

Ittron, Inc.

TEST REPORT FOR

**OpenWay Gas Remote Disconnect
Model: OWRGRD**

Tested to The Following Standards:

**FCC Part 15 Subpart C Section(s) 15.247
(FHSS 902-928 MHz)**

Report No.: 100666-9

Date of issue: January 23, 2018



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Ittron, Inc.
2111 N. Molter Road
Liberty Lake, WA 99019

Representative: Jay Holcomb
Customer Reference Number: 137056

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

Dianne Dudley & Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 100666

December 7, 2017

December 7-8, 2017

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

A handwritten signature in black ink that reads "Steve Behm". The signature is written in a cursive style and is positioned above a horizontal line.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 North Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(i)	Number of Hopping Channels	NA	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	NP
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass

NA = Not Applicable

NP= CKC Laboratories was not contracted to perform test. See Appendix A for manufacturer's declaration.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

CKC Laboratories tested Model: **OWGRD**

Since the time of testing, the manufacturer has chosen to update the model name to:

Model: OWGRD Any difference between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model.

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
OpenWay Gas Remote Disconnect.	Itron, Inc.	OWRGRD	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	E6410	CFGY2A00CET

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	903 to 926.8MHz (OOK) 902.2 to 927.75MHz (GFSK 10kbps) 902.4 to 927.6MHz (GFSK 150kbps)
Number of Hopping Channels:	120 (903 to 926.8MHz (OOK)) 512 (902.2 to 927.75MHz (GFSK 10kbps)) 64 (902.4 to 927.6MHz (GFSK 150kbps))
Modulation Type(s):	OOK and GFSK
Maximum Duty Cycle:	Power level 3 for OOK is 56.1% Power level 1 for OOK is 12.7 % GFSK is 100%
Number of TX Chains:	2
Antenna Type(s) and Gain:	2.3 dBi (vertical) and 0.1 dBi (horizontal)
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	6.0V DC – battery
Firmware / Software used for Test:	2.0.10.0

FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/8/2017
Configuration:	1		
Test Setup:	The equipment under test (EUT) is placed on the tabletop. The output of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is transmitting at its rated output power.		

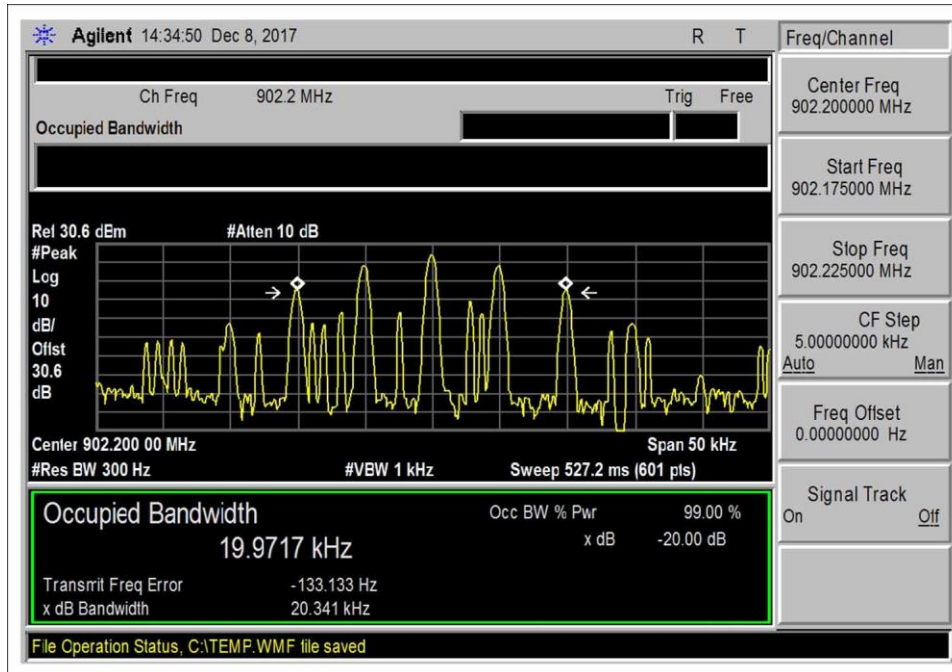
Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	35

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P06664	Cable	Gore	PHASEFLEX FJR01N01036.0	4/5/2016	4/5/2018

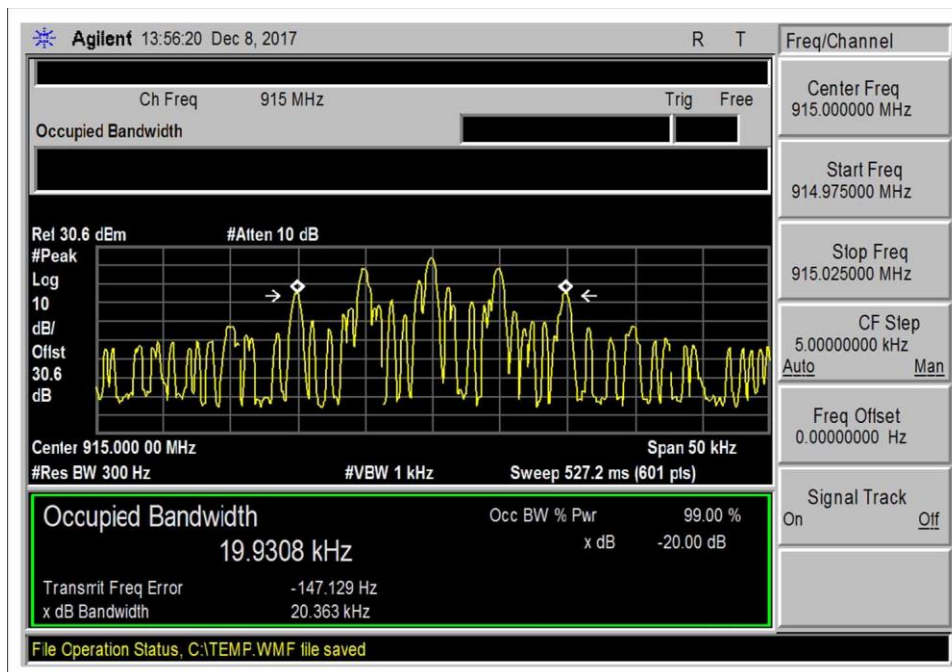
15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
903	V	OOK power level 1	167.8	≤500	Pass
915	V	OOK power level 1	150.6	≤500	Pass
926.8	V	OOK power level 1	150.9	≤500	Pass
903	V	OOK power level 3	169.6	≤500	Pass
915	V	OOK power level 3	169.7	≤500	Pass
926.8	V	OOK power level 3	169.5	≤500	Pass
902.2	V	GFSK 10kbps power level 3	20.3	≤500	Pass
915	V	GFSK 10kbps power level 3	20.4	≤500	Pass
927.75	V	GFSK 10kbps power level 3	20.3	≤500	Pass
902.4	V	GFSK 150kbps power level 3	161.2	≤500	Pass
915.2	V	GFSK 150kbps power level 3	161.2	≤500	Pass
927.6	V	GFSK 150kbps power level 3	161.3	≤500	Pass

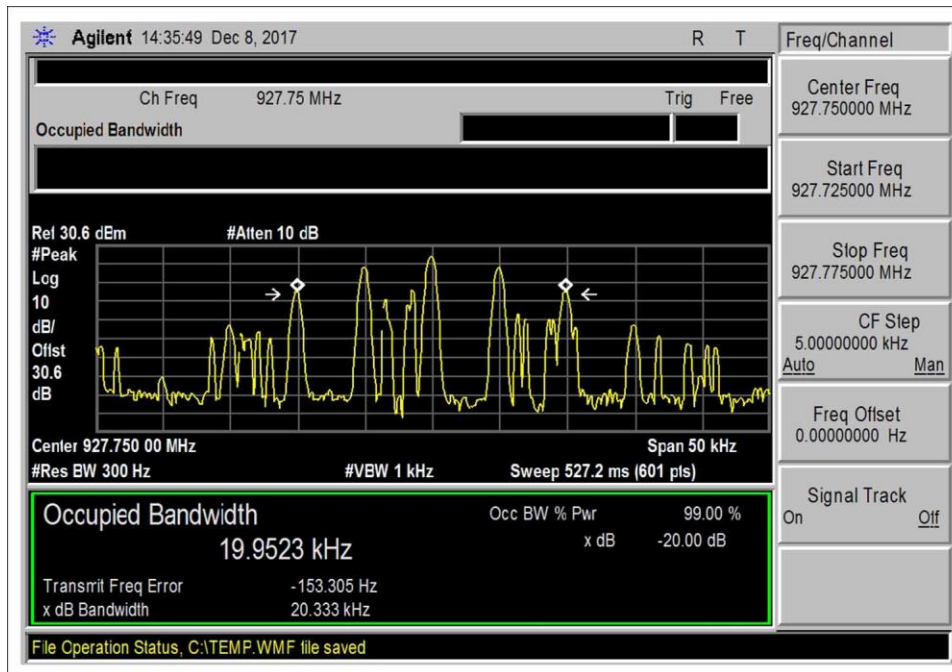
Plot(s)



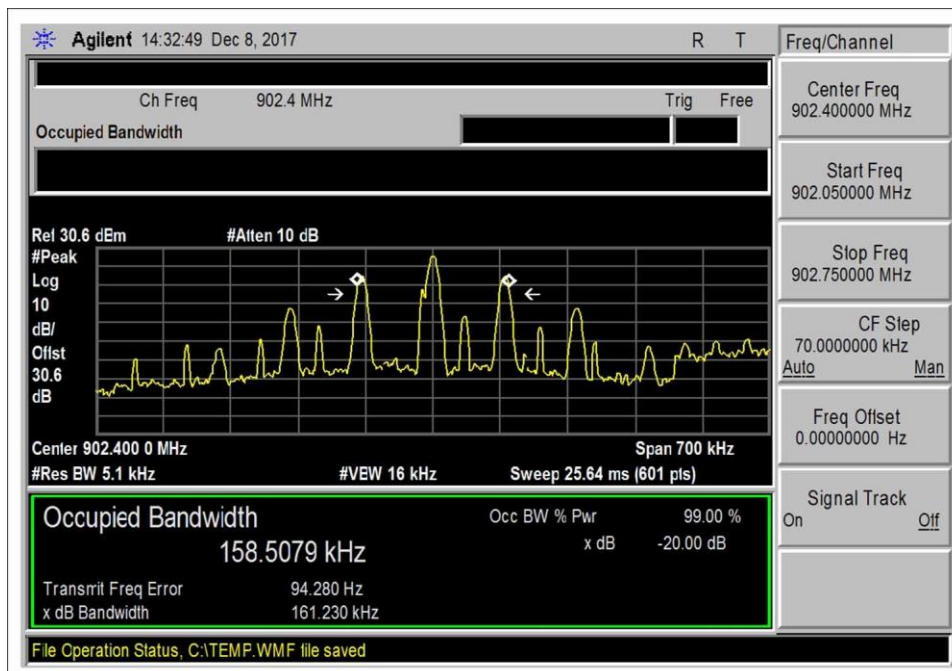
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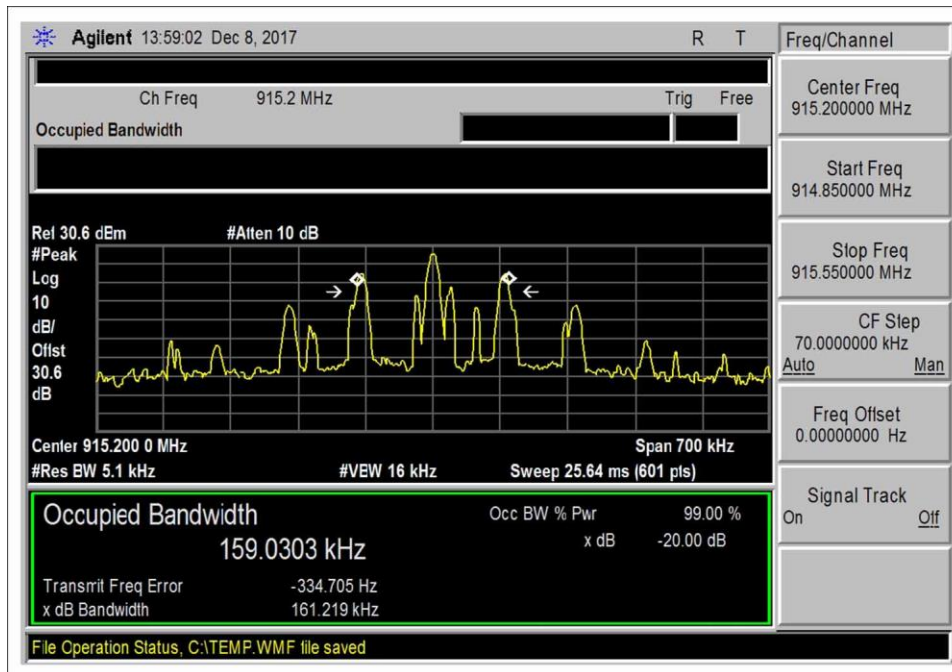
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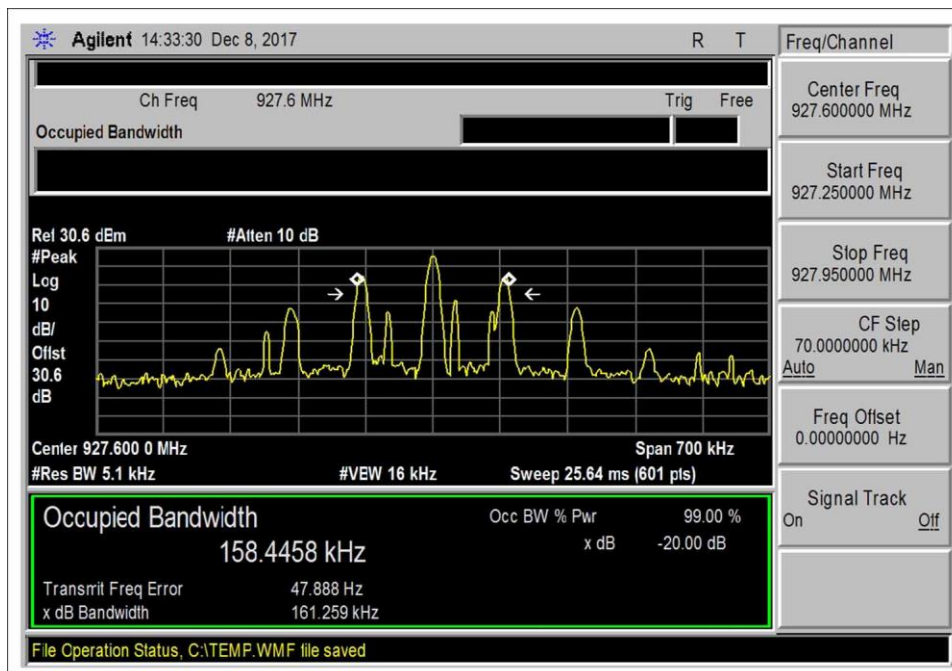
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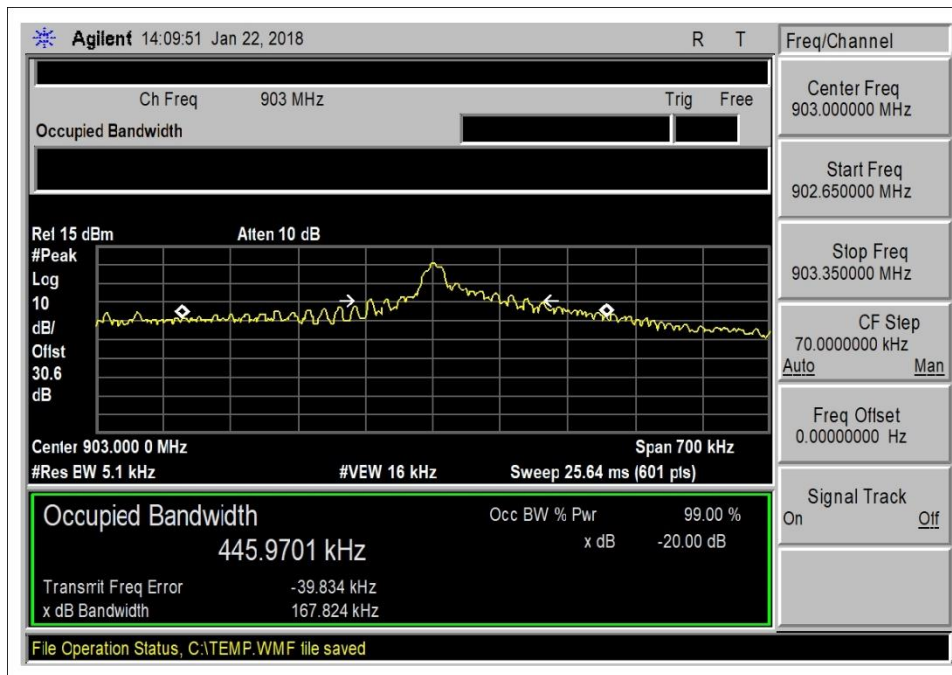
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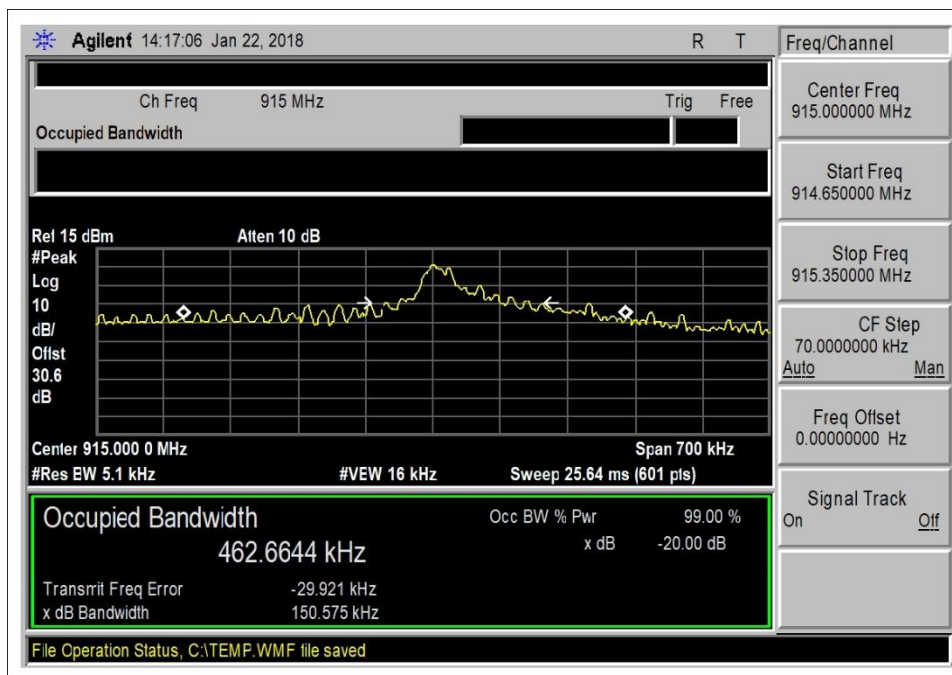
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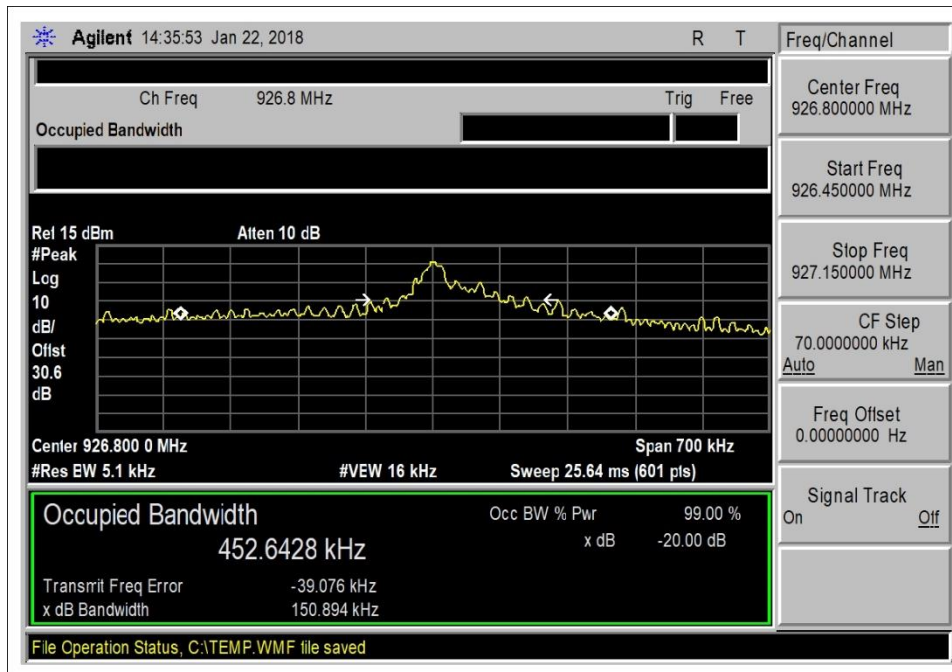
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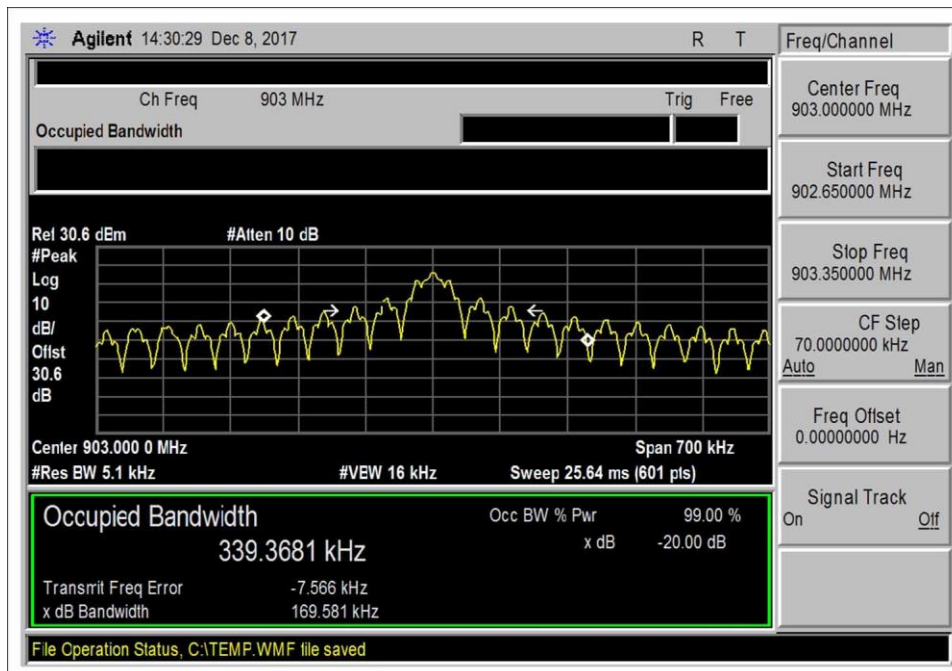
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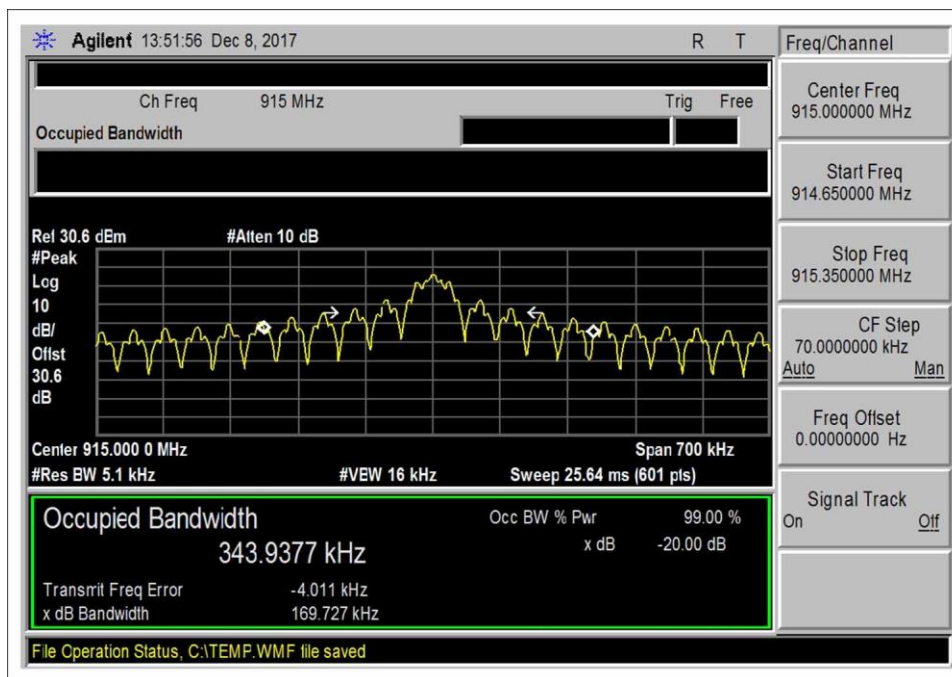
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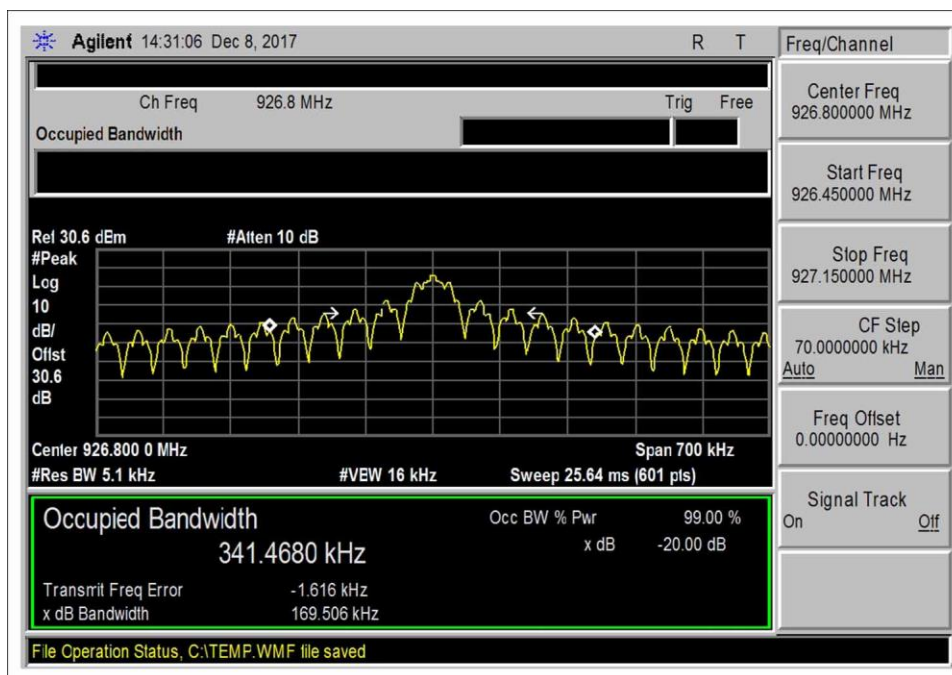
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20db_BW_OOK_pl3_lowCH



20db_BW_OOK_pl3_midCH

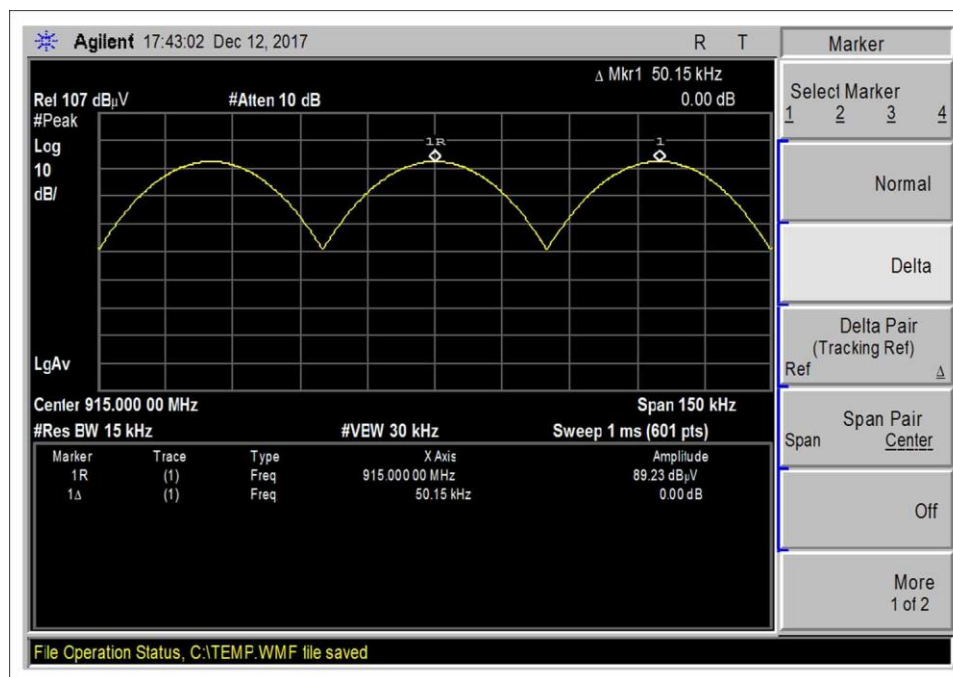


20db_BW_OOK_pl3_highCH

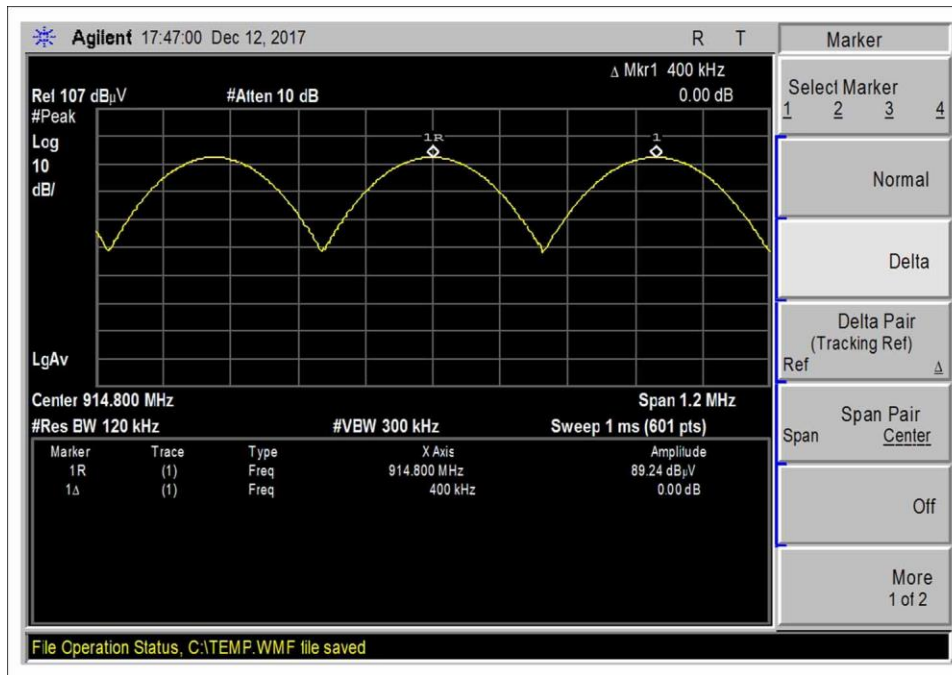
15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
V	Hopping OOK	200	>169.7	Pass
V	Hopping GFSK 10kbps	50	>25.0	Pass
V	Hopping GFSK 150kbps	400	>161.3	Pass

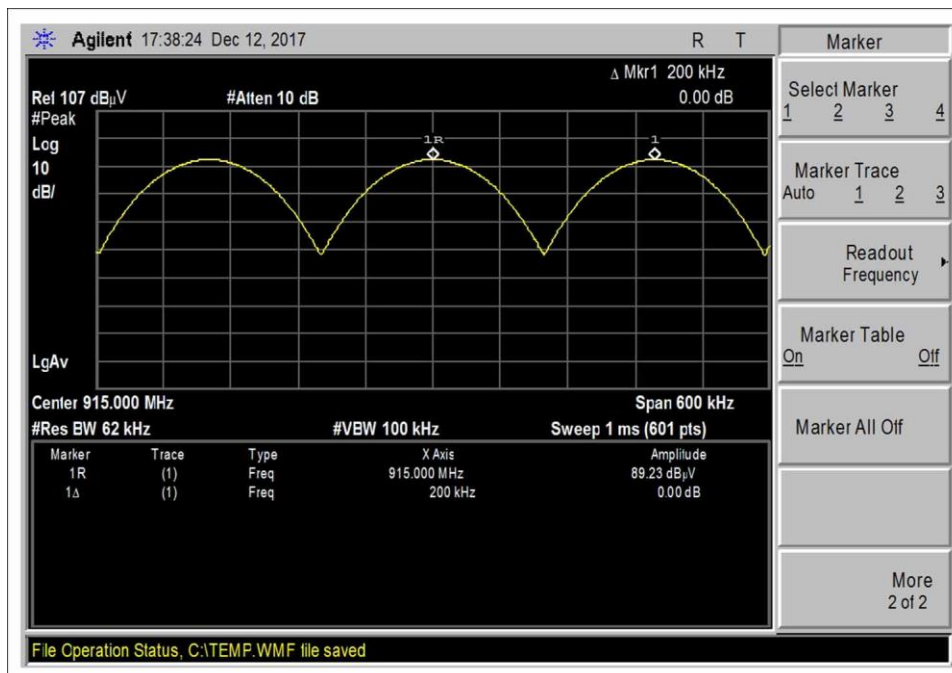
Plot(s)



GFSK_10kbps



GFSK_150kbps



OOK

15.247(a)(1)(iii) Number of Hopping Channels

Test Data Summary				
$Limit = \begin{cases} 50 \text{ Channels} & 20 \text{ dB BW} < 250 \text{ kHz} \\ 25 \text{ Channels} & 20 \text{ dB BW} \geq 250 \text{ kHz} \end{cases}$				
Antenna Port	Operational Mode	Measured (Channels)	Limit (Channels)	Results
V	Hopping OOK	120	≥ 50	Pass
V	Hopping GFSK 10kbps	512 calculated	≥ 50	Pass
V	Hopping GFSK 150kbps	64	≥ 50	Pass

GFSK 10kbps number of hopping frequencies calculation

Channel spacing is 50kHz.

Low channel is 902.2MHz

High channel is 927.75MHz

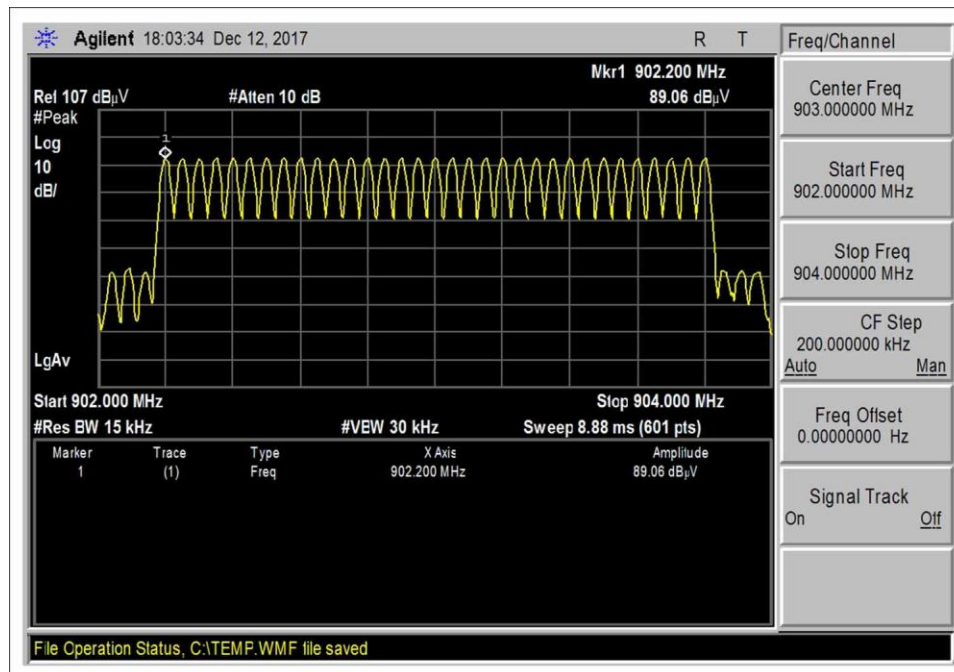
$927.75\text{MHz} - 902.2\text{MHz} = 25.55\text{MHz}$

$25.55 / 0.05 = 511$

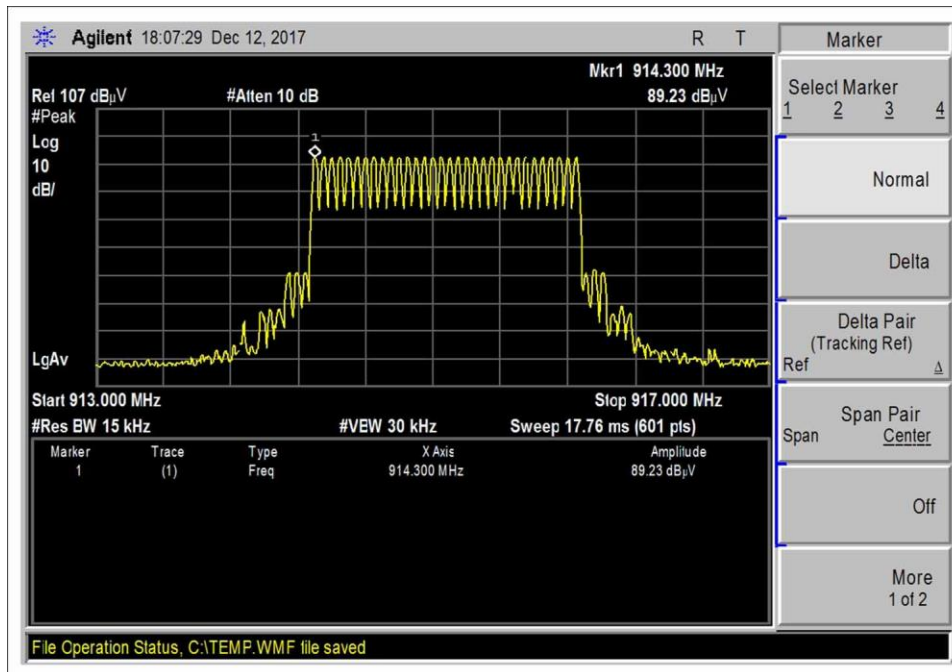
$511 + 1 = 512 \text{ channels}$

Three plots are included to show channels in the low, middle, and high frequency ranges.

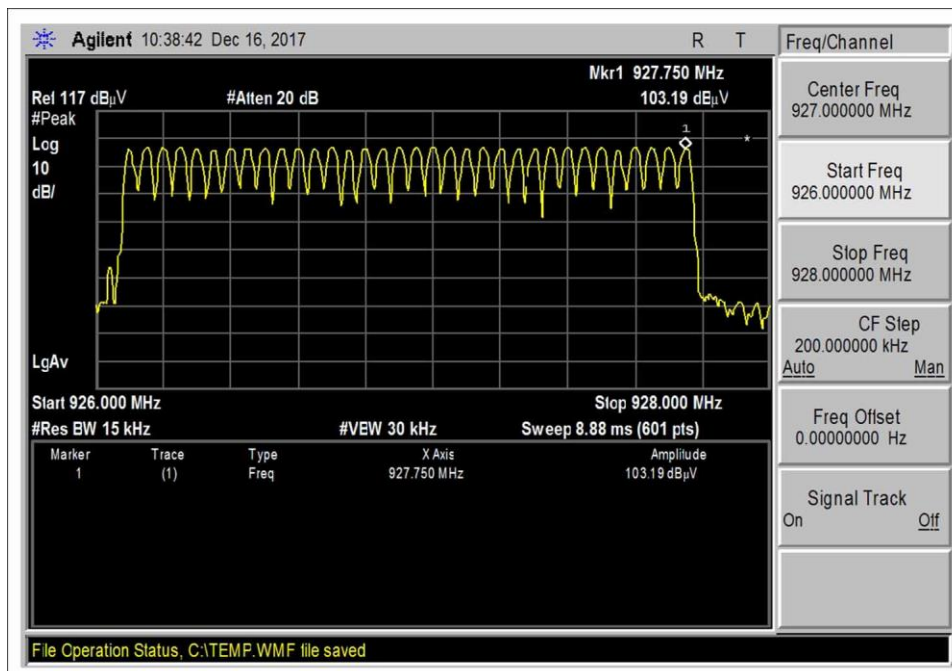
Plot(s)



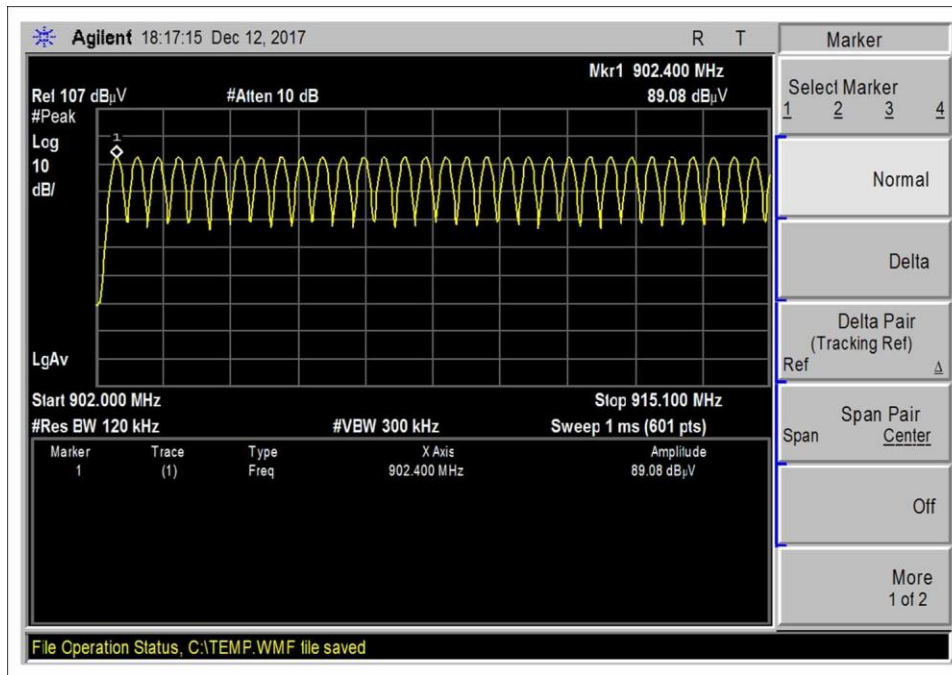
GFSK_10kbps_Low_33CH



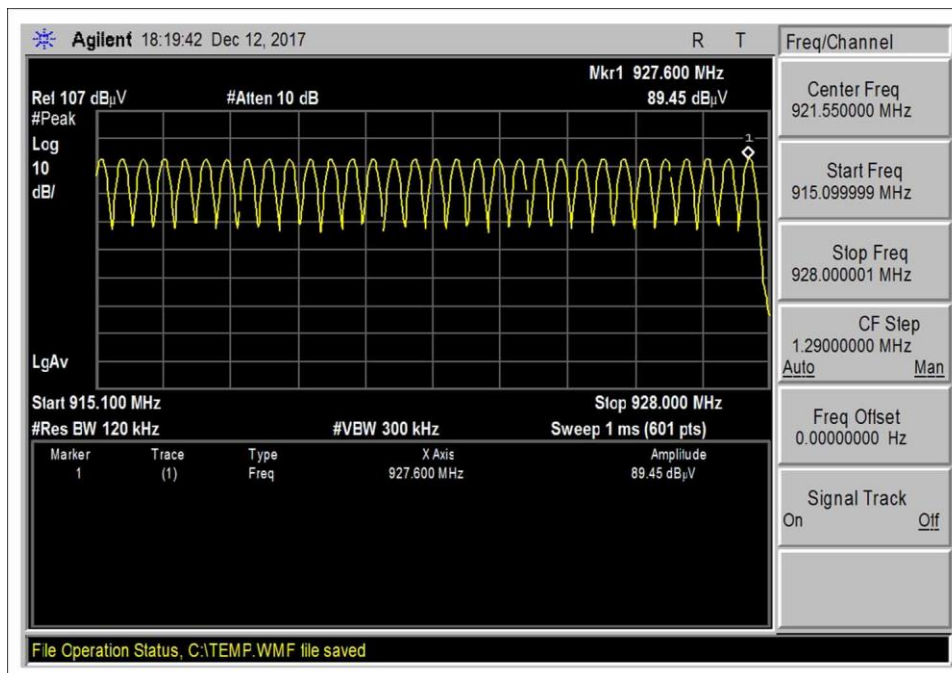
GFSK_10kbps_Middle_32CH



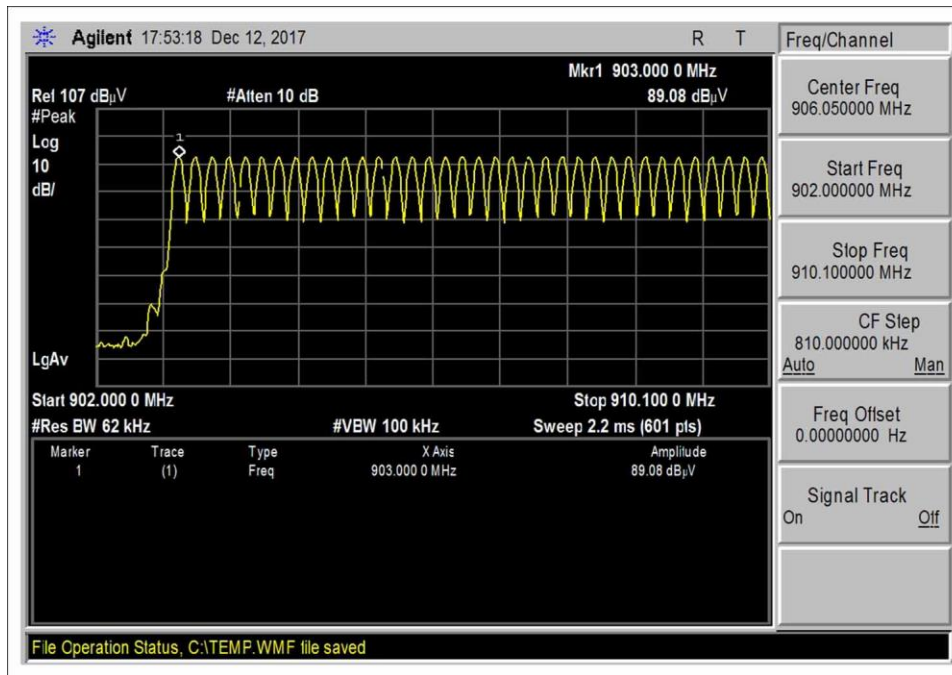
GFSK_10kbps_High_34CH



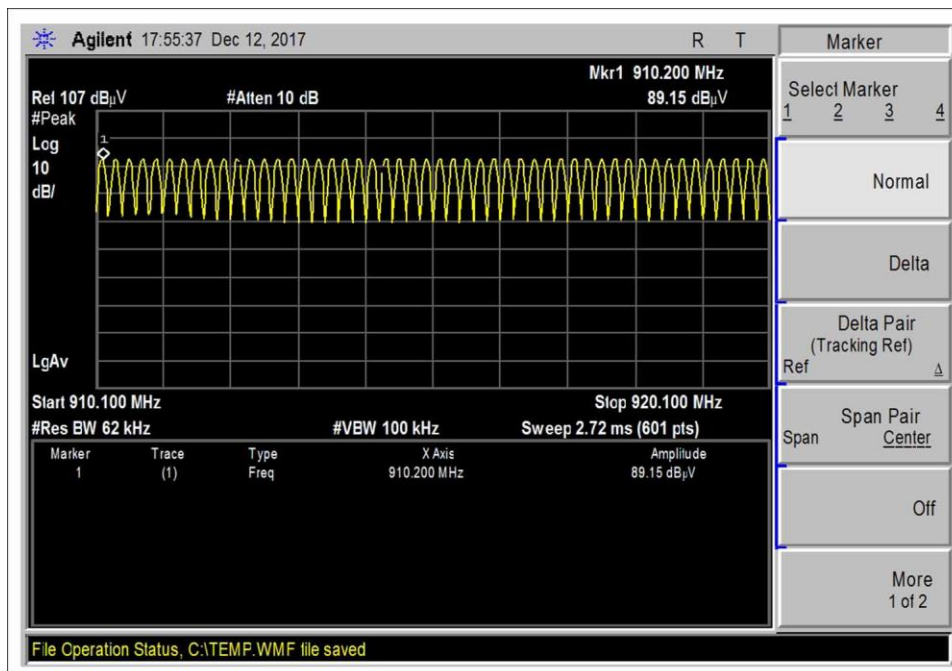
GFSK_150kbps_LowMid_32CH



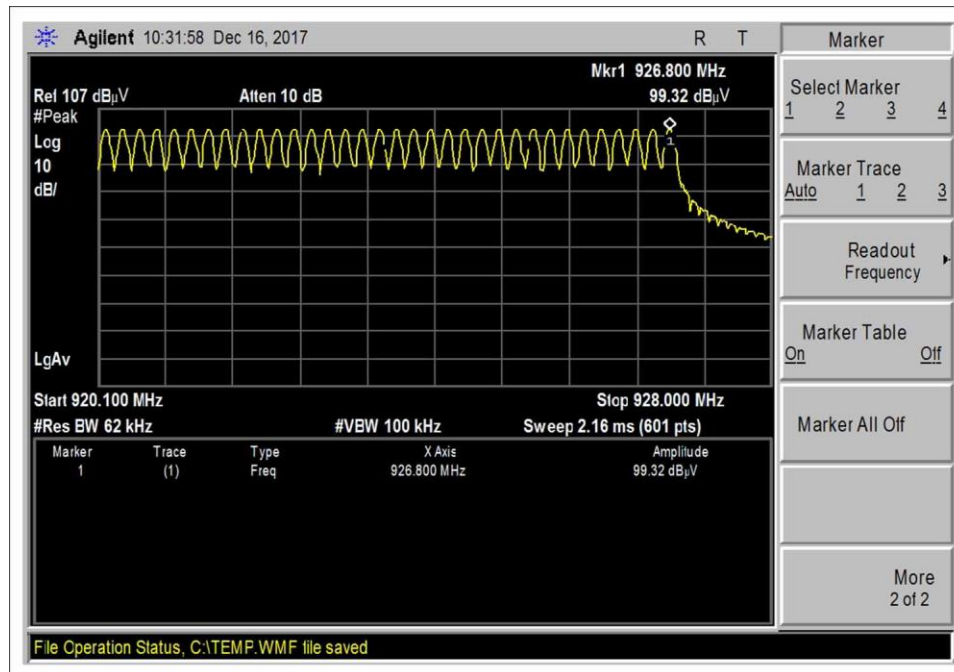
GFSK_150kbps_MidHigh_32CH



OOK_Low_36CH

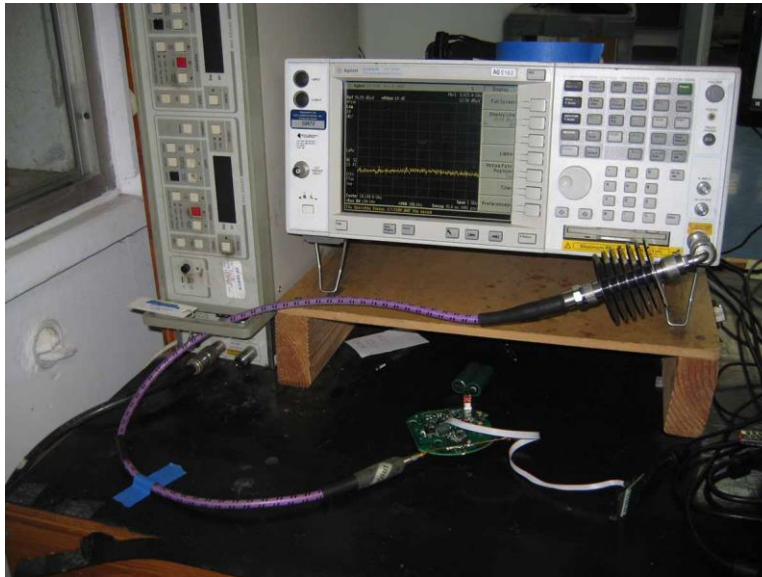


OOK_Middle_50CH



OOK_High_34CH

Test Setup Photo(s)



15.247(b)(1) Output Power

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/8/2017
Configuration:	1		
Test Setup:	The equipment under test (EUT) is placed on the tabletop. The output of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is transmitting at its rated output power.		

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	35

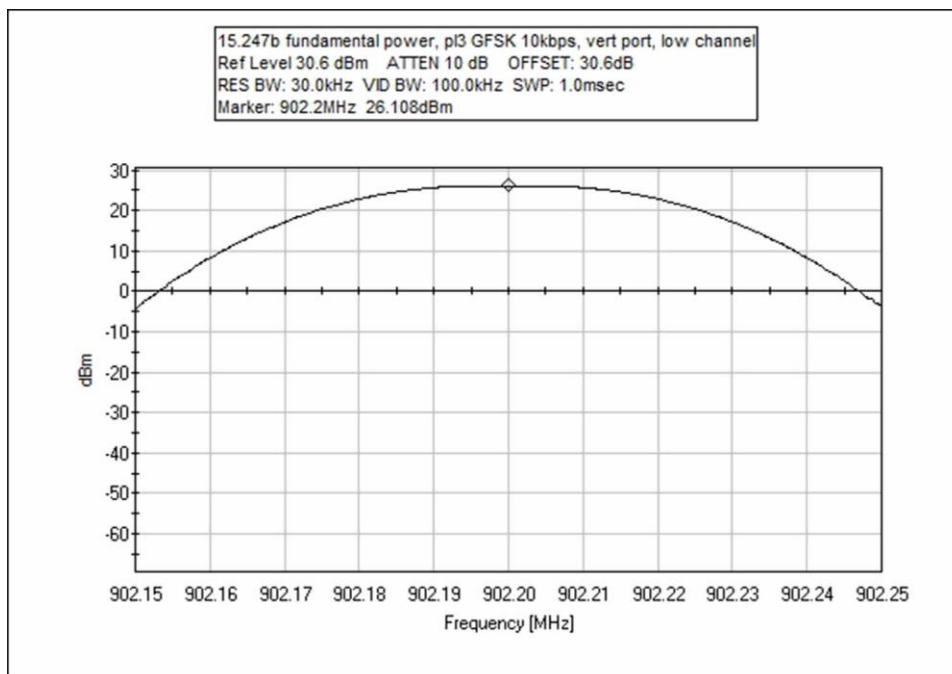
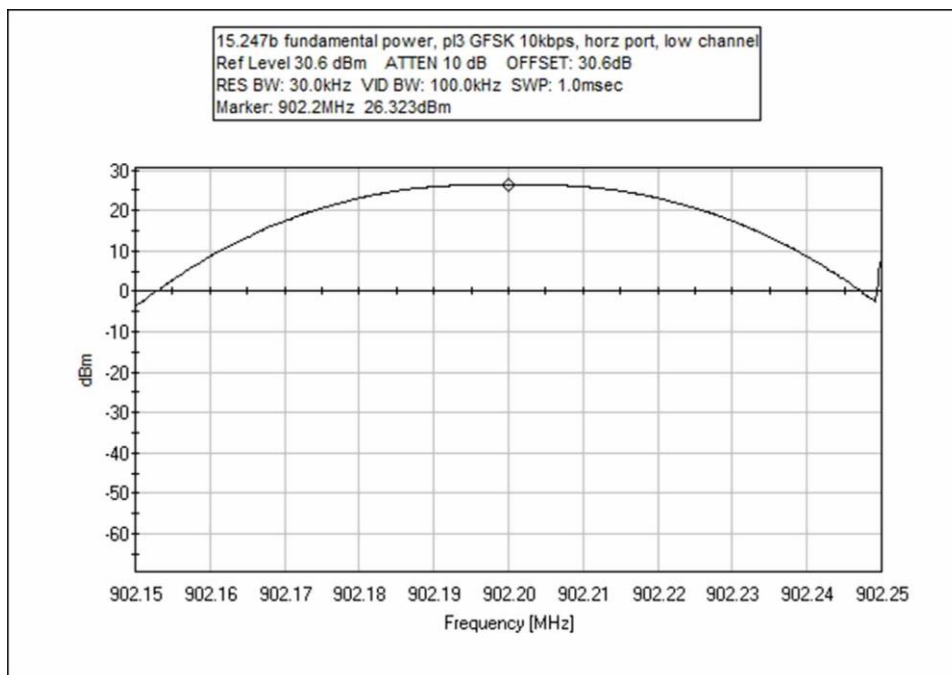
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P06664	Cable	Gore	Phaseflex FJR01N01036.0	4/5/2016	4/5/2018

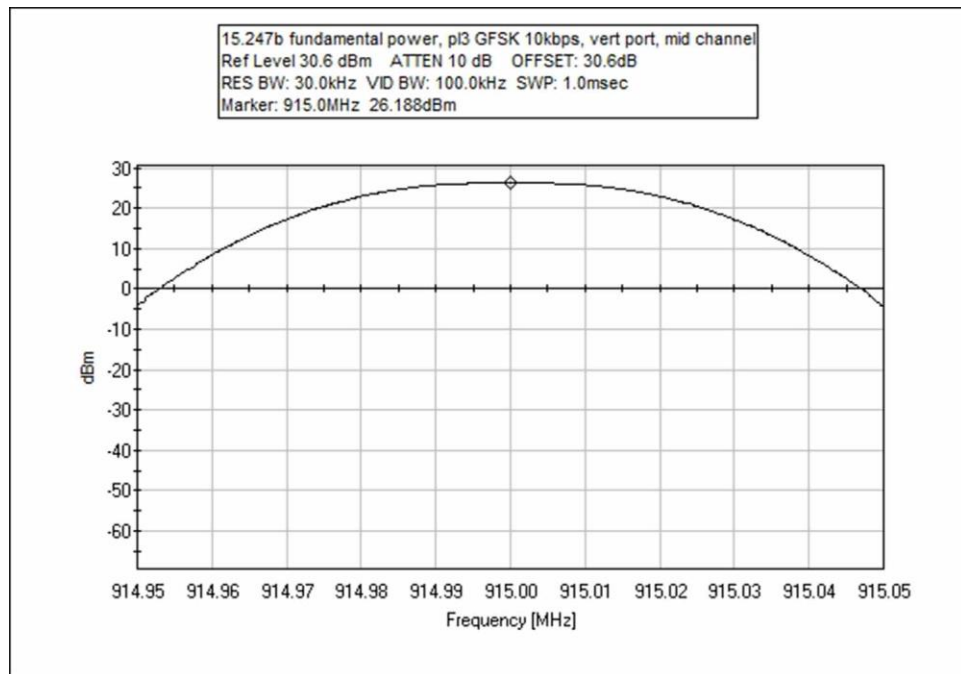
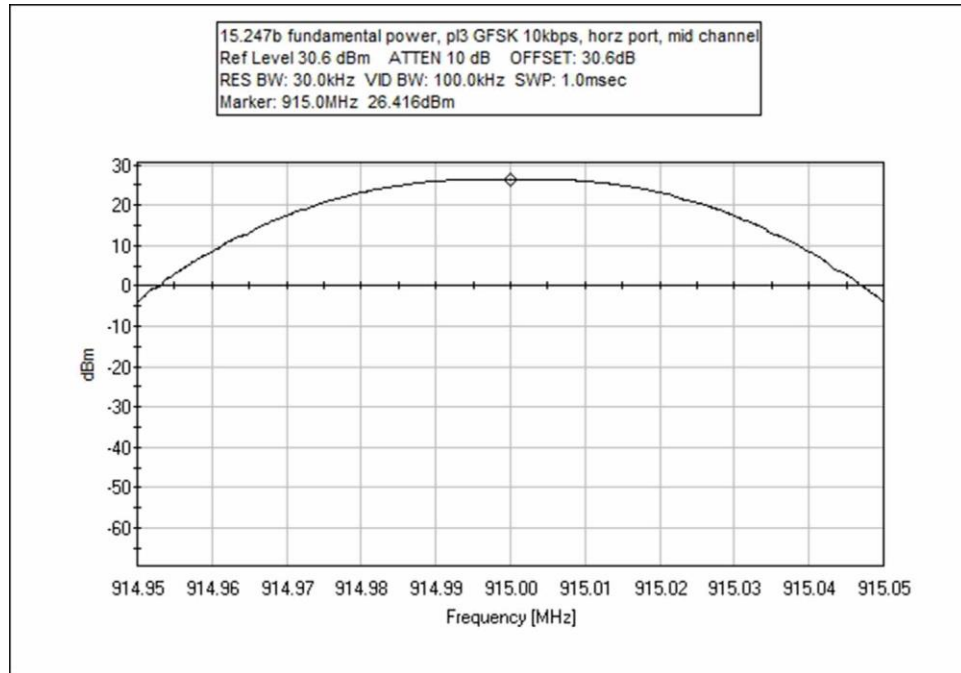
Test Data Summary - Voltage Variations

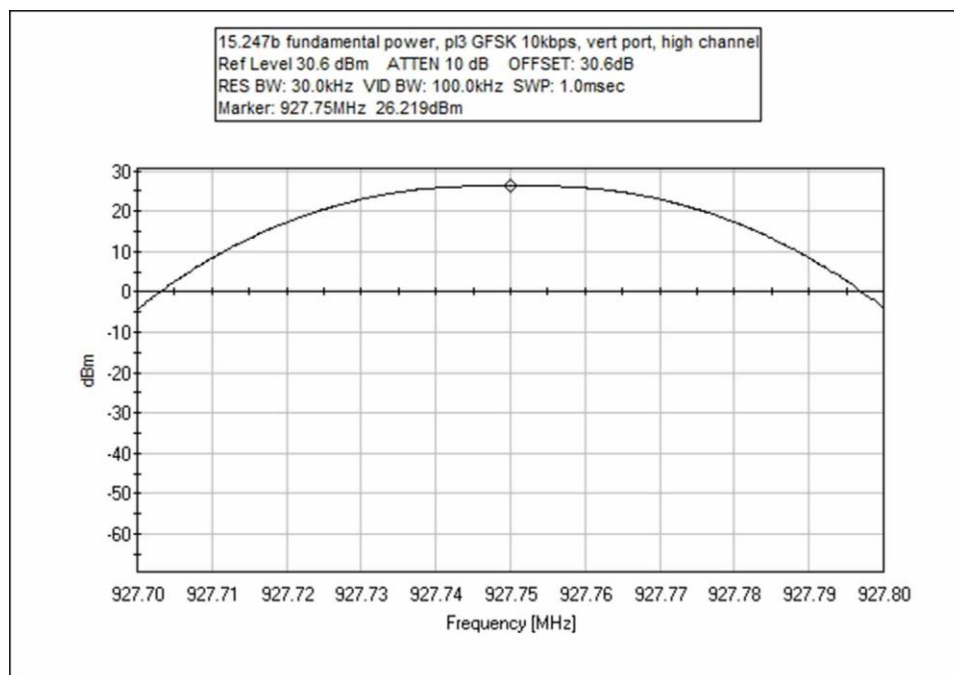
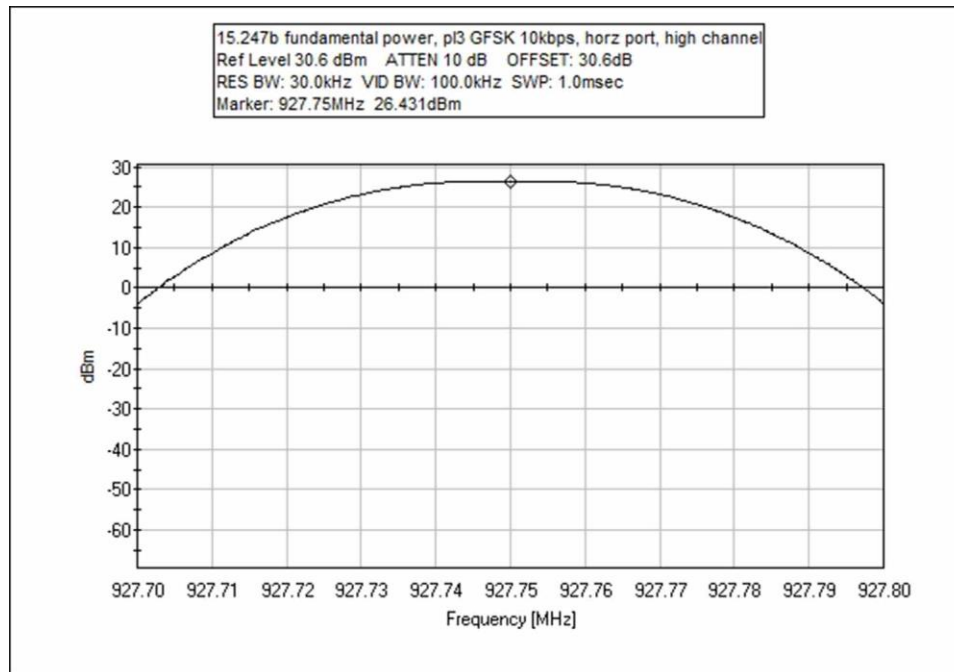
This equipment is battery powered and the manufacturer declares the equipment cannot operate while charging. Power output tests were performed using a new battery.

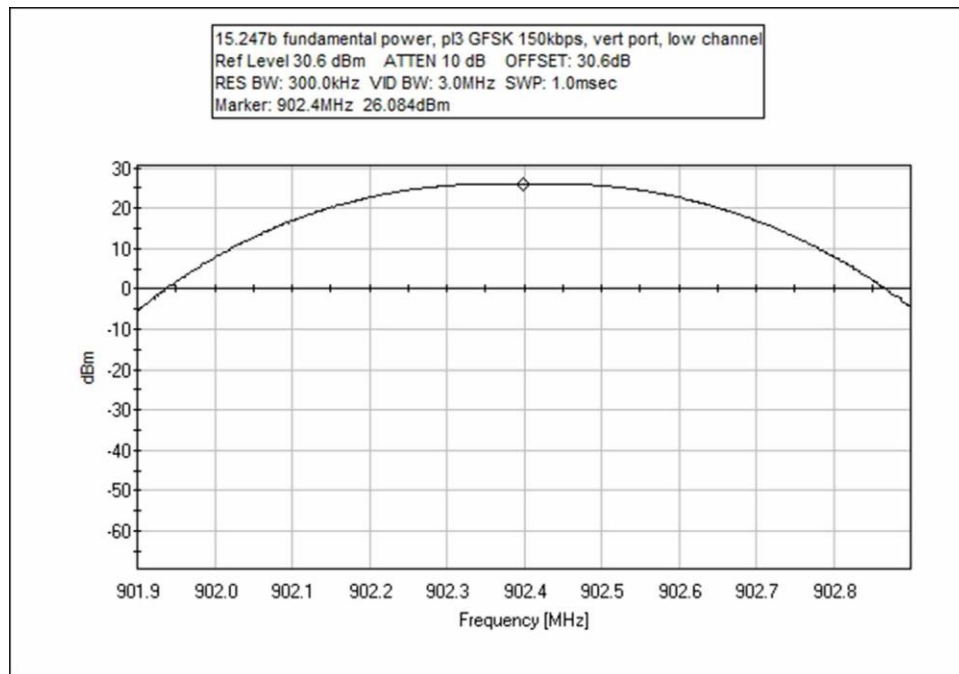
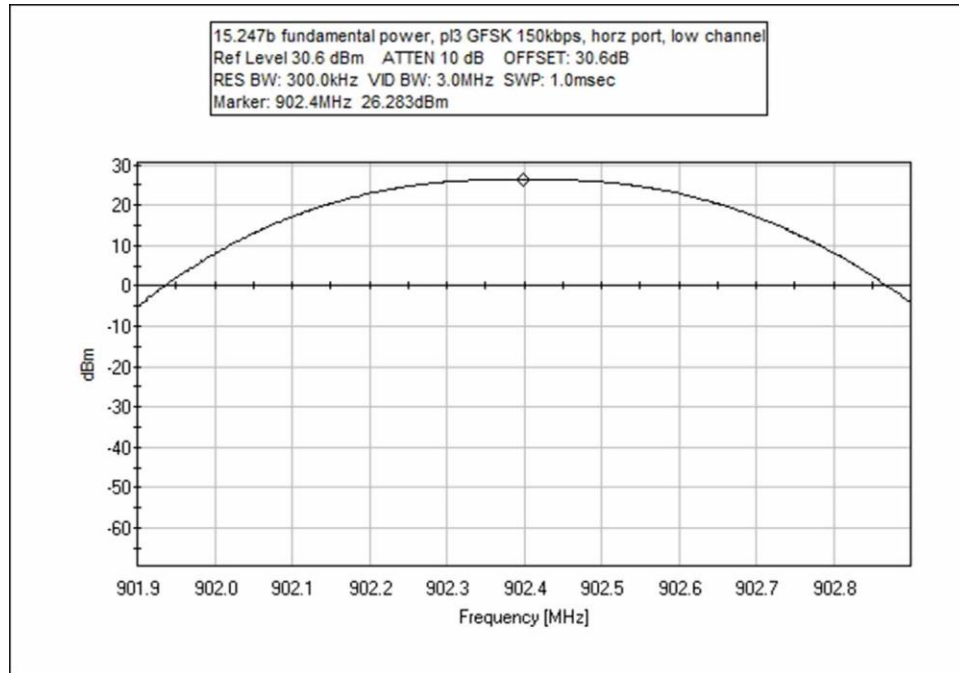
Test Data Summary - RF Conducted Measurement					
$\text{Limit} = \begin{cases} 30\text{dBm Conducted}/36\text{dBm EIRP} & \geq 50 \text{ Channels} \\ 24\text{dBm Conducted}/30\text{dBm EIRP} & < 50 \text{ Channels (min 25)} \end{cases}$					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
903	OOK pl1 / V	2.3	11.5	≤36	Pass
915	OOK pl1 / V	2.3	11.7	≤36	Pass
926.8	OOK pl1 / V	2.3	11.8	≤36	Pass
903	OOK pl3 / V	2.3	22.2	≤36	Pass
915	OOK pl3 / V	2.3	22.3	≤36	Pass
926.8	OOK pl3 / V	2.3	22.5	≤36	Pass
902.2	GFSK 10kbps pl3 / V	2.3	26.1	≤36	Pass
915	GFSK 10kbps pl3 / V	2.3	26.2	≤36	Pass
927.75	GFSK 10kbps pl3 / V	2.3	26.2	≤36	Pass
902.4	GFSK 150kbps pl3 / V	2.3	26.1	≤36	Pass
915.2	GFSK 150kbps pl3 / V	2.3	26.2	≤36	Pass
927.6	GFSK 150kbps pl3 / V	2.3	26.2	≤36	Pass
903	OOK pl1 / H	0.1	11.6	≤36	Pass
915	OOK pl1 / H	0.1	11.8	≤36	Pass
926.8	OOK pl1 / H	0.1	12.0	≤36	Pass
903	OOK pl3 / H	0.1	22.4	≤36	Pass
915	OOK pl3 / H	0.1	22.6	≤36	Pass
926.8	OOK pl3 / H	0.1	22.9	≤36	Pass
902.2	GFSK 10kbps pl3 / H	0.1	26.3	≤36	Pass
915	GFSK 10kbps pl3 / H	0.1	26.4	≤36	Pass
927.75	GFSK 10kbps pl3 / H	0.1	26.4	≤36	Pass
902.4	GFSK 150kbps pl3 / H	0.1	26.3	≤36	Pass
915.2	GFSK 150kbps pl3 / H	0.1	26.4	≤36	Pass
927.6	GFSK 150kbps pl3 / H	0.1	26.4	≤36	Pass

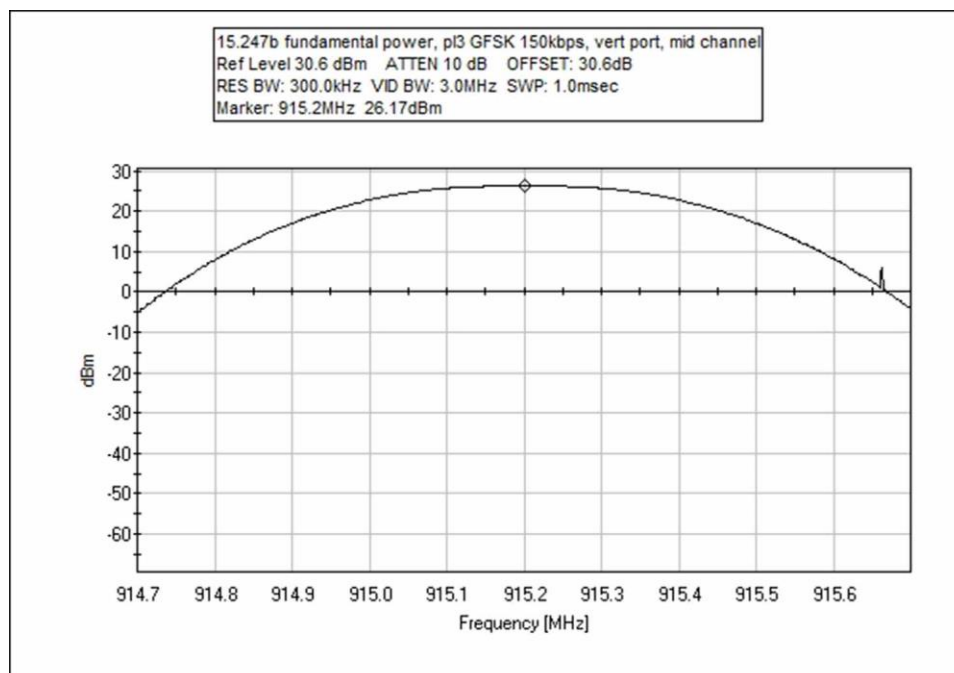
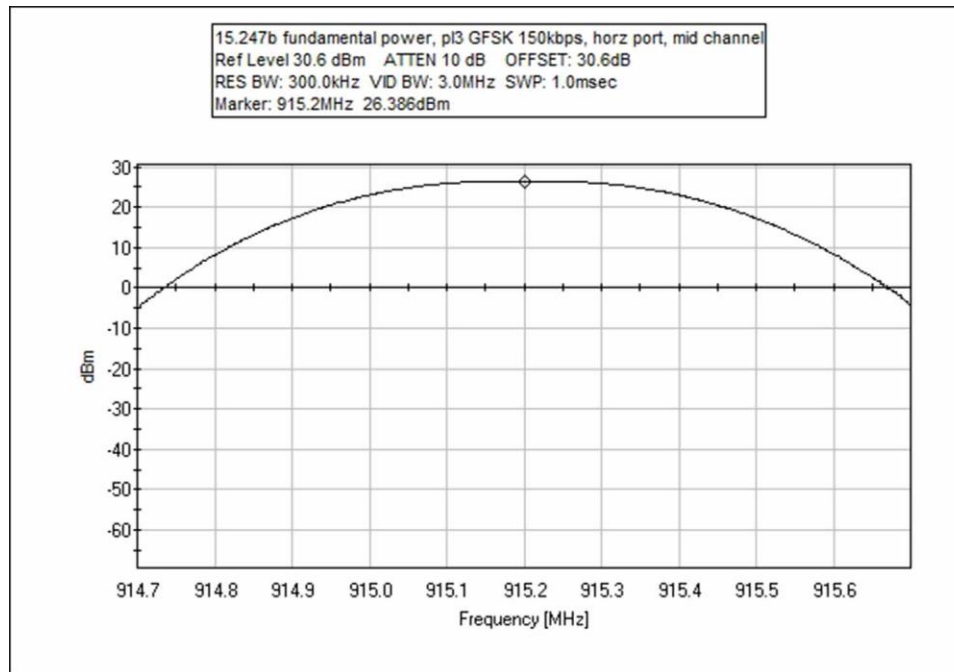
Plots

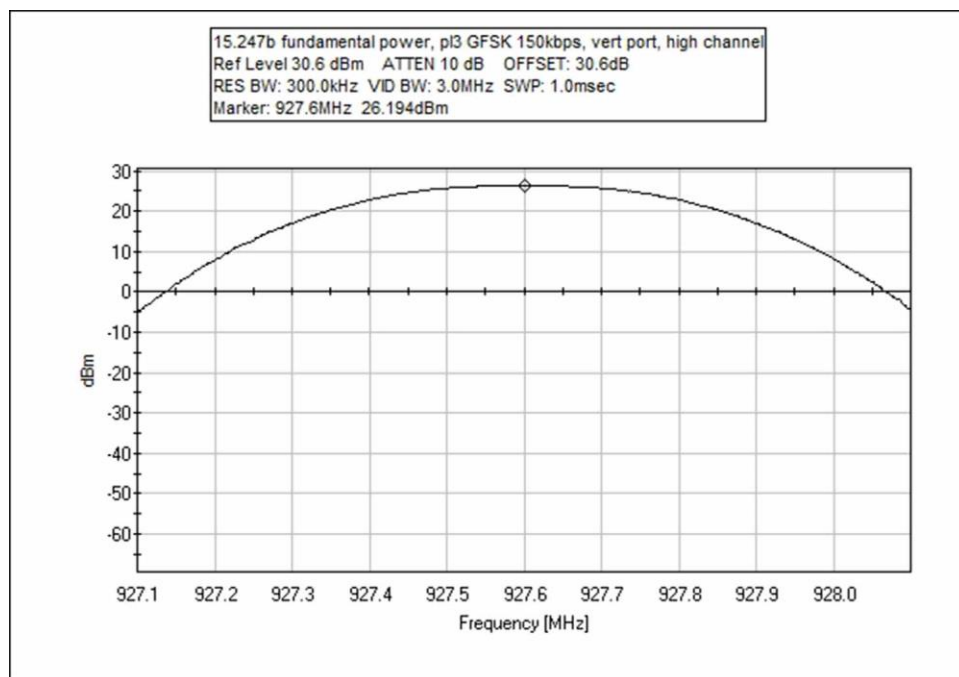
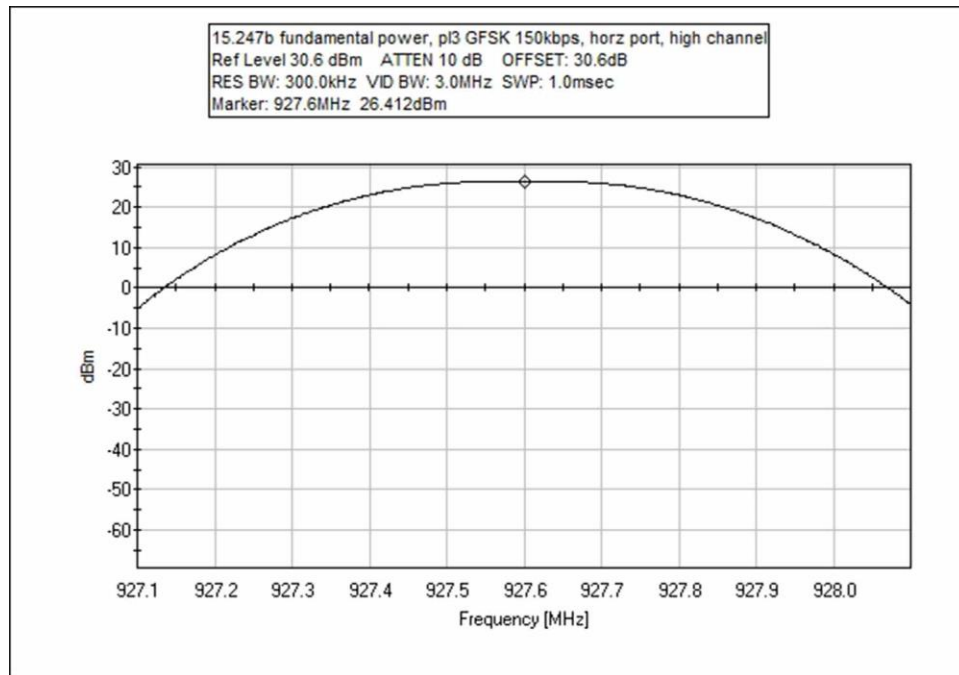


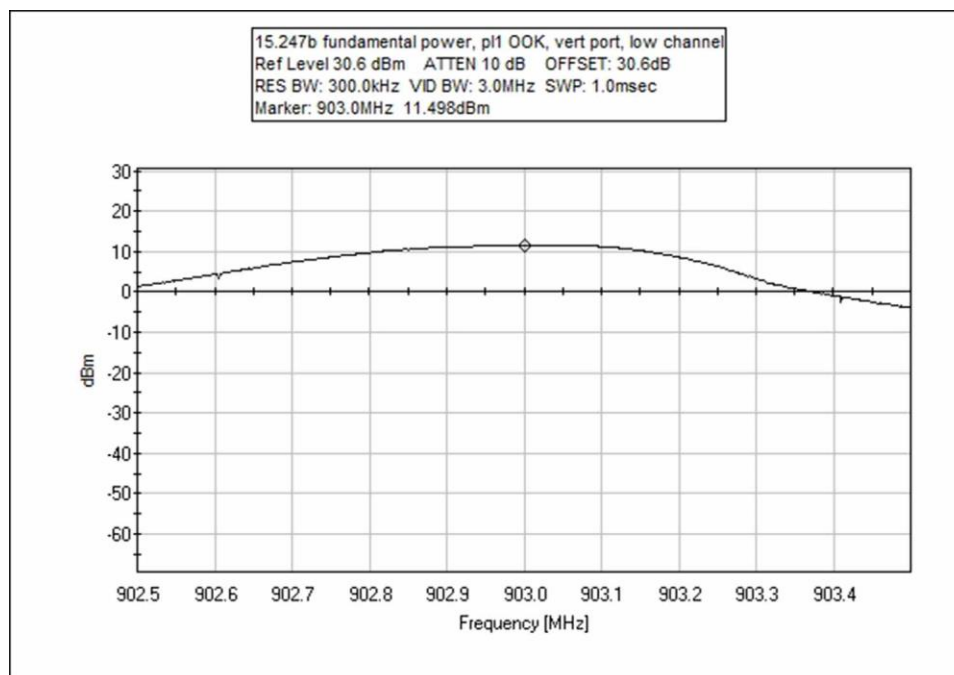
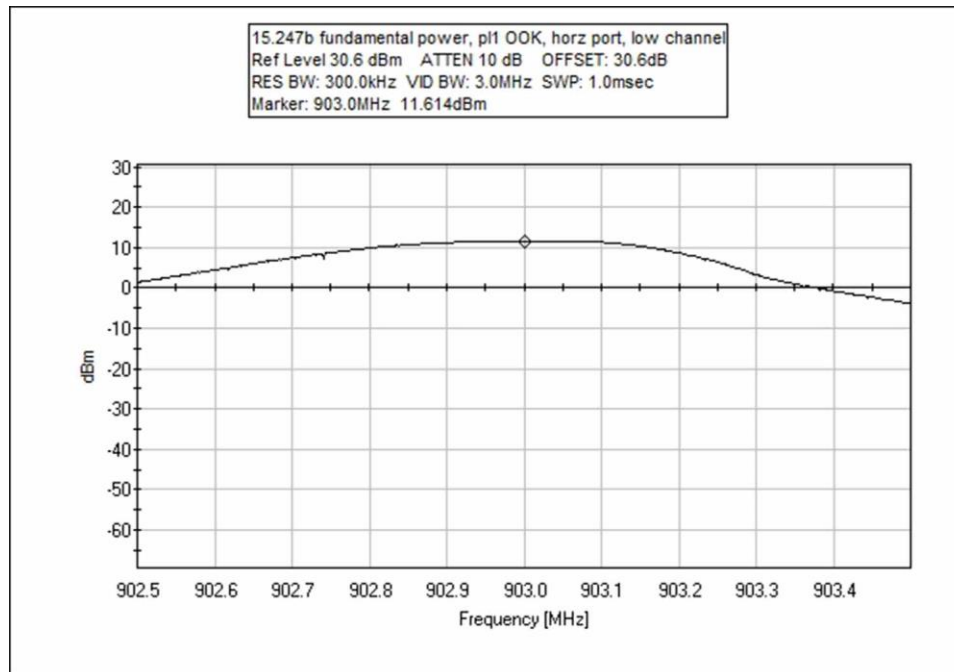


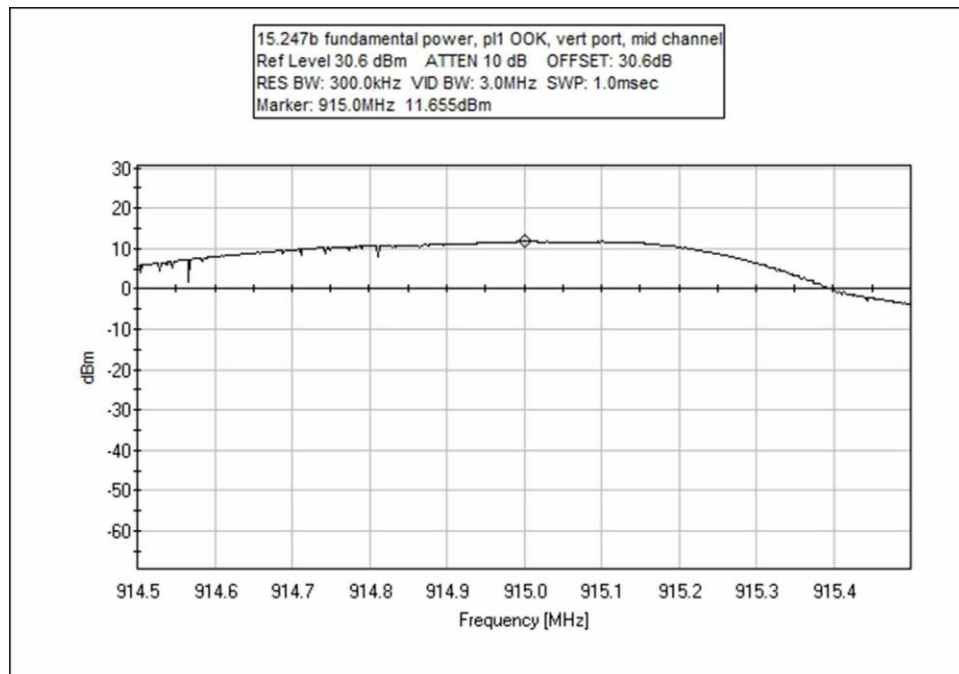
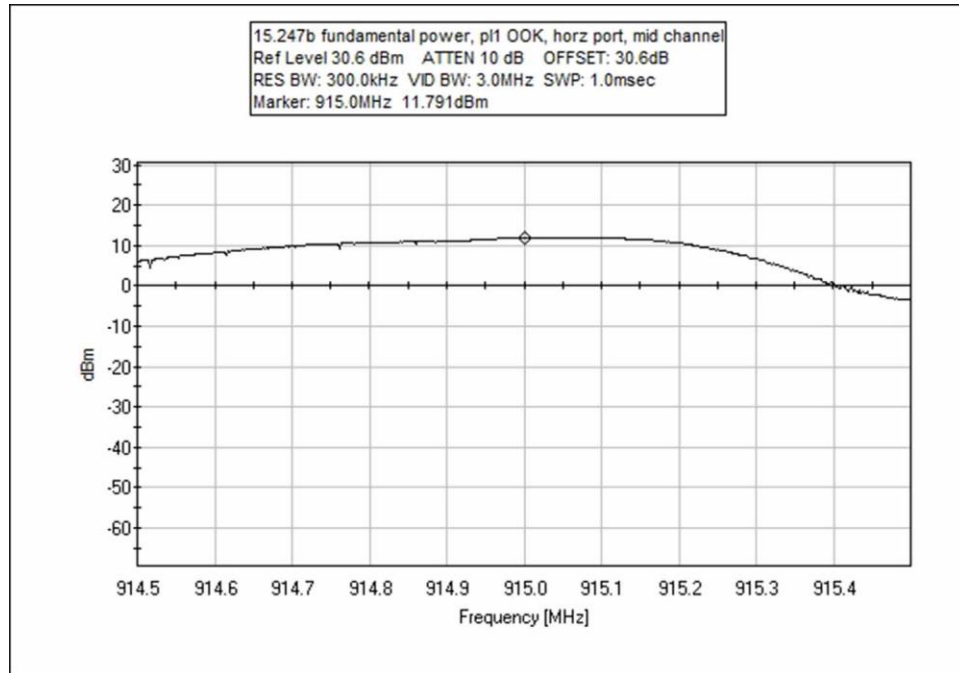


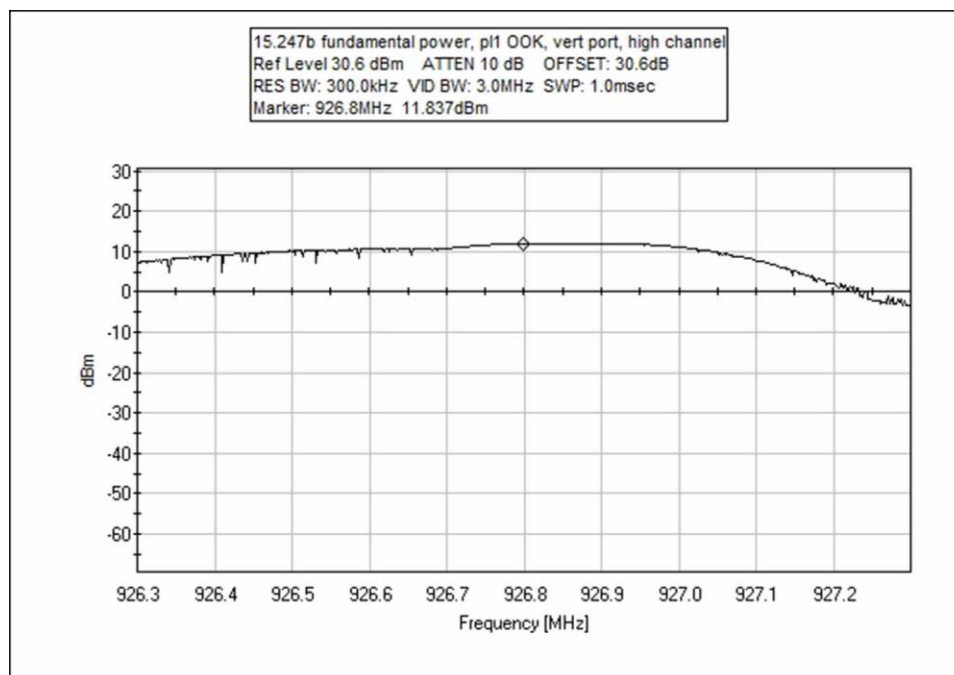
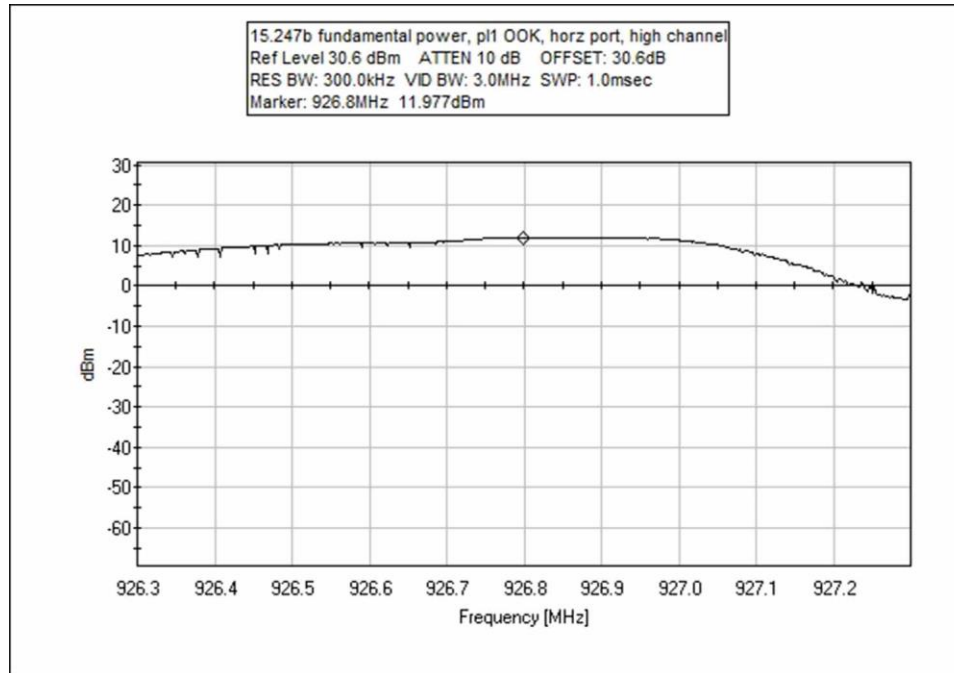


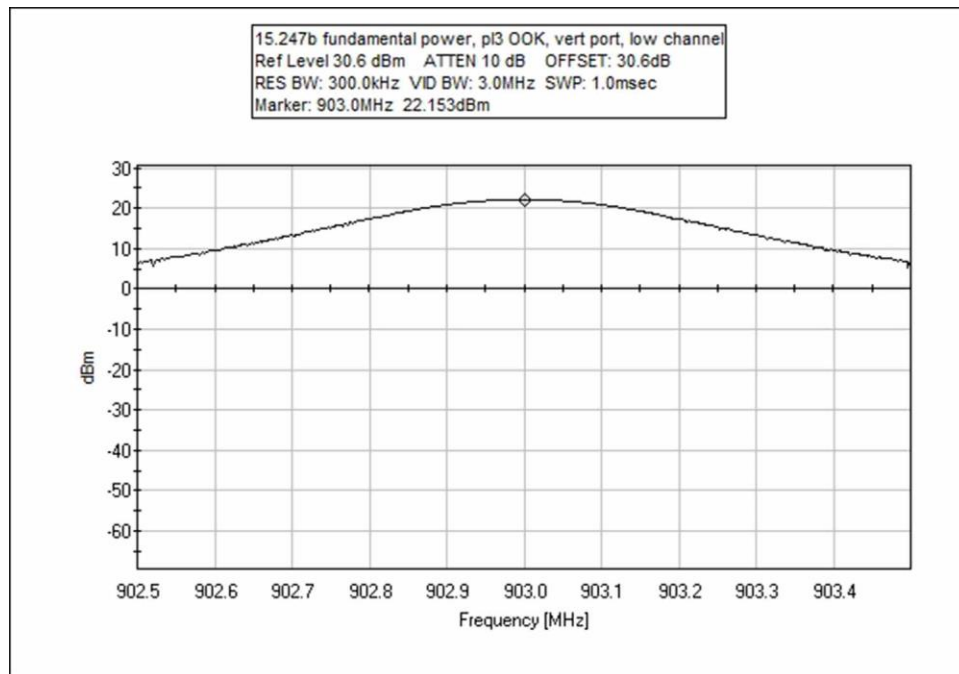
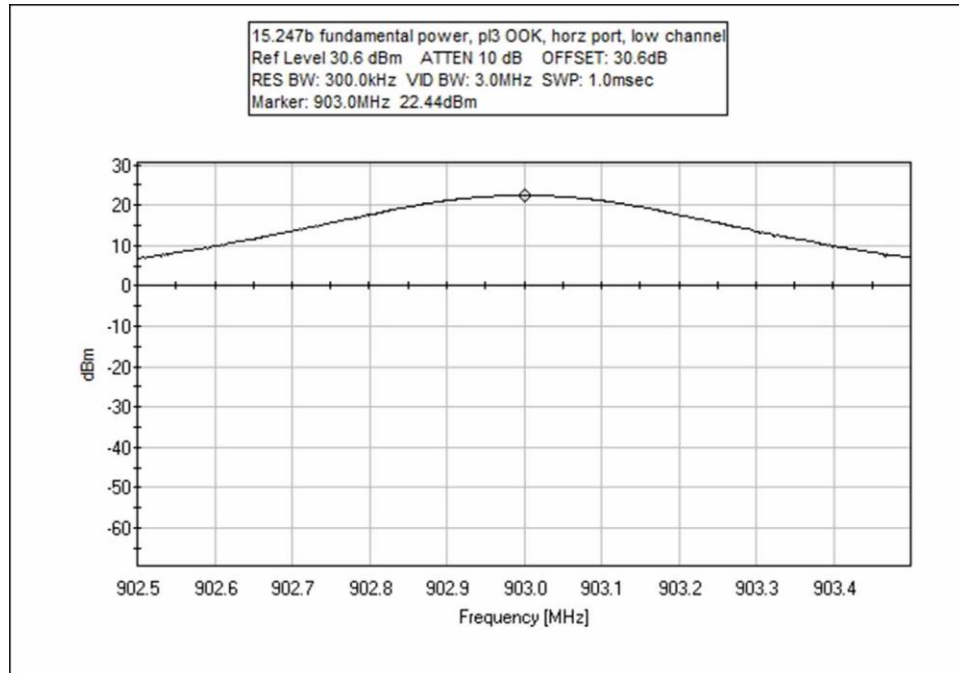


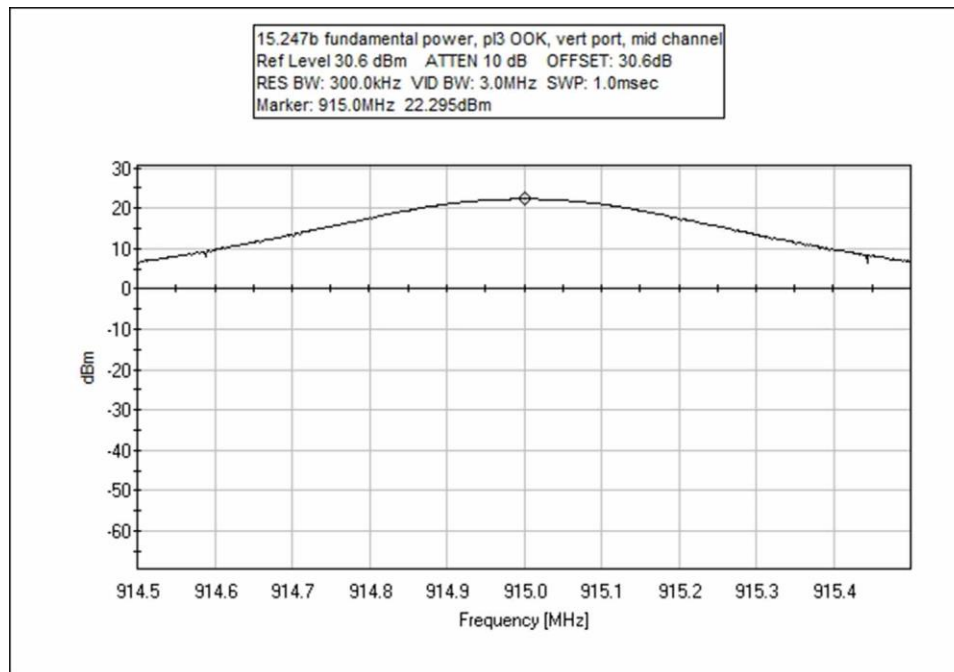
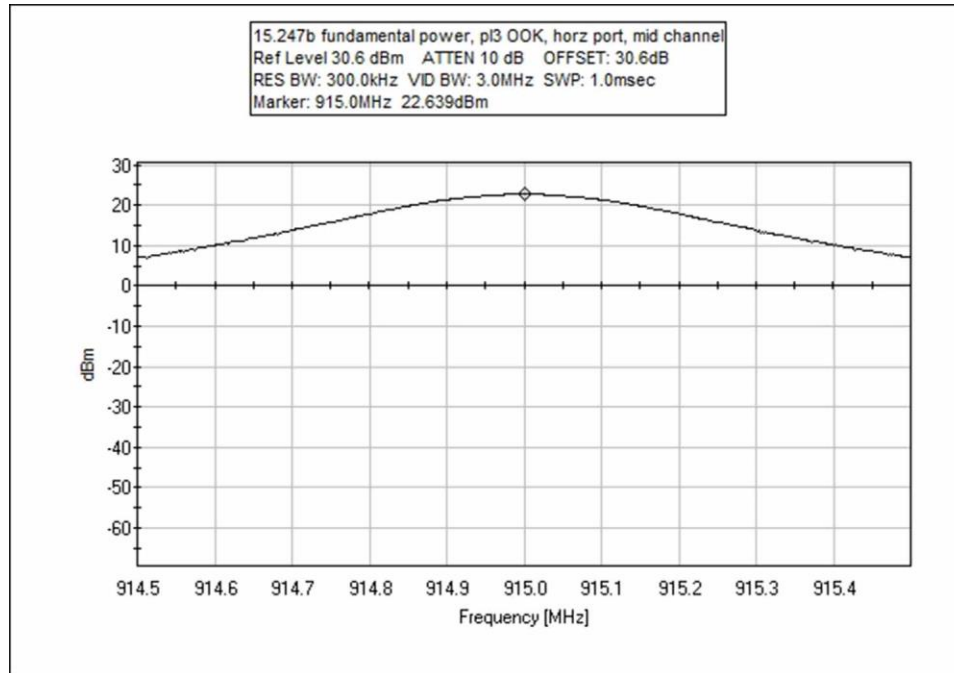


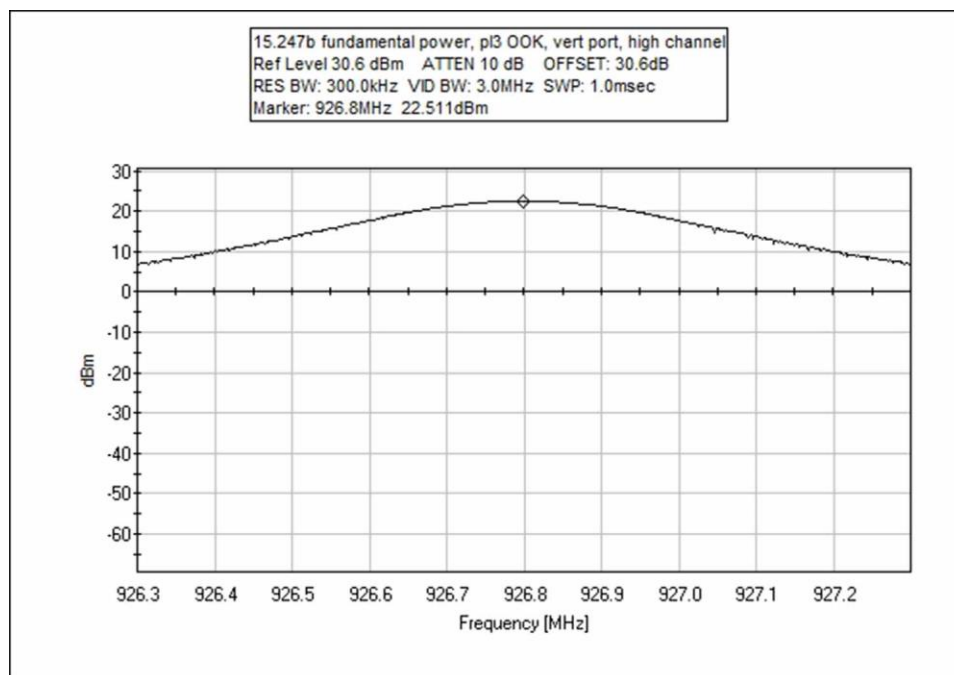
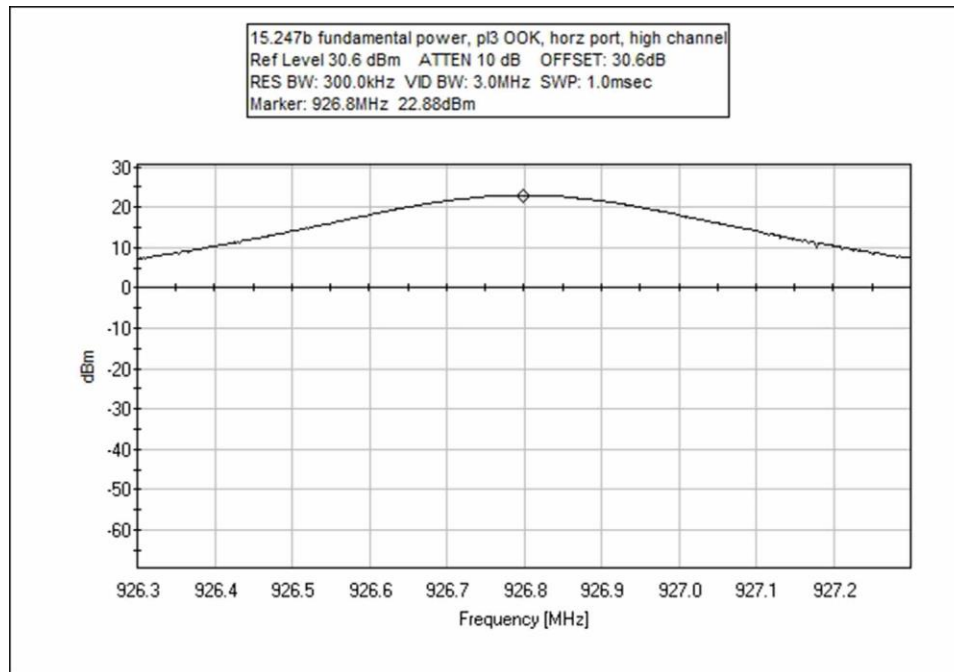












Test Setup Photo(s)

