

## 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 FHSS Radio

Report # FREW0054.5



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NVLAP Lab Code: 200629-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety

## **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	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	
11.10.2	Power Spectral Density	No	N/A	Not required for FHSS devices.

### **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: <u>http://www.nwemc.com/accreditations/</u> 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 gualified 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.

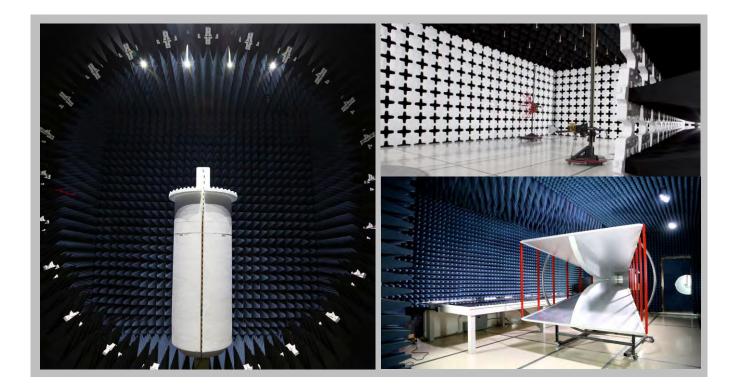
Test	+ MU	<u>- MU</u>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-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           Labs OC01-13         Labs MN01-08, MN10         Labs NY01-04           41 Tesla         9349 W Broadway Ave.         4939 Jordan Rd.         22           Irvine, CA 92618         Brooklyn Park, MN 55445         Elbridge, NY 13060         23           (949) 861-8918         (612)-638-5136         (315) 554-8214         34		Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600		
		NV	'LAP			
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	
	Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1	
		BS	MI			
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R	
	VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110	
	Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157	



# **PRODUCT DESCRIPTION**



### **Client and Equipment Under Test (EUT) Information**

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

### Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

902 MHz - 928 MHz FHSS Radio Module with a 7.15 dBi Antenna

#### **Testing Objective:**

Seeking to demonstrate compliance of the FHSS radio module under FCC 15.247 for operation in the 902 - 928 MHz Band.



### Max Power Settings:

	Data Rate				
	115.2kb 250kb				
Low Channel	30	30			
Mid Channel	30	30			
High Channel	30	30			

### Power Settings for 7.15dBi Antenna:

	Data Rate			
	115.2kb 250kb			
Low Channel	29	29		
Mid Channel	29	29		
High Channel	29	29		

# CONFIGURATIONS



### Configuration FREW0054-1

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-Т	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		
Laptop Computer	Dell	Latitude E6520	None		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
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	7.15dBi Elevated
Cuaxial Cable	165	0.011	INU	Module	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
			Tested as	No EMI suppression	EUT remained at
1	1/4/2016	Duty Cycle	delivered to	devices were added or	Northwest EMC
			Test Station.	modified during this test.	following the test.
		Dand Edge	Tested as	No EMI suppression	EUT remained at
2	1/4/2016	Band Edge Compliance	delivered to	devices were added or	Northwest EMC
		Compliance	Test Station.	modified during this test.	following the test.
		Occupied	Tested as	No EMI suppression	EUT remained at
3	1/4/2016	Occupied Bandwidth	delivered to	devices were added or	Northwest EMC
		Banuwiutii	Test Station.	modified during this test.	following the test.
		Spurious	Tested as	No EMI suppression	EUT remained at
4	1/4/2016	Conducted	delivered to	devices were added or	Northwest EMC
		Emissions	Test Station.	modified during this test.	following the test.
		Band Edge	Tested as	No EMI suppression	EUT remained at
5	1/5/2016	Compliance -	delivered to	devices were added or	Northwest EMC
		Hopping Mode	Test Station.	modified during this test.	following the test.
			Tested as	No EMI suppression	EUT remained at
6	1/6/2016	Output Power	delivered to	devices were added or	Northwest EMC
			Test Station.	modified during this test.	following the test.
			Tested as	No EMI suppression	EUT remained at
7	1/5/2016	Dwell Time	delivered to	devices were added or	Northwest EMC
			Test Station.	modified during this test.	following the test.
		Number of	Tested as	No EMI suppression	EUT remained at
8	1/5/2016	Hopping	delivered to	devices were added or	Northwest EMC
		Frequencies	Test Station.	modified during this test.	following the test.
		Carrier	Tested as	No EMI suppression	EUT remained at
9	1/5/2016	Frequency	delivered to	devices were added or	Northwest EMC
		Separation	Test Station.	modified during this test.	following the test.
		Spurious	Tested as	No EMI suppression	EUT remained at
10	1/7/2016	Radiated	delivered to	devices were added or	Northwest EMC
		Emissions	Test Station.	modified during this test.	following the test.
		Powerline	Tested as	No EMI suppression	Scheduled testing
11	1/18/2016	Conducted	delivered to	devices were added or	was completed.
		Emissions	Test Station.	modified during this test.	was completed.



### **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 500hm measuring port is terminated by a 500hm EMI meter or a 500hm resistive load. All 500hm measuring ports of the LISN are terminated by 500hm. 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 56, 914.9184 MHz, 115.2kbps, Power Level = 29. Transmitting Mid Channel 37, 914.976 MHz, 250kbps, Power Level = 29.



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 #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0

### COMMENTS

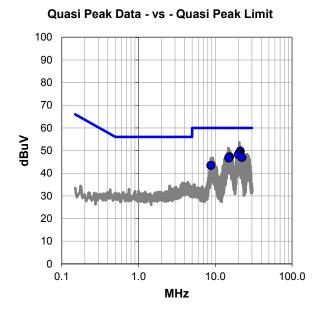
DC Power Supply powered by AC Mains, providing 9VDC to EUT

#### **EUT OPERATING MODES**

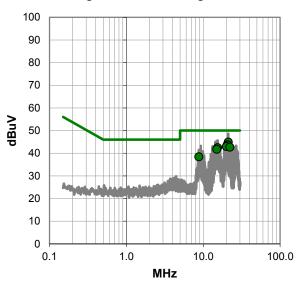
Transmitting Mid Channel 56, 914.9184 MHz, 115.2kbps, Power Level = 29.

### **DEVIATIONS FROM TEST STANDARD**

None



#### Average Data - vs - Average Limit





### **RESULTS - Run #11**

Q	Quasi Peak Data - vs - Quasi Peak Limit						
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)		
21.180	27.2	22.5	49.7	60.0	-10.3		
21.075	26.3	22.5	48.8	60.0	-11.2		
20.479	26.3	22.4	48.7	60.0	-11.3		
20.077	25.8	22.4	48.2	60.0	-11.8		
15.421	25.4	21.9	47.3	60.0	-12.7		
22.285	24.3	22.7	47.0	60.0	-13.0		
15.023	24.9	21.8	46.7	60.0	-13.3		
8.777	22.4	21.0	43.4	60.0	-16.6		

	Average Data - vs - Average Limit							
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)			
21.180	22.4	22.5	44.9	50.0	-5.1			
20.479	21.2	22.4	43.6	50.0	-6.4			
21.075	21.1	22.5	43.6	50.0	-6.4			
20.077	20.5	22.4	42.9	50.0	-7.1			
22.285	20.0	22.7	42.7	50.0	-7.3			
15.421	20.6	21.9	42.5	50.0	-7.5			
15.023	19.9	21.8	41.7	50.0	-8.3			
8.777	17.4	21.0	38.4	50.0	-11.6			

### CONCLUSION

Pass

Tested By



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

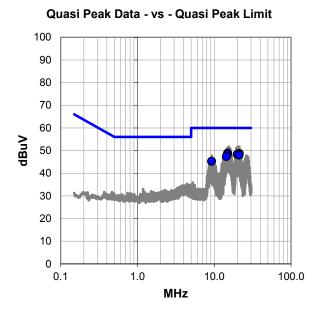
DC Power Supply powered by AC Mains, providing 9VDC to EUT

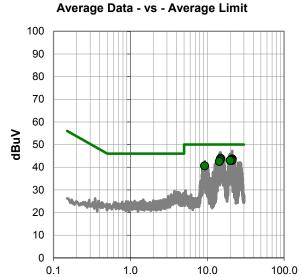
### **EUT OPERATING MODES**

Transmitting Mid Channel 56, 914.9184 MHz, 115.2kbps, Power Level = 29.

### **DEVIATIONS FROM TEST STANDARD**

None





MHz



### RESULTS - Run #12

Q	Quasi Peak Data - vs - Quasi Peak Limit							
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)			
14.921	27.1	21.8	48.9	60.0	-11.1			
21.177	26.2	22.5	48.7	60.0	-11.3			
20.576	25.9	22.5	48.4	60.0	-11.6			
19.968	25.9	22.4	48.3	60.0	-11.7			
14.820	26.4	21.8	48.2	60.0	-11.8			
21.077	25.5	22.5	48.0	60.0	-12.0			
14.421	25.7	21.7	47.4	60.0	-12.6			
9.278	24.2	21.1	45.3	60.0	-14.7			

	Average Data - vs - Average Limit							
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)			
14.921	22.1	21.8	43.9	50.0	-6.1			
21.177	21.1	22.5	43.6	50.0	-6.4			
20.576	20.9	22.5	43.4	50.0	-6.6			
14.820	21.5	21.8	43.3	50.0	-6.7			
21.077	20.5	22.5	43.0	50.0	-7.0			
19.968	20.6	22.4	43.0	50.0	-7.0			
14.421	20.8	21.7	42.5	50.0	-7.5			
9.278	19.5	21.1	40.6	50.0	-9.4			

### CONCLUSION

Pass

Tested By



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 #:	13	Line:	High Line	Add. Ext. Attenuation (dB):	0

### COMMENTS

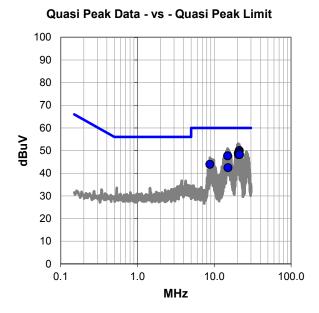
DC Power Supply powered by AC Mains, providing 9VDC to EUT

#### **EUT OPERATING MODES**

Transmitting Mid Channel 37, 914.976 MHz, 250kbps, Power Level = 29.

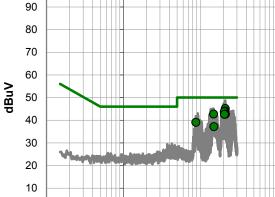
### **DEVIATIONS FROM TEST STANDARD**

None





Average Data - vs - Average Limit



1.0

MHz

10.0

100.0

0

0.1



### **RESULTS - Run #13**

Quasi Peak Data - vs - Quasi Peak Limit									
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)				
21.177	27.5	22.5	50.0	60.0	-10.0				
21.078	26.7	22.5	49.2	60.0	-10.8				
20.576	26.4	22.5	48.9	60.0	-11.1				
20.680	25.8	22.5	48.3	60.0	-11.7				
21.278	25.7	22.5	48.2	60.0	-11.8				
14.921	25.9	21.8	47.7	60.0	-12.3				
8.779	22.9	21.0	43.9	60.0	-16.1				
15.112	20.6	21.8	42.4	60.0	-17.6				

Average Data - vs - Average Limit									
	Spec.								
Freq	Amp.	Factor	Adjusted	Limit	Margin				
(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)				
21.177	22.6	22.5	45.1	50.0	-4.9				
21.078	21.5	22.5	44.0	50.0	-6.0				
20.576	21.3	22.5	43.8	50.0	-6.2				
14.921	20.9	21.8	42.7	50.0	-7.3				
21.278	20.1	22.5	42.6	50.0	-7.4				
20.680	20.1	22.5	42.6	50.0	-7.4				
8.779	18.0	21.0	39.0	50.0	-11.0				
15.112	15.3	21.8	37.1	50.0	-12.9				

### CONCLUSION

Pass

Tested By



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 #:	14	Line:	Neutral	Add. Ext. Attenuation (dB):	0

### COMMENTS

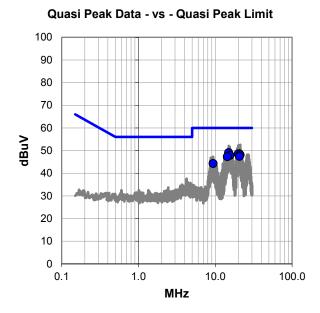
DC Power Supply powered by AC Mains, providing 9VDC to EUT

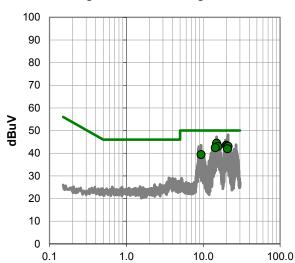
### **EUT OPERATING MODES**

Transmitting Mid Channel 37, 914.976 MHz, 250kbps, Power Level = 29.

### **DEVIATIONS FROM TEST STANDARD**

None





MHz

#### Average Data - vs - Average Limit



### **RESULTS - Run #14**

Quasi Peak Data - vs - Quasi Peak Limit									
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)				
14.920	27.3	21.8	49.1	60.0	-10.9				
20.580	26.1	22.5	48.6	60.0	-11.4				
19.974	26.1	22.4	48.5	60.0	-11.5				
21.077	25.6	22.5	48.1	60.0	-11.9				
15.522	26.0	21.9	47.9	60.0	-12.1				
20.675	25.0	22.5	47.5	60.0	-12.5				
14.419	25.6	21.7	47.3	60.0	-12.7				
9.378	23.2	21.1	44.3	60.0	-15.7				

Average Data - vs - Average Limit									
				Spec.					
Freq	Amp.	Factor	Adjusted	Limit	Margin				
(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)				
14.920	22.6	21.8	44.4	50.0	-5.6				
19.974	21.1	22.4	43.5	50.0	-6.5				
20.580	20.7	22.5	43.2	50.0	-6.8				
21.077	20.5	22.5	43.0	50.0	-7.0				
15.522	21.1	21.9	43.0	50.0	-7.0				
14.419	20.7	21.7	42.4	50.0	-7.6				
20.675	19.5	22.5	42.0	50.0	-8.0				
9.378	18.3	21.1	39.4	50.0	-10.6				

### CONCLUSION

Pass

Tested By



### SPURIOUS RADIATED EMISSIONS

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

#### MODES OF OPERATION

Transmitting at 115.2kb at Maximum Duty Cycle, Low Channel 2, 902.4768 MHz
Transmitting at 115.2kb at Maximum Duty Cycle, Mid Channel 56, 914.9184 MHz
Transmitting at 115.2kb at Maximum Duty Cycle, High Channel 111, 927.5904 MHz
Transmitting at 250kb at Maximum Duty Cycle, Low Channel 1, 902.5344 MHz
Transmitting at 250kb at Maximum Duty Cycle, Mid Channel 37, 914.976 MHz
Transmitting at 250kb at Maximum Duty Cycle, High Channel 73, 927.4176 MHz
POWER SETTINGS INVESTIGATED

#### 9 VDC

#### CONFIGURATIONS INVESTIGATED

FREW0054 - 4

#### FREQUENCY RANGE INVESTIGATED

#### Stop Frequency 12400 MHz

# Start Frequency 30 MHz SAMPLE CALCULATIONS

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

#### TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interva
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 mc
Antenna - Biconilog	Teseq	CBL 6141B	AYL	7/30/2015	24 mc
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAB	7/31/2015	12 mc
Cable	Northwest EMC	Bilog Cables	NC1	8/27/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50114	HFN	3/5/2015	12 m
Antenna - Double Ridge	EMCO	3115	AHM	6/3/2014	24 m
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 m
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	9/21/2015	12 m
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	0 mo
Cable	Northwest EMC	Standard Gain Horn Cable	NC3	6/17/2015	12 m

#### MEASUREMENT BANDWIDTHS

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

#### 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.



Oper

Comments:

Test Specifications FCC 15.247:2016

### SPURIOUS RADIATED EMISSIONS

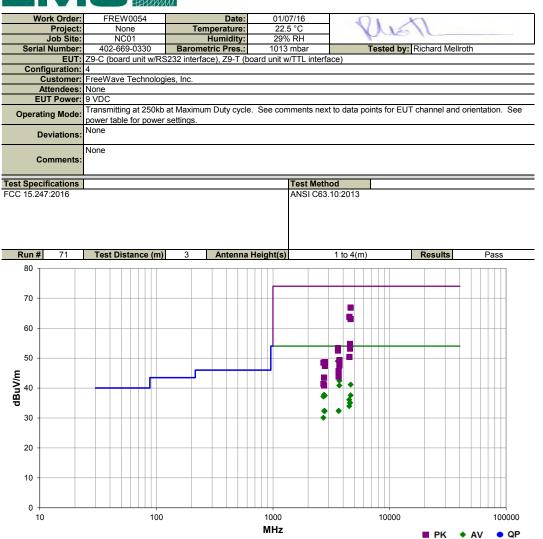
Test Method ANSI C63.10:2013

	tikuku								
Work Order:	FREW0054	Date:	01/07/16	OI N					
Project:	None	Temperature:	22.5 °C	VIISI					
Job Site:	NC01	Humidity:	29% RH	poe i					
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	4							
Customer:	FreeWave Technologies, Inc.								
Attendees:	None								
EUT Power:	9 VDC								
	Transmitting at 115.2kb at Maximum Duty cycle. See comments next to data points for EUT channel and orientation. See power table for power settings.								
	None	settings.							
	None								

Results Run # 70 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Pass 80 70 60 50 **m//ngp** ł :: 30 20 10 0 10 100 1000 10000 100000 MHz PK ♦ AV • QP

										PK	AV	O QP	
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
3609.883	48.8	3.9	1.4	319.0	3.0	0.0	Horz	AV	0.0	52.7	54.0	-1.3	Low Ch, 115.2kb, EUT Flat
3609.858	48.8	3.9	1.4	320.0	3.0	0.0	Horz	AV	0.0	52.7	54.0	-1.3	Low Ch, 115.2kb, EUT on Side
3609.842	48.6	3.9	1.5	319.0	3.0	0.0	Horz	AV	0.0	52.5	54.0	-1.5	Low Ch, 115.2kb, EUT Vertical
3609.875	46.2	3.9	2.6	329.0	3.0	0.0	Vert	AV	0.0	50.1	54.0	-3.9	Low Ch, 115.2kb, EUT Vertical
3609.875	46.2	3.9	2.6	328.0	3.0	0.0	Vert	AV	0.0	50.1	54.0	-3.9	Low Ch, 115.2kb, EUT Flat
3609.867	46.0	3.9	3.1	333.0	3.0	0.0	Vert	AV	0.0	49.9	54.0	-4.1	Low Ch, 115.2kb, EUT on Side
3710.342	38.4	5.3	1.7	320.0	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	High Ch, 115.2kb, EUT Flat
3710.317	37.7	5.3	3.2	342.0	3.0	0.0	Vert	AV	0.0	43.0	54.0	-11.0	High Ch, 115.2kb, EUT Vert
4575.858	53.3	8.5	1.5	193.0	3.0	0.0	Horz	PK	0.0	61.8	74.0	-12.2	Mid Ch, 115.2kb, EUT Flat
2707.400	38.8	-0.1	1.5	265.0	3.0	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Low Ch, 115.2kb, EUT Flat
4574.517	29.0	8.5	1.5	193.0	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	Mid Ch, 115.2kb, EUT Flat
4574.508	29.0	8.5	2.8	219.0	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	Mid Ch, 115.2kb, EUT Vert
2782.708	37.5	0.0	2.5	215.0	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	High Ch, 115.2kb, EUT Flat
3659.692	32.1	4.8	1.2	316.0	3.0	0.0	Horz	AV	0.0	36.9	54.0	-17.1	Mid Ch, 115.2kb, EUT Flat
4514.333	48.9	7.9	1.5	315.0	3.0	0.0	Horz	PK	0.0	56.8	74.0	-17.2	Low Ch, 115.2kb, EUT Flat
2707.475	56.3	-0.1	1.5	265.0	3.0	0.0	Horz	PK	0.0	56.2	74.0	-17.8	Low Ch, 115.2kb, EUT Flat
4512.375	27.9	7.9	1.5	146.0	3.0	0.0	Vert	AV	0.0	35.8	54.0	-18.2	Low Ch, 115.2kb, EUT Vert
2744.775	35.8	-0.1	1.5	251.0	3.0	0.0	Horz	AV	0.0	35.7	54.0	-18.3	Mid Ch, 115.2kb, EUT Flat
4576.250	47.0	8.5	2.8	219.0	3.0	0.0	Vert	PK	0.0	55.5	74.0	-18.5	Mid Ch, 115.2kb, EUT Vert
3610.150	51.4	3.9	1.4	319.0	3.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	Low Ch, 115.2kb, EUT Flat
3610.117	51.3	3.9 3.9	1.4 1.5	320.0	3.0 3.0	0.0	Horz	PK PK	0.0	55.2	74.0 74.0	-18.8 -19.4	Low Ch, 115.2kb, EUT on Side
3610.425 3659.733	50.7 29.7	3.9 4.8	1.5	319.0	3.0	0.0 0.0	Horz Vert	AV	0.0 0.0	54.6 34.5	74.0 54.0	-19.4	Low Ch, 115.2kb, EUT Vertical
4512.292	29.7	4.8 7.9	1.5	190.0 315.0	3.0	0.0		AV	0.0	34.5 34.5	54.0 54.0	-19.5	Mid Ch, 115.2kb, EUT Vert Low Ch, 115.2kb, EUT Flat
2707.425	26.6	-0.1	3.1	315.0 191.0	3.0	0.0	Horz Vert	AV	0.0	34.5 34.4	54.0 54.0	-19.5	Low Ch, 115.2kb, EUT Flat Low Ch, 115.2kb, EUT Vert
4536.792	26.0	-0.1	1.5	35.0	3.0	0.0	Vert	AV	0.0	34.4	54.0	-19.0	High Ch, 115.2kb, EUT Vert
4535.600	26.0	8.1	1.5	146.0	3.0	0.0	Horz	AV	0.0	34.1	54.0	-19.9	High Ch, 115.2kb, EUT Flat
3610.025	49.2	3.9	2.6	329.0	3.0	0.0	Vert	PK	0.0	53.1	74.0	-20.9	Low Ch, 115.2kb, EUT Vertical
3610.108	49.0	3.9	2.6	328.0	3.0	0.0	Vert	PK	0.0	52.9	74.0	-20.3	Low Ch, 115.2kb, EUT Flat
2744.700	32.9	-0.1	3.8	151.0	3.0	0.0	Vert	AV	0.0	32.8	54.0	-21.1	Mid Ch, 115.2kb, EUT Vert
2782.792	32.8	0.0	3.4	181.0	3.0	0.0	Vert	AV	0.0	32.8	54.0	-21.2	High Ch, 115.2kb, EUT Vert
3609.733	48.6	3.9	3.1	333.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	Low Ch, 115.2kb, EUT on Side
3660.225	47.6	4.8	1.2	316.0	3.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	Mid Ch, 115.2kb, EUT Flat
3711.158	46.9	5.3	1.7	320.0	3.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	High Ch, 115.2kb, EUT Flat
2707.208	51.4	-0.1	3.1	191.0	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	Low Ch, 115.2kb, EUT Vert
4512.667	43.4	7.9	1.5	146.0	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	Low Ch, 115.2kb, EUT Vert
3711.317	45.0	5.3	3.2	342.0	3.0	0.0	Vert	PK	0.0	50.3	74.0	-23.7	High Ch, 115.2kb, EUT Vert
2783.350	46.5	0.0	3.4	181.0	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	High Ch, 115.2kb, EUT Vert
2782.892	46.3	0.0	2.5	215.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	High Ch, 115.2kb, EUT Flat
4537.133	37.4	8.1	1.5	35.0	3.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	High Ch, 115.2kb, EUT Vert
4535.967	37.4	8.1	1.5	146.0	3.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	High Ch, 115.2kb, EUT Flat
3659.400	39.7	4.8	1.5	190.0	3.0	0.0	Vert	PK	0.0	44.5	74.0	-29.5	Mid Ch, 115.2kb, EUT Vert
2744.517	43.5	-0.1	1.5	251.0	3.0	0.0	Horz	PK	0.0	43.4	74.0	-30.6	Mid Ch, 115.2kb, EUT Flat
2744.925	41.2	-0.1	3.8	151.0	3.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	Mid Ch, 115.2kb, EUT Vert





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
3610.033	45.1	3.9	3.1	346.0	3.0	0.0	Vert	AV	0.0	49.0	54.0	-5.0	Low Ch, 250kb, EUT Vertical
3610.133	45.0	3.9	1.5	314.0	3.0	0.0	Horz	AV	0.0	48.9	54.0	-5.1	Low Ch, 250kb, EUT Flat
4638.292	57.7	9.2	1.9	216.0	3.0	0.0	Horz	PK	0.0	66.9	74.0	-7.1	High Ch, 250kb, EUT Flat
4514.783	55.9	7.9	1.5	188.0	3.0	0.0	Horz	PK	0.0	63.8	74.0	-10.2	Low Ch, 250kb, EUT Flat
4638.625	53.9	9.2	1.5	340.0	3.0	0.0	Vert	PK	0.0	63.1	74.0	-10.9	High Ch, 250kb, EUT Vertical
3709.617	37.2	5.2	1.5	218.0	3.0	0.0	Horz	AV	0.0	42.4	54.0	-11.6	High Ch, 250kb, EUT Flat
4636.858	32.0	9.1	1.9	216.0	3.0	0.0	Horz	AV	0.0	41.1	54.0	-12.9	High Ch, 250kb, EUT Flat
3709.708	35.6	5.2	2.5	188.0	3.0	0.0	Vert	AV	0.0	40.8	54.0	-13.2	High Ch, 250kb, EUT Vertical
2744.867	37.8	-0.1	2.2	221.0	3.0	0.0	Horz	AV	0.0	37.7	54.0	-16.3	Mid Ch, 250kb, EUT Flat
4637.342	28.4	9.1	1.5	340.0	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	High Ch, 250kb, EUT Vertical
2782.208	37.4	0.0	2.5	212.0	3.0	0.0	Horz	AV	0.0	37.4	54.0	-16.6	High Ch, 250kb, EUT Flat
2707.583	37.3	-0.1	1.5	250.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Low Ch, 250kb, EUT Flat
4514.375	28.2	7.9	1.5	188.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	Low Ch, 250kb, EUT Flat
4574.625	26.6	8.5	1.5	151.0	3.0	0.0	Horz	AV	0.0	35.1	54.0	-18.9	Mid Ch, 250kb, EUT Flat
4576.525	26.5	8.5	3.1	251.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	Mid Ch, 250kb, EUT Vertical
4576.958	46.2	8.5	3.1	251.0	3.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3	Mid Ch, 250kb, EUT Vertical
4510.658	26.1	7.8	1.5	311.0	3.0	0.0	Vert	AV	0.0	33.9	54.0	-20.1	Low Ch, 250kb, EUT Vertical
3610.117	49.4	3.9	1.5	314.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	Low Ch, 250kb, EUT Flat
4576.733	44.6	8.5	1.5	151.0	3.0	0.0	Horz	PK	0.0	53.1	74.0	-20.9	Mid Ch, 250kb, EUT Flat
3609.792	48.6	3.9	3.1	346.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	Low Ch, 250kb, EUT Vertical
3659.942	27.6	4.8	2.8	95.0	3.0	0.0	Vert	AV	0.0	32.4	54.0	-21.6	Mid Ch, 250kb, EUT Vertical
2744.950	32.4	-0.1	1.0	194.0	3.0	0.0	Vert	AV	0.0	32.3	54.0	-21.7	Mid Ch, 250kb, EUT Vertical
2782.175	32.3	0.0	3.0	179.0	3.0	0.0	Vert	AV	0.0	32.3	54.0	-21.7	High Ch, 250kb, EUT Vertical
3659.808	27.5	4.8	3.5	324.0	3.0	0.0	Horz	AV	0.0	32.3	54.0	-21.7	Mid Ch, 250kb, EUT Flat
4514.858	42.5	7.9	1.5	311.0	3.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	Low Ch, 250kb, EUT Vertical
2707.508	30.2	-0.1	1.5	136.0	3.0	0.0	Vert	AV	0.0	30.1	54.0	-23.9	Low Ch, 250kb, EUT Vertical
3709.100	44.1	5.2	1.5	218.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	High Ch, 250kb, EUT Flat
2782.108	48.6	0.0	2.5	212.0	3.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	High Ch, 250kb, EUT Flat
2707.633	48.6	-0.1	1.5	250.0	3.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	Low Ch, 250kb, EUT Flat
3710.217	42.3	5.3	2.5	188.0	3.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	High Ch, 250kb, EUT Vertical
2782.233	47.4	0.0	3.0	179.0	3.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	High Ch, 250kb, EUT Vertical
3660.733	40.8	4.8	3.5	324.0	3.0	0.0	Horz	PK	0.0	45.6	74.0	-28.4	Mid Ch, 250kb, EUT Flat
3659.925	39.0	4.8	2.8	95.0	3.0	0.0	Vert	PK	0.0	43.8	74.0	-30.2	Mid Ch, 250kb, EUT Vertical
2745.050	43.5	-0.1	2.2	221.0	3.0	0.0	Horz	PK	0.0	43.4	74.0	-30.6	Mid Ch, 250kb, EUT Flat
2707.192	41.5	-0.1	1.5	136.0	3.0	0.0	Vert	PK	0.0	41.4	74.0	-32.6	Low Ch, 250kb, EUT Vertical
2744.725	40.9	-0.1	1.0	194.0	3.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	Mid Ch, 250kb, EUT Vertical



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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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.

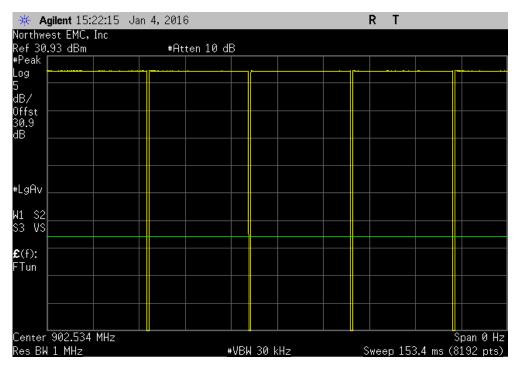


EUT	Z9-C (board unit w/RS23	2 interface), Z9-T (b	oard unit w/TTL i	interface)				Work Order:	FREW0054	
	: 402-669-0330							Date:	01/04/16	
Customer	: FreeWave Technologies,	Inc.						Temperature:	23°C	
Attendees	: Dean Busch							Humidity:	29%	
	None						E	Barometric Pres.:	1009 mbar	
Tested by	Richard Mellroth			Power:	9 VDC			Job Site:	NC02	
EST SPECIFICAT	FIONS				Test Method					
CC 15.247:2016					ANSI C63.10:2013					
OMMENTS										
EVIATIONS FRO	M TEST STANDARD									
lone						_				
	1	Sian	ature	fret						
	1	Signa	ature	fren			Number of	Value	Limit	
	1	Signa	ature	flist	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
onfiguration #	1 250kb	Signa	ature	flit	Pulse Width	Period				Results
onfiguration #	1 250kb Low Channel 1, 902.5344 I		ature	flict	Pulse Width 33.217 ms	Period 33.983 ms				Results N/A
onfiguration #		MHz	ature	fuet	33.217 ms N/A	33.983 ms N/A		(%) 97.7 N/A	(%) N/A N/A	N/A N/A
onfiguration #	Low Channel 1, 902.5344 I	MHz MHz	ature	flist	33.217 ms N/A 33.217 ms	33.983 ms N/A 33.983 ms		<b>(%)</b> 97.7	(%) N/A	N/A N/A N/A
onfiguration #	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M	MHz MHz MHz MHz	ature	fuer	33.217 ms N/A 33.217 ms N/A	33.983 ms N/A 33.983 ms N/A		(%) 97.7 N/A 97.7 N/A	(%) N/A N/A N/A N/A	N/A N/A N/A N/A
onfiguration #	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M High Channel 73, 927.4176	MHz MHz MHz MHz 6 MHz	ature	flist	33.217 ms N/A 33.217 ms N/A 33.217 ms	33.983 ms N/A 33.983 ms N/A 33.983 ms	Pulses 1 5 1 5 1 5	(%) 97.7 N/A 97.7 N/A 97.7	(%) N/A N/A N/A N/A	N/A N/A N/A N/A N/A
FSK Modulation, 3	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M High Channel 73, 927.4176 High Channel 73, 927.4176	MHz MHz MHz MHz 6 MHz	ature	flict	33.217 ms N/A 33.217 ms N/A	33.983 ms N/A 33.983 ms N/A		(%) 97.7 N/A 97.7 N/A	(%) N/A N/A N/A N/A	N/A N/A N/A N/A
FSK Modulation,	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M High Channel 73, 927.4176 High Channel 73, 927.4176 115.2kb	MHz MHz MHz MHz 6 MHz 6 MHz	ature	flist	33.217 ms N/A 33.217 ms N/A 33.217 ms N/A	33.983 ms N/A 33.983 ms N/A 33.983 ms N/A	Pulses 1 5 1 5 1 5 5	(%) 97.7 N/A 97.7 N/A 97.7 N/A	(%) N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A
FSK Modulation, 3	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M High Channel 73, 927.4176 High Channel 73, 927.4176 115.2kb Low Channel 2, 902.4768 I	MHz MHz AHz AHz 5 MHz 5 MHz MHz	ature	flit	33.217 ms N/A 33.217 ms N/A 33.217 ms N/A N/A	33.983 ms N/A 33.983 ms N/A 33.983 ms N/A N/A	Pulses 1 5 1 5 1 5 1 N/A	(%) 97.7 N/A 97.7 N/A 97.7 N/A 100	(%) N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A
Ione Configuration # SFSK Modulation,	Low Channel 1, 902.5344 I Low Channel 1, 902.5344 I Mid Channel 37, 914.976 M Mid Channel 37, 914.976 M High Channel 73, 927.4176 High Channel 73, 927.4176 115.2kb	MHz MHz MHz AHz 8 MHz 8 MHz MHz MHz	ature	flict	33.217 ms N/A 33.217 ms N/A 33.217 ms N/A	33.983 ms N/A 33.983 ms N/A 33.983 ms N/A	Pulses 1 5 1 5 1 5 5	(%) 97.7 N/A 97.7 N/A 97.7 N/A	(%) N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A



Pulse Width         Period         Pulses         (%)         (%)         Results           33.217 ms         33.983 ms         1         97.7         N/A         N/A           # Agilent 15:21:57         Jan 4, 2016         R         T           Northwest EMC, Inc         Mkr3         34.98 ms           #Peak         91.5 dBm         19.15 dBm           #Peak         91.5 dBm         19.15 dBm           #Peak         91.5 dBm         91.5 dBm		0	Six Modulation,	250kb, Low Chann Number of	Value	Limit	
33.217 ms     33.983 ms     1     97.7     N/A     N/A       # Agilent 15:21:57     Jan 4, 2016     R     T       Northwest EMC, Inc     Mkr3     34.98 ms       Ref 30.93 dBm     #Atten 10 dB     19.15 dBm       #Peak     19.15 dBm       dB/     19.15 dBm       dB/     19.15 dBm       interval     19.15 dBm       #LgAv     19.15 dBm       #LgAv     10.15 dBm       #LgAv     10.15 dBm       #LgAv     10.15 dBm       Mit S2     10.10 dBm       Center 902.534 MHz     Span 0 Hz       Res BW 1 MHz     #VBW 30 kHz       Marker     Trace       1     Time       2     10.10 Time       2     11.48 dBm		Pulse Width	Period				Results
Northwest EMC, Inc         Mkr3         34.98 ms           Ref 30.93 dBm         #Atten 10 dB         19.15 dBm           #Peak		33.217 ms	33.983 ms	1		N/Á	N/A
Northwest EMC, Inc         Mkr3         34.98 ms           Ref 30.93 dBm         #Atten 10 dB         19.15 dBm           #Peak							
Ref 30.93 dBm     #Atten 10 dB     19.15 dBm       #Peak			2016			RT	
<pre>#Peak Log 5 dB/ 0ffst 30.9 dB #LgAv w1 \$2 Center 902.534 MHz Res BW 1 MHz Marker Trace Type X Axis Amplitude 1 (1) Time 998.7 µs 21.69 dBm 2 (1) Time 34.22 ms 11.48 dBm</pre>							
Log 5 dB/ 0 dB/ 0 ffst 30.9 dB = LgAv W1 \$2 Center 902.534 MHz Res BW 1 MHz Trace Type X Axis Amplitude 1 (1) Time 998.7 µs 21.69 dBm 2 (1) Time 34.22 ms 11.48 dBm	Ref 30.93 dB	m	#Atten 10 (	dB			19.15 dBm
5     Φ     3       dB/     0ffst     30.9       dB     30.9       Genter 902.534 MHz     Span 0 Hz       Res BW 1 MHz     #VBW 30 kHz       Span 0 Hz     Span 0 Hz       Marker     Trace       11.0     Time       34.22 ms     11.48 d							
dB/ Offst 30.9 dB ■LgAv W1 \$2 Center 902.534 MHz Res BW 1 MHz MHz M1 K2 Marker Trace Type X Axis 1 (1) Time 998.7 µs 21.69 dBm 2 (1) Time 34.22 ms 11.48 dBm							3
Offst         Image: Second secon	J						
30.9 dB							2
#LgAv         #LgAv         Span 0 Hz           w1 \$2         \$	30.9						<b>•</b>
W1 S2 Center 902.534 MHz Res BW 1 MHz Marker Trace Type X Axis 1 (1) Time 998.7 µs 2 (1) Time 34.22 ms 11.48 dBm	dB						
W1 S2 Center 902.534 MHz Res BW 1 MHz Marker Trace Type X Axis 1 (1) Time 998.7 µs 2 (1) Time 34.22 ms 11.48 dBm							
W1 S2 Center 902.534 MHz Res BW 1 MHz Marker Trace Type X Axis 1 (1) Time 998.7 µs 2 (1) Time 34.22 ms 11.48 dBm							
W1 S2 Center 902.534 MHz Res BW 1 MHz Marker Trace Type X Axis 1 (1) Time 998.7 µs 2 (1) Time 34.22 ms 11.48 dBm							
Center         902.534 MHz         Span 0 Hz           Res BW 1 MHz         #VBW 30 kHz         Sweep 38.22 ms (8192 pts)           Marker         Trace         Type         X Axis           1         (1)         Time         998.7 µs         21.69 dBm           2         (1)         Time         34.22 ms         11.48 dBm	#LgHv						
Center         902.534 MHz         Span 0 Hz           Res BW 1 MHz         #VBW 30 kHz         Sweep 38.22 ms (8192 pts)           Marker         Trace         Type         X Axis           1         (1)         Time         998.7 µs         21.69 dBm           2         (1)         Time         34.22 ms         11.48 dBm	W1 \$2						
Res BW 1 MHz         #VBW 30 kHz         Sweep 38.22 ms (8192 pts)           Marker         Trace         Type         X Axis         Amplitude           1         (1)         Time         998.7 μs         21.69 dBm           2         (1)         Time         34.22 ms         11.48 dBm		34 MHz					Span 0 Hz
Marker Trace Type X Axis Amplitude 1 (1) Time 998.7 µs 21.69 dBm 2 (1) Time 34.22 ms 11.48 dBm				₩VBW 30 kHz		Sweep 38.	
2 (1) Time 34.22 ms 11.48 dBm					Ampli	itude	

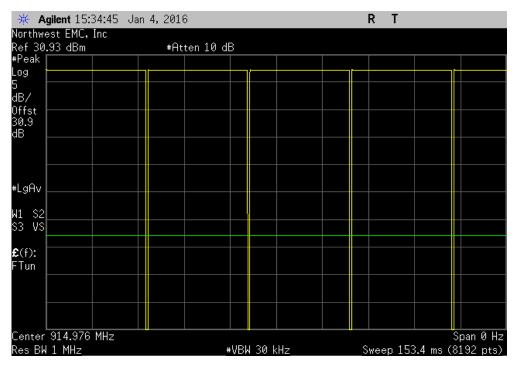
GFSK Modulation, 250kb, Low Channel 1, 902.5344 MHz								
			Number of	Value	Limit			
	Pulse Width	Period	Pulses	(%)	(%)	Results		
	N/A	N/A	5	N/A	N/A	N/A		





			,	250kb, Mid Chan Number of	Value	Limit	
		Pulse Width	Period	Pulses	(%)	(%)	Results
		33.217 ms	33.983 ms	1	97.7	N/A	N/A
🔆 Agile	<b>nt</b> 15:34	4:29 Jan 4,	2016			RT	
Northwest Ref 30.93		nc	#Atten 10	dB			Mkr3 34.98 ms 19.83 dBm
#Peak 厂							
Log 🕂							
5 📕							🏅
dB/							
Offst							
30.9 dB							
ad 🕂							
							<b></b>
#LgAv							
W1 S2							
Center 91	4.976 N	1Hz	I		I		Span 0 Hz
Res BW 1				₩VBW 30 kHz		Sweep 38	.22 ms (8192 pts)
Marker	Trace			Axis	Ĥr	mplitude	
1	(1)	Time Time		198.7 µs }4.22 ms		.56 dBm .41 dBm	
2	(1) (1)	Time Time		4.22 ms 84.98 ms		.41 dBm .83 dBm	
	12/				10		

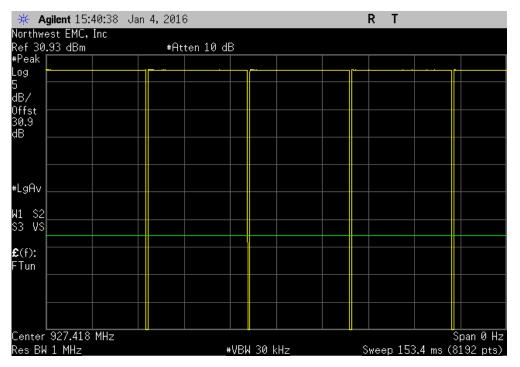
GFSK Modulation, 250kb, Mid Channel 37, 914.976 MHz								
		Number of	Value	Limit				
 Pulse Width	Period	Pulses	(%)	(%)	Results	_		
N/A	N/A	5	N/A	N/A	N/A	1		





				Number of	Value	Limit	
		Pulse Width	Period	Pulses	(%)	(%)	Results
		33.217 ms	33.983 ms	1	97.7	N/A	N/A
	gilent 15: est EMC,		2016			RT	Mkr3 34.98 ms
Ref 30.	.93 dBm		#Atten 10 c	:B			22.23 dBm
#Peak	۱ ۲						
Log	•						•
5 dB/							
Offst							
30.9 l							
dB							
							2
#LgAv							
14 00							
W1 S2  Contor	927.418	 M⊔⇒					Span 0 Hz
Res BW		rinz.		#VBW 30 kHz		Swaan 38 3	22 ms (8192 pts)
Marke		ce Type		Axis	Ĥmr	olitude	12 III3 (0102 pt3)
1	(1)	) Time	9	98.7 µs	23.2	25 dBm	
2	(1) (1)			4.22 ms 4.98 ms		54 dBm 23 dBm	
3	(1,	/ Time	3	4.50 MS	22.0	23 4611	

	GFSK Modulation, 250kb, High Channel 73, 927.4176 MHz								
			Number of	Value	Limit				
	Pulse Width	Period	Pulses	(%)	(%)	Results			
	N/A	N/A	5	N/A	N/A	N/A			



## **CARRIER FREQUENCY SEPARATION**



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

#### **TEST EQUIPMENT**

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

#### **TEST DESCRIPTION**

The carrier frequency separation was measured between hopping channels in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

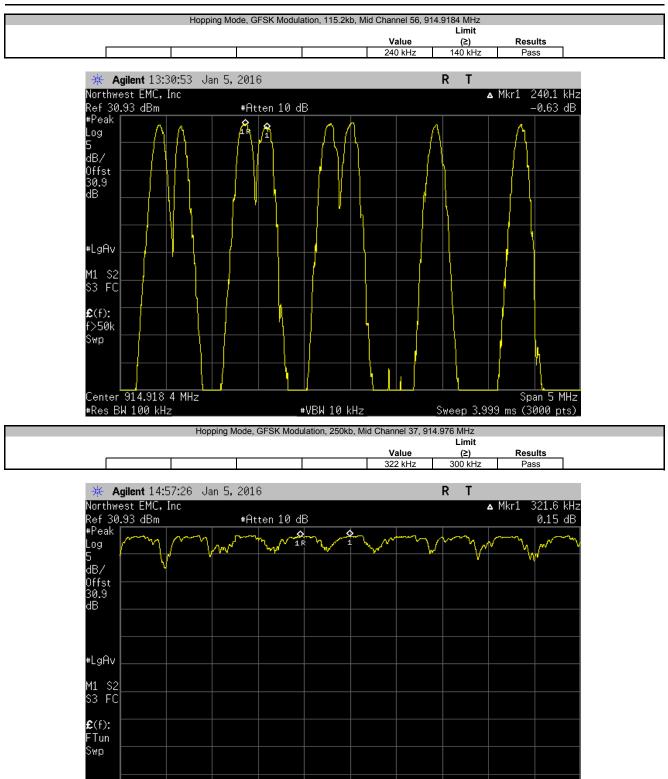
## **CARRIER FREQUENCY SEPARATION**



EUT	Z9-C (board unit w/RS23	2 interface), Z9-T (board unit w/TTL in	terface)		Work Order	FREW0054	
Serial Number:	402-669-0330				Date	: 01/05/16	
Customer	FreeWave Technologies	, Inc.			Temperature	24°C	
Attendees	Dean Busch				Humidity		
Project					Barometric Pres.		
	Richard Mellroth		Power:		Job Site	NC02	
TEST SPECIFICAT	IONS			Test Method			
FCC 15.247:2016				ANSI C63.10:2013			
COMMENTS							
None							
	M TEST STANDARD						
None							
		4	n n				
Configuration #	1		1/ SIA				
		Signature	P				
						Limit	
					 Value	(≥)	Results
Hopping Mode							
	GFSK Modulation, 115.2kt	b					
		56, 914.9184 MHz			240 kHz	140 kHz	Pass
	GFSK Modulation, 250kb						
	Mid Channel	37, 914.976 MHz			322 kHz	300 kHz	Pass

## **CARRIER FREQUENCY SEPARATION**





₩VBW 30 kHz

Center 914.976 0 MHz

#Res BW 300 kHz

Span 3 MHz

Sweep 999.7 µs (3000 pts)



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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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 number of hopping frequencies was measured across the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.



EUT	29-C (board unit w/RS23	2 interface), Z9-T (board unit w/T	Work Order	FREW0054			
Serial Number	r: 402-669-0330			01/05/16			
Custome	r: FreeWave Technologies	, Inc.			Temperature	24°C	
Attendees	: Dean Busch				Humidity	26%	
	t: None				Barometric Pres.		
	: Richard Mellroth		Power	9 VDC	Job Site	NC02	
TEST SPECIFICA	TIONS			Test Method			
FCC 15.247:2016				ANSI C63.10:2013			
COMMENTS				-			
None							
DEVIATIONS FRO	M TEST STANDARD						
None							
			Di h				
Configuration #	1		VII				
		Signature	have in				
					Number of		
					Channels	Limit	Results
Hopping Mode							
	GFSK Modulation, 115.2kb	b					
	Mid Channel	56, 914.9184 MHz (Span 1)	N/A	N/A	N/A		
		56, 914.9184 MHz (Span 2)	100	≥ 50	Pass		
	GFSK Modulation, 250kb						
		37, 914.976 MHz	73	≥ 50	Pass		







	Hopping Mode, (	GFSK Modulation	, 115.2kb, Mid	Channel 56, 9 <sup>°</sup> Number		Span 1)		
				Channe 73			Results Pass	
NK Autor 10	4E•24 Jan E	0010			R	T		
		2016			ĸ	Т		
Ref 30.93 dBm #Peak		#Atten 10 d	B					
Log MMM	MAMMAN	MMMMM	manya	MUMMAN	WWWW	mmm	mmm	19
5								
Offst 30.9 dB								
dB								
#LgAv								
M1 S2								
S3 FC								
£(f): FTun								
Swp								
Start 902.000 M #Res BW 300 kH			⊭VBW 30 k⊦	łz	Sweep		o 928.000 M ms (3000 p	



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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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 average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The hopping function of the EUT was enabled.

Per FCC 15.247 (a)(1)(i), the average time of occupancy on any frequency shall not be greater than 400mS within a 20 second period for hopping channels with a 20dB bandwidth less than 250kHz, and the average time of occupancy on any frequency shall not be greater than 400mS within a 10 second period for hopping channels with a 20dB bandwidth greater than 250kHz.



EUT	Z9-C (board unit w/RS23	32 interface), Z9-T (board unit v	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		
EST SPECIFICAT	FIONS			Test Method						
CC 15.247:2016				ANSI C63.10:2013						
OMMENTS										
one										
	M TEST STANDARD									
one										
			10							
onfiguration #	1		V ALSAN							
		<b>A</b> 1 - 1								
		Signature	proje				A 71			
		Signature	Pulse Width	Number of	Average No.	Scale	On Time	Limit	Deculto	
onning Mada		Signature	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	Results	
opping Mode	OFOX Madulation 115 Old	· · ·							Results	
opping Mode	GFSK Modulation, 115.2kt	b	(ms)	Pulses	of Pulses	Factor	(ms)	(ms)		
opping Mode	Mid Channel	b I 56, 914.9184 MHz	(ms) 3.272	Pulses N/A	of Pulses	Factor N/A	(ms) N/A	(ms)	N/A	
opping Mode	Mid Channel Mid Channel	b 1 56, 914.9184 MHz 1 56, 914.9184 MHz	(ms) 3.272 N/A	Pulses N/A 6	of Pulses N/A N/A	Factor N/A N/A	(ms) N/A N/A	(ms) N/A N/A	N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel	b 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz	(ms) 3.272 N/A N/A	Pulses N/A 6 6	of Pulses N/A N/A N/A	Factor N/A N/A N/A	(ms) N/A N/A N/A	(ms) N/A N/A N/A	N/A N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel	b 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A	Pulses N/A 6 6 6	of Pulses N/A N/A N/A N/A	Factor N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	N/A N/A N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel	b 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A N/A	Pulses N/A 6 6 6 6 6	of Pulses N/A N/A N/A N/A N/A	Factor N/A N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	(ms) N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel	b 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A	Pulses N/A 6 6 6	of Pulses N/A N/A N/A N/A	Factor N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	N/A N/A N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel GFSK Modulation, 250kb	b 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A N/A 3.272	Pulses N/A 6 6 6 6 6 N/A	of Pulses N/A N/A N/A N/A N/A	Factor N/A N/A N/A N/A N/A	(ms) N/A N/A N/A N/A 19.632	(ms) N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel GFSK Modulation, 250kb Mid Channel	b 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A N/A	Pulses N/A 6 6 6 6 6	of Pulses N/A N/A N/A N/A N/A 6	Factor N/A N/A N/A N/A N/A N/A	(ms) N/A N/A N/A N/A	(ms) N/A N/A N/A N/A 400	N/A N/A N/A N/A Pass	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel GFSK Modulation, 250kb Mid Channel Mid Channel	b 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 156, 914.9184 MHz	(ms) 3.272 N/A N/A N/A 3.272 1.5	Pulses N/A 6 6 6 6 N/A N/A	of Pulses N/A N/A N/A N/A 6 N/A	Factor N/A N/A N/A N/A N/A N/A	(ms) N/A N/A N/A N/A 19.632 N/A	(ms) N/A N/A N/A N/A 400 N/A	N/A N/A N/A N/A Pass N/A	
lopping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel GFSK Modulation, 250kb Mid Channel Mid Channel Mid Channel	b 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 137, 914.976 MHz 37, 914.976 MHz	(ms) 3.272 N/A N/A N/A 3.272 1.5 N/A	Pulses N/A 6 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	of Pulses N/A N/A N/A N/A 6 N/A N/A	Factor N/A N/A N/A N/A N/A N/A N/A	(ms) N/A N/A N/A N/A 19.632 N/A N/A	(ms) N/A N/A N/A N/A 400 N/A N/A	N/A N/A N/A N/A Pass N/A N/A	
opping Mode	Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel Mid Channel	b 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 56, 914.9184 MHz 37, 914.976 MHz 37, 914.976 MHz 37, 914.976 MHz	(ms) 3.272 N/A N/A N/A N/A 3.272 1.5 N/A N/A N/A	Pulses N/A 6 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	of Pulses N/A N/A N/A N/A 6 N/A N/A N/A	Factor           N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A	(ms) N/A N/A N/A N/A 19.632 N/A N/A N/A	(ms) N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A N/A Pass N/A N/A	



			ode, GFSK Modul				
I	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	Results
	3.272	N/A	N/A	N/A	N/A	N/A	N/A
	<b>\gilent</b> 14:37		,2016			RT	
	est EMC, In	С					▲ Mkr1 3.272
Ref 30	).93 dBm		#Atten 10 d	IB			12.87 (
#Peak Log							
5							
dB/							
Offst				+			
30.9 dB		1 R					
αD							
#LgAv							
M1 S2 S3 VS							
55 V3							
<b>£</b> (f):							
FTun							
Chart	914.918 MH:						 Stop 914.918 M
	914.910 MH. √ 300 kHz _	2		#VBW 30 kH:	7	Swaan 6	3800 914.918 M 13 ms (2000 pt
NV0 D1	1 000 MHZ			SPH OV NIR	<u> </u>	v	10 mo (Eooo bu
	Pulse Width				Mid Channel 56, 9 On Time		
، 	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	Results
		Number of	Average No.	Scale	On Time	Limit	Results N/A
	<b>(ms)</b> N/A	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor	On Time (ms)	Limit (ms) N/A	
* /	(ms) N/A	Number of Pulses 6	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	
₩ / Northw	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak	(ms) N/A	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
<mark>₩</mark> Northw Ref 30 #Peak Log	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
¥¥ ↓ Northw Ref 30 #Peak Log 5 dB/	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ 4 Northw Ref 30 #Peak Log 5 dB/ Offst 30.9	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ 0ffst	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ Offst 30.9	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
water	(ms) N/A Agilent 14:38 Vest EMC, In	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB	(ms) N/A Agilent 14:38 est EMC, In ).93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB #LgAv	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB #LgAv	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv %1 \$2 \$3 V\$	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
∰ / Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv ₩1 \$2 \$3 V\$	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ ₽ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V\$	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ / Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv ₩1 \$2 \$3 V\$	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
∰ / Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv ₩1 \$2 \$3 V\$	(ms) N/A est EMC, In 0.93 dBm	Number of Pulses 6	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	
₩ 1 Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V\$ £(f): FTun	(ms) N/A Agilent 14:38 Dest EMC, In D.93 dBm	Number of Pulses 6 ::44 Jan 5, C	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A R T	
Image: Weight of the second secon	(ms) N/A Agilent 14:38 Dest EMC, In D.93 dBm	Number of Pulses 6 ::44 Jan 5, C	Average No. of Pulses N/A #Atten 10 d #Atten 10 d 4 4 4 4 4 4 4 4 4 4 4 4 4	Scale Factor N/A	On Time (ms) N/A	Limit (ms) N/A R T	N/A
Image: width width         Ref 30         #Peak         Log         5         dB/         0ffst         30.9         dB         #LgAv         W1       \$2         S3       V\$         £(f):         FTun         Start	(ms) N/A Agilent 14:38 Dest EMC, In D.93 dBm	Number of Pulses 6 ::44 Jan 5, C	Average No. of Pulses N/A #Atten 10 d #Atten 10 d 4 4 4 4 4 4 4 4 4 4 4 4 4	Scale Factor N/A	On Time (ms) N/A	Limit (ms) N/A R T	



	Pulse Width	Hopping M Number of	ode, GFSK Modul Average No.	Scale	On Time	Limit	
	(ms)	Pulses	of Pulses	Factor	(ms)	(ms)	Results
	N/A	6	N/A	N/A	N/A	N/A	N/A
	Agilent 14:3	9:11 Jan 5	,2016			RT	
	vest EMC, 1		, 2010				
Ref 3	0.93 dBm		#Atten 10 d	₿			
#Peak							
Log 5		_					
dB/							
Offst 30.9							
dB							
#LgAv							
W1 S3	2						
S3 V:	5						
<b>£</b> (f):							
FTun							
Start	914.918 M	Hz					Stop 914.918 MHz
Res B	W 300 kHz		_	₩VBW 30 kHz		_ Swe	ep 20 s (8192 pts)
			ode, GFSK Modul	ation 115 2kb	Aid Channel 56 Q		
		Muunahaan af					
_	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	
C			Average No.	Scale	On Time	Limit	
· · · · · · · · · · · · · · · · · · ·	<b>(ms)</b> N/A	Pulses 6	Average No. of Pulses N/A	Scale Factor	On Time (ms)	Limit (ms) N/A	Results
Northy	(ms) N/A Agilent 14:3 Vest EMC,	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms)	Results
Northy Ref 3	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
North Ref 3 #Peak	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northy Ref 3 #Peak Log 5	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northv Ref 3 #Peak Log 5 dB/	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northy Ref 3 #Peak Log 5 dB/ 0ffst 30.9	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northv Ref 3 #Peak Log 5 dB/	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northy Ref 3 #Peak Log 5 dB/ 0ffst 30.9	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northy Ref 3 #Peak Log 5 dB/ 0ffst 30.9	(ms) N/A Agilent 14:3 Vest EMC, 1 2.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northy Ref 3 #Peak Log 5 dB/ 0ffst 30.9 dB	(ms) N/A Agilent 14:3 vest EMC, 1 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 #Peak 5 dB/ Offst 30.9 dB #LgAv	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 #Peak 5 dB/ Offst 30.9 dB #LgAv	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ Offst 30.9 dB #LgAv #LgAv W1 S; S3 V:	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ 0ffst 30.9 dB #LgAv W1 S; S3 V: £(f):	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ Offst 30.9 dB #LgAv #LgAv W1 S; S3 V:	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ 0ffst 30.9 dB #LgAv W1 S; S3 V: £(f):	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ 0ffst 30.9 dB #LgAv W1 S; S3 V: £(f):	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results
Northw Ref 3 +Peak 5 dB/ Offst 30.9 dB #LgAv W1 S; S3 V; £(f): FTun	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5 Inc	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	Limit (ms) N/A	Results         N/A
Northw Ref 3 +Peak 0 dB/ 0ffst 30.9 dB #LgAv W1 S; S3 V3 £(f): FTun Start	(ms) N/A Agilent 14:3 vest EMC, 7 0.93 dBm	Pulses 6 9:41 Jan 5 Inc	Average No. of Pulses N/A *Atten 10 d *Atten 10 d *Att	Scale Factor N/A	On Time (ms) N/A	Limit (ms) N/A R T	Results



	<b>B</b> 1 140 151				Mid Channel 56, 9		
	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	Results
Г	N/A	6	N/A	N/A	N/A	N/A	N/A
	10// (	Ŭ	1077		14/7		
	Agilent 14:4		2016			RT	
	west EMC, I	lnc					
Ref 3	30 <u>.93</u> dBm		#Atten 10 d	IB			
#Peal	ĸ	1					
Log							
5				.			
dB/ Offst							
0ffst 30.9							
dB							
#LgA	v						
-0.0							
W1 S S3 V	52						
S3 ∖	IS						
<b>£</b> (f):							
FTun							
					, <u> </u>		
	914.918 M	Hz					top 914.918 MHz
Res E	3W 300 kHz			#VBW 30 kH	z	Sweep :	20 s (8192 pts)_
		Hopping Mo	ode, GFSK Modul	ation, 115.2kb,	Mid Channel 56, 9	14.9184 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time	Limit	
F	(ms)	Pulses	of Pulses	Factor	(ms)	(ms)	Results
	3.272	N/A	6	N/A	19.632	400	Pass

	Pulse Width Number of Average No. Scale On Time Limit						
	(ms)	Pulses	of Pulses	Factor	(ms)	(ms)	Results
[	3.272	N/A	6	N/A	19.632	400	Pass

**Calculation Only** 

No Screen Capture Required



		Hopping	Mode, GFSK Modu	lation 250kb M	id Channel 37 0	14 976 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time	Limit	
	(ms)	Pulses	of Pulses	Factor	(ms)	(ms)	Results
	1.5	N/A	N/A	N/A	N/A	N/A	N/A
*	Agilent 14:4	1:40 Jan 5,	. 2016			RT	
	vest EMC, I		2010				▲ Mkr1 1.5 ms
Ref 3	0.93 dBm		#Atten 10 d	В			5.59 dB
#Peak							
Log 5					¥		
dB/		1	R				
Offst							
30.9 dB							
		الرام إخرام					
#LgAv							
M1	2						
M1 S2 S3 V3							
£(f): F⊺un							
i ran							
C	01.4.070 M						0
Start Res R	914.976 MW W 300 kHz	HZ					Stop 914.976 MHz
1000 D				ŧVRW 30 kH≂		Sween 41	31 ms (2000 nts)
	M 300 KHZ	Lionnica		VBW 30 kHz			.31 ms (2000 pts)
	Pulse Width	Hopping I Number of	Mode, GFSK Modu Average No.				.31 ms (2000 pts)
	Pulse Width (ms)	Number of Pulses	Mode, GFSK Modu Average No. of Pulses	ilation, 250kb, M Scale Factor	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms)	Results
	Pulse Width	Number of	Mode, GFSK Modu Average No.	llation, 250kb, M Scale	id Channel 37, 9 <sup>.</sup> On Time	14.976 MHz Limit	
	Pulse Width (ms)	Number of Pulses 5	Mode, GFSK Modu Average No. of Pulses N/A	ilation, 250kb, M Scale Factor	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms)	Results
来 North	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 3	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
∰ North Ref 3 #Peak	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
Northw Ref 3 #Peak Log 5	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
Northw Ref 3 #Peak Log 5 dB/	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30,9	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
Northw Ref 3 #Peak Log 5 dB/	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30,9	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9 dB	Pulse Width (ms) N/A Agilent 14:4 Yest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9 dB	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V\$	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northy Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V3 \$3 V3	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V3 \$3 V3	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 22:15 Jan 5, inc 2000 2000 2000 2000 2000 2000 2000 20	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 S3 V5 \$3 V5	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 2:15 Jan 5,	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A	Results
₩ Northw Ref 30 #Peak Log 5 dB/ Offst 30.9 dB #LgAv W1 \$2 \$3 V\$ £(f): FTun	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 22:15 Jan 5, inc 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mode, GFSK Modu Average No. of Pulses N/A	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms)	14.976 MHz Limit (ms) N/A R T	Results           N/A
₩         Northw         Ref 30         *Peak         Log         5         dB/         Offst         30.9         dB         *LgAv         W1         \$3         \$\$2         £(f):         FTun         Start	Pulse Width (ms) N/A Agilent 14:4 rest EMC, 1 0.93 dBm	Number of Pulses 5 22:15 Jan 5, inc 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Mode, GFSK Modu Average No. of Puises N/A 2016 #Atten 10 d	llation, 250kb, M Scale Factor N/A	id Channel 37, 9 On Time (ms) N/A	14.976 MHz Limit (ms) N/A R T	Results



			Node, GFSK Modul				
F	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	Limit (ms)	Results
	N/A	5	N/A	N/A	N/A	N/A	N/A
	gilent 14:4		2016			RT	
	est EMC, I	nc	#0++~~ 10 dE	>			
кег зи #Peak	0.93 dBm		#Atten 10 dE				
Log							
5,							
dB/ Offst							
30.9 dB						4	
dB							
#LgAv							
W1 S2 S3 VS							
<u> </u>							
<b>£</b> (f):							
FTun							
	914.976 MH	lz					Stop 914.976 MHz
Res Bl	√300 kHz		#	VBW 30 kHz		Sweep	o 10 s (8192 pts)
	ulso Width		Mode, GFSK Modul			4.976 MHz	
F	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms)	4.976 MHz Limit (ms)	Results
ء 		Number of	Average No.	Scale	On Time	4.976 MHz Limit	Results N/A
	<b>(ms)</b> N/A	Number of Pulses 5	Average No. of Pulses N/A	Scale Factor	On Time (ms)	4.976 MHz Limit (ms) N/A	
A ¥	(ms) N/A	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A	Scale Factor	On Time (ms)	4.976 MHz Limit (ms)	
₩ A Northw Ref 30	<b>(ms)</b> N/A	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
<mark>⊯ A</mark> Northw Ref 30 #Peak	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
∰ A Northw Ref 30	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ 0ffst	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ Offst 30.9	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ Offst 30.9	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB	(ms) N/A Agilent 14:4 est EMC, I	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB #LgAv	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB #LgAv	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩ A Northw Ref 30 #Peak Log 5 dB/ 0ffst 30.9 dB	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
Image: Weight of the symmetry	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩       A         Northw       Ref 30         #Peak       Log         5       dB/         0ffst       30.9         dB          #LgAv       %1         %1       \$2         %2       %3         %2       %3	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
Image: Weight of the symmetry	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
₩       A         Northw       Ref 30         #Peak       Log         5       dB/         0ffst       30.9         dB          #LgAv       %1         %1       \$2         %2       %3         %2       %3	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
Jointhw         Northw         Ref 30         #Peak         Log         5         dB/         Offst         30.9         dB         #LgAv         W1       \$2         \$3       V\$         £(f):	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5,	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A	
Image: Weight of the system         Northw         Ref 30         #Peak         Log         5         dB/         Offst         30.9         dB         #LgAv         W1       \$2         \$3       VS         £(f):         FTun	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5, nc 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Average No. of Pulses N/A 2016	Scale Factor N/A	On Time (ms)	4.976 MHz Limit (ms) N/A R T	
Image: Weight of the synthesis of the synthesynthesis of the synthesynthesis of the synthesis of the synthesis	(ms) N/A est EMC, I 0.93 dBm	Number of Pulses 5 3:05 Jan 5, nc 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Average No. of Pulses N/A 2016 #Atten 10 dE 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Scale Factor N/A	On Time (ms) N/A	4.976 MHz Limit (ms) N/A R T	



			Mode, GFSK Mod				
Pulse		Number of	Average No.	Scale	On Time	Limit	
(m N	1 <b>s)</b>	Pulses 5	of Pulses N/A	Factor N/A	(ms) N/A	(ms) N/A	Results N/A
	/ <b>A</b>	5	11/14	11/4	11/7		11/0
🔆 Agiler	<b>1t</b> 14:4	3:24 Jan 5,	2016			RT	
Northwest							
Ref 30.93	dBm		#Atten 10 d	IB			
#Peak							
Log							
5							
dB/							
Offst							
30.9 dB							
#LgAv							
W1 S2 S3 VS							
S3 VS							
<b>£</b> (f):							
FTun							
				<u> </u>			
Start 914.	976 ML						top 914.976 MHz
Res BW 30		12		₩VBW 30 kHz		Swaan	10 s (8192 pts)_
NGS DM JO	0 KHZ						10 3 (0102 pts)
Pulse	Width	Hopping I Number of	Mode, GFSK Mod	ulation, 250kb, N Scale	lid Channel 37, 9 <sup>2</sup> On Time		
Puise (m		Pulses	Average No. of Pulses	Factor	(ms)	Limit (ms)	Results
1		N/A	5	N/A	7.5	400	Pass

Pulse	Pulse Width Number of Average No. Scale On Time Limit						
(n	ns)	Pulses	of Pulses	Factor	(ms)	(ms)	Results
1	.5	N/A	5	N/A	7.5	400	Pass

**Calculation Only** 

No Screen Capture Required



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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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**

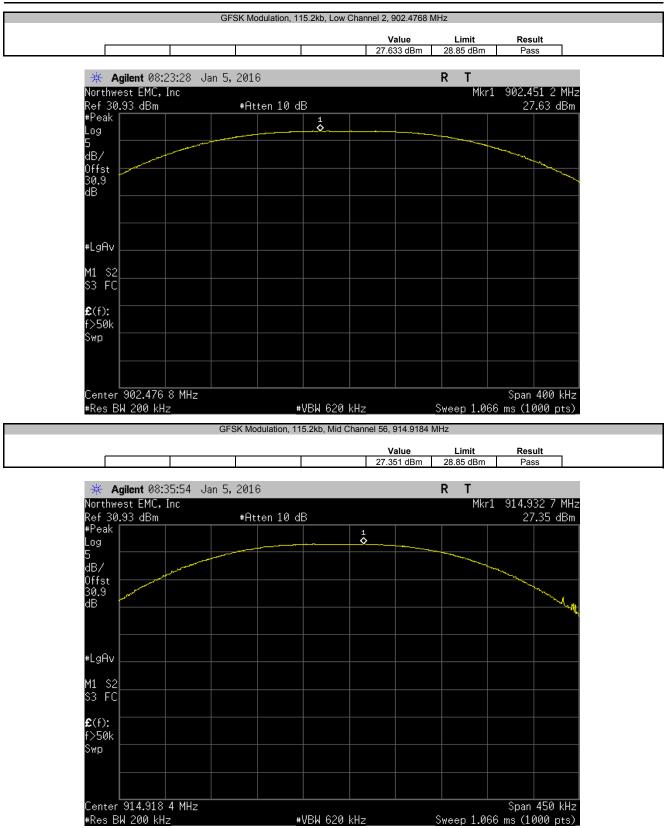
The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

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

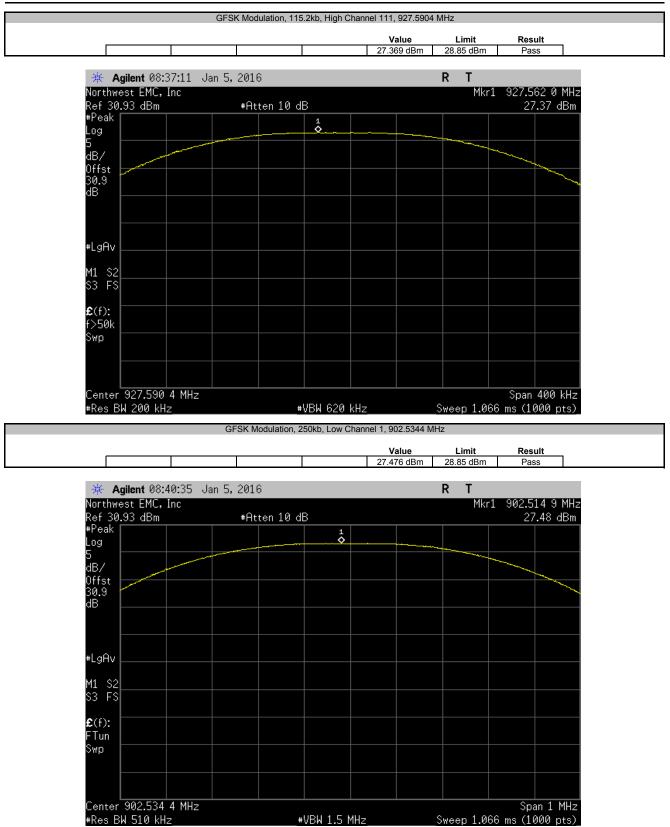


EUT: Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)	Work Order:	FREW0054	
Serial Number: 402-669-0330	Date:	01/05/16	
Customer: FreeWave Technologies, Inc.	Temperature:	24°C	
Attendees: Dean Busch	Humidity:	26%	
Project: None	Barometric Pres.:	1002 mbar	
Tested by: Richard Mellroth Power: 9 VDC	Job Site:	NC02	
TEST SPECIFICATIONS Test Method			
FCC 15.247:2016 ANSI C63.10:2013			
COMMENTS			
EUT power level = 29. Demonstrating compliance with a 7.15dBi antenna.			
DEVIATIONS FROM TEST STANDARD			
None			
01 10			
Configuration # 1			
Signature			
	Value	Limit	Result
GFSK Modulation, 115.2kb			
Low Channel 2, 902.4768 MHz	27.633 dBm	28.85 dBm	Pass
Mid Channel 56, 914.9184 MHz	27.351 dBm	28.85 dBm	Pass
High Channel 111, 927.5904 MHz	27.369 dBm	28.85 dBm	Pass
GFSK Modulation, 250kb			
Low Channel 1, 902.5344 MHz	27.476 dBm	28.85 dBm	Pass
Mid Channel 37, 914.976 MHz	27.36 dBm	28.85 dBm	Pass
High Channel 73, 927.4176 MHz	27.373 dBm	28.85 dBm	Pass



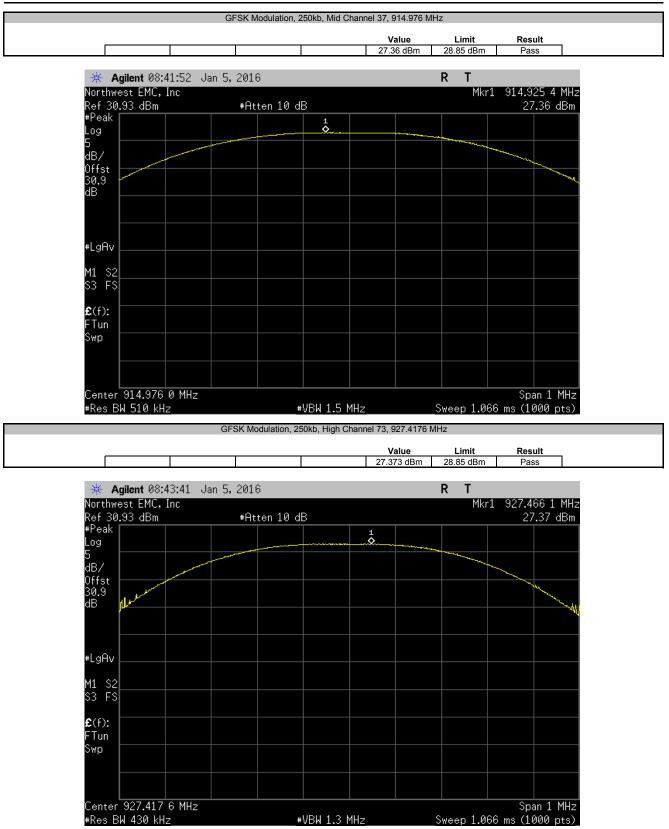






Report No. FREW0054.5







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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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**

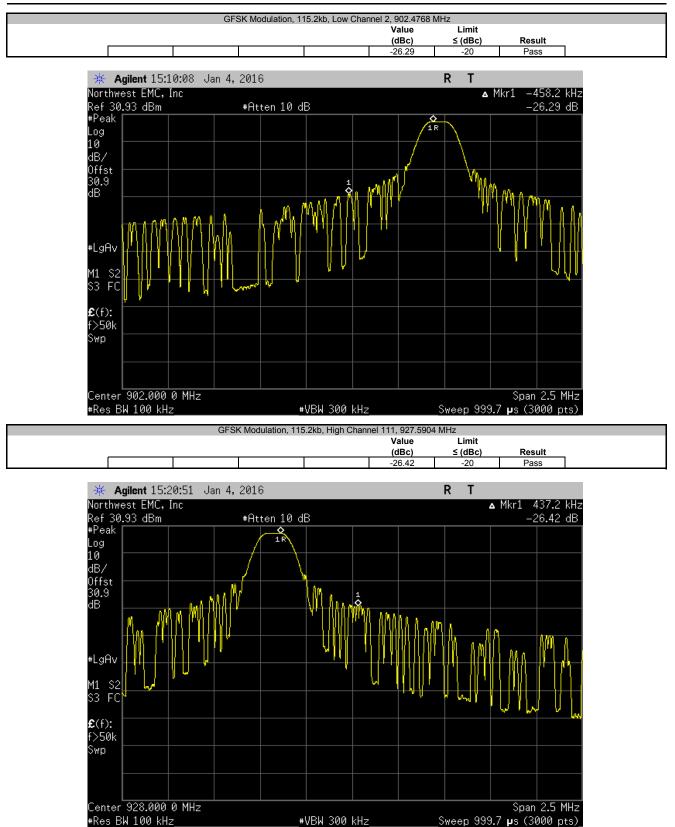
The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

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

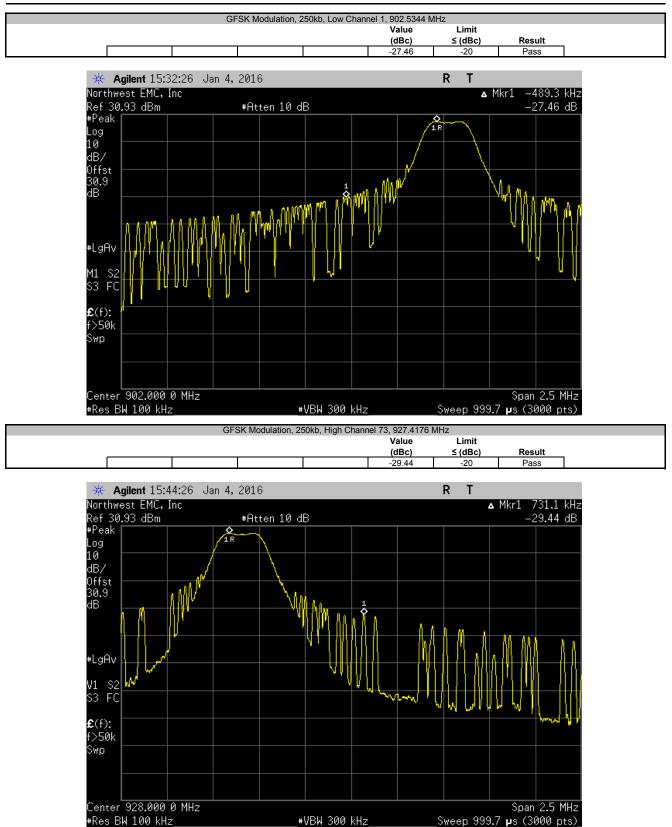


	Z9-T (board unit w/TTL i	nterface)			Work Order	FREW0054	
Serial Number:	402-669-0330				Date	01/04/16	
	FreeWave Technologies	, Inc.			Temperature	23°C	
Attendees	Dean Busch				Humidity	29%	
Project					Barometric Pres.		
	Richard Mellroth		Powe	r: 9 VDC	Job Site	NC02	
TEST SPECIFICAT	IONS			Test Method			
FCC 15.247:2016				ANSI C63.10:2013			
COMMENTS							
EUT power set at r	naximum = 30.						
DEVIATIONS FROM	M TEST STANDARD						
None							
			ni n				
Configuration #	1		VALSI				
		Signature	poor la				
					Value	Limit	
					(dBc)	≤ (dBc)	Result
GFSK Modulation, 1	115.2kb						
	Low Channel 2, 902.4768	MHz			-26.29	-20	Pass
	High Channel 111, 927.59	04 MHz			-26.42	-20	Pass
GFSK Modulation, 2	250kb						
	Low Channel 1, 902.5344	MHz			-27.46	-20	Pass
	High Channel 73, 927.417	6 MHz			-29.44	-20	Pass











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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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**

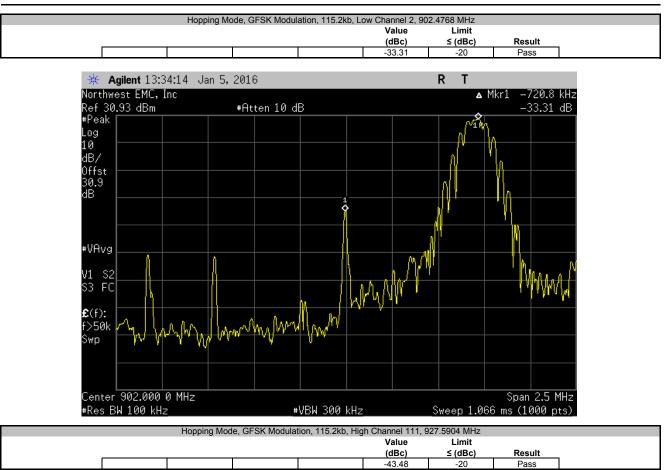
The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

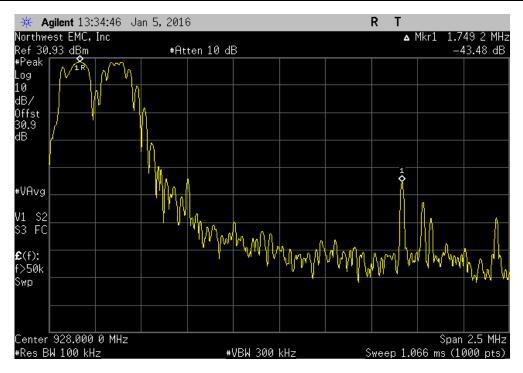
The spectrum was scanned below the lower band edge and above the higher band edge.



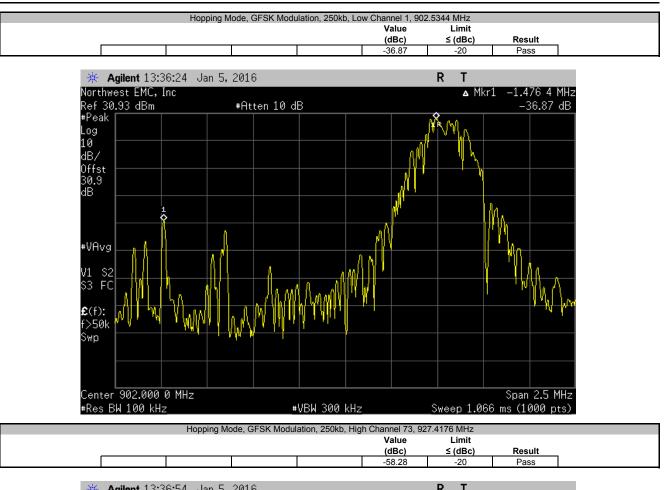
		2 interface), Z9-T (board unit w/	TTL interface)			FREW0054	
Serial Number	r: 402-669-0330					01/05/16	
Customer	r: FreeWave Technologies,	Inc.			Temperature	24°C	
Attendees	: Dean Busch				Humidity		
	t: None				Barometric Pres.		
Tested by	: Richard Mellroth		Power:	9 VDC	Job Site	NC02	
TEST SPECIFICA	TIONS			Test Method			
FCC 15.247:2016				ANSI C63.10:2013			
				1			
COMMENTS				-			
None							
DEVIATIONS FRO	M TEST STANDARD						
None							
			n n				
Configuration #	1		VIEN				
		Signature	here is				
					Value	Limit	
					(dBc)	≤ (dBc)	Result
Hopping Mode							
	GFSK Modulation, 115.2kb	)					
	Low Channel	2, 902.4768 MHz			-33.31	-20	Pass
	High Channe	111, 927.5904 MHz			-43.48	-20	Pass
	GFSK Modulation, 250kb						
		1, 902.5344 MHz			-36.87	-20	Pass
	High Channe	73, 927.4176 MHz			-58.28	-20	Pass

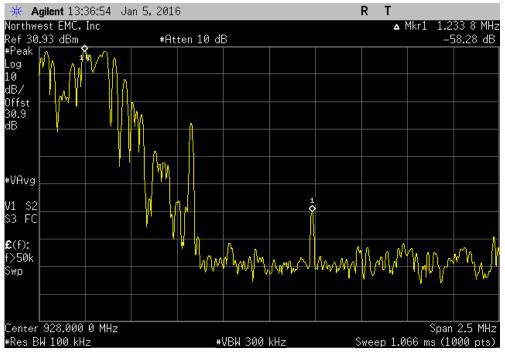














Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this 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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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

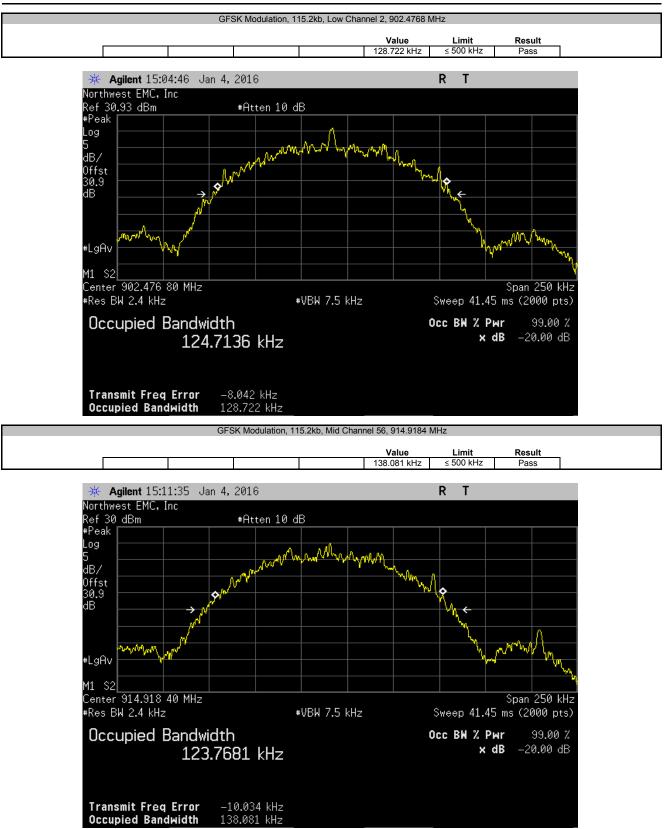
#### **TEST DESCRIPTION**

The occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

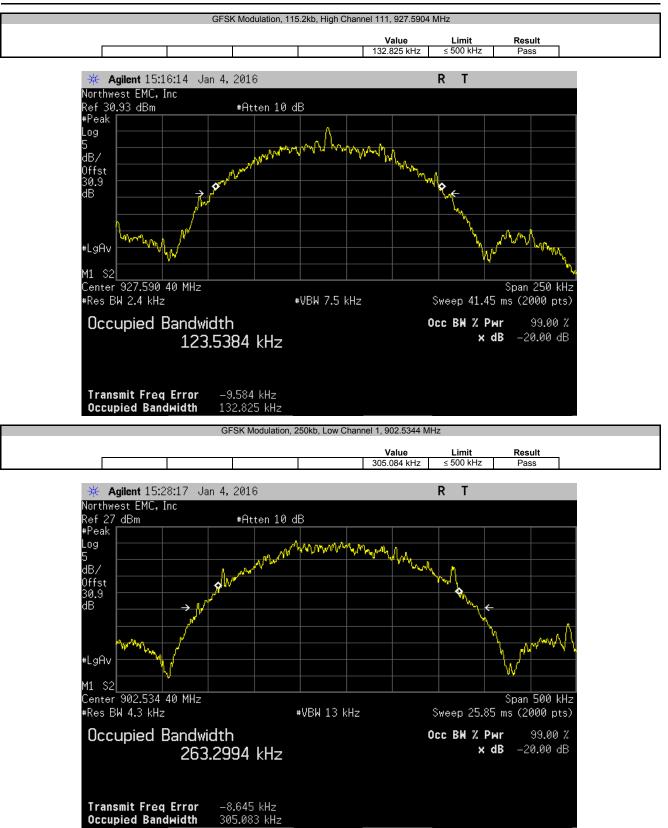


EUT: 29-C (board unit w/RS232 Interface), 29-T (board unit w/TTL interface)         Work Order: FREW0054           Serial Number: 402-669-030         Date: [01/04/16           Customer:         FreeWave Technologies, Inc.         Temperature:         23° C           Attendees:         Dean Busch         Humidity:         29%				
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       Tested by: Richard Mellroth     Power:     9 VDC     Job Site:     NC02       Test Method       FCC 15.247:2016       COMMENTS       EUT power set at maximum = 30.       Value       Limit     Result       Configuration #     1     Signature       Limit     Result       Kodulation, 115.2kb   <		Work Order:	FREW0054	
Attendees:     Dean Busch     Humidity:     29%       Project:     None     Barometric Press:     1009 mbar       Test dethy:       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, 115.2kb          Condented 56, 914.9184 MHz     138.081 kHz     ≤ 500 kHz       High Channel 111, 927.5904 MHz     132.825 kHz     ≤ 500 kHz      GFSK Modulation, 250kb	Serial Number: 402-669-0330	Date:	01/04/16	
Project:         None         Barometric Pres.:         1009 mbar           Test by:         Richard Mellroth         Power:         9 VDC         Job Site:         NC02           TEST SPECIFICATIONS         Test Method         Interview of the second of th	Customer: FreeWave Technologies, Inc.	Temperature:	23°C	
Tested by:     Richard Mellroth     Power:     9 VDC     Job Site:     NC02       TEST SPECIFICATIONS     Test Method     Fest Method     Fest Method     Fest Method       FCC 15.247:2016     ANSI C63.10:2013     ANSI C63.10:2013     ANSI C63.10:2013     ANSI C63.10:2013       COMMENTS     EUT power set at maximum = 30.     Signature     Signature     Signature       DEVIATIONS FROM TEST STANDARD     Signature     Value     Limit     Result       GFSK Modulation, 115.2kb     Low Channel 2, 902.4768 MHz     128.722 kHz     \$ 500 kHz     Pass       Mid Channel 56, 914.9184 MHz     138.081 kHz     \$ 500 kHz     Pass       High Channel 111, 927.5904 MHz     132.825 kHz     \$ 500 kHz     Pass       GFSK Modulation, 250kb     Test Stop Altrice     Test Stop Altrice	Attendees: Dean Busch	Humidity:	29%	
Test SPECIFICATIONS       Test Method         FCC 15.247:2016       ANSI C63.10:2013         COMMENTS       EUT power set at maximum = 30.         EUT power set at maximum = 30.       Signature         Configuration #       1         Signature       Value         Low Channel 2, 902.4768 MHz       128.722 kHz       \$ 500 kHz       Pass         High Channel 56, 914.9184 MHz       138.081 kHz       \$ 500 kHz       Pass         High Channel 111, 927.5904 MHz       132.825 kHz       \$ 500 kHz       Pass         GFSK Modulation, 250kb       132.825 kHz       \$ 500 kHz       Pass	Project: None	Barometric Pres.:	1009 mbar	
FCC 15.247:2016         ANSI C63.10:2013           COMMENTS         EUT power set at maximum = 30.           DEVIATIONS FROM TEST STANDARD         None           None	Tested by: Richard Mellroth Power: 9 VDC	Job Site:	NC02	
COMMENTS         EUT power set at maximum = 30.         DEVIATIONS FROM TEST STANDARD         None         Configuration #       1         Signature         Value       Limit       Result         GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz       128.722 kHz       ≤ 500 kHz       Pass         Mid Channel 56, 914.9184 MHz       138.081 kHz       ≤ 500 kHz       Pass         High Channel 111, 927.5904 MHz       132.825 kHz       ≤ 500 kHz       Pass         GFSK Modulation, 250kb       132.825 kHz       ≤ 500 kHz       Pass	TEST SPECIFICATIONS Test Method			
EUT power set at maximum = 30.           DEVIATIONS FROM TEST STANDARD           None         Value         Limit         Result           Configuration #         1         Signature         Value         Limit         Result           GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz         128.722 kHz         \$ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         \$ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         \$ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         \$ 500 kHz         Pass	FCC 15.247:2016 ANSI C63.10:2013			
EUT power set at maximum = 30.           DEVIATIONS FROM TEST STANDARD           None         Value         Limit         Result           Configuration #         1         Signature         Value         Limit         Result           GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz         128.722 kHz         \$ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         \$ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         \$ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         \$ 500 kHz         Pass				
DEVIATIONS FROM TEST STANDARD           None           Configuration #         1         Signature           Signature         Value         Limit         Result           GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass High Channel 56, 914.9184 MHz           High Channel 11, 927.5904 MHz         138.081 kHz         ≤ 500 kHz         Pass Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	COMMENTS			
DEVIATIONS FROM TEST STANDARD           None           Configuration #         1         Signature           Signature         Value         Limit         Result           GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass High Channel 56, 914.9184 MHz           High Channel 11, 927.5904 MHz         138.081 kHz         ≤ 500 kHz         Pass Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	EUT power set at maximum = 30.			
None         Configuration #         1         Signature           GFSK Modulation, 115.2kb         Imit         Result           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass				
None         Configuration #         1         Signature           GFSK Modulation, 115.2kb         Imit         Result           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass				
Configuration #         1         Signature           Value         Limit         Result           GFSK Modulation, 115.2kb         Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	DEVIATIONS FROM TEST STANDARD			
Signature           Value         Limit         Result           GFSK Modulation, 115.2kb         128.722 kHz         ≤ 500 kHz         Pass           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	None			
Signature           Value         Limit         Result           GFSK Modulation, 115.2kb         128.722 kHz         ≤ 500 kHz         Pass           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	0: 5			
Value         Limit         Result           GFSK Modulation, 115.2kb         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         138.081 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	Configuration # 1			
GFSK Modulation, 115.2kb         128.722 kHz         ≤ 500 kHz         Pass           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	Signature			
GFSK Modulation, 115.2kb         128.722 kHz         ≤ 500 kHz         Pass           Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass				
Low Channel 2, 902.4768 MHz         128.722 kHz         ≤ 500 kHz         Pass           Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         138.081 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         32.825 kHz         ≤ 500 kHz         Pass		Value	Limit	Result
Mid Channel 56, 914.9184 MHz         138.081 kHz         ≤ 500 kHz         Pass           High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         32.825 kHz         ≤ 500 kHz         Pass	GFSK Modulation, 115.2kb			
High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	Low Channel 2, 902.4768 MHz	128.722 kHz	≤ 500 kHz	Pass
High Channel 111, 927.5904 MHz         132.825 kHz         ≤ 500 kHz         Pass           GFSK Modulation, 250kb         132.825 kHz         ≤ 500 kHz         Pass	Mid Channel 56, 914,9184 MHz	138.081 kHz	≤ 500 kHz	Pass
		132.825 kHz	≤ 500 kHz	Pass
		305.084 kHz	≤ 500 kHz	Pass
Mid Channel 37, 914.976 MHz ≤ 500 kHz Pass		301.916 kHz	≤ 500 kHz	Pass
High Channel 73, 927.4176 MHz ≤ 500 kHz Pass		283.817 kHz	≤ 500 kHz	Pass

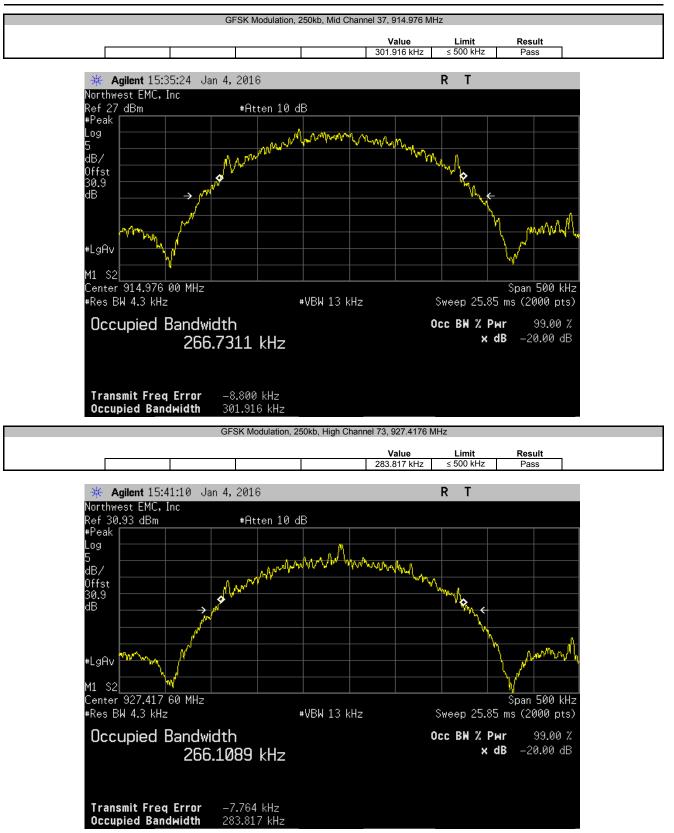














Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this 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**

					Interval
Description	Manufacturer	Model	ID	Last Cal.	(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

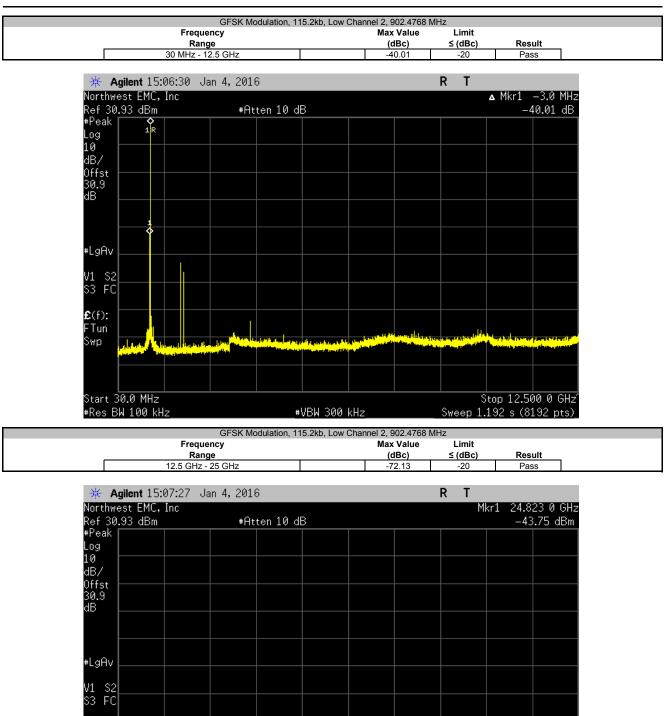
#### **TEST DESCRIPTION**

The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.



	Z9-C (board unit w/RS232 interface), Z9-T (board unit w/TTL interface)			Work Order:		
Serial Number	r: 402-669-0330				01/04/16	
	FreeWave Technologies, Inc.			Temperature:		
	Dean Busch			Humidity:		
	t: None	None			1009 mbar	
	Richard Mellroth		Power: 9 VDC	Job Site:	NC02	
EST SPECIFICAT	TIONS		Test Method			
CC 15.247:2016			ANSI C63.10:2013			
OMMENTS						
UT power set at	maximum = 30.					
	M TEST STANDARD					
one			0			
			01 h			
onfiguration #						
Configuration #	1	Signatura	MEN			
onfiguration #	1	Signature	Frequency	May Value	Limit	
onfiguration #	1	Signature	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
-		Signature	Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result
		Signature				Result
	115.2kb	Signature	Range	(dBc)	≤ (dBc)	
	115.2kb Low Channel 2, 902.4768 MHz	Signature	Range 30 MHz - 12.5 GHz	(dBc) -40.01	≤ (dBc) -20	Pass
	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz	Signature	Range 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz	( <b>dBc</b> ) -40.01 -72.13	≤ (dBc) -20 -20	Pass Pass
	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz	Signature	Range 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz 30 MHz - 12.5 GHz	(dBc) -40.01 -72.13 -55.51	≤ (dBc) -20 -20 -20	Pass Pass Pass
Configuration #	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz	Signature	Range 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz 12.5 GHz - 25 GHz	(dBc) -40.01 -72.13 -55.51 -71.8	≤ (dBc) -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass
FSK Modulation,	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz High Channel 111, 927.5904 MHz High Channel 111, 927.5904 MHz	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           30 MHz - 12.5 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96	≤ (dBc) -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass
FSK Modulation,	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz High Channel 111, 927.5904 MHz High Channel 111, 927.5904 MHz	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           30 MHz - 12.5 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96	≤ (dBc) -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass
FSK Modulation,	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz High Channel 111, 927.5904 MHz High Channel 111, 927.5904 MHz 250kb	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96 -71.75	<pre> &lt; (dBc) -20 -20 -20 -20 -20 -20 -20 -20</pre>	Pass Pass Pass Pass Pass Pass
FSK Modulation,	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz High Channel 111, 927.5904 MHz High Channel 111, 927.5904 MHz 250kb Low Channel 1, 902.5344 MHz	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96 -71.75 -54.11	<pre> &lt; (dBc)</pre>	Pass Pass Pass Pass Pass Pass Pass
FSK Modulation,	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mid Channel 56, 914.9184 MHz High Channel 111, 927.5904 MHz High Channel 111, 927.5904 MHz Low Channel 1, 902.5344 MHz Low Channel 1, 902.5344 MHz	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96 -71.75 -54.11 -71.7	≤ (dBc) -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass Pass
	115.2kb Low Channel 2, 902.4768 MHz Low Channel 2, 902.4768 MHz Mid Channel 56, 914.9184 MHz Mig Channel 56, 914.9184 MHz High Channel 11, 927.5904 MHz Low Channel 1, 902.5344 MHz Low Channel 1, 902.5344 MHz Low Channel 1, 902.5344 MHz Mid Channel 37, 914.976 MHz	Signature	Range           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz           12.5 GHz - 25 GHz           30 MHz - 12.5 GHz	(dBc) -40.01 -72.13 -55.51 -71.8 -36.96 -71.75 -54.11 -71.7 -55.59	≤ (dBc) -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass Pass





#VBW 300 kHz

£(f): FTun Swp

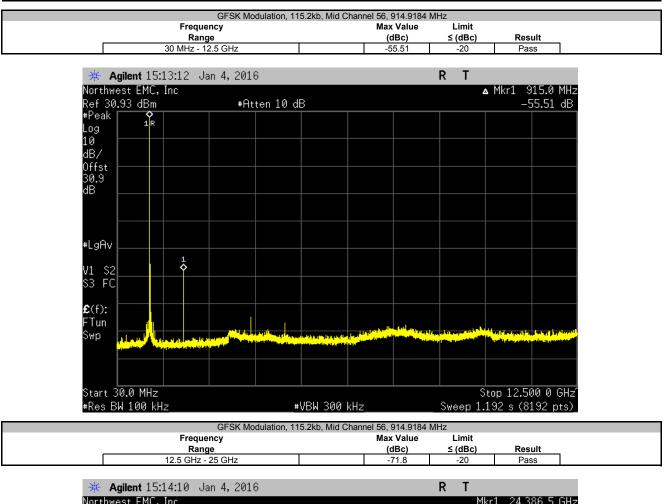
Start 12.500 0 GHz

#Res BW 100 kHz

Stop 25.000 0 GHz

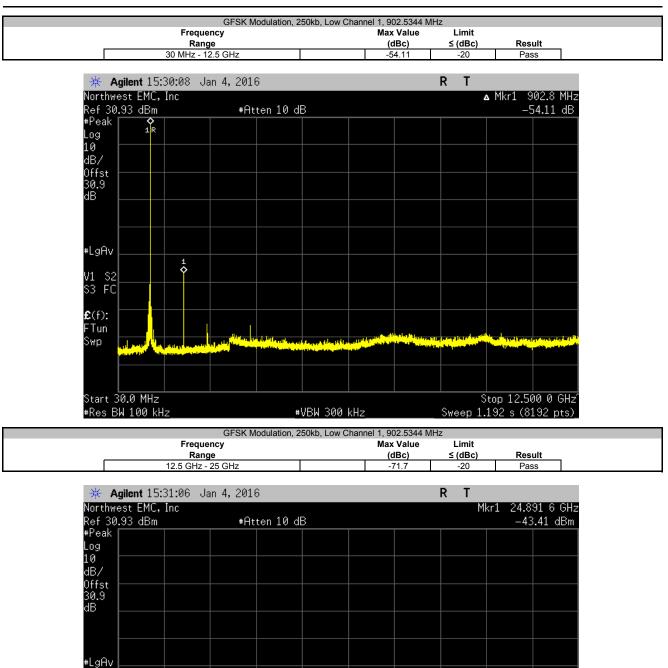
Sweep 1.195 s (8192 pts)





🔆 🔆 Agilent 15:14:10 Jan	4,2016		RT	
Northwest EMC, Inc			M	(r1 24.386 5 GHz
Ref 30.93 dBm	#Atten 10 dB	3		-43.34 dBm
#Peak				
Log 10				
dB/				
Offst				
30.9				
dB				
#LgAv				
V1 S2				
\$3 FC				
				1
£(f): FTununted to be denote under de			It also and a	والمناسبة بالم
FTun Swp <mark>electric</mark> ated telephotostated				and the second
Start 12.500 0 GHz				top 25.000 0 GHz^
#Res BW 100 kHz	#\	/BW 300 kHz	Sweep 1.	195 s (8192 pts)_





#VBW 300 kHz

V1 S2 S3 FC

£(f): FTun Swp

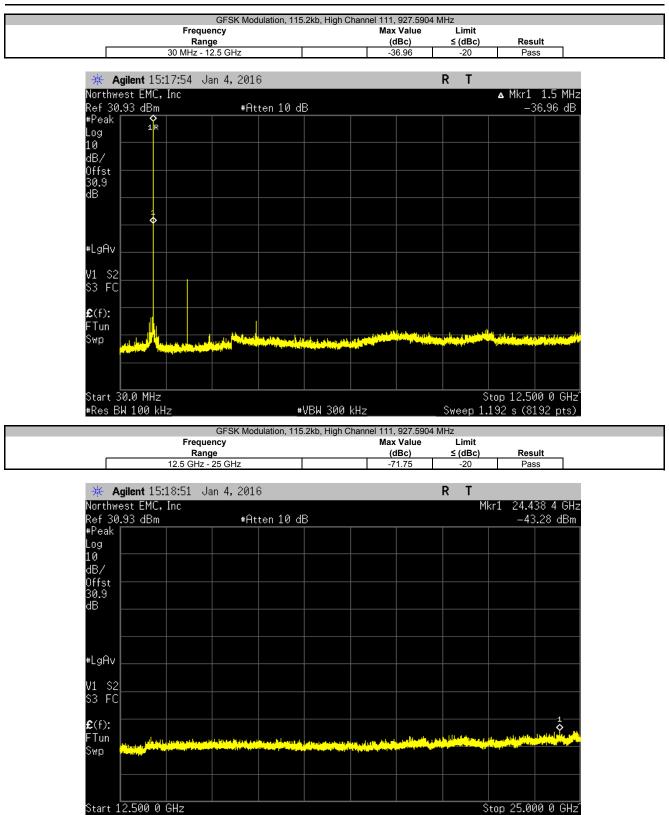
Start 12.500 0 GHz

#Res BW 100 kHz

Stop 25.000 0 GHz

Sweep 1.195 s (8192 pts)



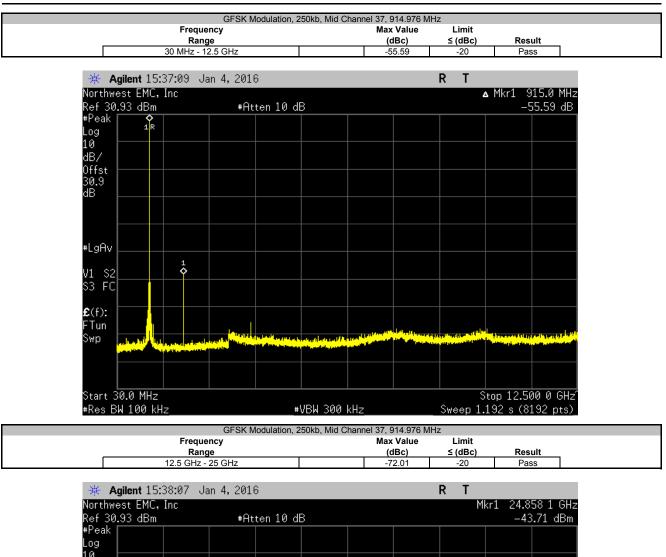


#VBW 300 kHz

Sweep 1.195 s (8192 pts)

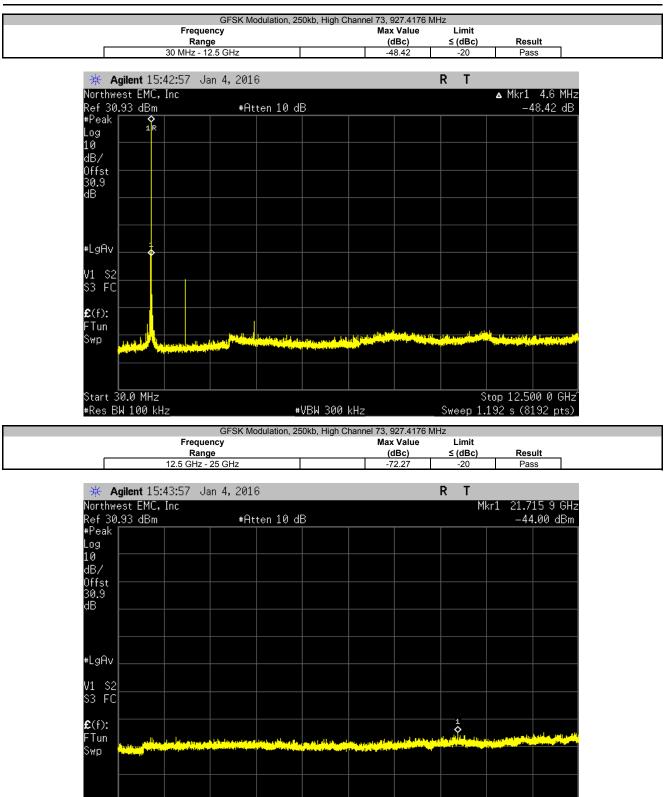
#Res BW 100 kHz





#Peak						
Log						
10 dB/						
Offst						
30.9						
dB						
#LgAv						
V1 S2						
\$3 FC						
<b>6</b> (D)						1
£(f): FTun best store as thus, data					للأفسار بالمراد	
Fiun Swp	ente lle contribuier principal de la suit	and a list of a	en is ein ein is			alan junit
Start 12.500 0 GHz				S	top 25.00	10 0 GHzî
#Res BW 100 kHz	#	VBW 300 I	kHz	Sweep 1.	195 s (81	.92 pts)_





#VBW 300 kHz

Start 12.500 0 GHz

#Res BW 100 kHz

Stop 25.000 0 GHz

Sweep 1.195 s (8192 pts)