



TEST REPORT

Report Number. : R14233208-E1

Applicant : Elster Solutions LLC
208 S Rogers Ln.
Raleigh, NC, 27610-2144, USA

Model : A4MGK4A

FCC ID : QZC-A4MGK4A

IC : 4557A-A4MGK4A

EUT Description : ELECTRICAL METER

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5 + A1

Date Of Issue:
2022-05-31

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-04-08	Initial Issue	M. Antola
V2	2022-05-09	Added 150kbps data rate to section 9.1 table. Revised references to 900MHz FHSS. Added note to section 9.5 regarding sweep time.	B. Kiewra
V3	2022-05-31	Revised data rate from 144.22 to 142.22kBps.	B. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Elster Solutions LLC
208 S Rogers Ln
Raleigh, NC 27610-2144

EUT DESCRIPTION: Electrical Meter

MODEL: A4MGK4A

SERIAL NUMBER: NXG032920957

SAMPLE RECEIPT DATE: 2022-03-02

DATE TESTED: 2022-03-14 to 2022-03-31

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1	Complies

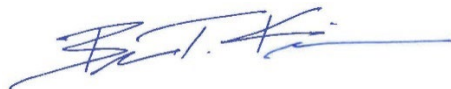
UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL LLC. By:

Prepared By:



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Project Engineer
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UL LLC.

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2. TEST RESULTS SUMMARY

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	RSS-GEN 6.7	20dB BW/99% OBW	Reporting purposes only	ANSI C63.10 Sections 6.9.2 and 6.9.3
15.247 (a)(1)	RSS-247 (5.1) (b)	Hopping Frequency Separation	Compliant	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Number of Hopping Channels	Compliant	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy	Compliant	None.
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power	Compliant	None.
See Comment		Average Power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (d)	RSS-247 (5.5)	Conducted Spurious Emissions	Compliant	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Compliant	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, Certificate Number 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr., Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Final Voltage (dBuV)} = \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \text{LISN Insertion Loss}$$

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an electrical meter which contains a 900MHz frequency hopping radio and cellular radio. This report covers the required 900MHz radio testing.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Data Rate	Output Power (dBm)	Output Power (mW)
902 - 928	35.56 kbps	23.13	205.59
902 - 928	50 kbps	26.19	415.91
902 - 928	142.22 kbps	23.11	204.64
902 - 928	150 kbps	26.16	413.05
902 - 928	200 kbps	26.12	409.26

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The radio utilizes a dipole antenna, with a maximum gain of 3.4 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 255.31.

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 30 MHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emissions between 30 MHz and 10 GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels at the worse-case data rate (50 kbps).

The EUT has only a single orientation; therefore, all final radiated testing was performed with the EUT in its typical orientation.

Conducted testing was performed at all data rates listed below. Radiated testing was performed only at the worse-case (highest power) data rate:

35.56 kbps, 50 kbps, 142.22 kbps, 150 kbps, 200 kbps

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude 5480	4XM63M2	NA
Laptop charger	Dell	DA65NM130	CN-03F1CN-48661-54G-3FV9-A02	NA
Support Board	Elster	NIC Carrier PCB	-	-
Laptop	Asus	E410M	M8N0CX04R719328	TX2-RTL8821CE
Laptop charger	Asus	ADP-33AW	NA	NA
Meter Enclosure	Milbank	U7490-O	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB-A to 3-pin	Non-Shielded	<3m	For programming EUT
2	USB	1	USB to Optical	Non-Shielded	<3m	None

TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R14233208-EP1 for setup diagrams

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 2				
SA0025	Spectrum Analyzer	Keysight Technologies	N9030A	2021-04-01	2022-04-01
PWM005	RF Power Meter	Keysight Technologies	N1912A	2021-07-27	2022-07-27
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2021-06-25	2022-06-25
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.2.17	NA	NA
	Additional Equipment used				
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2023-08-17

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2021-04-05	2022-04-05
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2021-08-16	2022-08-16
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2021-08-17	2022-08-17
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2021-04-05	2022-04-05
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2021-08-19	2022-08-19
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2022-03-01	2023-03-01
	1-18 GHz				
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-05-13	2022-05-13
	Gain-Loss Chains				
C1-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2021-07-20	2022-07-20
C1-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-07-20	2022-07-20
C1-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-07-20	2022-07-20
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SA0027	Spectrum Analyzer	Agilent	N9030A	2021-06-25	2022-06-25
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2021-09-27	2022-09-27
HPF012	1GHz high-pass filter, 2W, F _{high} =18GHz	Micro-Tronics	HPM18129	2022-02-17	2023-02-17
BRF007	902-928MHz notch filter, 2W, F _{high} =1.5GHz	Micro-Tronics	BRC17691	2021-07-21	2022-07-21

8. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

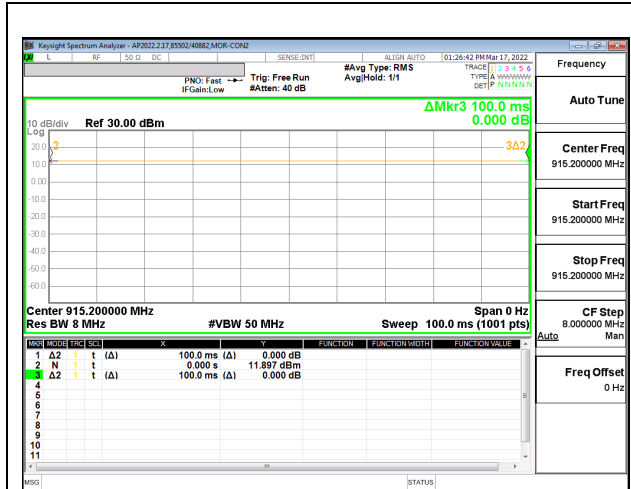
None; for reporting purposes only.

PROCEDURE

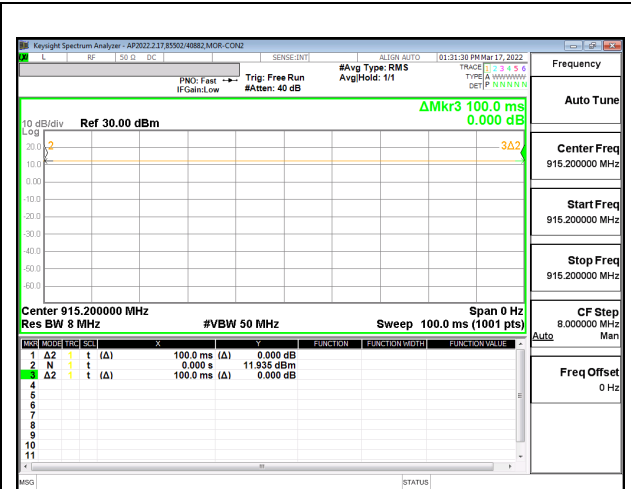
ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

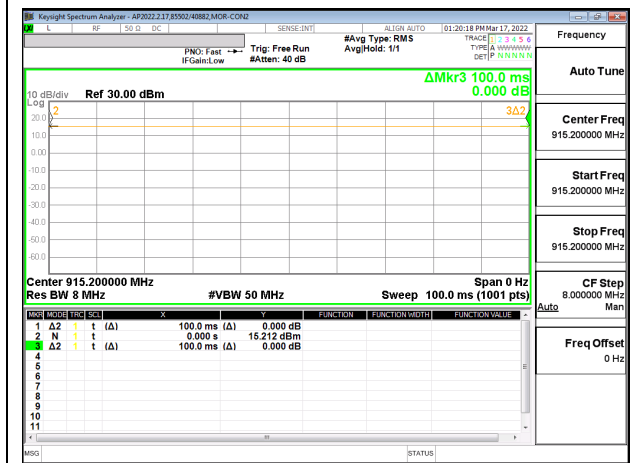
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
35.56 kbps Data Rate	100.0	100.0	1.000	100.00	0.00	0.010
50 kbps Data Rate	100.0	100.0	1.000	100.00	0.00	0.010
142.22 kbps Data Rate	100.0	100.0	1.000	100.00	0.00	0.010
150 kbps Data Rate	100.0	100.0	1.000	100.00	0.00	0.010
200 kbps Data Rate	100.0	100.0	1.000	100.00	0.00	0.010



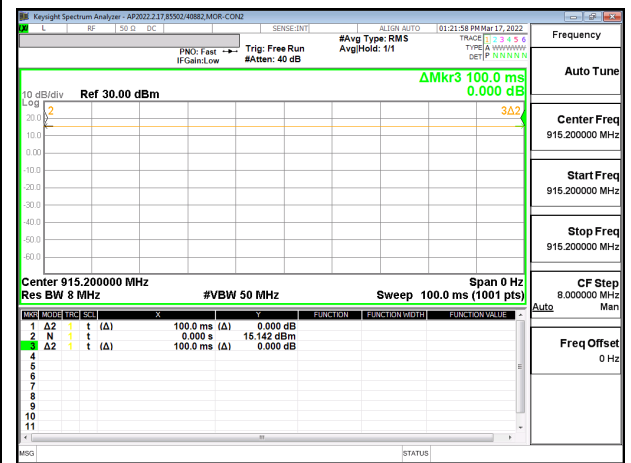
35.56 kbps Data Rate



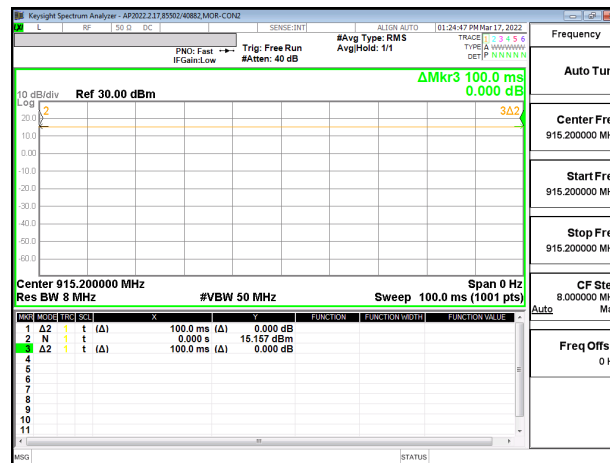
50 kbps Data Rate



142.22 kbps Data Rate



150 kbps Data Rate



200 kbps Data Rate

9.2. 20 dB AND 99% BANDWIDTH

LIMITS

FCC §15.247 (a) (1) (i)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz

99% Bandwidth: None; for reporting purposes only.

TEST PROCEDURE

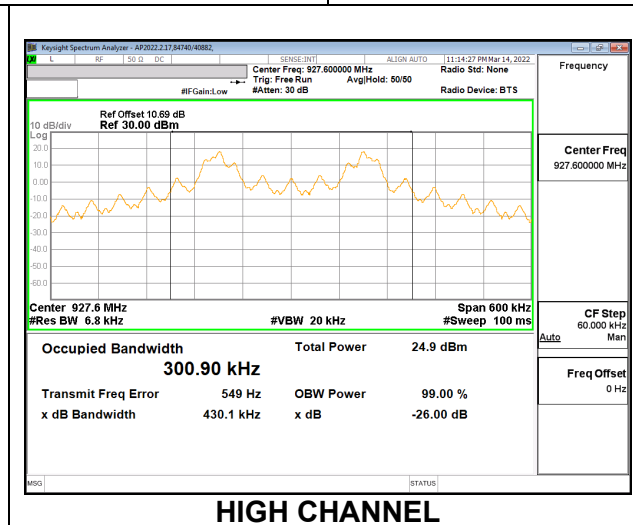
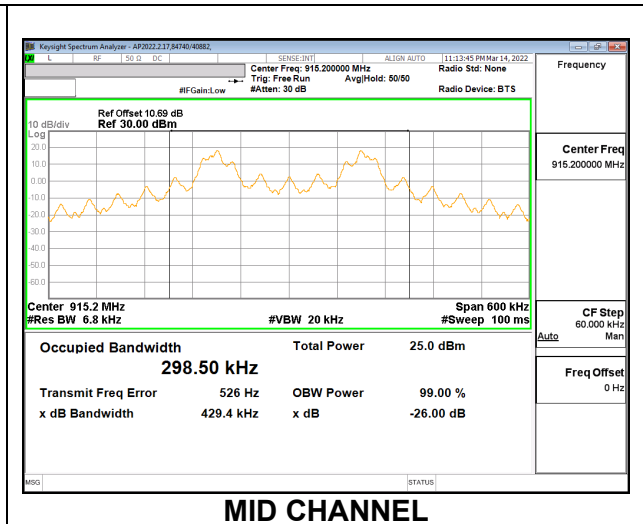
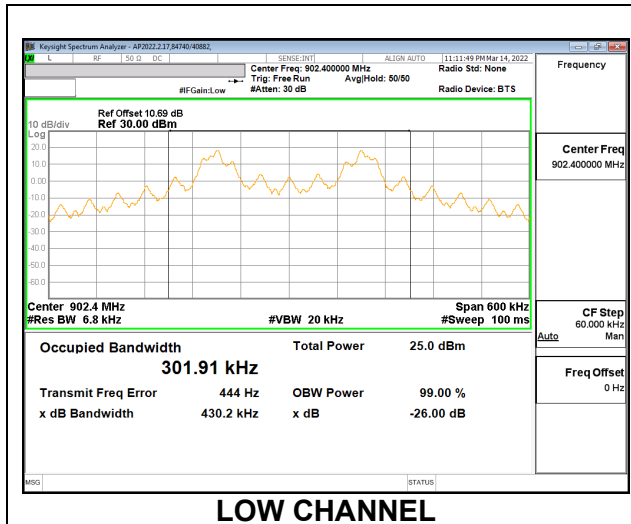
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

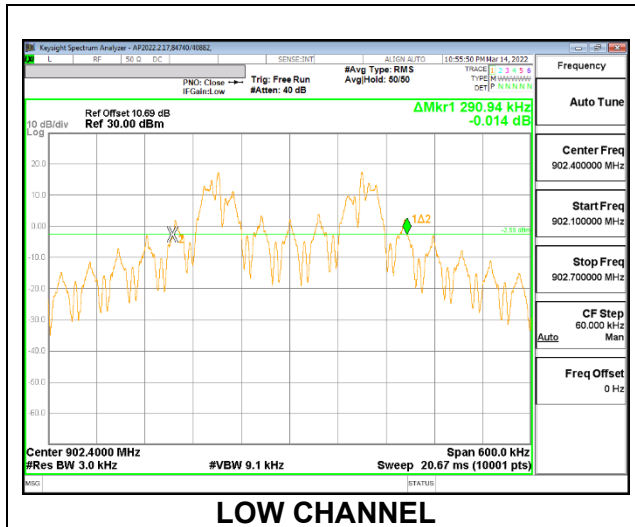
Mode	Channel	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
35.56 kbps	Low	902.4	0.302	0.291
	Mid	915.2	0.299	0.29
	High	927.6	0.301	0.291
50 kbps	Low	902.4	0.116	0.11
	Mid	915.2	0.116	0.11
	High	927.6	0.117	0.113
142.22 kbps	Low	902.4	0.307	0.302
	Mid	915.2	0.306	0.302
	High	927.6	0.307	0.302
150 kbps	Low	902.4	0.185	0.19
	Mid	915.2	0.183	0.189
	High	927.6	0.184	0.190
200 kbps	Low	902.4	0.248	0.261
	Mid	915.2	0.246	0.262
	High	927.6	0.246	0.254

9.2.1. 35.56 kbps DATA RATE

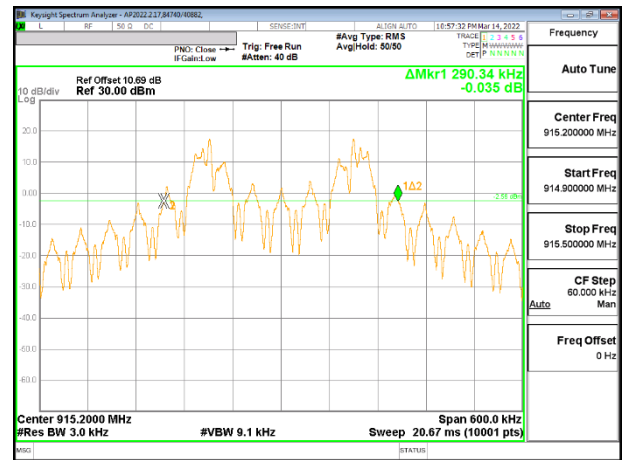
99% OCCUPIED BANDWIDTH



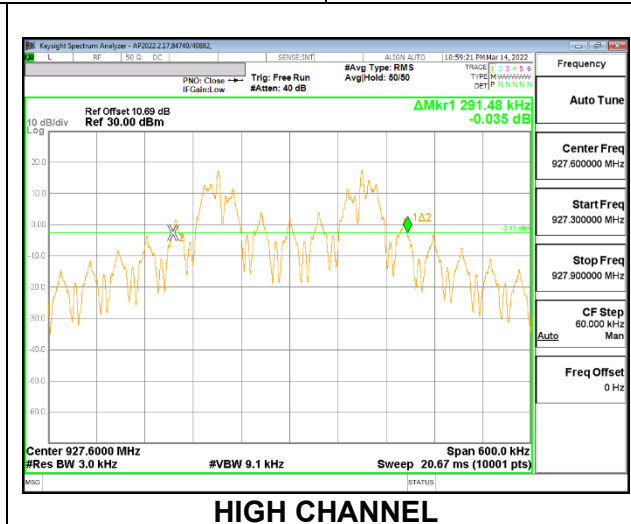
20dB BANDWIDTH



LOW CHANNEL



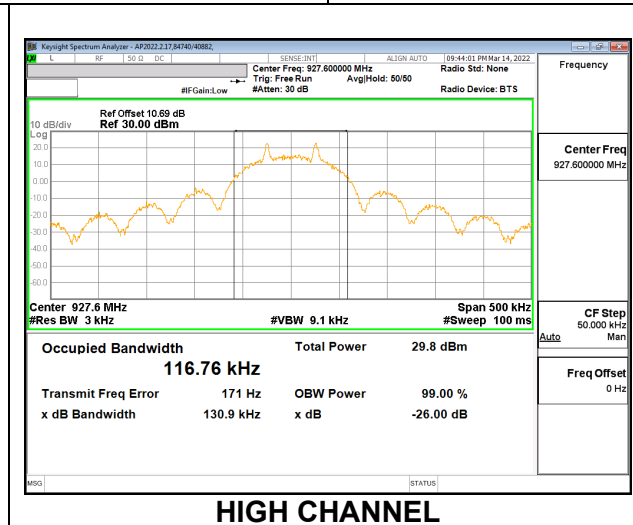
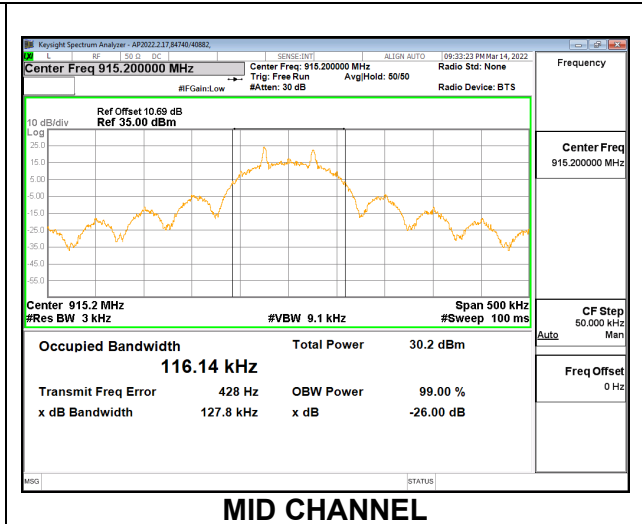
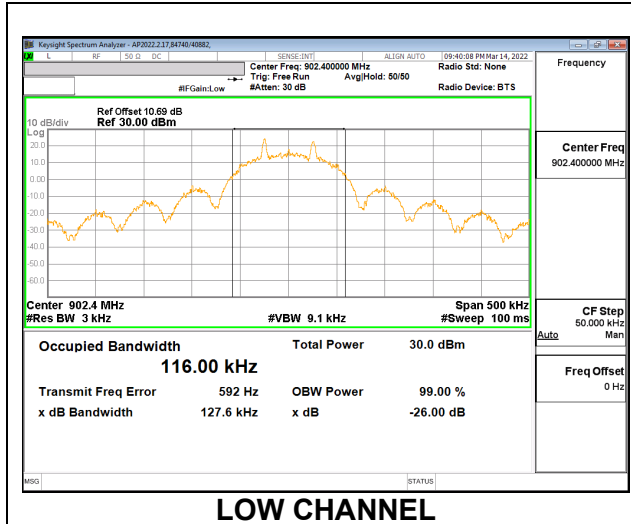
MID CHANNEL



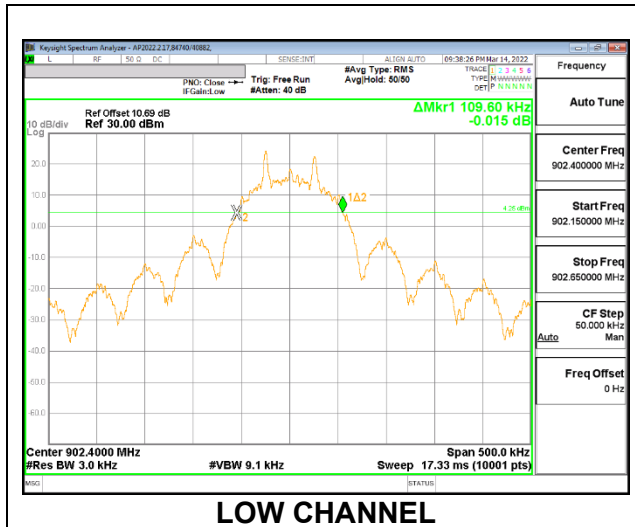
HIGH CHANNEL

9.2.2. 50 kbps DATA RATE

99% OCCUPIED BANDWIDTH



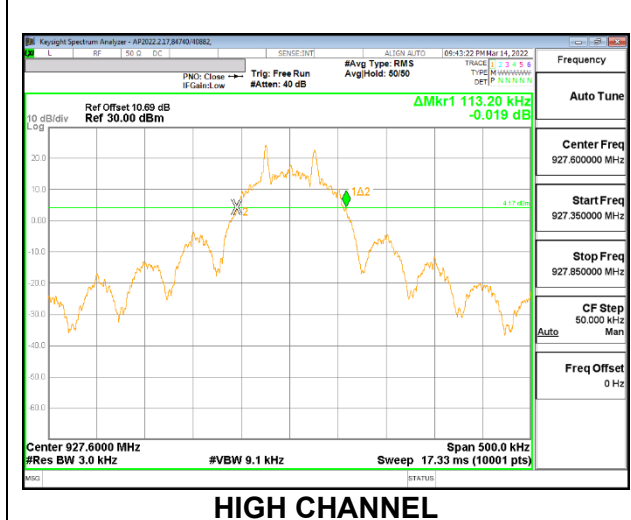
20dB BANDWIDTH



LOW CHANNEL



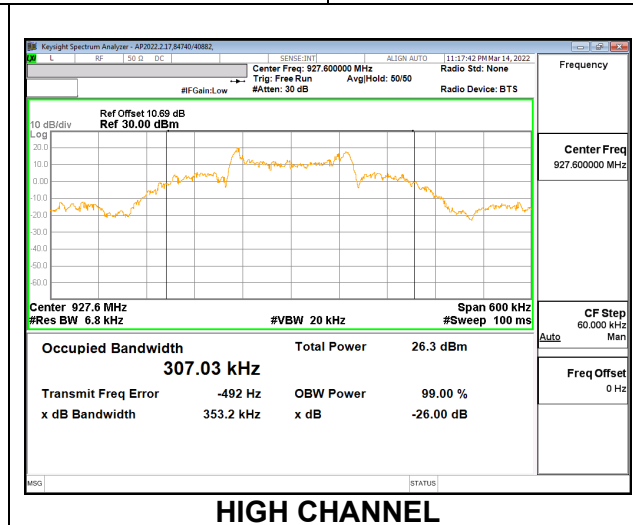
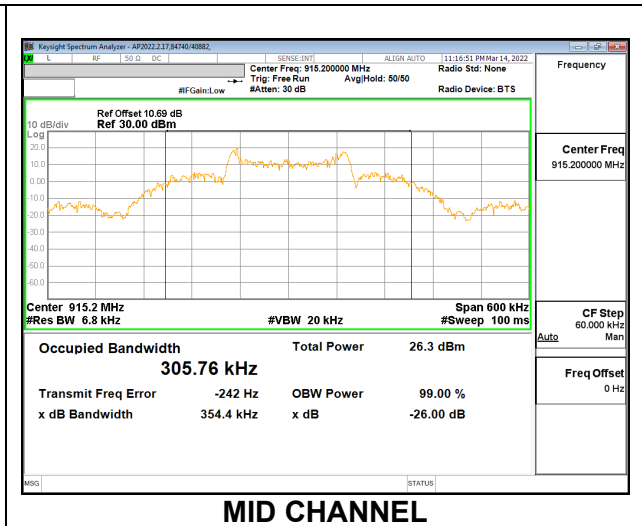
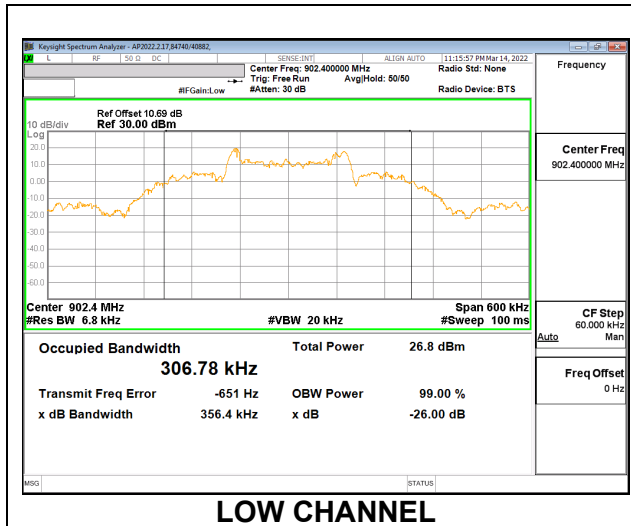
MID CHANNEL



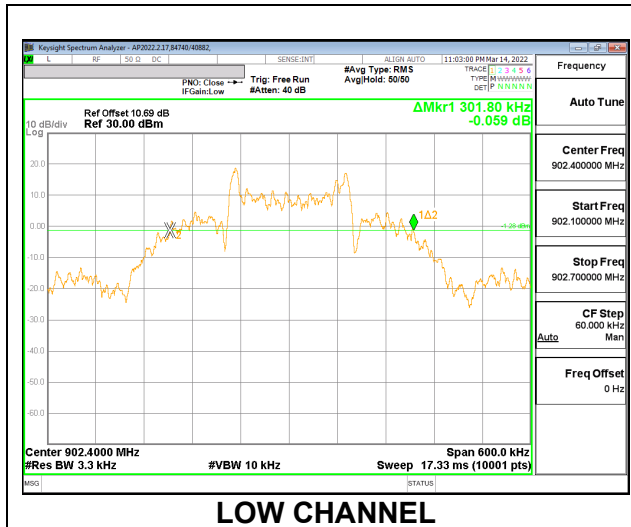
HIGH CHANNEL

9.2.3. 142.22 kbps DATA RATE

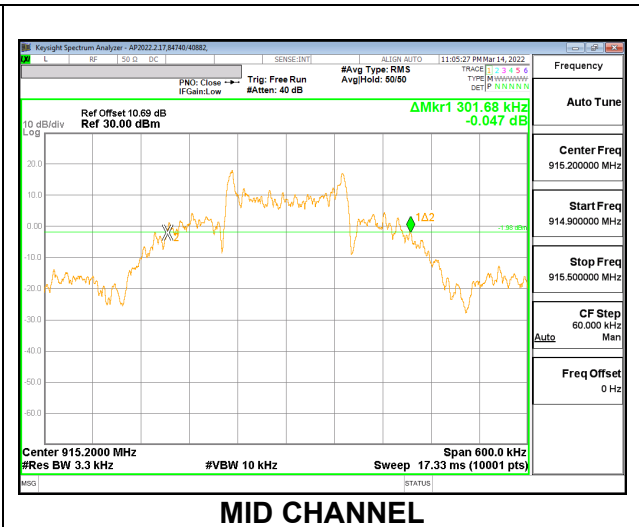
99% OCCUPIED BANDWIDTH



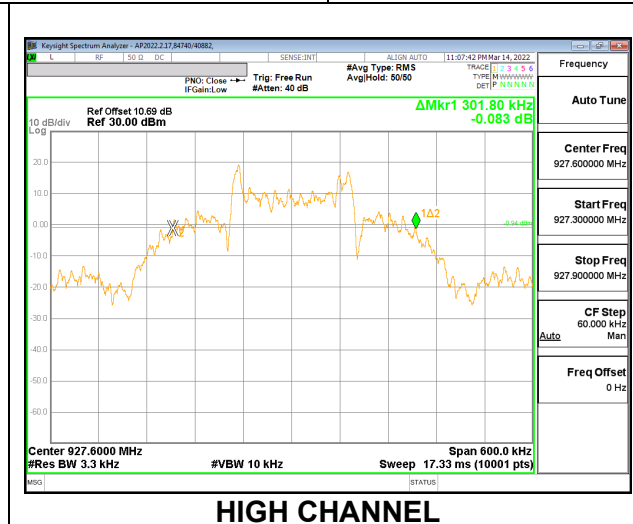
20dB BANDWIDTH



LOW CHANNEL



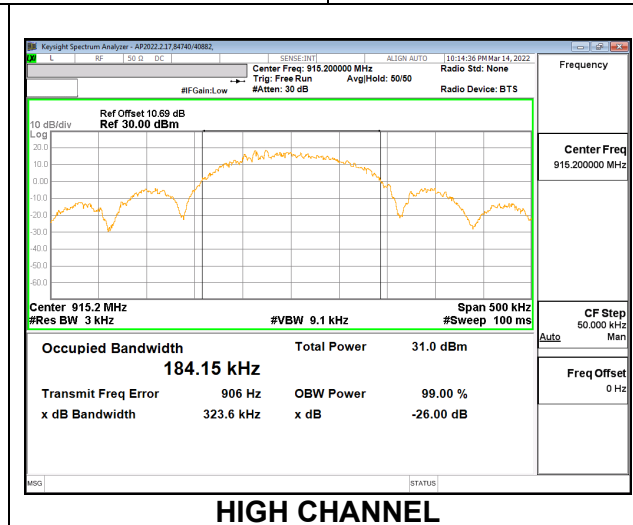
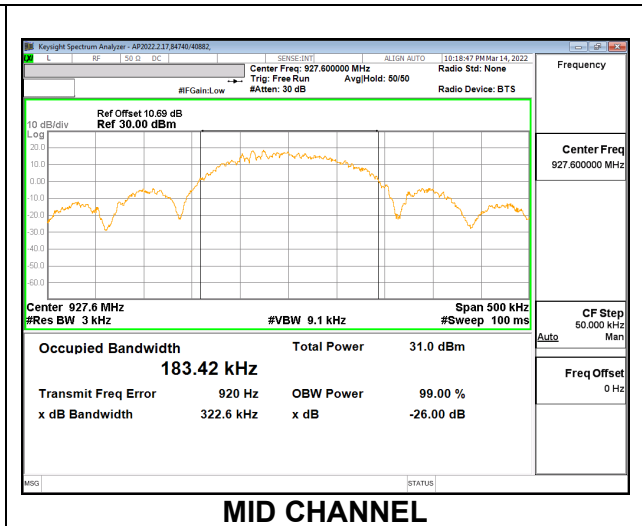
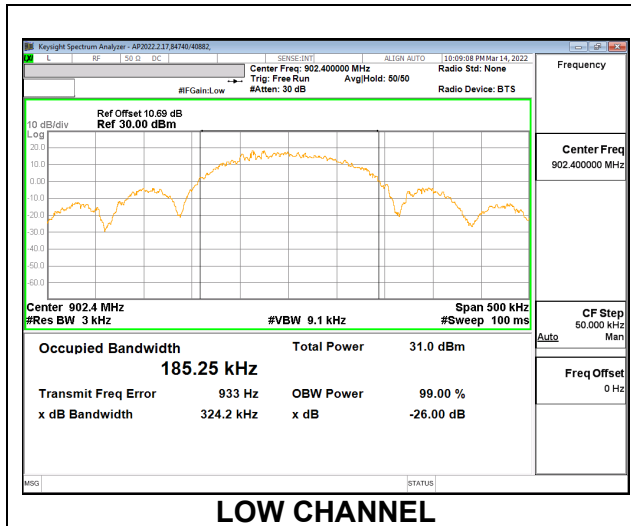
MID CHANNEL



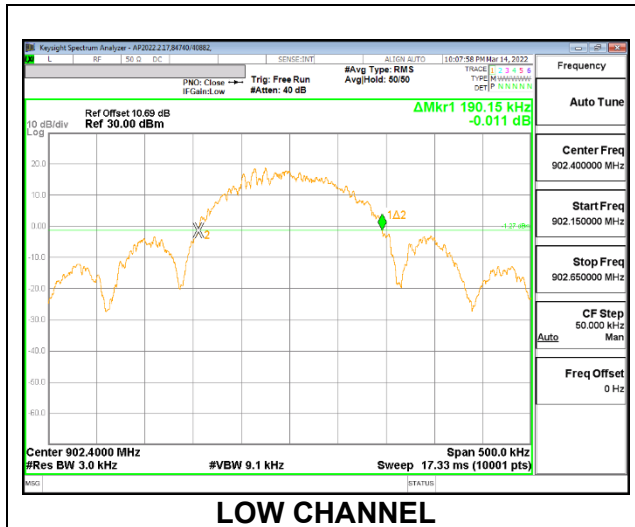
HIGH CHANNEL

9.2.4. 150 kbps DATA RATE

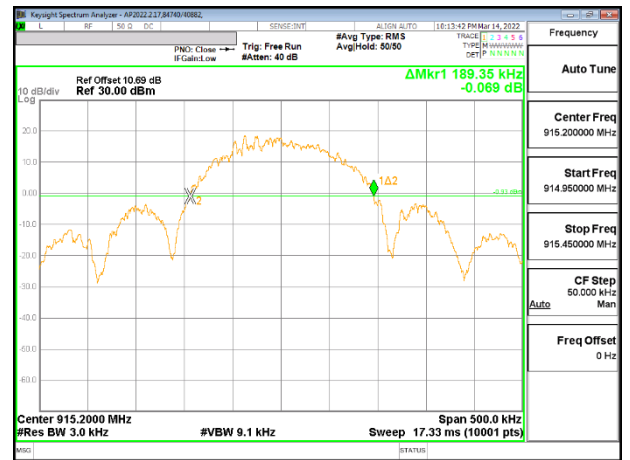
99% OCCUPIED BANDWIDTH



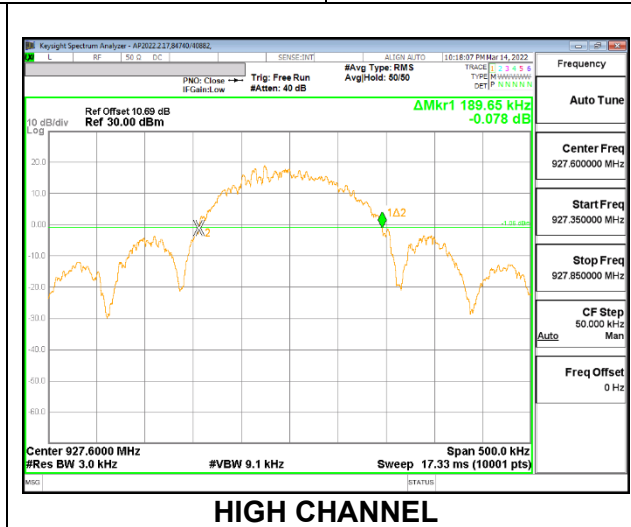
20dB BANDWIDTH



LOW CHANNEL



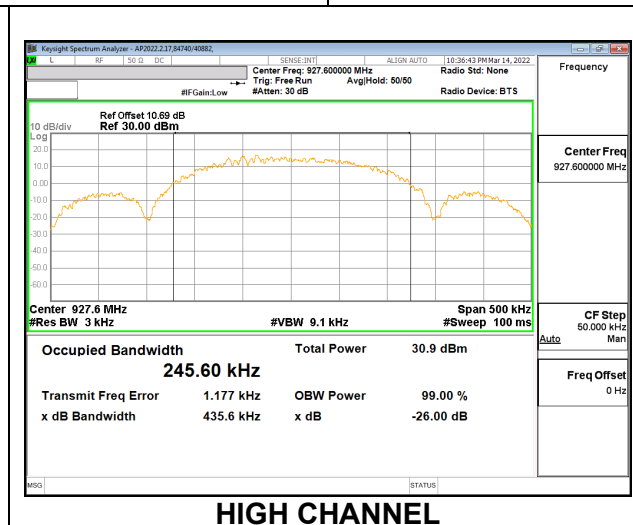
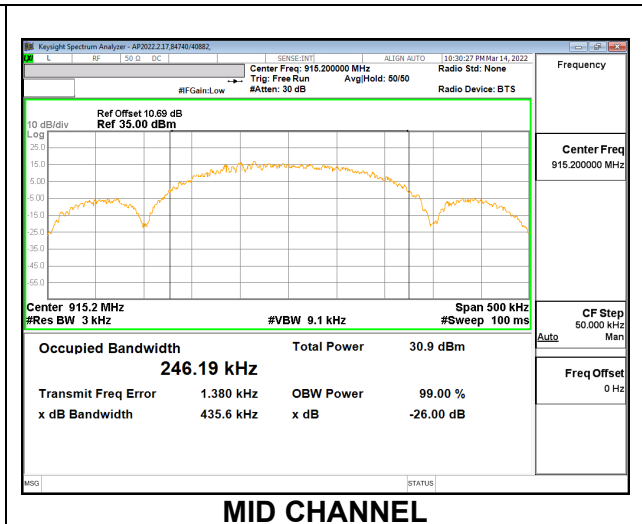
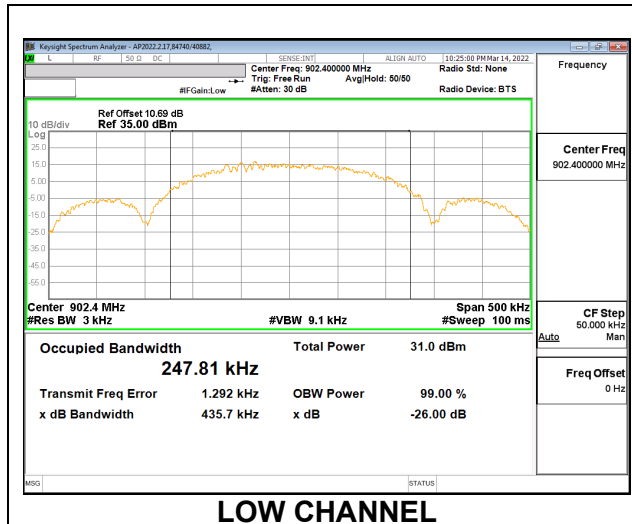
MID CHANNEL



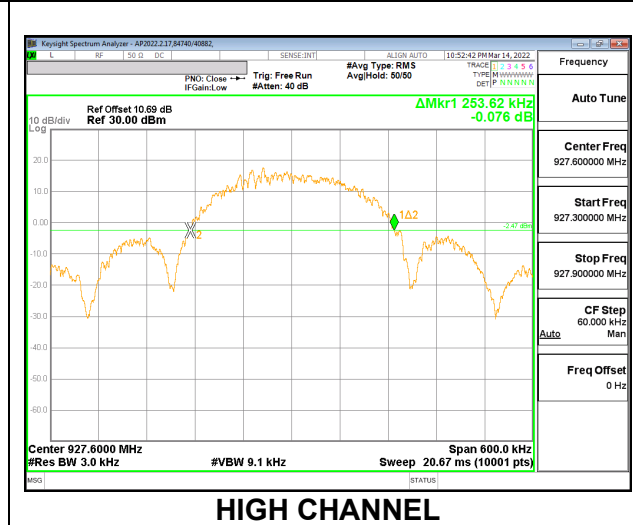
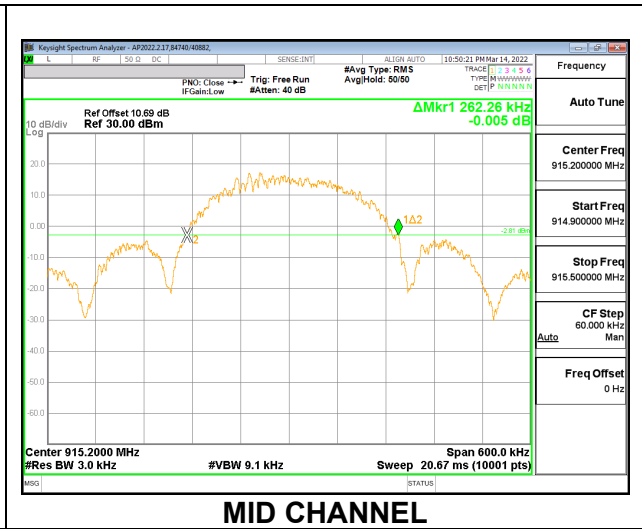
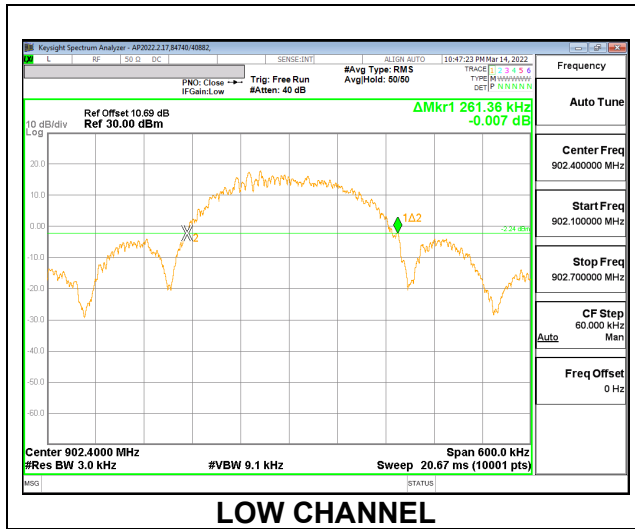
HIGH CHANNEL

9.2.5. 200 kbps DATA RATE

99% OCCUPIED BANDWIDTH



20dB BANDWIDTH



9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

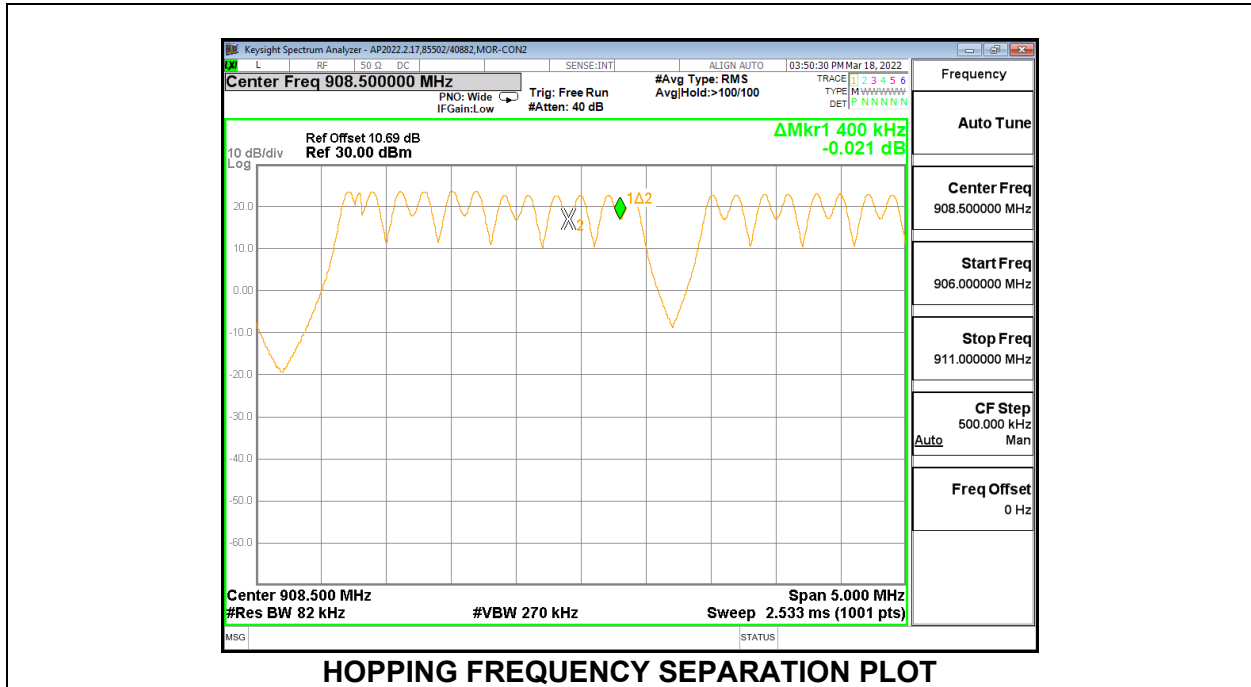
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

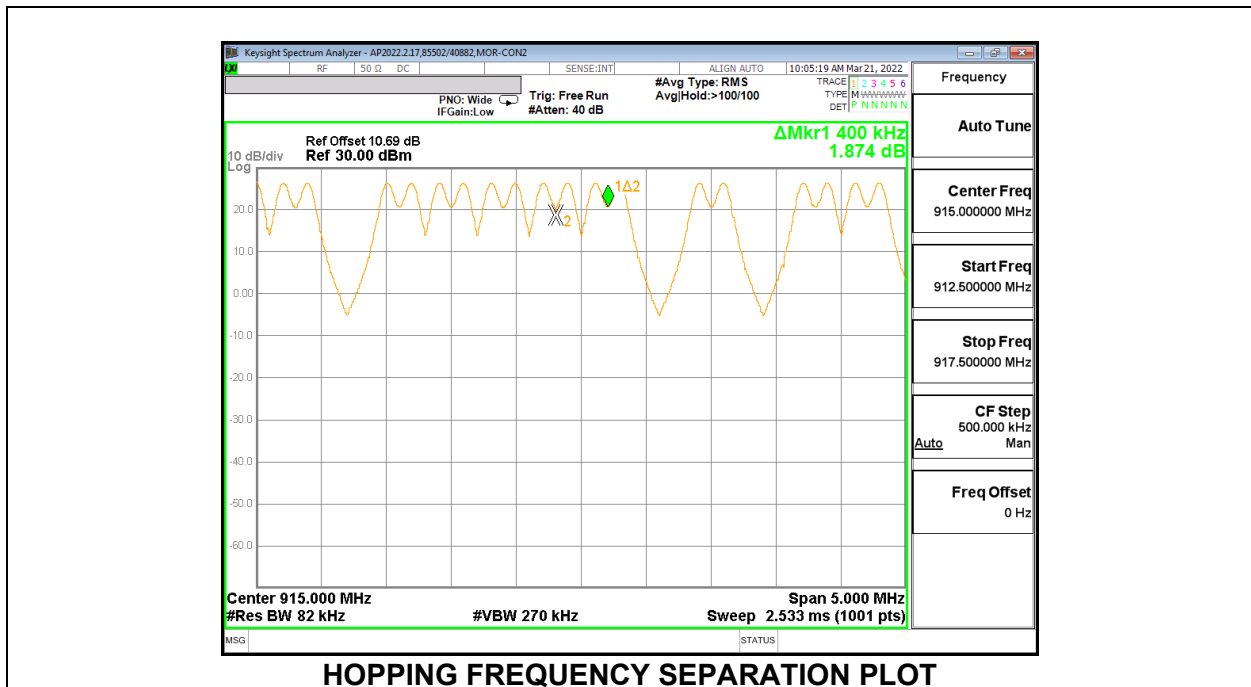
The transmitter output is connected to a spectrum analyzer. To start the RBW is set to approximately 30% of the channel spacing and the VBW is set to $VBW \geq RBW$. The RBW was adjusted as necessary to best identify the center of each individual channel. The sweep time is coupled.

RESULTS

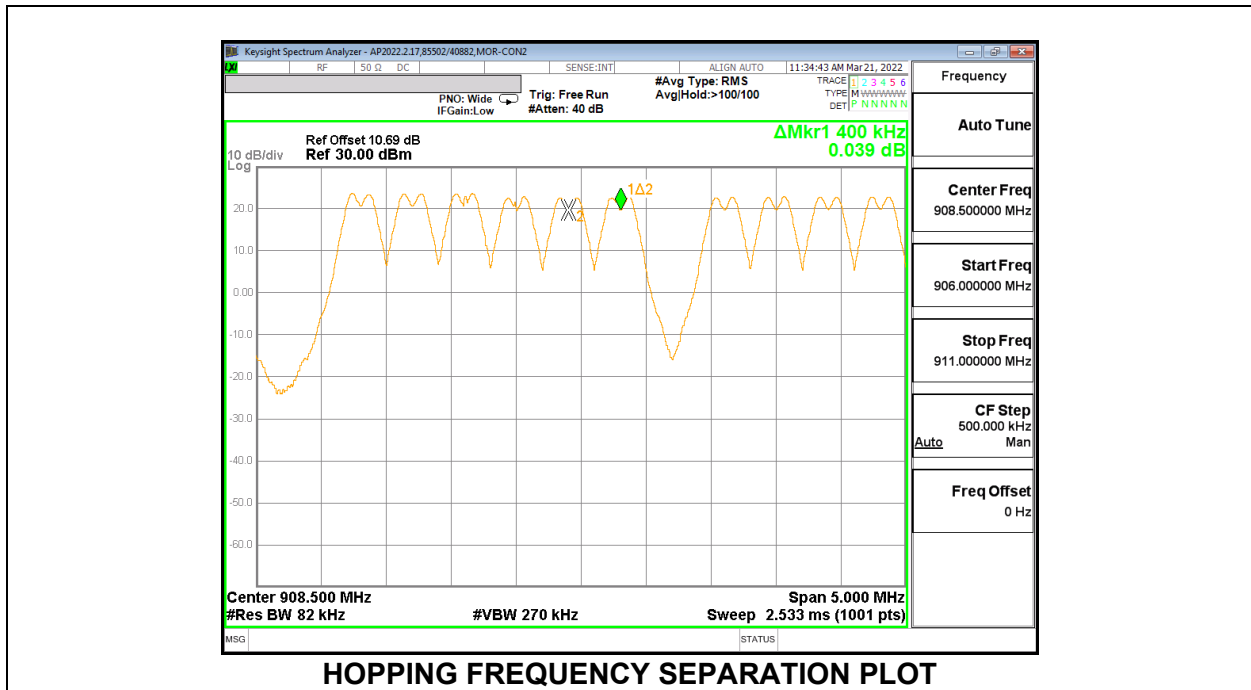
9.3.1. 35.56 kbps DATA RATE



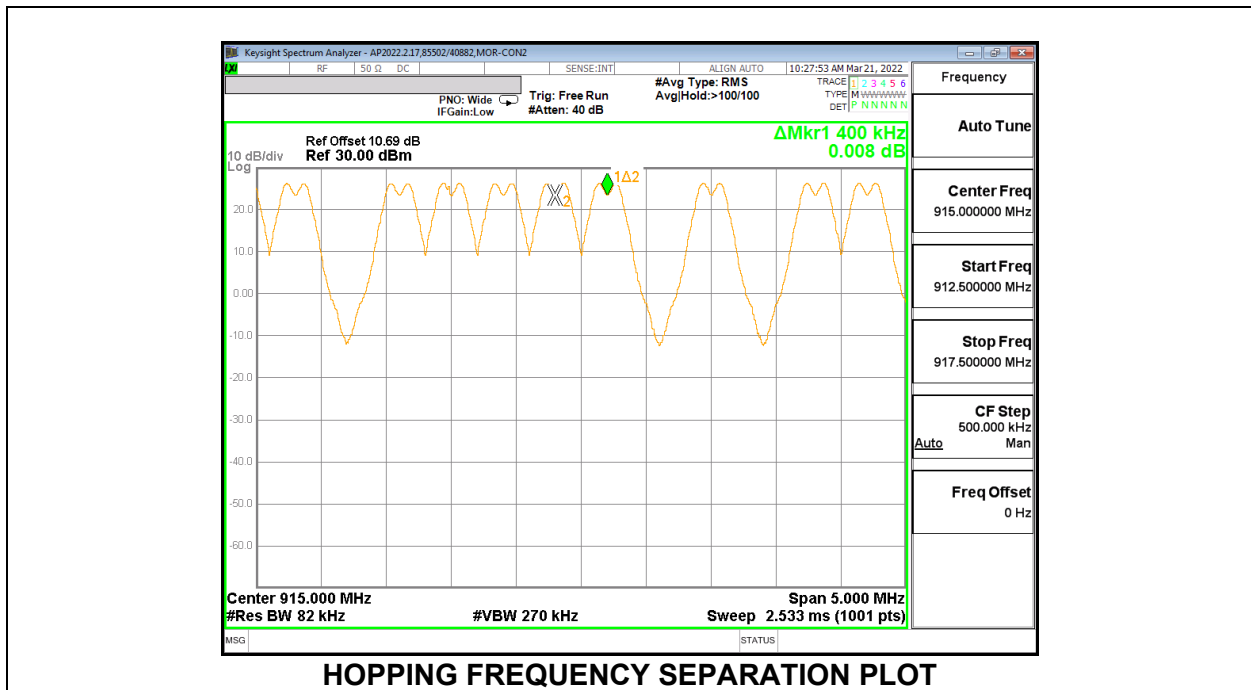
9.3.2. 50 kbps DATA RATE



9.3.3. 142.22 kbps DATA RATE



9.3.4. 150 kbps DATA RATE



9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies

TEST PROCEDURE

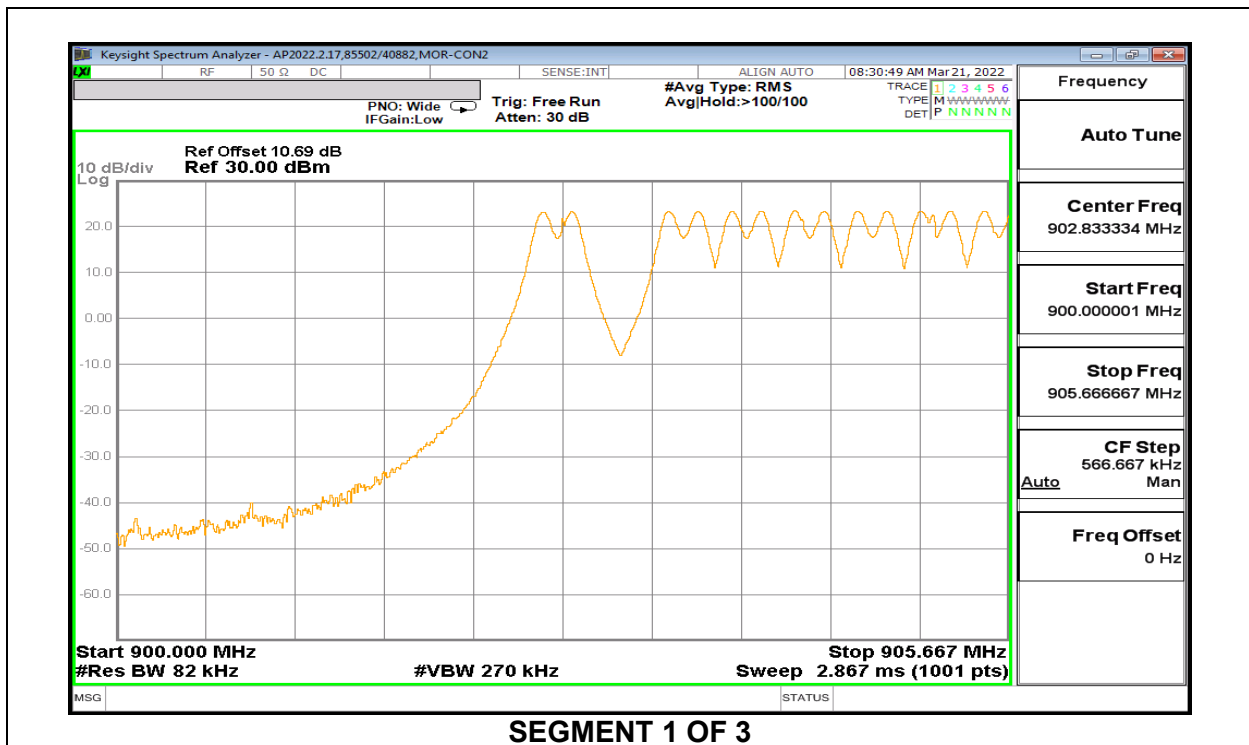
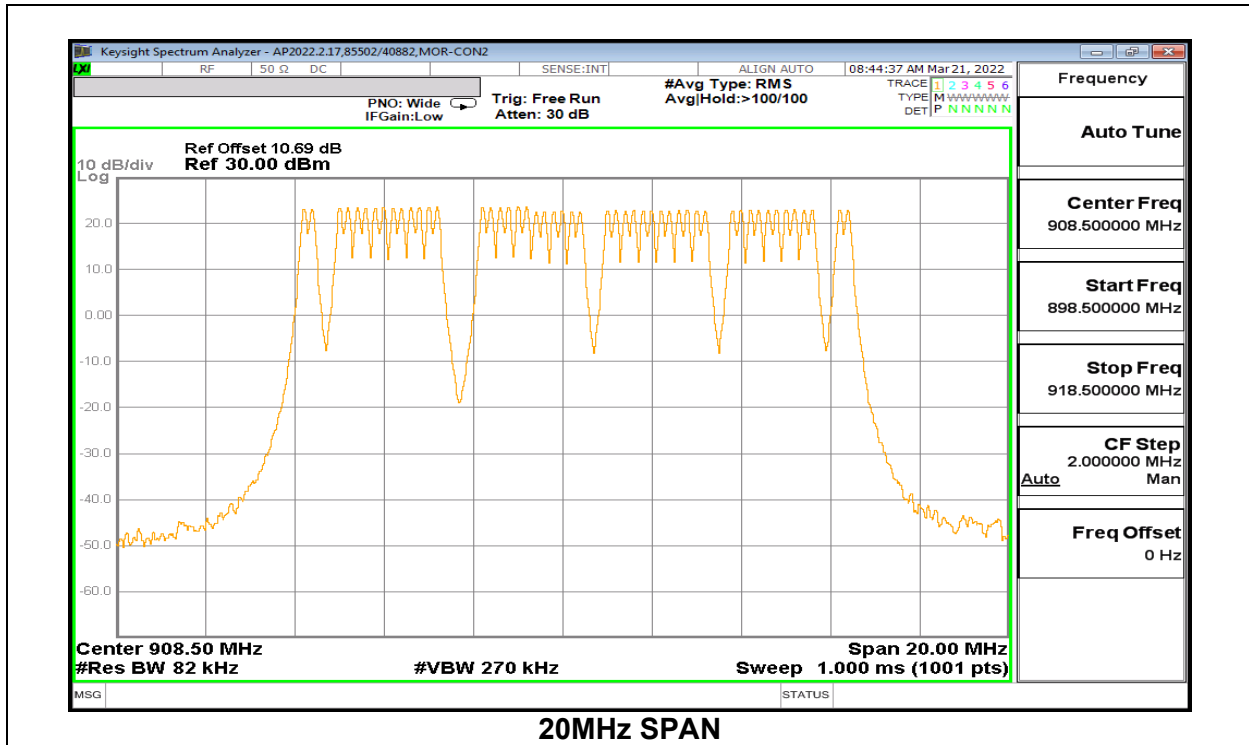
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to clearly identify the individual channels, approximately 30% of the channel spacing or 20dB bandwidth. The analyzer is set to Max Hold.

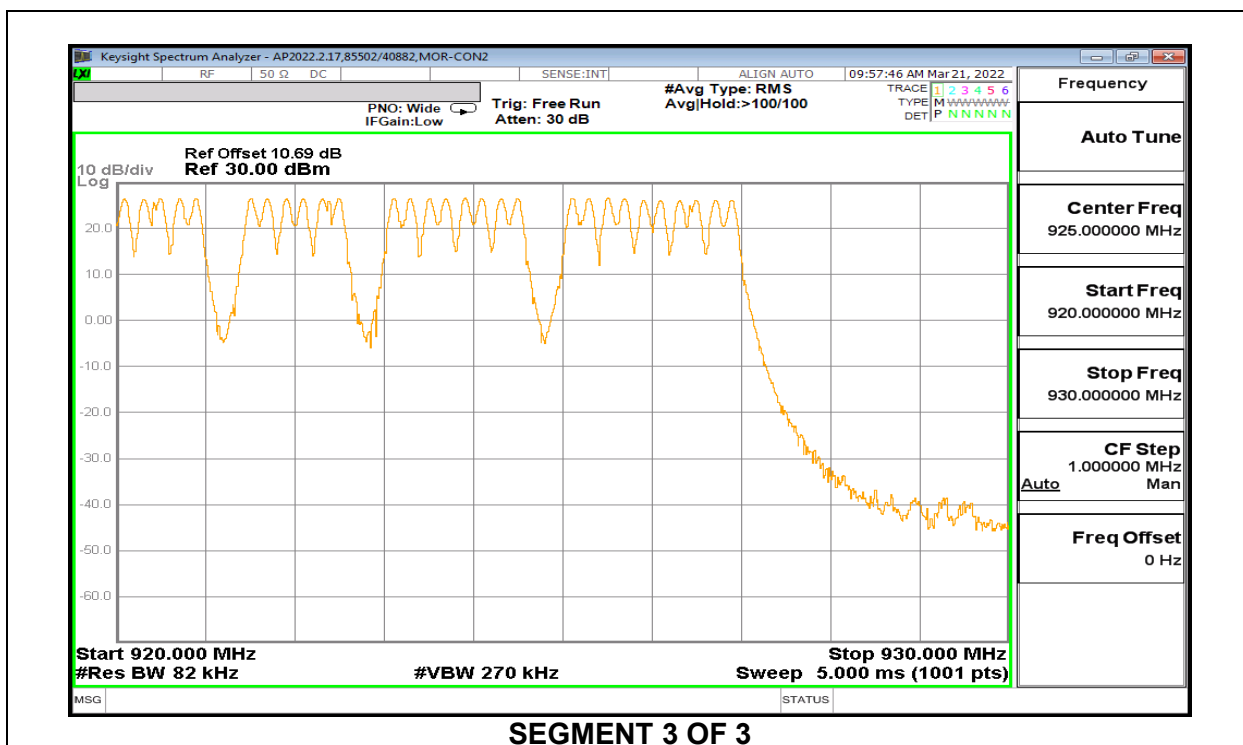
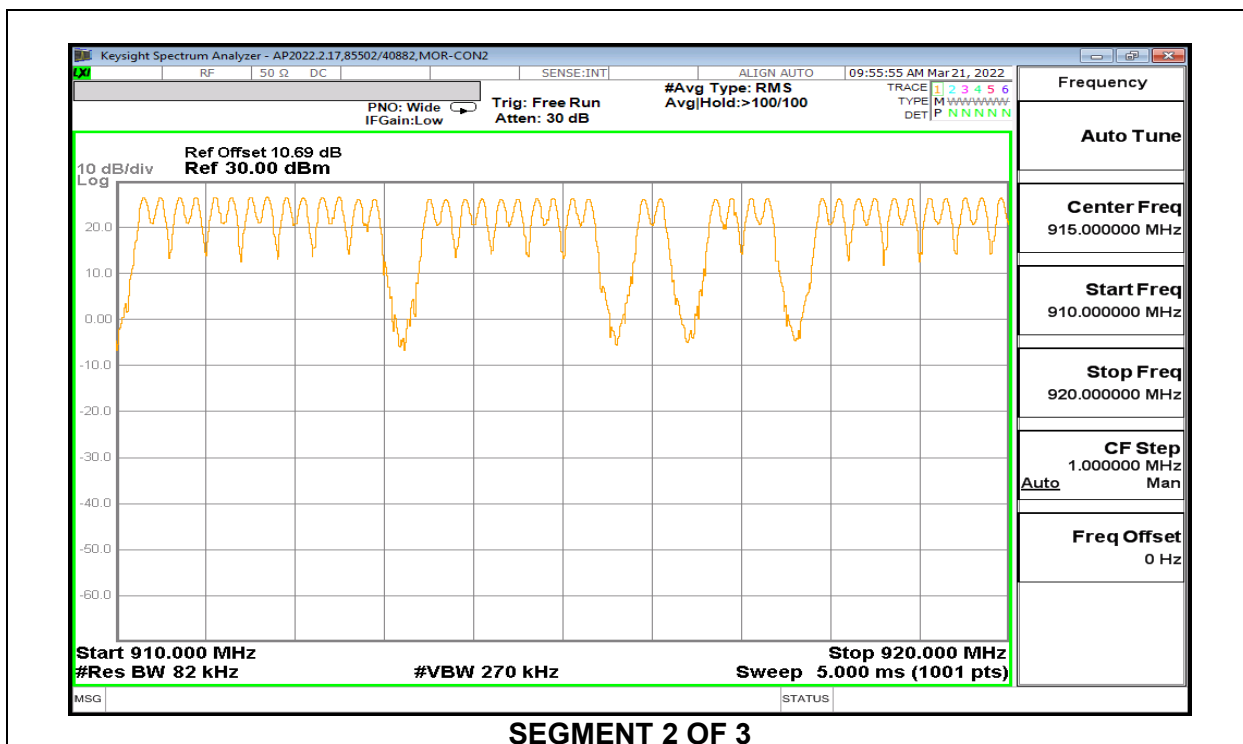
RESULTS

For 50 kbps, 150 kbps, 200kbps data rates: 50 Channels Observed

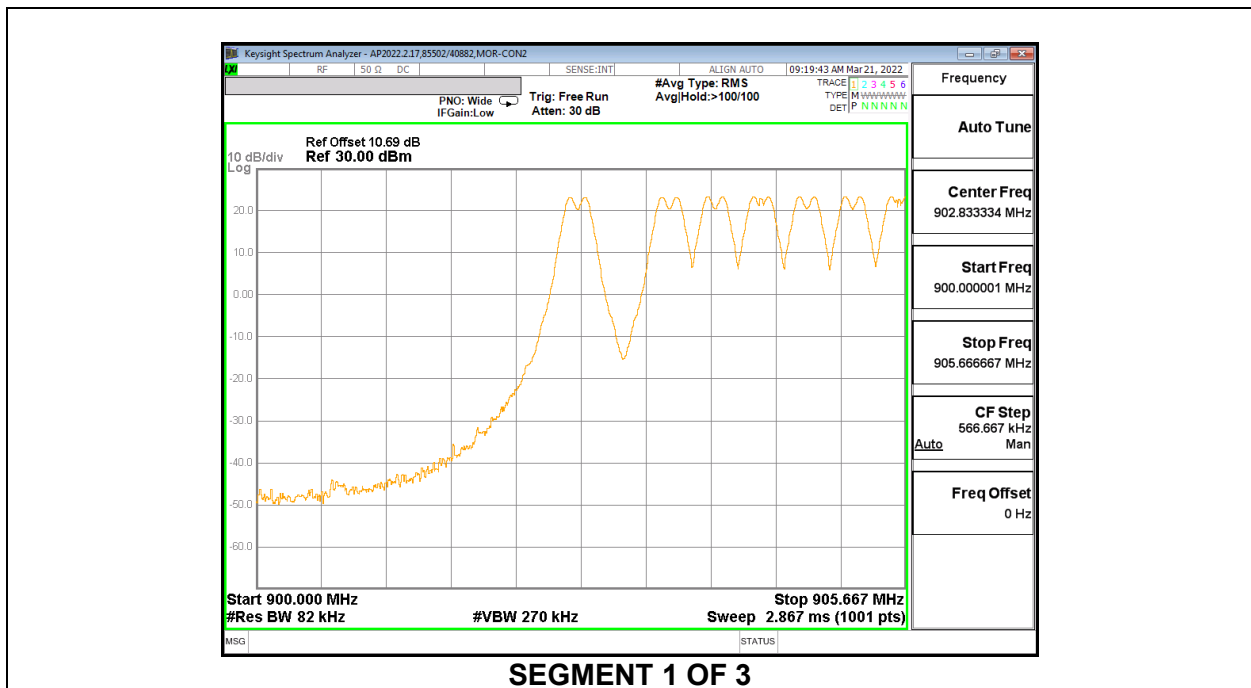
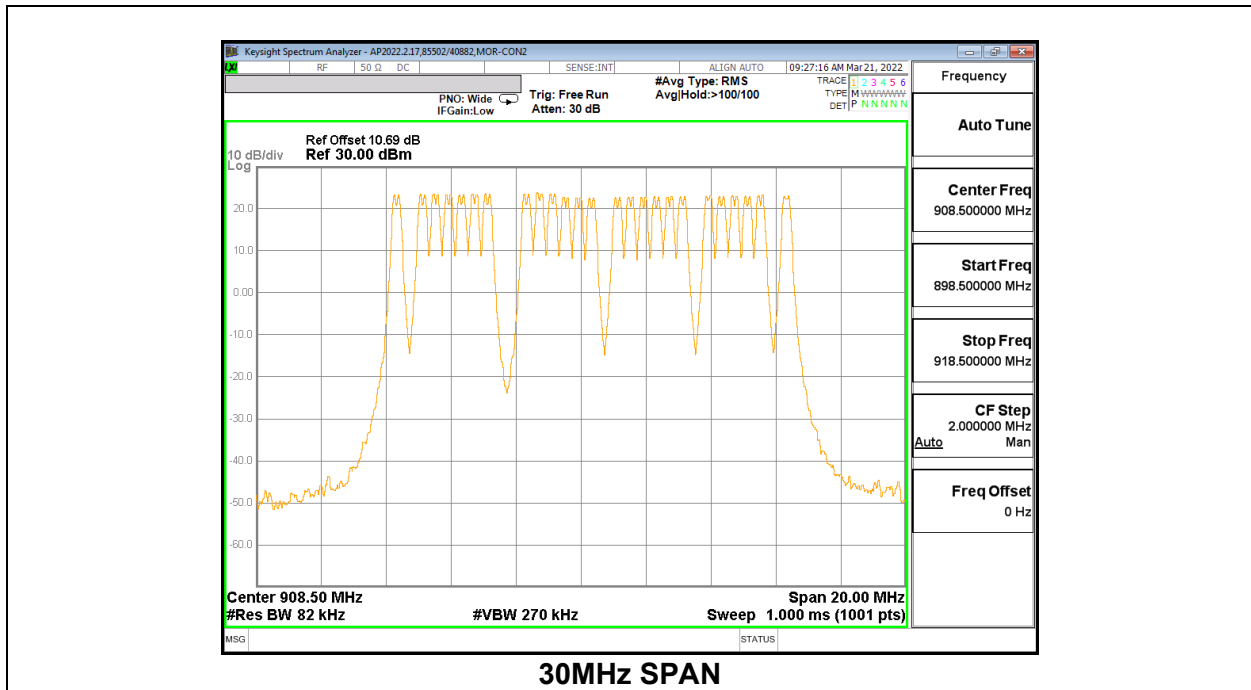
For 35.56 kbps & 142.22 kbps data rates: 25 Channels Observed

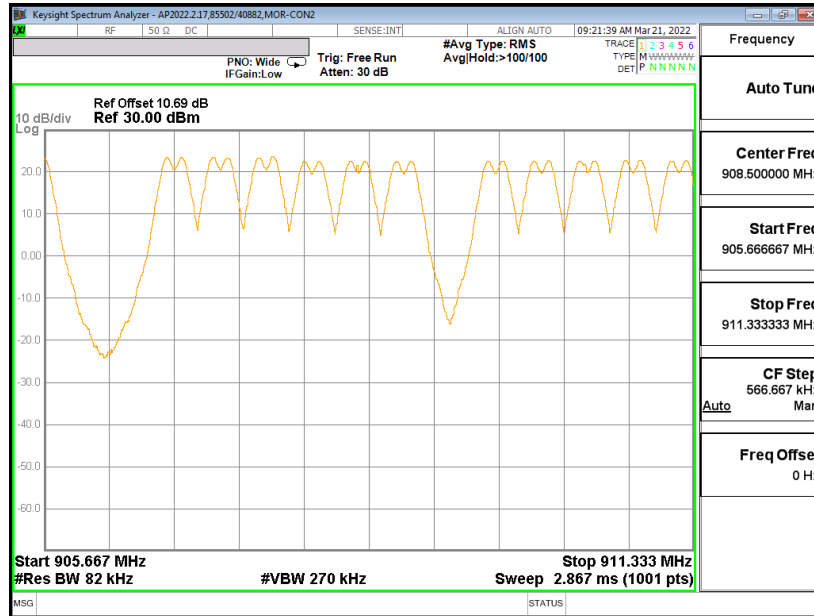
9.4.1. 35.56 kbps DATA RATE



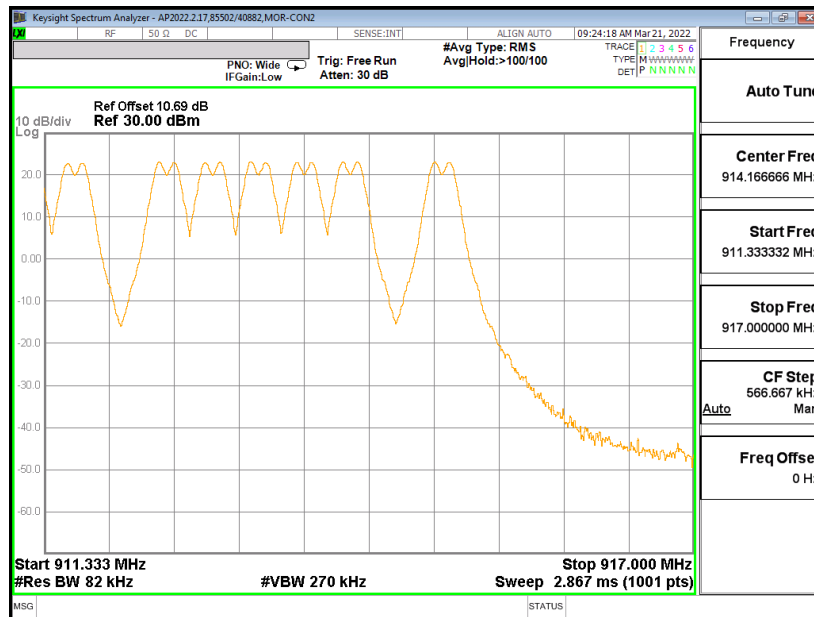


9.4.3. 142.22 kbps DATA RATE



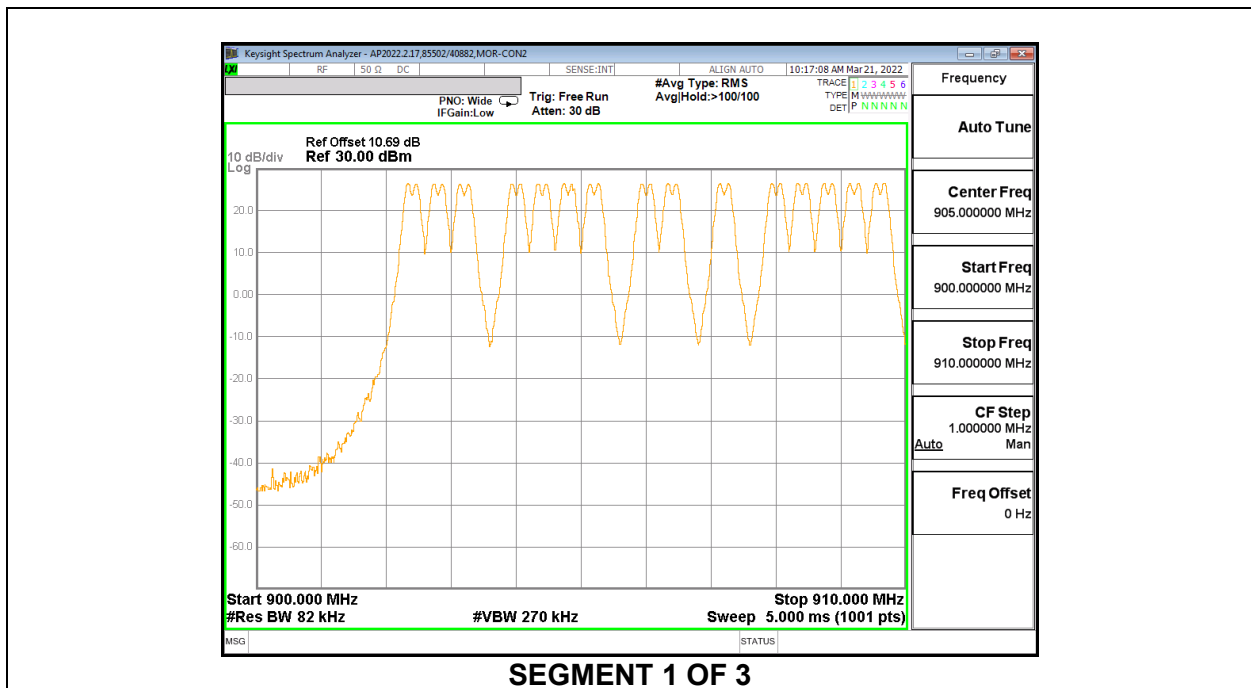
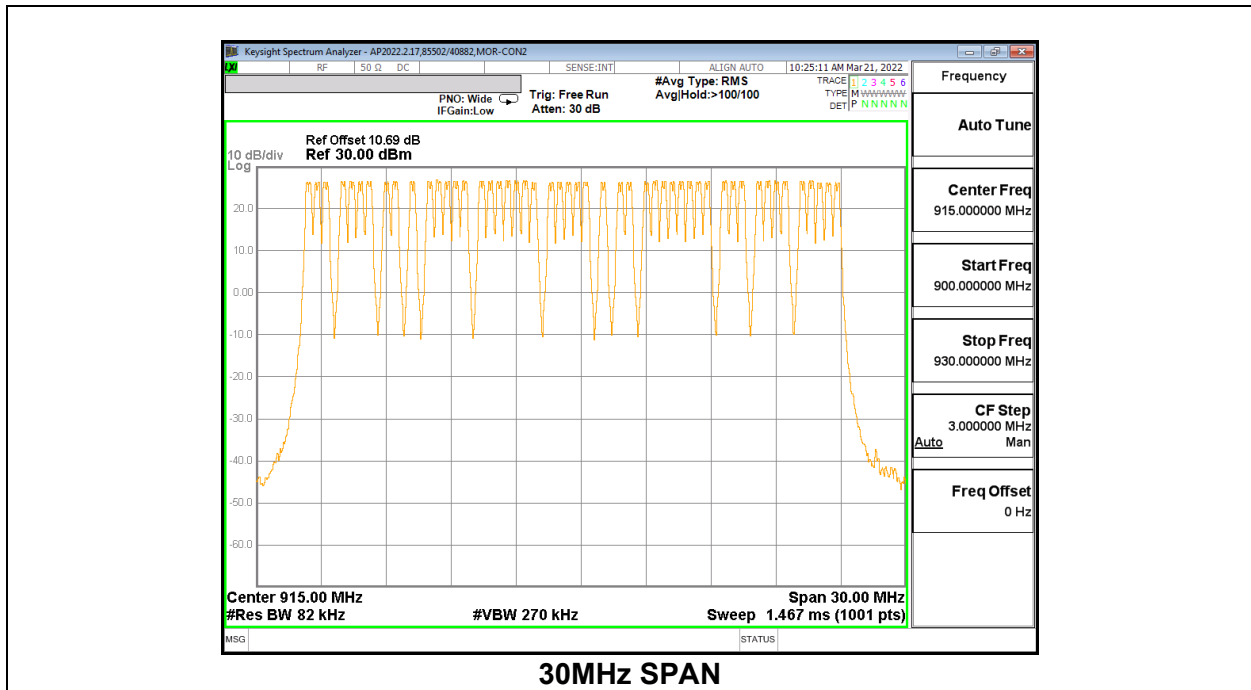


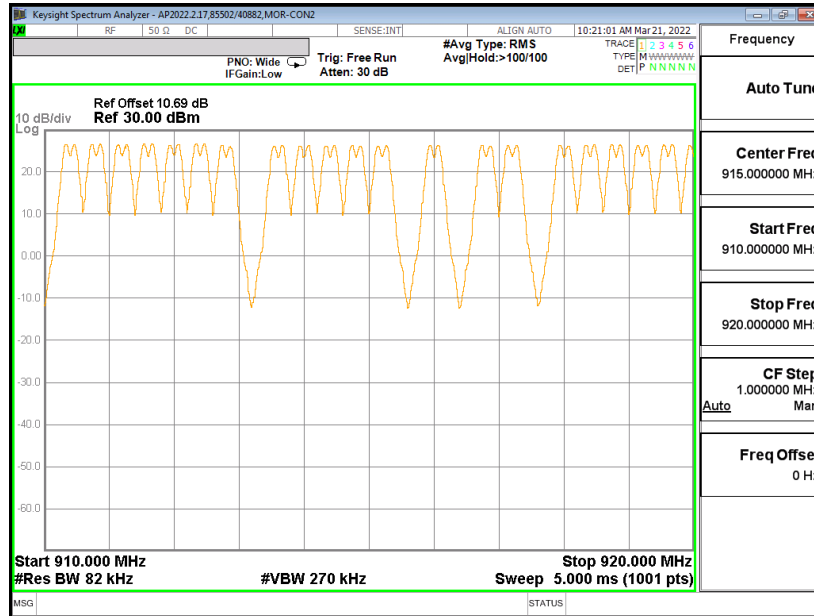
SEGMENT 2 OF 3



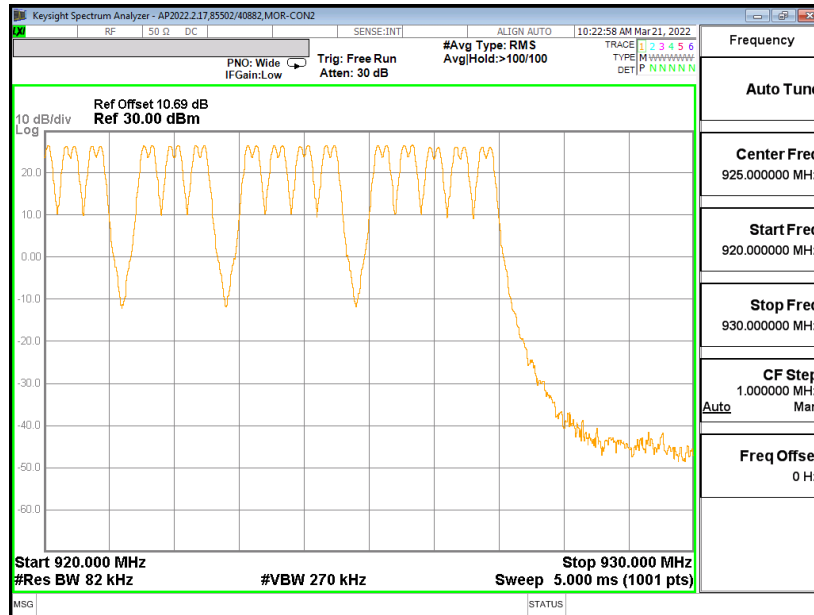
SEGMENT 3 OF 3

9.4.4. 150 kbps DATA RATE



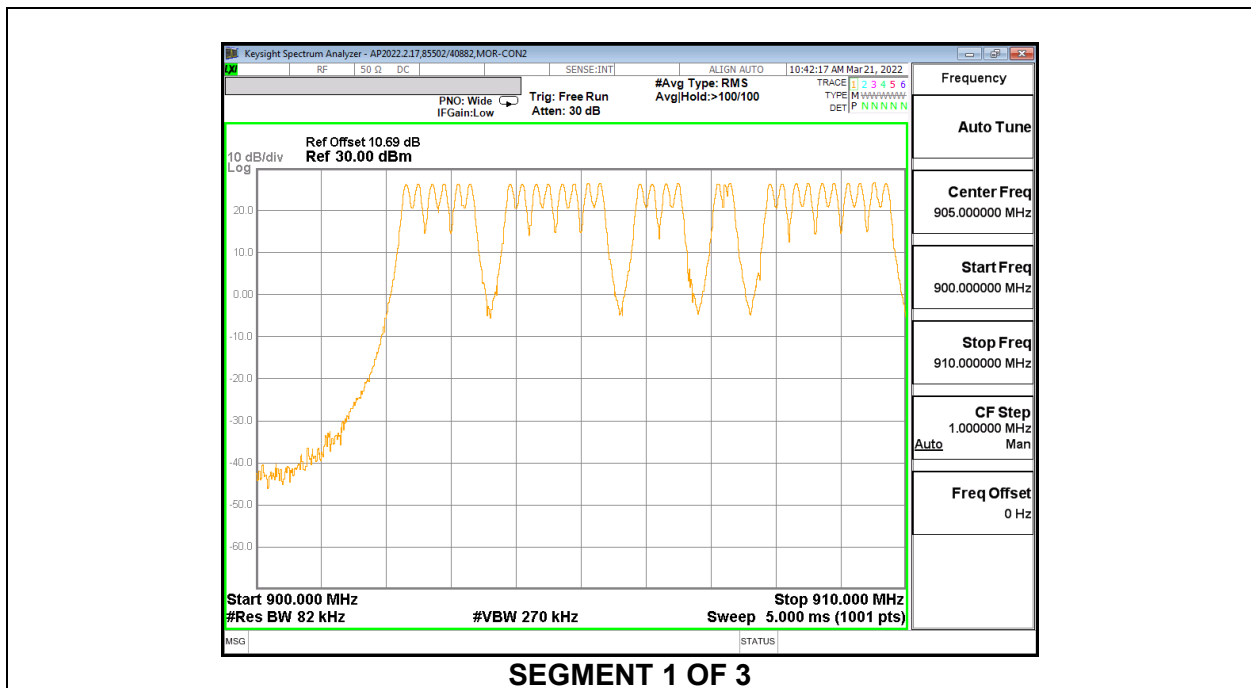
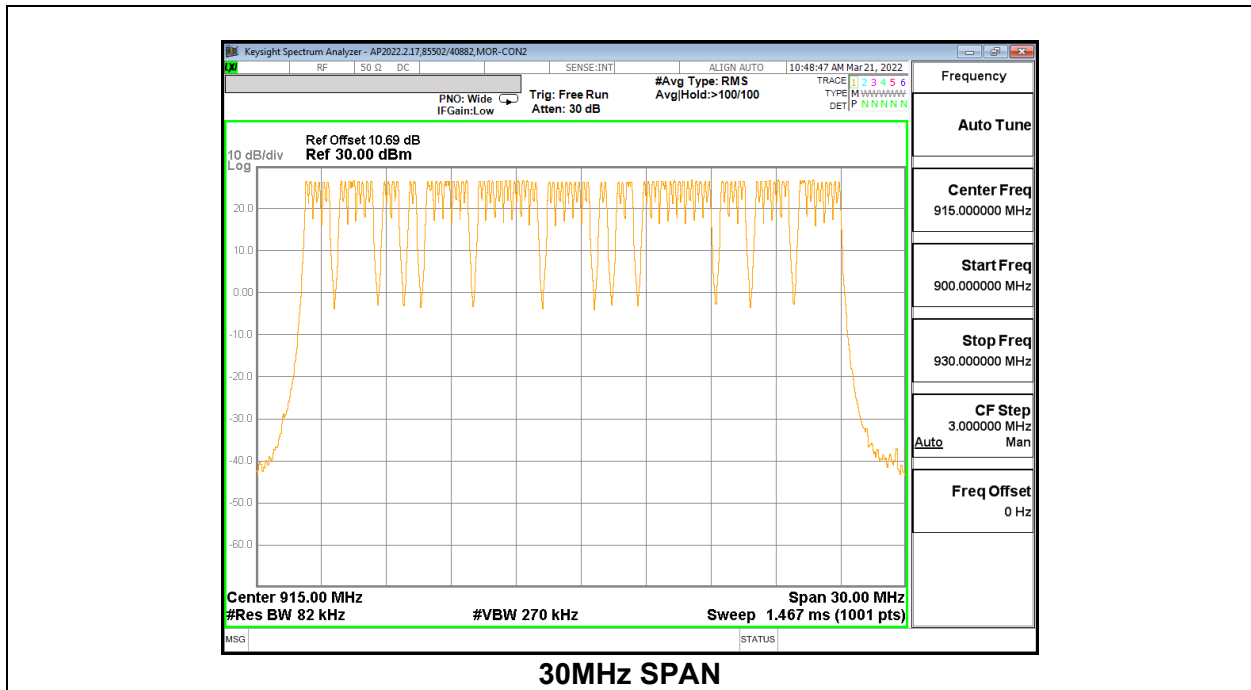


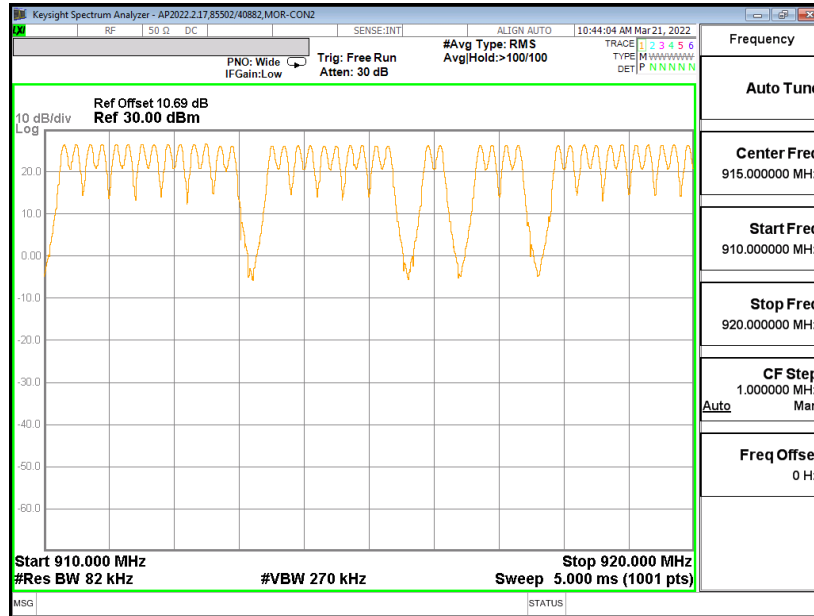
SEGMENT 2 OF 3



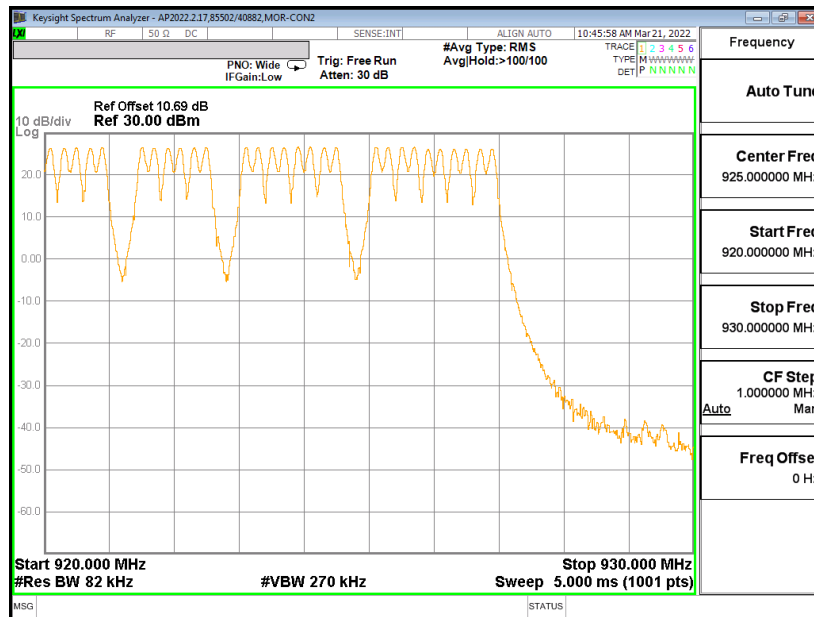
SEGMENT 3 OF 3

9.4.5. 200 kbps DATA RATE





SEGMENT 2 OF 3



SEGMENT 3 OF 3

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

TEST PROCEDURE

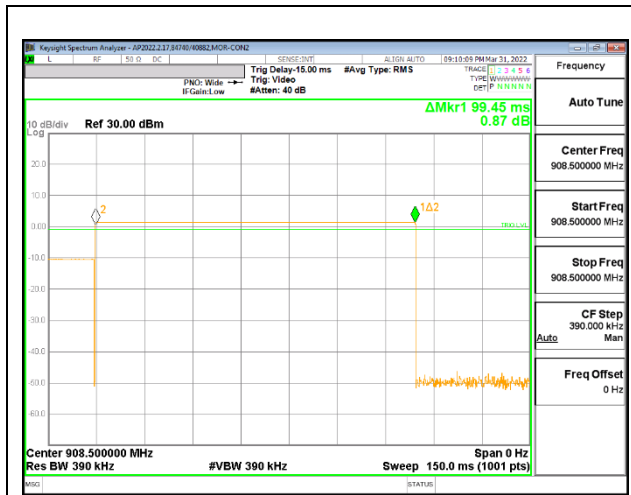
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 10 or 20 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 20 second period (50 channels * 0.4 s) is equal to (# of pulses in 20 s) * pulse width.

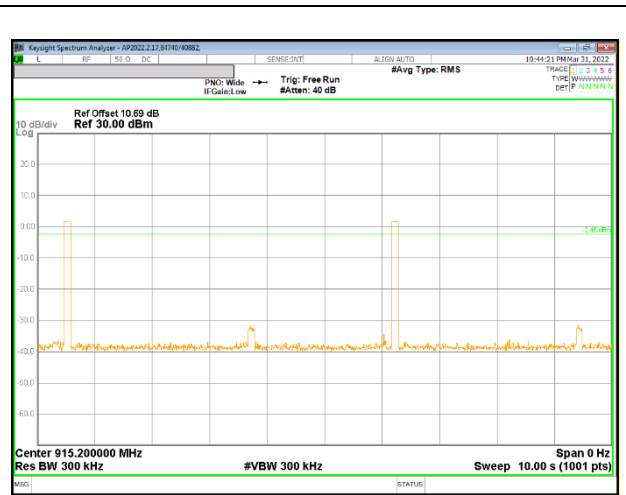
The average time of occupancy in the specified 10 second period (25 channels * 0.4 s) is equal to (# of pulses in 10 s) * pulse width.

RESULTS

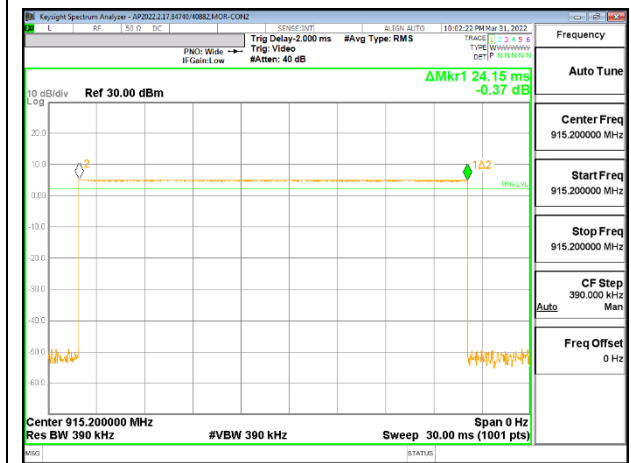
# of Channels	Mode	Pulse Width (msec)	Number of Pulses in 20 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
50	50 kbps	24.15	9	0.2174	0.4	-0.1827
	150 kbps	24.15	8	0.1932	0.4	-0.2068
# of Channels	Mode	Pulse Width (msec)	Number of Pulses in 10 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
50	200 kbps	24.06	4	0.0962	0.4	-0.3038
# of Channels	Mode	Pulse Width (msec)	Number of Pulses in 10 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
25	35.56 kbps	99.45	2	0.1989	0.4	-0.2011
	142.22 kbps	37.4	7	0.2618	0.4	-0.1382



PULSE WIDTH – 35.56 kbps



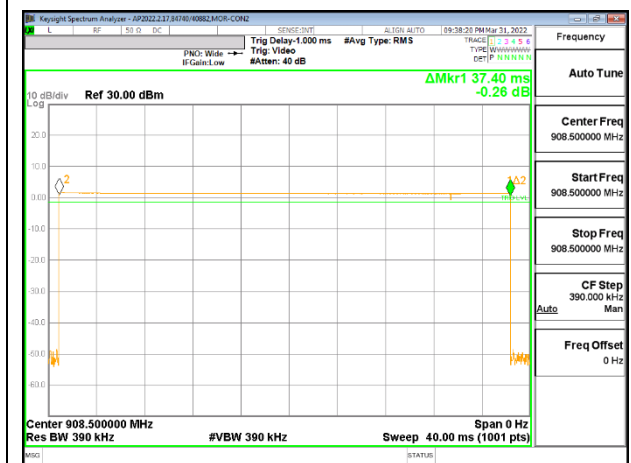
NUMBER OF PULSES IN 10 SECOND OBSERVATION PERIOD – 35.56 kbps



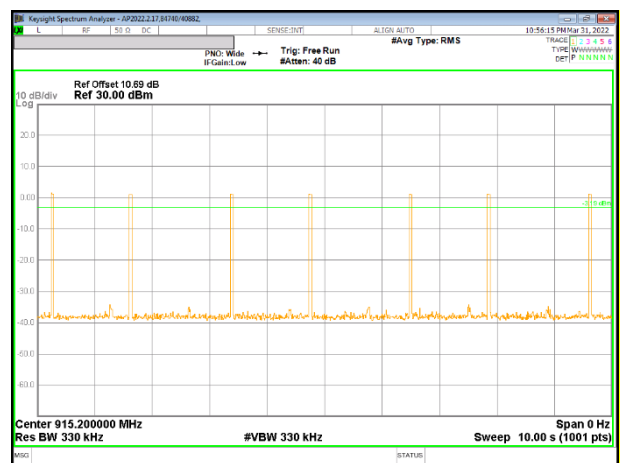
PULSE WIDTH – 50 kbps



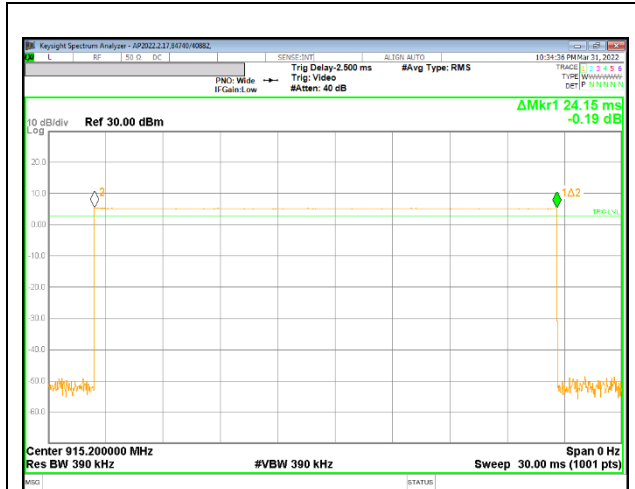
NUMBER OF PULSES IN 20 SECOND OBSERVATION PERIOD – 50 kbps



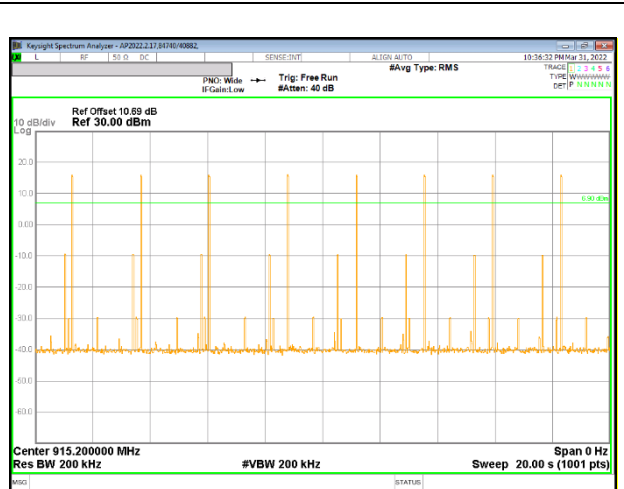
PULSE WIDTH – 142.22 kbps



NUMBER OF PULSES IN 10 SECOND OBSERVATION PERIOD – 142.22 kbps



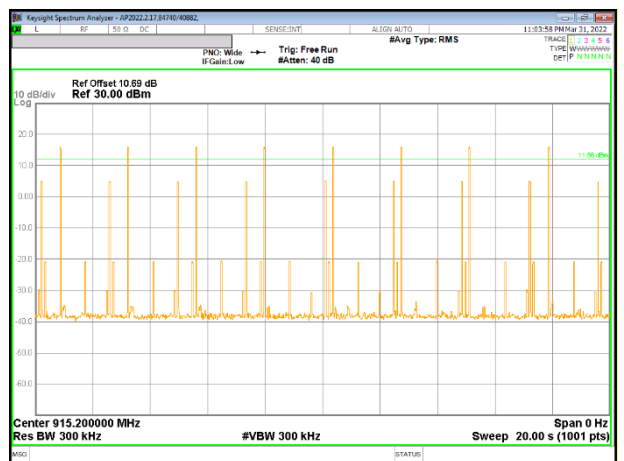
PULSE WIDTH – 150 kbps



NUMBER OF PULSES IN 20 SECOND OBSERVATION PERIOD – 150 kbps



PULSE WIDTH – 200 kbps



NUMBER OF PULSES IN 10 SECOND OBSERVATION PERIOD – 200 kbps
 Note: Sweep time is 20s, however with center line being 10s, there are 4 pulses withing a 10s observation period.

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (2)

RSS-247 (5.4) (a)

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.69 dB (including 9.77 dB pad and 0.92 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

9.6.1. 35.56 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4	23.13	23.98	-0.85
Middle	915.2	22.97	23.98	-1.01
High	927.6	22.92	23.98	-1.06

9.6.2. 142.22 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4	23.11	23.98	-0.87
Middle	915.2	22.98	23.98	-1.00
High	927.6	22.89	23.98	-1.09

9.6.3. 50 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4	26.19	30	-3.81
Middle	915.2	26.14	30	-3.86
High	927.6	26.02	30	-3.98

9.6.4. 150 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4	26.16	30	-3.84
Middle	915.2	26.14	30	-3.86
High	927.6	26.02	30	-3.98

9.6.5. 200 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.4	26.12	30	-3.88
Middle	915.2	26.10	30	-3.90
High	927.6	26.03	30	-3.97

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.69 dB (including 9.77 dB pad and 0.92 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

9.7.1. 35.56 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)
Low	902.4	23.04
Middle	915.2	22.89
High	927.6	22.84

9.7.2. 142.22 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)
Low	902.4	23.02
Middle	915.2	22.91
High	927.6	22.81

9.7.3. 50 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)
Low	902.4	26.12
Middle	915.2	26.06
High	927.6	25.99

9.7.4. 150 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)
Low	902.4	26.10
Middle	915.2	26.07
High	927.6	25.96

9.7.5. 200 kbps DATA RATE

Tested By:	84740/40882
Date:	2022-03-14

Channel	Frequency (MHz)	Output Power (dBm)
Low	902.4	26.05
Middle	915.2	26.03
High	927.6	25.97

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The authorized bandedges at 902 and 928 MHz are investigated with the transmitter set to the normal hopping mode.

RESULTS