Itron, 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.: 104631-2

Date of issue: February 10, 2021

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.

Test Certificate # 803.01

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Liberty Lake, WA 99019

Representative: Jay Holcomb
Customer Reference Number: 224127

REPORT PREPARED BY:

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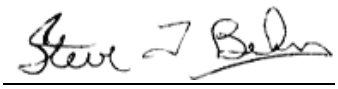
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 104631

DATE OF EQUIPMENT RECEIPT: January 6, 2021
DATE(S) OF TESTING: January 6-8 and 18, 2021

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.
Canyon Park
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	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	Pass
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

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

Device	Manufacturer	Model #	S/N
ORRNC	Itron	RN-EGM	335579339

Support Equipment:

Device	Manufacturer	Model #	S/N
Antenna	PCTEL	BOA9022NM-ITR	181489
Laptop	Dell	Latitude E6400	DQ8W1M1

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Proprietary FHSS
Operating Frequency Range:	902.3 – 926.9 MHz (83 channels, FSK 100kbps, GFSK 150kbps, 200kbps) 902.4 – 927.6 MHz (64 channels, FSK 150kbps, GFSK 300kbps, OFDM 600kbps)
Number of Hopping Channels:	83 or 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):	FSK 100kbps, 150kbps GFSK 150kbps, 200kbps, 300kbps OFDM 600kbps
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 Certification GUI vUpdate2 Test FW11.0.51.1 GEN5EGM_REL1_BETA

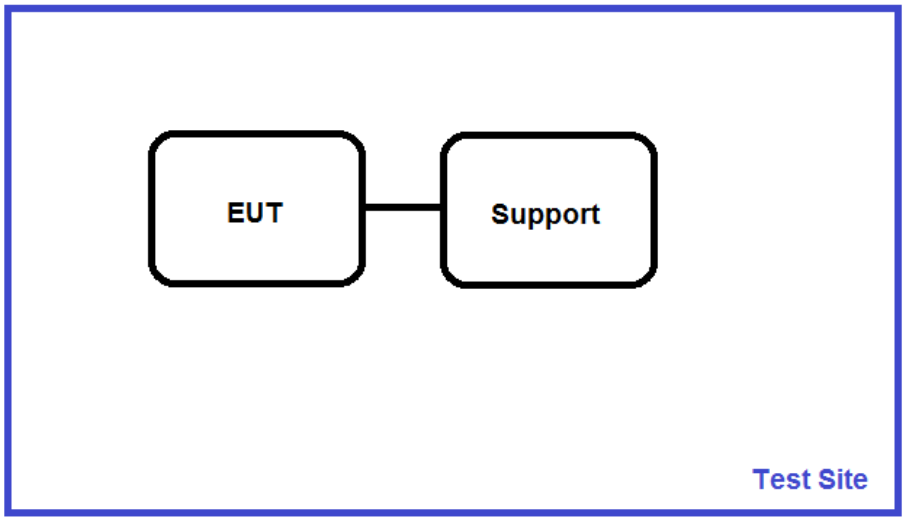
EUT and Accessory Photo(s)

EUT

Support Equipment Photo(s)

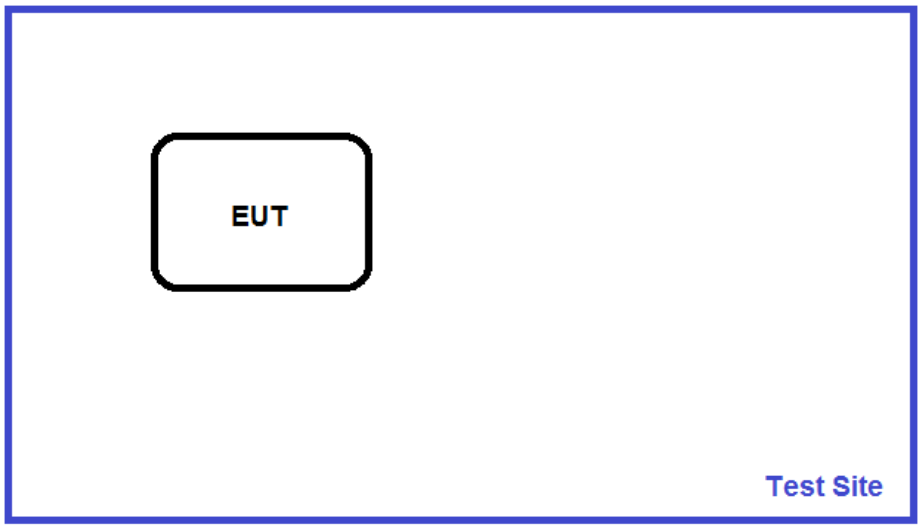
Block Diagram of Test Setup(s)

Test Setup Block Diagram



Conducted

Test Setup Block Diagram



Radiated

FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	1/5/2021
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 (ºC)	22	Relative Humidity (%):	41

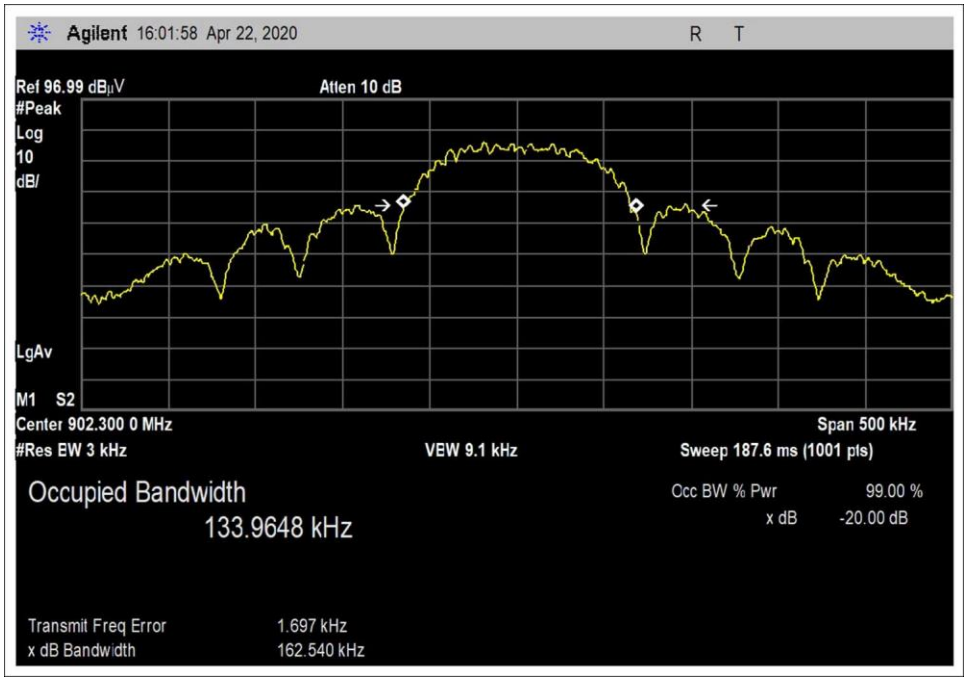
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02872	Spectrum Analyzer	Agilent	E4440A	11/18/2019	11/18/2021
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022

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

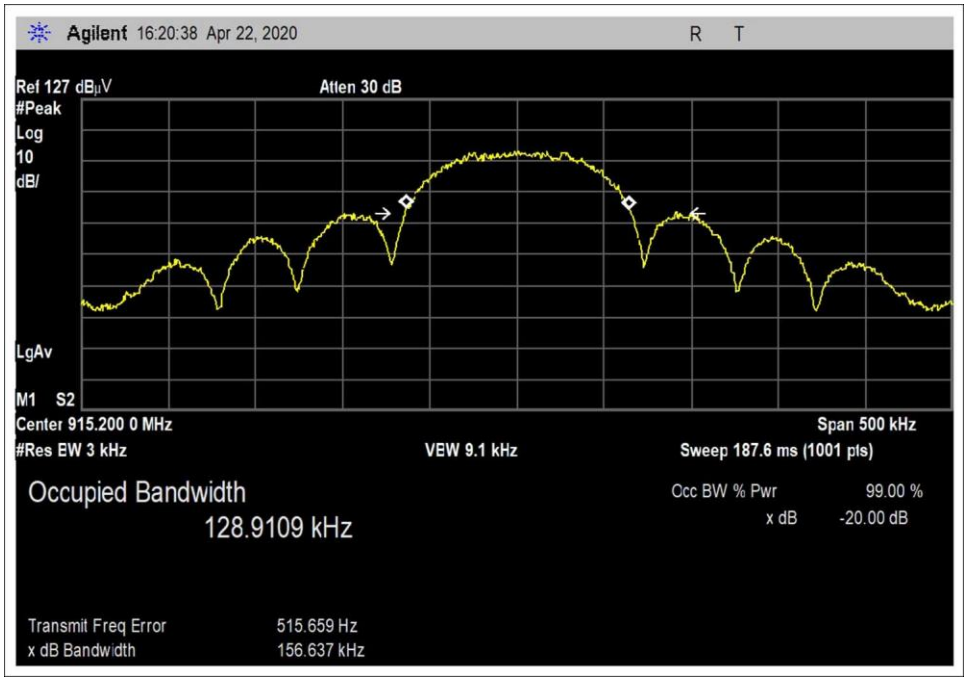
Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
902.3	1	FSK 100 kbps	165.5	≤500	Pass
915.2	1	FSK 100 kbps	156.6	≤500	Pass
926.9	1	FSK 100 kbps	161.1	≤500	Pass
902.4	1	FSK 150 kbps	192.8	≤500	Pass
915.2	1	FSK 150 kbps	193.1	≤500	Pass
927.6	1	FSK 150 kbps	191.2	≤500	Pass
902.3	1	GFSK 150 kbps	182.6	≤500	Pass
915.2	1	GFSK 150 kbps	180.6	≤500	Pass
926.9	1	GFSK 150 kbps	183.3	≤500	Pass
902.3	1	GFSK 200 kbps	241.7	≤500	Pass
915.2	1	GFSK 200 kbps	241.8	≤500	Pass
926.9	1	GFSK 200 kbps	241.8	≤500	Pass
902.4	1	GFSK 300 kbps	368.9	≤500	Pass
915.2	1	GFSK 300 kbps	364.2	≤500	Pass
927.6	1	GFSK 300 kbps	367.7	≤500	Pass
902.4	1	OFDM 600kbps	332.2	≤500	Pass
915.2	1	OFDM 600kbps	333.1	≤500	Pass
927.6	1	OFDM 600kbps	336.8	≤500	Pass

Plot(s)

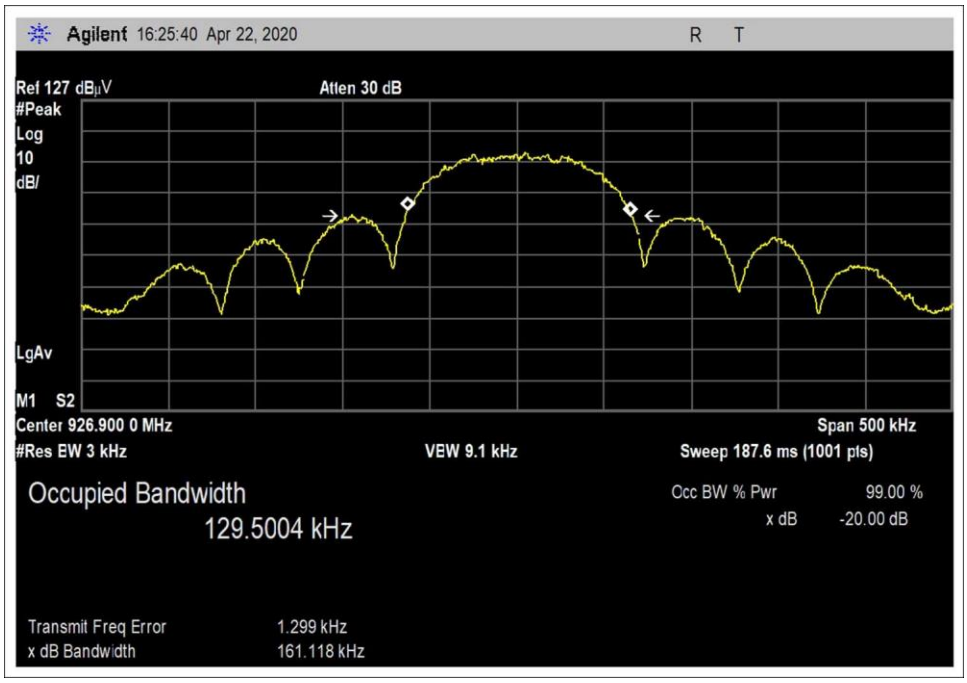
Note: At the time of testing, the date stamp on the plots below was set on a default setting and should read 1/5/2021



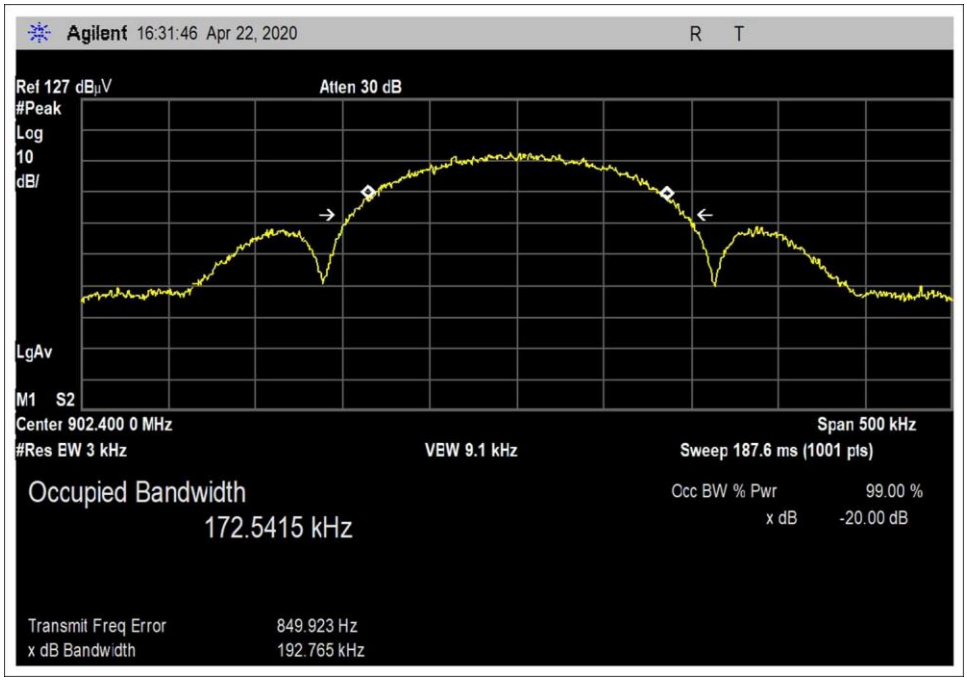
Low Channel, FSK, 100kbps



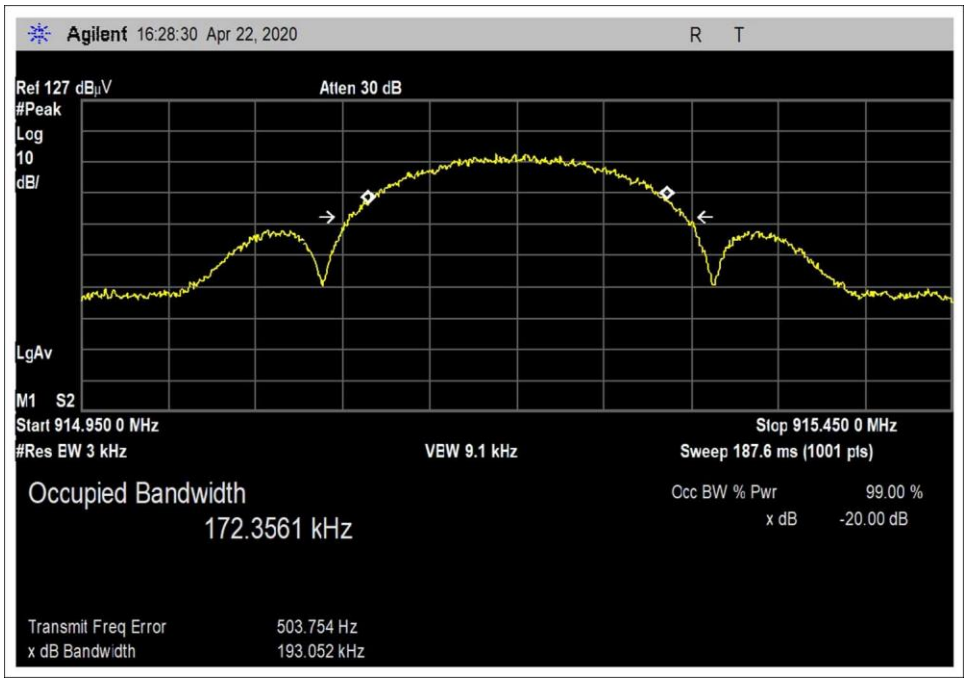
Middle Channel, FSK, 100kbps



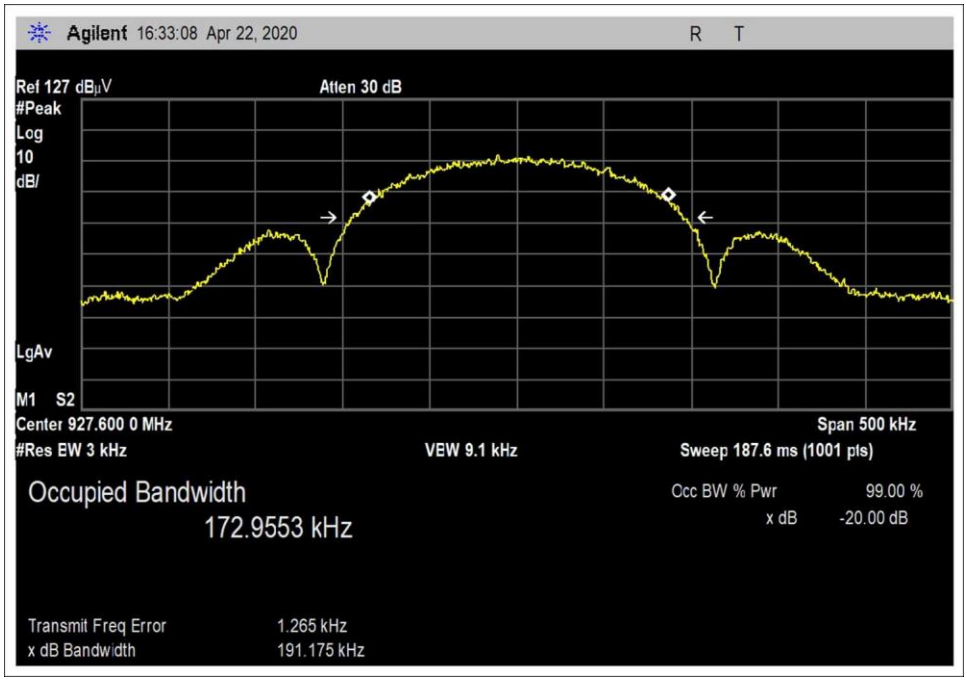
High Channel, FSK, 100kbps



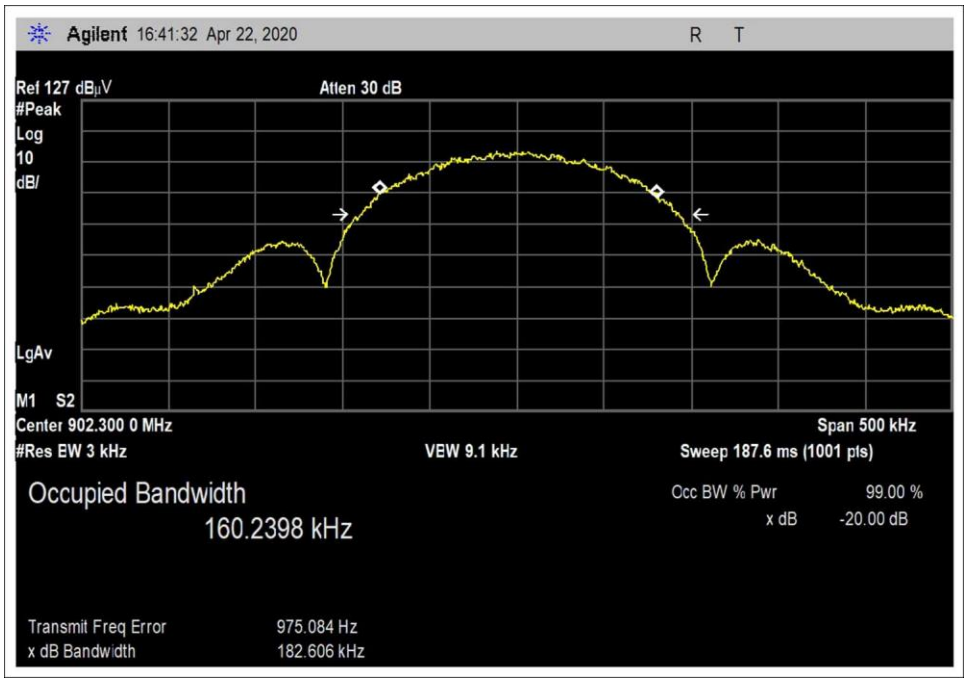
Low Channel, FSK, 150kbps



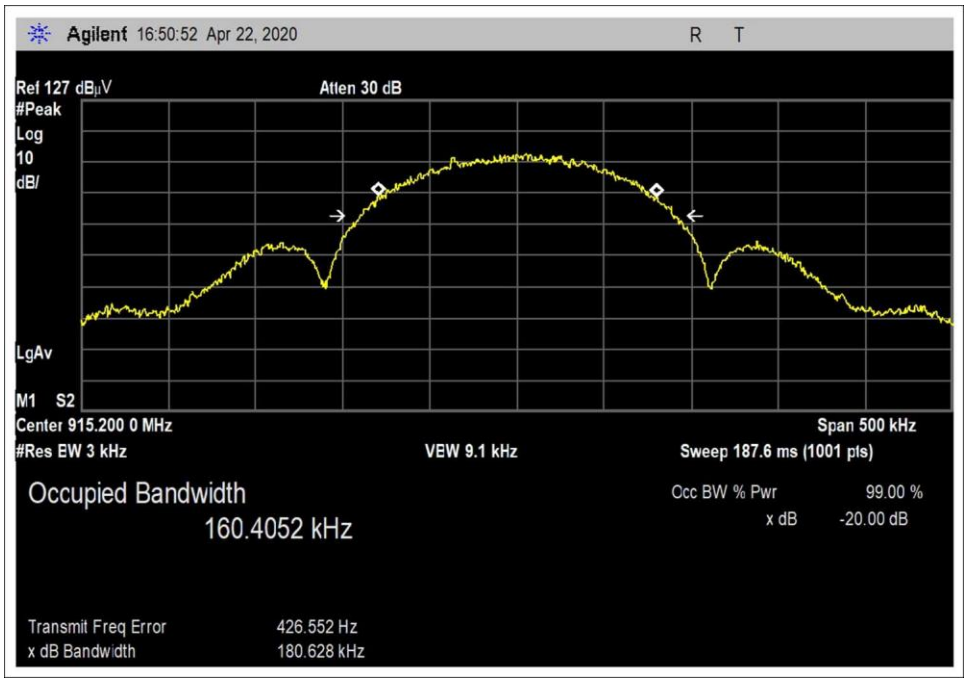
Middle Channel, FSK, 150kbps



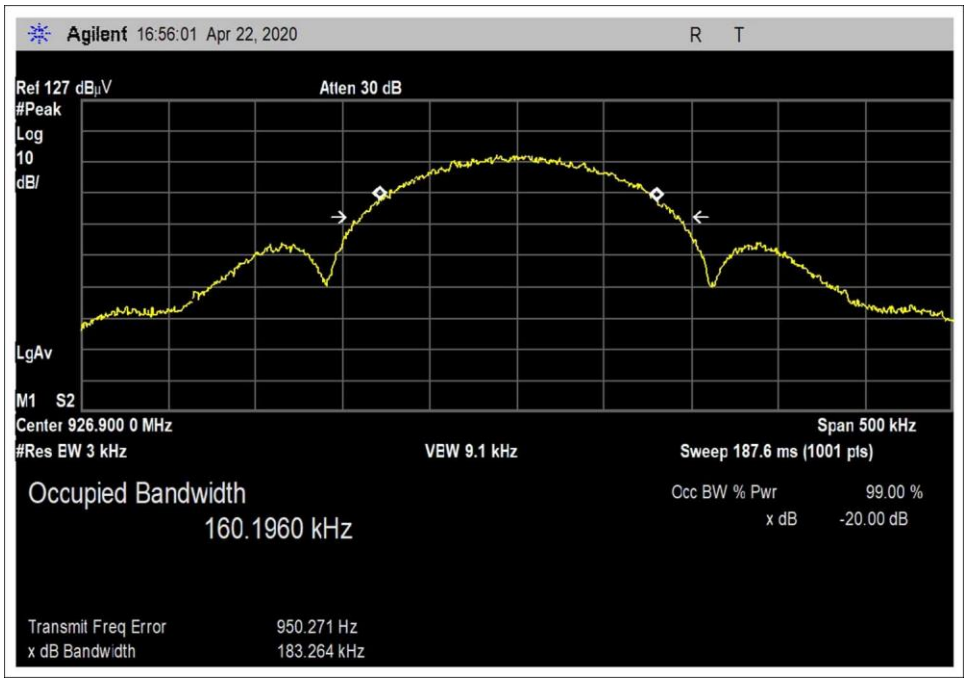
High Channel FSK, 150kbps



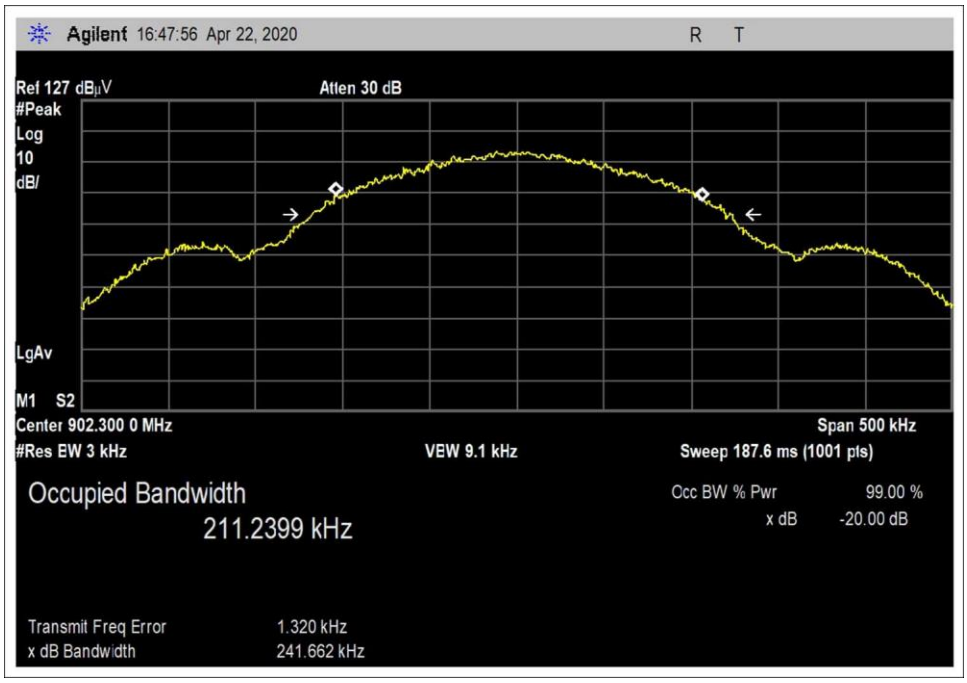
Low Channel, GFSK, 150kbps



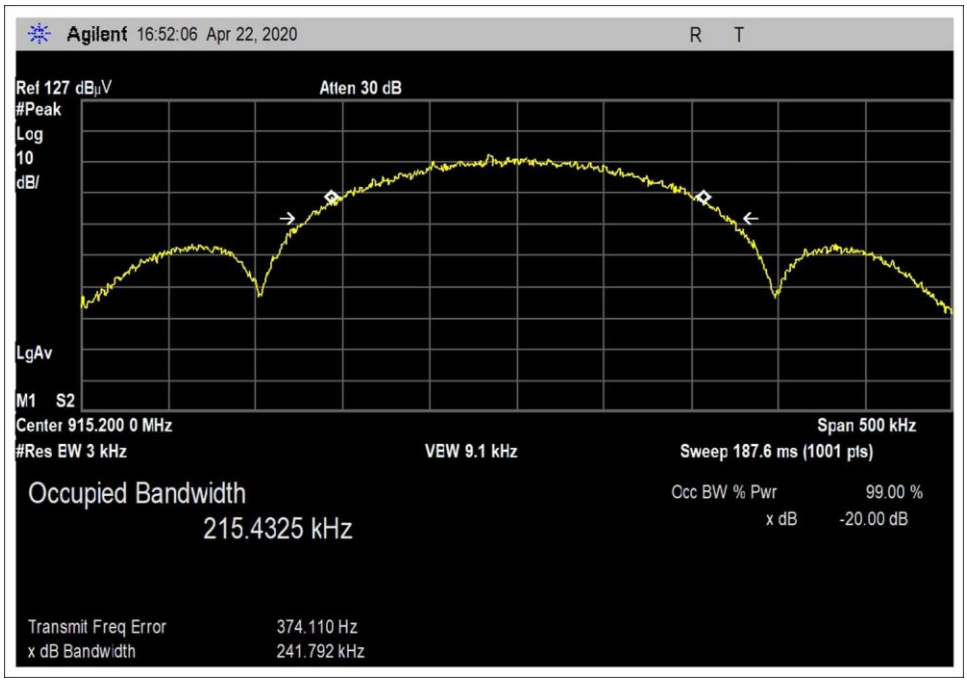
Middle Channel, GFSK, 150kbps



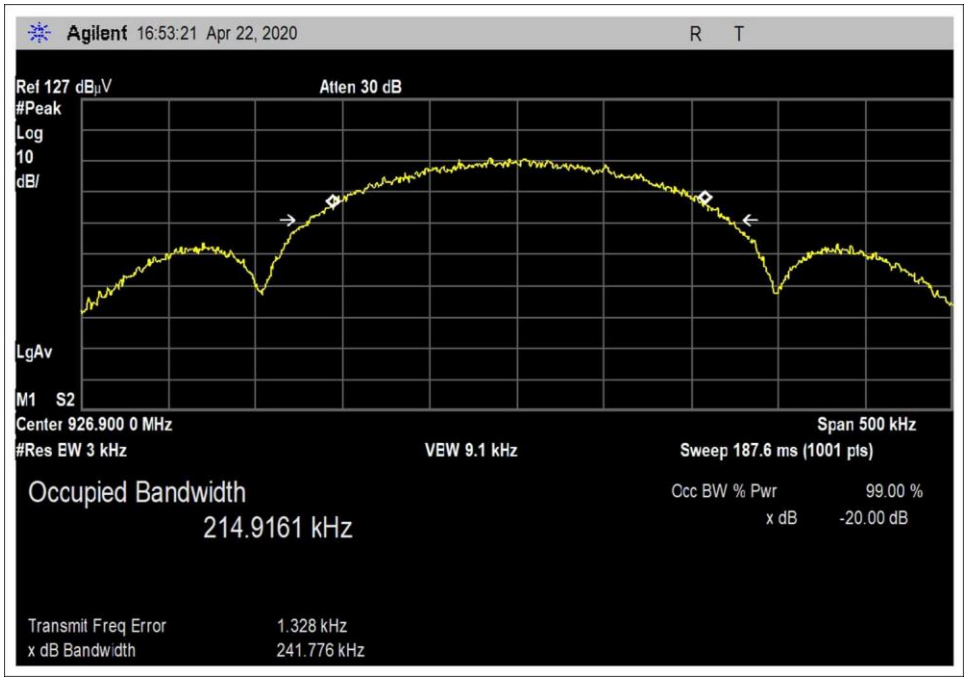
High Channel, GFSK, 150kbps



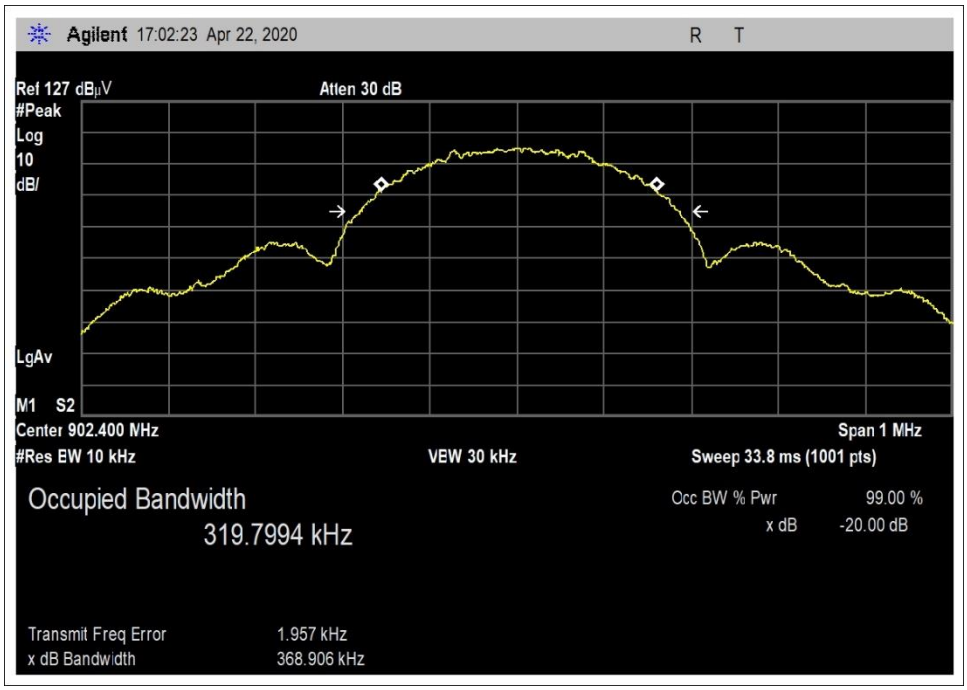
Low Channel, GFSK, 200kbps



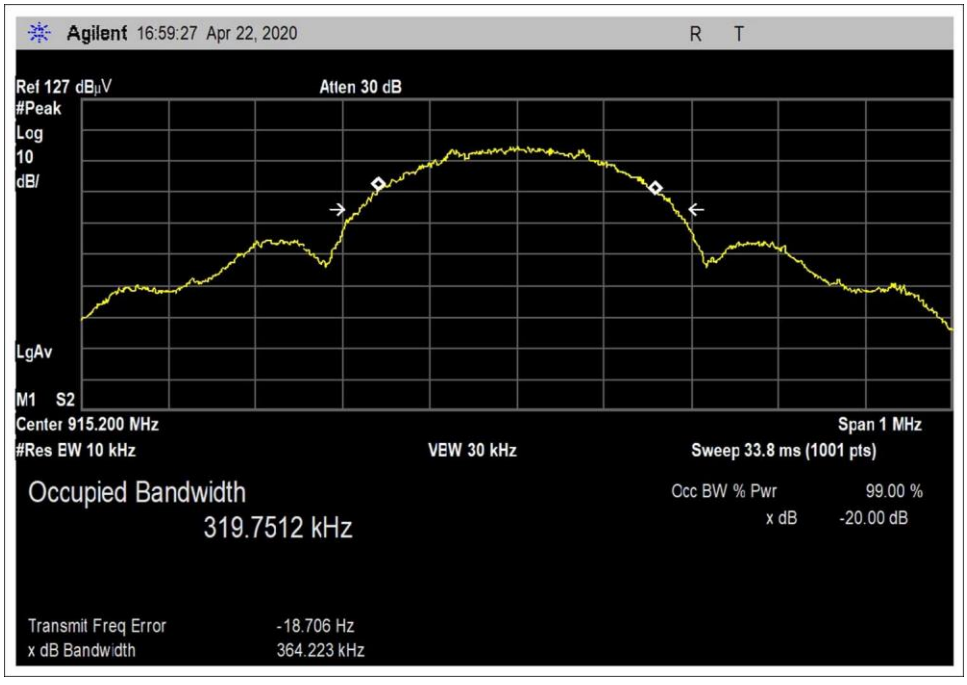
Middle Channel, GFSK, 200kbps



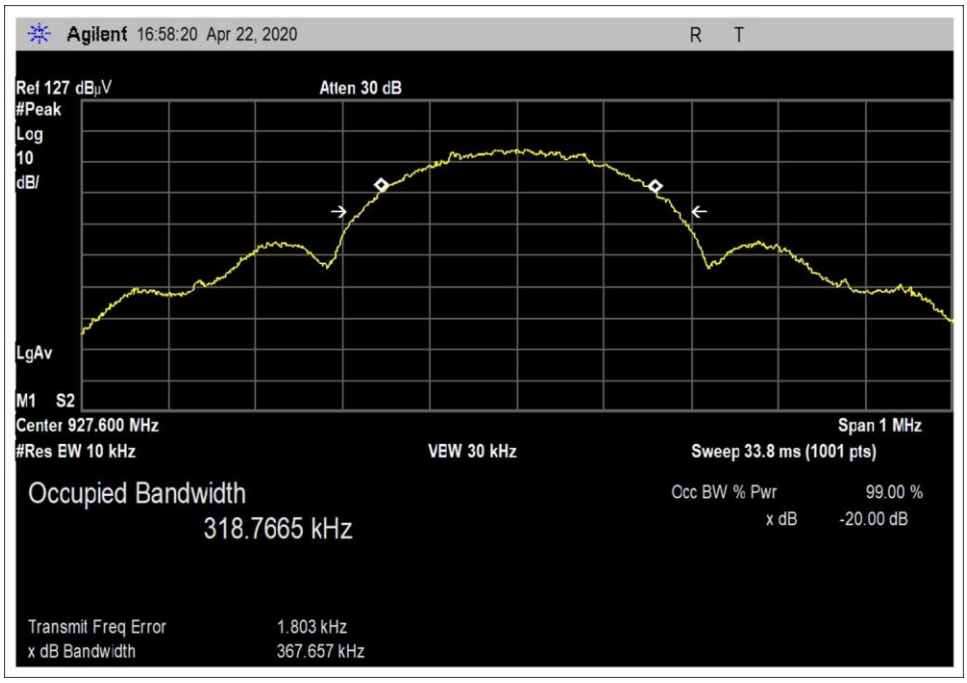
High Channel, GFSK,200kbps



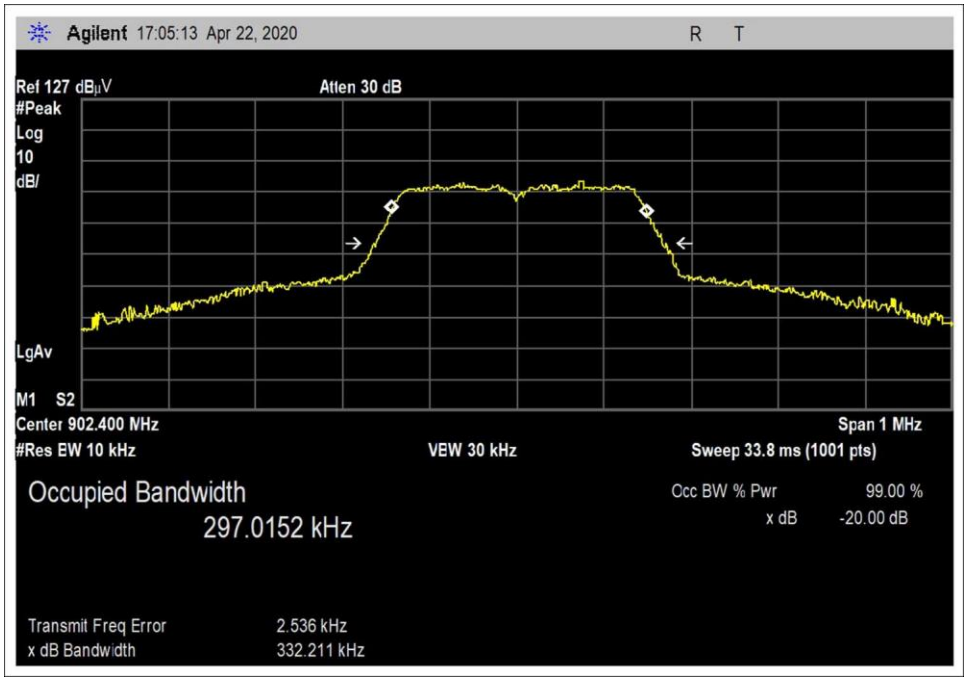
Low Channel, GFSK, 300kbps



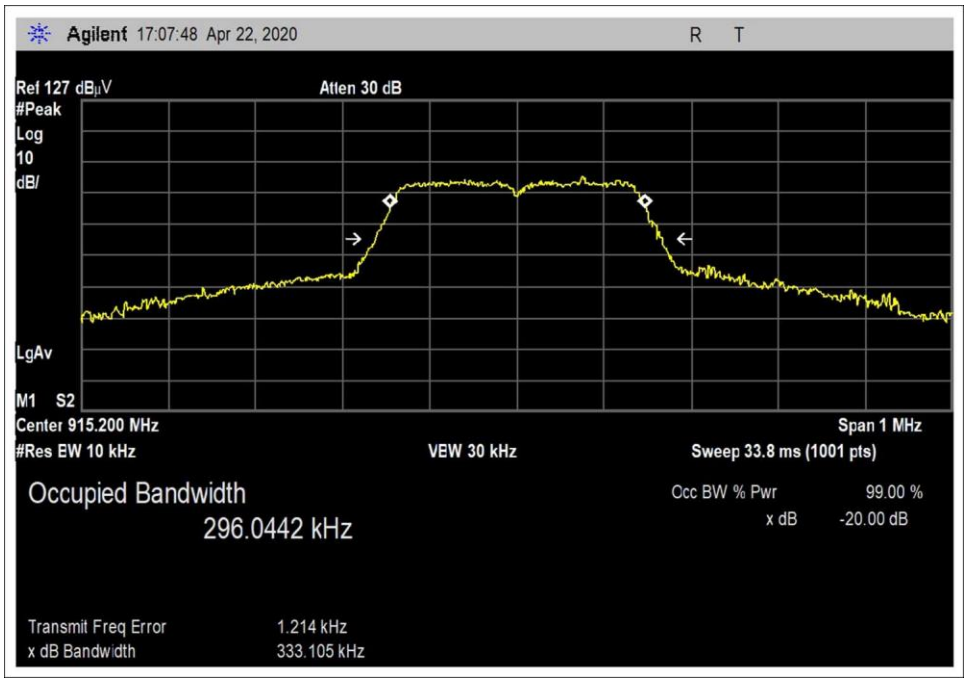
Middle Channel, GFSK, 300kbps



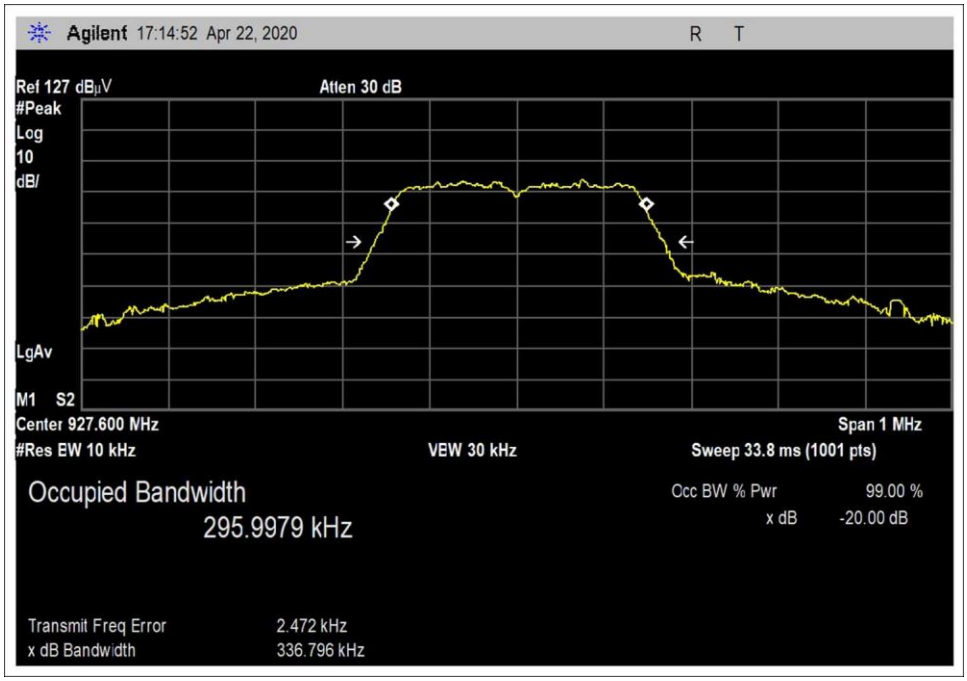
High Channel, GFSK, 300kbps



Low Channel, OFDM, 600kbps



Middle Channel, OFDM, 600kbps



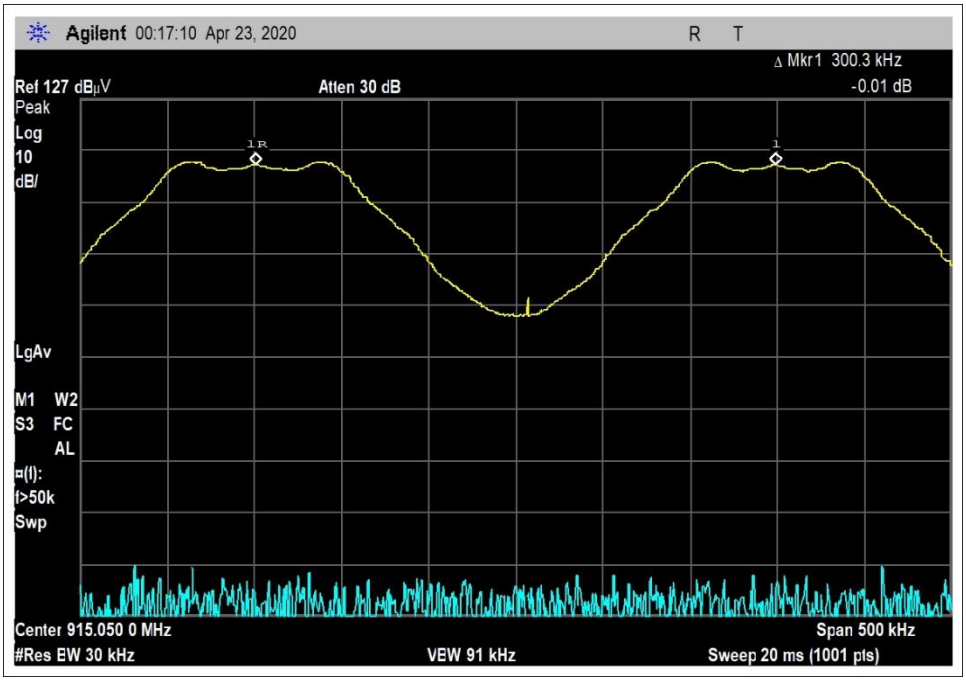
High Channel, OFDM, 600kbps

15.247(a)(1) Carrier Separation

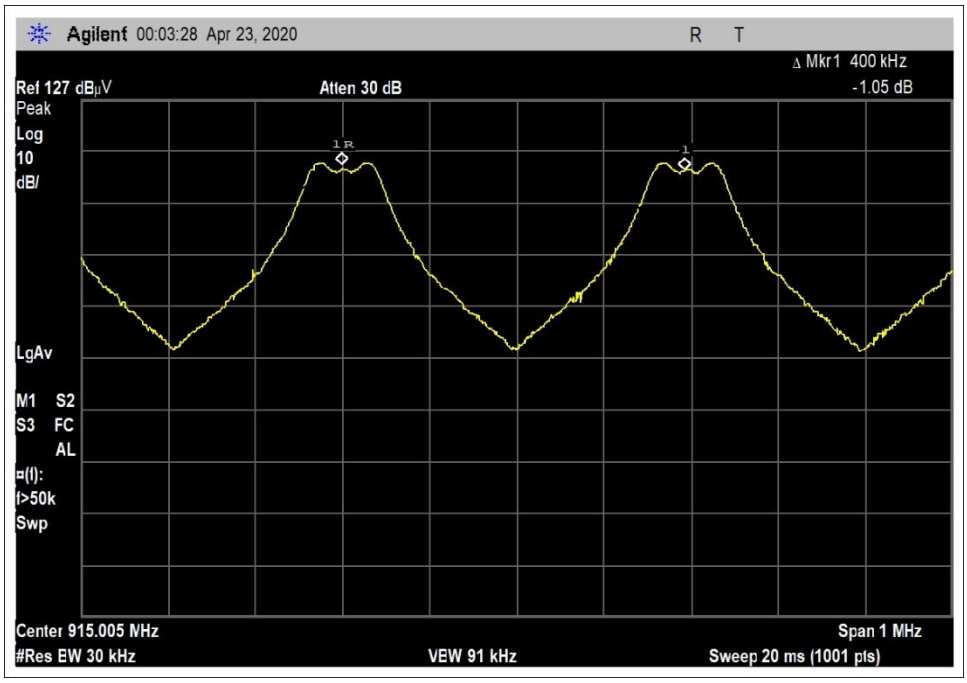
Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	**Operational Mode**	**Measured (kHz)**	**Limit (kHz)**	**Results**
1	FSK 100kbps / GFSK 150kbps, 200kbps	300	> 193.1	Pass
1	FSK 150kbps / GFSK 300kbps / OFDM 600kbps	400	> 368.9	Pass

*Note: Limit is worst case bandwidth for modes listed.

Plot(s)



300kHz

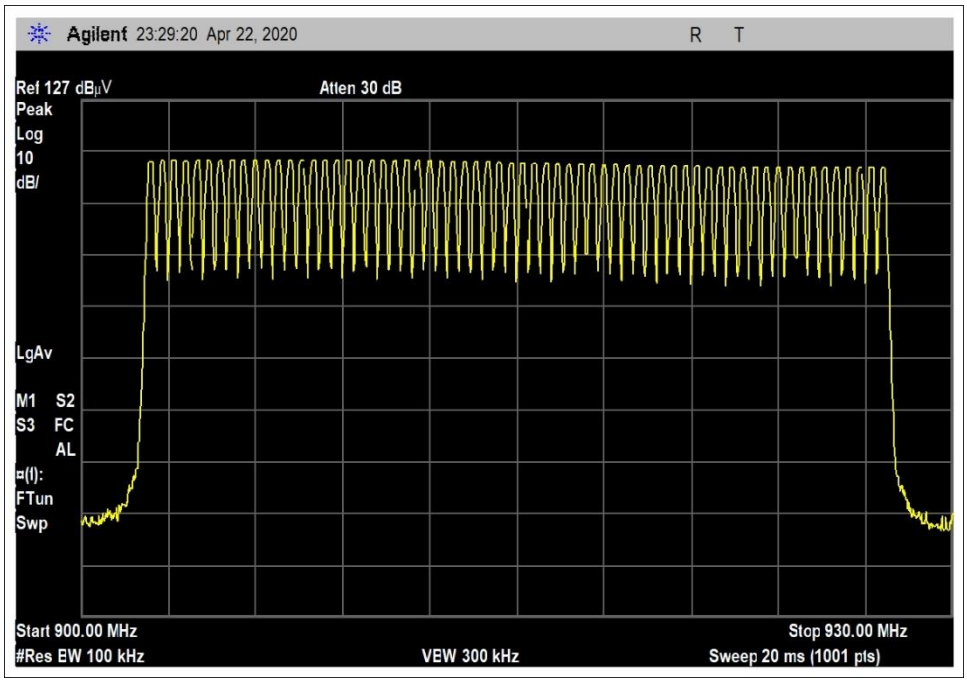

Agilent 00:03:28 Apr 23, 2020
R T
Δ Mkr1 400 kHz
-1.05 dB
Ref 127 dBµV
Atten 30 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AL
ε(f):
f>50k
Swp
Center 915.005 MHz
Span 1 MHz
#Res EW 30 kHz
VEW 91 kHz
Sweep 20 ms (1001 pts)

400kHz

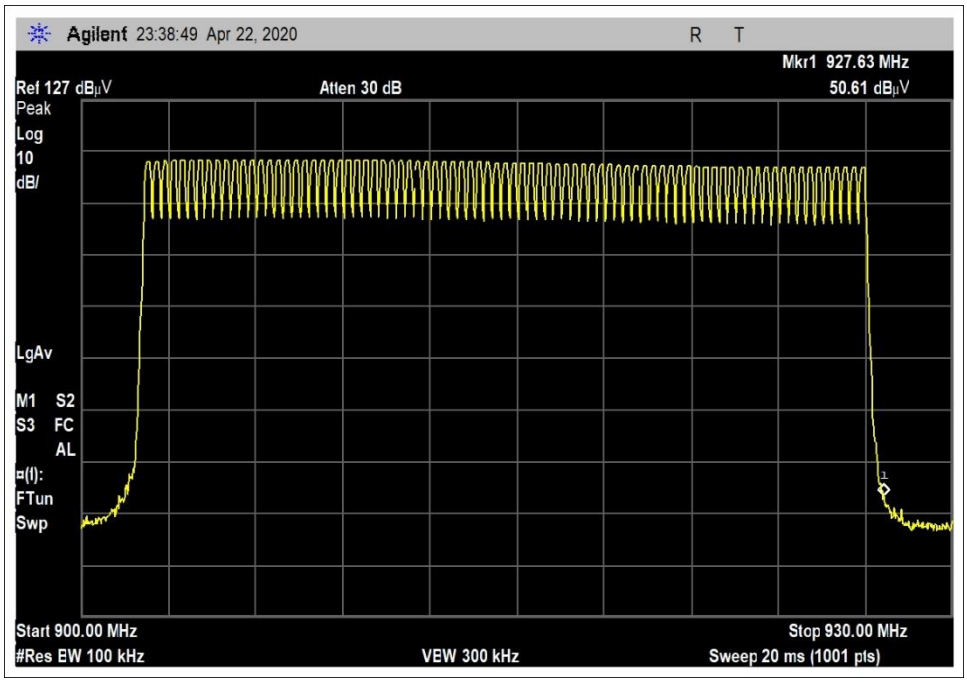
15.247(a)(1)(i) Number of Hopping Channels

Test Data Summary				
$Limit = \begin{cases} 50\ Channels \mid 20\ dB\ BW < 250kHz \\ 25\ Channels \mid 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (Channels)**	**Limit (Channels)**	**Results**
1	FSK 100kbps, 150kbps / GFSK 150kbps, 200kbps	83	≥50	Pass
1	GFSK 300kbps / OFDM 600kBPS	64	≥25	Pass

Plot(s)



64 Channel


Agilent 23:38:49 Apr 22, 2020
R T
Mkr1 927.63 MHz
Ref 127 dBµV
Atten 30 dB
50.61 dBµV
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AL
n(l):
FTun
Swp
Start 900.00 MHz
Stop 930.00 MHz
#Res EW 100 kHz
VBW 300 kHz
Sweep 20 ms (1001 pts)

83 Channel

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

Test Data Summary				
Observation Period, P_{obs} is derived from the following: $P_{Obs} = \begin{cases} 20\ Seconds & 20\ dB\ BW < 250kHz \\ 10\ Seconds & 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (ms)**	**Limit (ms/P_{obs})**	**Results**
1	300kHz Spacing/83 Channel	140.2	≤400	Pass
1	400kHz Spacing/64 Channel	259.7	≤400	Pass

Note: Worst case reported.

Measured results are calculated as follows:

$$Dwell\ time = \left(\sum_{Bursts} RF\ Burst\ On\ Time + \sum_{Control} Control\ Signal\ On\ time \right) \Big|_{P_{obs}}$$

Actual Calculated Values: (300kHz/83 Channel):

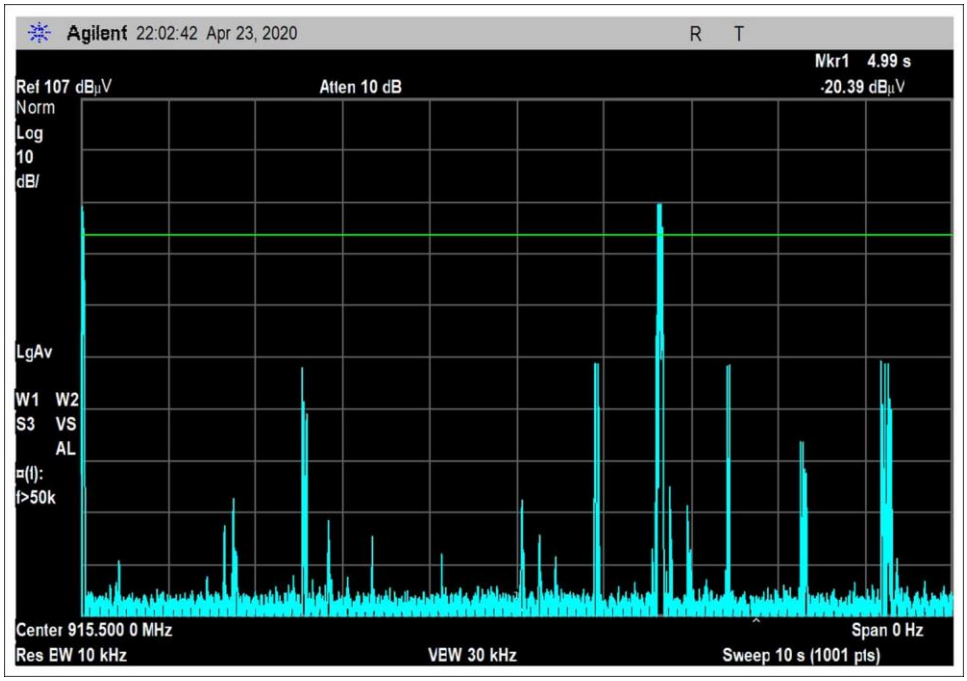
Parameter	Value
Observation Period (P_{obs}):	10s
Number of RF Bursts / P_{obs}:	2
On time of RF Burst:	70.1ms
Number of Control or other signals / P_{obs}:	0
On time of Control or other Signals:	0
Total Measured On Time:	140.2ms

Actual Calculated Values: (400kHz/64 Channel):

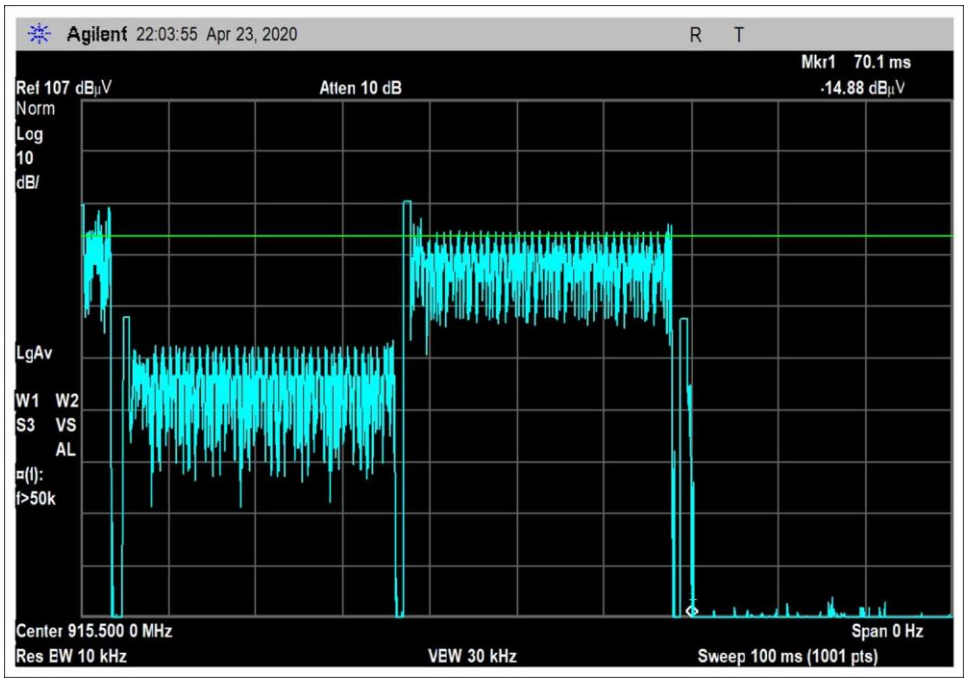
Parameter	Value
Observation Period (P_{obs}):	20s
Number of RF Bursts / P_{obs}:	7
On time of RF Burst:	37.1ms
Number of Control or other signals / P_{obs}:	0
On time of Control or other Signals:	0
Total Measured On Time:	259.7

Plot(s)

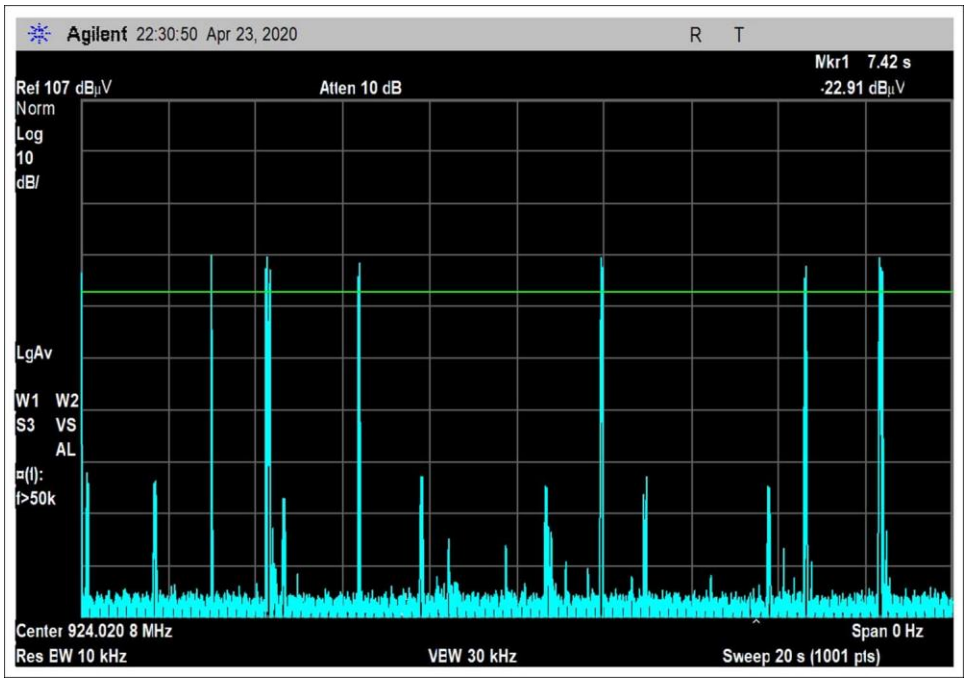
Note: At the time of testing, the date stamp on the plots below was set on a default setting and should read 1/5/2021



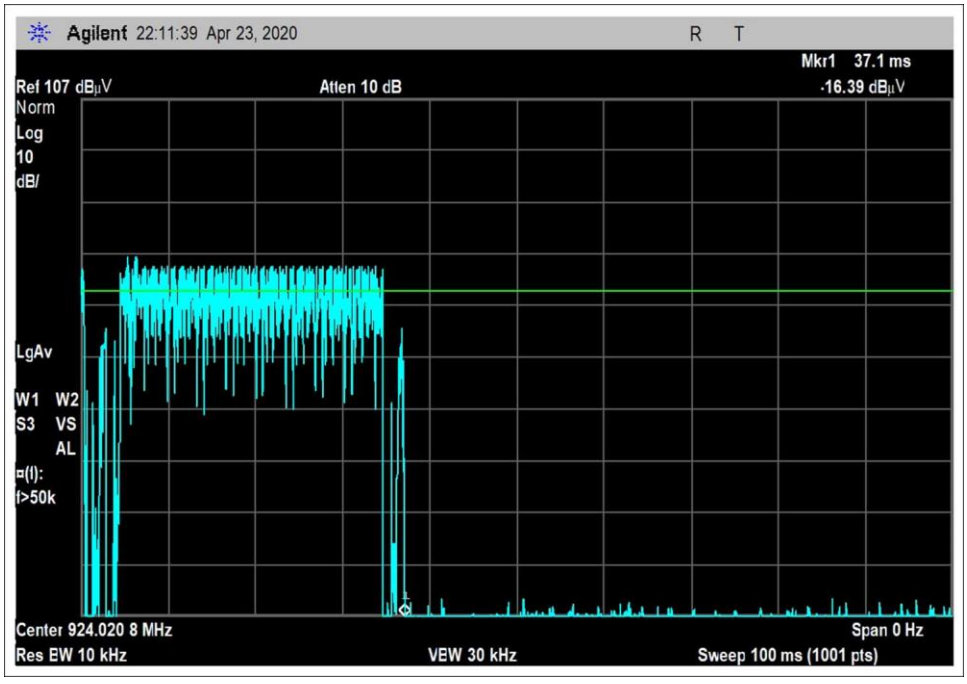
300kHz



300kHz

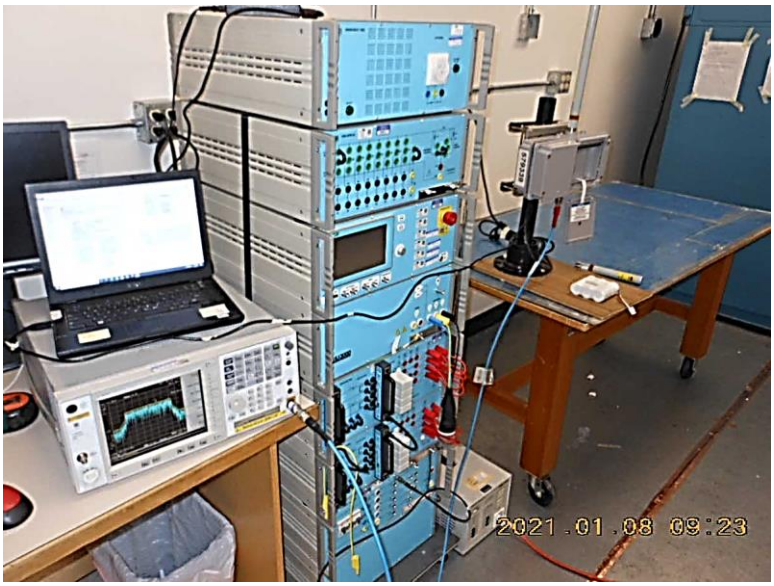


400kHz

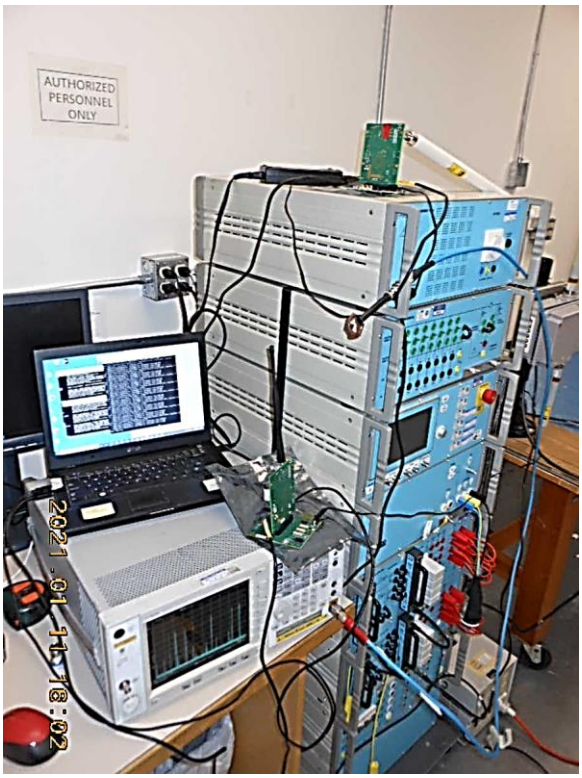


400kHz

Test Setup Photo(s)



Conducted Measurements



Time of Occupancy

15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	1/5/2021
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 (ºC)	22	Relative Humidity (%):	41

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

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation / Ant Port**	**$V_{Minimum}$ (dBm)**	**$V_{Nominal}$ (dBm)**	**$V_{Maximum}$ (dBm)**	**Max Deviation from $V_{Nominal}$ (dB)**
902.3	FSK 100 kbps / 1	28.8	28.8	28.7	0.1
915.2	FSK 100 kbps / 1	28.4	28.4	28.4	0
926.9	FSK 100 kbps / 1	27.7	27.7	27.6	0.1
902.4	FSK 150 kbps / 1	28.7	28.8	28.8	0.1
915.2	FSK 150 kbps / 1	28.3	28.3	28.2	0.1
927.6	FSK 150 kbps / 1	27.6	27.7	27.7	0.1
902.3	GFSK 150 kbps / 1	28.7	28.8	28.8	0.1
915.2	GFSK 150 kbps / 1	28.3	28.3	28.3	0
926.9	GFSK 150 kbps / 1	27.7	27.6	27.6	0.1
902.3	GFSK 200 kbps / 1	28.7	28.7	28.7	0
915.2	GFSK 200 kbps / 1	28.2	28.2	28.1	0.1
926.9	GFSK 200 kbps / 1	27.6	27.6	27.5	0.1
902.4	GFSK 300 kbps / 1	28.7	28.7	28.8	0.1
915.2	GFSK 300 kbps / 1	28.1	28.2	28.1	0.1
927.6	GFSK 300 kbps / 1	27.7	27.7	27.7	0
902.4	OFDM 600 kbps / 1	28.4	28.5	28.5	0.1
915.2	OFDM 600 kbps / 1	28.2	28.2	28.2	0
927.6	OFDM 600 kbps / 1	27.4	27.4	27.4	0

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

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	115
$V_{Minimum}$:	98
$V_{Maximum}$:	132

Test Data Summary - RF Conducted Measurement

$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 50\ Channels \\ 24dBm\ Conducted/30dBm\ EIRP \mid < 50\ Channels\ (\min 25) \end{cases}$

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
902.3	FSK 100 kbps	Omnidirectional / 2.6dBi	28.8	≤ 30	Pass
915.2	FSK 100 kbps	Omnidirectional / 2.6dBi	28.4	≤ 30	Pass
926.9	FSK 100 kbps	Omnidirectional / 2.6dBi	27.7	≤ 30	Pass
902.4	FSK 150 kbps	Omnidirectional / 2.6dBi	28.8	≤ 30	Pass
915.2	FSK 150 kbps	Omnidirectional / 2.6dBi	28.3	≤ 30	Pass
927.6	FSK 150 kbps	Omnidirectional / 2.6dBi	27.7	≤ 30	Pass
902.3	GFSK 150 kbps	Omnidirectional / 2.6dBi	28.8	≤ 30	Pass
915.2	GFSK 150 kbps	Omnidirectional / 2.6dBi	28.3	≤ 30	Pass
926.9	GFSK 150 kbps	Omnidirectional / 2.6dBi	27.6	≤ 30	Pass
902.3	GFSK 200 kbps	Omnidirectional / 2.6dBi	28.7	≤ 30	Pass
915.2	GFSK 200 kbps	Omnidirectional / 2.6dBi	28.2	≤ 30	Pass
926.9	GFSK 200 kbps	Omnidirectional / 2.6dBi	27.6	≤ 30	Pass
902.4	GFSK 300 kbps	Omnidirectional / 2.6dBi	28.7	≤ 30	Pass
915.2	GFSK 300 kbps	Omnidirectional / 2.6dBi	28.2	≤ 30	Pass
927.6	GFSK 300 kbps	Omnidirectional / 2.6dBi	27.7	≤ 30	Pass
902.4	OFDM 600 kbps	Omnidirectional / 2.6dBi	28.5	≤ 30	Pass
915.2	OFDM 600 kbps	Omnidirectional / 2.6dBi	28.2	≤ 30	Pass
927.6	OFDM 600 kbps	Omnidirectional / 2.6dBi	27.4	≤ 30	Pass

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**104631**	Date:	1/18/2021
Test Type:	**Conducted Emissions**	Time:	10:10:36
Tested By:	Matt Harrison	Sequence#:	7
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

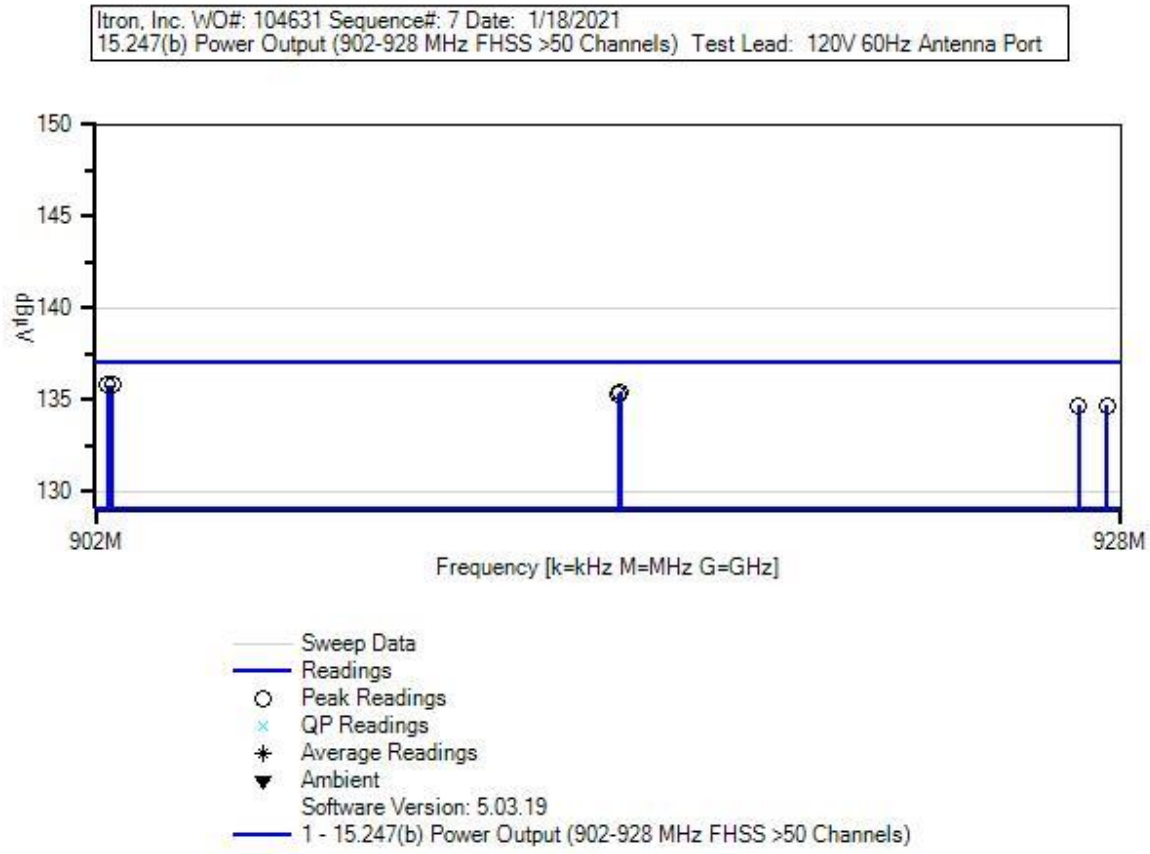
Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41%
Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range:902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

FSK Fixed RBW



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
T2	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T3	ANP07229	Attenuator	PE7004-20	10/2/2019	10/2/2021

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	902.315M	115.2	+0.5	+0.0	+20.1		+0.0	135.8	137.0 FSK 100	-1.2	Anten
2	902.425M	115.2	+0.5	+0.0	+20.1		+0.0	135.8	137.0 FSK 150	-1.2	Anten
3	915.225M	114.8	+0.5	+0.0	+20.1		+0.0	135.4	137.0 FSK 100	-1.6	Anten
4	915.170M	114.7	+0.5	+0.0	+20.1		+0.0	135.3	137.0 FSK 150	-1.7	Anten
5	926.920M	114.1	+0.5	+0.0	+20.1		+0.0	134.7	137.0 FSK 100	-2.3	Anten
6	927.645M	114.1	+0.5	+0.0	+20.1		+0.0	134.7	137.0 FSK 150	-2.3	Anten

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**104631**	Date:	1/18/2021
Test Type:	**Conducted Emissions**	Time:	11:29:03
Tested By:	Matt Harrison	Sequence#:	8
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

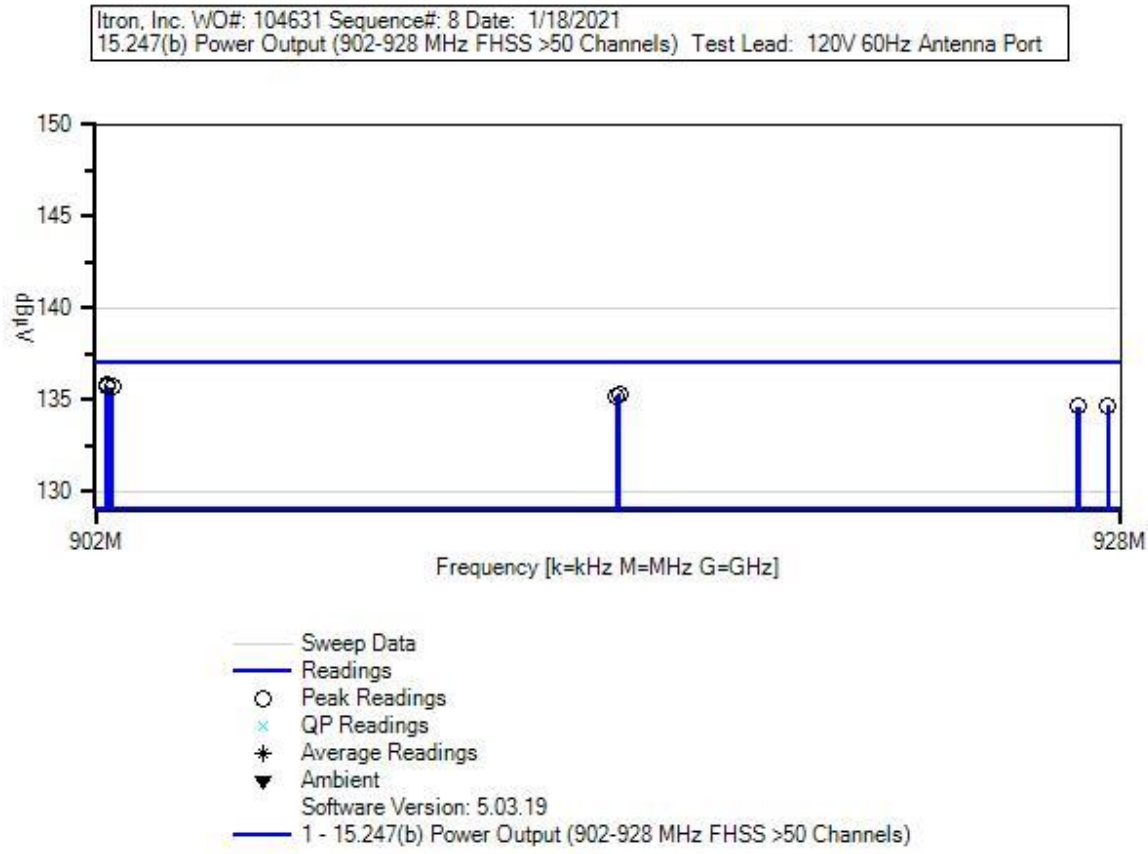
Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41%
Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range: 902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

GFSK Fixed RBW



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
T2	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T3	ANP07229	Attenuator	PE7004-20	10/2/2019	10/2/2021

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	902.270M	115.2	+0.5	+0.0	+20.1		+0.0	135.8	137.0 GFSK150	-1.2	Anten
2	902.300M	115.1	+0.5	+0.0	+20.1		+0.0	135.7	137.0 GFSK200	-1.3	Anten
3	902.420M	115.1	+0.5	+0.0	+20.1		+0.0	135.7	137.0 GFSK300	-1.3	Anten
4	915.185M	114.7	+0.5	+0.0	+20.1		+0.0	135.3	137.0 GFSK150	-1.7	Anten
5	915.130M	114.6	+0.5	+0.0	+20.1		+0.0	135.2	137.0 GFSK200	-1.8	Anten
6	915.110M	114.6	+0.5	+0.0	+20.1		+0.0	135.2	137.0 GFSK300	-1.8	Anten
7	927.665M	114.1	+0.5	+0.0	+20.1		+0.0	134.7	137.0 GFSK300	-2.3	Anten
8	926.915M	114.0	+0.5	+0.0	+20.1		+0.0	134.6	137.0 GFSK200	-2.4	Anten
9	926.885M	114.0	+0.5	+0.0	+20.1		+0.0	134.6	137.0 GFSK150	-2.4	Anten

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**104631**	Date:	1/18/2021
Test Type:	**Conducted Emissions**	Time:	12:27:34
Tested By:	Matt Harrison	Sequence#:	9
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

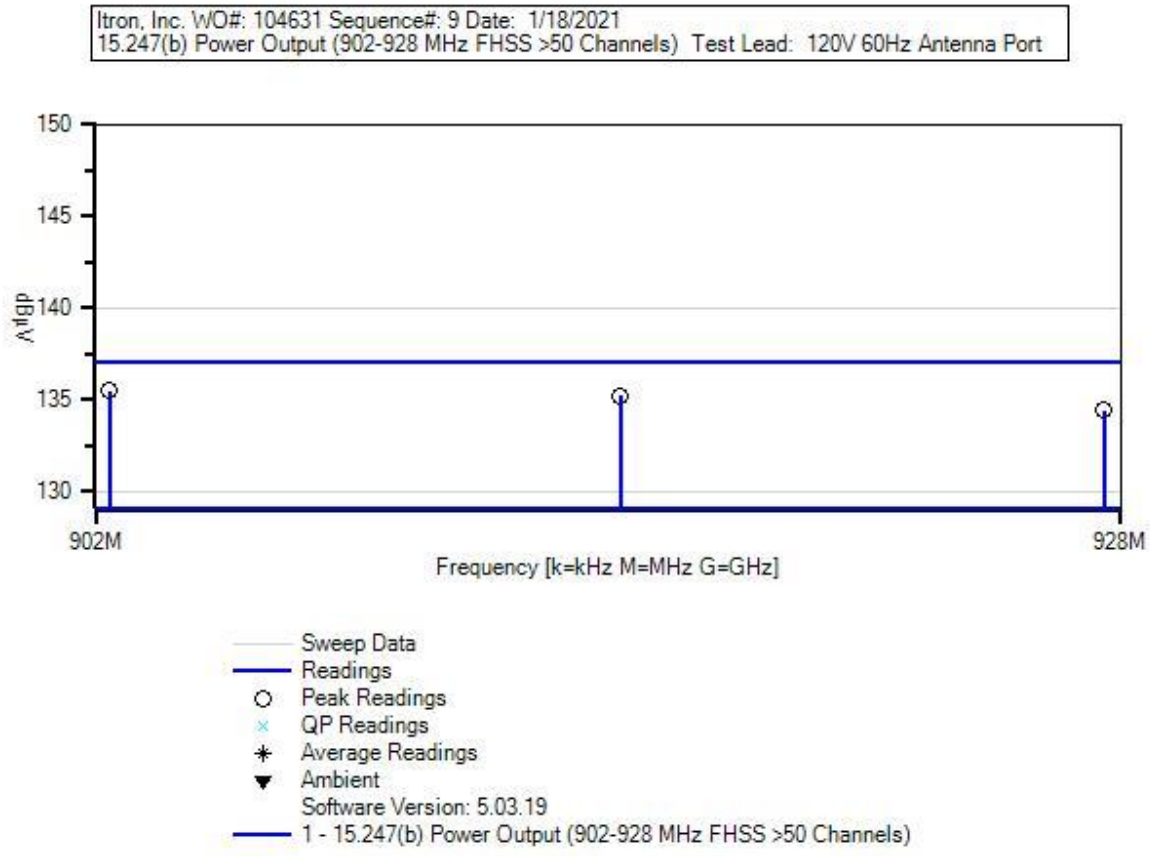
Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41%
Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range: 902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

OFDM FHSS Fixed RBW



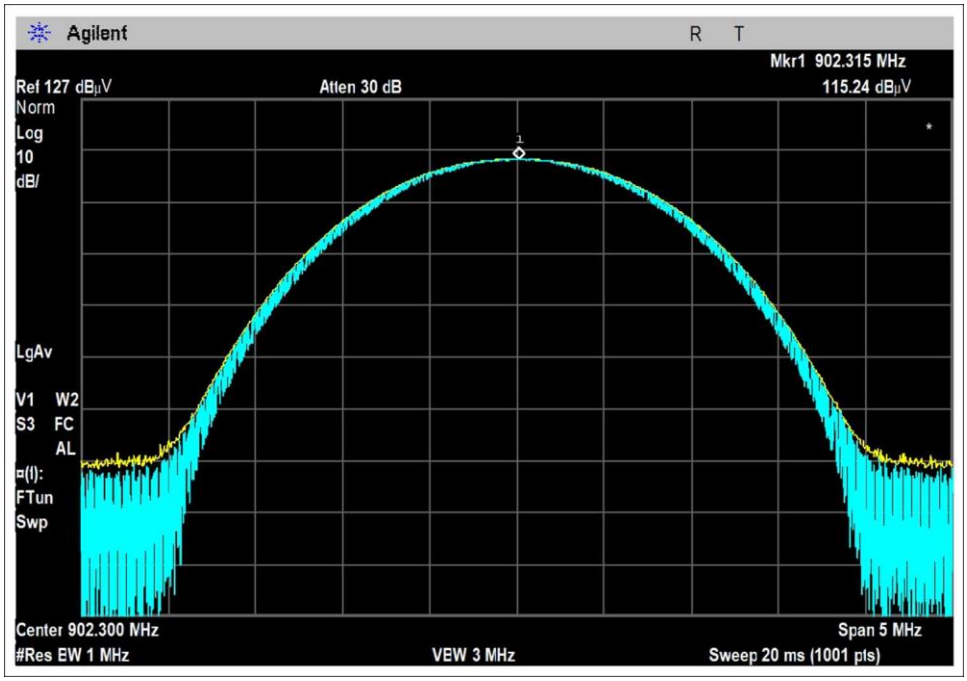
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T2	ANP07229	Attenuator	PE7004-20	10/2/2019	10/2/2021

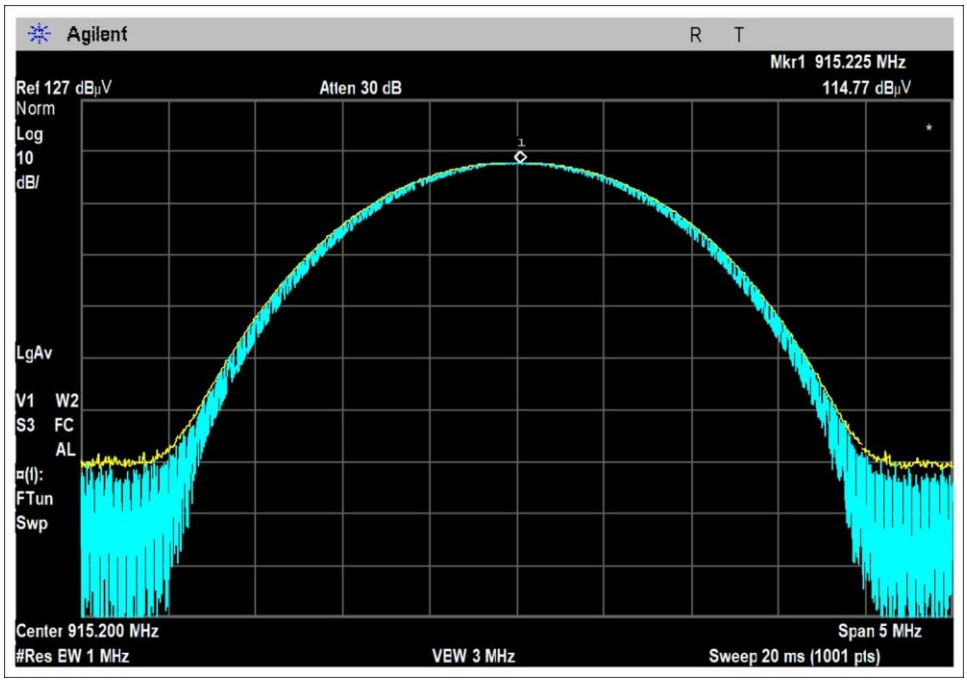
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	902.350M	114.9	+0.5	+20.1			+0.0	135.5	137.0	-1.5	Anten
2	915.205M	114.6	+0.5	+20.1			+0.0	135.2	137.0	-1.8	Anten
3	927.550M	113.8	+0.5	+20.1			+0.0	134.4	137.0	-2.6	Anten

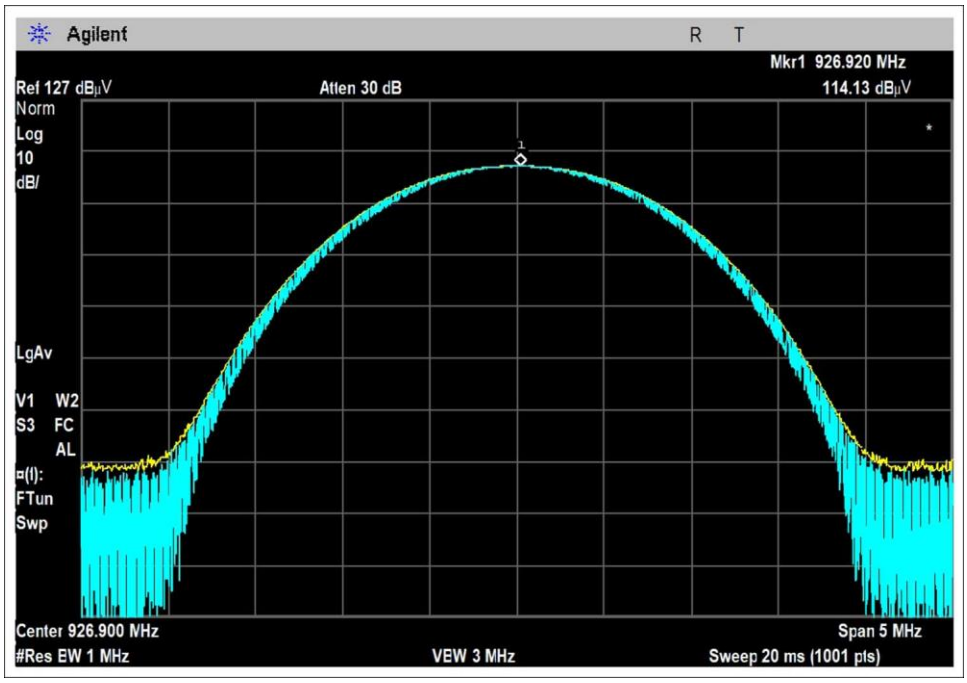
Plots



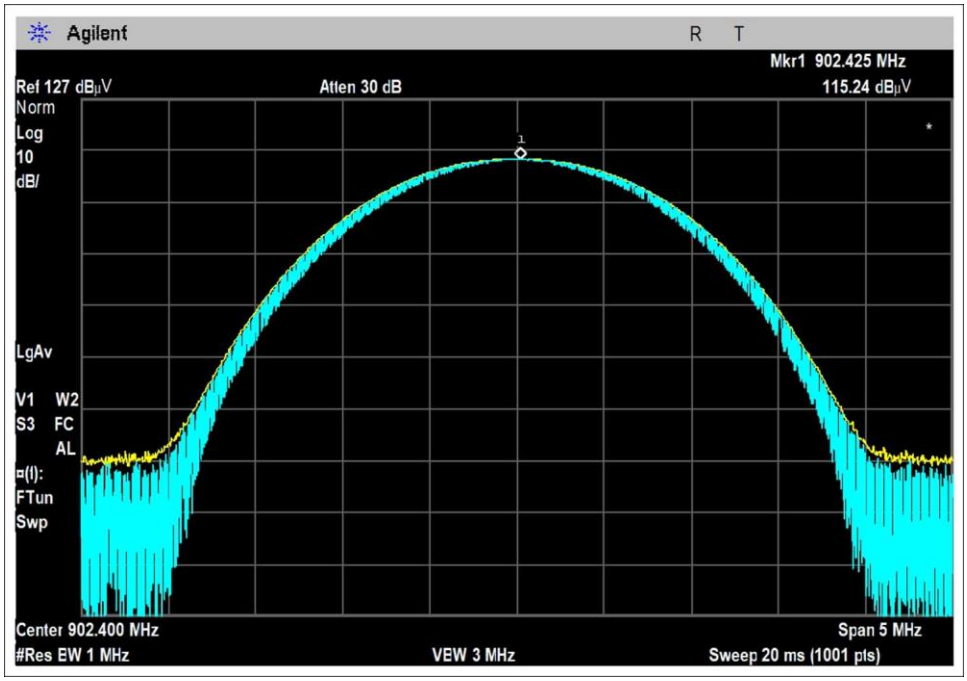
Low Channel, FSK, 100kbps



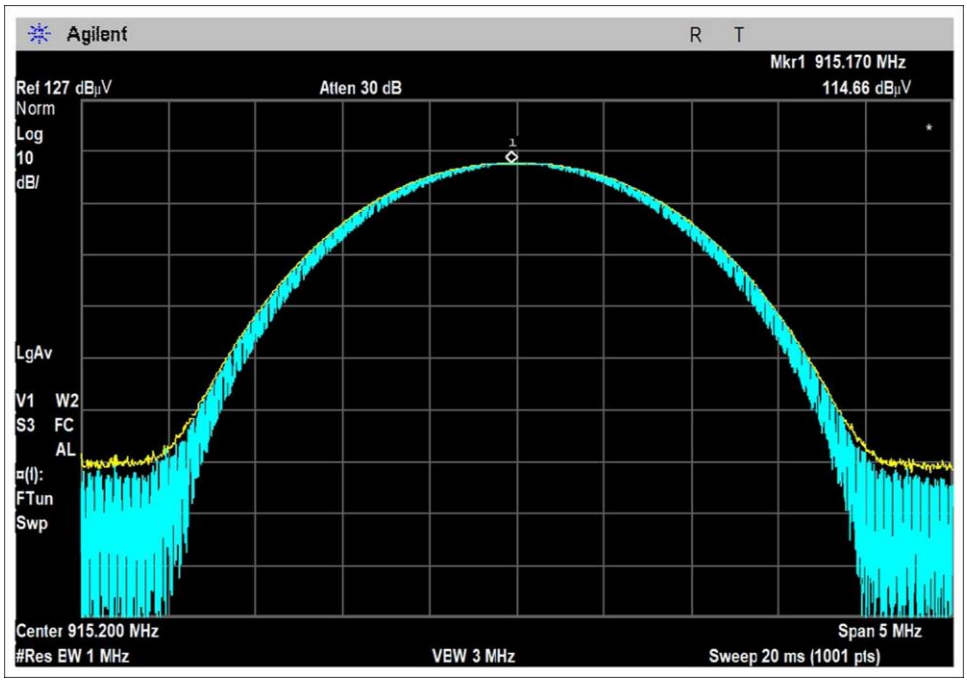
Middle Channel, FSK, 100kbps



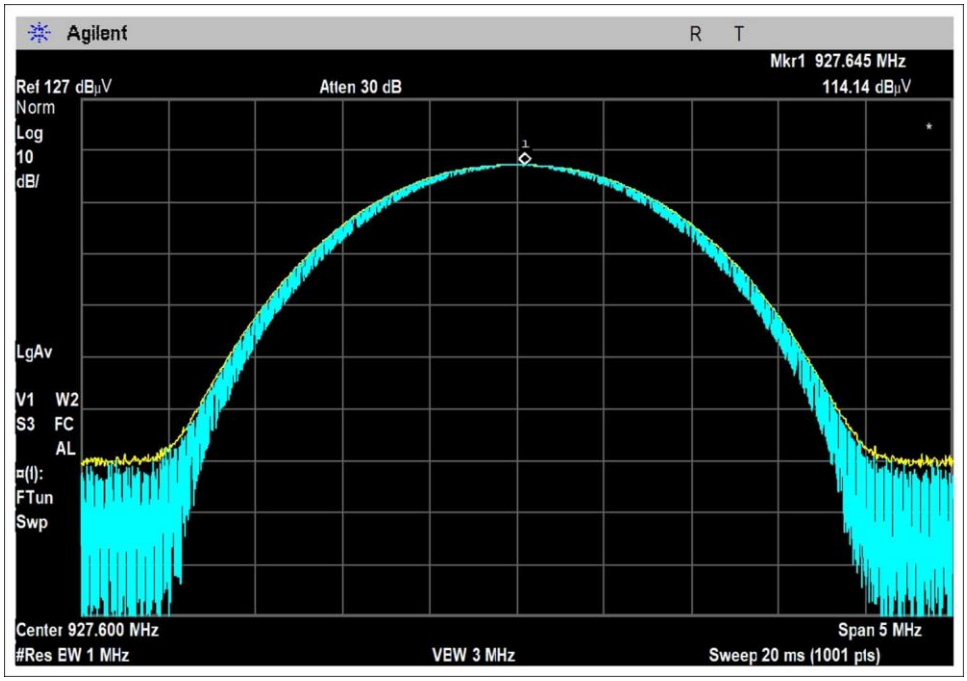
High Channel, FSK, 100kbps



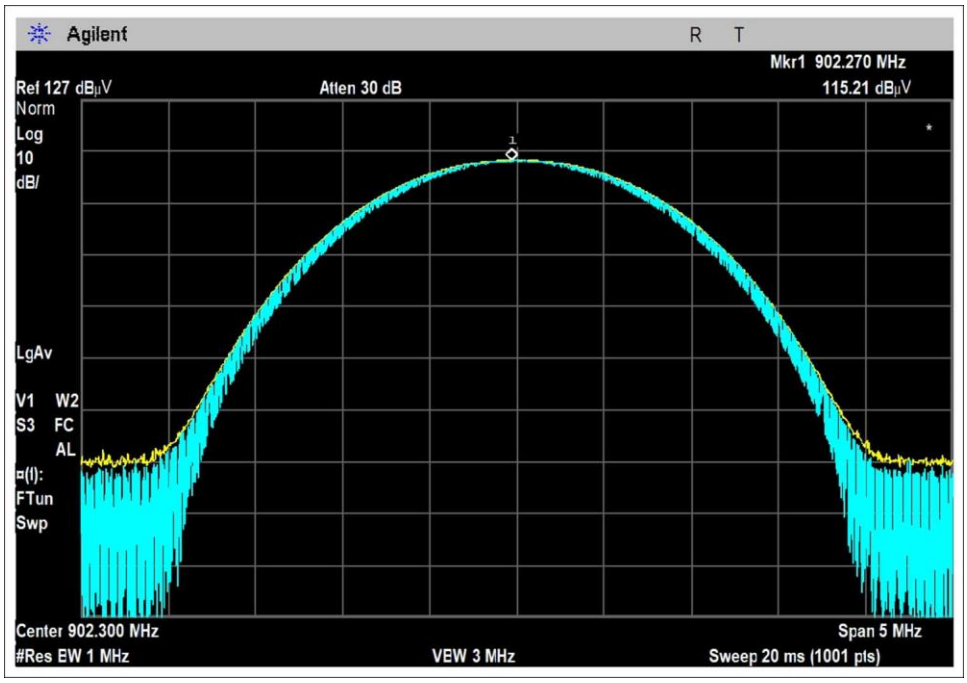
Low Channel, FSK, 150kbps



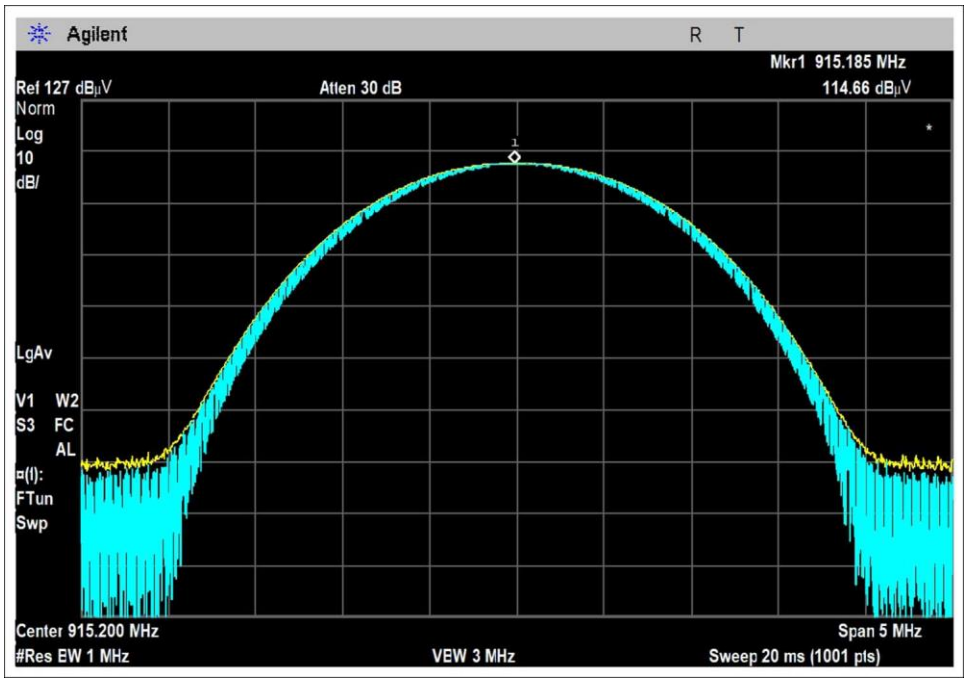
Middle Channel, FSK, 150kbps



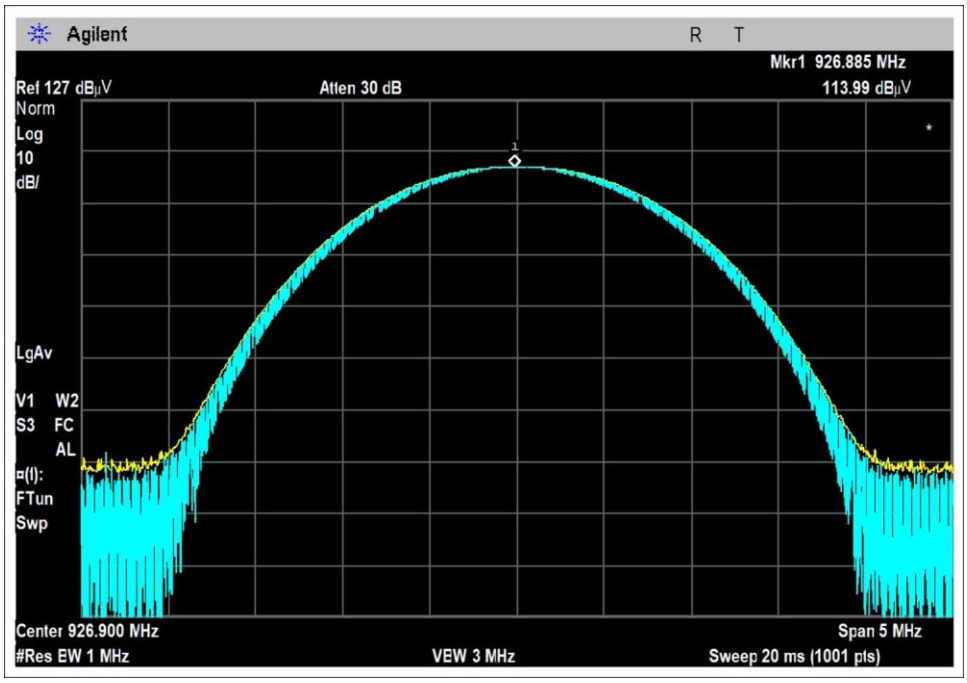
High Channel, FSK, 150kbps



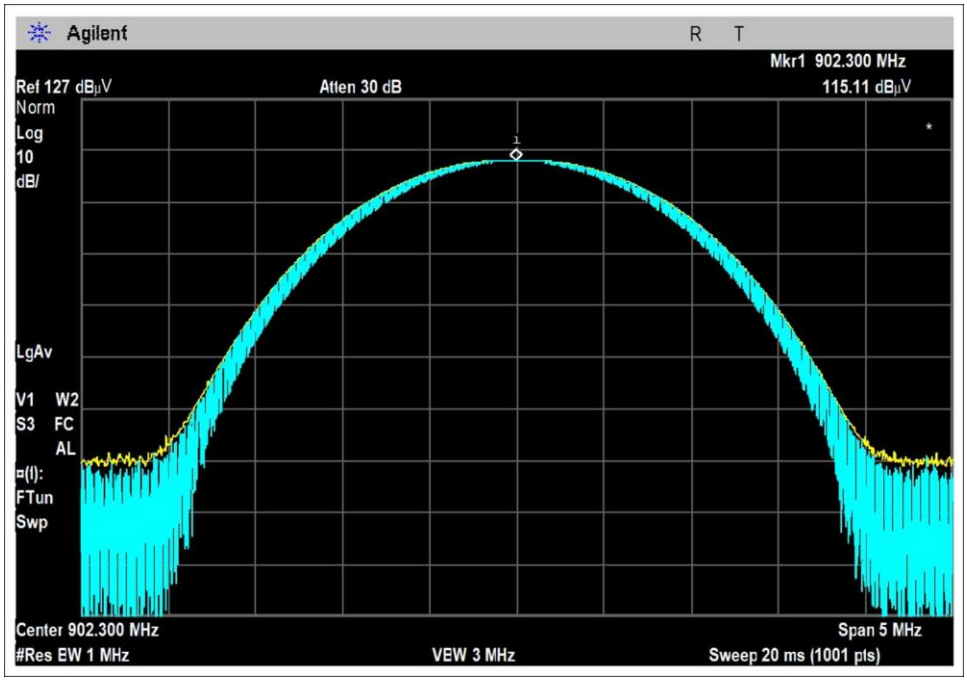
Low Channel, GFSK, 150kbps



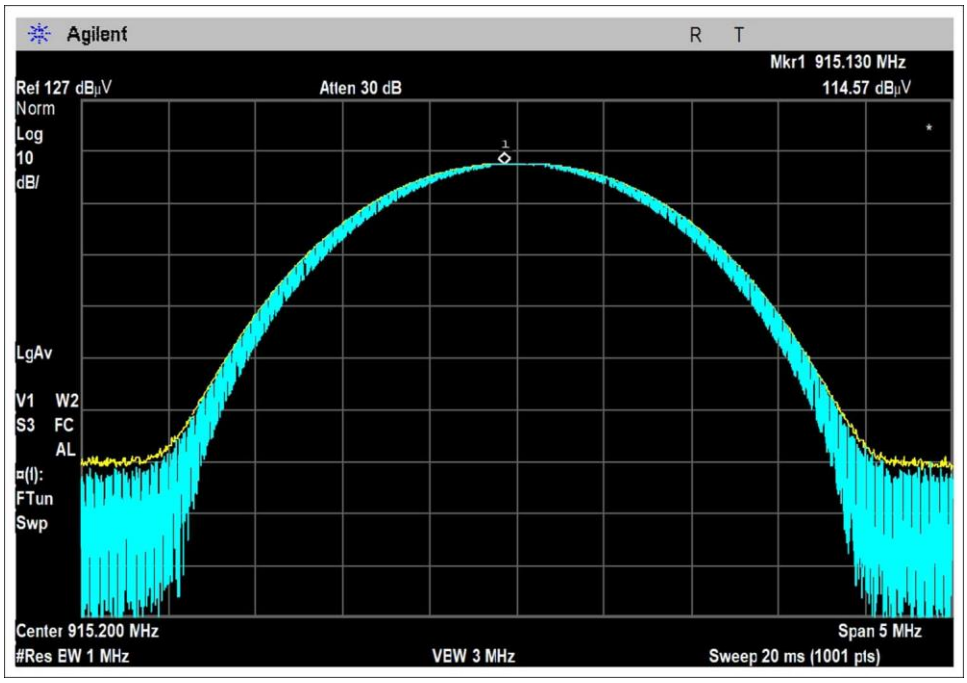
Middle Channel, GFSK, 150kbps



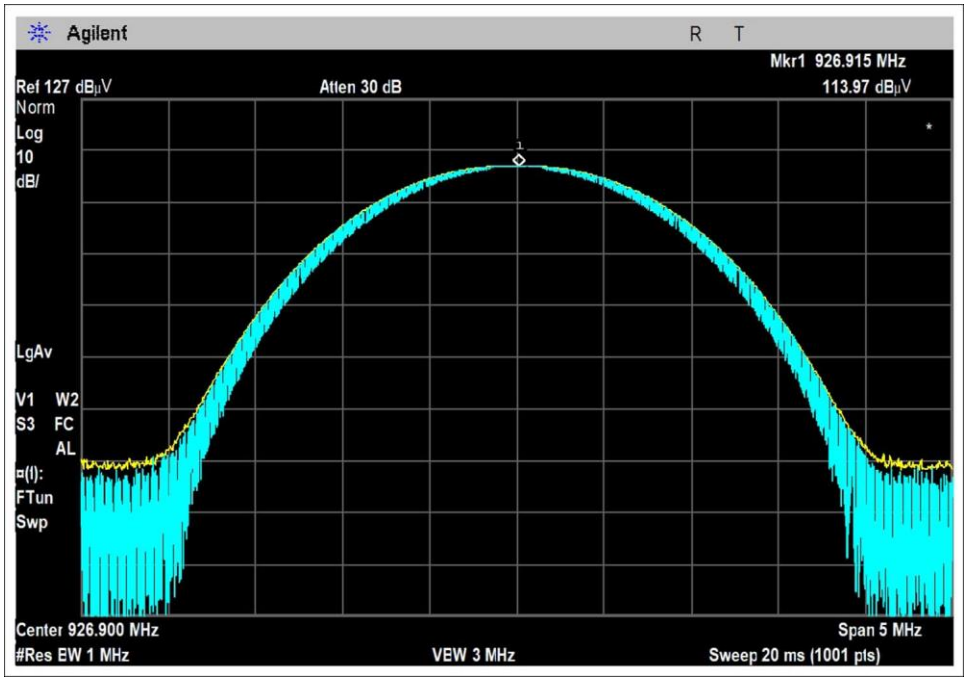
High Channel, GFSK, 150kbps



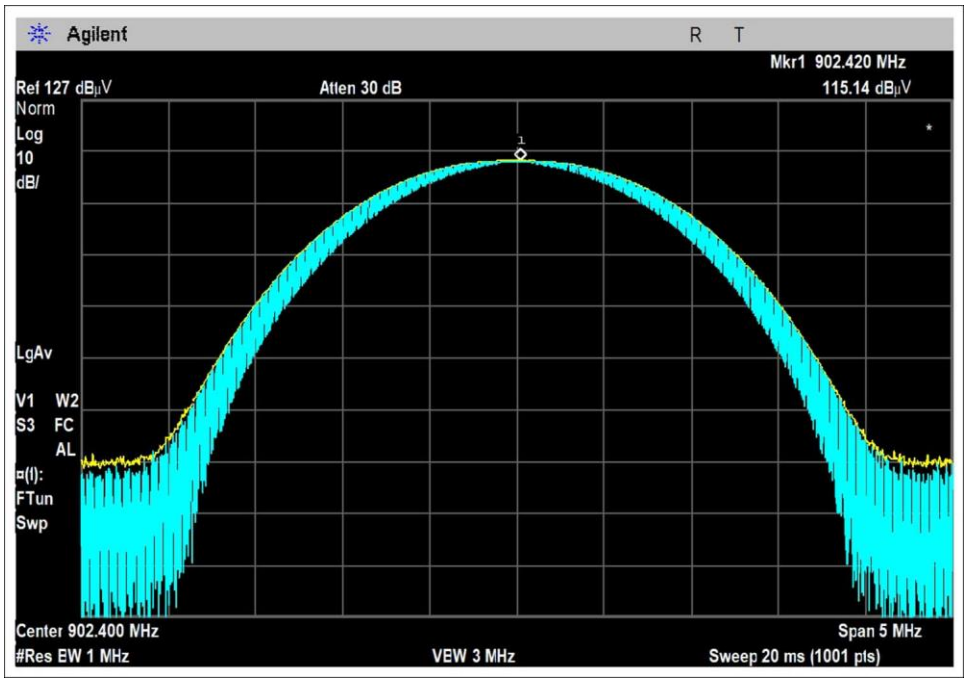
Low Channel, GFSK, 200kbps



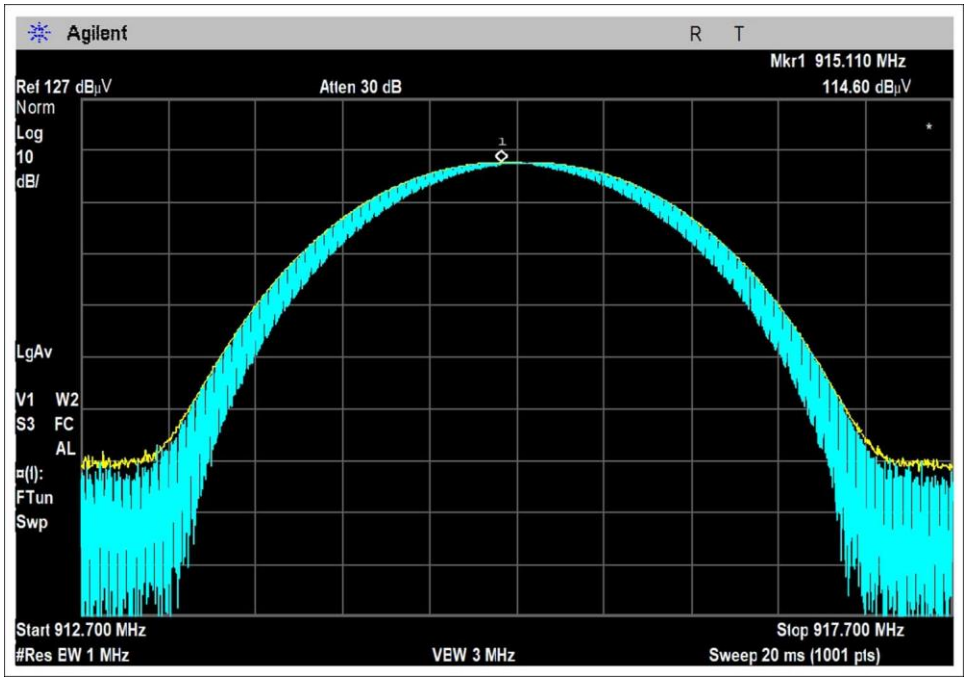
Middle Channel, GFSK, 200kbps



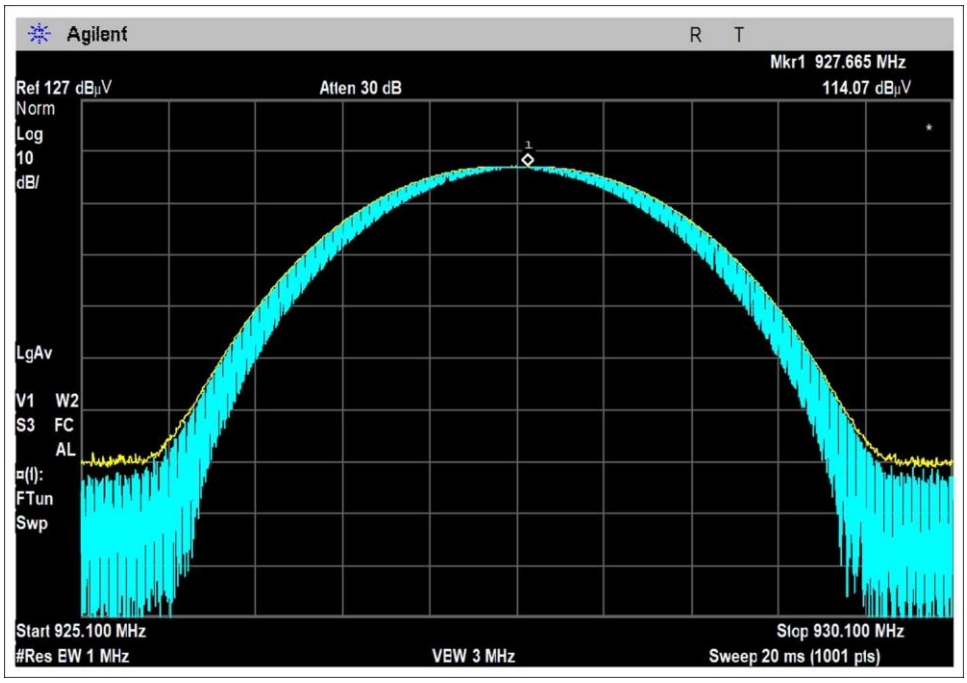
High Channel, GFSK, 200kbps



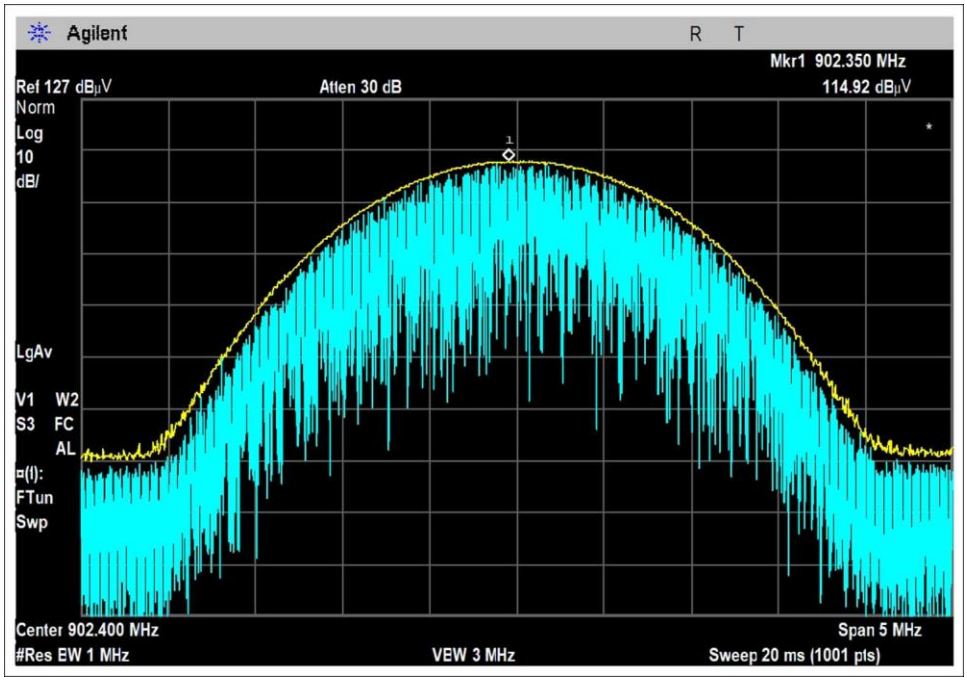
Low Channel, GFSK, 300kbps



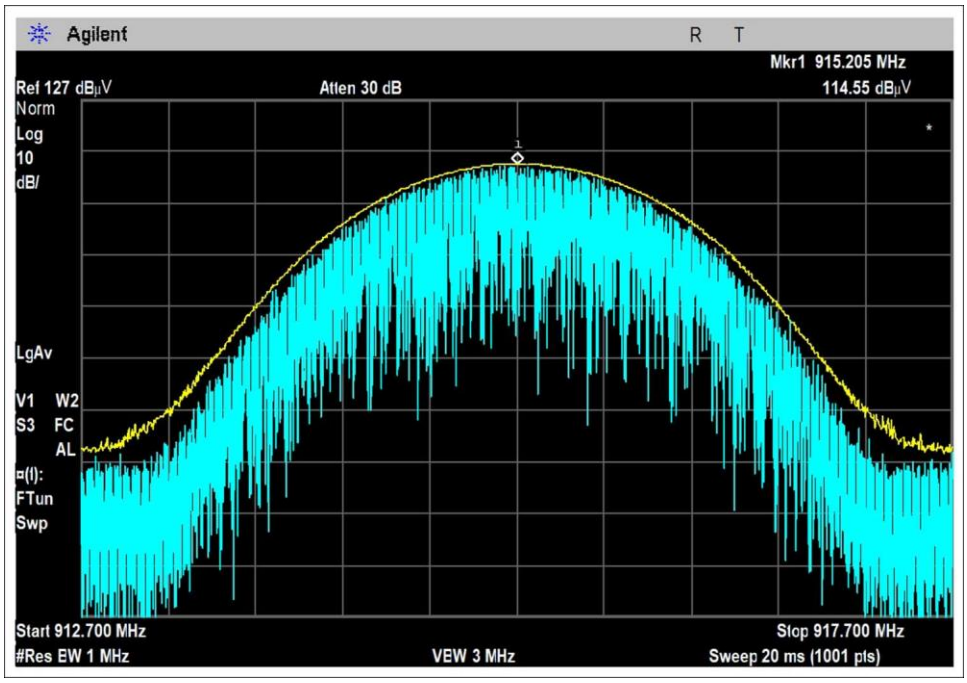
Middle Channel, GFSK, 300kbps



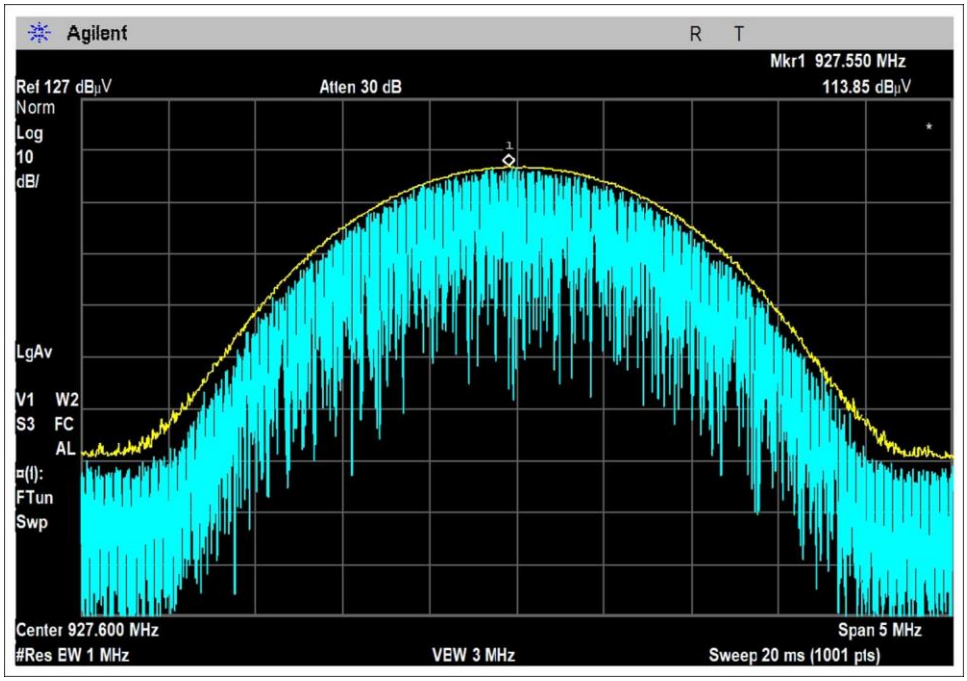
High Channel, GFSK, 300kbps



Low Channel, OFDM

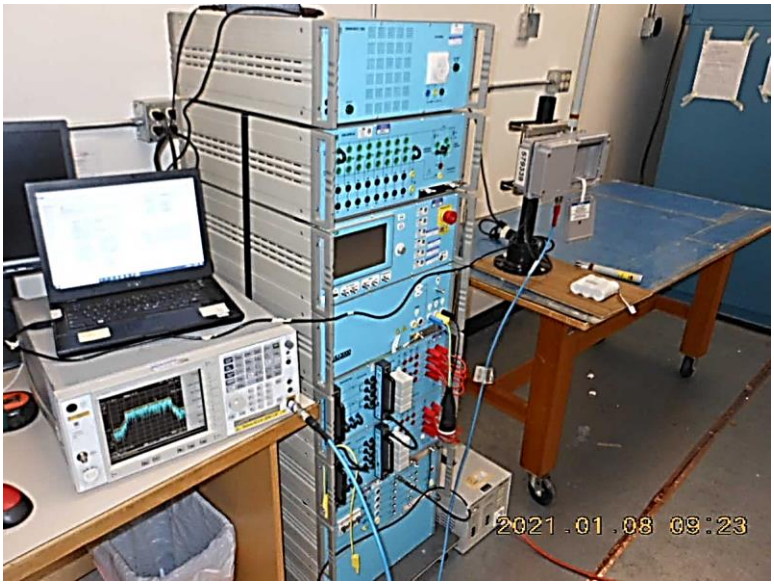


Middle Channel, OFDM



High Channel, OFDM

Test Setup Photo(s)



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**104631**	Date:	1/8/2021
Test Type:	**Conducted Emissions**	Time:	14:27:51
Tested By:	Matt Harrison	Sequence#:	22
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

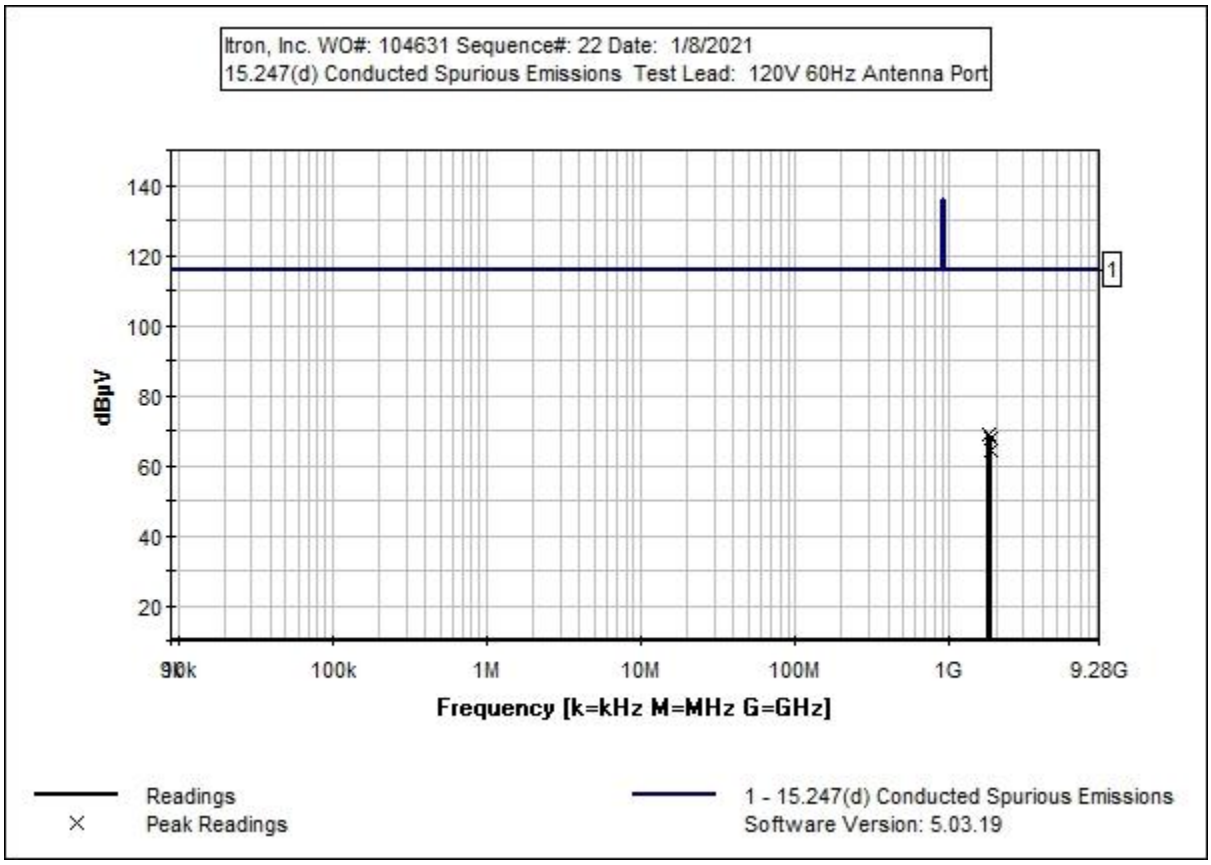
Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41 %
Atmospheric Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range:902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

FSK Modulation



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05748	Attenuator	PE7004-20	3/4/2020	3/4/2022
T2	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist. Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1801.000M	48.3	+20.0	+0.6			+0.0	68.9	115.5	-46.6	Anten
2	1828.000M	47.0	+20.0	+0.6			+0.0	67.6	115.5	-47.9	Anten
3	1855.000M	43.3	+20.0	+0.7			+0.0	64.0	115.5	-51.5	Anten

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**104631**	Date:	1/8/2021
Test Type:	**Conducted Emissions**	Time:	14:30:55
Tested By:	Matt Harrison	Sequence#:	23
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

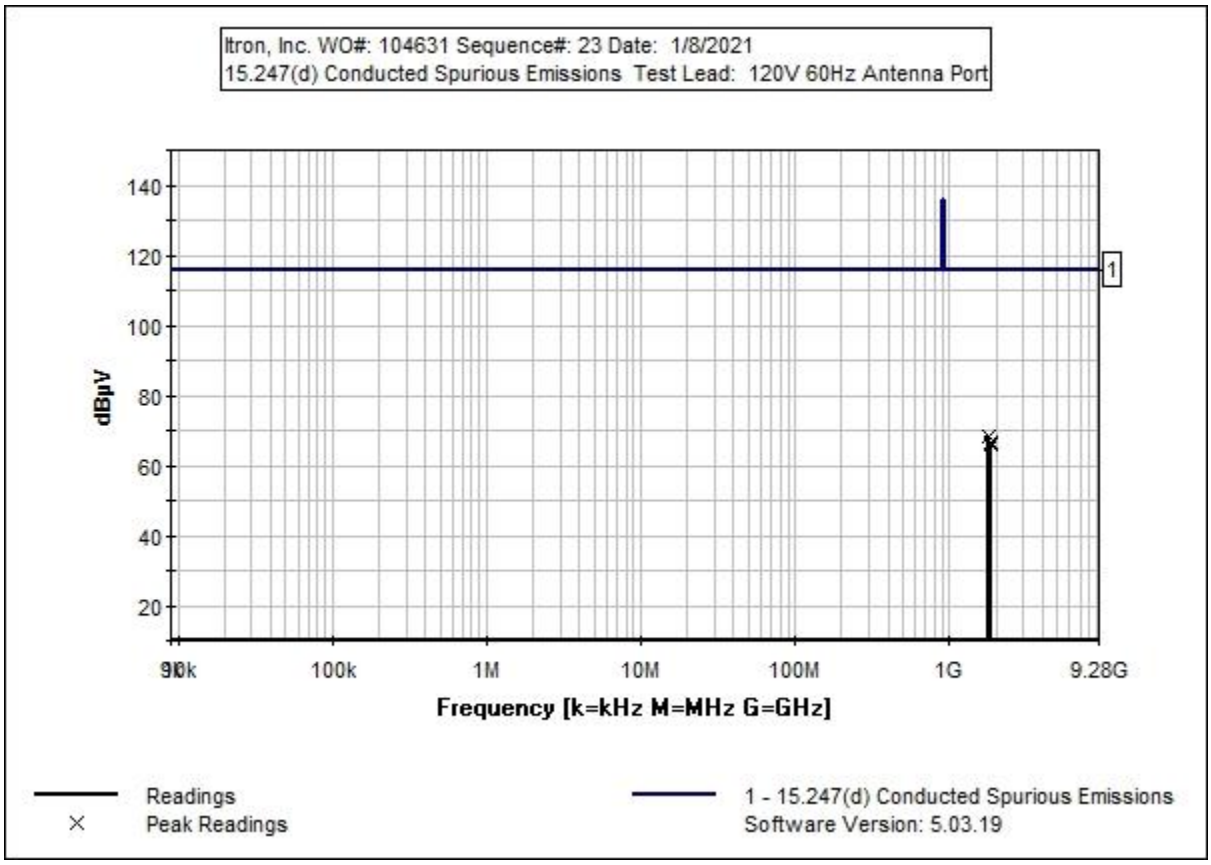
Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41%
Atmospheric Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range:902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

GFSK Modulation



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05748	Attenuator	PE7004-20	3/4/2020	3/4/2022
T2	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist. Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1801.000M	47.8	+20.0	+0.6			+0.0	68.4	115.7	-47.3	Anten
2	1828.000M	46.1	+20.0	+0.6			+0.0	66.7	115.7	-49.0	Anten
3	1855.000M	45.3	+20.0	+0.7			+0.0	66.0	115.7	-49.7	Anten

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**104631**	Date:	1/8/2021
Test Type:	**Conducted Emissions**	Time:	14:33:33
Tested By:	Matt Harrison	Sequence#:	24
Software:	EMITest 5.03.19		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 23°C
Relative Humidity: 41%
Atmospheric Pressure: 101.6kPa

Test Method: ANSI C63.10 (2013)

Frequency Range: 902-928MHz

Test Setup:
The equipment under test (EUT) is setup for direct antenna port measurements. The EUT is transmitting continuous wave at its rated output power.

OFDM FHSS Modulation