

# NORTHWEST EMC

## FreeWave Technologies, Inc.

Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)

FCC 15.207:2016

FCC 15.247:2016

915 MHz DTS Radio

Report # FREW0054.2



NVLAP Lab Code: 200629-0

# CERTIFICATE OF TEST

Last Date of Test: January 18, 2016

FreeWave Technologies, Inc.

Model: Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	ANSI C63.10:2013

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6, 11.12.1, 11.13.2	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	N/A	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.2.2.4	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:



Rod Munro, Operations Manager

*Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.*

# REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

# 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 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

## Canada

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

## European Union

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

## Australia/New Zealand

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

## Korea

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

## Japan

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

## Taiwan

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

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

## Singapore

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

## Israel

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

## Hong Kong

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

## Vietnam

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

## SCOPE

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

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

<http://gsi.nist.gov/global/docs/cabs/designations.html>

# 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 on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 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)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.0 dB	-5.0 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

# FACILITIES



California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>NVLAP</b>					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code: 201049-0	NVLAP Lab Code: 200629-0
<b>Industry Canada</b>					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
<b>BSMI</b>					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA</b>					
US0158	US0175	N/A	US0017	US0191	US0157



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	FreeWave Technologies, Inc.
<b>Address:</b>	5395 Pearl Parkway, Suite 100
<b>City, State, Zip:</b>	Boulder, CO 80301
<b>Test Requested By:</b>	Dean Busch
<b>Model:</b>	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)
<b>First Date of Test:</b>	January 04, 2016
<b>Last Date of Test:</b>	January 18, 2016
<b>Receipt Date of Samples:</b>	January 04, 2016
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
902 MHz - 928 MHz DTS Radio Module with a 7.15 dBi Antenna
<b>Testing Objective:</b>
Seeking to demonstrate compliance of the DTS radio module under FCC 15.247 for operation in the 902 - 928 MHz Band.

# DTS RF Power Table – FCC 15.247

## Max Power Settings:

	Data Rate		
	500kb	1Mb	4Mb
<b>Low Channel</b>	30	30	30
<b>Mid Channel</b>	30	30	30
<b>High Channel</b>	30	30	30

## Power Settings for 7.15dBi Antenna:

	Data Rate		
	500kb	1Mb	4Mb
<b>Low Channel</b>	29	29	28
<b>Mid Channel</b>	29	29	28
<b>High Channel</b>	29	29	28

# CONFIGURATIONS

## Configuration FREW0054- 1

<b>Software/Firmware Running during test</b>	
<b>Description</b>	<b>Version</b>
Firmware	FWT0001TA.69

<b>EUT</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
900 MHz Industrial Radio Module	Freewave Technologies, Inc.	Z9-T	402-669-0330	
Translation Board	Freewave Technologies, Inc.	MM2-MR	402-661-3868	
Radio Module (Includes models Z9-T and MM2-MR)	Freewave Technologies, Inc.	Z9-C	None	

<b>Peripherals in test setup boundary</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
AC-DC Power Supply	Leader Electronics Inc	MT12-Y090100-A1	None	
Laptop Computer	Dell	Latitude E6520	None	

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
Serial to USB Cable	No	1.8m	No	Translation Board	Laptop Computer
DC Power	No	1.7m	No	AC-DC Power Supply	Translation Board

# CONFIGURATIONS

## Configuration FREW0054- 4

Software/Firmware Running during test	
Description	Version
Firmware	FWT0001TA.69

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
900 MHz Industrial Radio Module	Freewave Technologies, Inc.	Z9-T	402-669-0330
Translation Board	Freewave Technologies, Inc.	MM2-MR	402-661-3868
Radio Module (Includes models Z9-T and MM2-MR)	Freewave Technologies, Inc.	Z9-C	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC-DC Power Supply	Leader Electronics Inc	MT12-Y090100-A1	None
7.15dBi Elevated Feed Antenna	Antenex	EB8965C	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop Computer	Lenovo	T500	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7m	No	AC-DC Power Supply	Translation Board
Serial to USB Cable	No	1.8m	No	Serial Extension Cable	Laptop Computer
Serial Extension Cable	No	9.0m	No	Translation Board	Serial to USB Cable
Coaxial Cable	Yes	0.6m	No	900 MHz Industrial Radio Module	7.15dBi Elevated Feed Antenna

# CONFIGURATIONS

## Configuration FREW0054- 7

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
900 MHz Industrial Radio Module	Freewave Technologies, Inc.	Z9-T	402-669-0330
Translation Board	Freewave Technologies, Inc.	MM2-MR	402-661-3868
Radio Module (Includes models Z9-T and MM2-MR)	Freewave Technologies, Inc.	Z9-C	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop Computer	Lenovo	T500	None
AC Brick	Lenovo	42T4418	None
7.15dBi Elevated Feed Antenna	Antenex	EB8965C	None
DC Power Supply	Kikisui	PWC0620	1930492

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial to USB Cable	No	1.8m	No	Translation Board	Laptop Computer
AC Power	No	0.8m	No	AC Mains	AC Brick
DC Power	No	1.6m	No	AC Brick	Laptop Computer
Coaxial Cable	Yes	0.6m	No	900 MHz Industrial Radio Module	7.15dBi Elevated Feed Antenna
DC Power	No	1.0m	No	DC Mains	Translation Board
AC Power	Yes	1.5m	No	AC Mains	DC Power Supply

# MODIFICATIONS

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/4/2016	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	1/4/2016	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.
3	1/4/2016	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	1/4/2016	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.
5	1/4/2016	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	1/5/2016	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.
7	1/8/2016	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.
8	1/18/2016	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# POWERLINE CONDUCTED EMISSIONS

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
LISN	Solar Electronics	9252-50-R-24-BNC	LIK	11/3/2015	11/3/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIM	11/3/2015	11/3/2016
Receiver	Rohde & Schwarz	ESCI	ARE	8/5/2015	8/5/2016
Cable - Conducted Cable Assembly	Northwest EMC	NC4, HHF, RKD	NC4A	12/28/2015	12/28/2016

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

## CONFIGURATIONS INVESTIGATED

FREW0054-7

## MODES INVESTIGATED

Transmitting Mid Channel 18, 914.4576 MHz, 500kbps, Power Level = 29.

Transmitting Mid Channel 9, 914.112 MHz, 1Mbps, Power Level = 29.

Transmitting Mid Channel 4, 914.2272 MHz, 4Mbps, Power Level = 29.

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	15	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

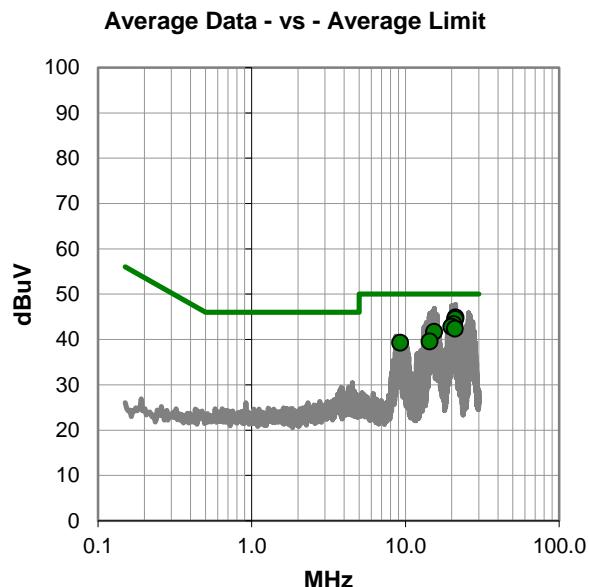
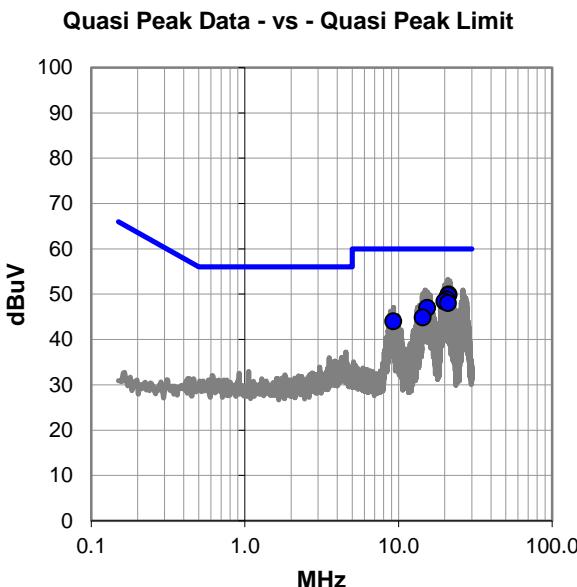
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 18, 914.4576 MHz, 500kbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #15

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.181	27.4	22.5	49.9	60.0	-10.1
21.079	27.2	22.5	49.7	60.0	-10.3
20.582	26.4	22.5	48.9	60.0	-11.1
19.965	26.0	22.4	48.4	60.0	-11.6
20.980	25.5	22.5	48.0	60.0	-12.0
15.418	25.1	21.9	47.0	60.0	-13.0
14.409	23.1	21.7	44.8	60.0	-15.2
9.278	22.9	21.1	44.0	60.0	-16.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.181	22.3	22.5	44.8	50.0	-5.2
21.079	22.0	22.5	44.5	50.0	-5.5
20.582	20.9	22.5	43.4	50.0	-6.6
19.965	20.4	22.4	42.8	50.0	-7.2
20.980	19.9	22.5	42.4	50.0	-7.6
15.418	19.8	21.9	41.7	50.0	-8.3
14.409	17.8	21.7	39.5	50.0	-10.5
9.278	18.2	21.1	39.3	50.0	-10.7

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	16	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

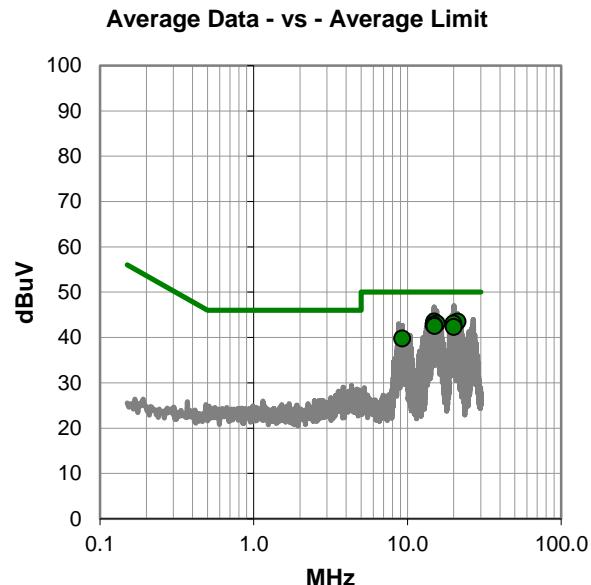
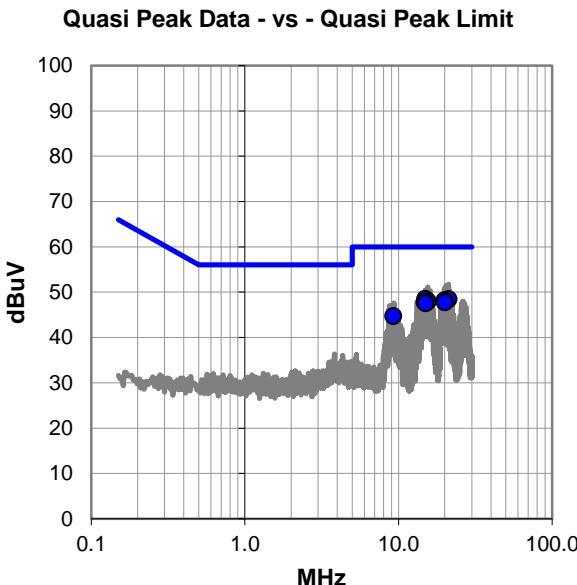
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 18, 914.4576 MHz, 500kbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #16

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
14.919	26.7	21.8	48.5	60.0	-11.5
21.177	25.9	22.5	48.4	60.0	-11.6
19.976	25.8	22.4	48.2	60.0	-11.8
15.521	26.1	21.9	48.0	60.0	-12.0
14.823	26.0	21.8	47.8	60.0	-12.2
20.071	25.3	22.4	47.7	60.0	-12.3
15.021	25.7	21.8	47.5	60.0	-12.5
9.277	23.6	21.1	44.7	60.0	-15.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.177	21.0	22.5	43.5	50.0	-6.5
14.919	21.7	21.8	43.5	50.0	-6.5
19.976	20.7	22.4	43.1	50.0	-6.9
15.521	21.2	21.9	43.1	50.0	-6.9
14.823	21.0	21.8	42.8	50.0	-7.2
15.021	20.7	21.8	42.5	50.0	-7.5
20.071	19.9	22.4	42.3	50.0	-7.7
9.277	18.7	21.1	39.8	50.0	-10.2

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	17	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

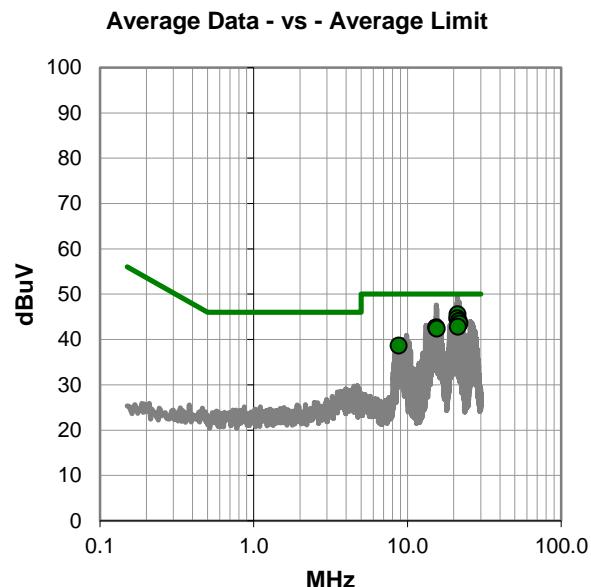
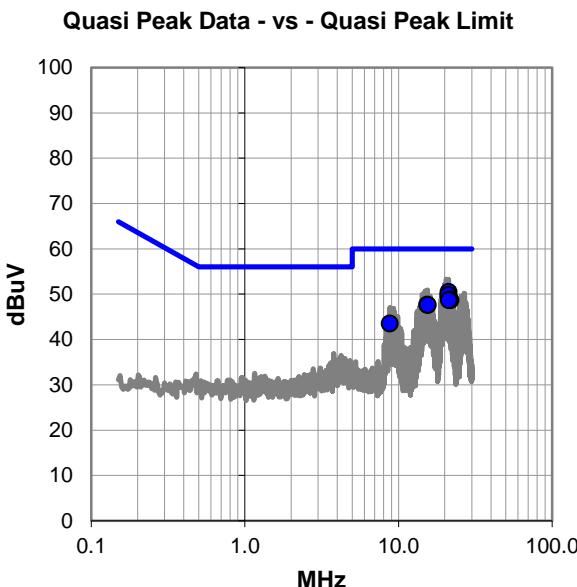
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 9, 914.112 MHz, 1Mbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #17

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	28.0	22.5	50.5	60.0	-9.5
21.077	27.3	22.5	49.8	60.0	-10.2
21.680	26.2	22.6	48.8	60.0	-11.2
21.786	26.1	22.6	48.7	60.0	-11.3
21.277	26.1	22.5	48.6	60.0	-11.4
15.421	25.8	21.9	47.7	60.0	-12.3
15.520	25.7	21.9	47.6	60.0	-12.4
8.781	22.5	21.0	43.5	60.0	-16.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	23.0	22.5	45.5	50.0	-4.5
21.077	22.1	22.5	44.6	50.0	-5.4
21.680	21.5	22.6	44.1	50.0	-5.9
21.786	20.9	22.6	43.5	50.0	-6.5
21.277	20.3	22.5	42.8	50.0	-7.2
15.421	20.8	21.9	42.7	50.0	-7.3
15.520	20.5	21.9	42.4	50.0	-7.6
8.781	17.6	21.0	38.6	50.0	-11.4

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	18	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

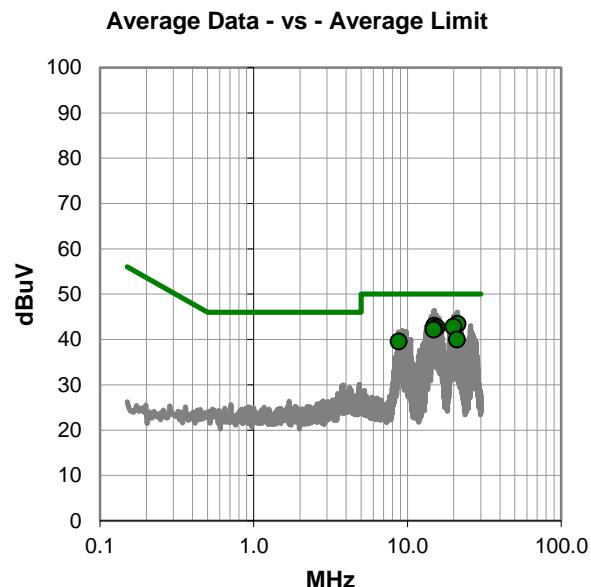
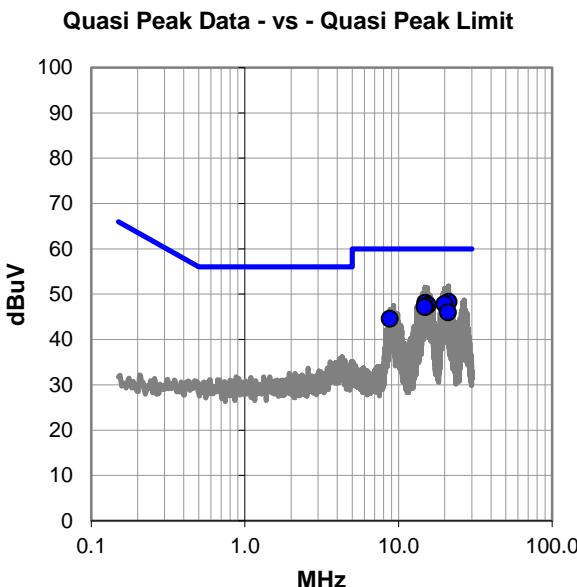
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 9, 914.112 MHz, 1Mbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	25.8	22.5	48.3	60.0	-11.7
14.918	26.3	21.8	48.1	60.0	-11.9
19.974	25.4	22.4	47.8	60.0	-12.2
15.523	25.7	21.9	47.6	60.0	-12.4
15.024	25.4	21.8	47.2	60.0	-12.8
14.816	25.4	21.8	47.2	60.0	-12.8
20.973	23.5	22.5	46.0	60.0	-14.0
8.780	23.5	21.0	44.5	60.0	-15.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	20.9	22.5	43.4	50.0	-6.6
14.918	21.2	21.8	43.0	50.0	-7.0
19.974	20.4	22.4	42.8	50.0	-7.2
15.523	20.8	21.9	42.7	50.0	-7.3
15.024	20.5	21.8	42.3	50.0	-7.7
14.816	20.4	21.8	42.2	50.0	-7.8
20.973	17.5	22.5	40.0	50.0	-10.0
8.780	18.5	21.0	39.5	50.0	-10.5

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	19	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

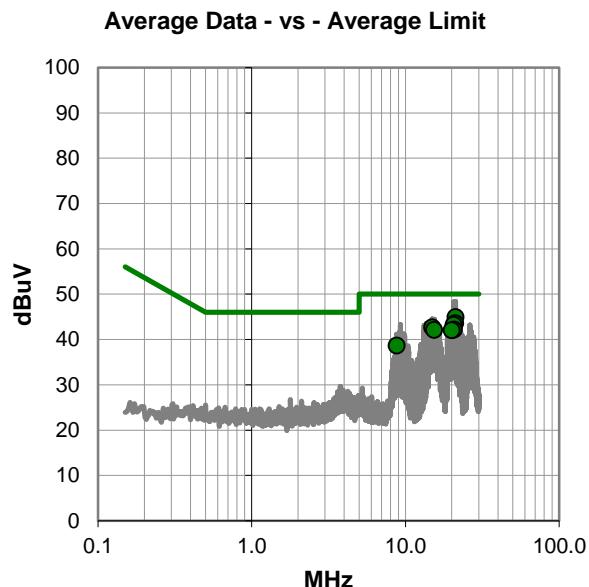
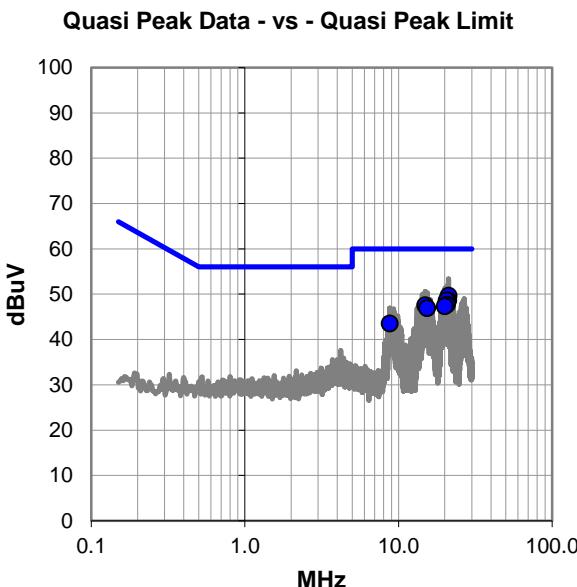
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 4, 914.2272 MHz, 4Mbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	27.1	22.5	49.6	60.0	-10.4
21.078	26.1	22.5	48.6	60.0	-11.4
20.580	26.1	22.5	48.6	60.0	-11.4
20.680	25.2	22.5	47.7	60.0	-12.3
14.919	25.7	21.8	47.5	60.0	-12.5
20.077	24.9	22.4	47.3	60.0	-12.7
15.422	25.0	21.9	46.9	60.0	-13.1
8.779	22.5	21.0	43.5	60.0	-16.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.179	22.4	22.5	44.9	50.0	-5.1
21.078	21.1	22.5	43.6	50.0	-6.4
20.580	20.8	22.5	43.3	50.0	-6.7
14.919	20.9	21.8	42.7	50.0	-7.3
20.680	19.7	22.5	42.2	50.0	-7.8
15.422	20.2	21.9	42.1	50.0	-7.9
20.077	19.6	22.4	42.0	50.0	-8.0
8.779	17.6	21.0	38.6	50.0	-11.4

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/18/2016
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	None	Relative Humidity:	38%
Customer Project:	None	Bar. Pressure:	1016 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	FREW0054-7

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	20	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

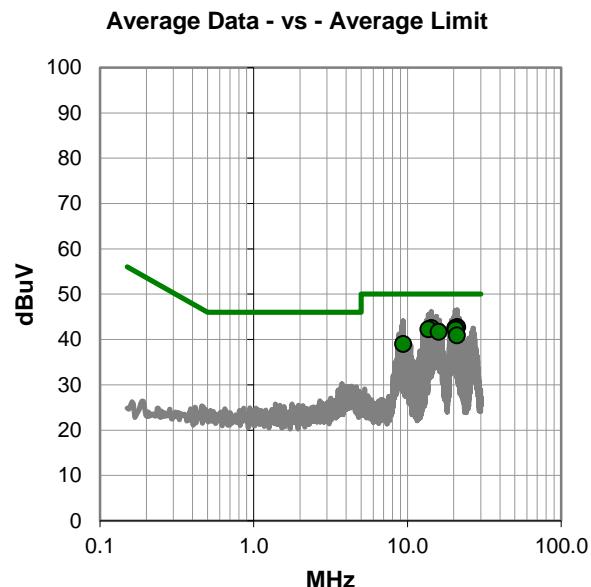
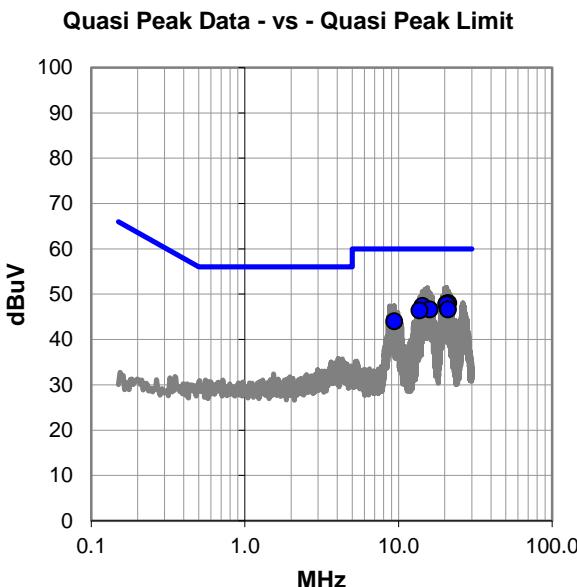
DC Power Supply powered by AC Mains, providing 9VDC to EUT

## EUT OPERATING MODES

Transmitting Mid Channel 4, 914.2272 MHz, 4Mbps, Power Level = 29.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #20

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.081	25.5	22.5	48.0	60.0	-12.0
20.475	25.4	22.4	47.8	60.0	-12.2
20.570	25.3	22.5	47.8	60.0	-12.2
14.317	25.7	21.7	47.4	60.0	-12.6
16.027	24.7	21.9	46.6	60.0	-13.4
20.978	24.1	22.5	46.6	60.0	-13.4
13.714	24.8	21.6	46.4	60.0	-13.6
9.383	22.9	21.1	44.0	60.0	-16.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.081	20.2	22.5	42.7	50.0	-7.3
20.475	20.1	22.4	42.5	50.0	-7.5
14.317	20.8	21.7	42.5	50.0	-7.5
13.714	20.6	21.6	42.2	50.0	-7.8
20.570	19.7	22.5	42.2	50.0	-7.8
16.027	19.7	21.9	41.6	50.0	-8.4
20.978	18.4	22.5	40.9	50.0	-9.1
9.383	17.9	21.1	39.0	50.0	-11.0

## CONCLUSION

Pass



Tested By

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

## MODES OF OPERATION

Transmitting at 500kb at Maximum Duty Cycle, Low Channel 1, 902.7072 MHz  
 Transmitting at 500kb at Maximum Duty Cycle, Mid Channel 18, 914.4576 MHz  
 Transmitting at 500kb at Maximum Duty Cycle, High Channel 36, 927.36 MHz  
 Transmitting at 1Mb at Maximum Duty Cycle, Low Channel 1, 903.0528 MHz  
 Transmitting at 1Mb at Maximum Duty Cycle, Mid Channel 9, 914.112 MHz  
 Transmitting at 1Mb at Maximum Duty Cycle, High Channel 18, 927.0144 MHz  
 Transmitting at 4Mb at Maximum Duty Cycle, Low Channel 1, 904.5504 MHz  
 Transmitting at 4Mb at Maximum Duty Cycle, Mid Channel 4, 914.2272 MHz  
 Transmitting at 4Mb at Maximum Duty Cycle, High Channel 7, 925.7472 MHz

## POWER SETTINGS INVESTIGATED

9 VDC

## CONFIGURATIONS INVESTIGATED

FREW0054 - 4

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12400 MHz
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## SAMPLE CALCULATIONS

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	6/23/2015	12 mo
Filter - Low Pass	Micro-Tronics	LPM50003	LFE	10/30/2015	12 mo
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HHO	6/3/2015	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFF	3/6/2015	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYL	7/30/2015	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAB	7/31/2015	12 mo
Cable	Northwest EMC	Bilog Cables	NC1	8/27/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50114	HFN	3/5/2015	12 mo
Antenna - Double Ridge	EMCO	3115	AHM	6/3/2014	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	7/31/2015	12 mo
Cable	Northwest EMC	3115 Horn Cable	NC2	6/17/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	9/21/2015	12 mo
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	0 mo
Cable	Northwest EMC	Standard Gain Horn Cable	NC3	6/17/2015	12 mo

## MEASUREMENT BANDWIDTHS

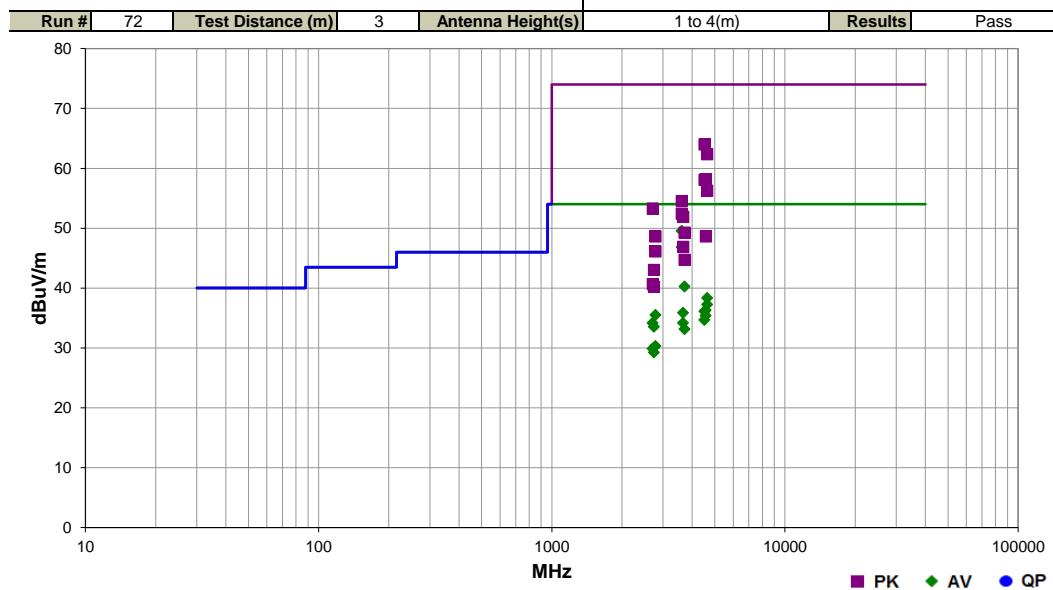
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

## 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.

Work Order:	FREW0054	Date:	01/07/16		
Project:	None	Temperature:	22.5 °C		
Job Site:	NC01	Humidity:	29% RH		
Serial Number:	402-669-0330	Barometric Pres.:	1013 mbar	Tested by:	Richard Mellroth
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)				
Configuration:	4				
Customer:	FreeWave Technologies, Inc.				
Attendees:	None				
EUT Power:	9 VDC				
Operating Mode:	Transmitting at 500kb at Maximum Duty cycle. See comments next to data points for EUT channel and orientation. See power table for power settings.				
Deviations:	None				
Comments:	None				

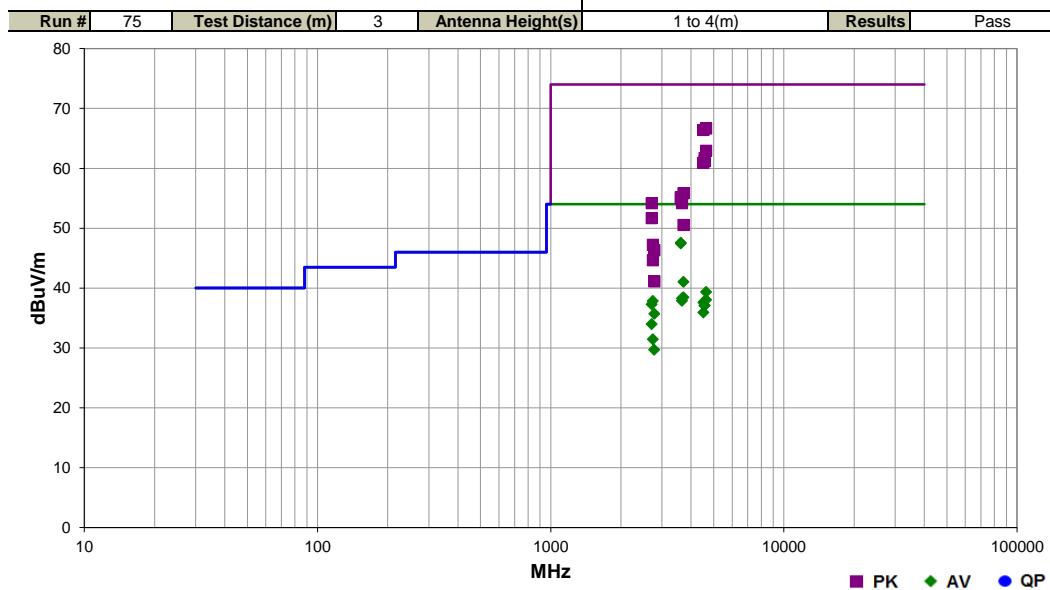
Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
3610.183	45.6	3.9	1.4	318.0	3.0	0.0	Horz	AV	0.0	49.5	54.0	-4.5	Low Ch, 500kb, EUT Flat
3610.183	42.9	3.9	2.9	338.0	3.0	0.0	Vert	AV	0.0	46.8	54.0	-7.2	Low Ch, 500kb, EUT Vertical
4515.633	56.1	7.9	1.5	77.0	3.0	0.0	Horz	PK	0.0	64.0	74.0	-10.0	Low Ch, 500kb, EUT Flat
4639.175	53.2	9.2	1.3	219.0	3.0	0.0	Horz	PK	0.0	62.4	74.0	-11.6	High Ch, 500kb, EUT Flat
3710.058	35.0	5.3	1.5	218.0	3.0	0.0	Horz	AV	0.0	40.3	54.0	-13.7	High Ch, 500kb, EUT Flat
4635.892	29.2	9.1	1.3	219.0	3.0	0.0	Horz	AV	0.0	38.3	54.0	-15.7	High Ch, 500kb, EUT Flat
4574.408	49.7	8.5	1.5	201.0	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	Mid Ch, 500kb, EUT Flat
4516.167	50.2	7.9	1.5	176.0	3.0	0.0	Vert	PK	0.0	58.1	74.0	-15.9	Low Ch, 500kb, EUT Vertical
4635.967	28.1	9.1	1.5	145.0	3.0	0.0	Vert	AV	0.0	37.2	54.0	-16.8	High Ch, 500kb, EUT Vertical
4573.058	27.8	8.5	1.5	148.0	3.0	0.0	Vert	AV	0.0	36.3	54.0	-17.7	Mid Ch, 500kb, EUT Vertical
4639.483	47.1	9.2	1.5	145.0	3.0	0.0	Vert	PK	0.0	56.3	74.0	-17.7	High Ch, 500kb, EUT Vertical
4516.083	28.2	7.9	1.5	77.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Low Ch, 500kb, EUT Flat
3657.200	31.1	4.8	1.5	316.0	3.0	0.0	Horz	AV	0.0	35.9	54.0	-18.1	Mid Ch, 500kb, EUT Flat
2781.575	35.5	0.0	2.9	210.0	3.0	0.0	Horz	AV	0.0	35.5	54.0	-18.5	High Ch, 500kb, EUT Flat
4573.008	26.9	8.5	1.5	201.0	3.0	0.0	Horz	AV	0.0	35.4	54.0	-18.6	Mid Ch, 500kb, EUT Flat
4512.550	26.8	7.9	1.5	176.0	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	Low Ch, 500kb, EUT Vertical
3610.100	50.6	3.9	1.4	318.0	3.0	0.0	Horz	PK	0.0	54.5	74.0	-19.5	Low Ch, 500kb, EUT Flat
2707.667	34.3	-0.1	2.0	322.0	3.0	0.0	Horz	AV	0.0	34.2	54.0	-19.8	Low Ch, 500kb, EUT Flat
3657.208	29.4	4.8	3.7	322.0	3.0	0.0	Vert	AV	0.0	34.2	54.0	-19.8	Mid Ch, 500kb, EUT Vertical
2742.867	33.6	-0.1	1.5	318.0	3.0	0.0	Horz	AV	0.0	33.5	54.0	-20.5	Mid Ch, 500kb, EUT Flat
2708.642	53.4	-0.1	2.0	322.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	Low Ch, 500kb, EUT Flat
3709.933	27.9	5.3	1.5	142.0	3.0	0.0	Vert	AV	0.0	33.2	54.0	-20.8	High Ch, 500kb, EUT Vertical
3610.067	48.5	3.9	2.9	338.0	3.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	Low Ch, 500kb, EUT Vertical
3659.308	47.1	4.8	1.5	316.0	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	Mid Ch, 500kb, EUT Flat
2781.508	30.3	0.0	3.9	360.0	3.0	0.0	Vert	AV	0.0	30.3	54.0	-23.7	High Ch, 500kb, EUT Vertical
2707.700	30.0	-0.1	1.4	156.0	3.0	0.0	Vert	AV	0.0	29.9	54.0	-24.1	Low Ch, 500kb, EUT Vertical
3710.842	44.0	5.3	1.5	218.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	High Ch, 500kb, EUT Flat
2743.767	29.3	-0.1	1.5	146.0	3.0	0.0	Vert	AV	0.0	29.2	54.0	-24.8	Mid Ch, 500kb, EUT Vertical
4574.383	40.1	8.5	1.5	148.0	3.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	Mid Ch, 500kb, EUT Vertical
2782.742	48.6	0.0	2.9	210.0	3.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	High Ch, 500kb, EUT Flat
3659.242	42.1	4.8	3.7	322.0	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Mid Ch, 500kb, EUT Vertical
2782.833	46.1	0.0	3.9	360.0	3.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	High Ch, 500kb, EUT Vertical
3708.567	39.5	5.2	1.5	142.0	3.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	High Ch, 500kb, EUT Vertical
2743.817	43.1	-0.1	1.5	318.0	3.0	0.0	Horz	PK	0.0	43.0	74.0	-31.0	Mid Ch, 500kb, EUT Flat
2708.683	40.8	-0.1	1.4	156.0	3.0	0.0	Vert	PK	0.0	40.7	74.0	-33.3	Low Ch, 500kb, EUT Vertical
2742.933	40.3	-0.1	1.5	146.0	3.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Mid Ch, 500kb, EUT Vertical

Work Order:	FREW0054	Date:	01/08/16	
Project:	None	Temperature:	24 °C	
Job Site:	NC01	Humidity:	27% RH	
Serial Number:	402-669-0330	Barometric Pres.:	1018 mbar	Tested by: Richard Mellroth
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)			
Configuration:	4			
Customer:	FreeWave Technologies, Inc.			
Attendees:	None			
EUT Power:	9 VDC			
Operating Mode:	Transmitting at 1Mb at Maximum Duty Cycle. See comments next to data points for EUT channel and orientation. See power table for power settings.			
Deviations:	None			
Comments:	None			

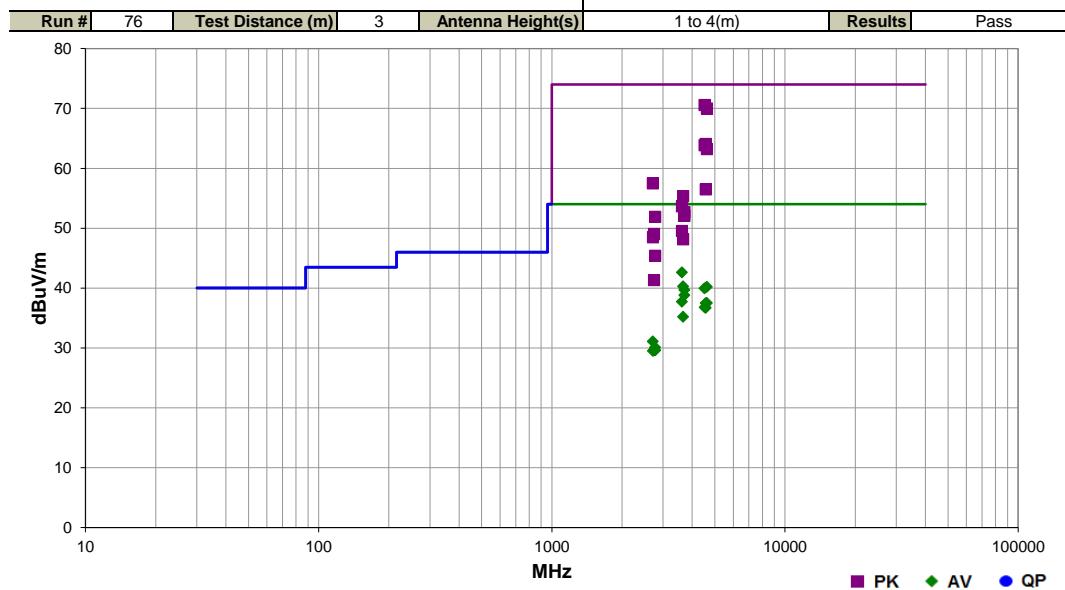
Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
3611.350	43.6	4.0	2.7	330.0	3.0	0.0	Vert	AV	0.0	47.6	54.0	-6.4	Low Ch, 1Mb, EUT Vertical
3611.383	43.5	4.0	1.1	311.0	3.0	0.0	Horz	AV	0.0	47.5	54.0	-6.5	Low Ch, 1Mb, EUT Flat
4636.958	57.5	9.1	1.2	175.0	3.0	0.0	Vert	PK	0.0	66.6	74.0	-7.4	High Ch, 1Mb, EUT Vertical
4517.458	58.5	7.9	1.0	161.0	3.0	0.0	Horz	PK	0.0	66.4	74.0	-7.6	Low Ch, 1Mb, EUT Flat
4637.042	53.8	9.1	1.0	246.0	3.0	0.0	Horz	PK	0.0	62.9	74.0	-11.1	High Ch, 1Mb, EUT Flat
4572.667	53.2	8.5	1.0	221.0	3.0	0.0	Vert	PK	0.0	61.7	74.0	-12.3	Mid Ch, 1Mb, EUT Vertical
4572.517	52.8	8.5	1.0	130.0	3.0	0.0	Horz	PK	0.0	61.3	74.0	-12.7	Mid Ch, 1Mb, EUT Flat
3708.783	35.8	5.2	1.0	320.0	3.0	0.0	Horz	AV	0.0	41.0	54.0	-13.0	High Ch, 1Mb, EUT Flat
4517.492	53.0	7.9	1.0	4.0	3.0	0.0	Vert	PK	0.0	60.9	74.0	-13.1	Low Ch, 1Mb, EUT Vertical
4636.192	30.2	9.1	1.2	175.0	3.0	0.0	Vert	AV	0.0	39.3	54.0	-14.7	High Ch, 1Mb, EUT Vertical
3708.808	33.2	5.2	1.0	190.0	3.0	0.0	Vert	AV	0.0	38.4	54.0	-15.6	High Ch, 1Mb, EUT Vertical
3655.517	33.5	4.8	1.3	313.0	3.0	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Mid Ch, 1Mb, EUT Flat
4636.092	28.9	9.1	1.0	246.0	3.0	0.0	Horz	AV	0.0	38.0	54.0	-16.0	High Ch, 1Mb, EUT Flat
3655.567	33.1	4.8	2.8	334.0	3.0	0.0	Vert	AV	0.0	37.9	54.0	-16.1	Mid Ch, 1Mb, EUT Vertical
2741.700	37.9	-0.1	2.9	225.0	3.0	0.0	Horz	AV	0.0	37.8	54.0	-16.2	Mid Ch, 1Mb, EUT Flat
4516.867	29.7	7.9	1.0	161.0	3.0	0.0	Horz	AV	0.0	37.6	54.0	-16.4	Low Ch, 1Mb, EUT Flat
2708.592	37.4	-0.1	1.0	251.0	3.0	0.0	Horz	AV	0.0	37.3	54.0	-16.7	Low Ch, 1Mb, EUT Flat
4572.425	28.6	8.5	1.0	221.0	3.0	0.0	Vert	AV	0.0	37.1	54.0	-16.9	Mid Ch, 1Mb, EUT Vertical
4571.808	28.6	8.5	1.0	130.0	3.0	0.0	Horz	AV	0.0	37.1	54.0	-16.9	Mid Ch, 1Mb, EUT Flat
4516.883	28.0	7.9	1.0	4.0	3.0	0.0	Vert	AV	0.0	35.9	54.0	-18.1	Low Ch, 1Mb, EUT Vertical
3708.867	50.6	5.2	1.0	320.0	3.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	High Ch, 1Mb, EUT Flat
2780.358	35.7	0.0	3.1	218.0	3.0	0.0	Horz	AV	0.0	35.7	54.0	-18.3	High Ch, 1Mb, EUT Flat
3612.667	51.2	4.0	1.1	311.0	3.0	0.0	Horz	PK	0.0	55.2	74.0	-18.8	Low Ch, 1Mb, EUT Flat
3612.600	51.0	4.0	2.7	330.0	3.0	0.0	Vert	PK	0.0	55.0	74.0	-19.0	Low Ch, 1Mb, EUT Vertical
3656.975	49.8	4.8	1.3	313.0	3.0	0.0	Horz	PK	0.0	54.6	74.0	-19.4	Mid Ch, 1Mb, EUT Flat
2709.333	54.3	-0.1	1.0	251.0	3.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	Low Ch, 1Mb, EUT Flat
3657.383	49.4	4.8	2.8	334.0	3.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	Mid Ch, 1Mb, EUT Vertical
2708.675	34.1	-0.1	3.3	197.0	3.0	0.0	Vert	AV	0.0	34.0	54.0	-20.0	Low Ch, 1Mb, EUT Vertical
2709.400	51.8	-0.1	3.3	197.0	3.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	Low Ch, 1Mb, EUT Vertical
2741.825	31.5	-0.1	3.6	193.0	3.0	0.0	Vert	AV	0.0	31.4	54.0	-22.6	Mid Ch, 1Mb, EUT Vertical
3708.233	45.3	5.2	1.0	190.0	3.0	0.0	Vert	PK	0.0	50.5	74.0	-23.5	High Ch, 1Mb, EUT Vertical
2780.183	29.7	0.0	1.0	65.0	3.0	0.0	Vert	AV	0.0	29.7	54.0	-24.3	High Ch, 1Mb, EUT Vertical
2742.583	47.3	-0.1	2.9	225.0	3.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	Mid Ch, 1Mb, EUT Flat
2780.983	46.3	0.0	3.1	218.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	High Ch, 1Mb, EUT Flat
2742.308	44.7	-0.1	3.6	193.0	3.0	0.0	Vert	PK	0.0	44.6	74.0	-29.4	Mid Ch, 1Mb, EUT Vertical
2782.442	41.1	0.0	1.0	65.0	3.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	High Ch, 1Mb, EUT Vertical

Work Order:	FREW0054	Date:	01/08/16	<i>Pls RT</i>
Project:	None	Temperature:	24 °C	
Job Site:	NC01	Humidity:	27% RH	
Serial Number:	402-669-0330	Barometric Pres.:	1018 mbar	Tested by: Richard Mellroth
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)			
Configuration:	4			
Customer:	FreeWave Technologies, Inc.			
Attendees:	None			
EUT Power:	9 VDC			
Operating Mode:	Transmitting at 4Mb at Maximum Duty Cycle. See comments next to data points for EUT channel and orientation. See power table for power settings.			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4521.717	62.6	8.0	1.5	342.0	3.0	0.0	Vert	PK	0.0	70.6	74.0	-3.4	Low Ch, 4Mb, EUT Vertical
4626.725	60.9	9.1	1.6	189.0	3.0	0.0	Horz	PK	0.0	70.0	74.0	-4.0	High Ch, 4Mb, EUT Flat
4569.608	55.6	8.5	1.5	132.0	3.0	0.0	Horz	PK	0.0	64.1	74.0	-9.9	Mid Ch, 4Mb, EUT Flat
4521.667	55.9	8.0	1.5	156.0	3.0	0.0	Horz	PK	0.0	63.9	74.0	-10.1	Low Ch, 4Mb, EUT Flat
4626.792	54.1	9.1	1.5	310.0	3.0	0.0	Vert	PK	0.0	63.2	74.0	-10.8	High Ch, 4Mb, EUT Vertical
3615.500	38.6	4.0	2.7	323.0	3.0	0.0	Vert	AV	0.0	42.6	54.0	-11.4	Low Ch, 4Mb, EUT Vertical
3657.600	35.5	4.8	1.5	315.0	3.0	0.0	Horz	AV	0.0	40.3	54.0	-13.7	Mid Ch, 4Mb, EUT Flat
4626.758	31.1	9.1	1.6	189.0	3.0	0.0	Horz	AV	0.0	40.2	54.0	-13.8	High Ch, 4Mb, EUT Flat
4521.850	32.0	8.0	1.5	342.0	3.0	0.0	Vert	AV	0.0	40.0	54.0	-14.0	Low Ch, 4Mb, EUT Vertical
3703.608	34.5	5.2	2.0	332.0	3.0	0.0	Vert	AV	0.0	39.7	54.0	-14.3	High Ch, 4Mb, EUT Vertical
3703.817	33.6	5.2	1.5	128.0	3.0	0.0	Horz	AV	0.0	38.8	54.0	-15.2	High Ch, 4Mb, EUT Flat
3615.617	33.7	4.0	1.5	9.0	3.0	0.0	Horz	AV	0.0	37.7	54.0	-16.3	Low Ch, 4Mb, EUT Vertical
4626.625	28.4	9.1	1.5	310.0	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	High Ch, 4Mb, EUT Vertical
2712.125	57.6	-0.1	2.8	70.0	3.0	0.0	Horz	PK	0.0	57.5	74.0	-16.5	Low Ch, 4Mb, EUT Flat
4569.692	29.0	8.5	1.5	132.0	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	Mid Ch, 4Mb, EUT Flat
4522.292	28.8	8.0	1.5	156.0	3.0	0.0	Horz	AV	0.0	36.8	54.0	-17.2	Low Ch, 4Mb, EUT Flat
4571.633	28.2	8.5	1.5	148.0	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	Mid Ch, 4Mb, EUT Vertical
4569.825	48.0	8.5	1.5	148.0	3.0	0.0	Vert	PK	0.0	56.5	74.0	-17.5	Mid Ch, 4Mb, EUT Vertical
3655.267	50.6	4.8	1.5	315.0	3.0	0.0	Horz	PK	0.0	55.4	74.0	-18.6	Mid Ch, 4Mb, EUT Flat
3658.142	30.4	4.8	1.5	310.0	3.0	0.0	Vert	AV	0.0	35.2	54.0	-18.8	Mid Ch, 4Mb, EUT Vertical
3615.917	49.6	4.0	2.7	323.0	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	Low Ch, 4Mb, EUT Vertical
3701.150	47.5	5.2	2.0	332.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	High Ch, 4Mb, EUT Vertical
3701.042	46.9	5.2	1.5	128.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	High Ch, 4Mb, EUT Flat
2775.483	51.9	0.0	2.6	263.0	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	High Ch, 4Mb, EUT Flat
2711.850	31.2	-0.1	2.8	70.0	3.0	0.0	Horz	AV	0.0	31.1	54.0	-22.9	Low Ch, 4Mb, EUT Flat
2775.592	30.1	0.0	2.6	263.0	3.0	0.0	Horz	AV	0.0	30.1	54.0	-23.9	High Ch, 4Mb, EUT Flat
2742.458	29.7	-0.1	1.5	75.0	3.0	0.0	Horz	AV	0.0	29.6	54.0	-24.4	Mid Ch, 4Mb, EUT Flat
2742.250	29.7	-0.1	1.5	227.0	3.0	0.0	Vert	AV	0.0	29.6	54.0	-24.4	Mid Ch, 4Mb, EUT Vertical
2778.450	29.6	0.0	3.4	304.0	3.0	0.0	Vert	AV	0.0	29.6	54.0	-24.4	High Ch, 4Mb, EUT Vertical
3615.850	45.5	4.0	1.5	9.0	3.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Low Ch, 4Mb, EUT Flat
2715.658	29.6	-0.1	1.5	354.0	3.0	0.0	Vert	AV	0.0	29.5	54.0	-24.5	Low Ch, 4Mb, EUT Vertical
2741.308	49.1	-0.1	1.5	75.0	3.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	Mid Ch, 4Mb, EUT Flat
2713.108	48.6	-0.1	1.5	354.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	Low Ch, 4Mb, EUT Vertical
3655.200	43.4	4.8	1.5	310.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	Mid Ch, 4Mb, EUT Vertical
2775.142	45.4	0.0	3.4	304.0	3.0	0.0	Vert	PK	0.0	45.4	74.0	-28.6	High Ch, 4Mb, EUT Vertical
2741.275	41.4	-0.1	1.5	227.0	3.0	0.0	Vert	PK	0.0	41.3	74.0	-32.7	Mid Ch, 4Mb, EUT Vertical

# DUTY CYCLE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	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.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

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 may have been used during some of the other tests in this report to only take the measurement during the burst duration.

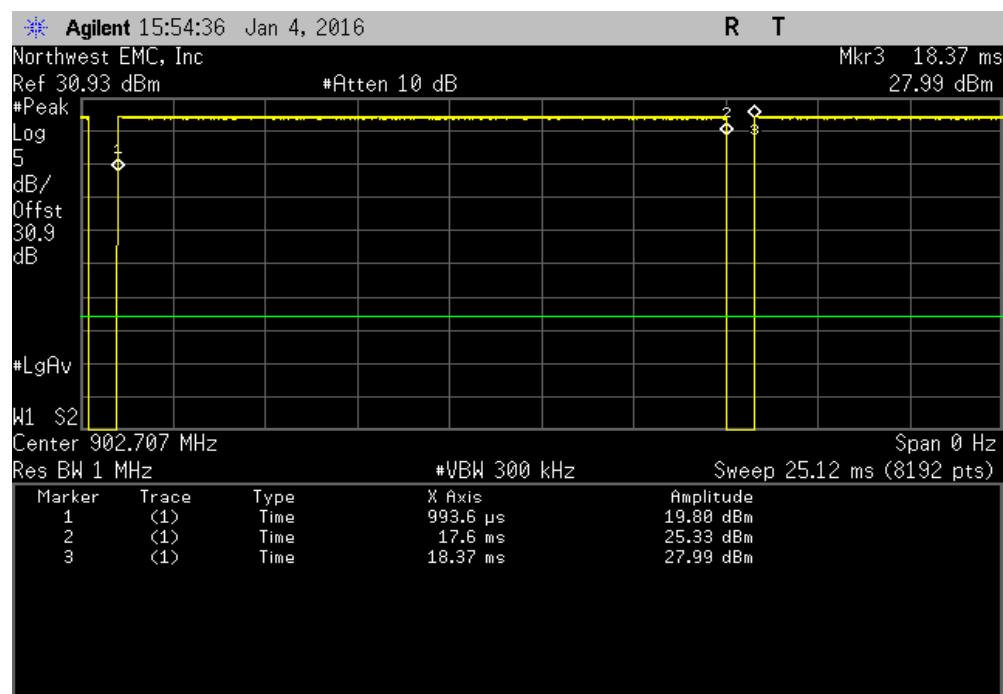
# DUTY CYCLE

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)		Work Order:	FREW0054	
Serial Number:	402-669-0330		Date:	01/04/16	
Customer:	FreeWave Technologies, Inc.		Temperature:	23°C	
Attendees:	Dean Busch		Humidity:	29%	
Project:	None		Barometric Pres.:	1009 mbar	
Tested by:	Richard Mellroth	Power:	9 VDC	Job Site:	NC02
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2016		ANSI C63.10:2013			
COMMENTS					
EUT power set at maximum = 30.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Pulse Width	Period	Number of Pulses
					Value (%)
					Limit (%)
					Results
GFSK Modulation, 500kb					
Low Channel 1, 902.7072 MHz		16.609 ms	17.376 ms	1	95.6
Low Channel 1, 902.7072 MHz		N/A	N/A	5	N/A
Mid Channel 18, 914.4576 MHz		16.609 ms	17.37 ms	1	95.6
Mid Channel 18, 914.4576 MHz		N/A	N/A	5	N/A
High Channel 36, 927.36 MHz		16.606 ms	17.373 ms	1	95.6
High Channel 36, 927.36 MHz		N/A	N/A	5	N/A
GFSK Modulation, 1Mb					
Low Channel 1, 903.0528 MHz		8.334 ms	9.08 ms	1	91.8
Low Channel 1, 903.0528 MHz		N/A	N/A	5	N/A
Mid Channel 9, 914.112 MHz		8.334 ms	9.08 ms	1	91.8
Mid Channel 9, 914.112 MHz		N/A	N/A	5	N/A
High Channel 18, 927.0144 MHz		8.336 ms	9.082 ms	1	91.8
High Channel 18, 927.0144 MHz		N/A	N/A	5	N/A
GFSK Modulation, 4Mb					
Low Channel 1, 904.5504 MHz		2.19 ms	2.875 ms	1	76.2
Low Channel 1, 904.5504 MHz		N/A	N/A	5	N/A
Mid Channel 4, 914.2272 MHz		2.19 ms	2.879 ms	1	76.1
Mid Channel 4, 914.2272 MHz		N/A	N/A	5	N/A
High Channel 7, 925.7472 MHz		2.19 ms	2.876 ms	1	76.1
High Channel 7, 925.7472 MHz		N/A	N/A	5	N/A

# DUTY CYCLE

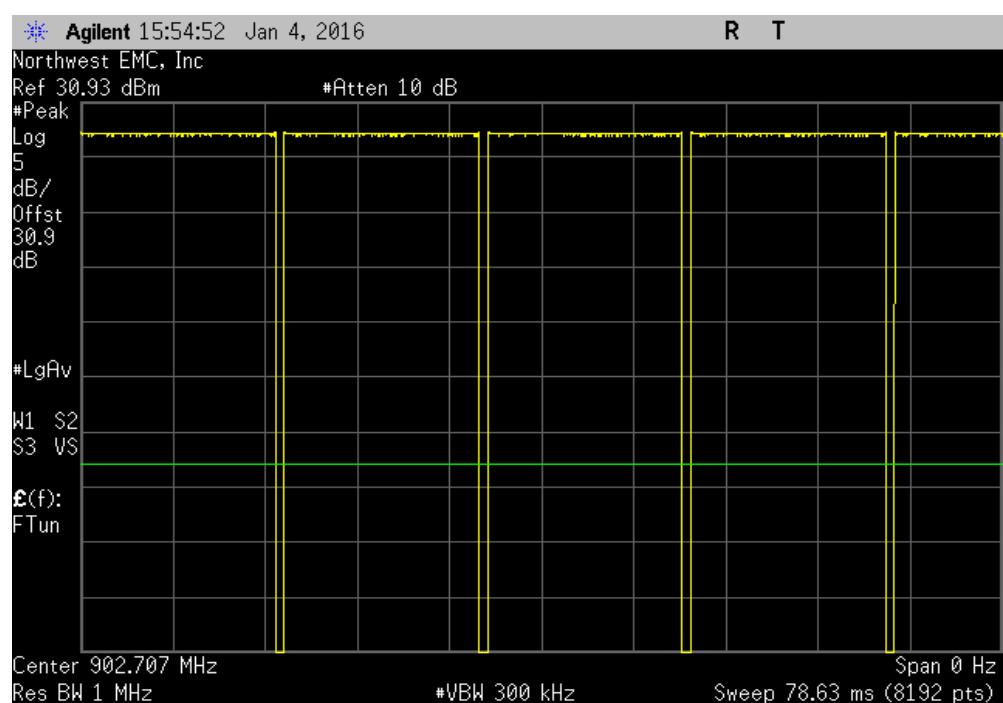
GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
16.609 ms	17.376 ms	1	95.6	N/A	N/A



GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz

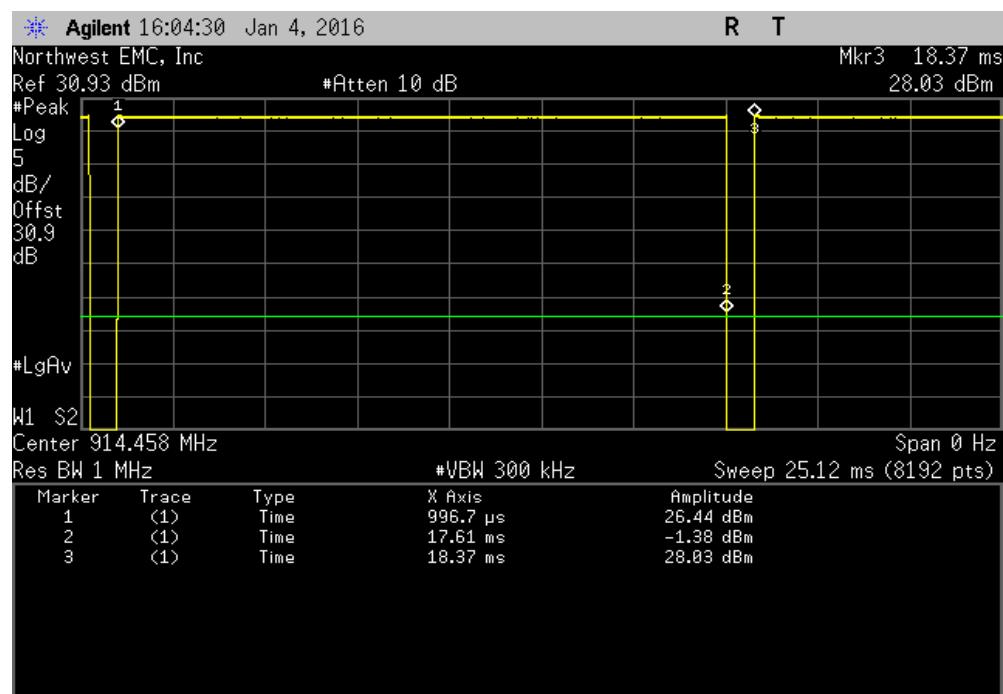
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# DUTY CYCLE

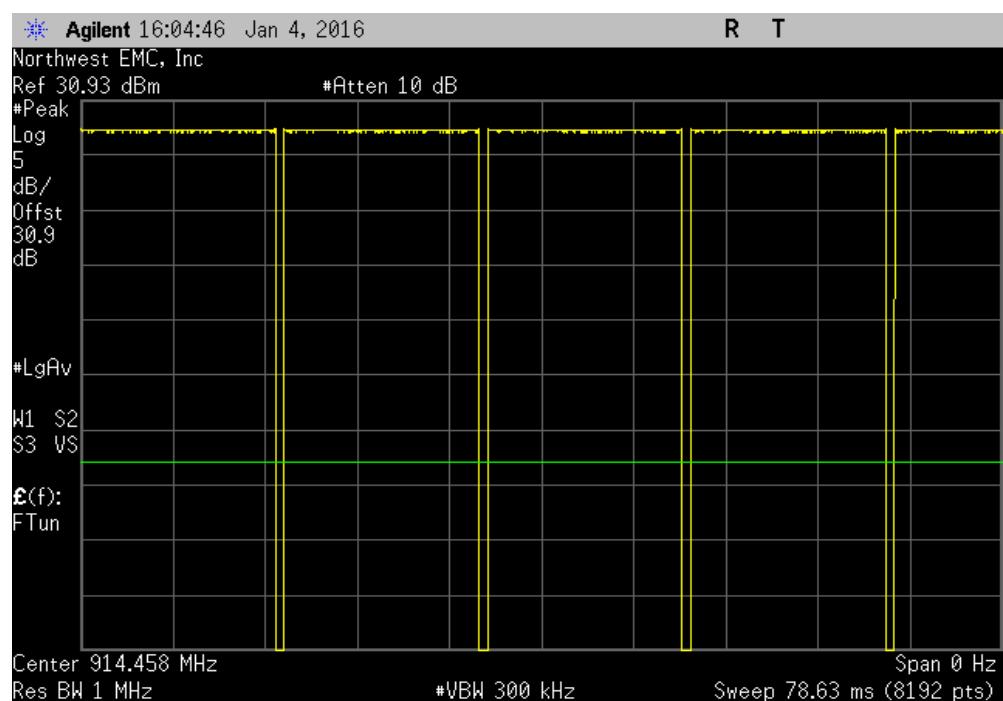
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
16.609 ms	17.37 ms	1	95.6	N/A	N/A



GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz

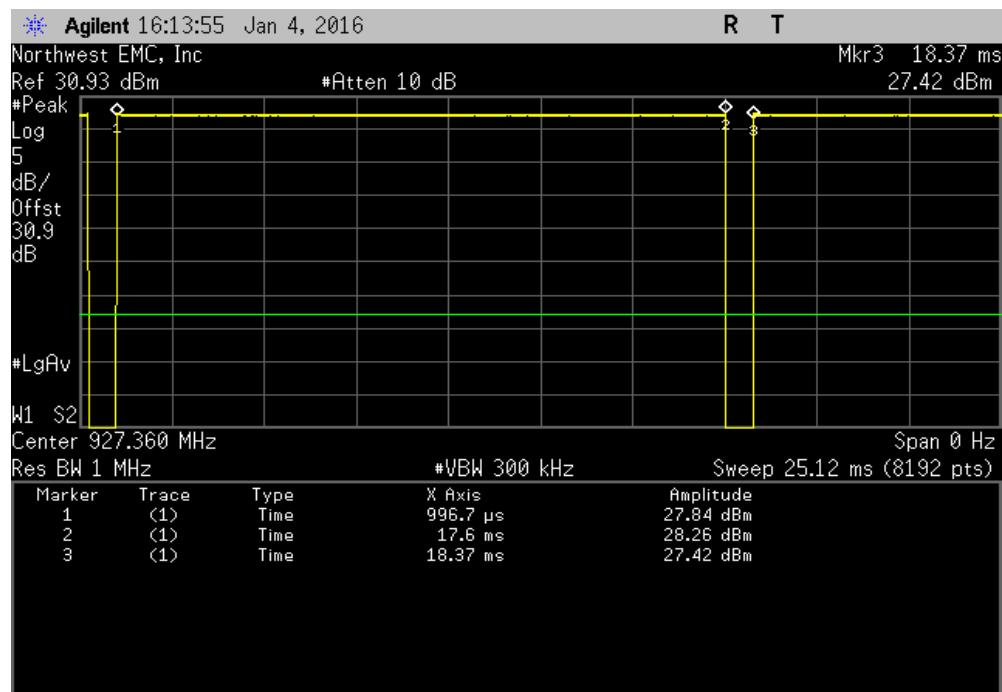
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# DUTY CYCLE

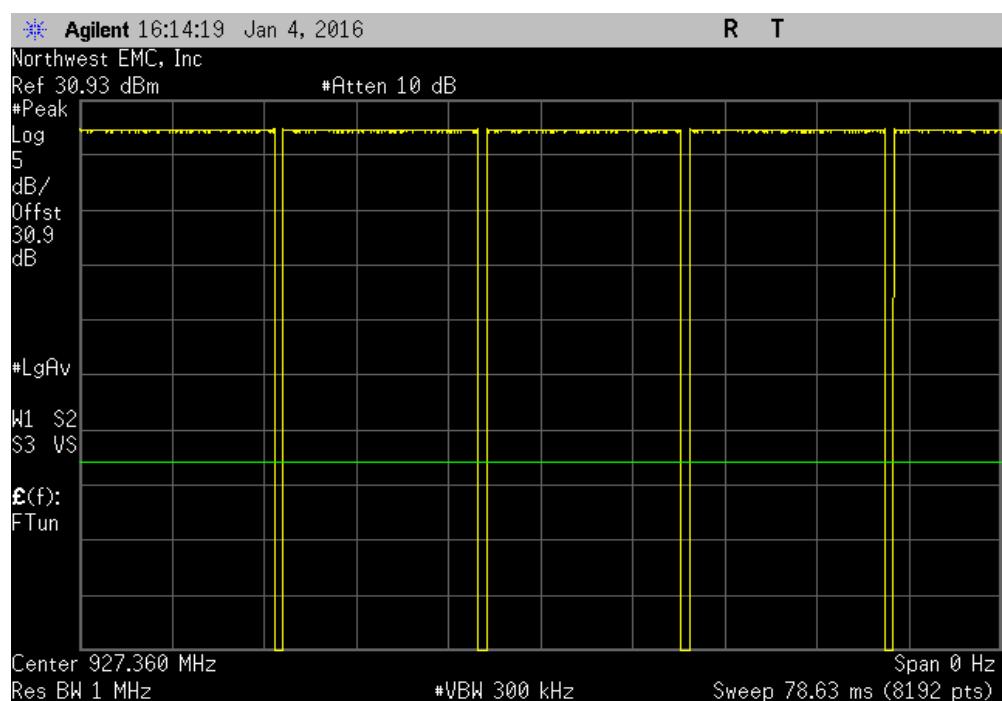
GFSK Modulation, 500kb, High Channel 36, 927.36 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
16.606 ms	17.373 ms	1	95.6	N/A	N/A



GFSK Modulation, 500kb, High Channel 36, 927.36 MHz

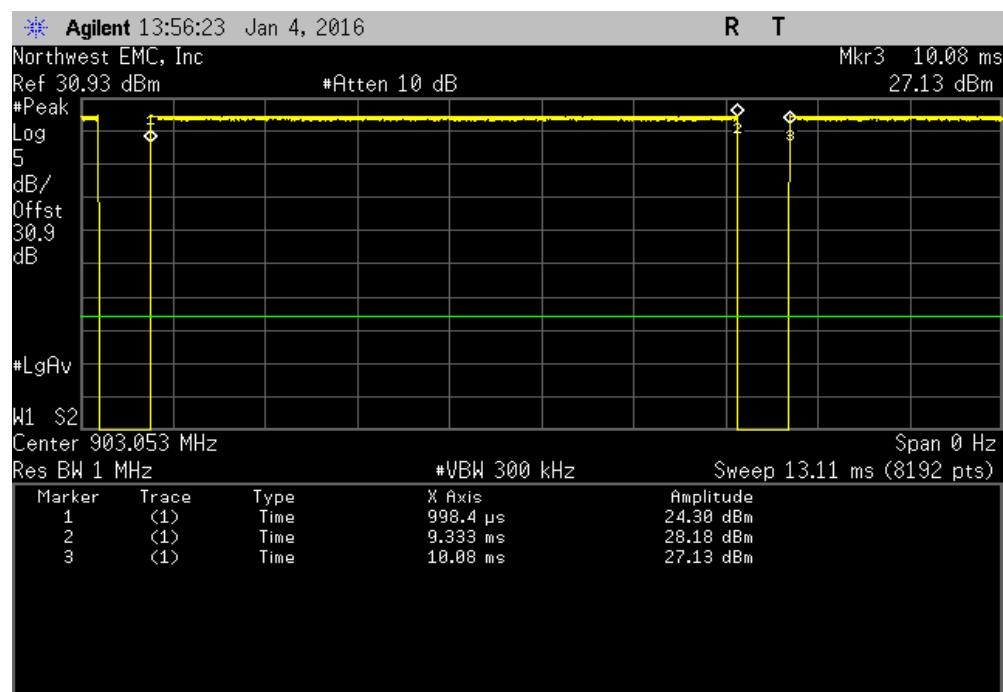
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# DUTY CYCLE

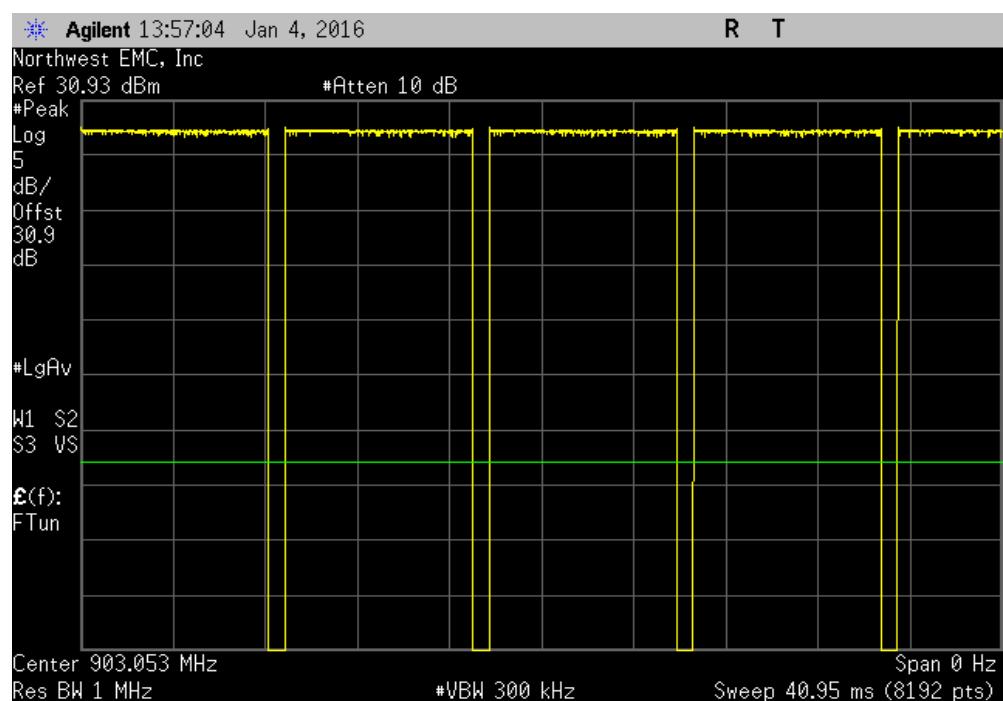
GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
8.334 ms	9.08 ms	1	91.8	N/A	N/A



GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz

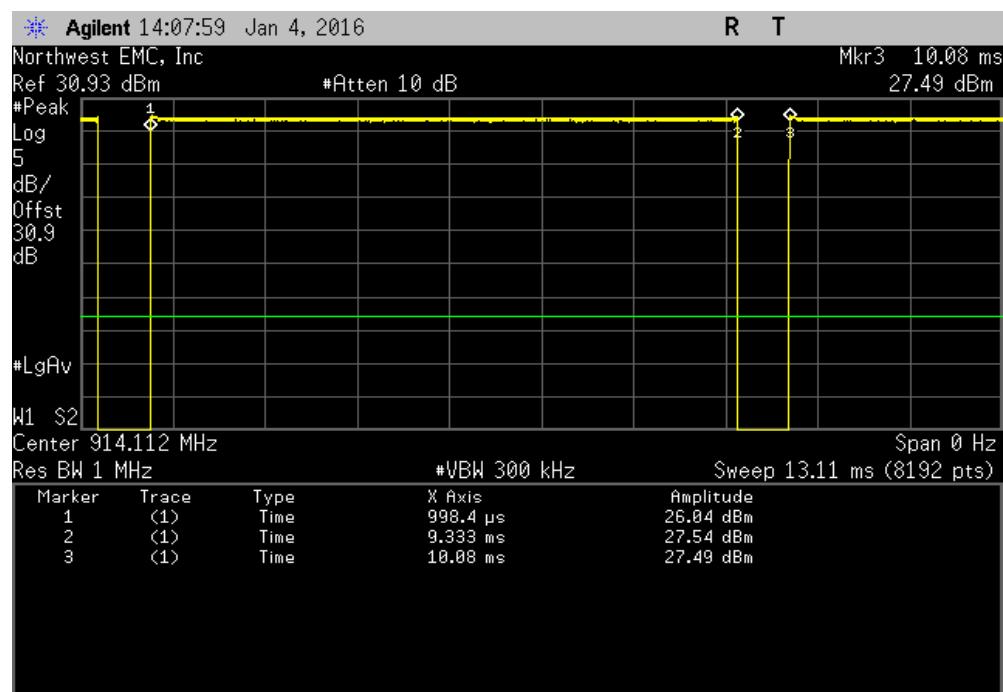
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# DUTY CYCLE

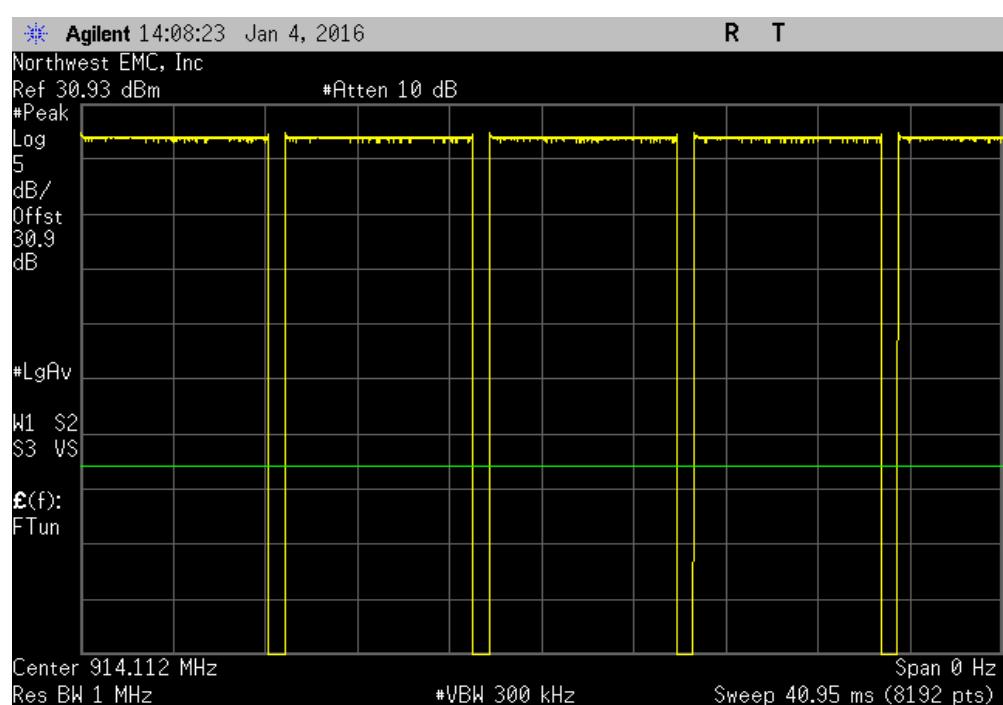
GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
8.334 ms	9.08 ms	1	91.8	N/A	N/A



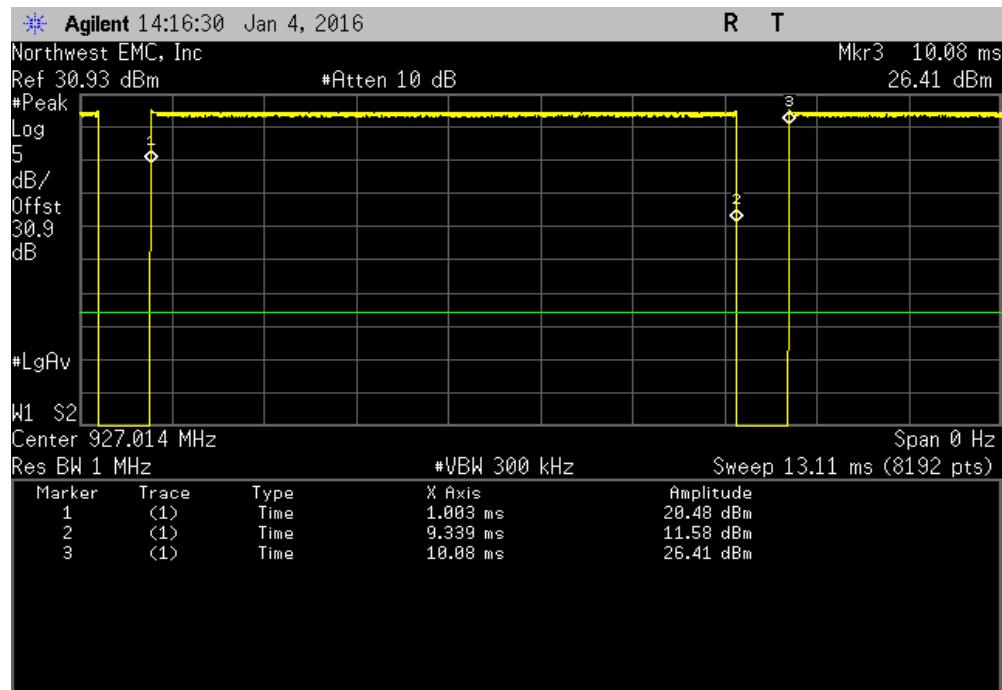
GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz

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

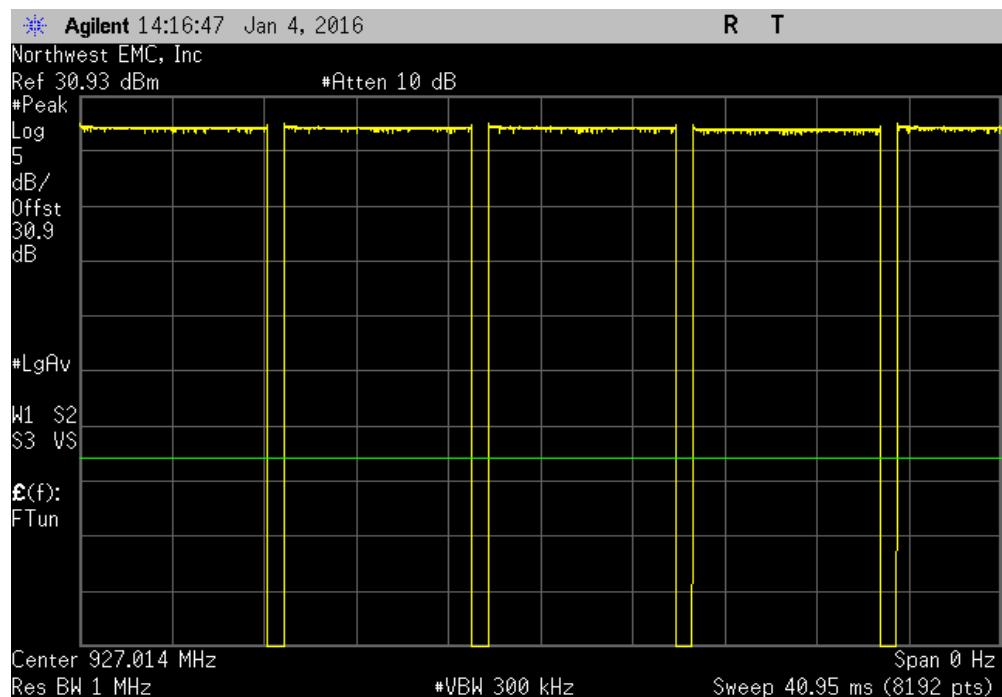


# DUTY CYCLE

GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
8.336 ms	9.082 ms	1	91.8	N/A	N/A	

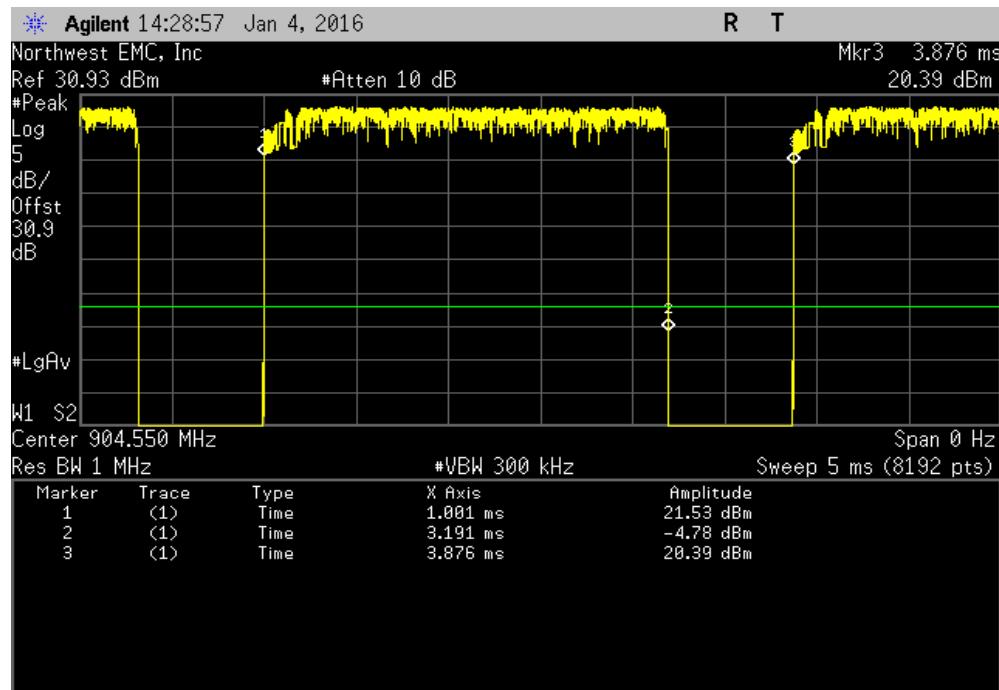


GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

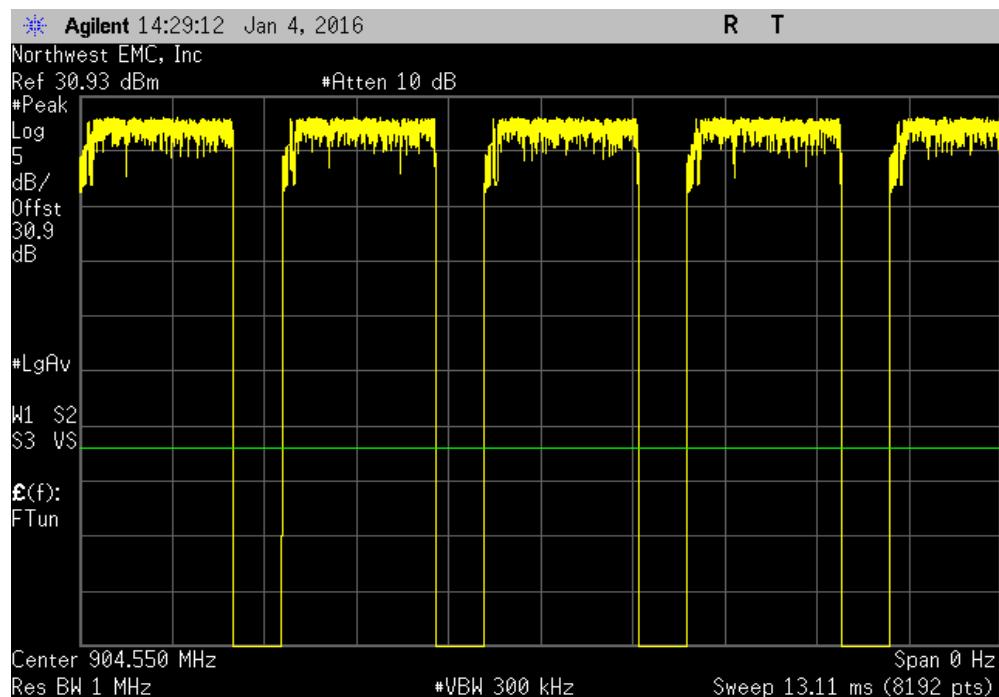


# DUTY CYCLE

GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.19 ms	2.875 ms	1	76.2	N/A	N/A	N/A



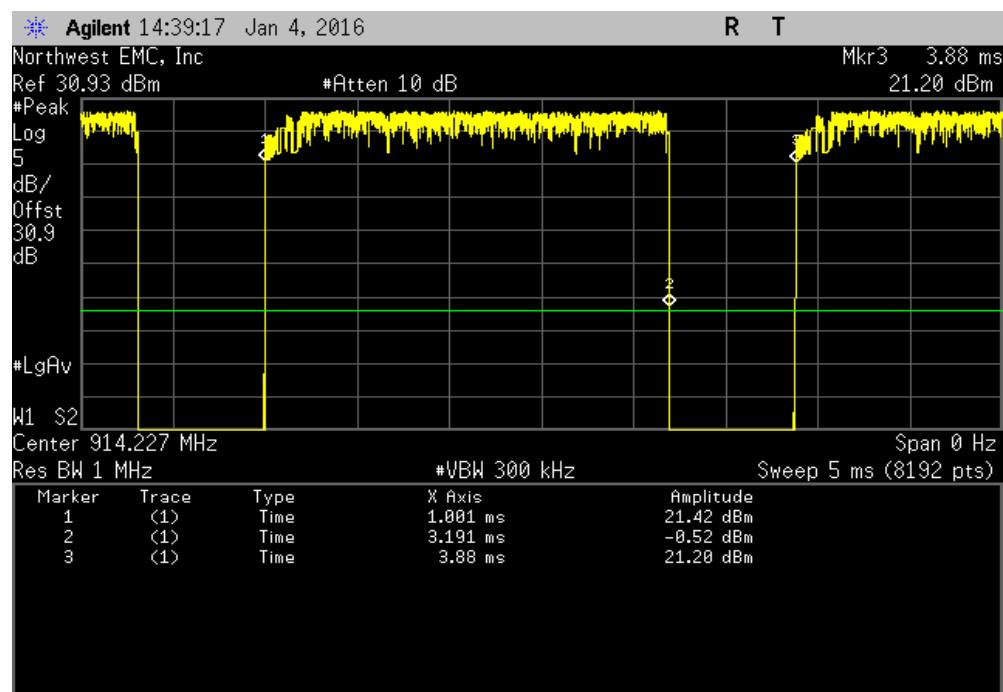
GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	N/A



# DUTY CYCLE

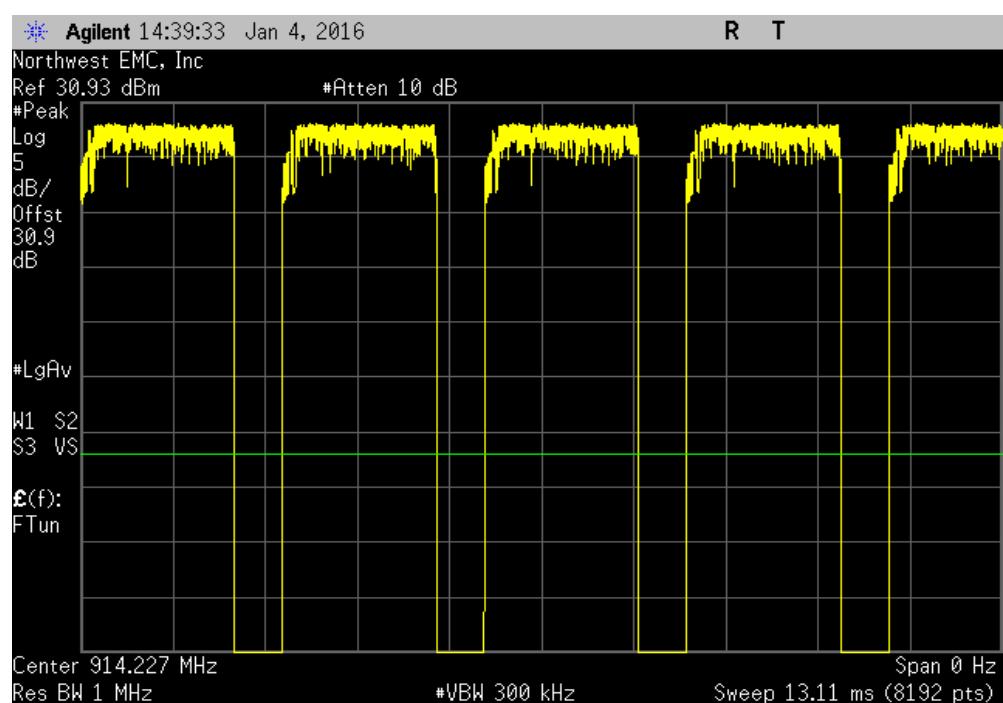
GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz

Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.19 ms	2.879 ms	1	76.1	N/A	N/A



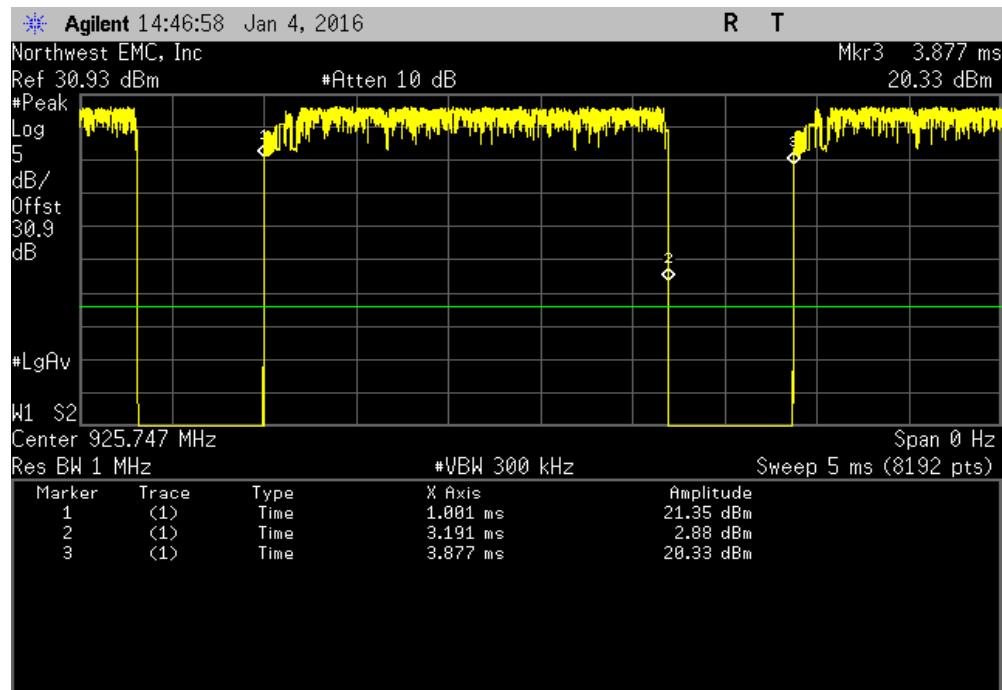
GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz

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

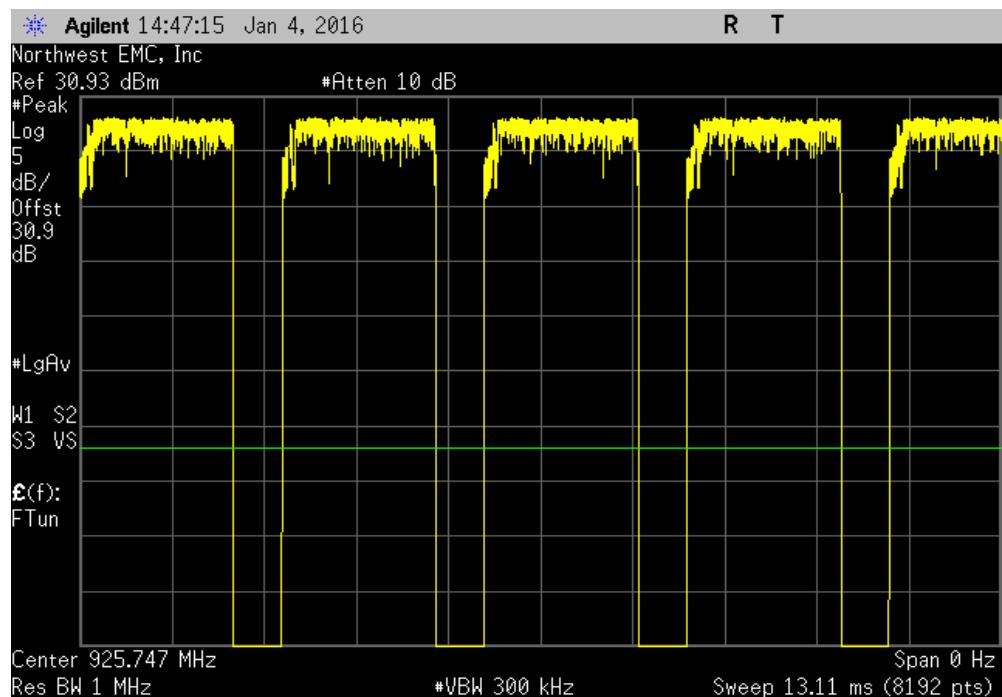


# DUTY CYCLE

GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.19 ms	2.876 ms	1	76.1	N/A	N/A	



GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



# OCCUPIED BANDWIDTH

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

## TEST DESCRIPTION

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.9% (approximate 26 dB) emission bandwidth (EBW) was also measured at the same time.

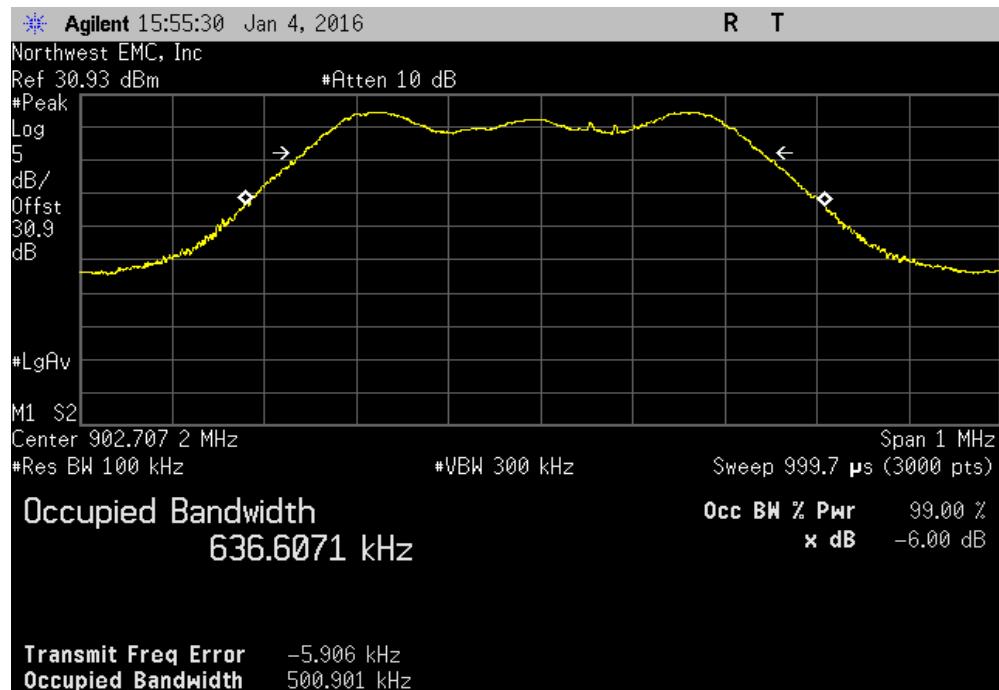
The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

# OCCUPIED BANDWIDTH

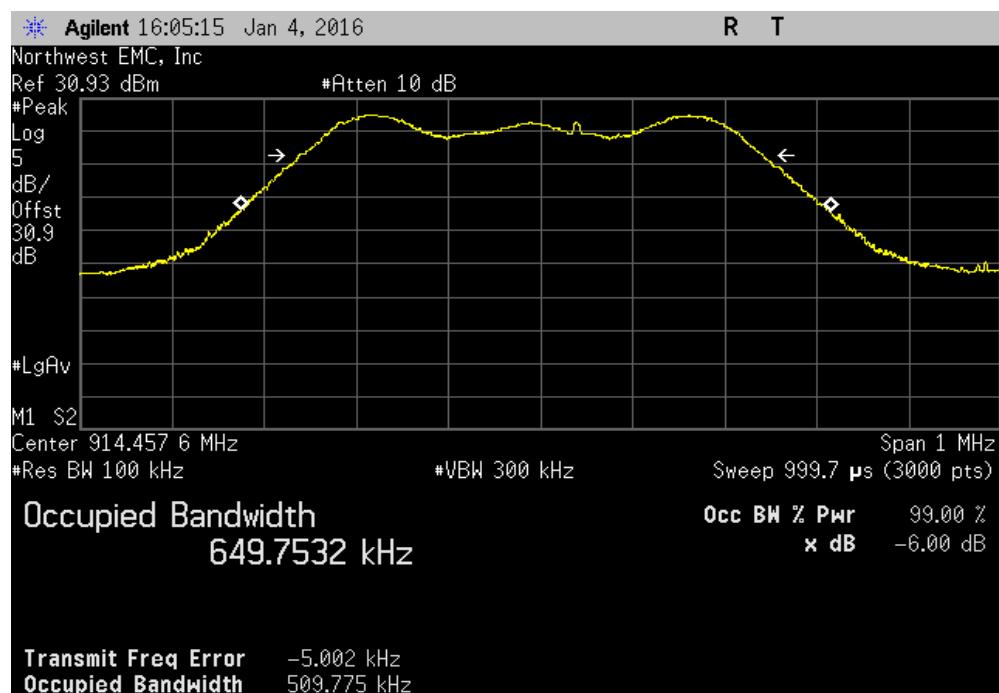
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)		Work Order:	FREW0054	
Serial Number:	402-669-0330		Date:	01/04/16	
Customer:	FreeWave Technologies, Inc.		Temperature:	23°C	
Attendees:	Dean Busch		Humidity:	29%	
Project:	None		Barometric Pres.:	1009 mbar	
Tested by:	Richard Mellroth	Power:	9 VDC	Job Site:	NC02
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2016		ANSI C63.10:2013			
COMMENTS					
EUT power set at maximum = 30.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Value	Limit (>)	Result
GFSK Modulation, 500kb			500.901 kHz	500 kHz	Pass
Low Channel 1, 902.7072 MHz			509.775 kHz	500 kHz	Pass
Mid Channel 18, 914.4576 MHz			507.897 kHz	500 kHz	Pass
High Channel 36, 927.36 MHz					
GFSK Modulation, 1Mb			648.526 kHz	500 kHz	Pass
Low Channel 1, 903.0528 MHz			681.447 kHz	500 kHz	Pass
Mid Channel 9, 914.112 MHz			671.961 kHz	500 kHz	Pass
High Channel 18, 927.0144 MHz					
GFSK Modulation, 4Mb			1.59 MHz	500 kHz	Pass
Low Channel 1, 904.5504 MHz			1.613 MHz	500 kHz	Pass
Mid Channel 4, 914.2272 MHz			1.661 MHz	500 kHz	Pass
High Channel 7, 925.7472 MHz					

# OCCUPIED BANDWIDTH

GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz			Value	Limit	Result
			500.901 kHz	(>) 500 kHz	Pass

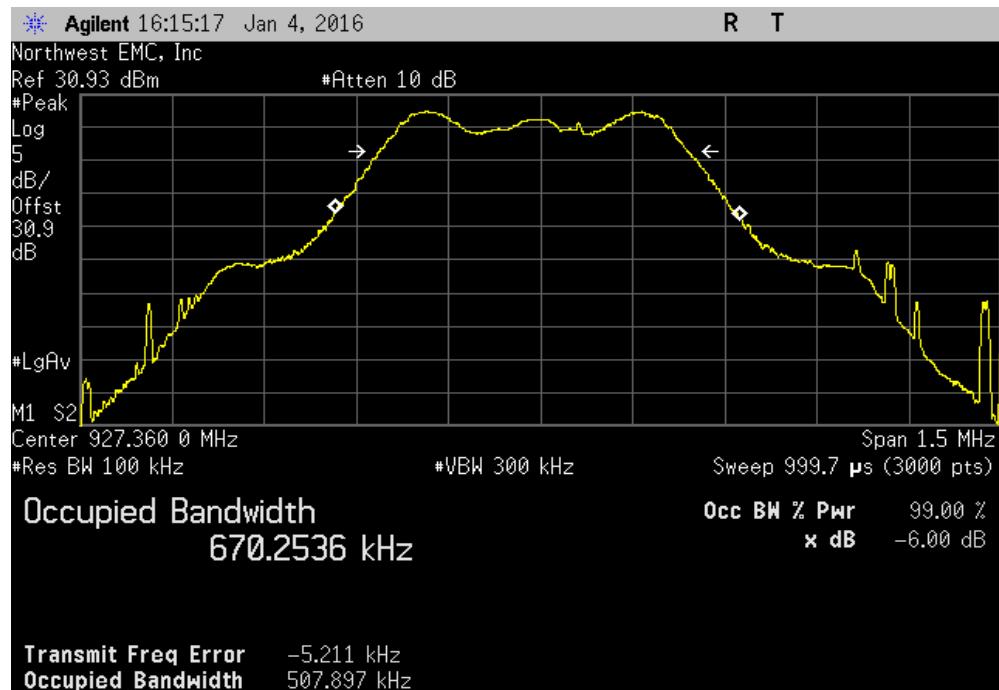


GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz			Value	Limit	Result
			509.775 kHz	(>) 500 kHz	Pass

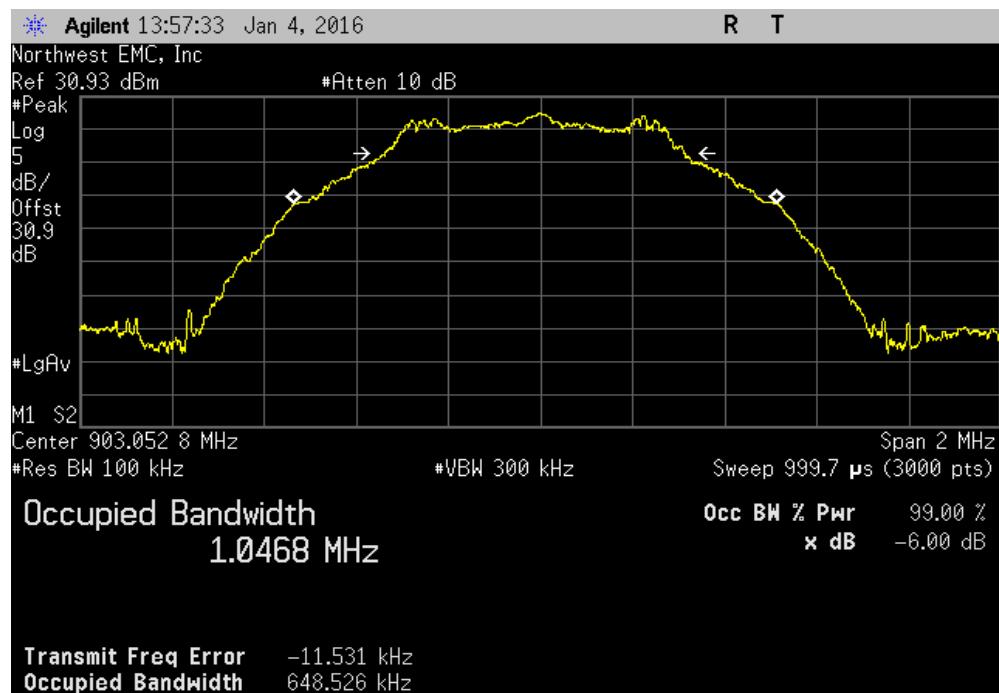


# OCCUPIED BANDWIDTH

GFSK Modulation, 500kb, High Channel 36, 927.36 MHz			Value	Limit	Result
			507.897 kHz	(>) 500 kHz	Pass

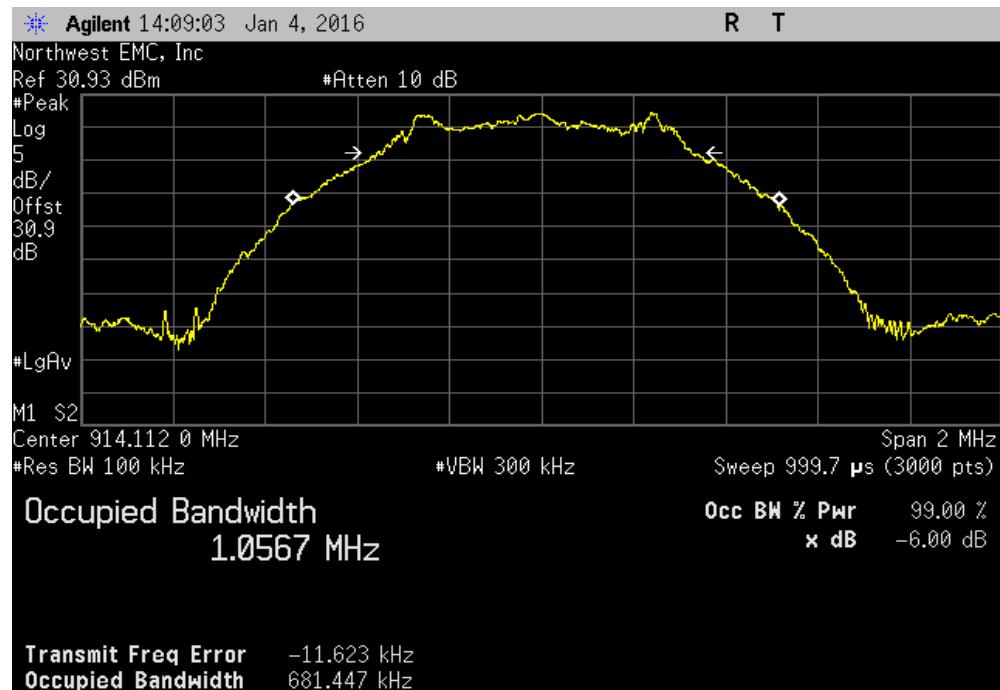


GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz			Value	Limit	Result
			648.526 kHz	(>) 500 kHz	Pass

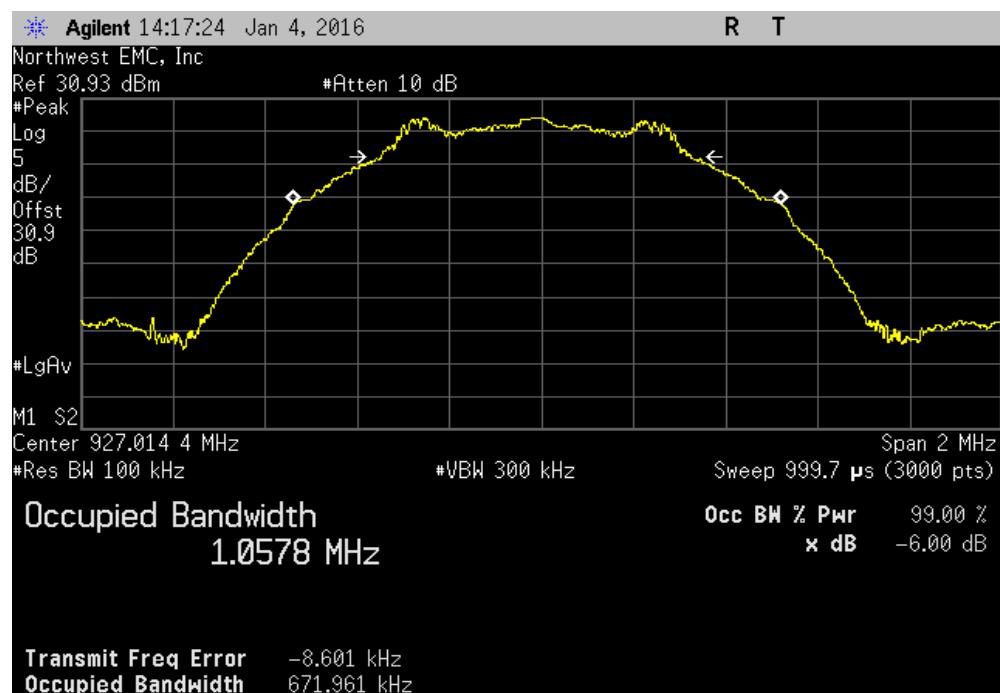


# OCCUPIED BANDWIDTH

GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz			Value	Limit (>)	Result
			681.447 kHz	500 kHz	Pass

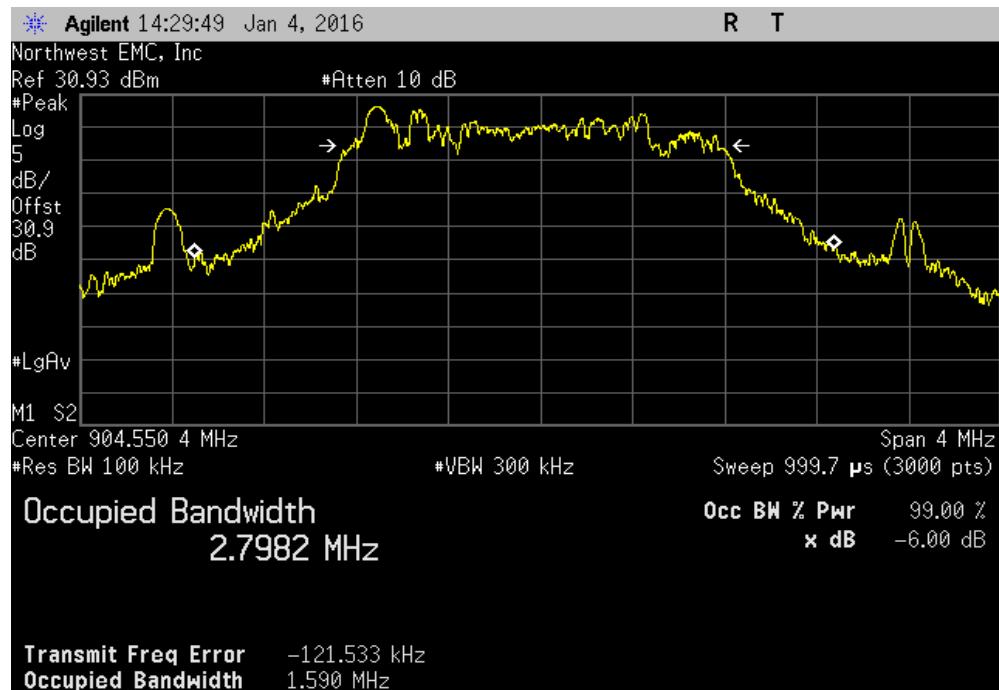


GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz			Value	Limit (>)	Result
			671.961 kHz	500 kHz	Pass

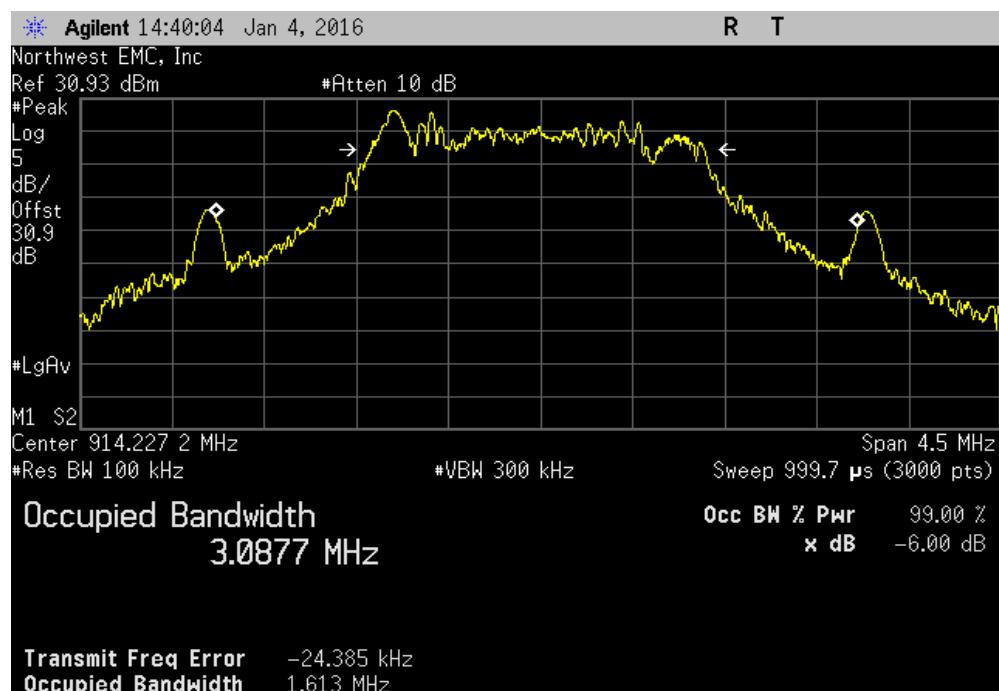


# OCCUPIED BANDWIDTH

GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz			Limit
Value	(>)	Result	
1.59 MHz	500 kHz	Pass	



GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz			Limit
Value	(>)	Result	
1.613 MHz	500 kHz	Pass	



# OCCUPIED BANDWIDTH



# OUTPUT POWER

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

## TEST DESCRIPTION

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. 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. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding  $[10 \log (1 / D)]$ , where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

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

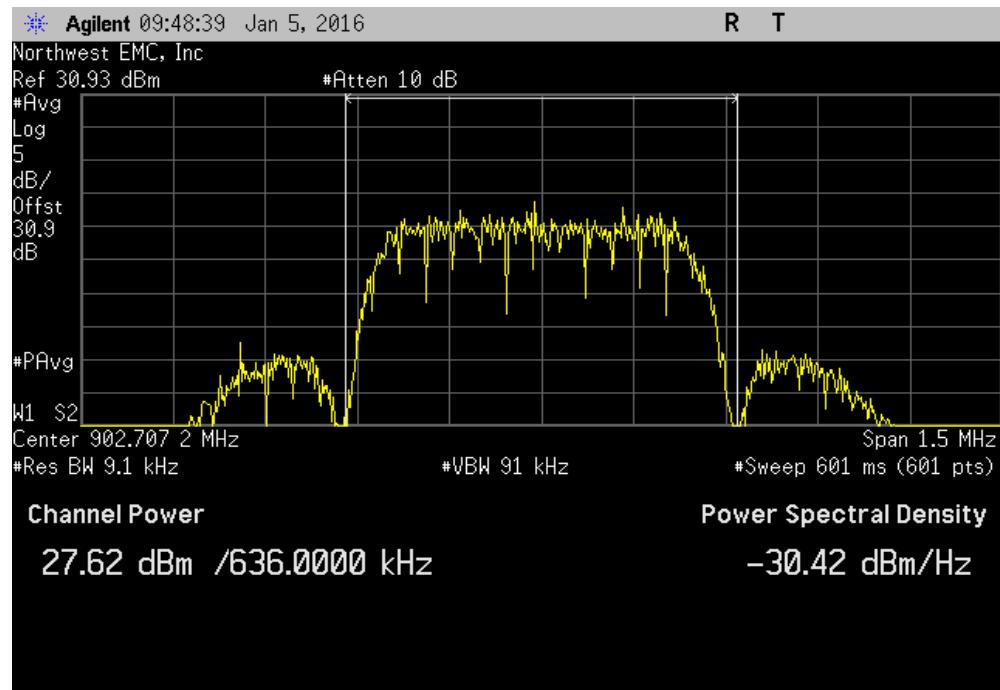
# OUTPUT POWER

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)		Work Order:	FREW0054	
Serial Number:	402-669-0330		Date:	01/05/16	
Customer:	FreeWave Technologies, Inc.		Temperature:	24°C	
Attendees:	Dean Busch		Humidity:	26%	
Project:	None		Barometric Pres.:	1002 mbar	
Tested by:	Richard Mellroth	Power:	9 VDC	Job Site:	NC02
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2016		ANSI C63.10:2013			
COMMENTS					
EUT power level = 29 @ 500kb, 29 @ 1Mb, 28 @ 4Mb. Demonstrating compliance with a 7.15dBi antenna.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)
GFSK Modulation, 500kb					
Low Channel 1, 902.7072 MHz			27.618	0.2	27.818
Mid Channel 18, 914.4576 MHz			27.562	0.2	27.762
High Channel 36, 927.36 MHz			27.566	0.2	27.766
GFSK Modulation, 1Mb					
Low Channel 1, 903.0528 MHz			27.426	0.4	27.826
Mid Channel 9, 914.112 MHz			27.416	0.4	27.816
High Channel 18, 927.0144 MHz			27.428	0.4	27.828
GFSK Modulation, 4Mb					
Low Channel 1, 904.5504 MHz			26.944	1.2	28.144
Mid Channel 4, 914.2272 MHz			26.966	1.2	28.166
High Channel 7, 925.7472 MHz			27.053	1.2	28.253

# OUTPUT POWER

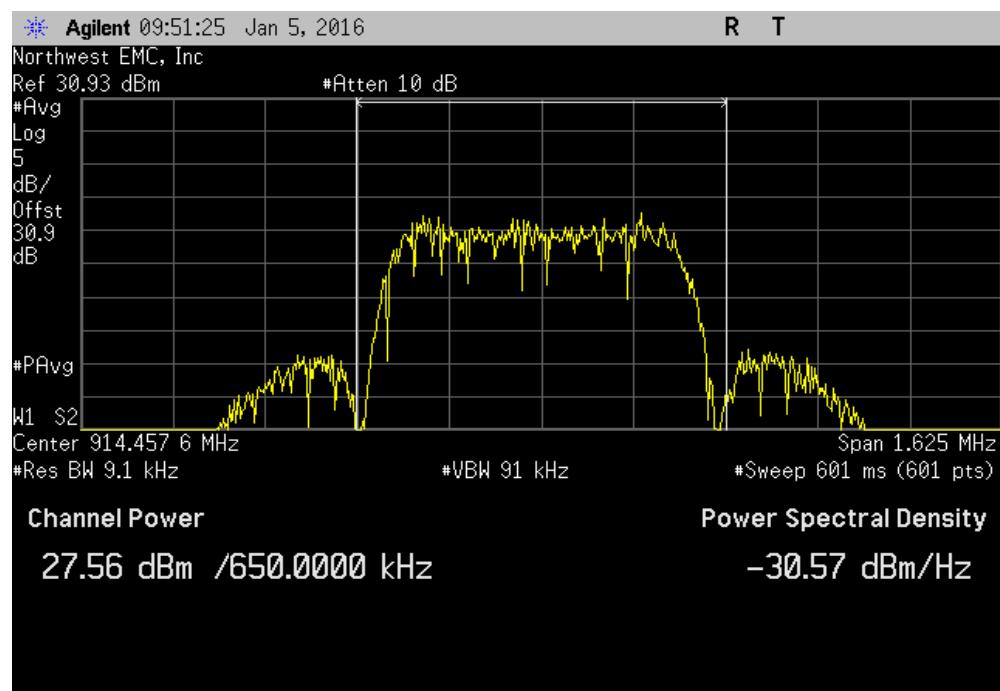
GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz

Avg Cond	Duty Cycle	Value	Limit	Results
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)	
27.618	0.2	27.818	28.85	Pass



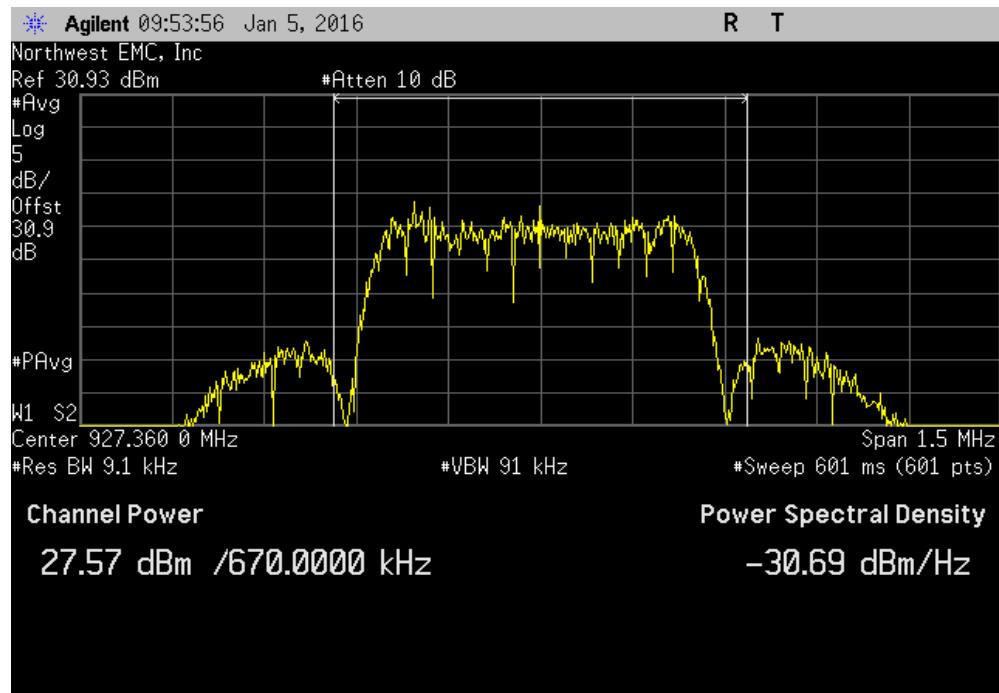
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz

Avg Cond	Duty Cycle	Value	Limit	Results
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)	
27.562	0.2	27.762	28.85	Pass

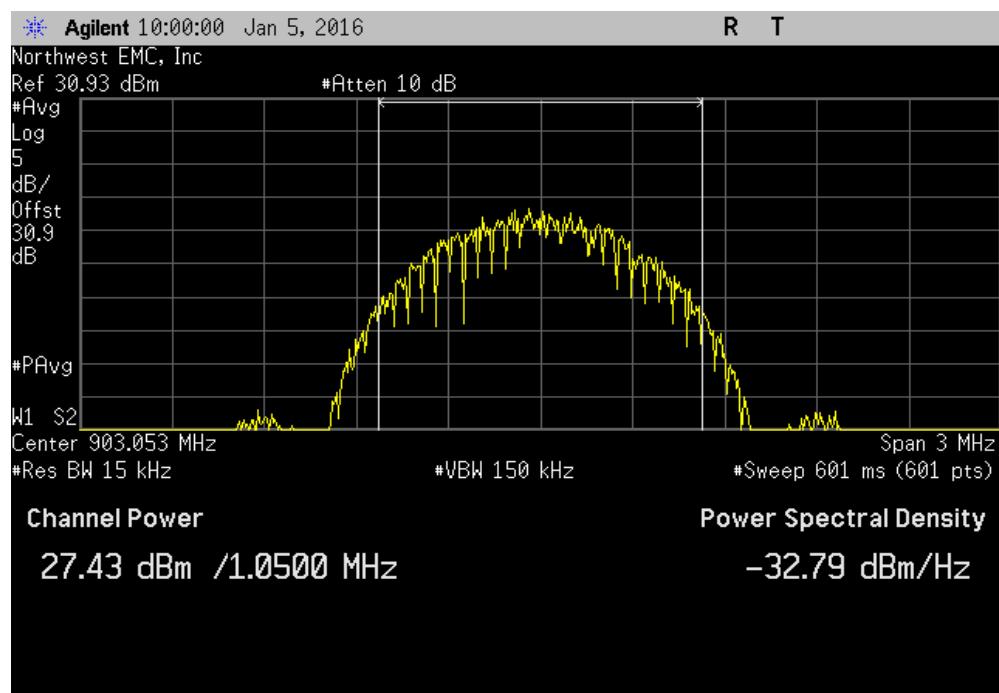


# OUTPUT POWER

GFSK Modulation, 500kb, High Channel 36, 927.36 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
27.566	0.2	27.766	28.85	Pass	

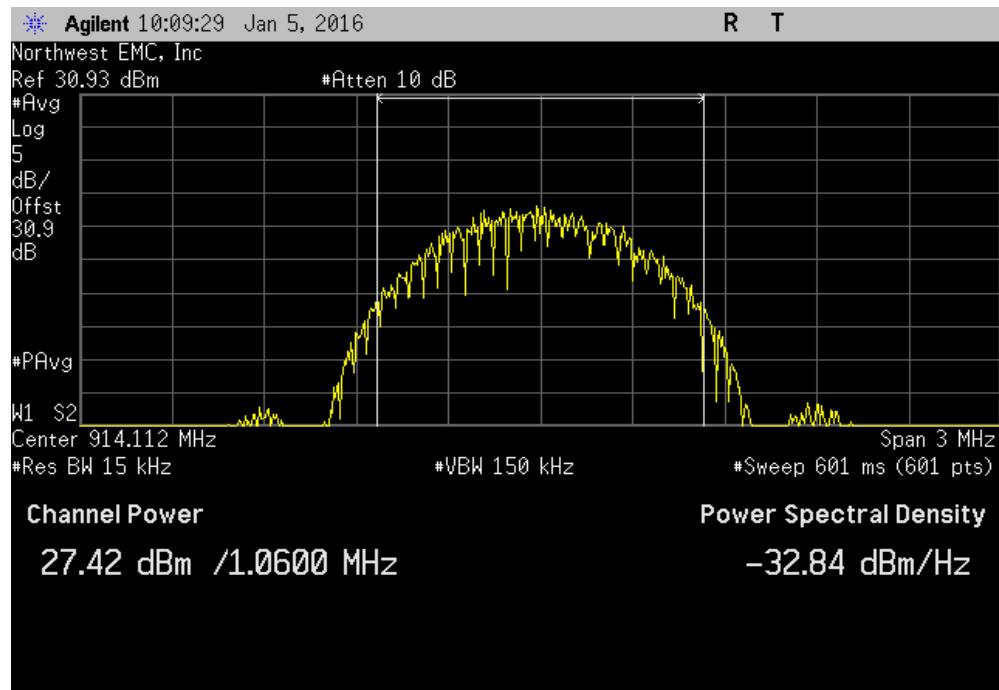


GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
27.426	0.4	27.826	28.85	Pass	

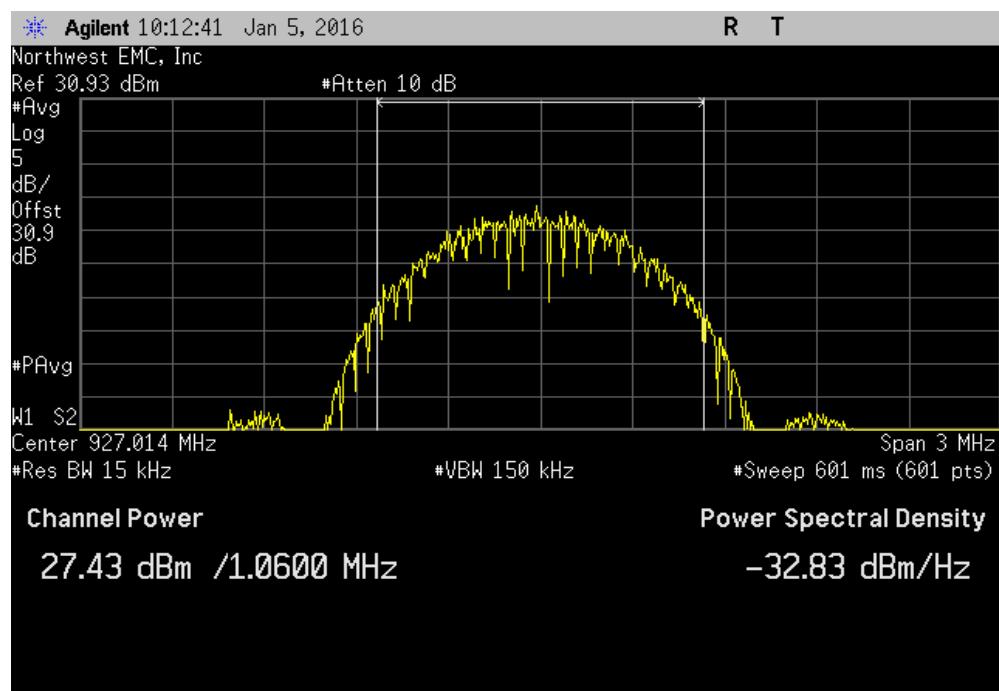


# OUTPUT POWER

GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
27.416	0.4	27.816	28.85	Pass	



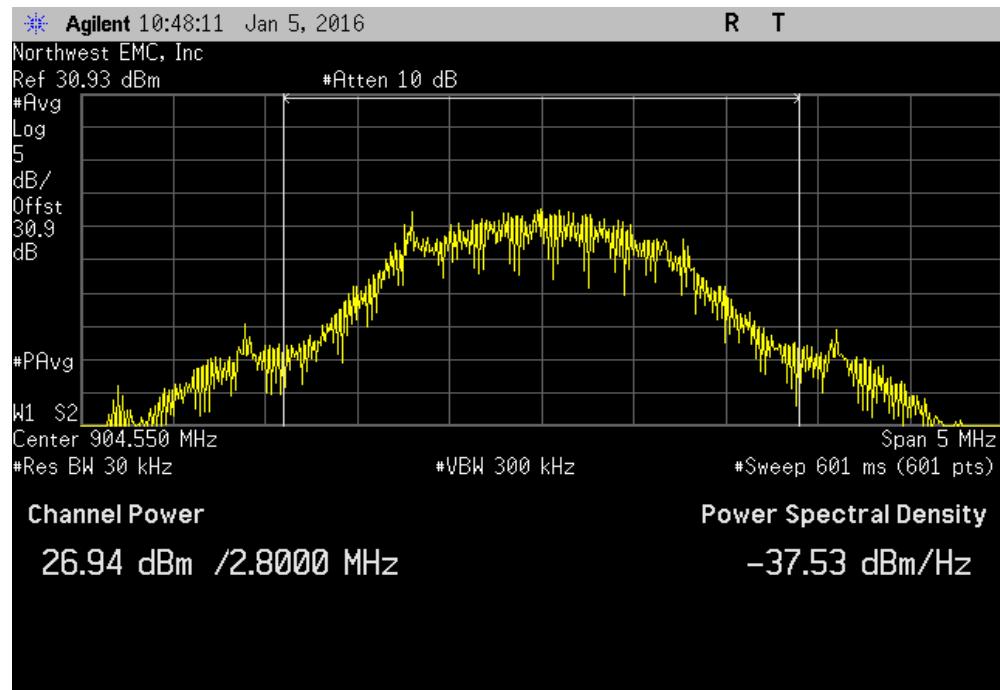
GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
27.428	0.4	27.828	28.85	Pass	



# OUTPUT POWER

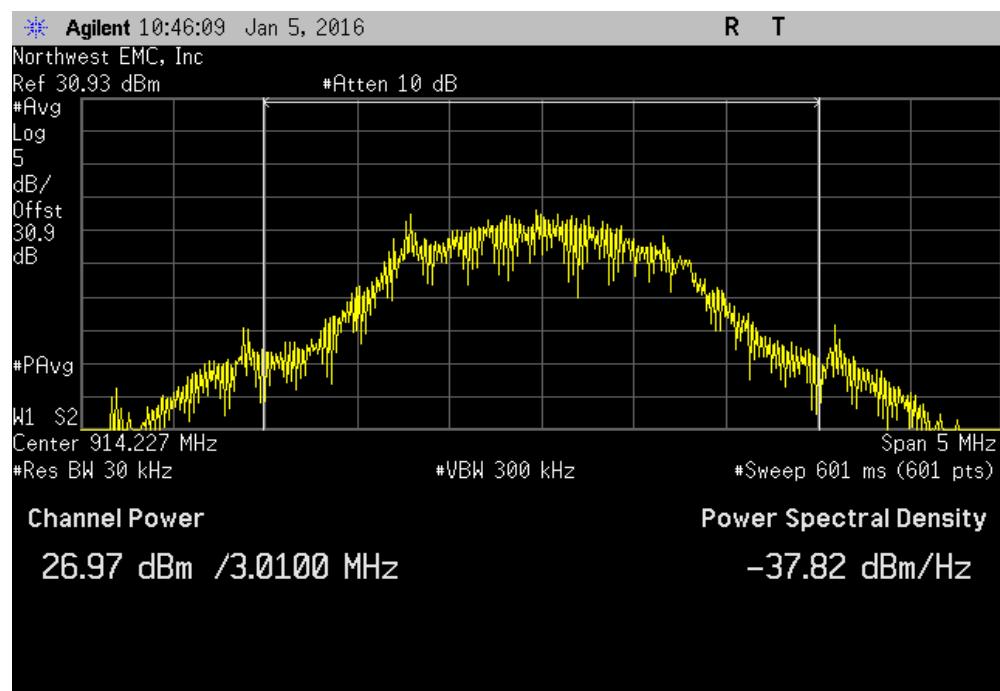
GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz

Avg Cond	Duty Cycle	Value	Limit	Results
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)	
26.944	1.2	28.144	28.85	Pass



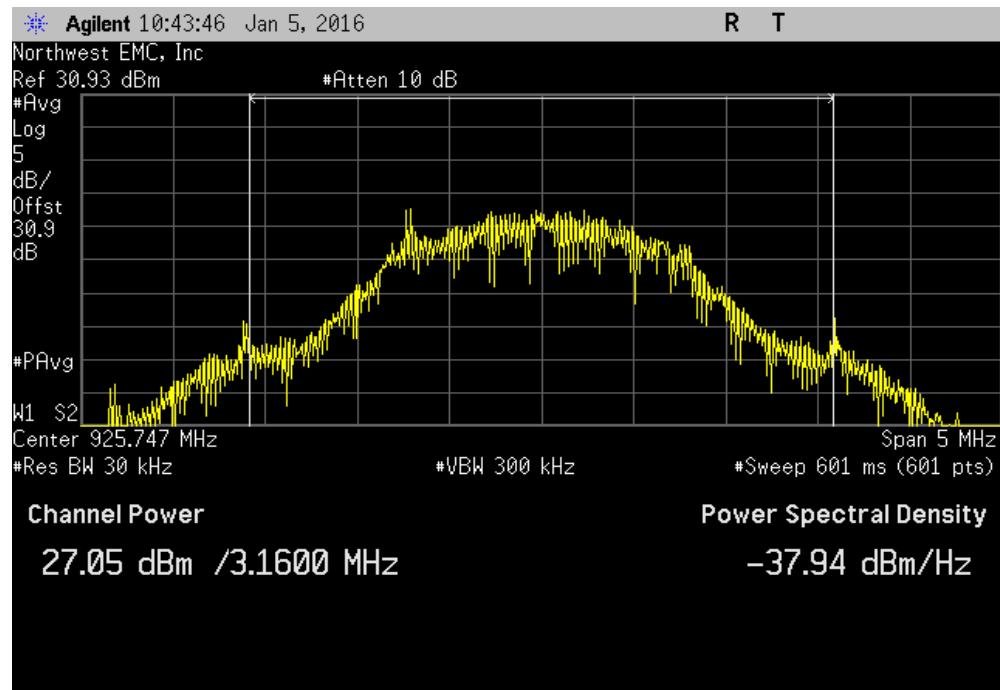
GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz

Avg Cond	Duty Cycle	Value	Limit	Results
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)	
26.966	1.2	28.166	28.85	Pass



# OUTPUT POWER

GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
27.053	1.2	28.253	28.85	Pass	



# POWER SPECTRAL DENSITY

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

## TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The method AVGPSD-2 in section 11.10.5 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector with a 100kHz RBW. Following the measurement a duty cycle correction was applied by adding  $[10 \log (1 / D)]$ , where D is the duty cycle, to the measured power to compute the average power during the actual transmission times. The observed power level is then scaled to an equivalent value in 3kHz by adding a Bandwidth Correction Factor (BWCF) where:

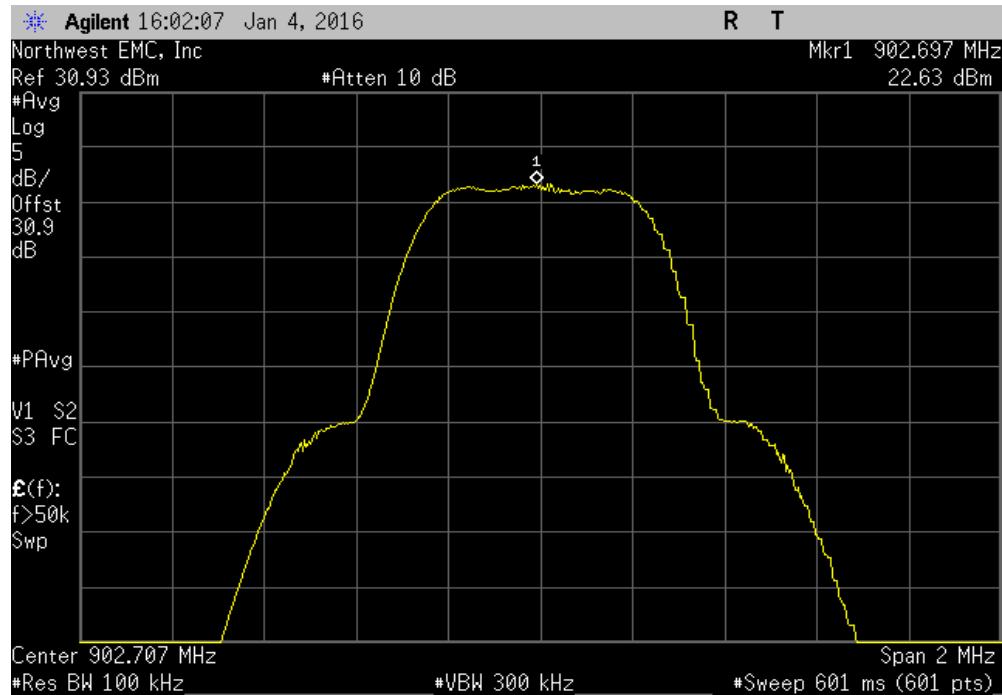
$$\text{BWCF} = 10 * \text{LOG}(3\text{kHz} / 100\text{kHz}) = -15.2 \text{ dB}$$

# POWER SPECTRAL DENSITY

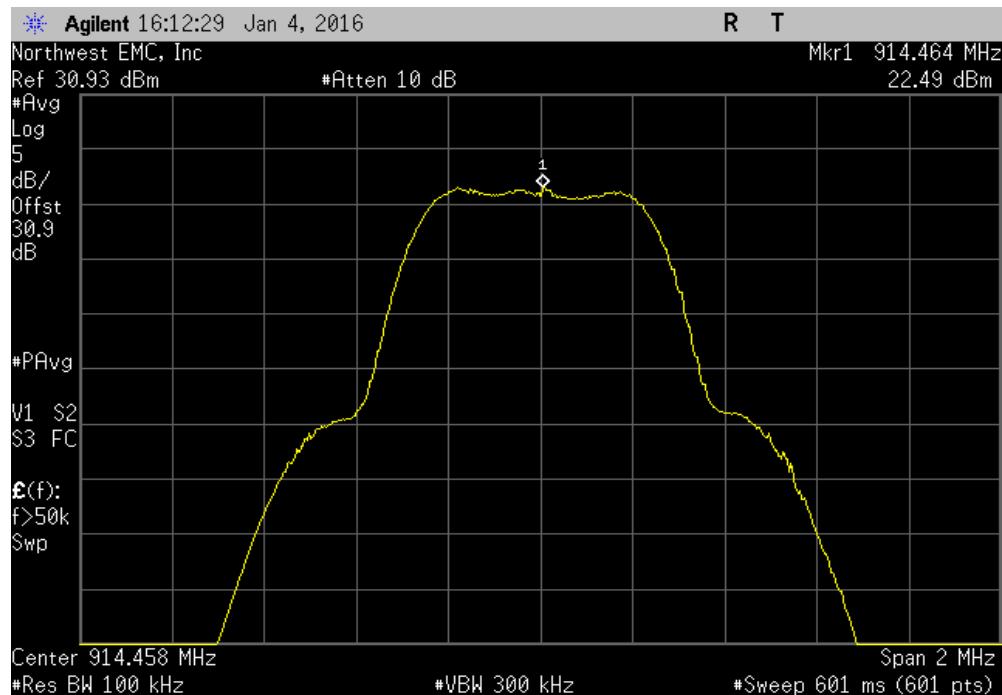
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)		Work Order:	FREW0054				
Serial Number:	402-669-0330		Date:	01/04/16				
Customer:	FreeWave Technologies, Inc.		Temperature:	23°C				
Attendees:	Dean Busch		Humidity:	29%				
Project:	None		Barometric Pres.:	1009 mbar				
Tested by:	Richard Mellroth	Power:	9 VDC	Job Site:	NC02			
TEST SPECIFICATIONS		Test Method						
FCC 15.247:2016		ANSI C63.10:2013						
COMMENTS								
EUT power set at maximum = 30.								
DEVIATIONS FROM TEST STANDARD								
None								
Configuration #	1	Signature						
			Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results
GFSK Modulation, 500kb								
Low Channel 1, 902.7072 MHz			22.63	0.2	-15.2	7.63	8	N/A
Mid Channel 18, 914.4576 MHz			22.49	0.2	-15.2	7.49	8	N/A
High Channel 36, 927.36 MHz			22.49	0.2	-15.2	7.49	8	N/A
GFSK Modulation, 1Mb								
Low Channel 1, 903.0528 MHz			22.18	0.4	-15.2	7.38	8	N/A
Mid Channel 9, 914.112 MHz			22.16	0.4	-15.2	7.36	8	N/A
High Channel 18, 927.0144 MHz			22.09	0.4	-15.2	7.29	8	N/A
GFSK Modulation, 4Mb								
Low Channel 1, 904.5504 MHz			19.55	1.2	-15.2	5.55	8	N/A
Mid Channel 4, 914.2272 MHz			19.38	1.2	-15.2	5.38	8	N/A
High Channel 7, 925.7472 MHz			19.33	1.2	-15.2	5.33	8	N/A

# POWER SPECTRAL DENSITY

GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz						
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results	
22.63	0.2	-15.2	7.63	8	N/A	



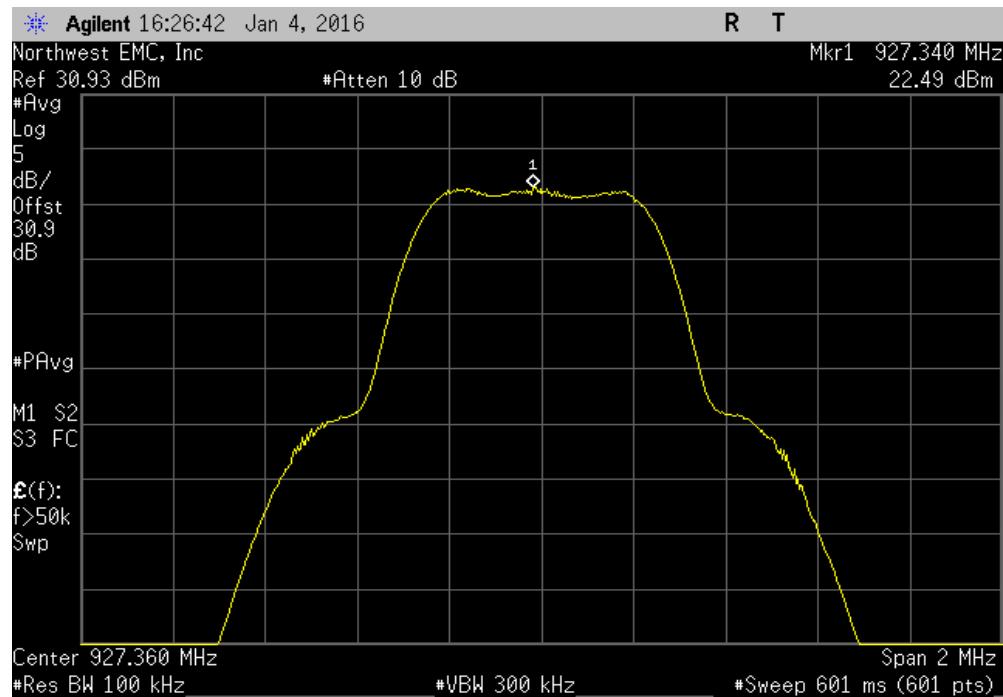
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz						
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results	
22.49	0.2	-15.2	7.49	8	N/A	



# POWER SPECTRAL DENSITY

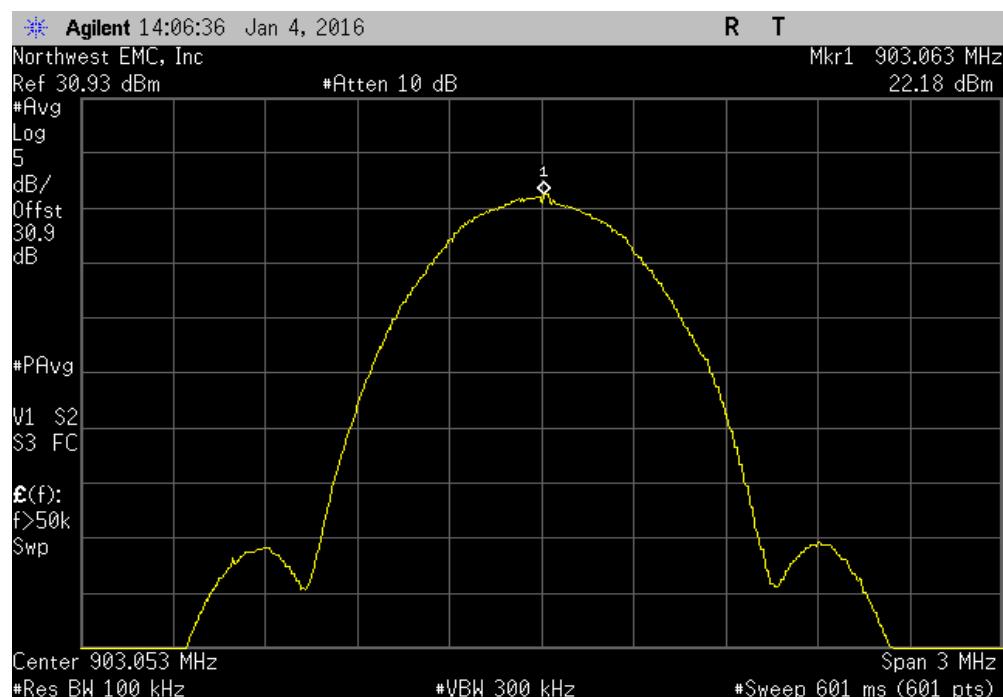
GFSK Modulation, 500kb, High Channel 36, 927.36 MHz

Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results
22.49	0.2	-15.2	7.49	8	N/A



GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz

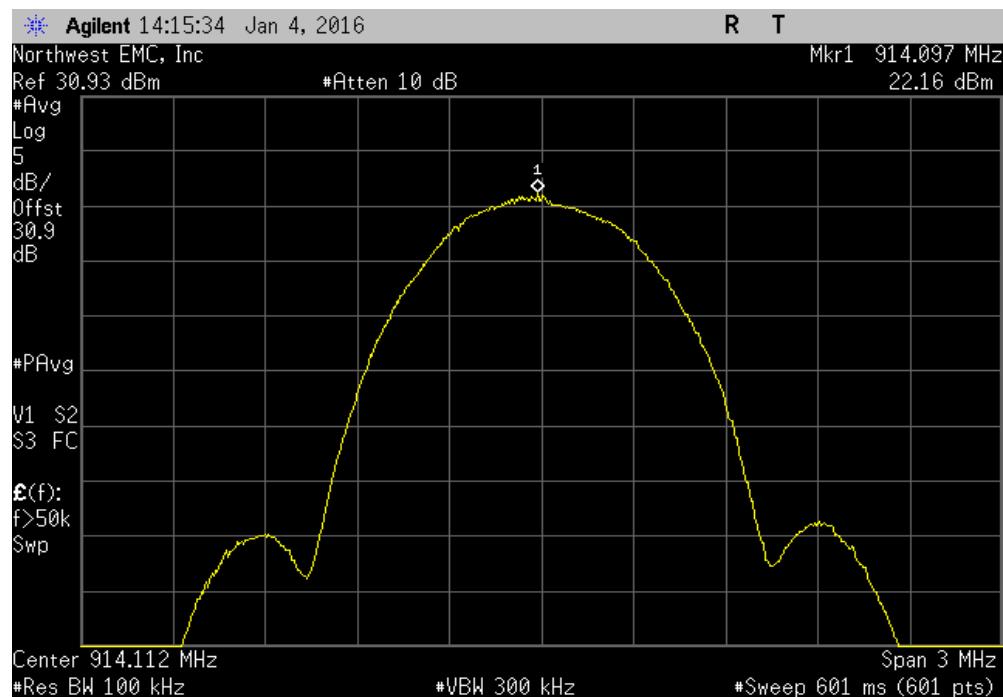
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results
22.18	0.4	-15.2	7.38	8	N/A



# POWER SPECTRAL DENSITY

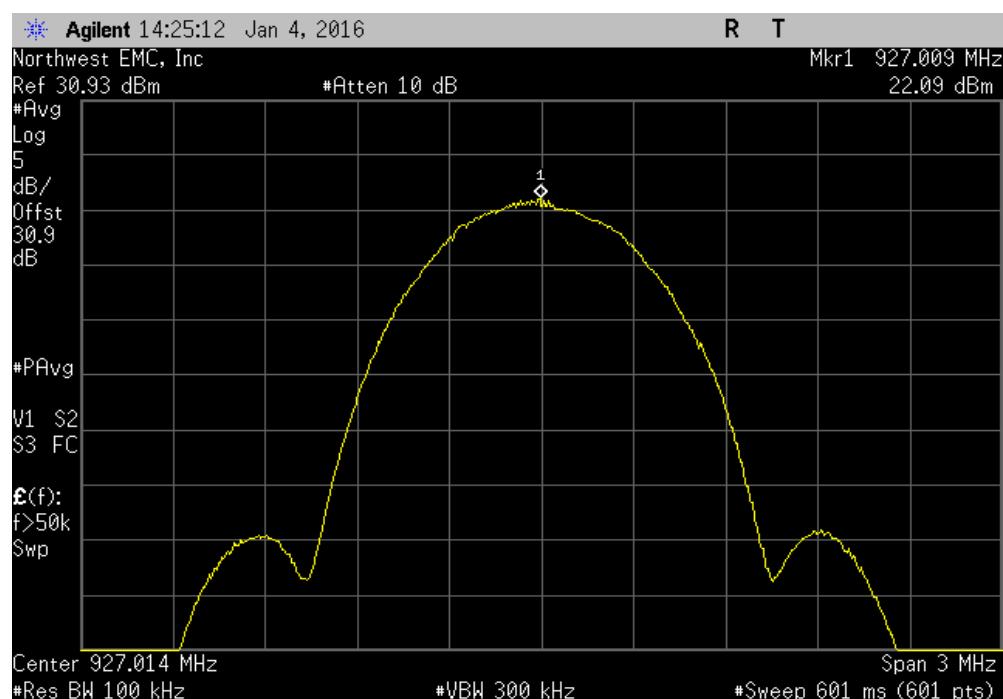
GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz

Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results
22.16	0.4	-15.2	7.36	8	N/A



GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz

Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results
22.09	0.4	-15.2	7.29	8	N/A

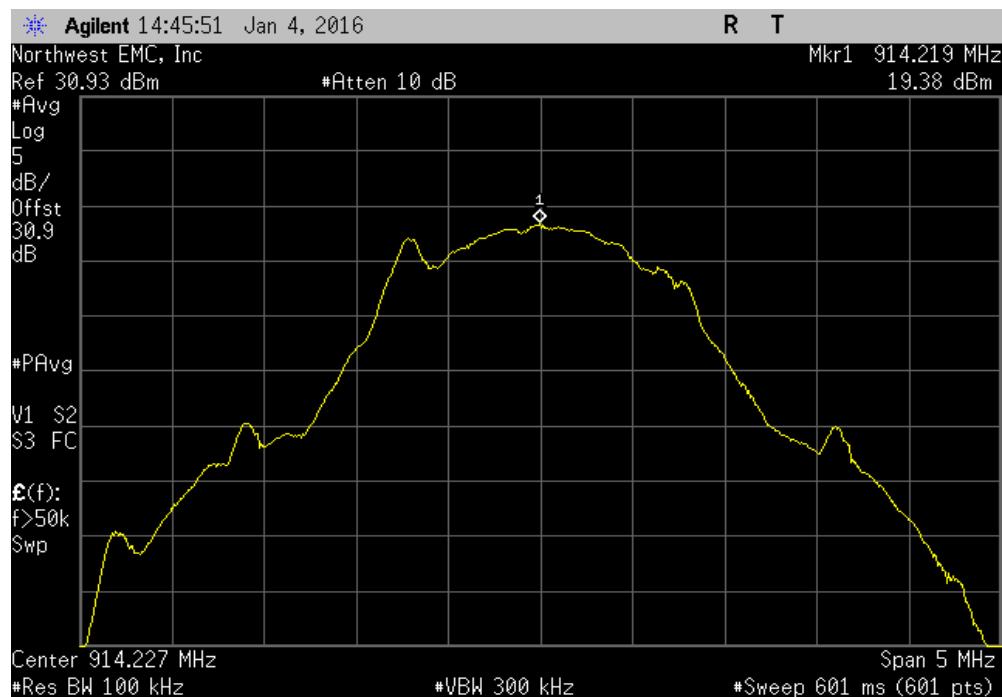


# POWER SPECTRAL DENSITY

GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz						
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results	
19.55	1.2	-15.2	5.55	8	N/A	



GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz						
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results	
19.38	1.2	-15.2	5.38	8	N/A	



# POWER SPECTRAL DENSITY

GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz						
Value dBm/100kHz	Duty Cycle Factor (dB)	dBm/100kHz to dBm/3kHz	Value dBm/3kHz	Limit	Results	
19.33	1.2	-15.2	5.33	8	N/A	



# BAND EDGE COMPLIANCE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

## TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

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

An RMS detector was used to match the method called out for Output Power. Because the reference level was taken with an RMS detector, the attenuation requirement is -30 dBc.

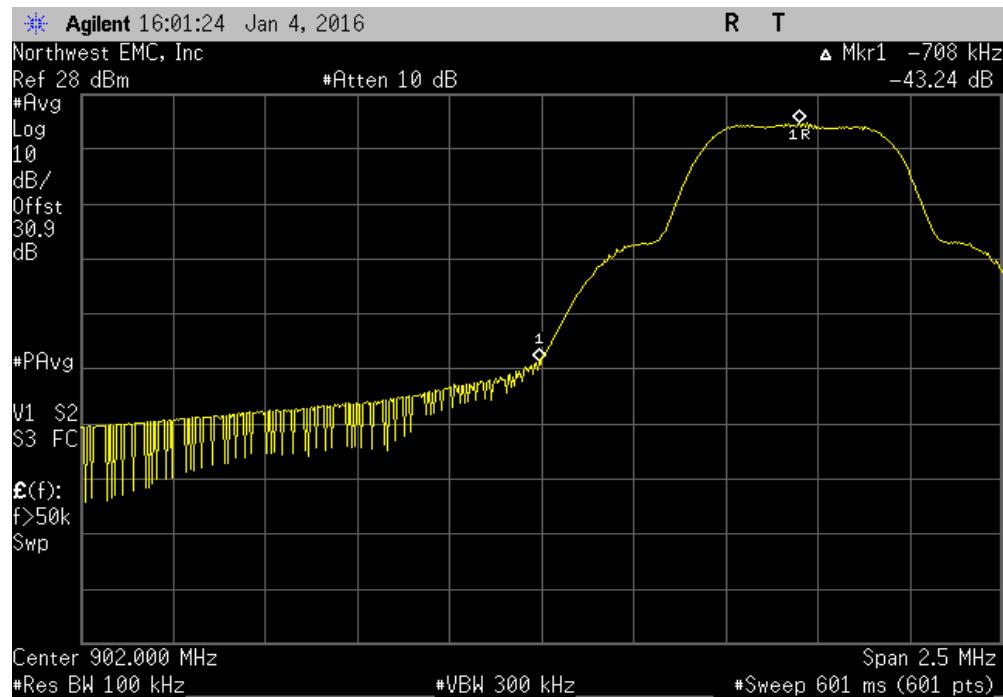
# BAND EDGE COMPLIANCE

EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)		Work Order:	FREW0054	
Serial Number:	402-669-0330		Date:	01/04/16	
Customer:	FreeWave Technologies, Inc.		Temperature:	23°C	
Attendees:	Dean Busch		Humidity:	29%	
Project:	None		Barometric Pres.:	1009 mbar	
Tested by:	Richard Mellroth	Power:	9 VDC	Job Site:	NC02
TEST SPECIFICATIONS			Test Method		
FCC 15.247:2016			ANSI C63.10:2013		
COMMENTS					
EUT power set at maximum = 30.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature			
			Value (dBc)	Limit ≤ (dBc)	Result
GFSK Modulation, 500kb					
Low Channel 1, 902.7072 MHz			-43.24	-30	Pass
High Channel 36, 927.36 MHz			-36.44	-30	Pass
GFSK Modulation, 1Mb					
Low Channel 1, 903.0528 MHz			-35.53	-30	Pass
High Channel 18, 927.0144 MHz			-31.93	-30	Pass
GFSK Modulation, 4Mb					
Low Channel 1, 904.5504 MHz			-37.93	-30	Pass
High Channel 7, 925.7472 MHz			-32.76	-30	Pass

# BAND EDGE COMPLIANCE

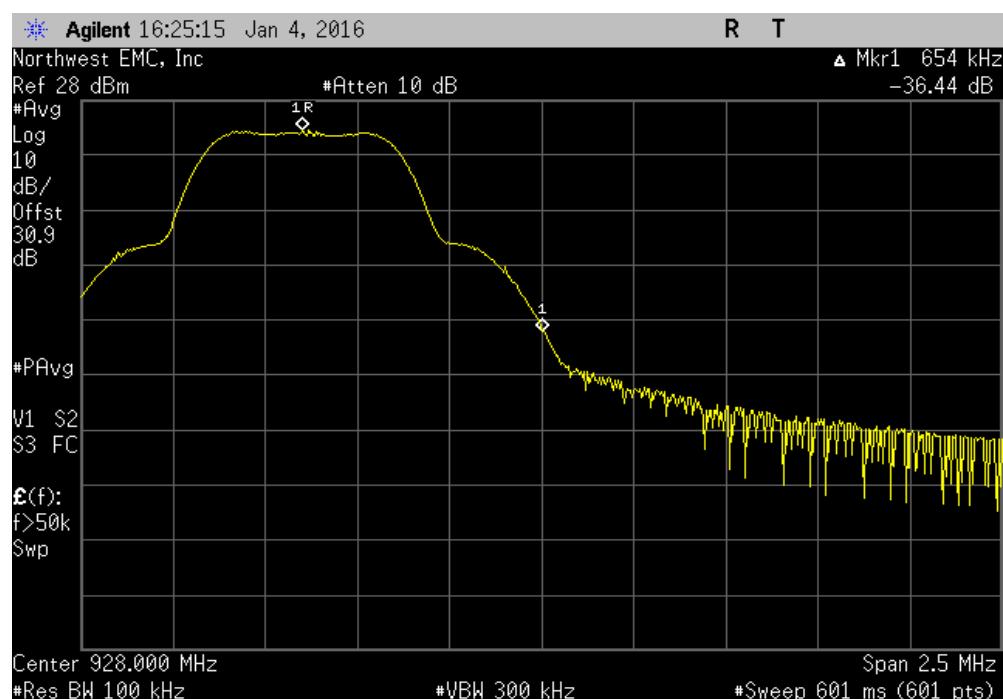
GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz

Value (dBc)	Limit $\leq$ (dBc)	Result
-43.24	-30	Pass



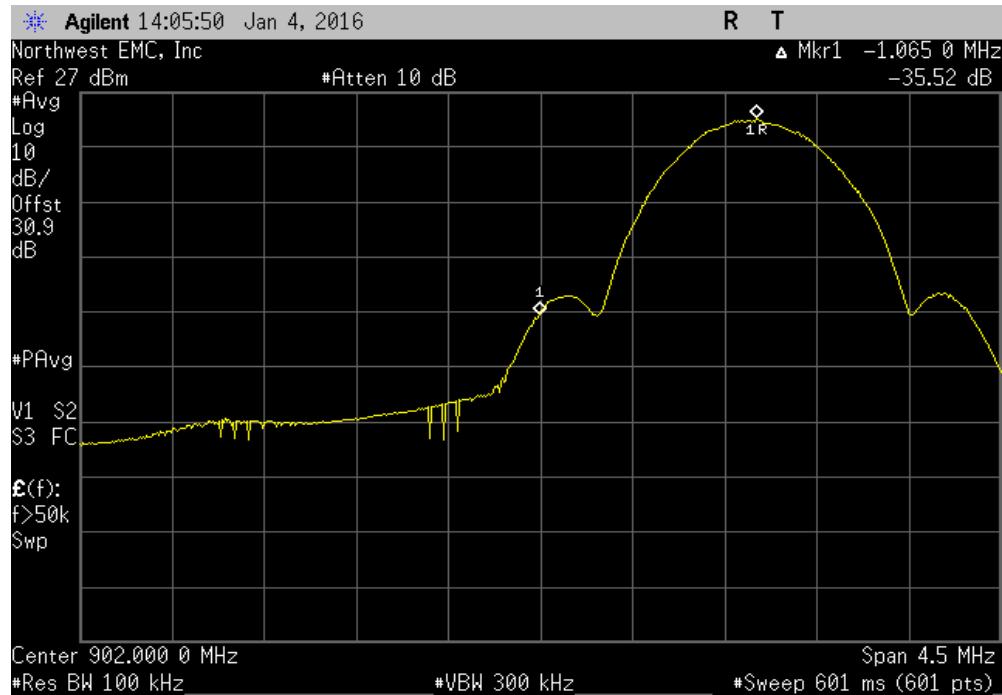
GFSK Modulation, 500kb, High Channel 36, 927.36 MHz

Value (dBc)	Limit $\leq$ (dBc)	Result
-36.44	-30	Pass

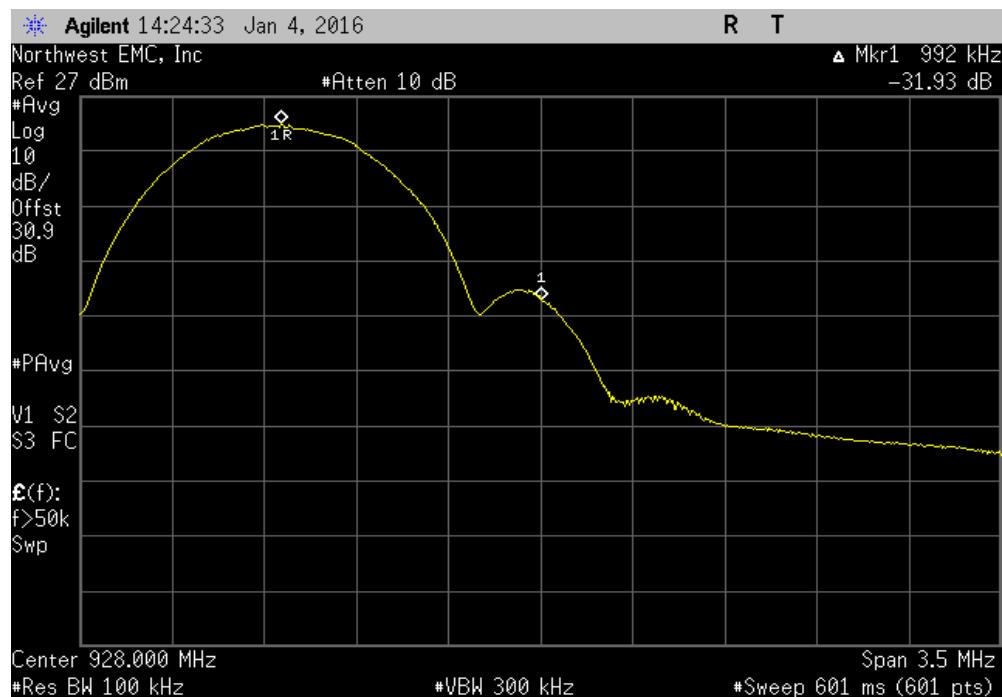


# BAND EDGE COMPLIANCE

GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-35.53	-30	Pass



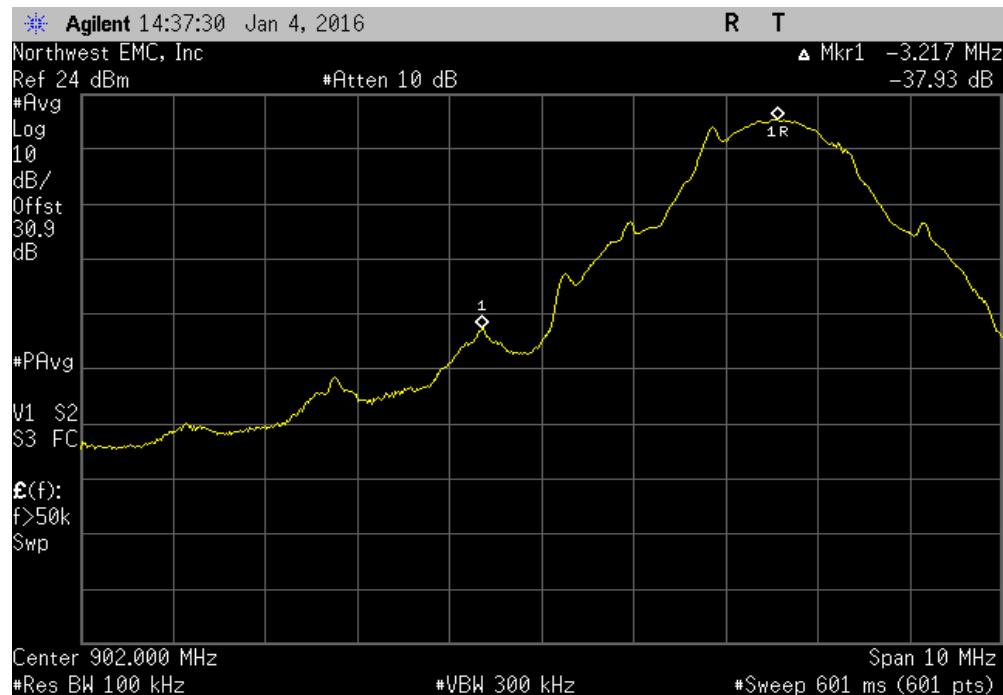
GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz			
	Value (dBc)	Limit ≤ (dBc)	Result
	-31.93	-30	Pass



# BAND EDGE COMPLIANCE

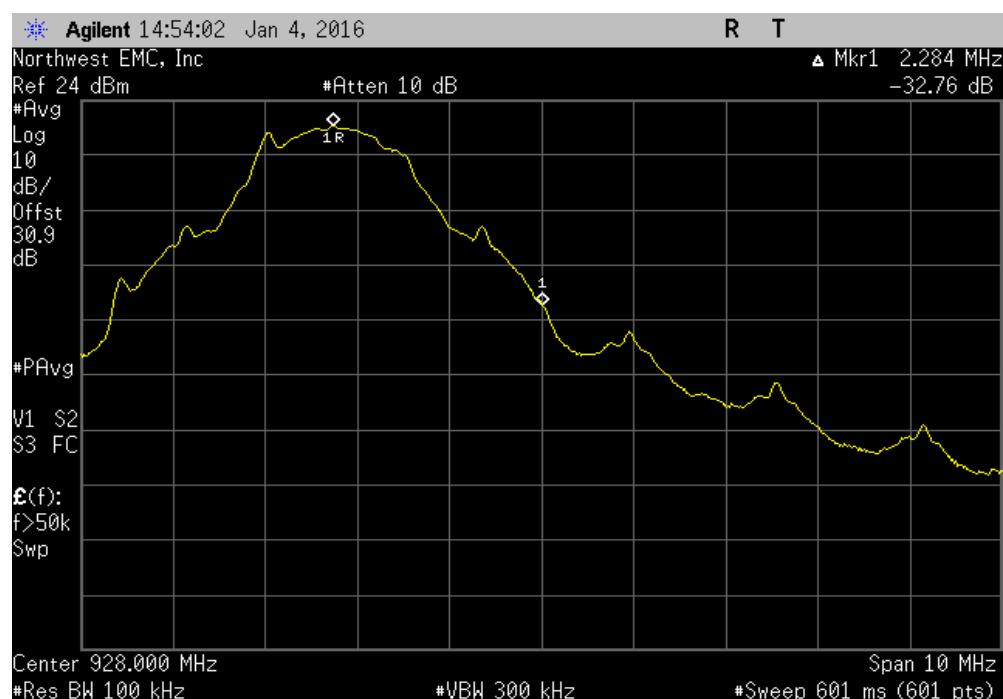
GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz

Value (dBc)	Limit $\leq$ (dBc)	Result
-37.93	-30	Pass



GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz

Value (dBc)	Limit $\leq$ (dBc)	Result
-32.76	-30	Pass



# SPURIOUS CONDUCTED EMISSIONS

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	S.M. Electronics	SA18H-10	REJ	9/18/2015	12
Attenuator	S.M. Electronics	SA18H-20	REK	9/28/2015	12
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

## TEST DESCRIPTION

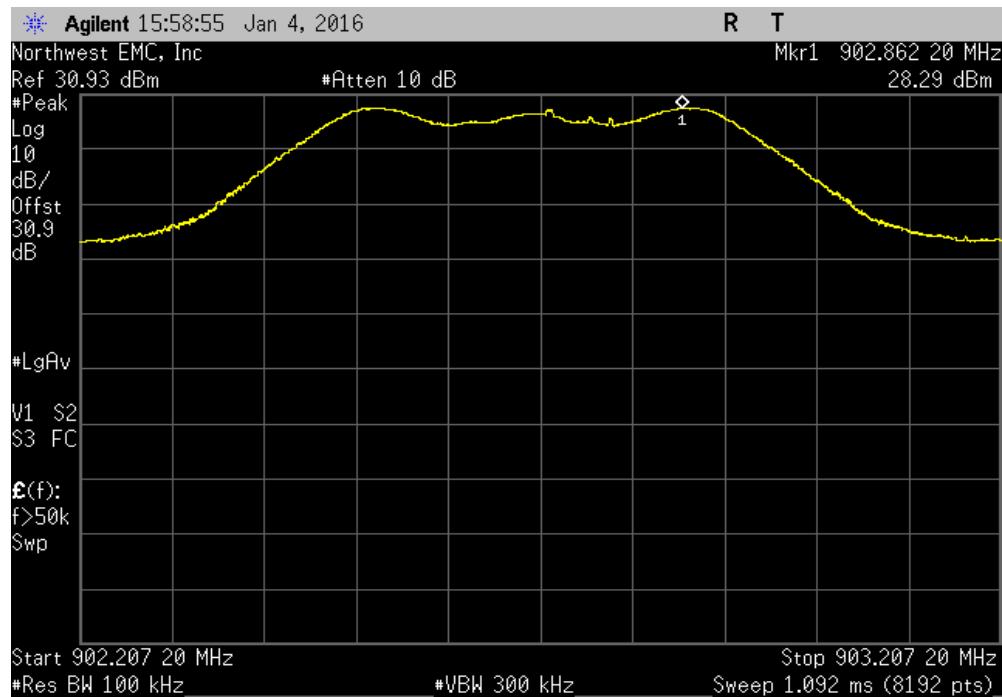
The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS

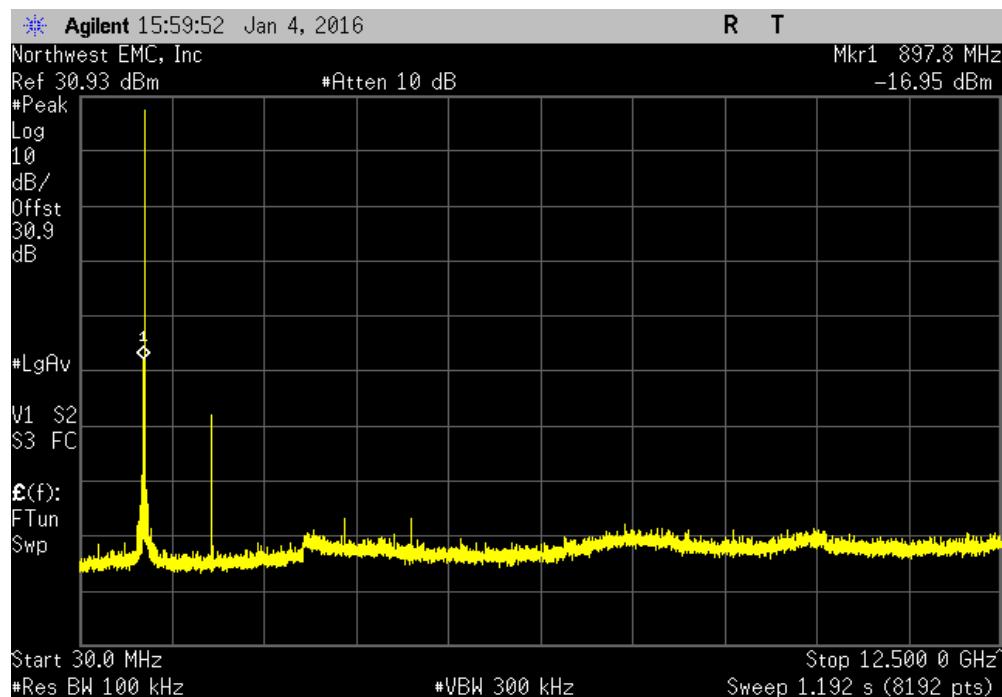
EUT:	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054
Serial Number:	402-669-0330	Date:	01/04/16
Customer:	FreeWave Technologies, Inc.	Temperature:	23°C
Attendees:	Dean Busch	Humidity:	29%
Project:	None	Barometric Pres.:	1009 mbar
Tested by:	Richard Mellroth	Power:	9 VDC
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013
FCC 15.247:2016			
COMMENTS			
EUT power set at maximum = 30.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature	
			
		Frequency Range	Max Value (dBc) Limit ≤ (dBc) Result
GFSK Modulation, 500kb			
Low Channel 1, 902.7072 MHz	Fundamental	N/A	N/A N/A
Low Channel 1, 902.7072 MHz	30 MHz - 12.5 GHz	-45.24	-20 Pass
Low Channel 1, 902.7072 MHz	12.5 GHz - 25 GHz	-71.88	-20 Pass
Mid Channel 18, 914.4576 MHz	Fundamental	N/A	N/A N/A
Mid Channel 18, 914.4576 MHz	30 MHz - 12.5 GHz	-55.69	-20 Pass
Mid Channel 18, 914.4576 MHz	12.5 GHz - 25 GHz	-71.44	-20 Pass
High Channel 36, 927.36 MHz	Fundamental	N/A	N/A N/A
High Channel 36, 927.36 MHz	30 MHz - 12.5 GHz	-49.18	-20 Pass
High Channel 36, 927.36 MHz	12.5 GHz - 25 GHz	-72.16	-20 Pass
GFSK Modulation, 1Mb			
Low Channel 1, 903.0528 MHz	Fundamental	N/A	N/A N/A
Low Channel 1, 903.0528 MHz	30 MHz - 12.5 GHz	-38.5	-20 Pass
Low Channel 1, 903.0528 MHz	12.5 GHz - 25 GHz	-72.01	-20 Pass
Mid Channel 9, 914.112 MHz	Fundamental	N/A	N/A N/A
Mid Channel 9, 914.112 MHz	30 MHz - 12.5 GHz	-56.85	-20 Pass
Mid Channel 9, 914.112 MHz	12.5 GHz - 25 GHz	-72.11	-20 Pass
High Channel 18, 927.0144 MHz	Fundamental	N/A	N/A N/A
High Channel 18, 927.0144 MHz	30 MHz - 12.5 GHz	-57.86	-20 Pass
High Channel 18, 927.0144 MHz	12.5 GHz - 25 GHz	-72.08	-20 Pass
GFSK Modulation, 4Mb			
Low Channel 1, 904.5504 MHz	Fundamental	N/A	N/A N/A
Low Channel 1, 904.5504 MHz	30 MHz - 12.5 GHz	-45.1	-20 Pass
Low Channel 1, 904.5504 MHz	12.5 GHz - 25 GHz	-73.23	-20 Pass
Mid Channel 4, 914.2272 MHz	Fundamental	N/A	N/A N/A
Mid Channel 4, 914.2272 MHz	30 MHz - 12.5 GHz	-56.28	-20 Pass
Mid Channel 4, 914.2272 MHz	12.5 GHz - 25 GHz	-73.2	-20 Pass
High Channel 7, 925.7472 MHz	Fundamental	N/A	N/A N/A
High Channel 7, 925.7472 MHz	30 MHz - 12.5 GHz	-52.41	-20 Pass
High Channel 7, 925.7472 MHz	12.5 GHz - 25 GHz	-73.08	-20 Pass

# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz					
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	N/A	N/A	N/A		

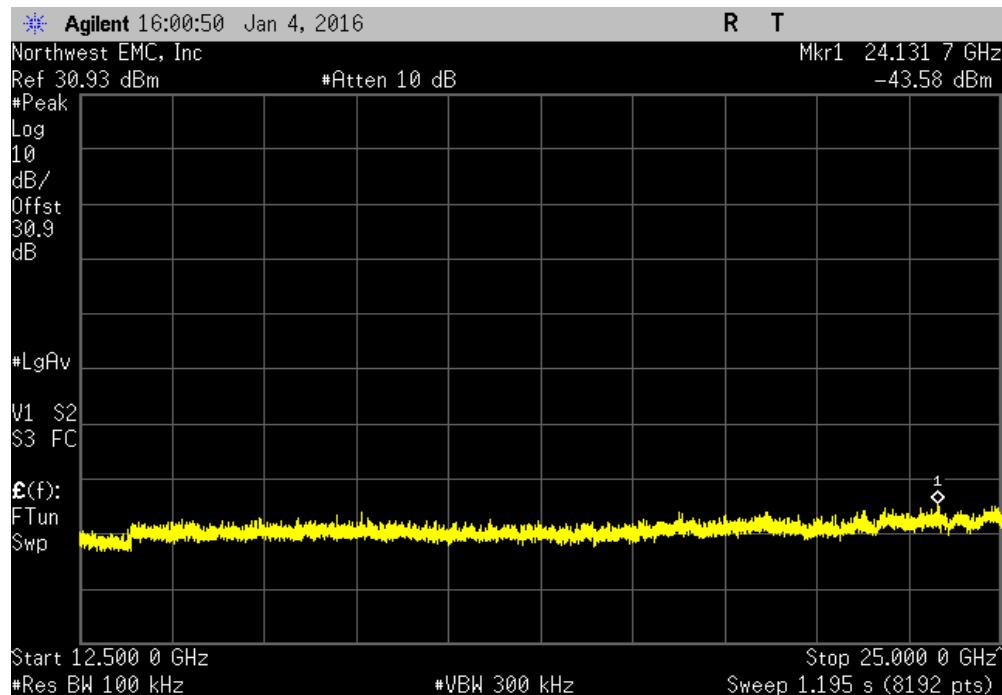


GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz					
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	-45.24	-20	Pass		

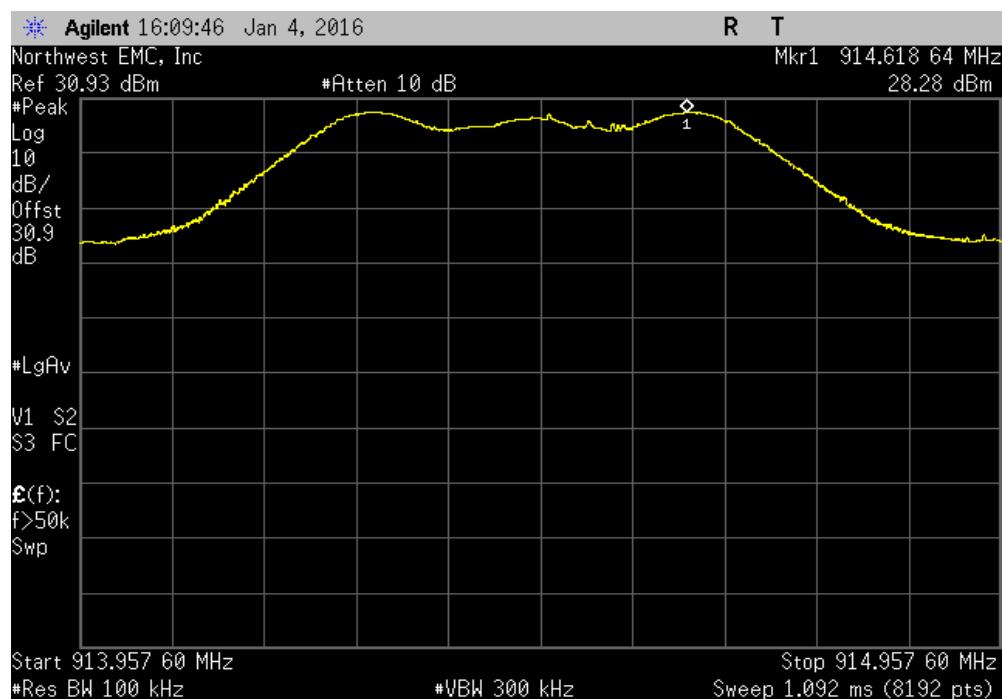


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 500kb, Low Channel 1, 902.7072 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-71.88	-20	Pass



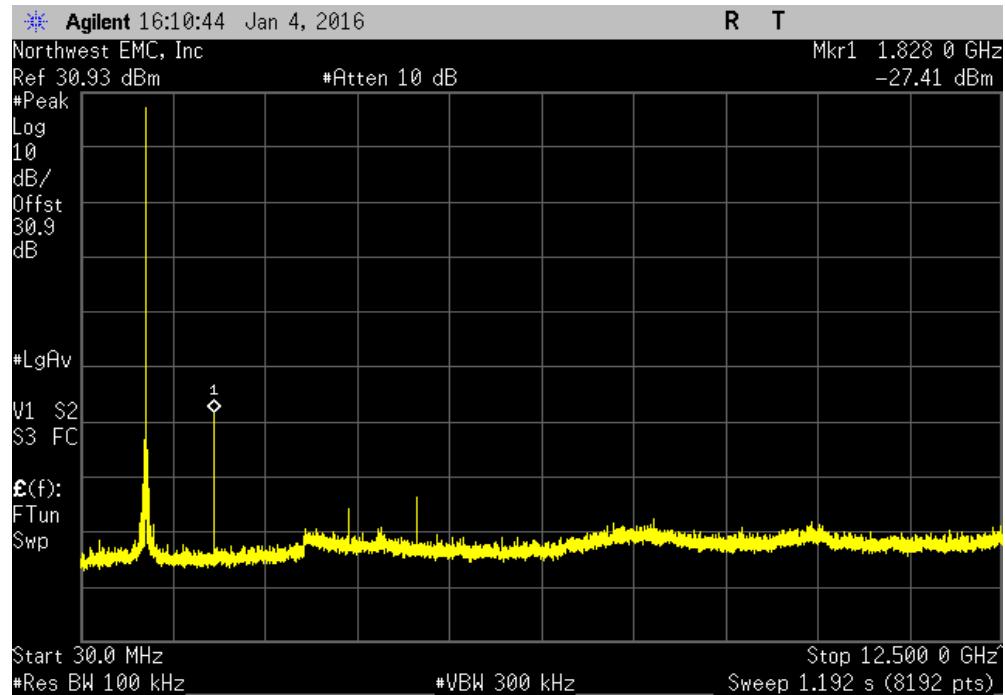
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental	N/A	N/A	N/A



# SPURIOUS CONDUCTED EMISSIONS

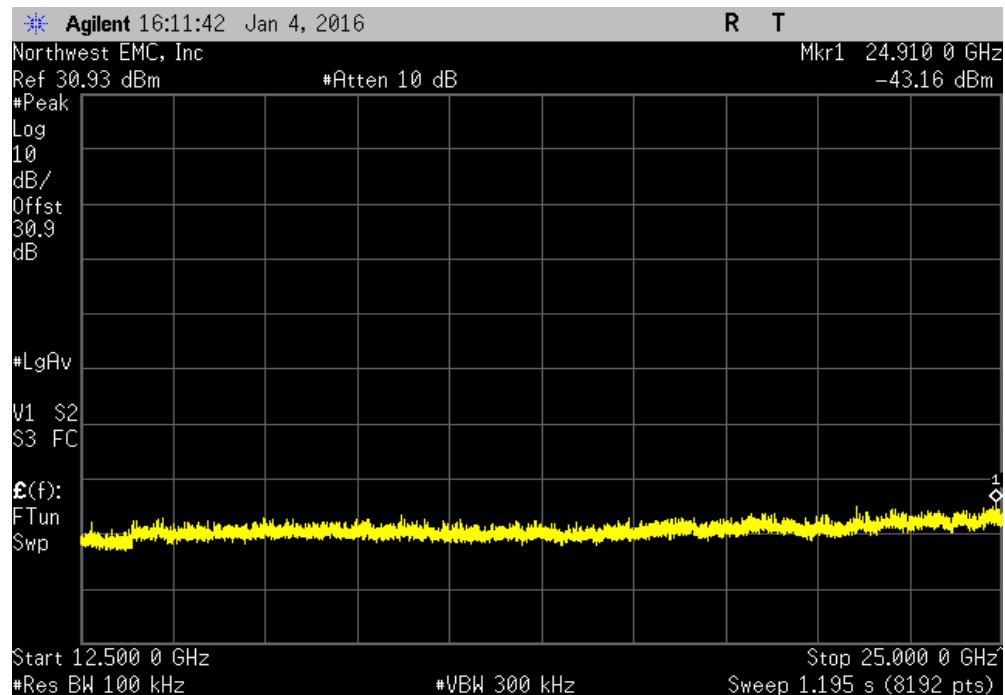
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz

Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz	-55.69	-20	Pass



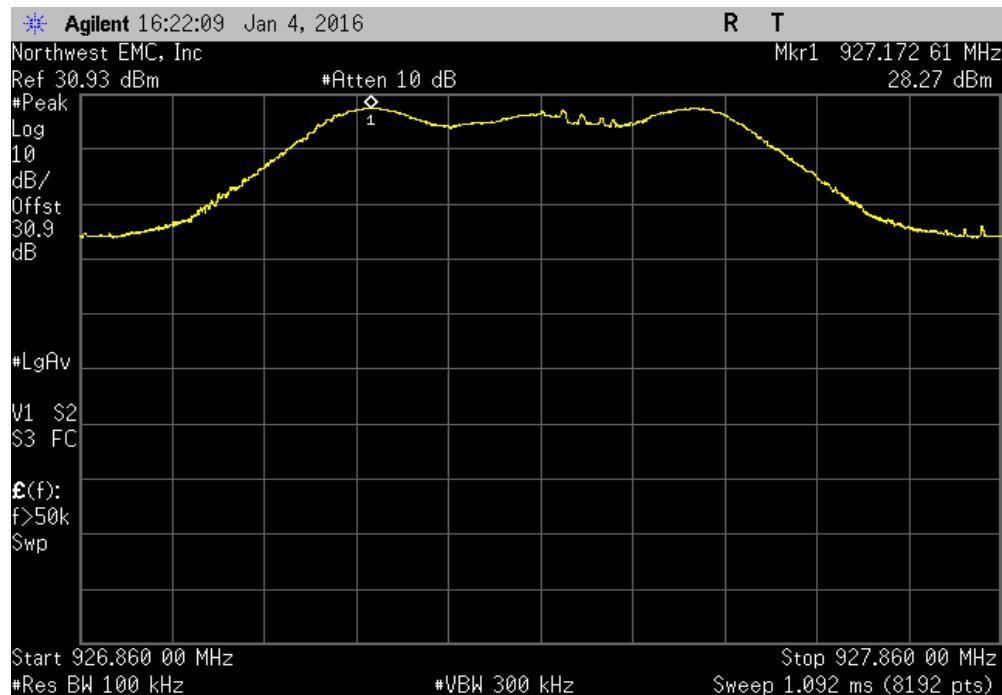
GFSK Modulation, 500kb, Mid Channel 18, 914.4576 MHz

Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	-71.44	-20	Pass

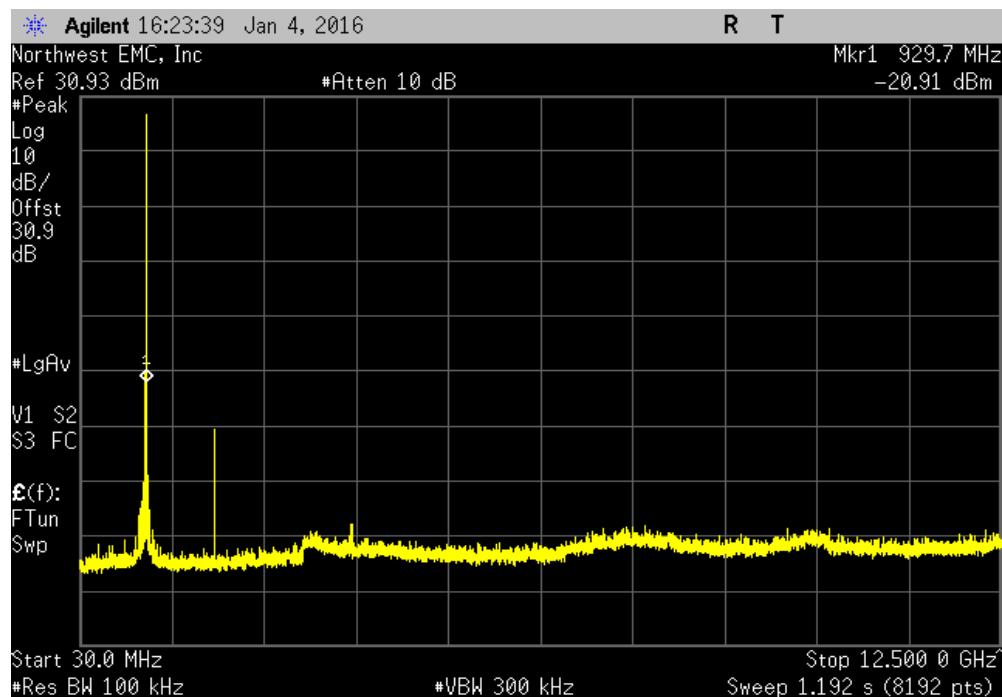


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 500kb, High Channel 36, 927.36 MHz					
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result		
Fundamental	N/A	N/A	N/A		

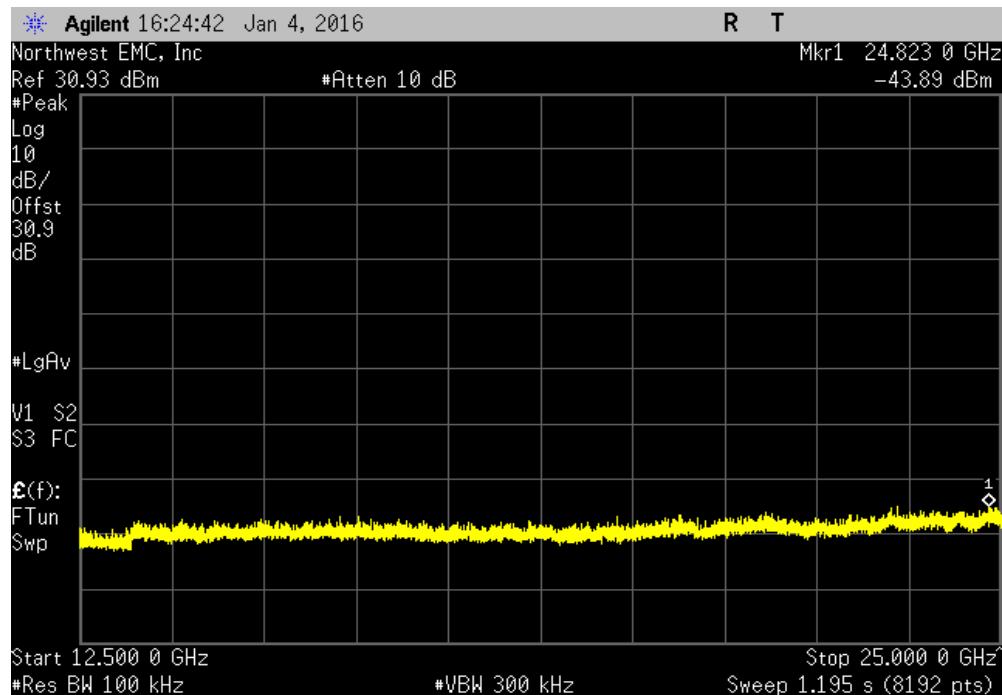


GFSK Modulation, 500kb, High Channel 36, 927.36 MHz					
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result		
30 MHz - 12.5 GHz	-49.18	-20	Pass		

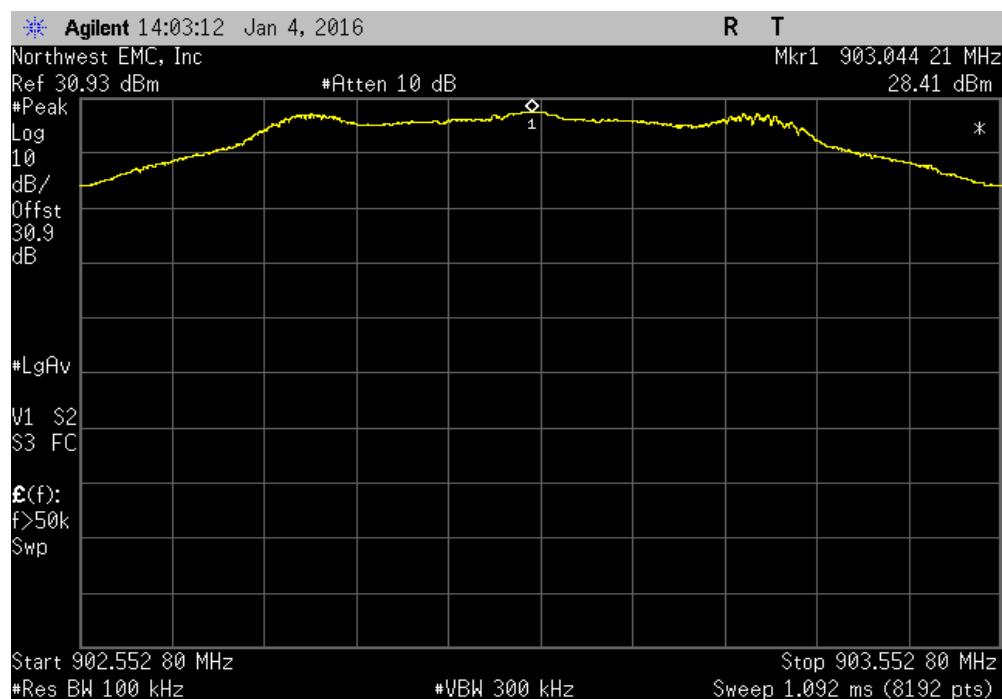


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 500kb, High Channel 36, 927.36 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-72.16	-20	Pass

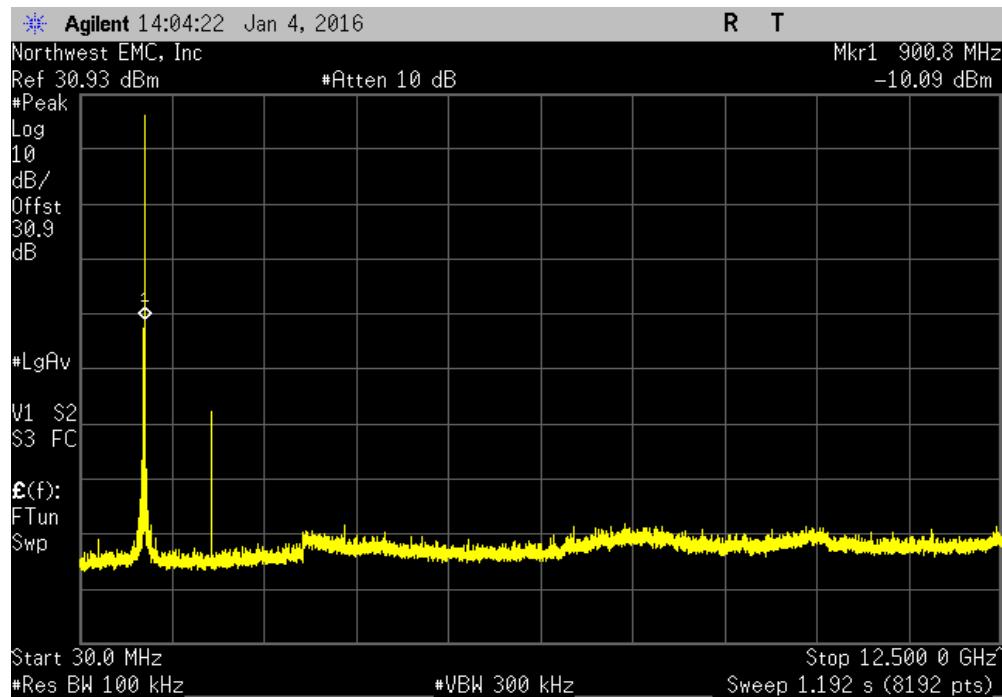


GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental	N/A	N/A	N/A

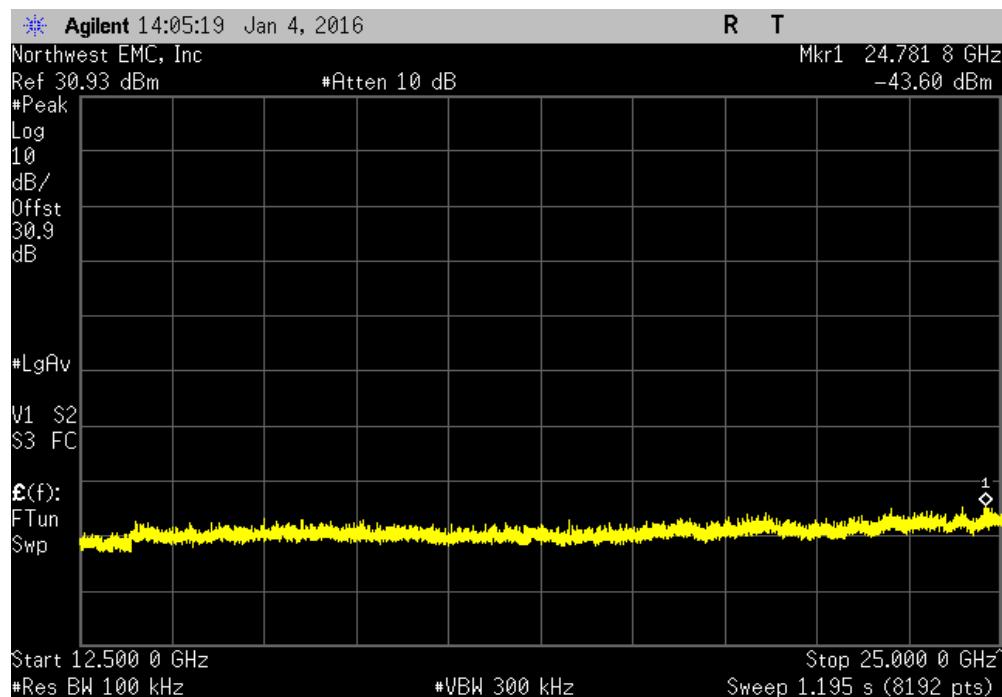


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz	-38.5	-20	Pass

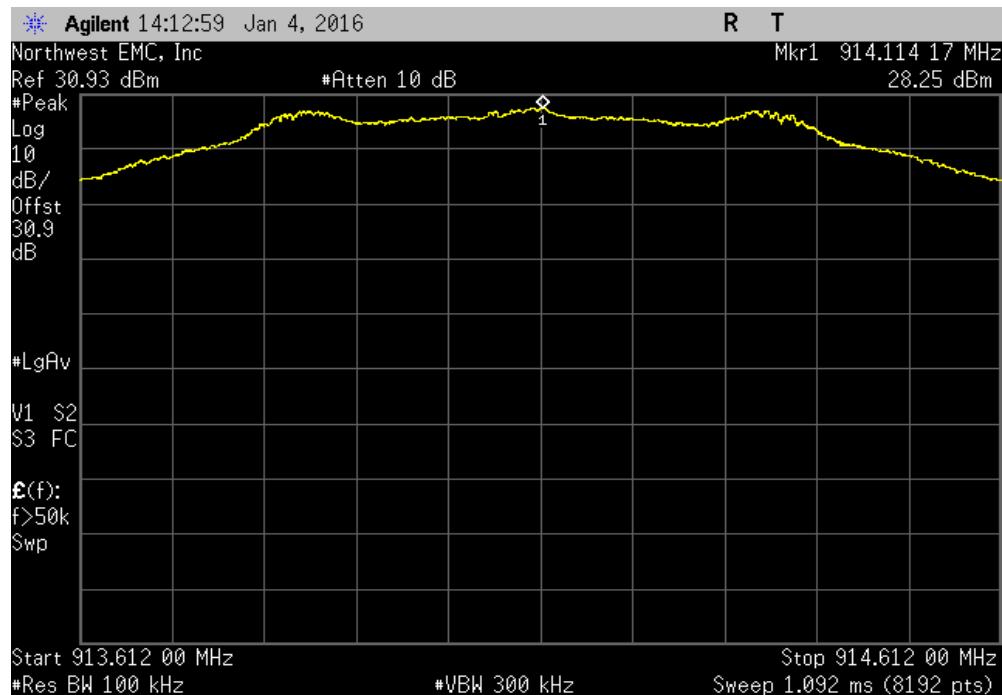


GFSK Modulation, 1Mb, Low Channel 1, 903.0528 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-72.01	-20	Pass

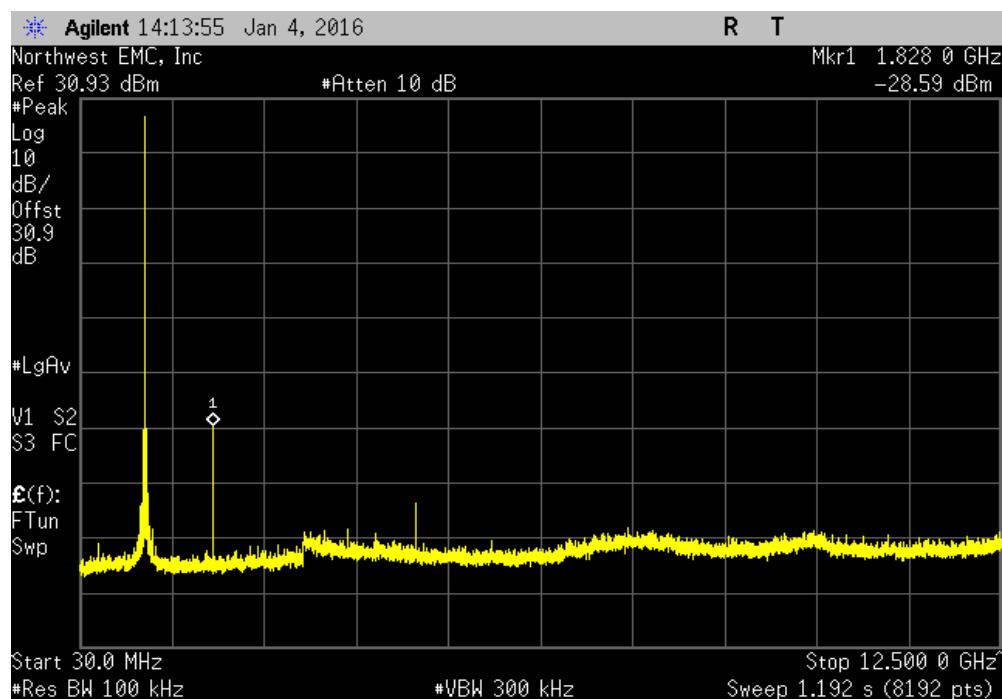


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
Fundamental	N/A	N/A	N/A		

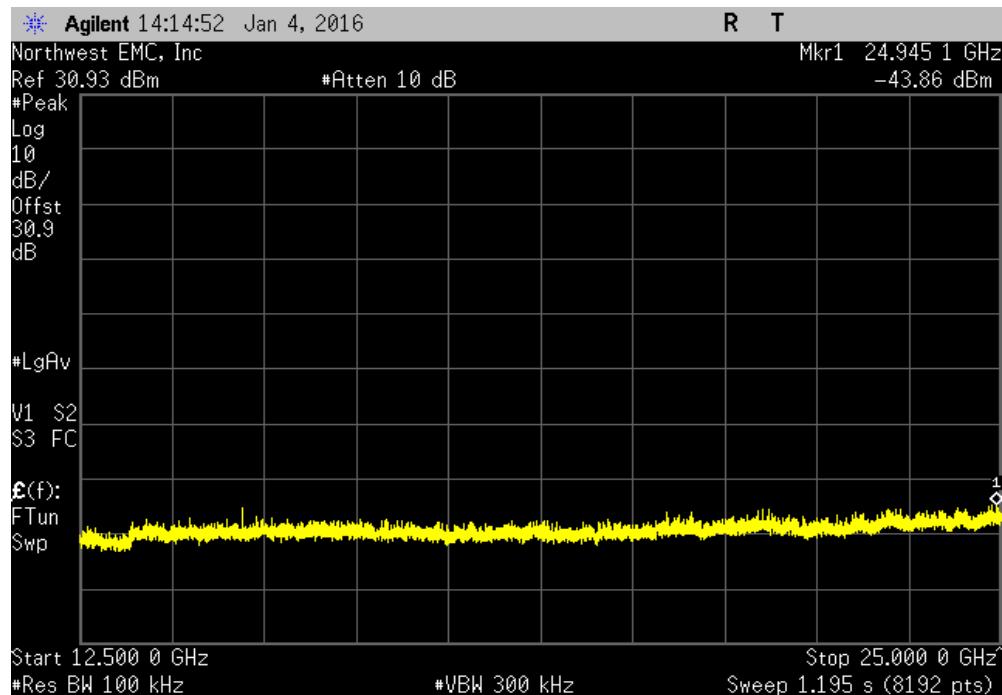


Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
30 MHz - 12.5 GHz	-56.85	-20	Pass		

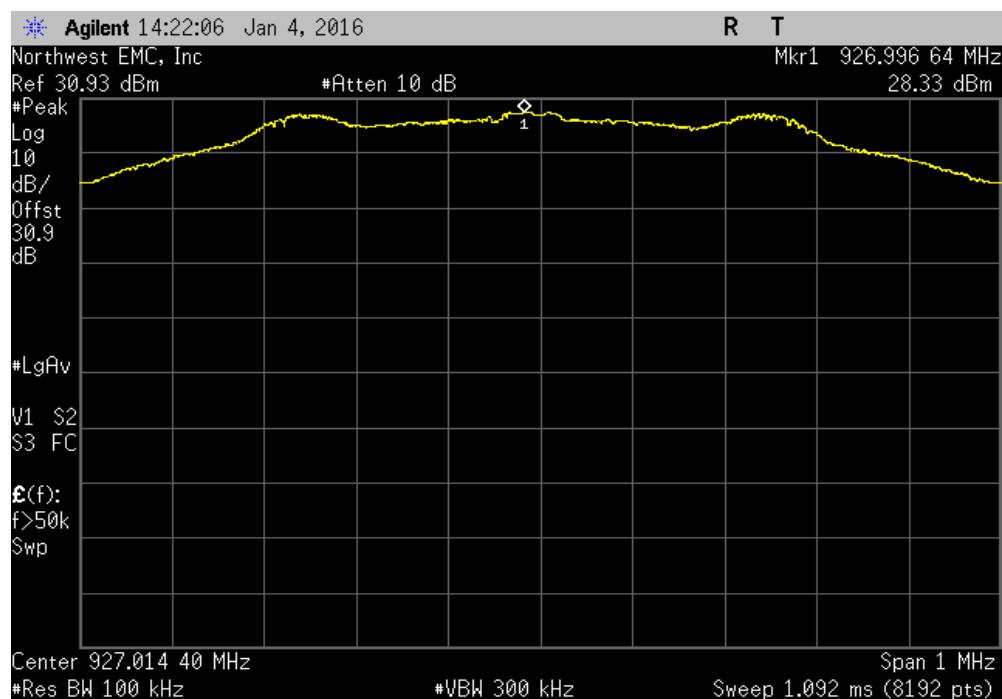


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 1Mb, Mid Channel 9, 914.112 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-72.11	-20	Pass

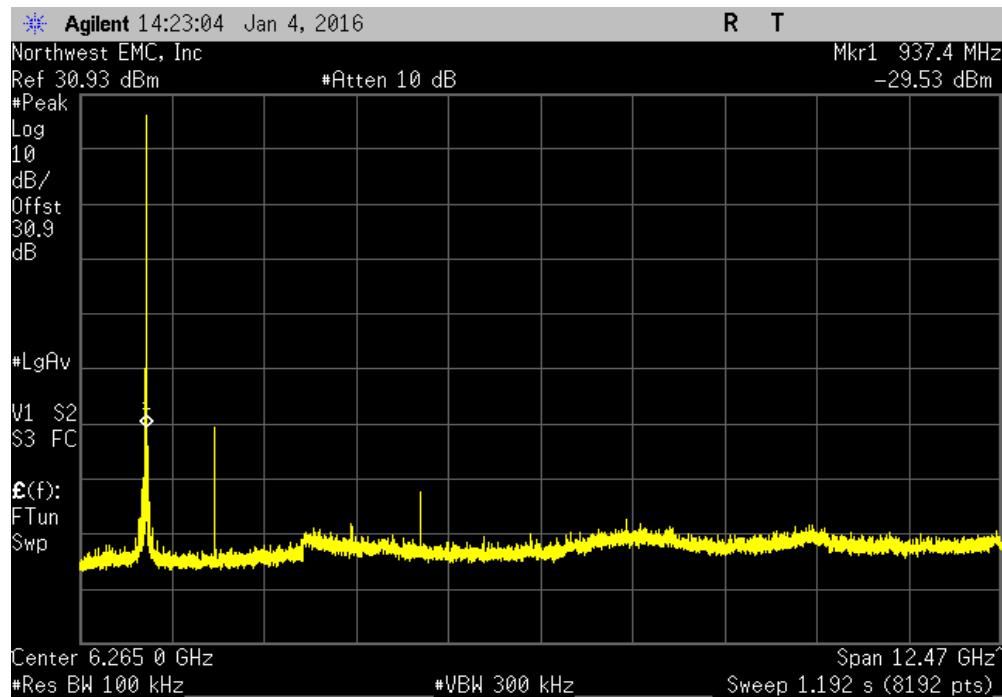


GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental	N/A	N/A	N/A

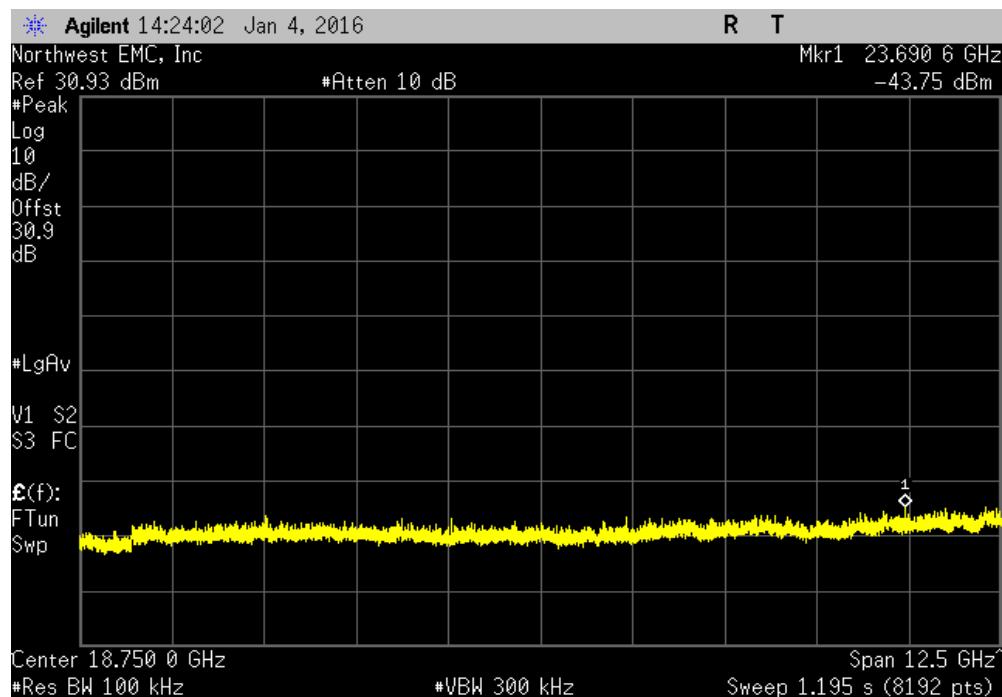


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz	-57.86	-20	Pass

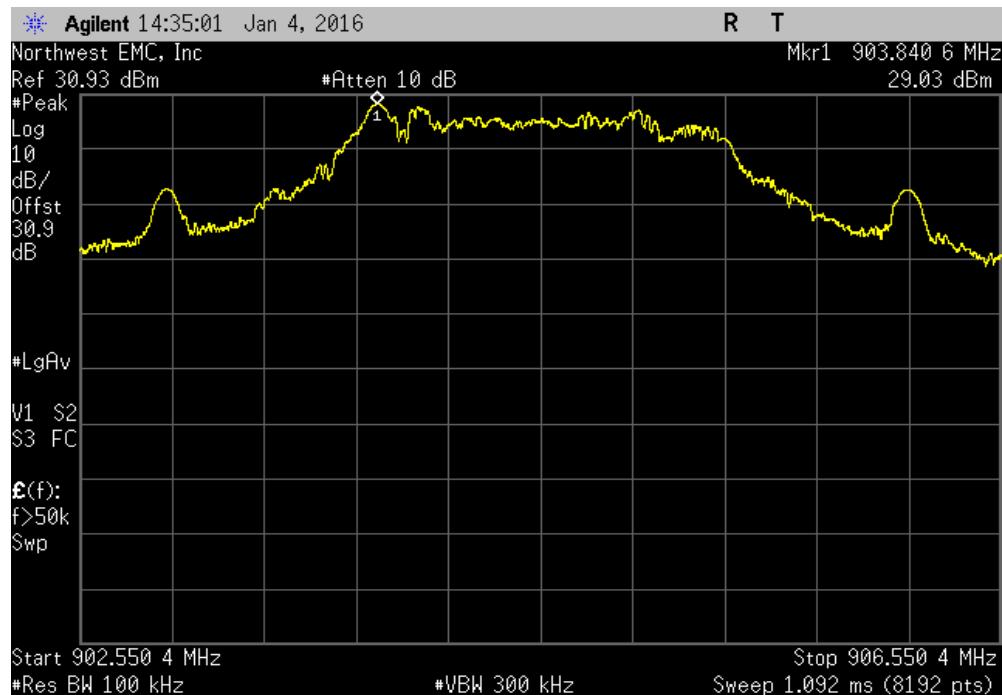


GFSK Modulation, 1Mb, High Channel 18, 927.0144 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-72.08	-20	Pass

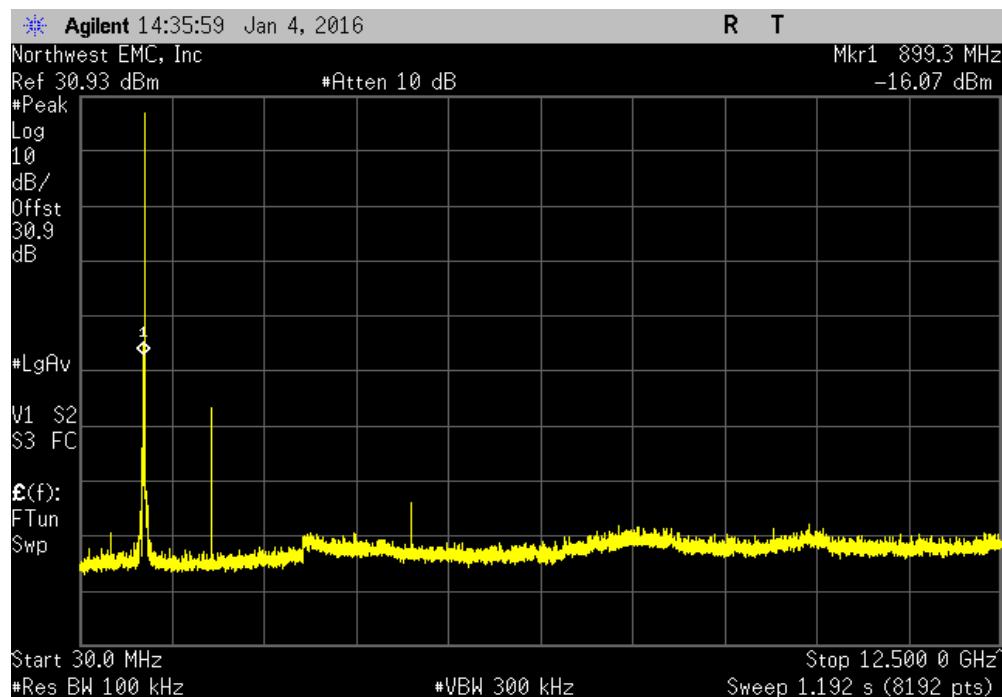


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
Fundamental	N/A	N/A	N/A		

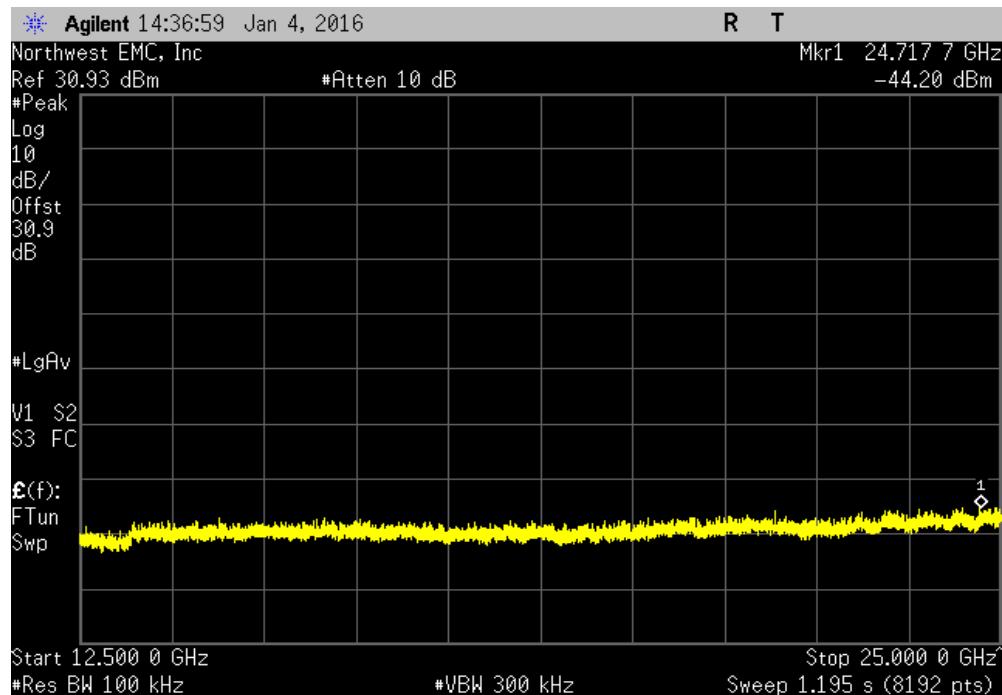


GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
30 MHz - 12.5 GHz	-45.1	-20	Pass		

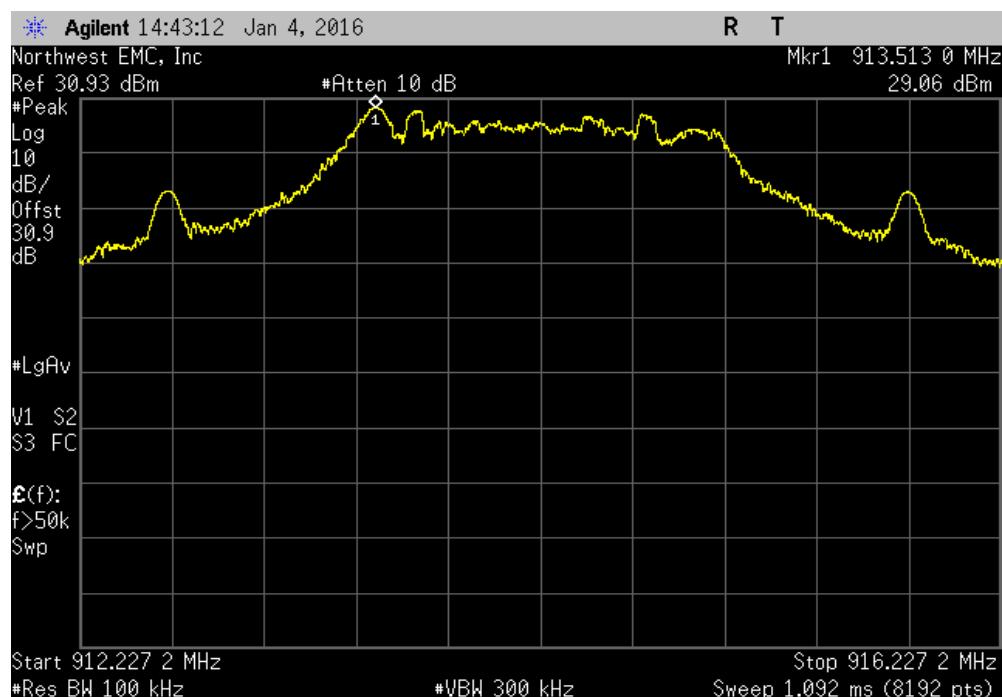


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 4Mb, Low Channel 1, 904.5504 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-73.23	-20	Pass

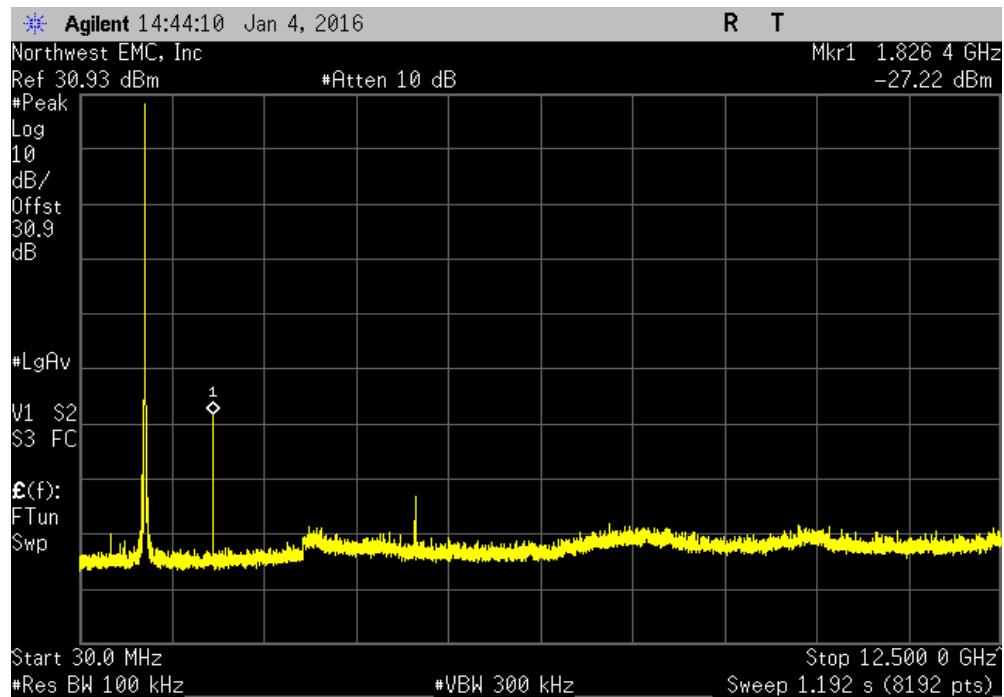


GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
Fundamental	N/A	N/A	N/A

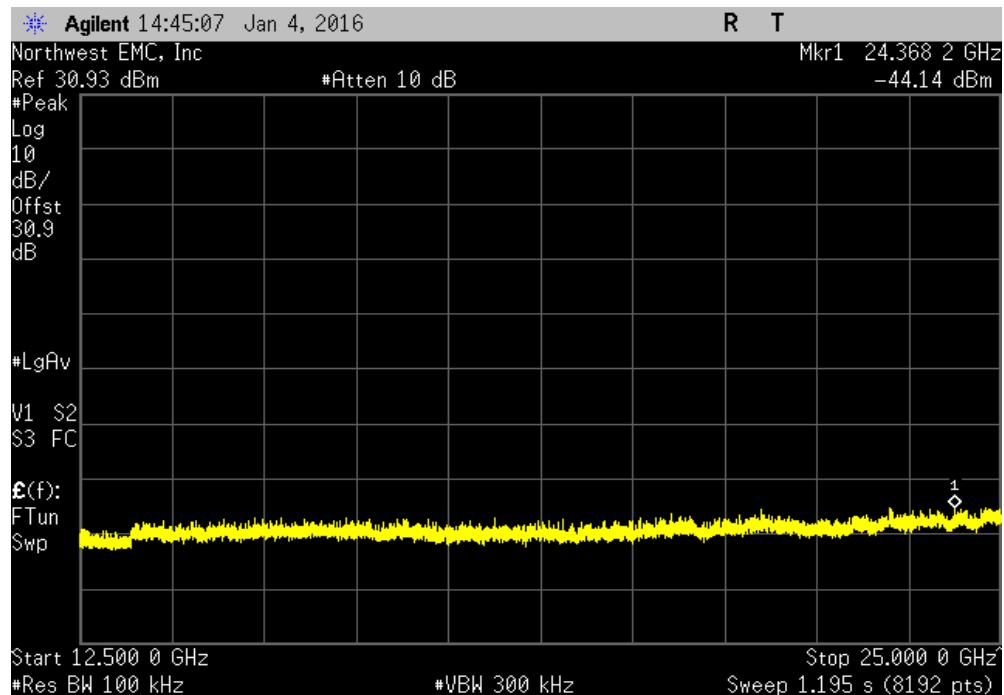


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
30 MHz - 12.5 GHz	-56.28	-20	Pass

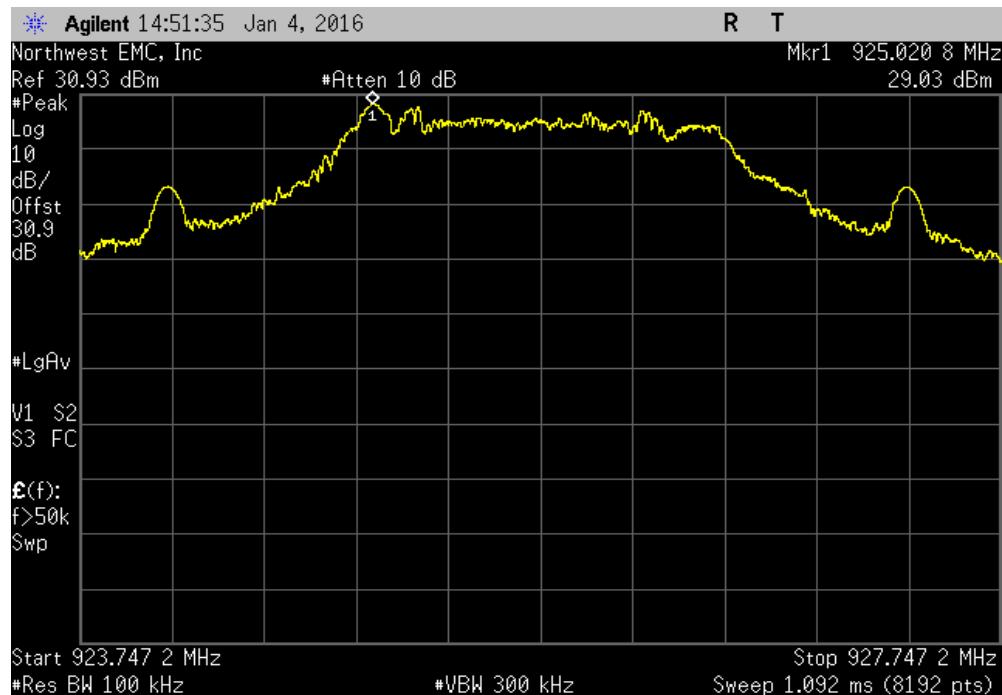


GFSK Modulation, 4Mb, Mid Channel 4, 914.2272 MHz			
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result
12.5 GHz - 25 GHz	-73.2	-20	Pass

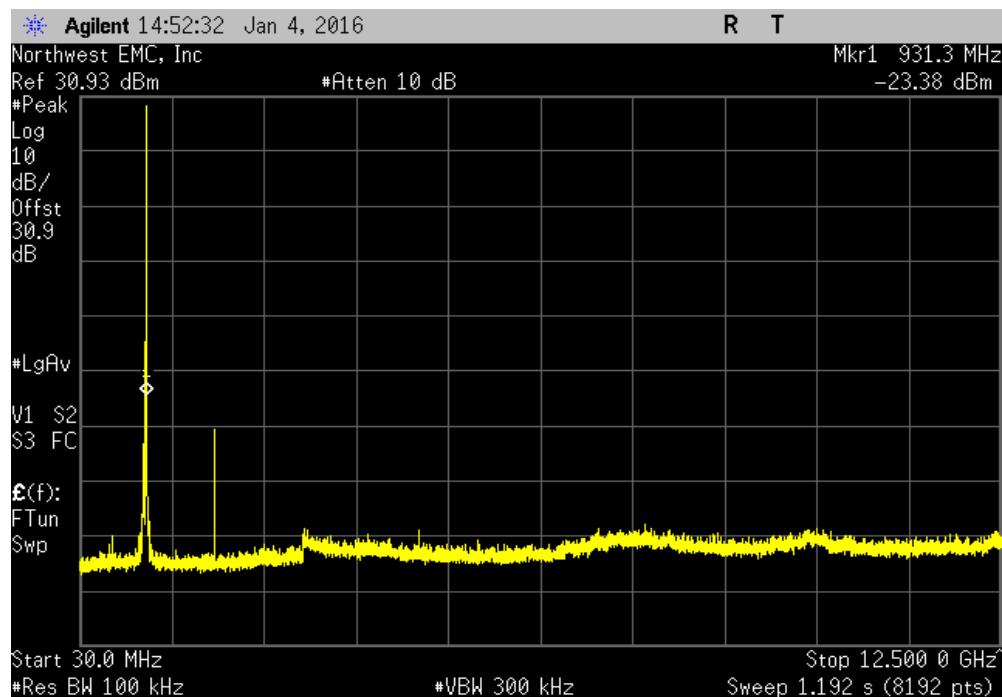


# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
Fundamental	N/A	N/A			N/A



GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz					
Frequency Range	Max Value (dBc)	Limit $\leq$ (dBc)	Result		
30 MHz - 12.5 GHz	-52.41	-20			Pass



# SPURIOUS CONDUCTED EMISSIONS

GFSK Modulation, 4Mb, High Channel 7, 925.7472 MHz			
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz	-73.08	-20	Pass

