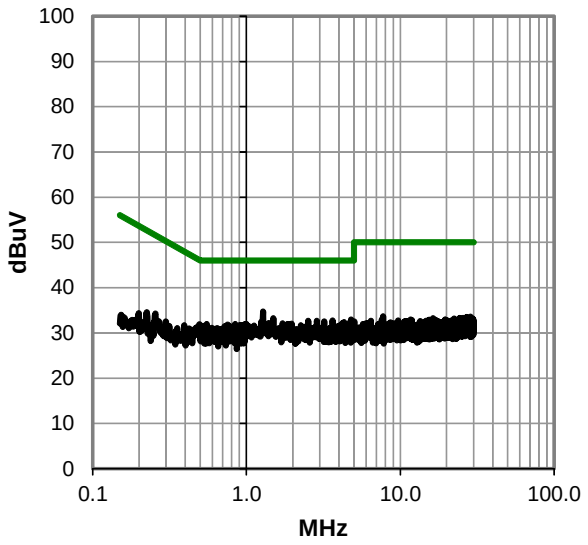
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #73

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.280	14.4	20.3	34.7	56.0	-21.3
1.496	12.9	20.3	33.2	56.0	-22.8
4.800	12.4	20.6	33.0	56.0	-23.1
3.632	12.3	20.4	32.7	56.0	-23.3
2.872	12.3	20.4	32.7	56.0	-23.3
2.520	12.3	20.4	32.7	56.0	-23.3
3.200	12.1	20.4	32.5	56.0	-23.5
4.304	11.9	20.5	32.4	56.0	-23.6
4.656	11.6	20.6	32.2	56.0	-23.9
1.720	11.8	20.3	32.1	56.0	-23.9
1.960	11.7	20.3	32.0	56.0	-24.0
0.844	11.7	20.3	32.0	56.0	-24.0
1.888	11.6	20.3	31.9	56.0	-24.1
0.551	11.7	20.2	31.9	56.0	-24.1
0.753	11.6	20.3	31.9	56.0	-24.2
0.493	11.7	20.2	31.9	56.1	-24.2
0.906	11.5	20.3	31.8	56.0	-24.2
0.969	11.4	20.3	31.7	56.0	-24.3
0.947	11.4	20.3	31.7	56.0	-24.3
2.256	11.3	20.3	31.6	56.0	-24.4
4.552	11.0	20.5	31.5	56.0	-24.5
3.944	11.1	20.4	31.5	56.0	-24.5
0.524	11.3	20.2	31.5	56.0	-24.5
0.781	11.2	20.3	31.5	56.0	-24.5
0.721	11.2	20.2	31.4	56.0	-24.6
0.595	10.9	20.2	31.1	56.0	-24.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.280	14.4	20.3	34.7	46.0	-11.3
1.496	12.9	20.3	33.2	46.0	-12.8
4.800	12.4	20.6	33.0	46.0	-13.1
3.632	12.3	20.4	32.7	46.0	-13.3
2.872	12.3	20.4	32.7	46.0	-13.3
2.520	12.3	20.4	32.7	46.0	-13.3
3.200	12.1	20.4	32.5	46.0	-13.5
4.304	11.9	20.5	32.4	46.0	-13.6
4.656	11.6	20.6	32.2	46.0	-13.9
1.720	11.8	20.3	32.1	46.0	-13.9
1.960	11.7	20.3	32.0	46.0	-14.0
0.844	11.7	20.3	32.0	46.0	-14.0
1.888	11.6	20.3	31.9	46.0	-14.1
0.551	11.7	20.2	31.9	46.0	-14.1
0.753	11.6	20.3	31.9	46.0	-14.2
0.493	11.7	20.2	31.9	46.1	-14.2
0.906	11.5	20.3	31.8	46.0	-14.2
0.969	11.4	20.3	31.7	46.0	-14.3
0.947	11.4	20.3	31.7	46.0	-14.3
2.256	11.3	20.3	31.6	46.0	-14.4
4.552	11.0	20.5	31.5	46.0	-14.5
3.944	11.1	20.4	31.5	46.0	-14.5
0.524	11.3	20.2	31.5	46.0	-14.5
0.781	11.2	20.3	31.5	46.0	-14.5
0.721	11.2	20.2	31.4	46.0	-14.6
0.595	10.9	20.2	31.1	46.0	-14.9

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	74	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

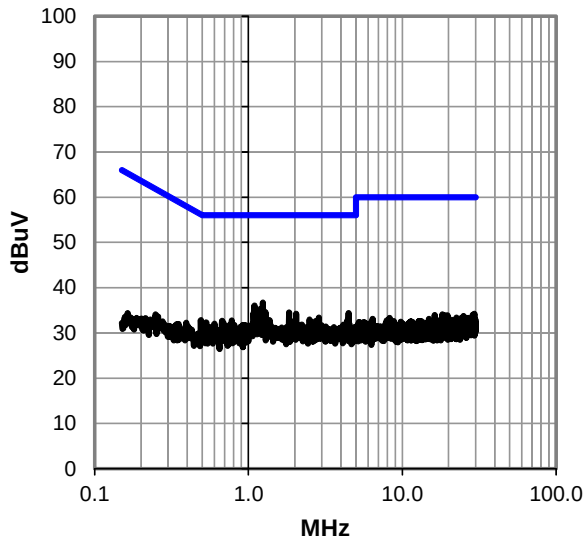
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, Low Channel 76, 902.2464 MHz, 153.6 kbps.

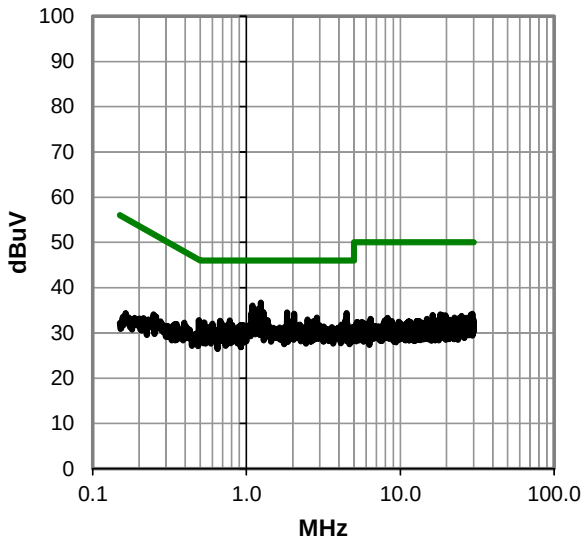
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #74

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.240	16.4	20.3	36.7	56.0	-19.3
1.096	15.8	20.3	36.1	56.0	-19.9
1.192	15.0	20.3	35.3	56.0	-20.7
1.288	14.3	20.3	34.6	56.0	-21.4
1.832	14.2	20.3	34.5	56.0	-21.5
1.080	14.1	20.3	34.4	56.0	-21.6
4.472	13.8	20.5	34.3	56.0	-21.7
2.040	13.9	20.3	34.2	56.0	-21.8
2.872	13.0	20.4	33.4	56.0	-22.6
2.496	12.6	20.4	33.0	56.0	-23.0
1.368	12.5	20.3	32.8	56.0	-23.2
0.777	12.5	20.3	32.8	56.0	-23.3
4.384	12.2	20.5	32.7	56.0	-23.3
0.492	12.6	20.2	32.8	56.1	-23.3
0.674	12.4	20.2	32.6	56.0	-23.4
4.424	12.1	20.5	32.6	56.0	-23.4
2.736	12.2	20.4	32.6	56.0	-23.4
1.920	12.2	20.3	32.5	56.0	-23.5
0.531	12.1	20.2	32.3	56.0	-23.7
1.312	12.0	20.3	32.3	56.0	-23.7
0.602	11.8	20.2	32.0	56.0	-24.0
2.776	11.5	20.4	31.9	56.0	-24.1
2.600	11.5	20.4	31.9	56.0	-24.1
4.144	11.4	20.5	31.9	56.0	-24.1
0.915	11.5	20.3	31.8	56.0	-24.2
0.810	11.5	20.3	31.8	56.0	-24.2

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.240	16.4	20.3	36.7	46.0	-9.3
1.096	15.8	20.3	36.1	46.0	-9.9
1.192	15.0	20.3	35.3	46.0	-10.7
1.288	14.3	20.3	34.6	46.0	-11.4
1.832	14.2	20.3	34.5	46.0	-11.5
1.080	14.1	20.3	34.4	46.0	-11.6
4.472	13.8	20.5	34.3	46.0	-11.7
2.040	13.9	20.3	34.2	46.0	-11.8
2.872	13.0	20.4	33.4	46.0	-12.6
2.496	12.6	20.4	33.0	46.0	-13.0
1.368	12.5	20.3	32.8	46.0	-13.2
0.777	12.5	20.3	32.8	46.0	-13.3
4.384	12.2	20.5	32.7	46.0	-13.3
0.492	12.6	20.2	32.8	46.1	-13.3
0.674	12.4	20.2	32.6	46.0	-13.4
4.424	12.1	20.5	32.6	46.0	-13.4
2.736	12.2	20.4	32.6	46.0	-13.4
1.920	12.2	20.3	32.5	46.0	-13.5
0.531	12.1	20.2	32.3	46.0	-13.7
1.312	12.0	20.3	32.3	46.0	-13.7
0.602	11.8	20.2	32.0	46.0	-14.0
2.776	11.5	20.4	31.9	46.0	-14.1
2.600	11.5	20.4	31.9	46.0	-14.1
4.144	11.4	20.5	31.9	46.0	-14.1
0.915	11.5	20.3	31.8	46.0	-14.2
0.810	11.5	20.3	31.8	46.0	-14.2

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	75	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

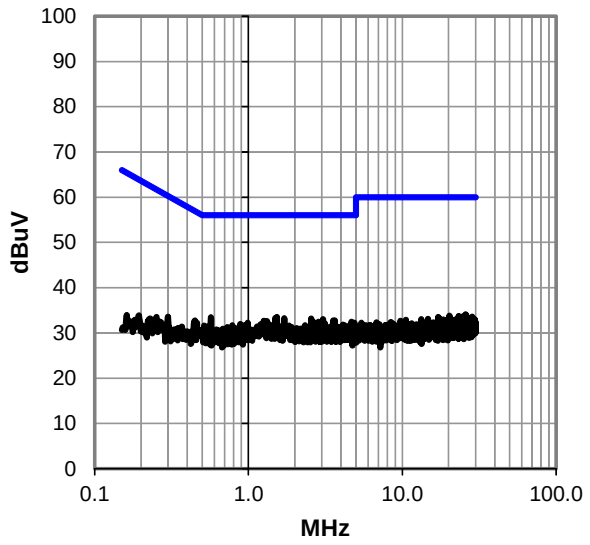
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, Mid Channel 130, 914.688 MHz, 153.6 kbps.

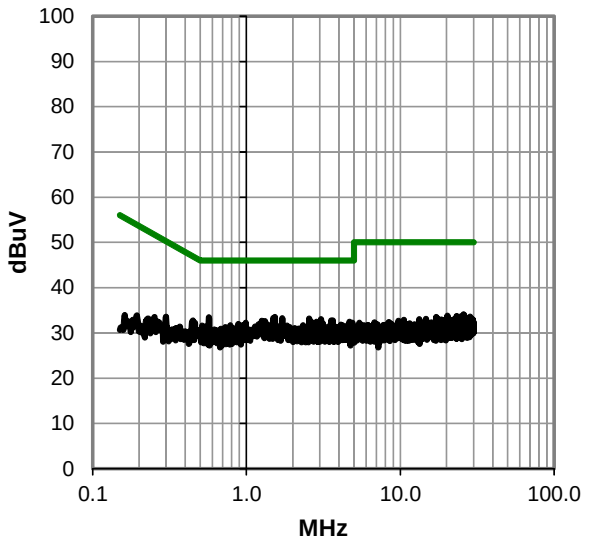
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #75

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.528	13.2	20.3	33.5	56.0	-22.5
0.570	13.2	20.2	33.4	56.0	-22.6
1.496	13.0	20.3	33.3	56.0	-22.7
1.712	12.9	20.3	33.2	56.0	-22.8
2.560	12.8	20.4	33.2	56.0	-22.8
3.056	12.6	20.4	33.0	56.0	-23.0
3.648	12.3	20.4	32.7	56.0	-23.3
3.552	12.3	20.4	32.7	56.0	-23.3
1.256	12.4	20.3	32.7	56.0	-23.3
1.320	12.3	20.3	32.6	56.0	-23.4
2.856	12.1	20.4	32.5	56.0	-23.5
2.640	12.1	20.4	32.5	56.0	-23.5
4.680	11.9	20.6	32.5	56.0	-23.6
0.988	12.0	20.3	32.3	56.0	-23.7
4.872	11.7	20.6	32.3	56.0	-23.8
3.136	11.7	20.4	32.1	56.0	-23.9
2.784	11.6	20.4	32.0	56.0	-24.0
0.886	11.7	20.3	32.0	56.0	-24.0
4.112	11.4	20.4	31.8	56.0	-24.2
0.448	12.5	20.3	32.8	56.9	-24.2
4.208	11.2	20.5	31.7	56.0	-24.3
0.944	11.4	20.3	31.7	56.0	-24.3
0.784	11.4	20.3	31.7	56.0	-24.3
2.328	11.3	20.4	31.7	56.0	-24.4
0.516	11.4	20.2	31.6	56.0	-24.4
3.600	11.2	20.4	31.6	56.0	-24.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.528	13.2	20.3	33.5	46.0	-12.5
0.570	13.2	20.2	33.4	46.0	-12.6
1.496	13.0	20.3	33.3	46.0	-12.7
1.712	12.9	20.3	33.2	46.0	-12.8
2.560	12.8	20.4	33.2	46.0	-12.8
3.056	12.6	20.4	33.0	46.0	-13.0
3.648	12.3	20.4	32.7	46.0	-13.3
3.552	12.3	20.4	32.7	46.0	-13.3
1.256	12.4	20.3	32.7	46.0	-13.3
1.320	12.3	20.3	32.6	46.0	-13.4
2.856	12.1	20.4	32.5	46.0	-13.5
2.640	12.1	20.4	32.5	46.0	-13.5
4.680	11.9	20.6	32.5	46.0	-13.6
0.988	12.0	20.3	32.3	46.0	-13.7
4.872	11.7	20.6	32.3	46.0	-13.8
3.136	11.7	20.4	32.1	46.0	-13.9
2.784	11.6	20.4	32.0	46.0	-14.0
0.886	11.7	20.3	32.0	46.0	-14.0
4.112	11.4	20.4	31.8	46.0	-14.2
0.448	12.5	20.3	32.8	46.9	-14.2
4.208	11.2	20.5	31.7	46.0	-14.3
0.944	11.4	20.3	31.7	46.0	-14.3
0.784	11.4	20.3	31.7	46.0	-14.3
2.328	11.3	20.4	31.7	46.0	-14.4
0.516	11.4	20.2	31.6	46.0	-14.4
3.600	11.2	20.4	31.6	46.0	-14.4

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	76	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

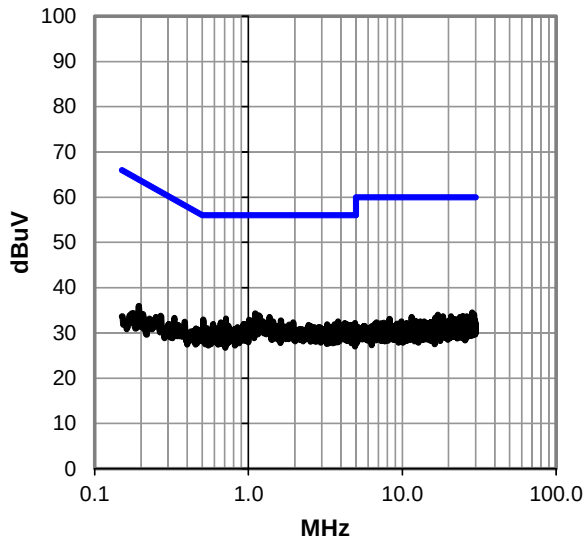
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, Mid Channel 130, 914.688 MHz, 153.6 kbps.

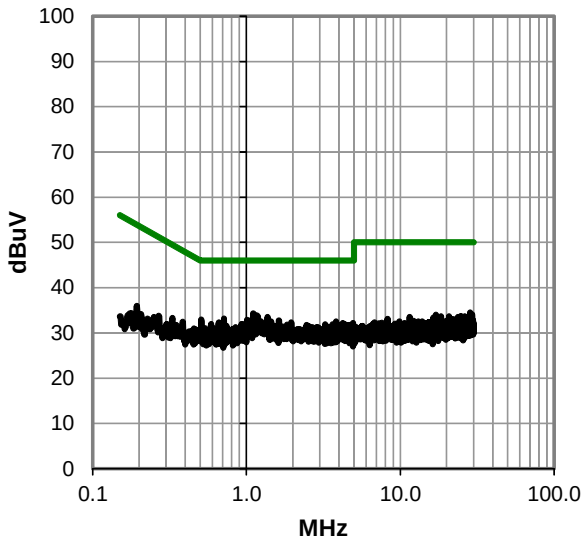
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #76

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.104	14.0	20.3	34.3	56.0	-21.7
1.168	13.6	20.3	33.9	56.0	-22.1
1.368	13.2	20.3	33.5	56.0	-22.5
0.714	12.9	20.2	33.1	56.0	-22.9
0.509	12.7	20.2	32.9	56.0	-23.1
1.008	12.6	20.3	32.9	56.0	-23.1
1.056	12.5	20.3	32.8	56.0	-23.2
1.632	12.4	20.3	32.7	56.0	-23.3
3.832	12.1	20.4	32.5	56.0	-23.5
1.448	12.2	20.3	32.5	56.0	-23.5
0.660	12.1	20.2	32.3	56.0	-23.7
1.952	12.0	20.3	32.3	56.0	-23.7
4.232	11.7	20.5	32.2	56.0	-23.8
4.928	11.6	20.6	32.2	56.0	-23.8
0.929	11.7	20.3	32.0	56.0	-24.0
0.589	11.7	20.2	31.9	56.0	-24.1
3.784	11.5	20.4	31.9	56.0	-24.1
3.632	11.5	20.4	31.9	56.0	-24.1
3.248	11.5	20.4	31.9	56.0	-24.1
0.942	11.6	20.3	31.9	56.0	-24.1
4.408	11.3	20.5	31.8	56.0	-24.2
4.352	11.3	20.5	31.8	56.0	-24.2
2.456	11.4	20.4	31.8	56.0	-24.2
4.648	11.2	20.6	31.8	56.0	-24.3
4.776	11.2	20.6	31.8	56.0	-24.3
4.120	11.3	20.4	31.7	56.0	-24.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.104	14.0	20.3	34.3	46.0	-11.7
1.168	13.6	20.3	33.9	46.0	-12.1
1.368	13.2	20.3	33.5	46.0	-12.5
0.714	12.9	20.2	33.1	46.0	-12.9
0.509	12.7	20.2	32.9	46.0	-13.1
1.008	12.6	20.3	32.9	46.0	-13.1
1.056	12.5	20.3	32.8	46.0	-13.2
1.632	12.4	20.3	32.7	46.0	-13.3
3.832	12.1	20.4	32.5	46.0	-13.5
1.448	12.2	20.3	32.5	46.0	-13.5
0.660	12.1	20.2	32.3	46.0	-13.7
1.952	12.0	20.3	32.3	46.0	-13.7
4.232	11.7	20.5	32.2	46.0	-13.8
4.928	11.6	20.6	32.2	46.0	-13.8
0.929	11.7	20.3	32.0	46.0	-14.0
0.589	11.7	20.2	31.9	46.0	-14.1
3.784	11.5	20.4	31.9	46.0	-14.1
3.632	11.5	20.4	31.9	46.0	-14.1
3.248	11.5	20.4	31.9	46.0	-14.1
0.942	11.6	20.3	31.9	46.0	-14.1
4.408	11.3	20.5	31.8	46.0	-14.2
4.352	11.3	20.5	31.8	46.0	-14.2
2.456	11.4	20.4	31.8	46.0	-14.2
4.648	11.2	20.6	31.8	46.0	-14.3
4.776	11.2	20.6	31.8	46.0	-14.3
4.120	11.3	20.4	31.7	46.0	-14.3

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	77	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

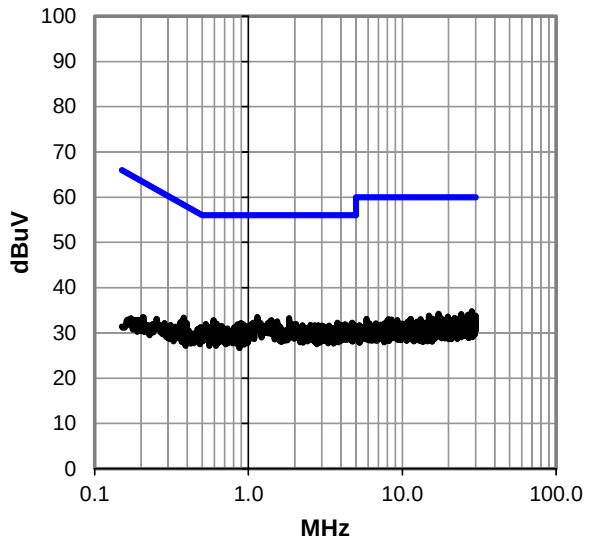
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, High Channel 187, 927.8208 MHz, 153.6 kbps.

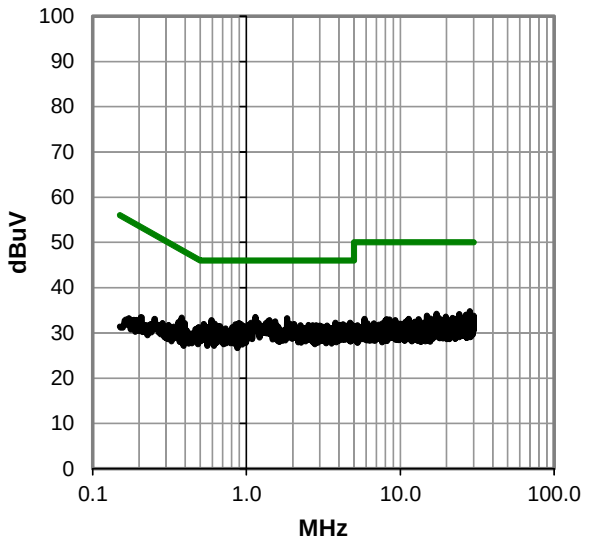
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #77

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.144	13.2	20.3	33.5	56.0	-22.5
1.832	12.9	20.3	33.2	56.0	-22.8
0.592	12.6	20.2	32.8	56.0	-23.2
1.408	12.5	20.3	32.8	56.0	-23.2
1.536	12.2	20.3	32.5	56.0	-23.5
1.072	12.0	20.3	32.3	56.0	-23.7
4.720	11.7	20.6	32.3	56.0	-23.8
3.792	11.8	20.4	32.2	56.0	-23.8
0.895	11.9	20.3	32.2	56.0	-23.8
0.623	11.8	20.2	32.0	56.0	-24.0
2.040	11.6	20.3	31.9	56.0	-24.1
0.529	11.7	20.2	31.9	56.0	-24.1
4.240	11.4	20.5	31.9	56.0	-24.1
0.849	11.6	20.3	31.9	56.0	-24.1
0.927	11.6	20.3	31.9	56.0	-24.1
4.624	11.3	20.6	31.9	56.0	-24.2
4.200	11.3	20.5	31.8	56.0	-24.2
2.536	11.4	20.4	31.8	56.0	-24.2
4.864	11.2	20.6	31.8	56.0	-24.3
4.112	11.3	20.4	31.7	56.0	-24.3
3.864	11.3	20.4	31.7	56.0	-24.3
2.840	11.3	20.4	31.7	56.0	-24.3
2.688	11.3	20.4	31.7	56.0	-24.3
2.248	11.3	20.3	31.6	56.0	-24.4
3.336	11.2	20.4	31.6	56.0	-24.4
2.992	11.2	20.4	31.6	56.0	-24.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.144	13.2	20.3	33.5	46.0	-12.5
1.832	12.9	20.3	33.2	46.0	-12.8
0.592	12.6	20.2	32.8	46.0	-13.2
1.408	12.5	20.3	32.8	46.0	-13.2
1.536	12.2	20.3	32.5	46.0	-13.5
1.072	12.0	20.3	32.3	46.0	-13.7
4.720	11.7	20.6	32.3	46.0	-13.8
3.792	11.8	20.4	32.2	46.0	-13.8
0.895	11.9	20.3	32.2	46.0	-13.8
0.623	11.8	20.2	32.0	46.0	-14.0
2.040	11.6	20.3	31.9	46.0	-14.1
0.529	11.7	20.2	31.9	46.0	-14.1
4.240	11.4	20.5	31.9	46.0	-14.1
0.849	11.6	20.3	31.9	46.0	-14.1
0.927	11.6	20.3	31.9	46.0	-14.1
4.624	11.3	20.6	31.9	46.0	-14.2
4.200	11.3	20.5	31.8	46.0	-14.2
2.536	11.4	20.4	31.8	46.0	-14.2
4.864	11.2	20.6	31.8	46.0	-14.3
4.112	11.3	20.4	31.7	46.0	-14.3
3.864	11.3	20.4	31.7	46.0	-14.3
2.840	11.3	20.4	31.7	46.0	-14.3
2.688	11.3	20.4	31.7	46.0	-14.3
2.248	11.3	20.3	31.6	46.0	-14.4
3.336	11.2	20.4	31.6	46.0	-14.4
2.992	11.2	20.4	31.6	46.0	-14.4

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	78	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

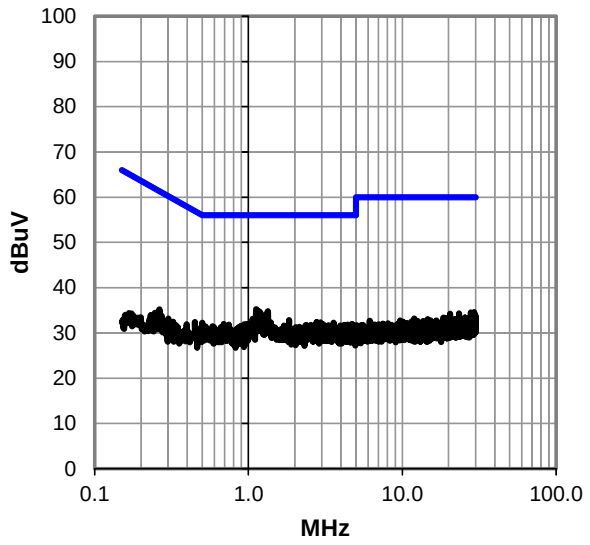
EUT OPERATING MODES

Transmitting at maximum duty cycle with 12dBi antenna, High Channel 187, 927.8208 MHz, 153.6 kbps.

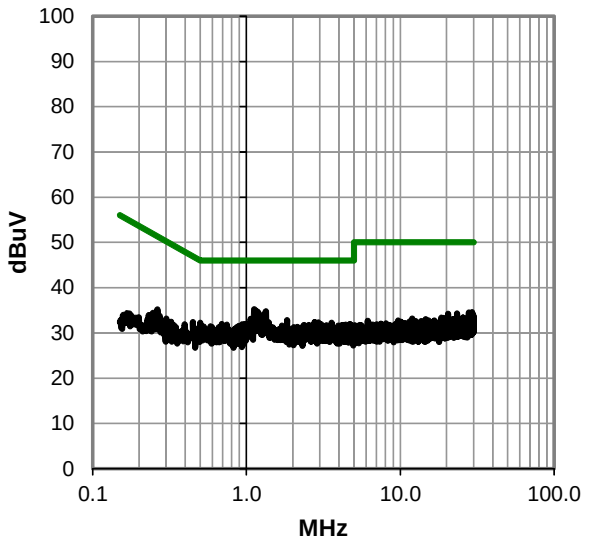
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #78

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.120	14.9	20.3	35.2	56.0	-20.8
1.336	14.5	20.3	34.8	56.0	-21.2
1.176	14.4	20.3	34.7	56.0	-21.3
1.192	14.2	20.3	34.5	56.0	-21.5
1.264	13.5	20.3	33.8	56.0	-22.2
1.064	12.8	20.3	33.1	56.0	-22.9
1.832	12.5	20.3	32.8	56.0	-23.2
2.768	12.0	20.4	32.4	56.0	-23.6
2.936	11.9	20.4	32.3	56.0	-23.7
3.576	11.8	20.4	32.2	56.0	-23.8
0.500	12.0	20.2	32.2	56.0	-23.8
0.980	11.7	20.3	32.0	56.0	-24.0
4.704	11.4	20.6	32.0	56.0	-24.1
0.689	11.7	20.2	31.9	56.0	-24.1
3.072	11.5	20.4	31.9	56.0	-24.1
0.940	11.6	20.3	31.9	56.0	-24.1
0.745	11.6	20.3	31.9	56.0	-24.2
4.408	11.3	20.5	31.8	56.0	-24.2
4.240	11.3	20.5	31.8	56.0	-24.2
2.544	11.4	20.4	31.8	56.0	-24.2
2.368	11.4	20.4	31.8	56.0	-24.3
3.312	11.3	20.4	31.7	56.0	-24.3
3.952	11.2	20.4	31.6	56.0	-24.4
1.704	11.3	20.3	31.6	56.0	-24.4
0.889	11.3	20.3	31.6	56.0	-24.4
0.449	12.1	20.3	32.4	56.9	-24.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.120	14.9	20.3	35.2	46.0	-10.8
1.336	14.5	20.3	34.8	46.0	-11.2
1.176	14.4	20.3	34.7	46.0	-11.3
1.192	14.2	20.3	34.5	46.0	-11.5
1.264	13.5	20.3	33.8	46.0	-12.2
1.064	12.8	20.3	33.1	46.0	-12.9
1.832	12.5	20.3	32.8	46.0	-13.2
2.768	12.0	20.4	32.4	46.0	-13.6
2.936	11.9	20.4	32.3	46.0	-13.7
3.576	11.8	20.4	32.2	46.0	-13.8
0.500	12.0	20.2	32.2	46.0	-13.8
0.980	11.7	20.3	32.0	46.0	-14.0
4.704	11.4	20.6	32.0	46.0	-14.1
0.689	11.7	20.2	31.9	46.0	-14.1
3.072	11.5	20.4	31.9	46.0	-14.1
0.940	11.6	20.3	31.9	46.0	-14.1
0.745	11.6	20.3	31.9	46.0	-14.2
4.408	11.3	20.5	31.8	46.0	-14.2
4.240	11.3	20.5	31.8	46.0	-14.2
2.544	11.4	20.4	31.8	46.0	-14.2
2.368	11.4	20.4	31.8	46.0	-14.3
3.312	11.3	20.4	31.7	46.0	-14.3
3.952	11.2	20.4	31.6	46.0	-14.4
1.704	11.3	20.3	31.6	46.0	-14.4
0.889	11.3	20.3	31.6	46.0	-14.4
0.449	12.1	20.3	32.4	46.9	-14.5

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	81	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

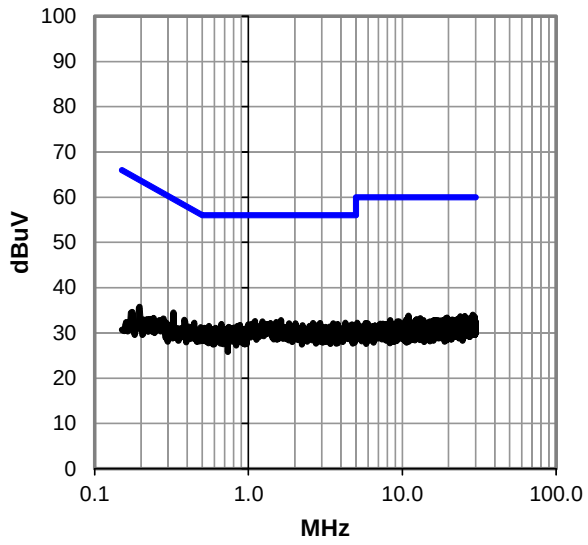
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, Low Channel 76, 902.2464 MHz, 153.6 kbps.

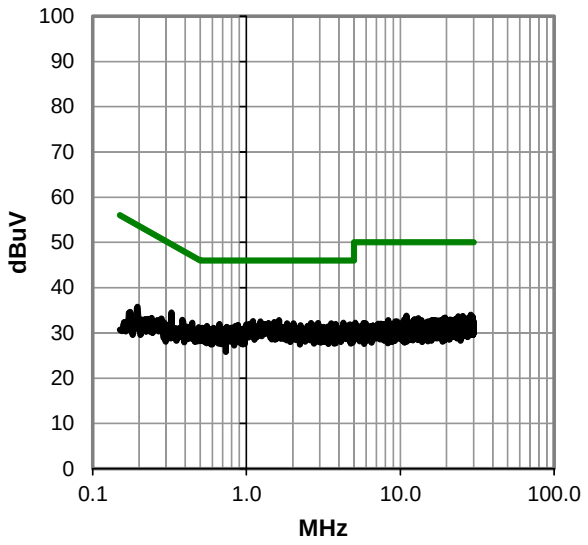
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #81

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.632	12.5	20.3	32.8	56.0	-23.2
1.104	12.3	20.3	32.6	56.0	-23.4
1.232	12.2	20.3	32.5	56.0	-23.5
1.512	12.1	20.3	32.4	56.0	-23.6
4.272	11.8	20.5	32.3	56.0	-23.7
2.920	11.8	20.4	32.2	56.0	-23.8
2.632	11.8	20.4	32.2	56.0	-23.8
2.016	11.8	20.3	32.1	56.0	-23.9
1.832	11.8	20.3	32.1	56.0	-23.9
3.552	11.7	20.4	32.1	56.0	-23.9
0.667	11.7	20.2	31.9	56.0	-24.1
3.808	11.5	20.4	31.9	56.0	-24.1
4.672	11.3	20.6	31.9	56.0	-24.2
4.744	11.3	20.6	31.9	56.0	-24.2
2.872	11.4	20.4	31.8	56.0	-24.2
0.883	11.5	20.3	31.8	56.0	-24.2
2.704	11.3	20.4	31.7	56.0	-24.3
2.240	11.3	20.3	31.6	56.0	-24.4
2.496	11.2	20.4	31.6	56.0	-24.4
0.850	11.3	20.3	31.6	56.0	-24.4
0.555	11.3	20.2	31.5	56.0	-24.5
3.376	11.0	20.4	31.4	56.0	-24.6
0.747	11.1	20.3	31.4	56.0	-24.7
3.168	10.9	20.4	31.3	56.0	-24.7
0.444	12.0	20.3	32.3	57.0	-24.7
4.776	10.7	20.6	31.3	56.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.632	12.5	20.3	32.8	46.0	-13.2
1.104	12.3	20.3	32.6	46.0	-13.4
1.232	12.2	20.3	32.5	46.0	-13.5
1.512	12.1	20.3	32.4	46.0	-13.6
4.272	11.8	20.5	32.3	46.0	-13.7
2.920	11.8	20.4	32.2	46.0	-13.8
2.632	11.8	20.4	32.2	46.0	-13.8
2.016	11.8	20.3	32.1	46.0	-13.9
1.832	11.8	20.3	32.1	46.0	-13.9
3.552	11.7	20.4	32.1	46.0	-13.9
0.667	11.7	20.2	31.9	46.0	-14.1
3.808	11.5	20.4	31.9	46.0	-14.1
4.672	11.3	20.6	31.9	46.0	-14.2
4.744	11.3	20.6	31.9	46.0	-14.2
2.872	11.4	20.4	31.8	46.0	-14.2
0.883	11.5	20.3	31.8	46.0	-14.2
2.704	11.3	20.4	31.7	46.0	-14.3
2.240	11.3	20.3	31.6	46.0	-14.4
2.496	11.2	20.4	31.6	46.0	-14.4
0.850	11.3	20.3	31.6	46.0	-14.4
0.555	11.3	20.2	31.5	46.0	-14.5
3.376	11.0	20.4	31.4	46.0	-14.6
0.747	11.1	20.3	31.4	46.0	-14.7
3.168	10.9	20.4	31.3	46.0	-14.7
0.444	12.0	20.3	32.3	47.0	-14.7
4.776	10.7	20.6	31.3	46.0	-14.8

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	82	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

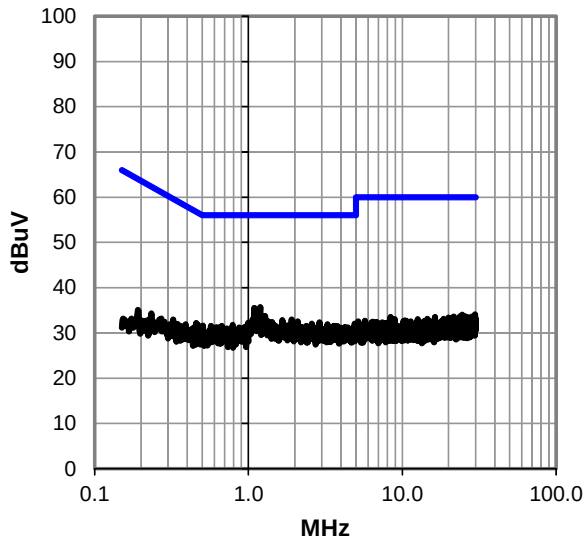
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, Low Channel 76, 902.2464 MHz, 153.6 kbps.

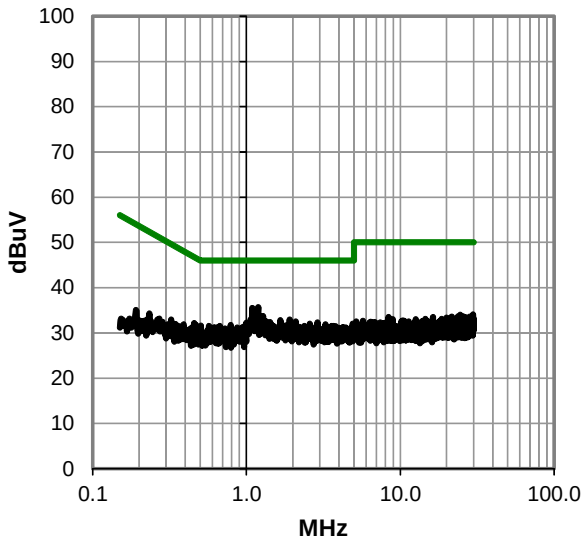
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #82

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.192	15.4	20.3	35.7	56.0	-20.3
1.096	15.2	20.3	35.5	56.0	-20.5
1.280	13.4	20.3	33.7	56.0	-22.3
1.160	13.4	20.3	33.7	56.0	-22.3
1.904	12.6	20.3	32.9	56.0	-23.1
1.224	12.6	20.3	32.9	56.0	-23.1
1.664	12.5	20.3	32.8	56.0	-23.2
2.088	12.2	20.3	32.5	56.0	-23.5
1.344	12.2	20.3	32.5	56.0	-23.5
1.424	12.1	20.3	32.4	56.0	-23.6
2.896	11.9	20.4	32.3	56.0	-23.7
2.584	11.7	20.4	32.1	56.0	-23.9
4.904	11.5	20.6	32.1	56.0	-24.0
3.256	11.5	20.4	31.9	56.0	-24.1
0.789	11.5	20.3	31.8	56.0	-24.2
0.505	11.4	20.2	31.6	56.0	-24.4
2.384	11.2	20.4	31.6	56.0	-24.4
0.672	11.3	20.2	31.5	56.0	-24.5
0.570	11.3	20.2	31.5	56.0	-24.5
3.656	11.1	20.4	31.5	56.0	-24.5
0.991	11.2	20.3	31.5	56.0	-24.5
3.808	11.0	20.4	31.4	56.0	-24.6
0.458	11.9	20.3	32.2	56.7	-24.6
0.961	11.1	20.3	31.4	56.0	-24.6
0.655	11.1	20.2	31.3	56.0	-24.7
4.256	10.8	20.5	31.3	56.0	-24.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.192	15.4	20.3	35.7	46.0	-10.3
1.096	15.2	20.3	35.5	46.0	-10.5
1.280	13.4	20.3	33.7	46.0	-12.3
1.160	13.4	20.3	33.7	46.0	-12.3
1.904	12.6	20.3	32.9	46.0	-13.1
1.224	12.6	20.3	32.9	46.0	-13.1
1.664	12.5	20.3	32.8	46.0	-13.2
2.088	12.2	20.3	32.5	46.0	-13.5
1.344	12.2	20.3	32.5	46.0	-13.5
1.424	12.1	20.3	32.4	46.0	-13.6
2.896	11.9	20.4	32.3	46.0	-13.7
2.584	11.7	20.4	32.1	46.0	-13.9
4.904	11.5	20.6	32.1	46.0	-14.0
3.256	11.5	20.4	31.9	46.0	-14.1
0.789	11.5	20.3	31.8	46.0	-14.2
0.505	11.4	20.2	31.6	46.0	-14.4
2.384	11.2	20.4	31.6	46.0	-14.4
0.672	11.3	20.2	31.5	46.0	-14.5
0.570	11.3	20.2	31.5	46.0	-14.5
3.656	11.1	20.4	31.5	46.0	-14.5
0.991	11.2	20.3	31.5	46.0	-14.5
3.808	11.0	20.4	31.4	46.0	-14.6
0.458	11.9	20.3	32.2	46.7	-14.6
0.961	11.1	20.3	31.4	46.0	-14.6
0.655	11.1	20.2	31.3	46.0	-14.7
4.256	10.8	20.5	31.3	46.0	-14.7

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	83	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

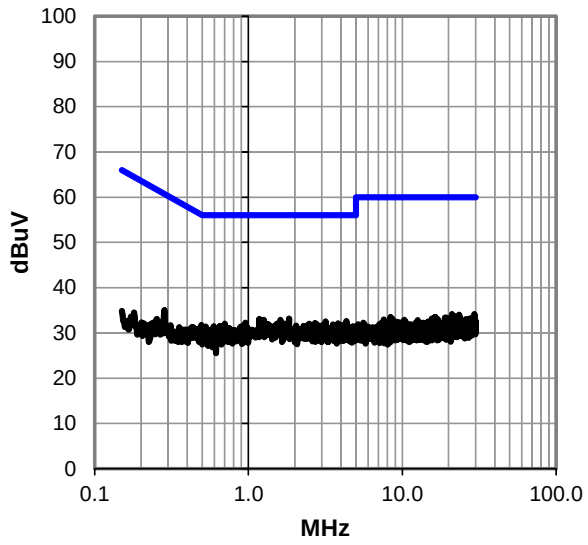
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, Mid Channel 130, 914.688 MHz, 153.6 kbps.

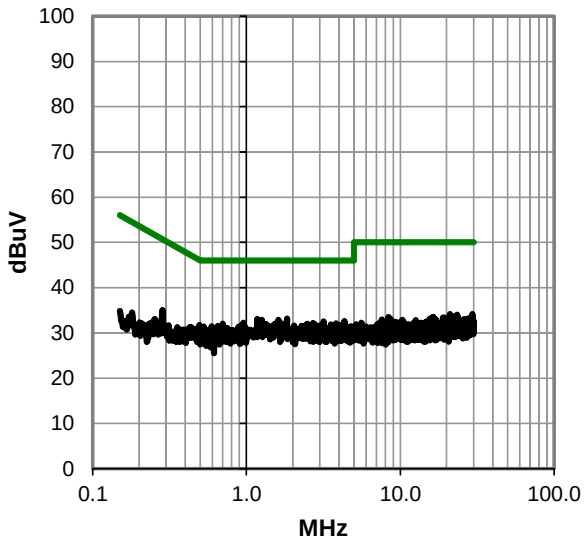
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #83

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.832	12.8	20.3	33.1	56.0	-22.9
1.176	12.8	20.3	33.1	56.0	-22.9
1.616	12.6	20.3	32.9	56.0	-23.1
1.256	12.6	20.3	32.9	56.0	-23.1
4.328	12.1	20.5	32.6	56.0	-23.4
3.176	12.1	20.4	32.5	56.0	-23.5
0.957	12.0	20.3	32.3	56.0	-23.7
2.704	11.8	20.4	32.2	56.0	-23.8
3.832	11.7	20.4	32.1	56.0	-23.9
2.488	11.7	20.4	32.1	56.0	-23.9
0.701	11.8	20.2	32.0	56.0	-24.0
2.784	11.5	20.4	31.9	56.0	-24.1
3.544	11.4	20.4	31.8	56.0	-24.2
4.088	11.3	20.4	31.7	56.0	-24.3
0.925	11.4	20.3	31.7	56.0	-24.3
2.040	11.3	20.3	31.6	56.0	-24.4
0.493	11.5	20.2	31.7	56.1	-24.4
0.652	11.3	20.2	31.5	56.0	-24.5
2.872	11.1	20.4	31.5	56.0	-24.5
4.800	10.9	20.6	31.5	56.0	-24.6
0.594	11.2	20.2	31.4	56.0	-24.6
0.529	11.2	20.2	31.4	56.0	-24.6
0.884	11.1	20.3	31.4	56.0	-24.6
4.704	10.7	20.6	31.3	56.0	-24.8
0.514	11.0	20.2	31.2	56.0	-24.8
3.616	10.8	20.4	31.2	56.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.832	12.8	20.3	33.1	46.0	-12.9
1.176	12.8	20.3	33.1	46.0	-12.9
1.616	12.6	20.3	32.9	46.0	-13.1
1.256	12.6	20.3	32.9	46.0	-13.1
4.328	12.1	20.5	32.6	46.0	-13.4
3.176	12.1	20.4	32.5	46.0	-13.5
0.957	12.0	20.3	32.3	46.0	-13.7
2.704	11.8	20.4	32.2	46.0	-13.8
3.832	11.7	20.4	32.1	46.0	-13.9
2.488	11.7	20.4	32.1	46.0	-13.9
0.701	11.8	20.2	32.0	46.0	-14.0
2.784	11.5	20.4	31.9	46.0	-14.1
3.544	11.4	20.4	31.8	46.0	-14.2
4.088	11.3	20.4	31.7	46.0	-14.3
0.925	11.4	20.3	31.7	46.0	-14.3
2.040	11.3	20.3	31.6	46.0	-14.4
0.493	11.5	20.2	31.7	46.1	-14.4
0.652	11.3	20.2	31.5	46.0	-14.5
2.872	11.1	20.4	31.5	46.0	-14.5
4.800	10.9	20.6	31.5	46.0	-14.6
0.594	11.2	20.2	31.4	46.0	-14.6
0.529	11.2	20.2	31.4	46.0	-14.6
0.884	11.1	20.3	31.4	46.0	-14.6
4.704	10.7	20.6	31.3	46.0	-14.8
0.514	11.0	20.2	31.2	46.0	-14.8
3.616	10.8	20.4	31.2	46.0	-14.8

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

WTD.2013.07.23, PSA-ESCI 2012.12.14, PSA-ESCI Version 2013.2.20

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	84	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

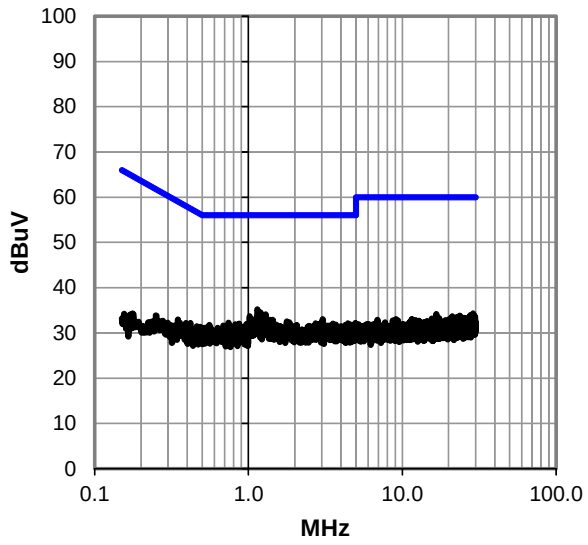
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, Mid Channel 130, 914.688 MHz, 153.6 kbps.

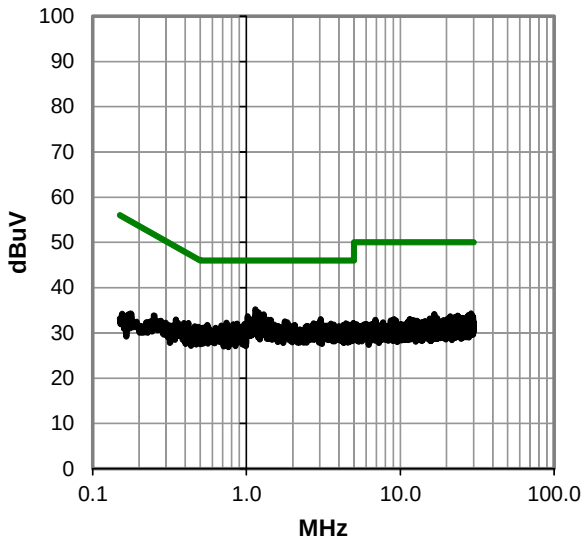
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #84

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.144	14.9	20.3	35.2	56.0	-20.8
1.200	14.2	20.3	34.5	56.0	-21.5
1.296	13.8	20.3	34.1	56.0	-21.9
1.016	13.4	20.3	33.7	56.0	-22.3
3.040	12.6	20.4	33.0	56.0	-23.0
1.440	12.6	20.3	32.9	56.0	-23.1
1.384	12.6	20.3	32.9	56.0	-23.1
1.776	12.2	20.3	32.5	56.0	-23.5
1.848	12.0	20.3	32.3	56.0	-23.7
0.743	12.0	20.3	32.3	56.0	-23.8
4.960	11.6	20.6	32.2	56.0	-23.8
4.440	11.6	20.5	32.1	56.0	-23.9
2.952	11.7	20.4	32.1	56.0	-23.9
2.736	11.7	20.4	32.1	56.0	-23.9
0.871	11.8	20.3	32.1	56.0	-23.9
3.544	11.6	20.4	32.0	56.0	-24.0
0.971	11.7	20.3	32.0	56.0	-24.0
2.872	11.5	20.4	31.9	56.0	-24.1
0.821	11.6	20.3	31.9	56.0	-24.1
4.600	11.3	20.6	31.9	56.0	-24.2
3.696	11.4	20.4	31.8	56.0	-24.2
1.512	11.5	20.3	31.8	56.0	-24.2
4.264	11.3	20.5	31.8	56.0	-24.2
0.556	11.5	20.2	31.7	56.0	-24.3
2.064	11.4	20.3	31.7	56.0	-24.3
2.688	11.3	20.4	31.7	56.0	-24.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.144	14.9	20.3	35.2	46.0	-10.8
1.200	14.2	20.3	34.5	46.0	-11.5
1.296	13.8	20.3	34.1	46.0	-11.9
1.016	13.4	20.3	33.7	46.0	-12.3
3.040	12.6	20.4	33.0	46.0	-13.0
1.440	12.6	20.3	32.9	46.0	-13.1
1.384	12.6	20.3	32.9	46.0	-13.1
1.776	12.2	20.3	32.5	46.0	-13.5
1.848	12.0	20.3	32.3	46.0	-13.7
0.743	12.0	20.3	32.3	46.0	-13.8
4.960	11.6	20.6	32.2	46.0	-13.8
4.440	11.6	20.5	32.1	46.0	-13.9
2.952	11.7	20.4	32.1	46.0	-13.9
2.736	11.7	20.4	32.1	46.0	-13.9
0.871	11.8	20.3	32.1	46.0	-13.9
3.544	11.6	20.4	32.0	46.0	-14.0
0.971	11.7	20.3	32.0	46.0	-14.0
2.872	11.5	20.4	31.9	46.0	-14.1
0.821	11.6	20.3	31.9	46.0	-14.1
4.600	11.3	20.6	31.9	46.0	-14.2
3.696	11.4	20.4	31.8	46.0	-14.2
1.512	11.5	20.3	31.8	46.0	-14.2
4.264	11.3	20.5	31.8	46.0	-14.2
0.556	11.5	20.2	31.7	46.0	-14.3
2.064	11.4	20.3	31.7	46.0	-14.3
2.688	11.3	20.4	31.7	46.0	-14.3

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	85	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

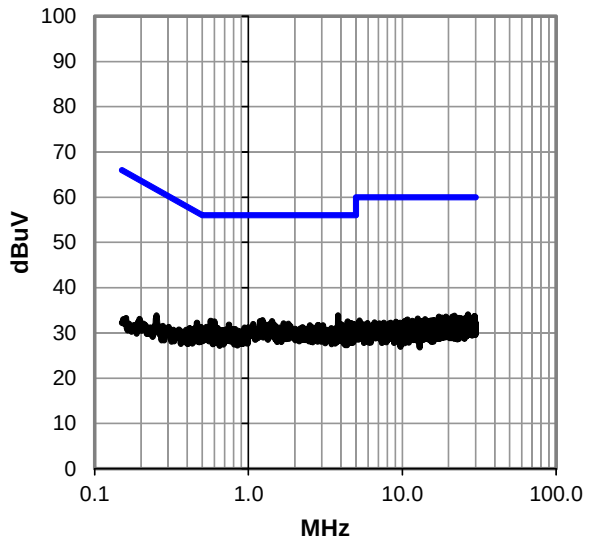
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, High Channel 187, 927.8208 MHz, 153.6 kbps.

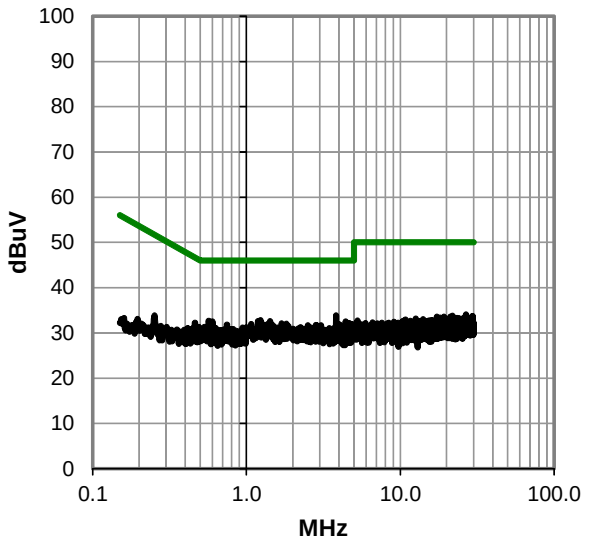
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC Powerline Conducted Emissions

RESULTS - Run #85

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.824	13.4	20.4	33.8	56.0	-22.2
1.232	12.5	20.3	32.8	56.0	-23.2
0.570	12.4	20.2	32.6	56.0	-23.4
1.424	12.3	20.3	32.6	56.0	-23.4
0.602	12.3	20.2	32.5	56.0	-23.5
4.416	12.0	20.5	32.5	56.0	-23.5
4.656	11.6	20.6	32.2	56.0	-23.9
1.696	11.8	20.3	32.1	56.0	-23.9
1.816	11.7	20.3	32.0	56.0	-24.0
1.072	11.7	20.3	32.0	56.0	-24.0
4.752	11.4	20.6	32.0	56.0	-24.1
4.840	11.4	20.6	32.0	56.0	-24.1
3.968	11.5	20.4	31.9	56.0	-24.1
0.747	11.6	20.3	31.9	56.0	-24.2
4.024	11.4	20.4	31.8	56.0	-24.2
2.824	11.4	20.4	31.8	56.0	-24.2
4.968	11.2	20.6	31.8	56.0	-24.2
3.056	11.3	20.4	31.7	56.0	-24.3
2.504	11.3	20.4	31.7	56.0	-24.3
0.461	12.0	20.2	32.2	56.7	-24.4
4.360	10.9	20.5	31.4	56.0	-24.6
0.534	11.1	20.2	31.3	56.0	-24.7
2.240	10.9	20.3	31.2	56.0	-24.8
1.584	10.9	20.3	31.2	56.0	-24.8
2.632	10.8	20.4	31.2	56.0	-24.8
0.944	10.9	20.3	31.2	56.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.824	13.4	20.4	33.8	46.0	-12.2
1.232	12.5	20.3	32.8	46.0	-13.2
0.570	12.4	20.2	32.6	46.0	-13.4
1.424	12.3	20.3	32.6	46.0	-13.4
0.602	12.3	20.2	32.5	46.0	-13.5
4.416	12.0	20.5	32.5	46.0	-13.5
4.656	11.6	20.6	32.2	46.0	-13.9
1.696	11.8	20.3	32.1	46.0	-13.9
1.816	11.7	20.3	32.0	46.0	-14.0
1.072	11.7	20.3	32.0	46.0	-14.0
4.752	11.4	20.6	32.0	46.0	-14.1
4.840	11.4	20.6	32.0	46.0	-14.1
3.968	11.5	20.4	31.9	46.0	-14.1
0.747	11.6	20.3	31.9	46.0	-14.2
4.024	11.4	20.4	31.8	46.0	-14.2
2.824	11.4	20.4	31.8	46.0	-14.2
4.968	11.2	20.6	31.8	46.0	-14.2
3.056	11.3	20.4	31.7	46.0	-14.3
2.504	11.3	20.4	31.7	46.0	-14.3
0.461	12.0	20.2	32.2	46.7	-14.4
4.360	10.9	20.5	31.4	46.0	-14.6
0.534	11.1	20.2	31.3	46.0	-14.7
2.240	10.9	20.3	31.2	46.0	-14.8
1.584	10.9	20.3	31.2	46.0	-14.8
2.632	10.8	20.4	31.2	46.0	-14.8
0.944	10.9	20.3	31.2	46.0	-14.8

CONCLUSION

Pass

Tested By

AC Powerline Conducted Emissions

WTD.2013.07.23, PSA-ESCI 2012.12.14, PSA-ESCI Version 2013.2.20

EUT:	MM2	Work Order:	FREW0015
Serial Number:	861-2469	Date:	11/20/2013
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	26%
Customer Project:	None	Bar. Pressure:	1028 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0015-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2013	ANSI C63.10:2009

TEST PARAMETERS

Run #:	86	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

EUT powered by 5 VDC supplied through development board via DC power supply

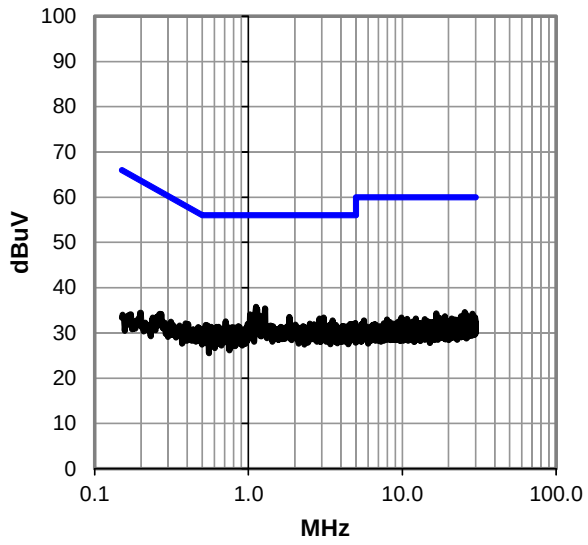
EUT OPERATING MODES

Transmitting at maximum duty cycle with 6 dBd (8.15 dBi) antenna, High Channel 187, 927.8208 MHz, 153.6 kbps.

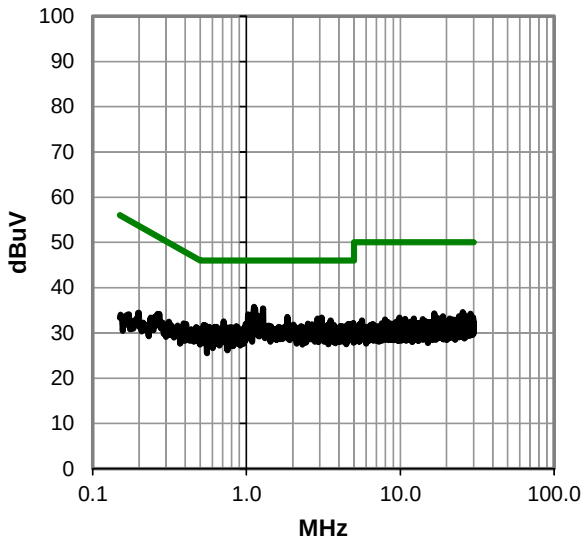
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



NORTHWEST EMC

WTD.2013.07.23, PSA-ESCI 2012.12.14, PSA-ESCI Version 2013.2.20

AC Powerline Conducted Emissions

RESULTS - Run #86

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.120	15.5	20.3	35.8	56.0	-20.2
1.280	15.1	20.3	35.4	56.0	-20.6
1.024	13.8	20.3	34.1	56.0	-21.9
1.848	13.2	20.3	33.5	56.0	-22.5
3.080	13.0	20.4	33.4	56.0	-22.6
2.896	12.8	20.4	33.2	56.0	-22.8
3.520	12.3	20.4	32.7	56.0	-23.3
0.709	12.3	20.2	32.5	56.0	-23.5
4.952	11.6	20.6	32.2	56.0	-23.8
2.512	11.7	20.4	32.1	56.0	-23.9
0.991	11.7	20.3	32.0	56.0	-24.0
4.592	11.4	20.6	32.0	56.0	-24.1
4.760	11.4	20.6	32.0	56.0	-24.1
2.664	11.5	20.4	31.9	56.0	-24.1
2.024	11.5	20.3	31.8	56.0	-24.2
3.688	11.3	20.4	31.7	56.0	-24.3
0.529	11.5	20.2	31.7	56.0	-24.3
3.344	11.3	20.4	31.7	56.0	-24.3
4.496	11.1	20.5	31.6	56.0	-24.4
0.543	11.4	20.2	31.6	56.0	-24.4
0.862	11.2	20.3	31.5	56.0	-24.5
2.272	11.1	20.4	31.5	56.0	-24.6
4.128	11.0	20.4	31.4	56.0	-24.6
4.064	11.0	20.4	31.4	56.0	-24.6
2.936	11.0	20.4	31.4	56.0	-24.6
4.240	10.9	20.5	31.4	56.0	-24.6

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.120	15.5	20.3	35.8	46.0	-10.2
1.280	15.1	20.3	35.4	46.0	-10.6
1.024	13.8	20.3	34.1	46.0	-11.9
1.848	13.2	20.3	33.5	46.0	-12.5
3.080	13.0	20.4	33.4	46.0	-12.6
2.896	12.8	20.4	33.2	46.0	-12.8
3.520	12.3	20.4	32.7	46.0	-13.3
0.709	12.3	20.2	32.5	46.0	-13.5
4.952	11.6	20.6	32.2	46.0	-13.8
2.512	11.7	20.4	32.1	46.0	-13.9
0.991	11.7	20.3	32.0	46.0	-14.0
4.592	11.4	20.6	32.0	46.0	-14.1
4.760	11.4	20.6	32.0	46.0	-14.1
2.664	11.5	20.4	31.9	46.0	-14.1
2.024	11.5	20.3	31.8	46.0	-14.2
3.688	11.3	20.4	31.7	46.0	-14.3
0.529	11.5	20.2	31.7	46.0	-14.3
3.344	11.3	20.4	31.7	46.0	-14.3
4.496	11.1	20.5	31.6	46.0	-14.4
0.543	11.4	20.2	31.6	46.0	-14.4
0.862	11.2	20.3	31.5	46.0	-14.5
2.272	11.1	20.4	31.5	46.0	-14.6
4.128	11.0	20.4	31.4	46.0	-14.6
4.064	11.0	20.4	31.4	46.0	-14.6
2.936	11.0	20.4	31.4	46.0	-14.6
4.240	10.9	20.5	31.4	46.0	-14.6

CONCLUSION

Pass

Tested By