

# Ittron, Inc.

## TEST REPORT FOR

**ORRNC**  
**Model: RN-EGM**

### Tested to The Following Standards:

**FCC Part 15 Subpart C Section(s)**

**15.207 & 15.247**  
**(FHSS 902-928 MHz)**

**Report No.: 103786-4**

**Date of issue: June 24, 2020**



**Test Certificate # 803.01**

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 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: 205550

**DATE OF EQUIPMENT RECEIPT:**

**DATE(S) OF TESTING:**

**REPORT PREPARED BY:**

Darcy Thompson  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 103786

April 27, 2020

April 27 – May 15, 2020

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, 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.



**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.  
22116 23rd Drive S.E., Suite A  
Canyon Park, Bothell, WA 98021

## Software Versions

| CKC Laboratories Proprietary Software | Version |
|---------------------------------------|---------|
| EMITest Emissions                     | 5.03.12 |

## Site Registration & Accreditation Information

| Location                 | *NIST CB # | FCC    | Japan  |
|--------------------------|------------|--------|--------|
| Canyon Park, Bothell, WA | US0081     | US1022 | A-0136 |
| Brea, CA                 | US0060     | US1025 | A-0136 |
| Fremont, CA              | US0082     | US1023 | A-0136 |
| Mariposa, CA             | US0103     | US1024 | A-0136 |

\*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

## 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    |
| 15.207          | AC Conducted Emissions             | NA            | Pass    |

NA = Not Applicable

NP = CKC Laboratories was not contracted to perform test. See Section for manufacturer declaration.

#### ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

## 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)

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   |
|--------|--------------|---------|-------|
| ORRNC  | Itron, Inc.  | RN-EGM  | FCC-1 |

#### Support Equipment:

| Device                | Manufacturer | Model #       | S/N |
|-----------------------|--------------|---------------|-----|
| Antenna (Transceiver) | PCTEL        | BOA9022NM-ITR | NA  |
| Antenna (Receiver)    | PCTEL        | BOA9025NM-ITR | NA  |

### Configuration 2

#### Equipment Tested:

| Device | Manufacturer | Model # | S/N   |
|--------|--------------|---------|-------|
| ORRNC  | Itron, Inc.  | RN-EGM  | FCC-1 |

#### Support Equipment:

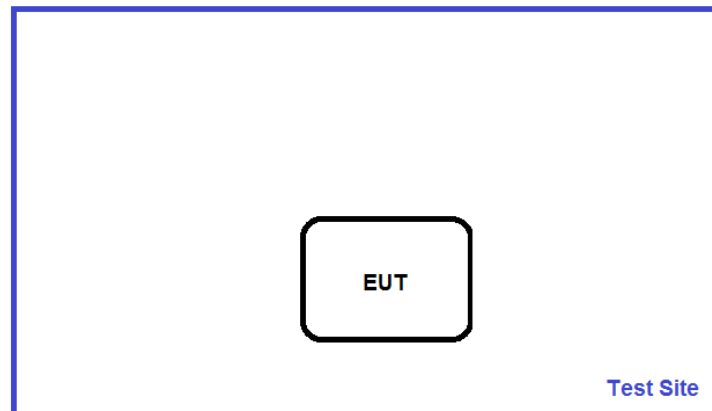
| Device                  | Manufacturer | Model #     | S/N |
|-------------------------|--------------|-------------|-----|
| Laptop                  | HP           | 14-dq1033cl | NA  |
| AC Adapter (For Laptop) | HP           | L25296-002  | NA  |

### General Product Information:

| Product Information                     | Manufacturer-Provided Details                                                                                                                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment Type:                         | Stand-Alone Equipment                                                                                                                                         |
| Type of Wideband System:                | Proprietary FHSS                                                                                                                                              |
| Operating Frequency Range:              | 902.4 to 927.6MHz                                                                                                                                             |
| Number of Hopping Channels:             | 64                                                                                                                                                            |
| Receiver Bandwidth and Synchronization: | The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter. |
| Modulation Type(s):                     | 50kbps, 150kbps GFSK<br>6.25kbps, 12.5kbps OQPSK<br>200kbps, 600kbps OFDM                                                                                     |
| Maximum Duty Cycle:                     | Assume 100% as worst case                                                                                                                                     |
| Number of TX Chains:                    | 1                                                                                                                                                             |
| Antenna Type(s) and Gain:               | Omnidirectional, 2.6dBI                                                                                                                                       |
| Beamforming Type:                       | NA                                                                                                                                                            |
| Antenna Connection Type:                | External Connector (Professional Installation)                                                                                                                |
| Nominal Input Voltage:                  | 115VAC Nominal (85-264VAC supported)                                                                                                                          |
| Firmware / Software used for Test:      | BrtLoader v4.8.5.4<br>Certification GUI vUpdate2<br>Test FW 0.0.0.0 (current as of 4/27/2020)                                                                 |

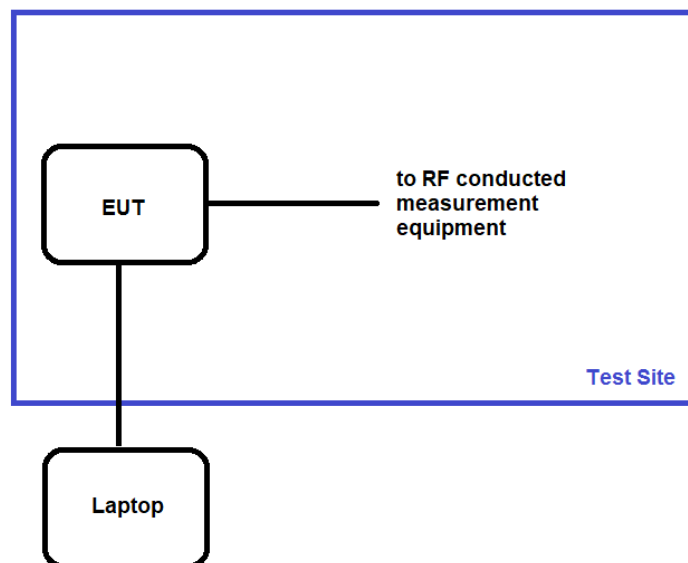
**Block Diagram of Test Setup(s)**

**Test Setup Block Diagram**



Configuration 1

**Test Setup Block Diagram**



Configuration 2

## FCC Part 15 Subpart C

### 15.247(a) Transmitter Characteristics

| Test Setup/Conditions |                                                                                                                                                                                                                |                |                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------|
| Test Location:        | Bothell Lab C3                                                                                                                                                                                                 | Test Engineer: | M. Atkinson            |
| Test Method:          | ANSI C63.10 (2013)                                                                                                                                                                                             | Test Date(s):  | 4/27/2020 to 4/28/2020 |
| Configuration:        | 2                                                                                                                                                                                                              |                |                        |
| 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)         | 24 | Relative Humidity (%): | 39 |

| Test Equipment |                   |              |           |            |            |
|----------------|-------------------|--------------|-----------|------------|------------|
| Asset#         | Description       | Manufacturer | Model     | Cal Date   | Cal Due    |
| 02872          | Spectrum Analyzer | Agilent      | E4440A    | 11/18/2019 | 11/18/2021 |
| P05748         | Attenuator        | Pasternack   | PE7004-20 | 3/4/2020   | 3/4/2022   |
| P05546         | Cable             | Andrews      | Heliac    | 8/24/2018  | 8/24/2020  |

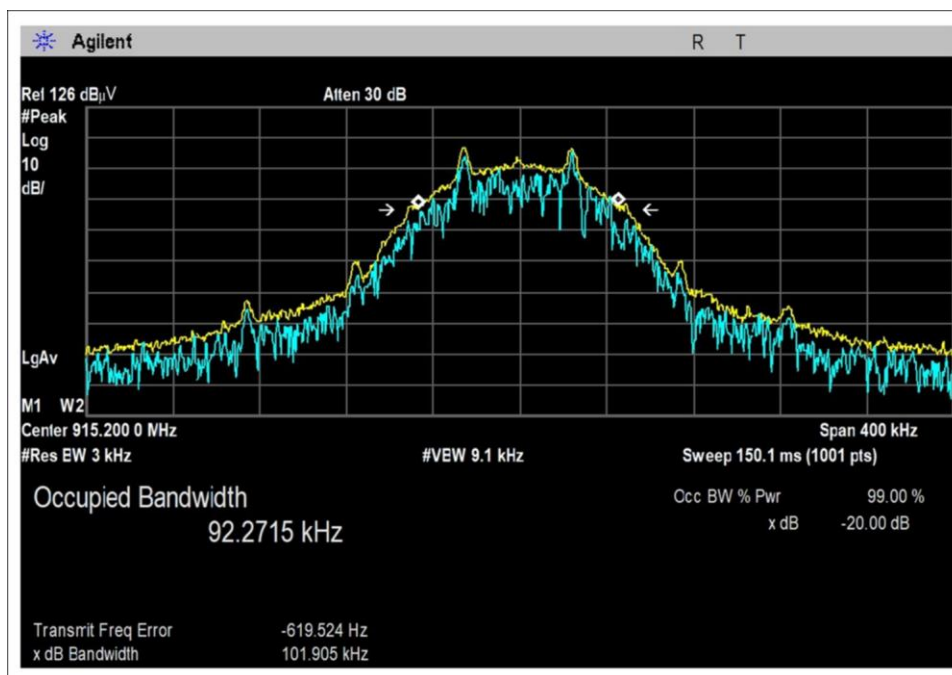
### 15.247(a)(1) 20 dB Bandwidth

| Test Data Summary |              |             |                |             |         |
|-------------------|--------------|-------------|----------------|-------------|---------|
| Frequency (MHz)   | Antenna Port | Modulation  | Measured (kHz) | Limit (kHz) | Results |
| 902.4             | 1            | FSK 50k     | 101.344        | ≤500        | Pass    |
| 915.2             | 1            | FSK 50k     | 101.905        | ≤500        | Pass    |
| 927.6             | 1            | FSK 50k     | 101.608        | ≤500        | Pass    |
| 902.4             | 1            | FSK 150k    | 182.078        | ≤500        | Pass    |
| 915.2             | 1            | FSK 150k    | 181.181        | ≤500        | Pass    |
| 927.6             | 1            | FSK 150k    | 179.903        | ≤500        | Pass    |
| 902.4             | 1            | OQPSK 6.25k | 131.910        | ≤500        | Pass    |
| 915.2             | 1            | OQPSK 6.25k | 129.714        | ≤500        | Pass    |
| 927.6             | 1            | OQPSK 6.25k | 129.439        | ≤500        | Pass    |
| 902.4             | 1            | OQPSK 12.5k | 129.398        | ≤500        | Pass    |
| 915.2             | 1            | OQPSK 12.5k | 130.400        | ≤500        | Pass    |
| 927.6             | 1            | OQPSK 12.5k | 129.474        | ≤500        | Pass    |
| 902.4             | 1            | OFDM 200k   | 338.482        | ≤500        | Pass    |
| 915.2             | 1            | OFDM 200k   | 335.433        | ≤500        | Pass    |
| 927.6             | 1            | OFDM 200k   | 338.108        | ≤500        | Pass    |
| 902.4             | 1            | OFDM 600k   | 334.818        | ≤500        | Pass    |
| 915.2             | 1            | OFDM 600k   | 329.729        | ≤500        | Pass    |
| 927.6             | 1            | OFDM 600k   | 332.693        | ≤500        | Pass    |

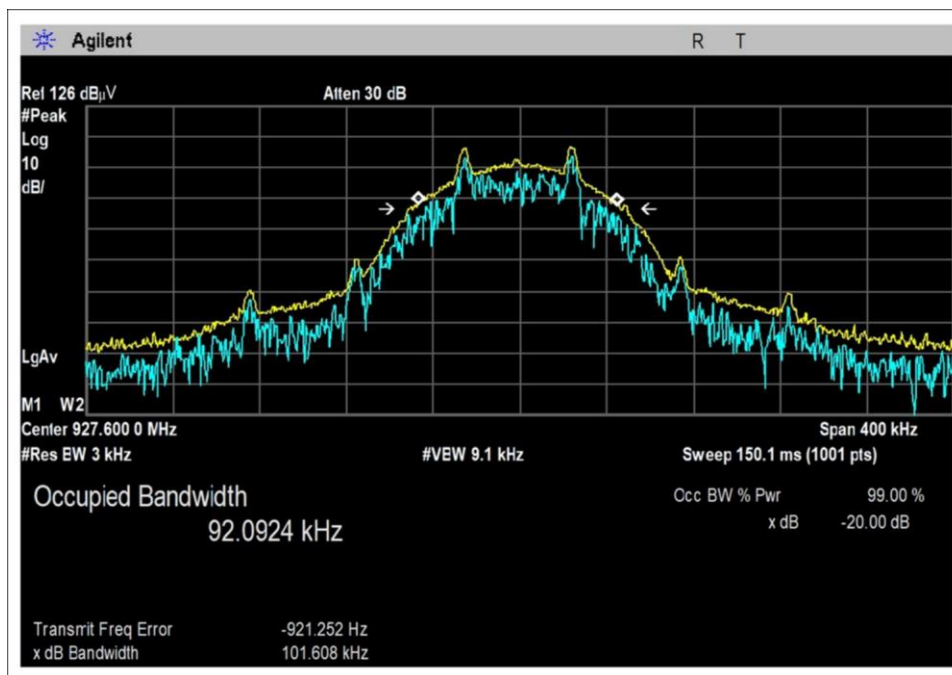
## Plot(s)



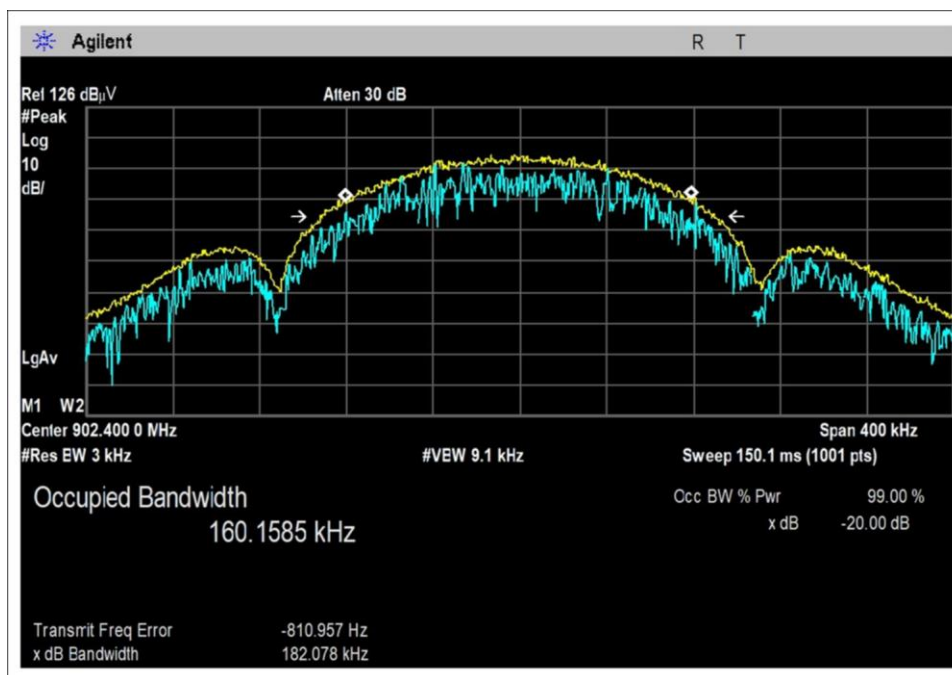
FSK 50kbps Low Channel



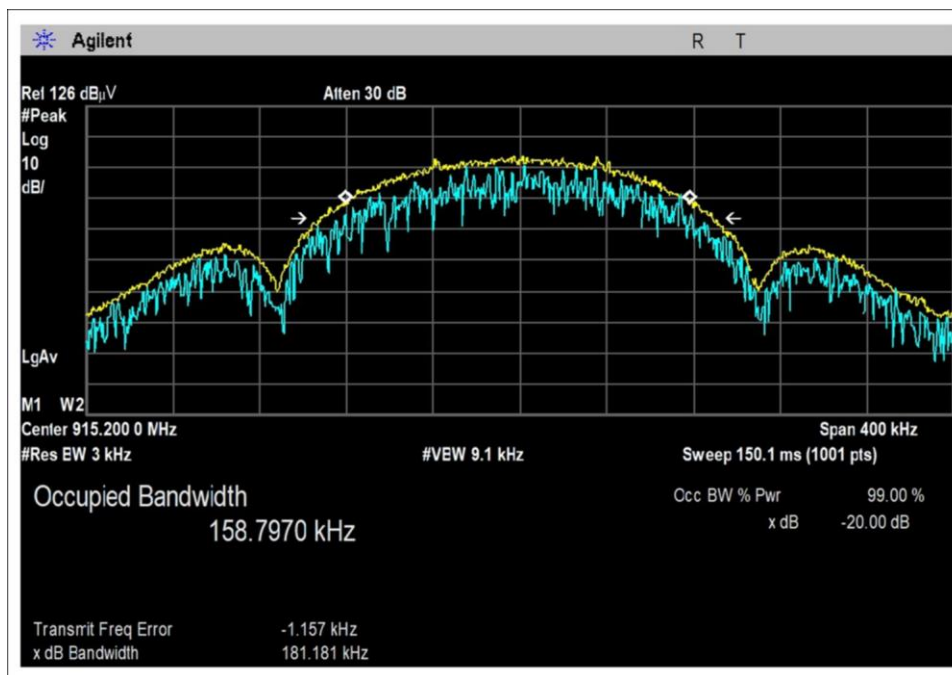
FSK 50kbps Middle Channel



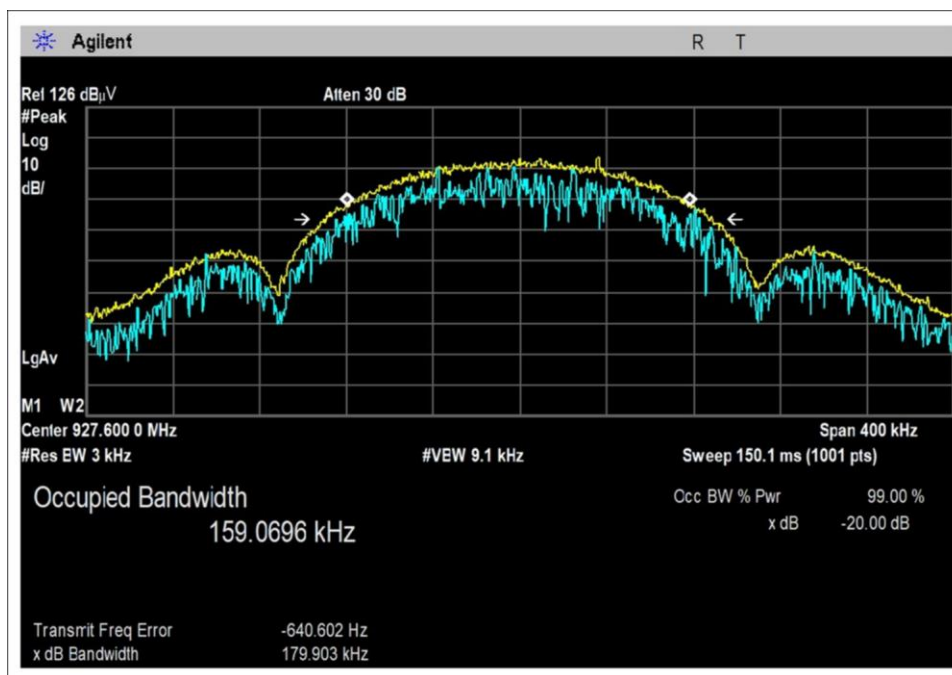
FSK 50kbps High Channel



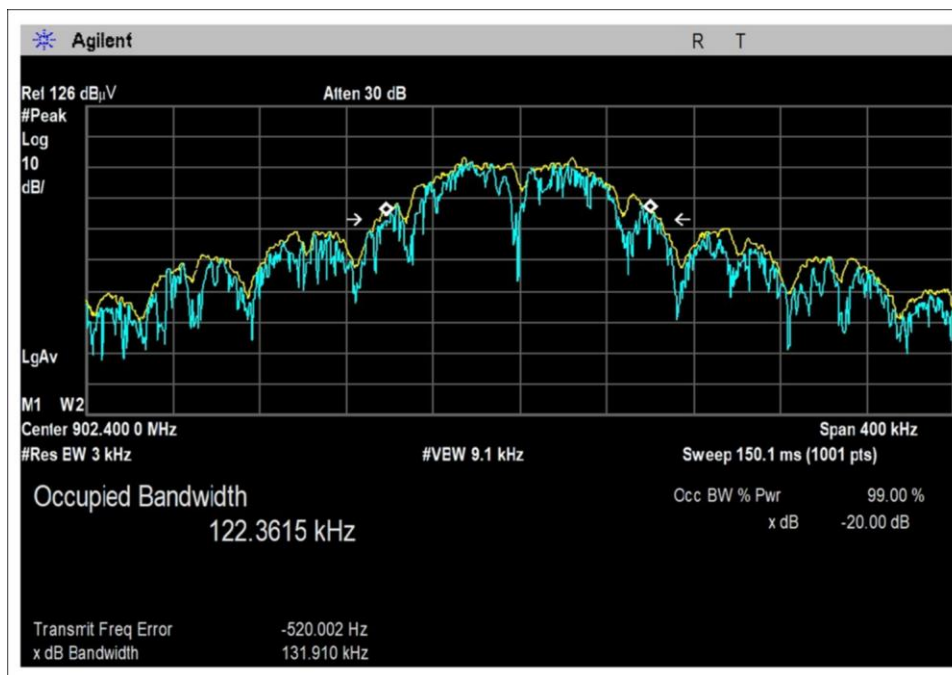
FSK 150kbps Low Channel



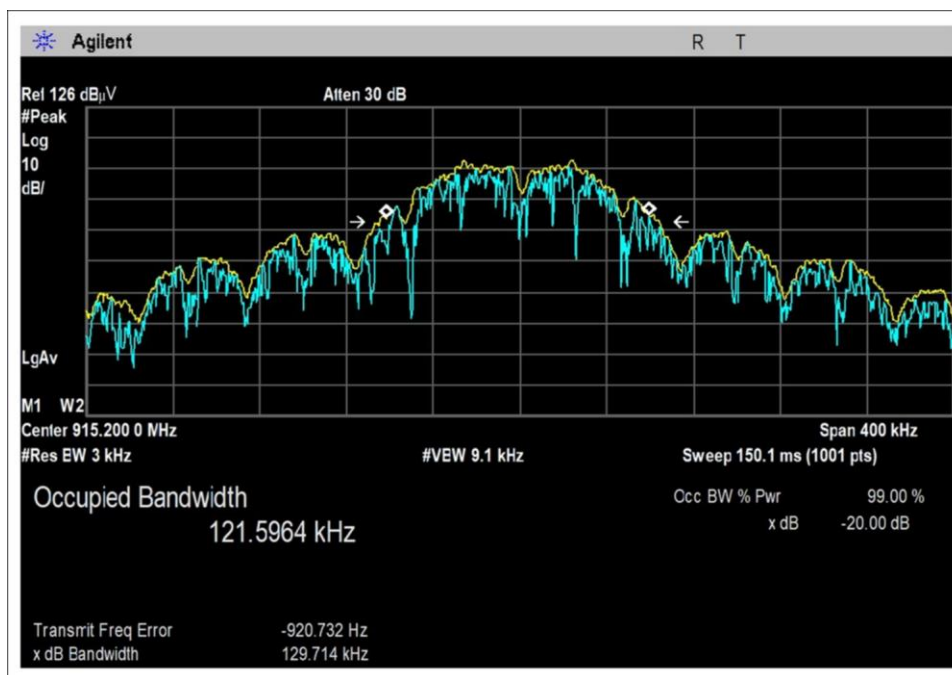
FSK 150kbps Middle Channel



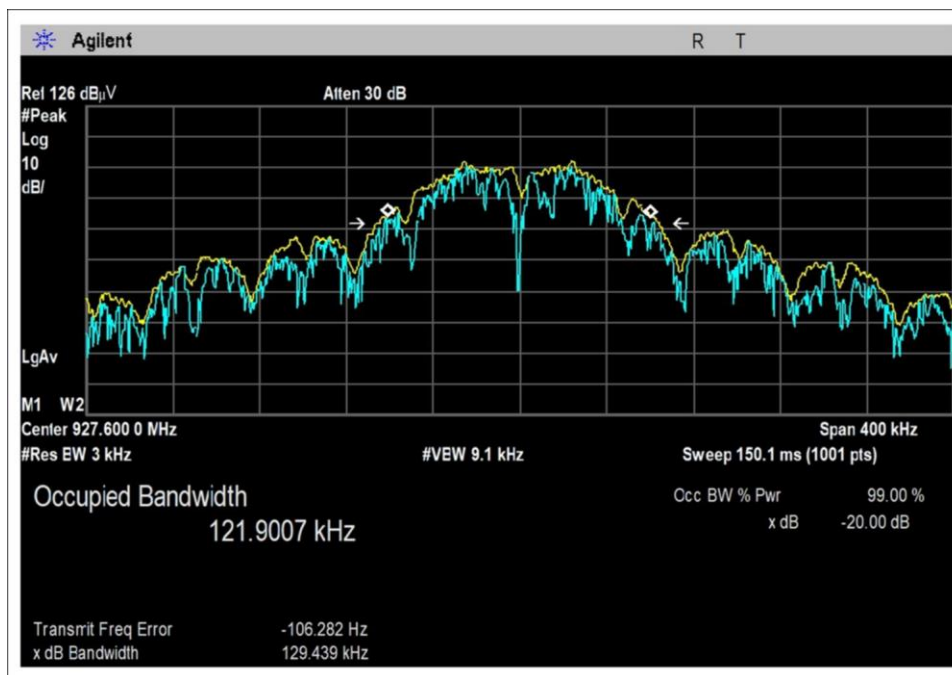
FSK 150kbps High Channel



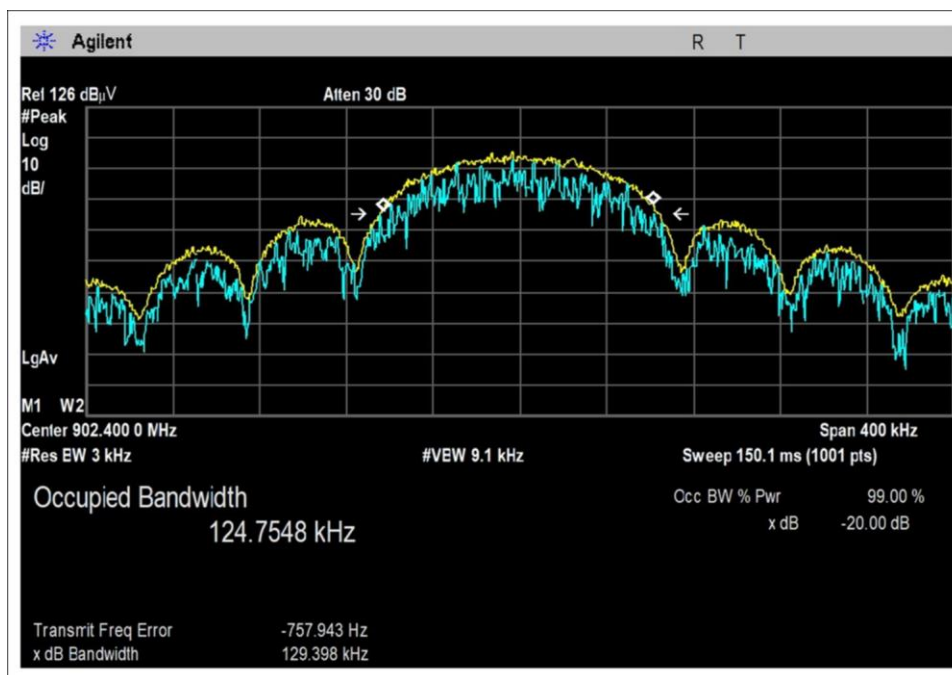
OQPSK 6.25kbps Low Channel



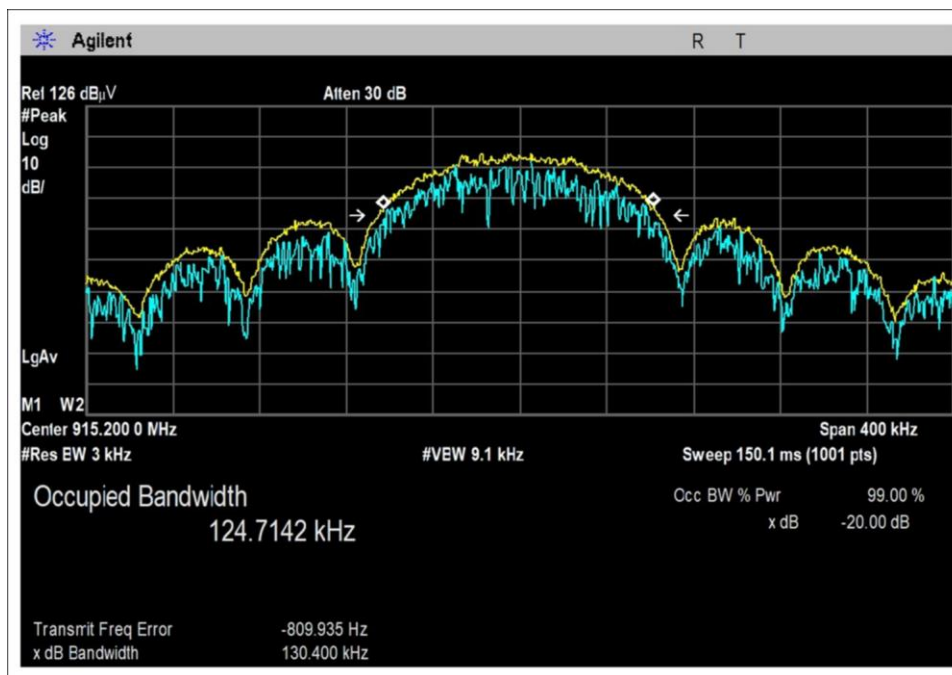
OQPSK 6.25kbps Middle Channel



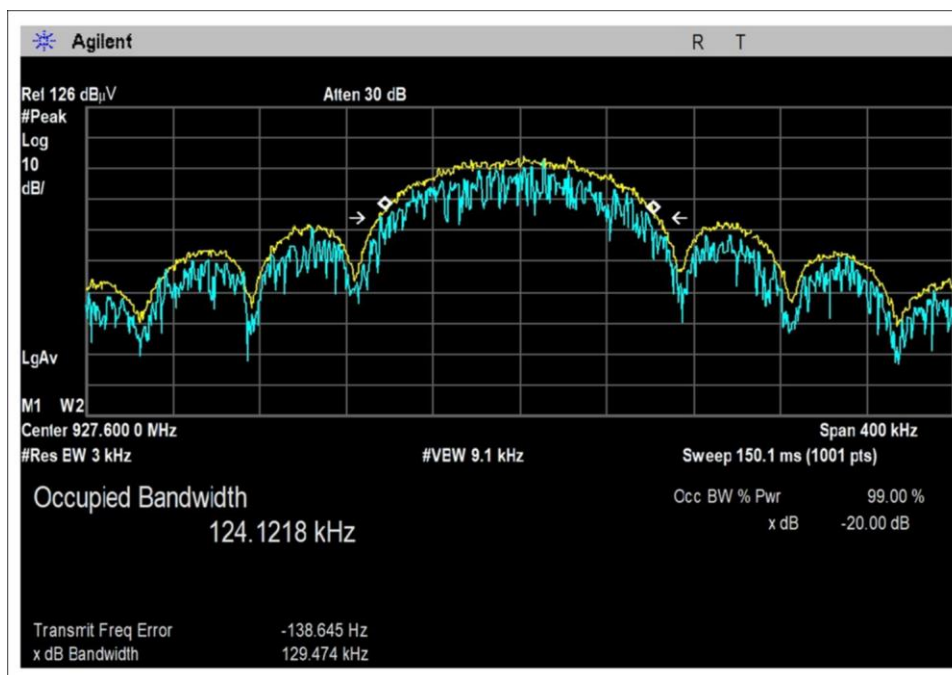
OQPSK 6.25kbps High Channel



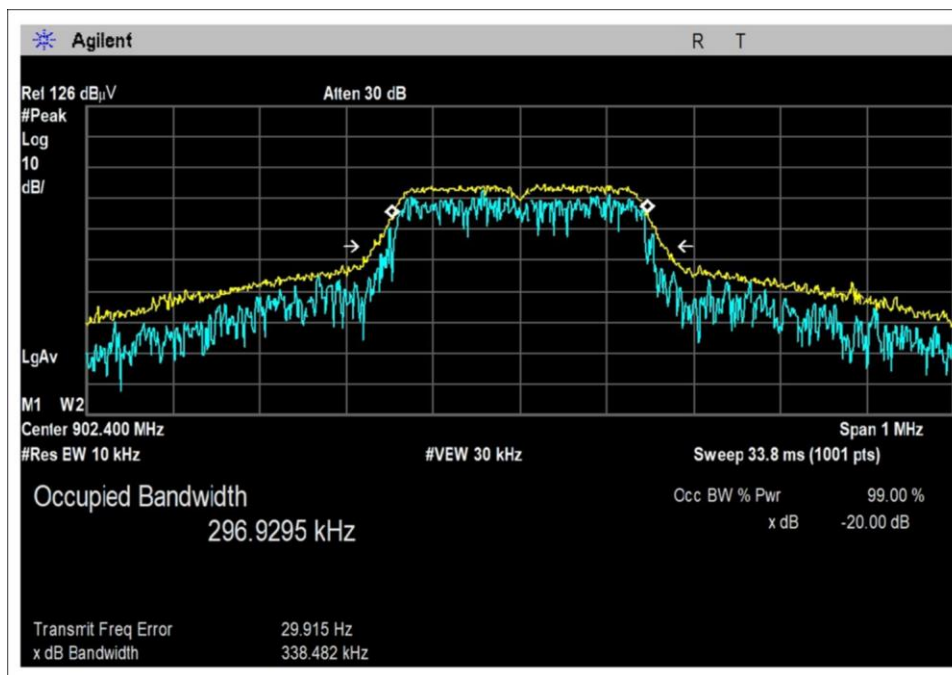
OQPSK 12.5kbps Low Channel



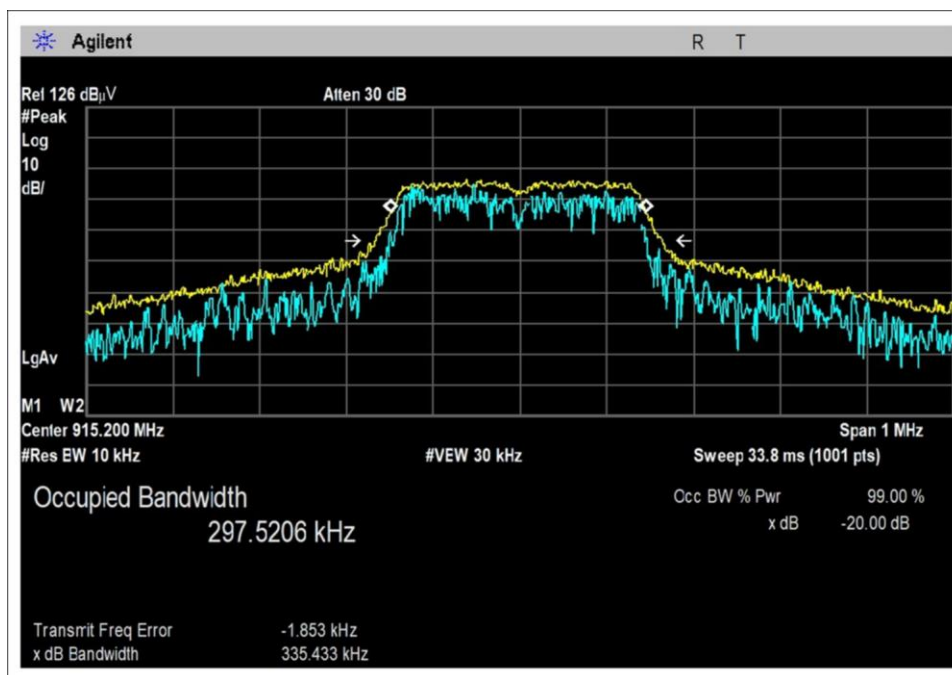
OQPSK 12.5kbps Middle Channel



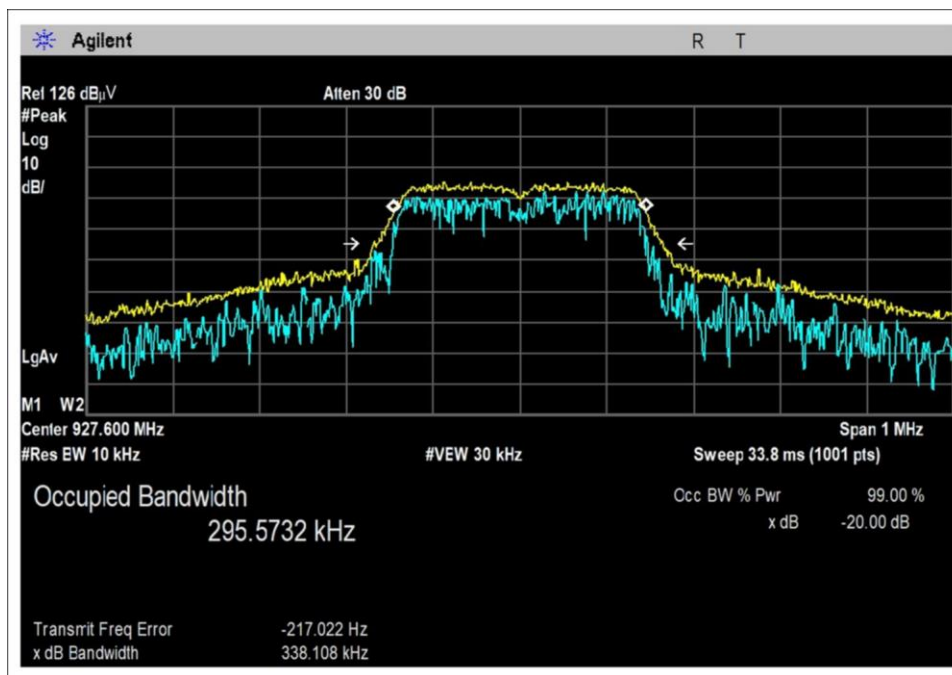
OQPSK 12.5kbps High Channel



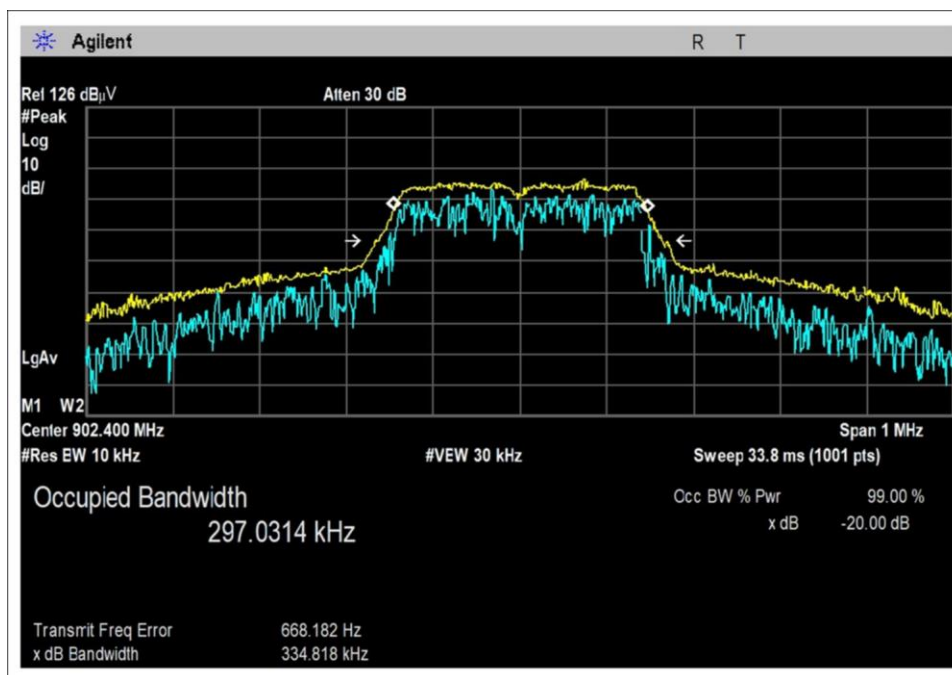
OFDM 200kbps Low Channel



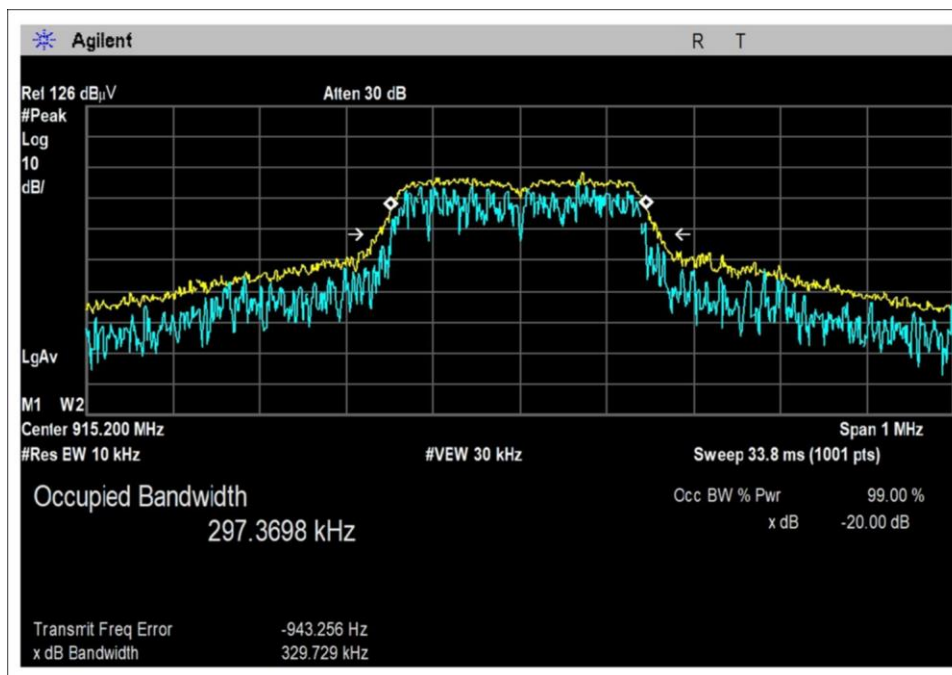
OFDM 200kbps Middle Channel



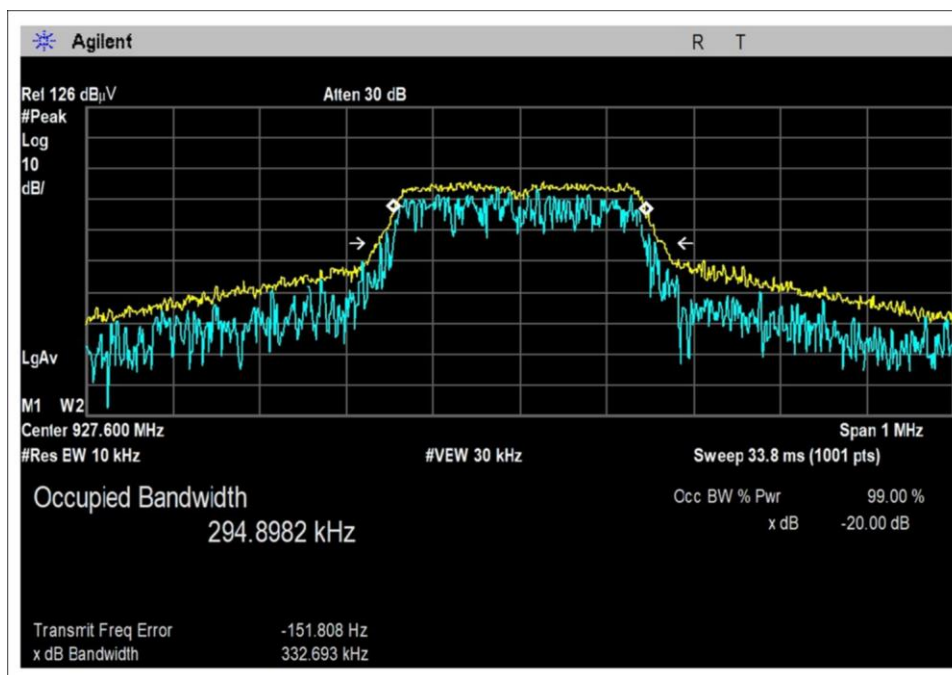
OFDM 200kbps High Channel



OFDM 600kbps Low Channel



OFDM 600kbps Middle Channel

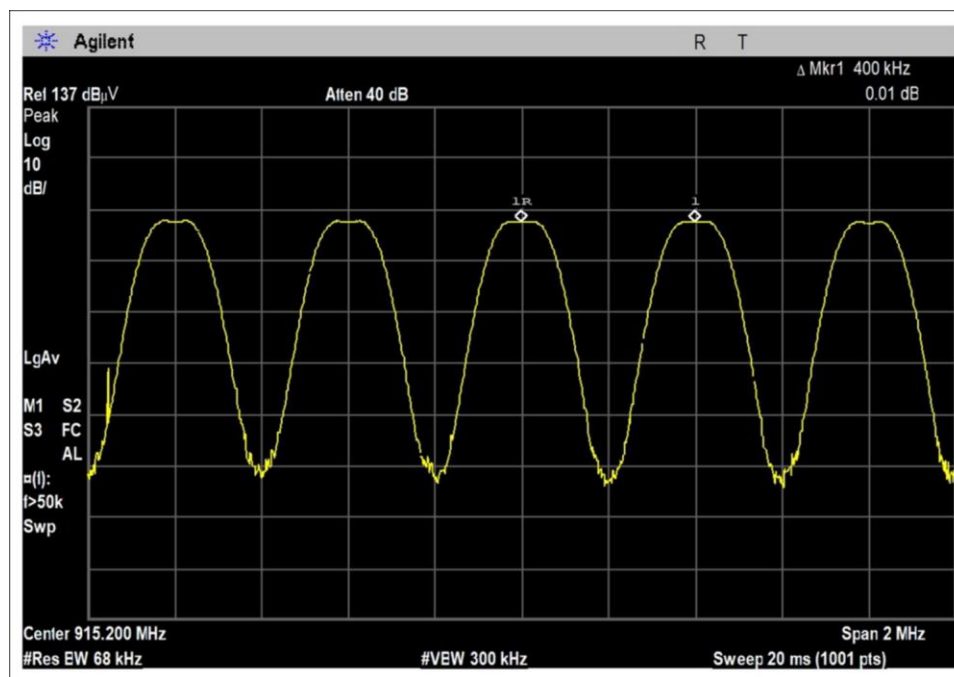


OFDM 600kbps High Channel

## 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 |
| 1                                                     | Hopping Mode     | 400            | >338.482    | Pass    |

## Plot(s)

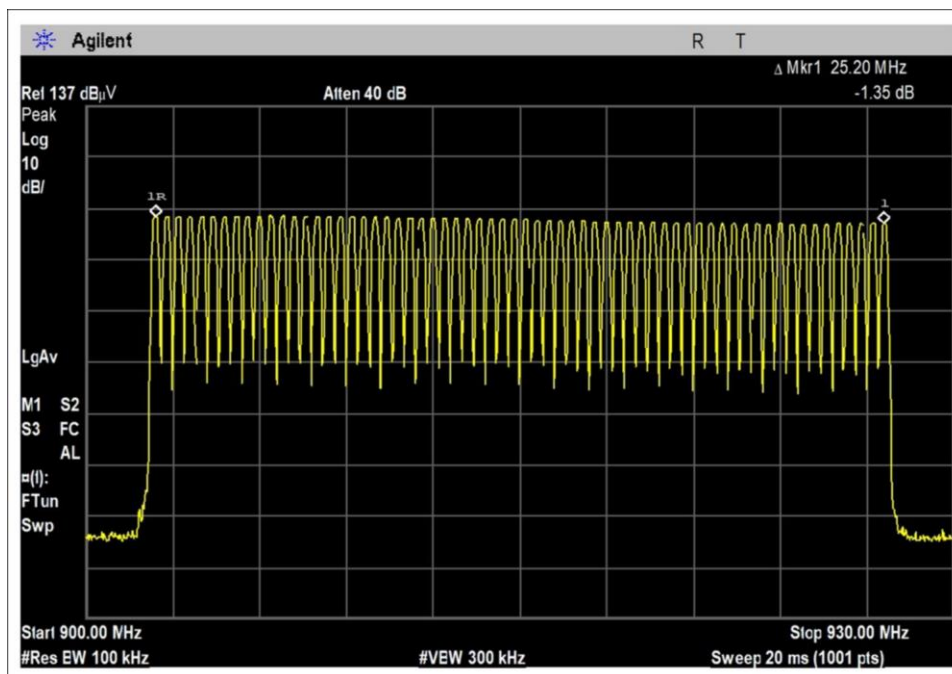


### 15.247(a)(1)(i) Number of Hopping Channels

| Test Data Summary                                                                                                                                                  |                  |                     |                  |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|------------------|---------|
| $\text{Limit} = \begin{cases} 50 \text{ Channels} & 20 \text{ dB BW} < 250 \text{ kHz} \\ 25 \text{ Channels} & 20 \text{ dB BW} \geq 250 \text{ kHz} \end{cases}$ |                  |                     |                  |         |
| Antenna Port                                                                                                                                                       | Operational Mode | Measured (Channels) | Limit (Channels) | Results |
| 1                                                                                                                                                                  | Hopping Mode     | 64                  | $\geq 50$        | Pass    |

Note: Some modulations have 20 dB BW lower than 250kHz, so at least 50 channels must be used.

### Plot(s)



### **15.247(a)(1)(i) Time of Occupancy**

The manufacturer declares: Due to the required equipment and firmware to exercise the EUT's multiple pseudo-random hopping sequences was not available and that the complexity of the different modulations and modes depend on the device to be in a fully operating network environment. Therefore, the manufacturer declares the following:

With the multiple modulations, modes and hop tables, the mode with the worst-case Time of Occupancy to demonstrate 400mS compliance is 399.8mS in 10 seconds, since this modulation is greater than 250kHz and less than 500 kHz OBW. Each session of multiple short transmissions takes place on one of 64 different channels in a pseudorandom sequence. The algorithm that determines the pseudo-random hop sequence ensures all 64 channels are used equally on the average.

Itron employs hopping patterns based on a pseudo-random sequence generated by an algorithm. The algorithm can have multiple components generated, that each has its own pseudo-random sequence.

The firmware ensures the channels are used in the prescribed pseudo random order, therefore, it maintains equal channel usage.

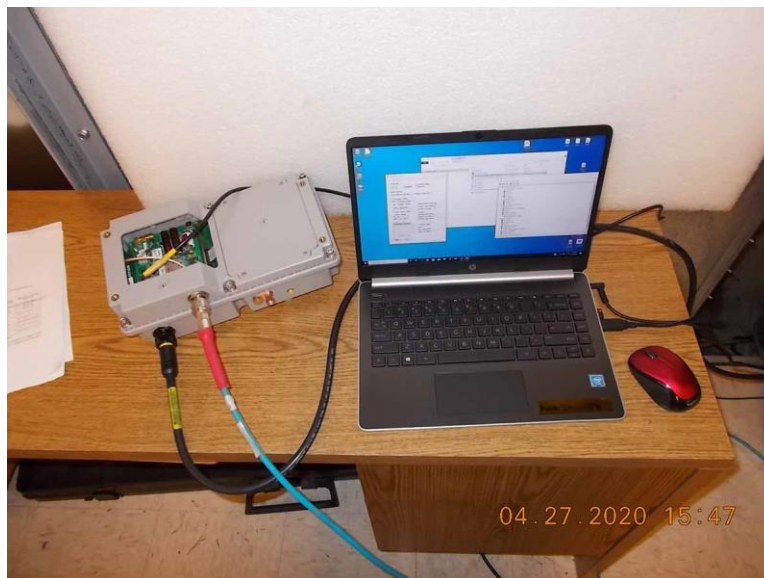
The system has single channel receiver bandwidths that match the transmitter's modulation bandwidth that is enabled.

With the transmitter and receiver in synchronization within the network, transmitters switch frequencies in synchronization with the receiver.

When the transmitter needs to send a continuous or long data stream, total time of the packet transmissions is monitored to comply with dwell time requirement of 400ms in the appropriate 10s or 20s window depending on the modulation/mode enabled.

This device does not employ any hopping avoidance techniques.

Test Setup Photo(s)



## 15.247(b)(2) Output Power

| Test Data Summary - Voltage Variations |                       |                            |                            |                            |                                              |
|----------------------------------------|-----------------------|----------------------------|----------------------------|----------------------------|----------------------------------------------|
| Frequency (MHz)                        | Modulation / Ant Port | V <sub>Minimum</sub> (dBm) | V <sub>Nominal</sub> (dBm) | V <sub>Maximum</sub> (dBm) | Max Deviation from V <sub>Nominal</sub> (dB) |
| 902.4                                  | OQPSK 6.25kbps        | 28.8                       | 28.8                       | 28.7                       | -0.1                                         |
| 915.2                                  | OQPSK 6.25kbps        | 28.3                       | 28.2                       | 28.2                       | +0.1                                         |
| 927.6                                  | OQPSK 6.25kbps        | 27.5                       | 27.5                       | 27.5                       | 0.0                                          |

Test performed using operational mode with the highest output power, representing worst case.

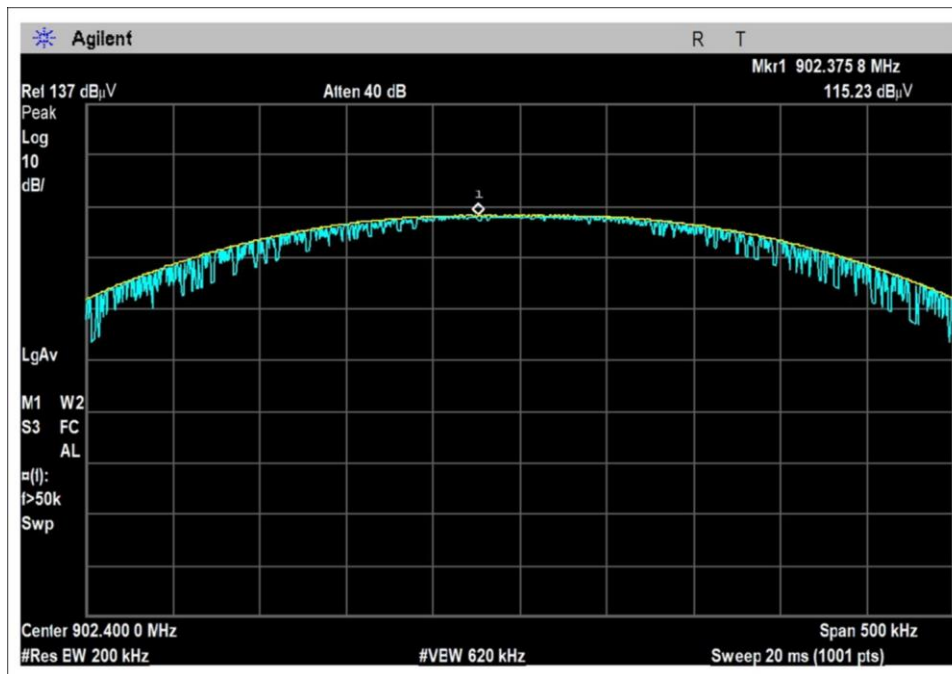
### Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

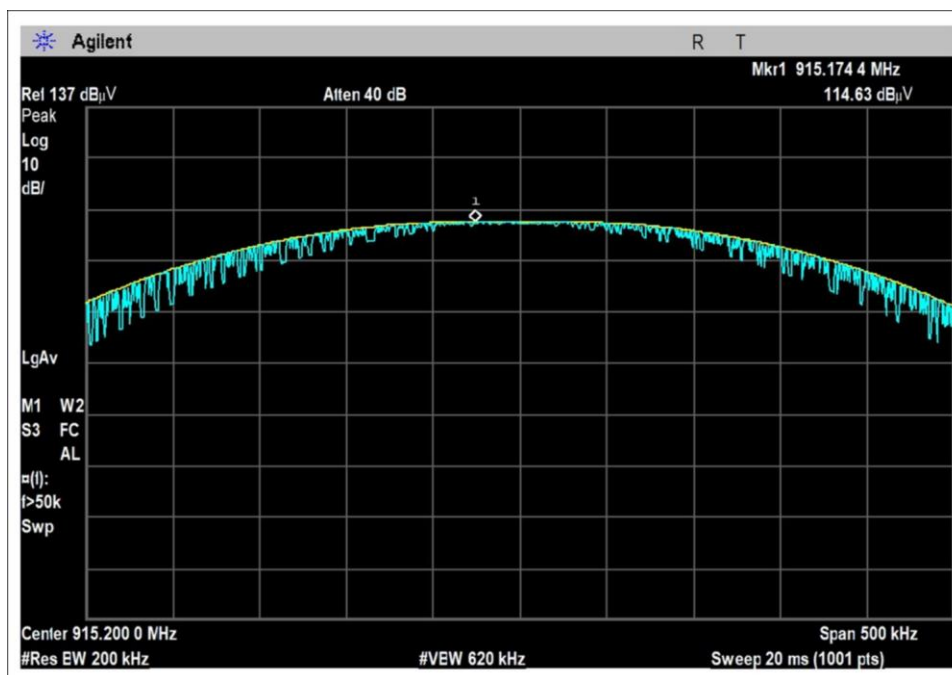
| Parameter              | Value |
|------------------------|-------|
| V <sub>Nominal</sub> : | 115   |
| V <sub>Minimum</sub> : | 85    |
| V <sub>Maximum</sub> : | 264   |

| 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 |
| 902.4                                                                                                                                                                                       | FSK 50k     | Omnidirectional, 2.6dBi max | 28.7           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | FSK 50k     | Omnidirectional, 2.6dBi max | 28.1           | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | FSK 50k     | Omnidirectional, 2.6dBi max | 27.5           | ≤30         | Pass    |
| 902.4                                                                                                                                                                                       | FSK 150k    | Omnidirectional, 2.6dBi max | 28.7           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | FSK 150k    | Omnidirectional, 2.6dBi max | 28.1           | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | FSK 150k    | Omnidirectional, 2.6dBi max | 27.5           | ≤30         | Pass    |
| 902.4                                                                                                                                                                                       | OQPSK 6.25k | Omnidirectional, 2.6dBi max | 28.8           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | OQPSK 6.25k | Omnidirectional, 2.6dBi max | 28.2           | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | OQPSK 6.25k | Omnidirectional, 2.6dBi max | 27.5           | ≤30         | Pass    |
| 902.4                                                                                                                                                                                       | OQPSK 12.5k | Omnidirectional, 2.6dBi max | 28.8           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | OQPSK 12.5k | Omnidirectional, 2.6dBi max | 28.2           | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | OQPSK 12.5k | Omnidirectional, 2.6dBi max | 27.5           | ≤30         | Pass    |
| 902.4                                                                                                                                                                                       | OFDM 200k   | Omnidirectional, 2.6dBi max | 28.7           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | OFDM 200k   | Omnidirectional, 2.6dBi max | 28             | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | OFDM 200k   | Omnidirectional, 2.6dBi max | 27.4           | ≤30         | Pass    |
| 902.4                                                                                                                                                                                       | OFDM 600k   | Omnidirectional, 2.6dBi max | 28.7           | ≤30         | Pass    |
| 915.2                                                                                                                                                                                       | OFDM 600k   | Omnidirectional, 2.6dBi max | 28.1           | ≤30         | Pass    |
| 927.6                                                                                                                                                                                       | OFDM 600k   | Omnidirectional, 2.6dBi max | 27.5           | ≤30         | Pass    |

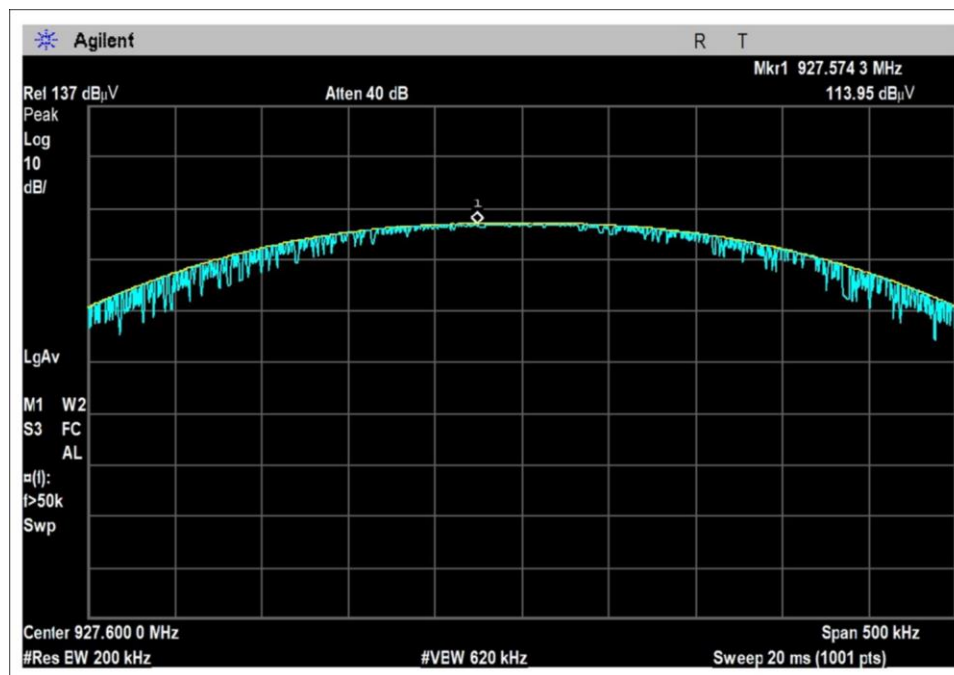
## Plots



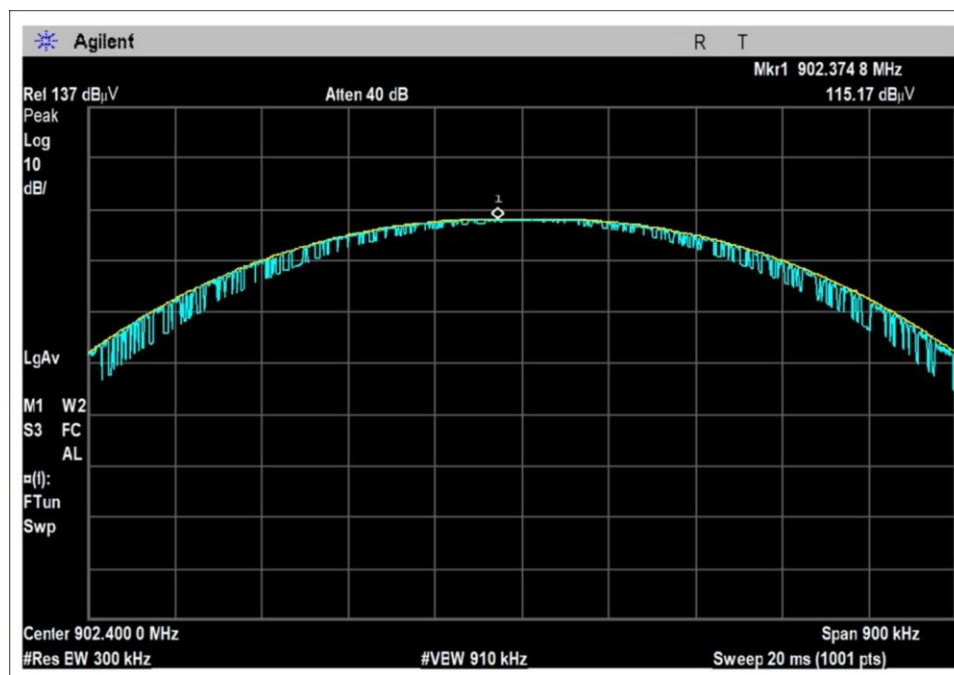
FSK 50kbps Low Channel



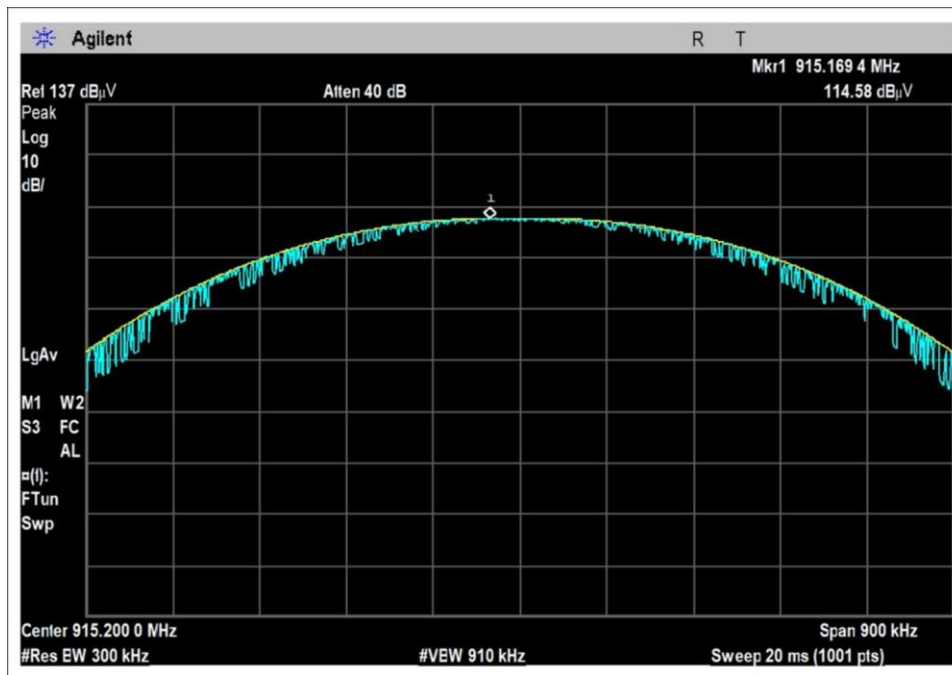
FSK 50kbps Middle Channel



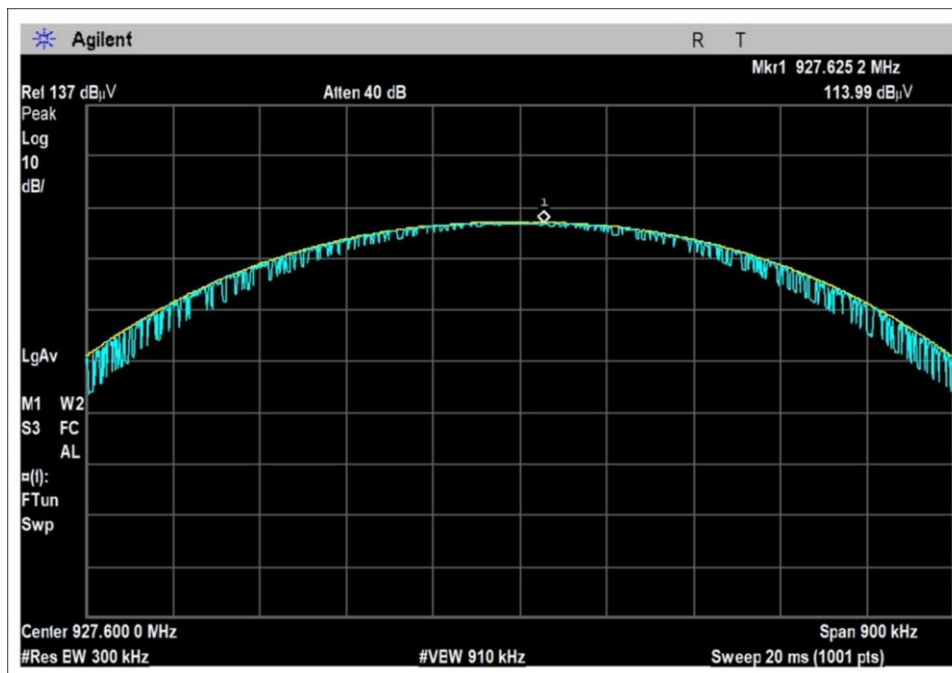
FSK 50kbps High Channel



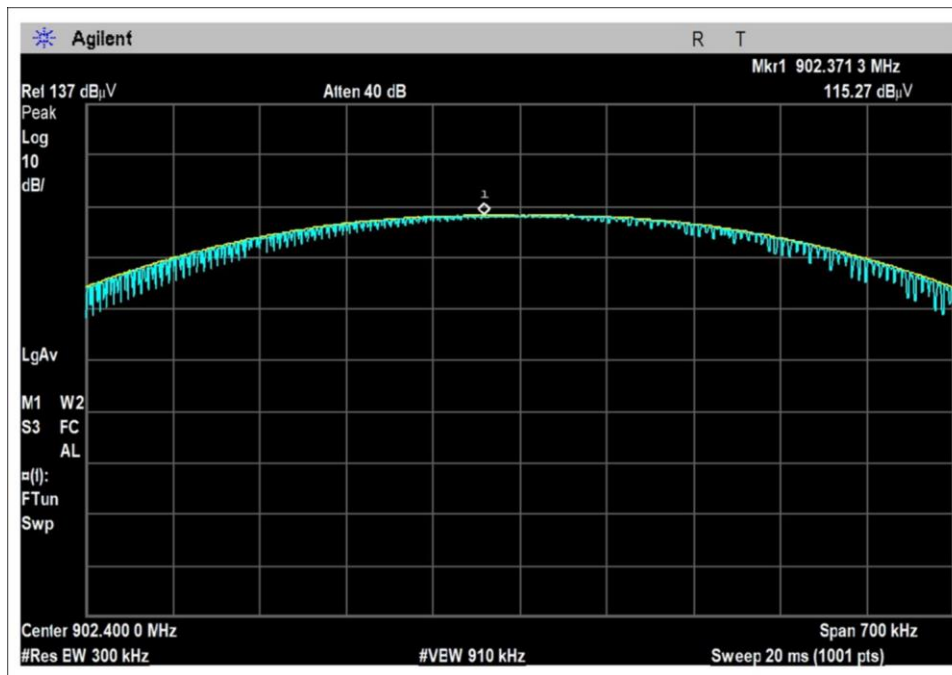
FSK 150kbps Low Channel



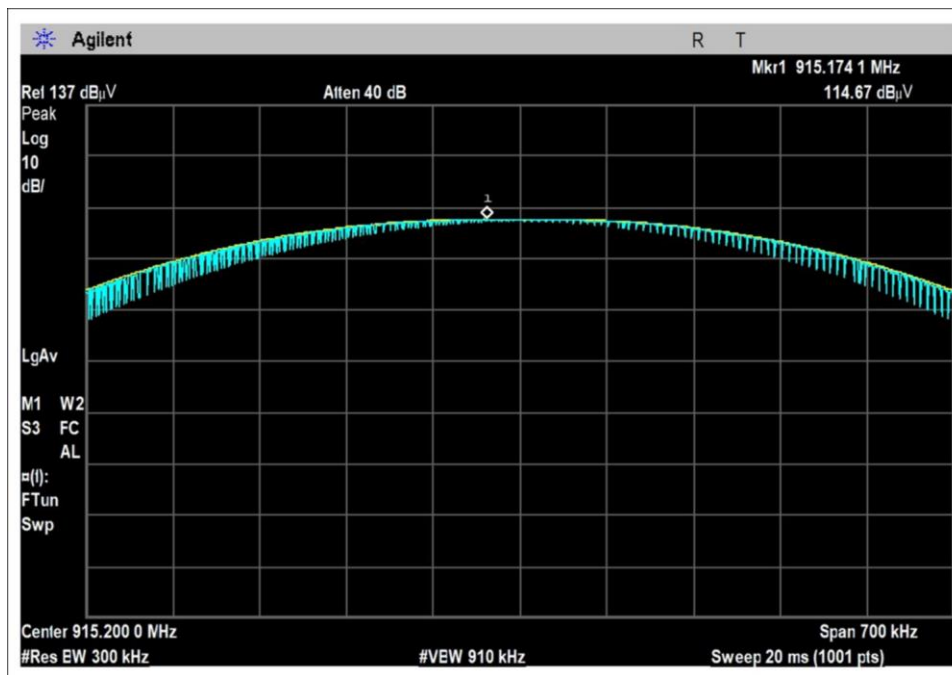
FSK 150kbps Middle Channel



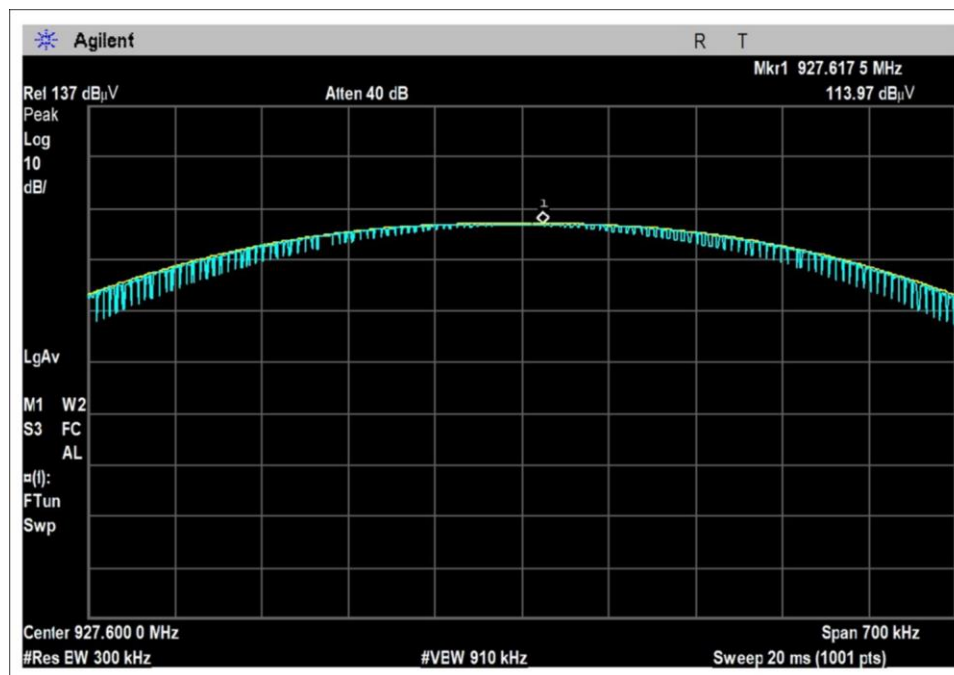
FSK 150kbps High Channel



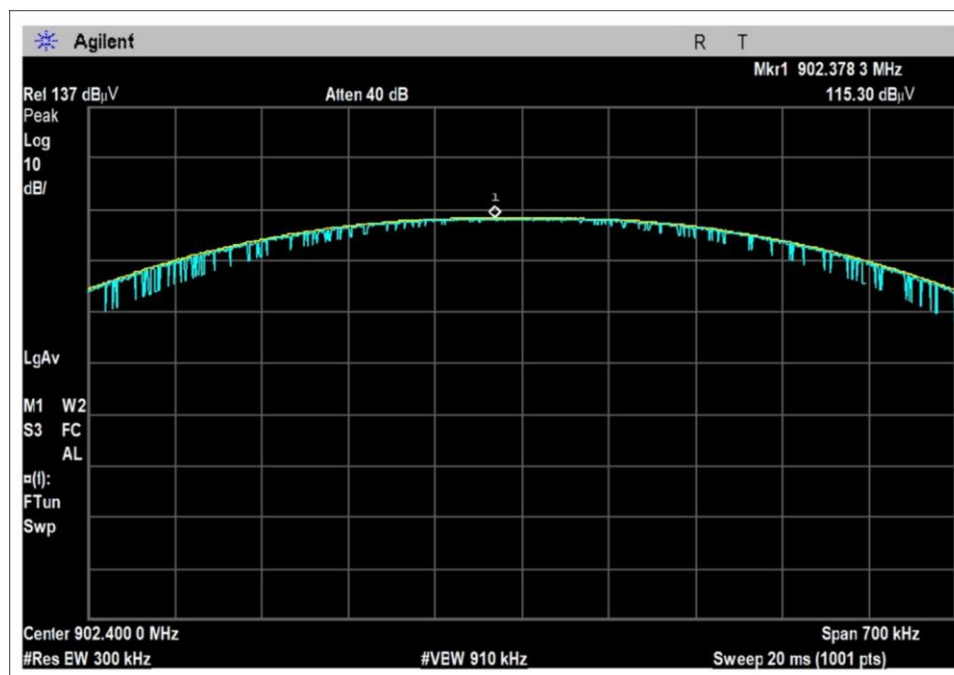
OQPSK 6.25kbps Low Channel



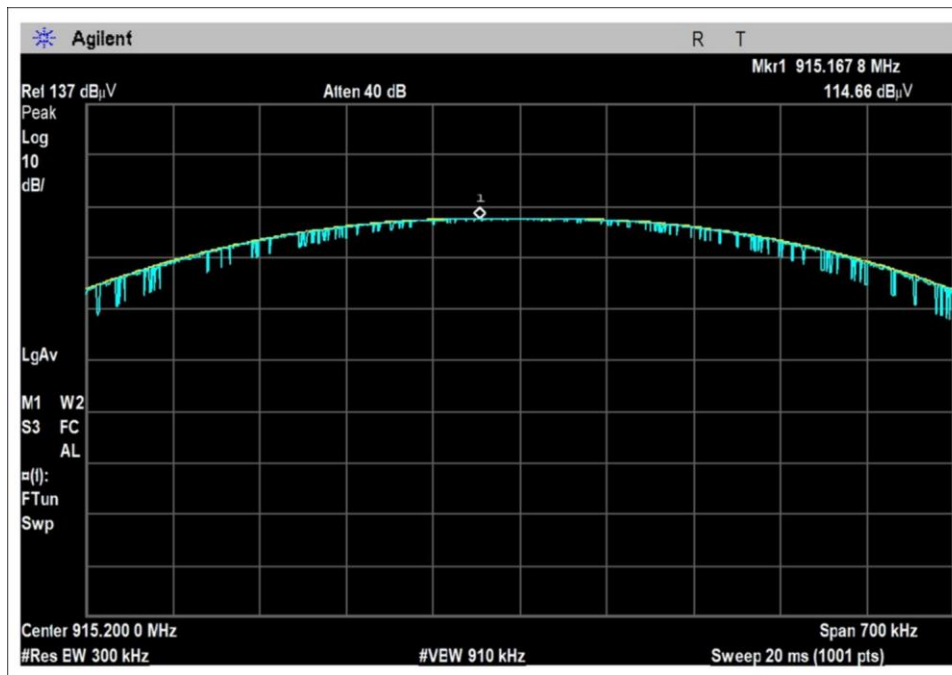
OQPSK 6.25kbps Middle Channel



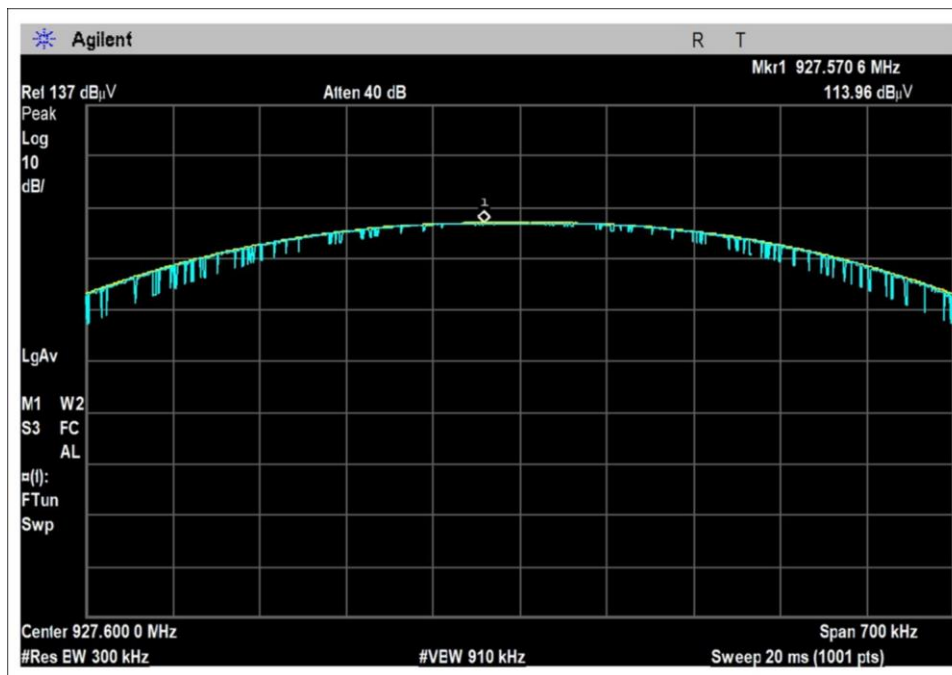
OQPSK 6.25kbps High Channel



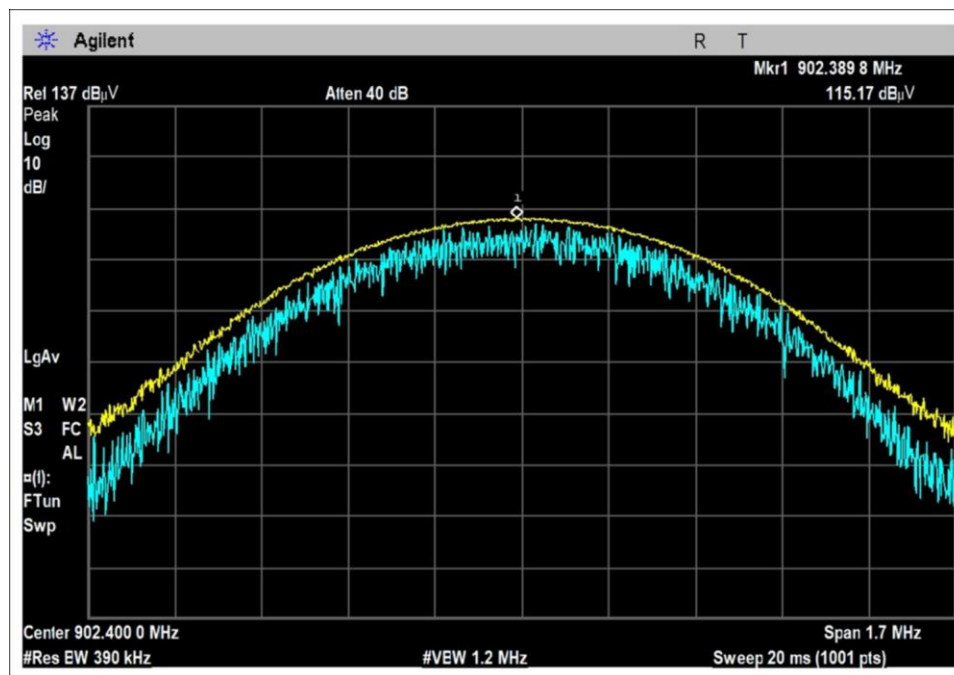
OQPSK 12.5kbps Low Channel



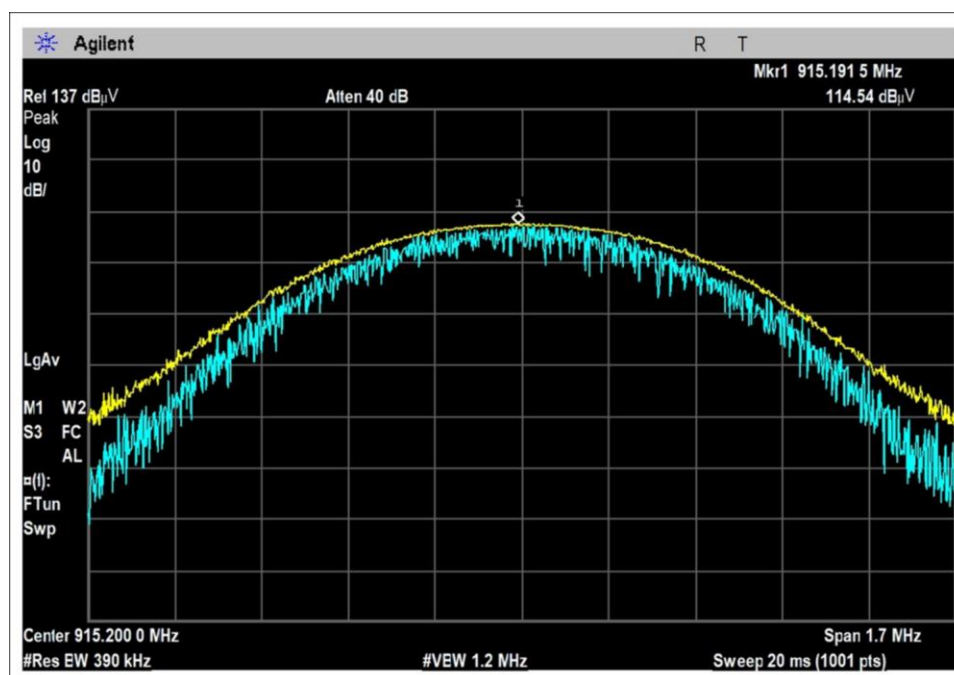
OQPSK 12.5kbps Middle Channel



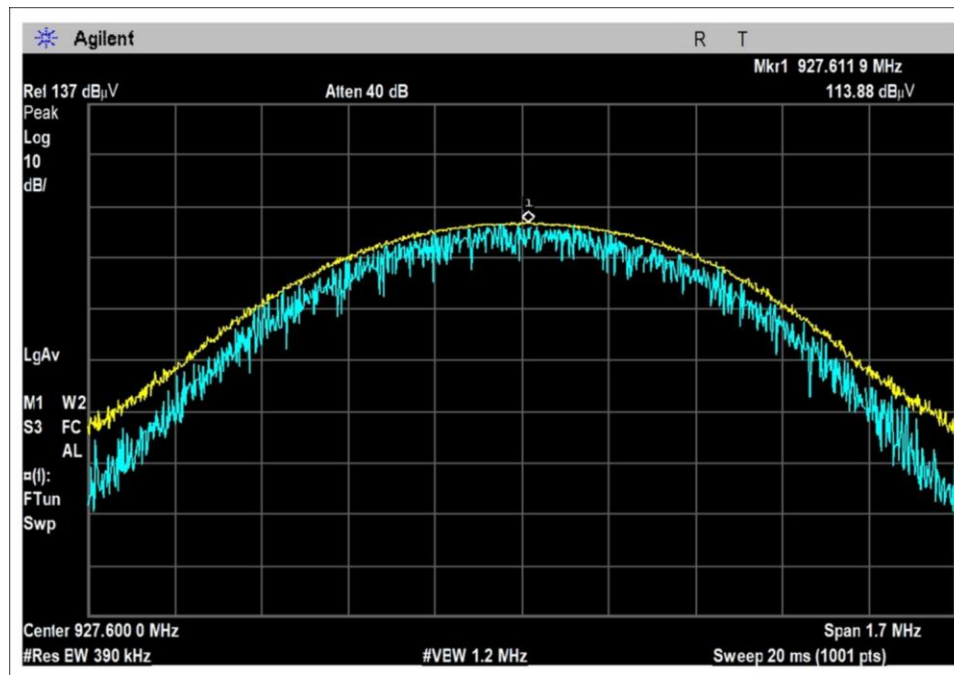
OQPSK 12.5kbps High Channel



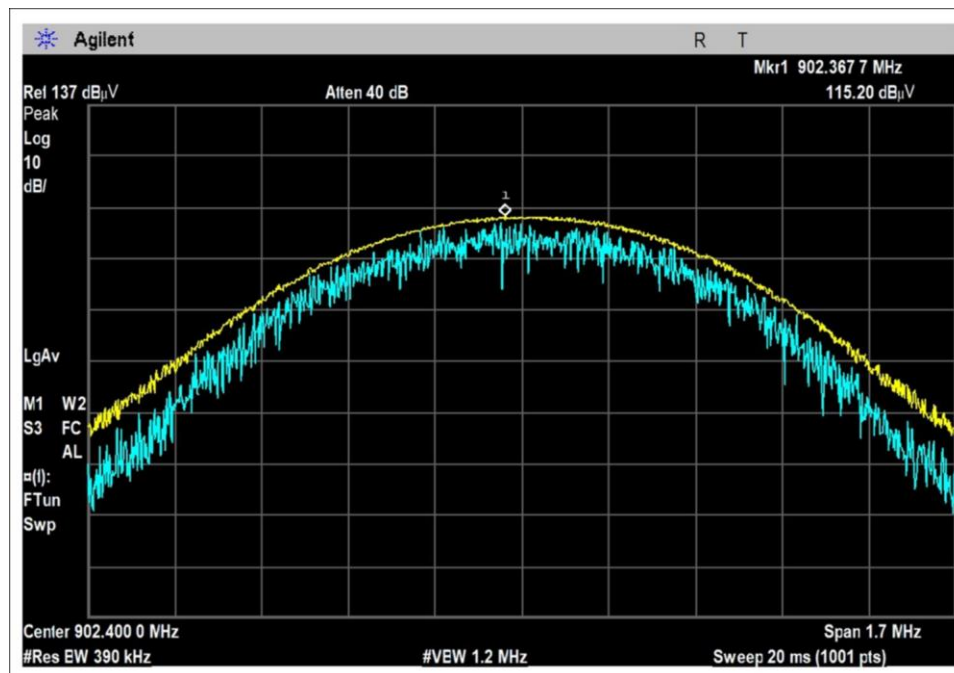
OFDM 200kbps Low Channel



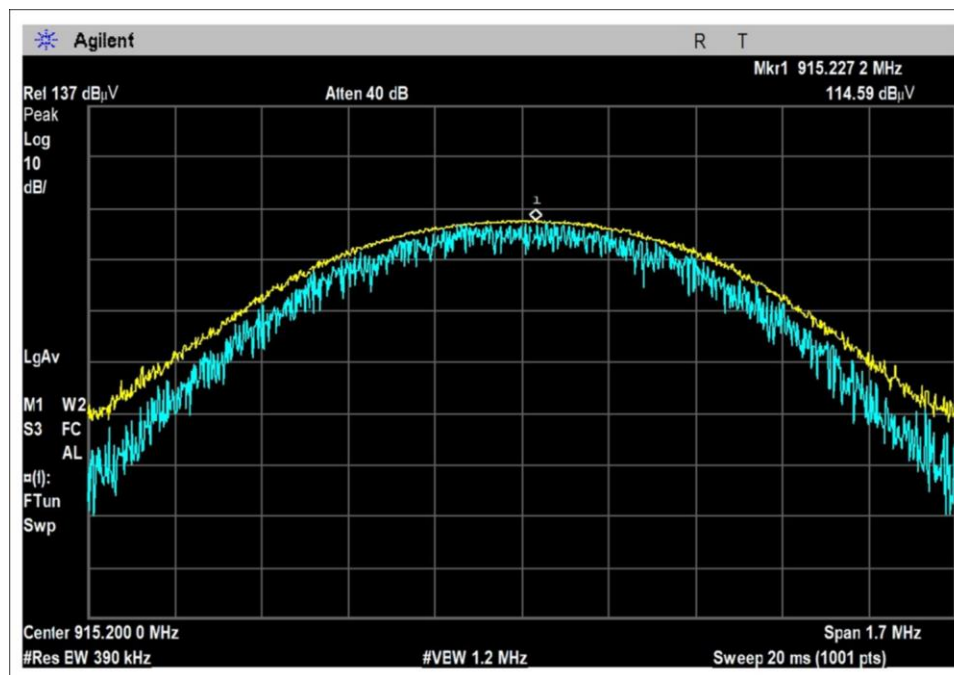
OFDM 200kbps Middle Channel



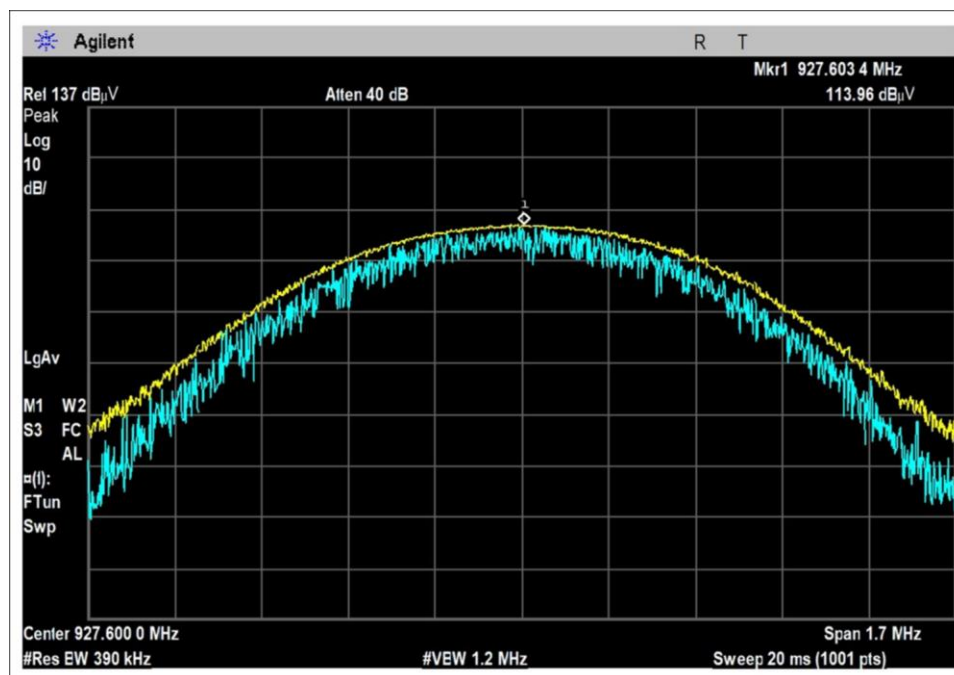
OFDM 200kbps High Channel



OFDM 600kbps Low Channel



OFDM 600kbps Middle Channel



OFDM 600kbps High Channel

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717  
 Customer: **Itron, Inc.**  
 Specification: **15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**  
 Work Order #: **103786** Date: 4/28/2020  
 Test Type: **Conducted Emissions** Time: 14:55:38  
 Tested By: Michael Atkinson Sequence#: 2  
 Software: EMITest 5.03.12 115VAC 60Hz

#### Equipment Tested:

| Device          | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 |              |         |     |

#### Support Equipment:

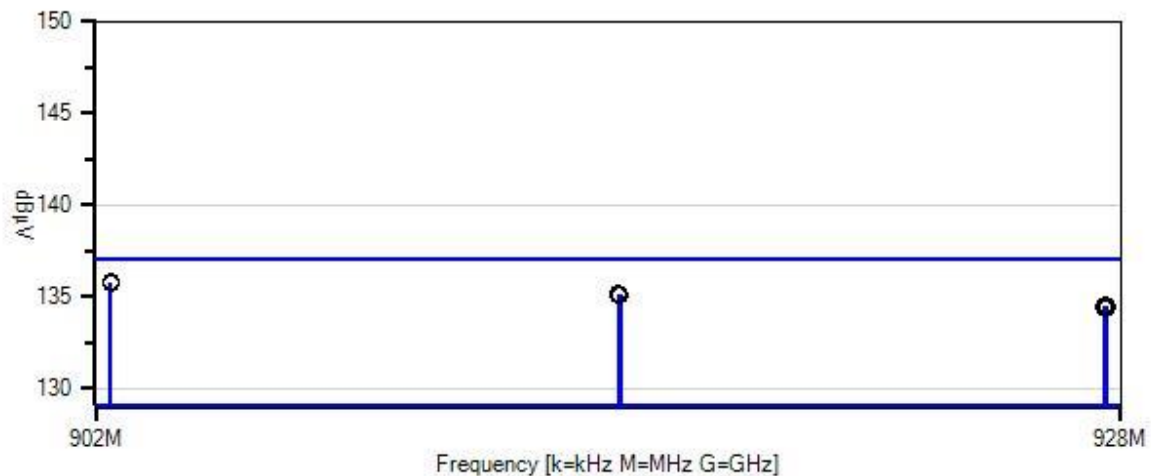
| Device          | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 |              |         |     |

#### Test Conditions / Notes:

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.

Test Location: Bothell Lab C3  
 Temperature (°C): 22  
 Relative Humidity (%): 35  
 Test Method: ANSI C63.10 (2013)

Itron, Inc. W/O#: 103786 Sequence#: 2 Date: 4/28/2020  
 15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 115VAC 60Hz RF Port



— Sweep Data  
 — Readings  
 ○ Peak Readings  
 × QP Readings  
 \* Average Readings  
 ▼ Ambient  
 Software Version: 5.03.12  
 1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)

**Test Equipment:**

| ID | Asset #  | Description       | Model     | Calibration Date | Cal Due Date |
|----|----------|-------------------|-----------|------------------|--------------|
| T1 | AN02872  | Spectrum Analyzer | E4440A    | 11/18/2019       | 11/18/2021   |
| T2 | ANP05748 | Attenuator        | PE7004-20 | 3/4/2020         | 3/4/2022     |
| T3 | ANP05546 | Cable             | Helix     | 8/24/2018        | 8/24/2020    |

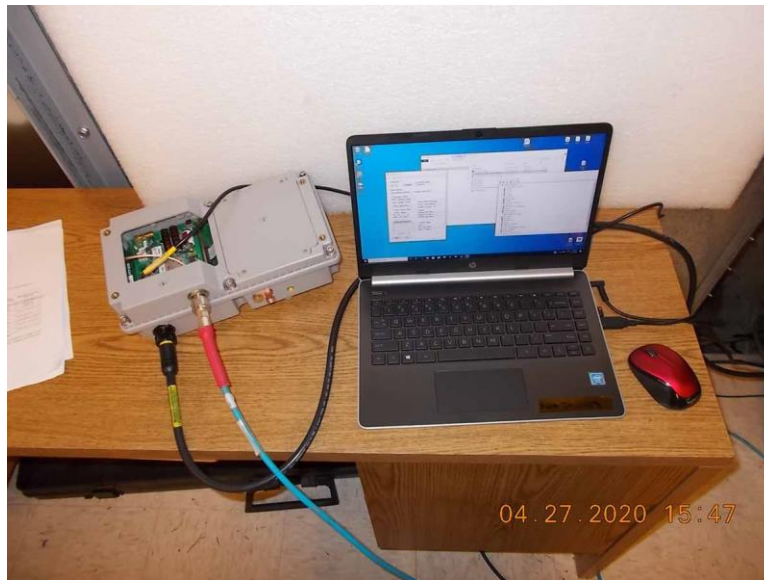
**Measurement Data:**

Reading listed by margin.

Test Lead: RF Port

| #  | Freq<br>MHz | Rdng<br>dBμV | T1<br>dB | T2<br>dB | T3<br>dB |  | dB | Dist<br>Table | Corr<br>dBμV | Spec<br>dBμV         | Margin<br>dB | Polar<br>Ant |
|----|-------------|--------------|----------|----------|----------|--|----|---------------|--------------|----------------------|--------------|--------------|
| 1  | 902.378M    | 115.3        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.8        | 137.0<br>12.5k OQPSK | -1.2         | RF Po        |
| 2  | 902.371M    | 115.3        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.8        | 137.0<br>6.25k OQPSK | -1.2         | RF Po        |
| 3  | 902.376M    | 115.2        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.7        | 137.0<br>50k FSK     | -1.3         | RF Po        |
| 4  | 902.368M    | 115.2        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.7        | 137.0<br>600M OFDM   | -1.3         | RF Po        |
| 5  | 902.390M    | 115.2        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.7        | 137.0<br>200M OFDM   | -1.3         | RF Po        |
| 6  | 902.374M    | 115.2        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.7        | 137.0<br>150k FSK    | -1.3         | RF Po        |
| 7  | 915.174M    | 114.7        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.2        | 137.0<br>6.25k OQPSK | -1.8         | RF Po        |
| 8  | 915.168M    | 114.7        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.2        | 137.0<br>12.5k OQPSK | -1.8         | RF Po        |
| 9  | 915.174M    | 114.6        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.1        | 137.0<br>50k FSK     | -1.9         | RF Po        |
| 10 | 915.227M    | 114.6        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.1        | 137.0<br>600M OFDM   | -1.9         | RF Po        |
| 11 | 915.169M    | 114.6        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.1        | 137.0<br>150k FSK    | -1.9         | RF Po        |
| 12 | 915.192M    | 114.5        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 135.0        | 137.0<br>200M OFDM   | -2.0         | RF Po        |
| 13 | 927.574M    | 114.0        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.5        | 137.0<br>50k FSK     | -2.5         | RF Po        |
| 14 | 927.625M    | 114.0        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.5        | 137.0<br>150k FSK    | -2.5         | RF Po        |
| 15 | 927.618M    | 114.0        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.5        | 137.0<br>6.25k OQPSK | -2.5         | RF Po        |
| 16 | 927.571M    | 114.0        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.5        | 137.0<br>12.5k OQPSK | -2.5         | RF Po        |
| 17 | 927.603M    | 114.0        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.5        | 137.0<br>600M OFDM   | -2.5         | RF Po        |
| 18 | 927.612M    | 113.9        | +0.0     | +20.0    | +0.5     |  |    | +0.0          | 134.4        | 137.0<br>200M OFDM   | -2.6         | RF Po        |

Test Setup Photo(s)



## 15.247(d) RF Conducted Emissions & Band Edge

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717  
 Customer: **Itron, Inc.**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **103786** Date: 5/15/2020  
 Test Type: **Conducted Emissions** Time: 11:05:36  
 Tested By: Michael Atkinson Sequence#: 6  
 Software: EMITest 5.03.12 115VAC 60Hz

#### Equipment Tested:

| Device          | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 |              |         |     |

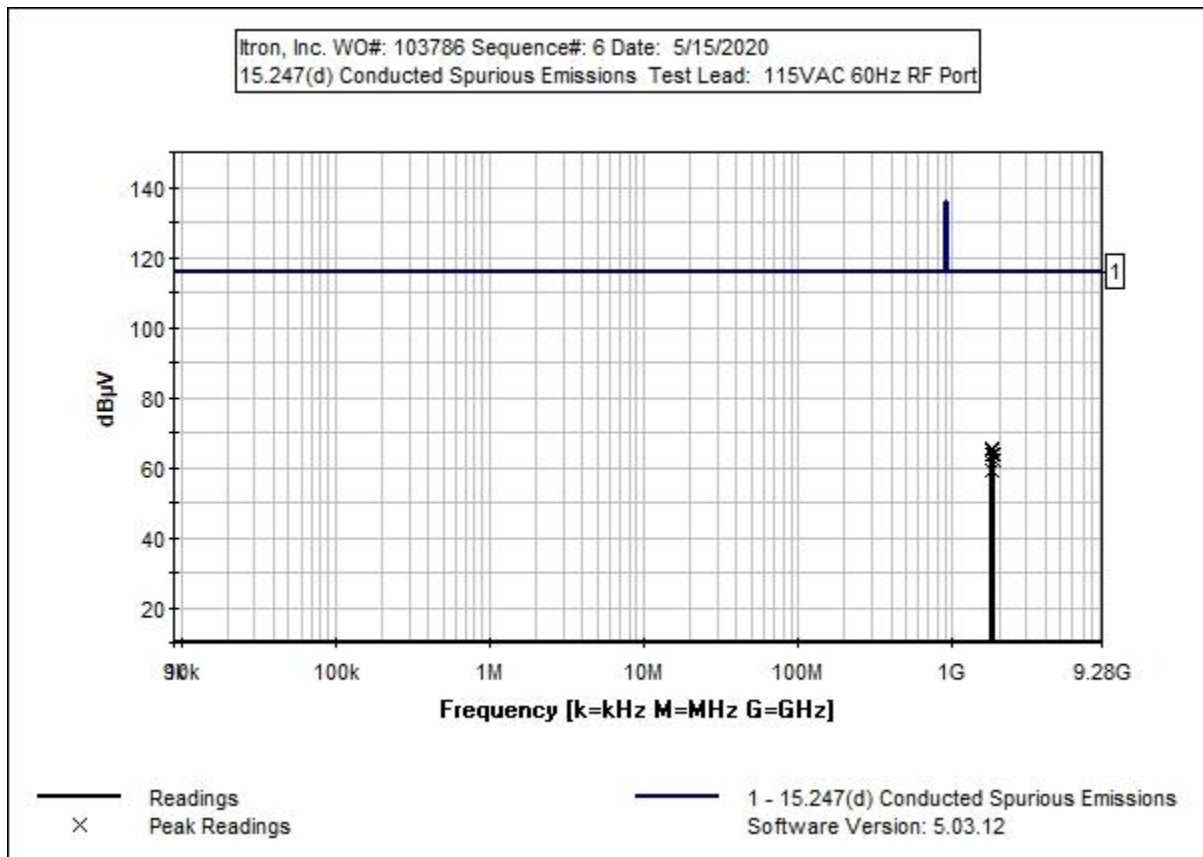
#### Support Equipment:

| Device          | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 |              |         |     |

#### Test Conditions / Notes:

Frequency: 9kHz-9.28GHz

Low, Middle, and High channels investigated, as well as hopping mode, worst case reported.



**Test Equipment:**

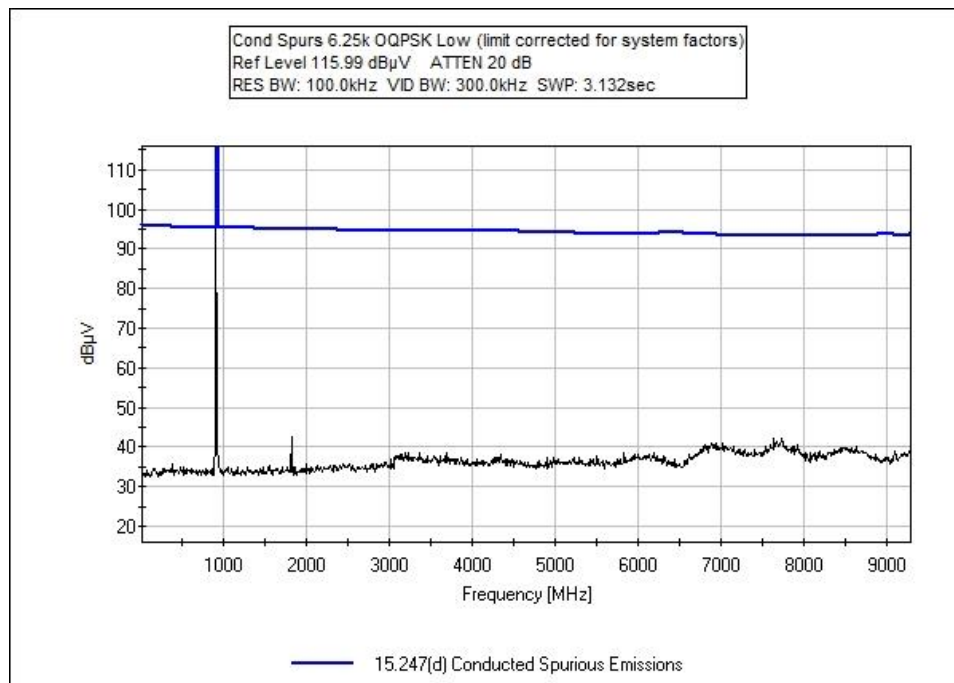
| ID | Asset #  | Description       | Model     | Calibration Date | Cal Due Date |
|----|----------|-------------------|-----------|------------------|--------------|
| T1 | ANP05748 | Attenuator        | PE7004-20 | 3/4/2020         | 3/4/2022     |
| T2 | ANP05546 | Cable             | Helix     | 8/24/2018        | 8/24/2020    |
| T3 | AN02673  | Spectrum Analyzer | E4446A    | 2/22/2019        | 2/22/2021    |

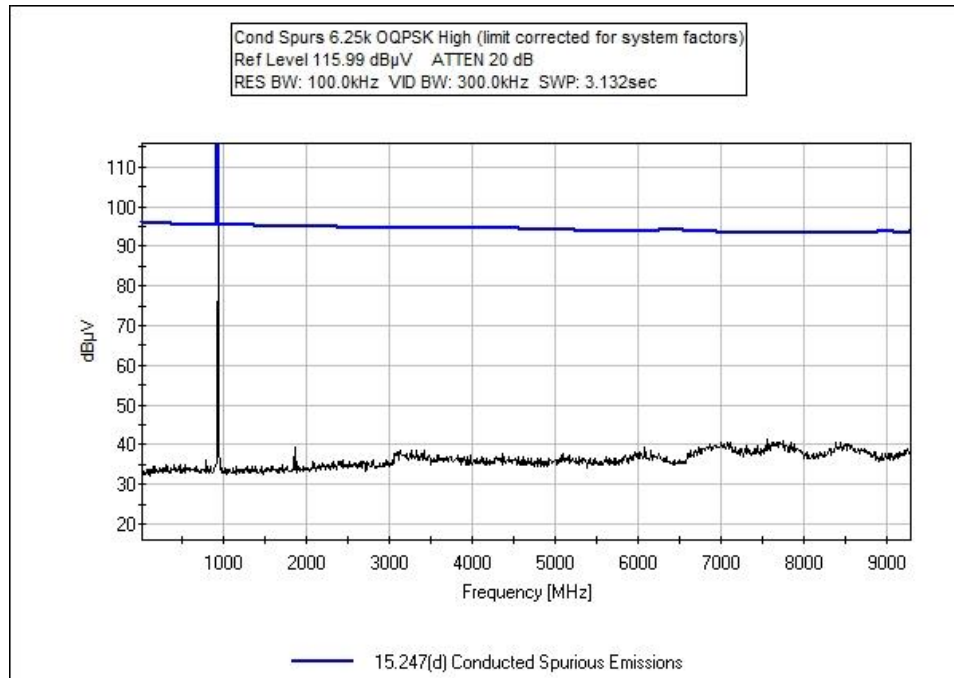
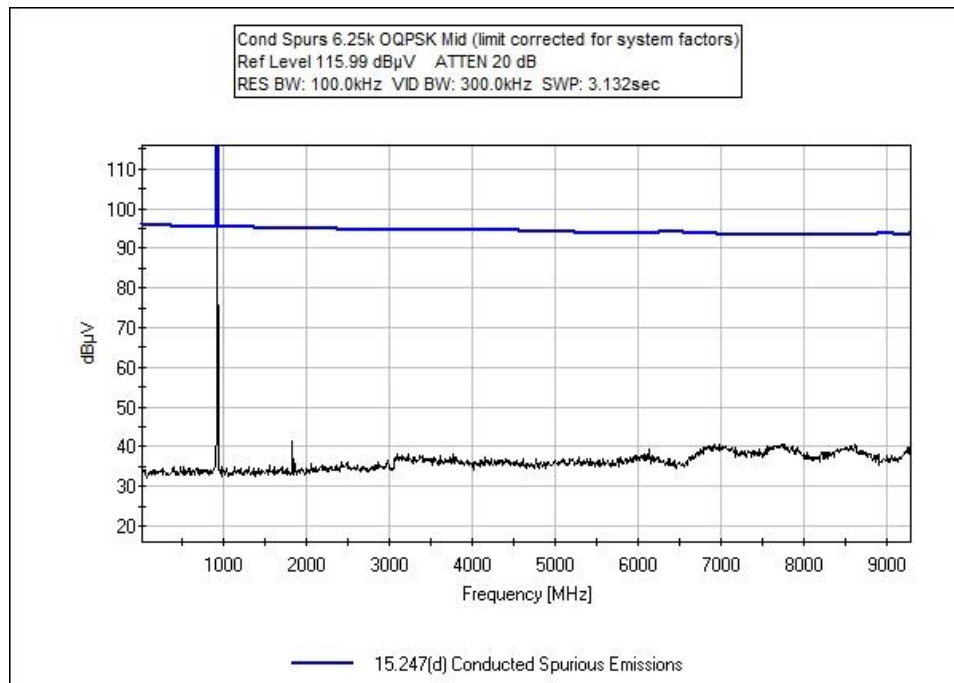
**Measurement Data:**

Reading listed by margin.

Test Lead: RF Port

| # | Freq<br>MHz | Rdng<br>dBμV | T1<br>dB | T2<br>dB | T3<br>dB | dB | Dist<br>Table | Corr<br>dBμV | Spec<br>dBμV | Margin<br>dB | Polar<br>Ant |
|---|-------------|--------------|----------|----------|----------|----|---------------|--------------|--------------|--------------|--------------|
| 1 | 1804.750M   | 44.4         | +20.0    | +0.9     | +0.0     |    | +0.0          | 65.3         | 116.0        | -50.7        | RF Po        |
|   |             |              |          |          |          |    |               |              | 6.25k OQPSK  |              |              |
| 2 | 1804.850M   | 43.8         | +20.0    | +0.9     | +0.0     |    | +0.0          | 64.7         | 116.0        | -51.3        | RF Po        |
|   |             |              |          |          |          |    |               |              | 12.5k OQPSK  |              |              |
| 3 | 1804.750M   | 43.7         | +20.0    | +0.9     | +0.0     |    | +0.0          | 64.6         | 116.0        | -51.4        | RF Po        |
|   |             |              |          |          |          |    |               |              | 50k FSK      |              |              |
| 4 | 1804.770M   | 43.0         | +20.0    | +0.9     | +0.0     |    | +0.0          | 63.9         | 116.0        | -52.1        | RF Po        |
|   |             |              |          |          |          |    |               |              | 150k FSK     |              |              |
| 5 | 1830.350M   | 42.8         | +20.0    | +0.9     | +0.0     |    | +0.0          | 63.7         | 116.0        | -52.3        | RF Po        |
|   |             |              |          |          |          |    |               |              | 6.25k OQPSK  |              |              |
| 6 | 1855.250M   | 41.4         | +20.0    | +0.9     | +0.0     |    | +0.0          | 62.3         | 116.0        | -53.7        | RF Po        |
|   |             |              |          |          |          |    |               |              | 6.25k OQPSK  |              |              |
| 7 | 1804.840M   | 38.5         | +20.0    | +0.9     | +0.0     |    | +0.0          | 59.4         | 116.0        | -56.6        | RF Po        |
|   |             |              |          |          |          |    |               |              | 600k OFDM    |              |              |
| 8 | 1804.780M   | 38.4         | +20.0    | +0.9     | +0.0     |    | +0.0          | 59.3         | 116.0        | -56.7        | RF Po        |
|   |             |              |          |          |          |    |               |              | 200k OFDM    |              |              |

**Plot(s)**




## Band Edge

### Band Edge Summary

Limit applied: Max Power/100kHz - 20dB.

Operating Mode: Single Channel (Low and High)

Operating Mode: Hopping

| Frequency (MHz) | Modulation          | Measured (dBm) | Limit (dBm) | Results |
|-----------------|---------------------|----------------|-------------|---------|
| 902             | FSK 50k             | -26.9          | <9          | Pass    |
| 928             | FSK 50k             | -29.8          | <9          | Pass    |
| 902             | Hopping FSK 50k     | -26.5          | <9          | Pass    |
| 928             | Hopping FSK 50k     | -28            | <9          | Pass    |
| 902             | FSK 150k            | -29.5          | <9          | Pass    |
| 928             | FSK 150k            | -26.9          | <9          | Pass    |
| 902             | Hopping FSK 150k    | -26.6          | <9          | Pass    |
| 928             | Hopping FSK 150k    | -29.7          | <9          | Pass    |
| 902             | OQPSK 6.25k         | -28.4          | <9          | Pass    |
| 928             | OQPSK 6.25k         | -28.1          | <9          | Pass    |
| 902             | Hopping OQPSK 6.25k | -25.7          | <9          | Pass    |
| 928             | Hopping OQPSK 6.25k | -27.6          | <9          | Pass    |
| 902             | OQPSK 12.5k         | -24.7          | <9          | Pass    |
| 928             | OQPSK 12.5k         | -28.8          | <9          | Pass    |
| 902             | Hopping OQPSK 12.5k | -28.4          | <9          | Pass    |
| 928             | Hopping OQPSK 12.5k | -29.8          | <9          | Pass    |
| 902             | OFDM 200k           | -6.6           | <9          | Pass    |
| 928             | OFDM 200k           | -7.8           | <9          | Pass    |
| 902             | Hopping OFDM 200k   | -5.5           | <9          | Pass    |
| 928             | Hopping OFDM 200k   | -9.3           | <9          | Pass    |
| 902             | OFDM 600k           | -4.6           | <9          | Pass    |
| 928             | OFDM 600k           | -5.7           | <9          | Pass    |
| 902             | Hopping OFDM 600k   | -3.7           | <9          | Pass    |
| 928             | Hopping OFDM 600k   | -7.9           | <9          | Pass    |

## Band Edge Plots

