Automaton Inc. dba RADAR

TEST REPORT FOR

RFID sensor operating in the UHF band
Model: RS510B

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928MHz)

Report No.: 108850-9

Date of issue: November 3, 2023

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

Testing the Future

CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Automaton Inc. dba RADAR
15150 Avenue of Science, Ste. 200
San Diego, CA 92121

Representative: Mark Easton
Customer Reference Number: 1993-SD1-TestRS510B

REPORT PREPARED BY:

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

Project Number: 108850

DATE OF EQUIPMENT RECEIPT:	October 18, 2023
DATE(S) OF TESTING:	October 18, 20, and 21, 2023

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.
110 North Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20

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 equipment sample utilized for testing is selected by the manufacturer. The declaration of pass or fail herein is a binary statement for simple acceptance rule (ILAC G8) based upon assessment to the specification(s) listed above, without consideration 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 (RF Conducted Unit, Radiated Emissions Unit)

Equipment Tested:

Device	Manufacturer	Model #	S/N
RFID sensor operating in the UHF band	Automaton Inc. dba RADAR	RS510B	1537

Support Equipment:

Device	Manufacturer	Model #	S/N
Minicomputer	Intel	NUC8HN	BTHN009003HV
Gigabit POE	Trendnet	TPE-117G1A	E18H7G2000147
Laptop	Dell	P107P	ST03AT1B3

Configuration 2 (Power Variation, AC Conducted Emissions)

Equipment Tested:

Device	Manufacturer	Model #	S/N
RFID sensor operating in the UHF band	Automaton Inc. dba RADAR	RS510B	1537

Support Equipment:

Device	Manufacturer	Model #	S/N
Minicomputer	Intel	NUC8HN	BTHN009003HV
Laptop	Dell	P107P	ST03AT1B3
Power supply	Topward	6306D	988614
POE injector	Solis Energy	HPI-2148	PT2144220316

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	902.75- 927.25MHz
Number of Hopping Channels:	50
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):	PR-ASK *
Maximum Duty Cycle:	98% or better
Number of TX Chains:	4
Antenna Type(s) and Gain:	Patch Array 7.04 dBi to 8.62dBi (Measured ant gain + beamforming gain as provided by the manufacturer)
Beamforming Type:	Digital
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	48VDC from POE
Firmware / Software used for Test:	Test mode firmware version: 0.85.12
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

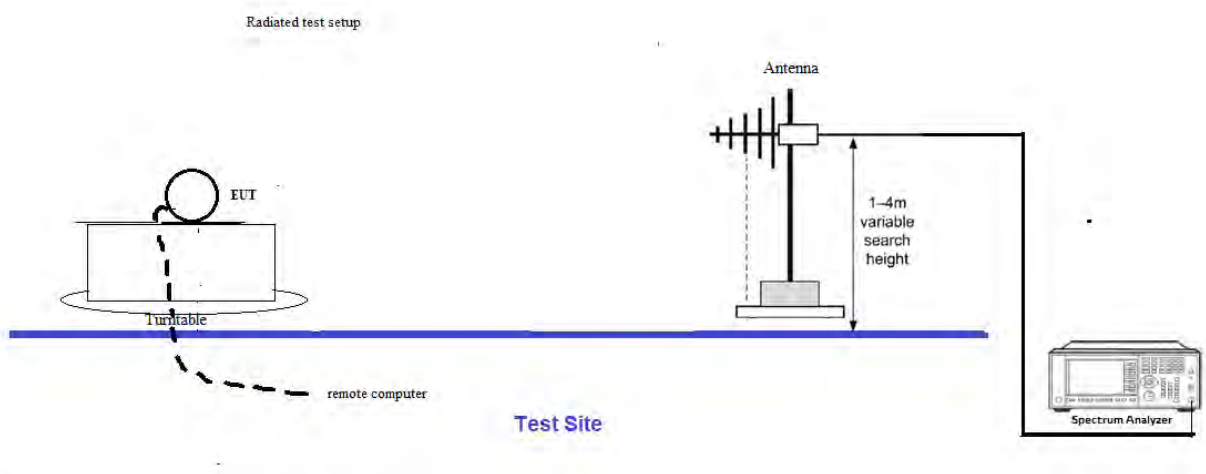
*Phase reversal ASK., TARI set at 6.25us

Antenna Gain and power settings.
Lowest gain 7.04dBi : Sector 135, 0 Power setting 22.8dBm
Highest gain 8,62dBi : Sector 67.5, -155 Power setting 21.2dBm

EUT Photo(s)

Support Equipment Photo(s)

Block Diagram of Test Setup(s)



FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013)	Test Date(s):	10/18/2023
Configuration:	1		
Test Setup:	The equipment under test (EUT) is set on a test bench. The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT. Frequency Range of EUT: 902.75MHz-927.25MHz TX 902.75MHz, 914.75MHz, 927.25MHz TARI = 6.25us as intended. Lowest antenna pattern and associated power level evaluated.		

Environmental Conditions			
Temperature (ºC)	22.4	Relative Humidity (%):	55

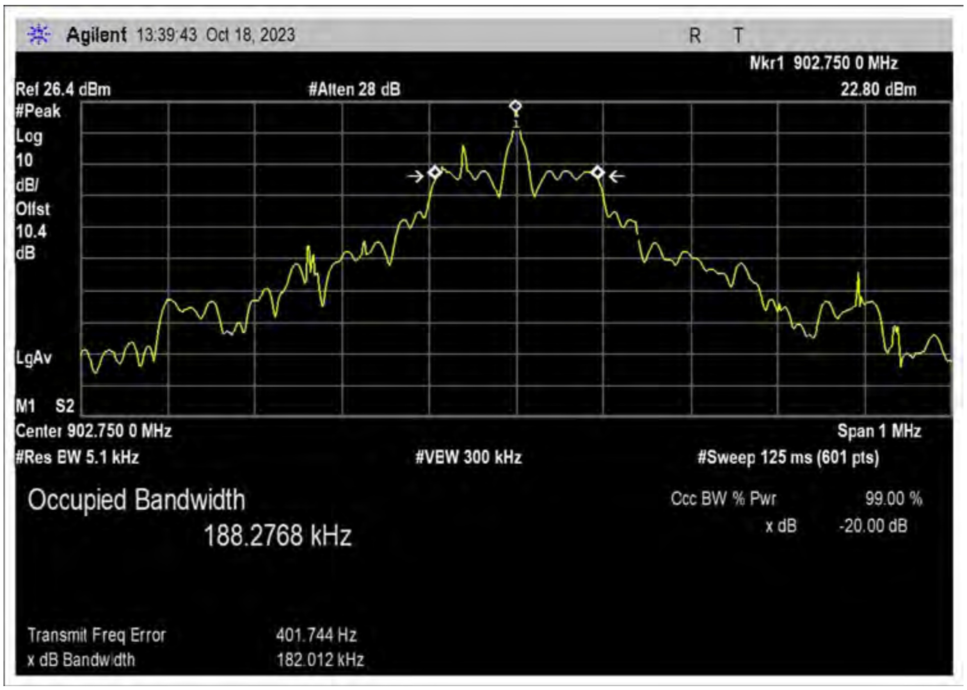
Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	12/13/2022	12/13/2023
03430	Attenuator	Aeroflex/Weinschel	75A-10-12	1/14/2022	1/14/2024
07658	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	6/22/2022	6/22/2024

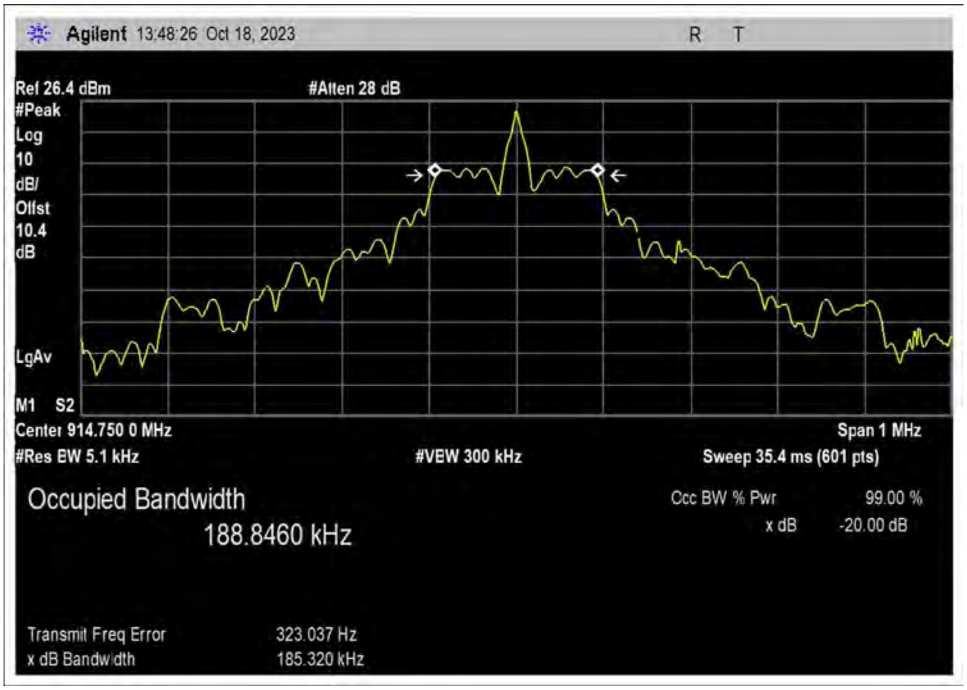
15.247(a)(1)(i) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
902.75	1	PR-ASK	182.012	≤500	Pass
914.75	1	PR-ASK	185.320	≤500	Pass
927.25	1	PR-ASK	185.297	≤500	Pass

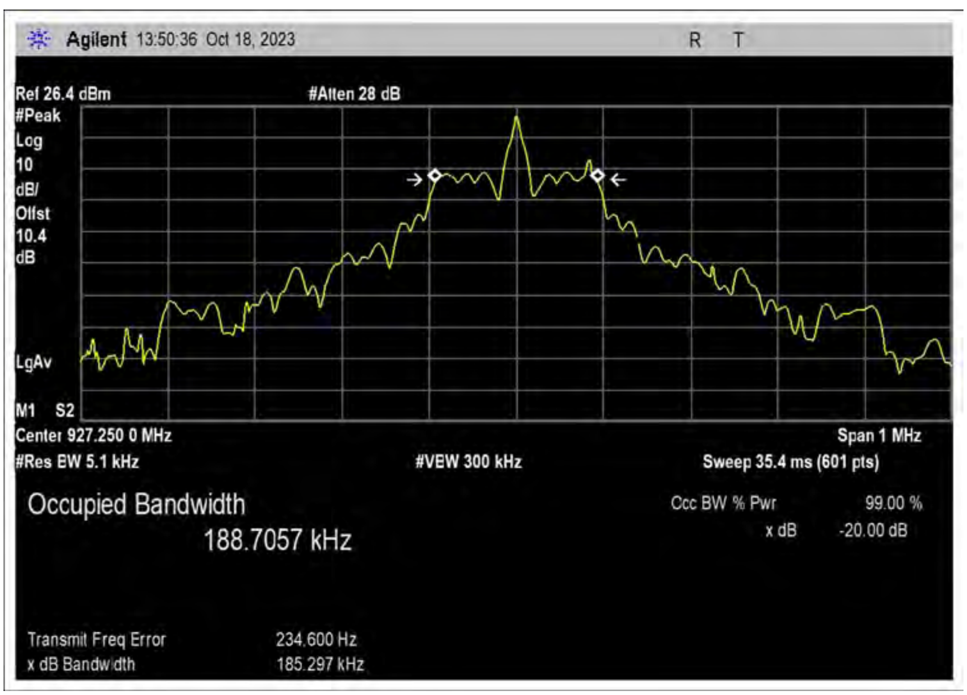
Plot(s)



Low Channel



Middle Channel

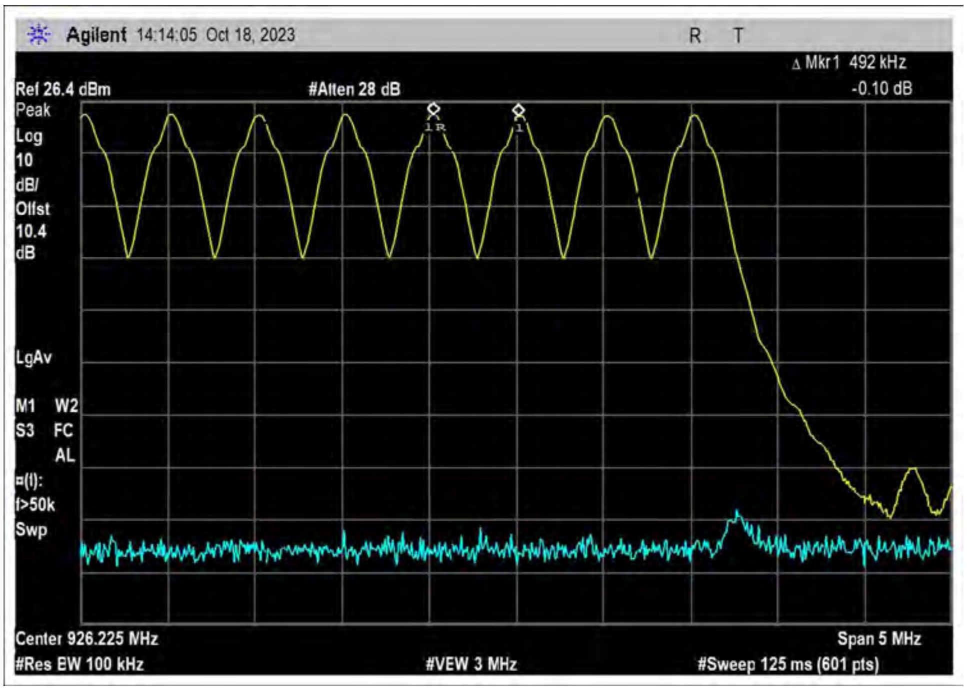


High Channel

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	482	> 185.320	Pass

Plot(s)

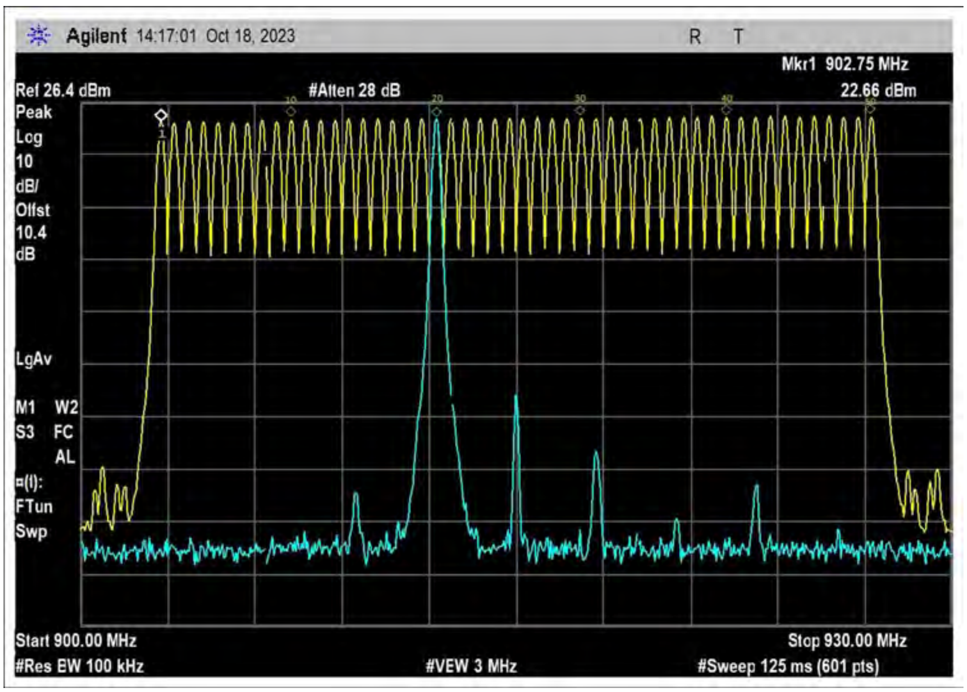


Channel Separation

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

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

Plot(s)



Number of Channel

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

Test Data Summary				
Observation Period, P_{obs} is derived from the following: $P_{Obs} = \begin{cases} 20\ Seconds\ \vert 20\ dB\ BW < 250kHz \\ 10\ Seconds\ \vert 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (ms)**	**Limit (ms/P_{obs})**	**Results**
1	hopping	351.3	≤400	Pass

Measured results are calculated as follows:

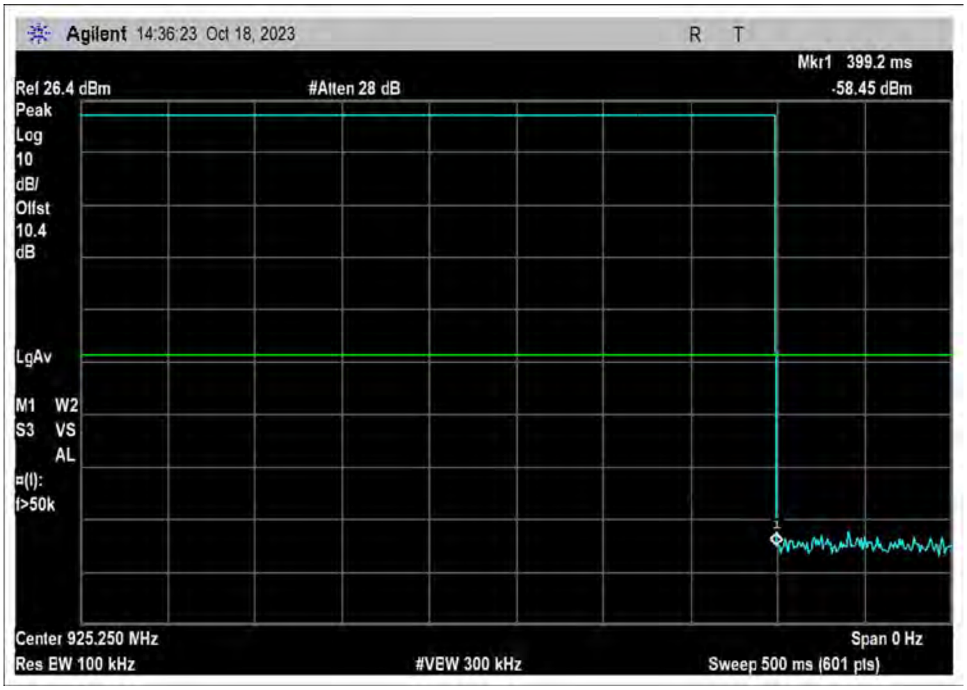
$$Dwell\ time = \left(\sum_{Bursts} RF\ Burst\ On\ Time + \sum_{Control} Control\ Signal\ On\ time \right) \Bigg|_{P_{obs}}$$

Actual Calculated Values:

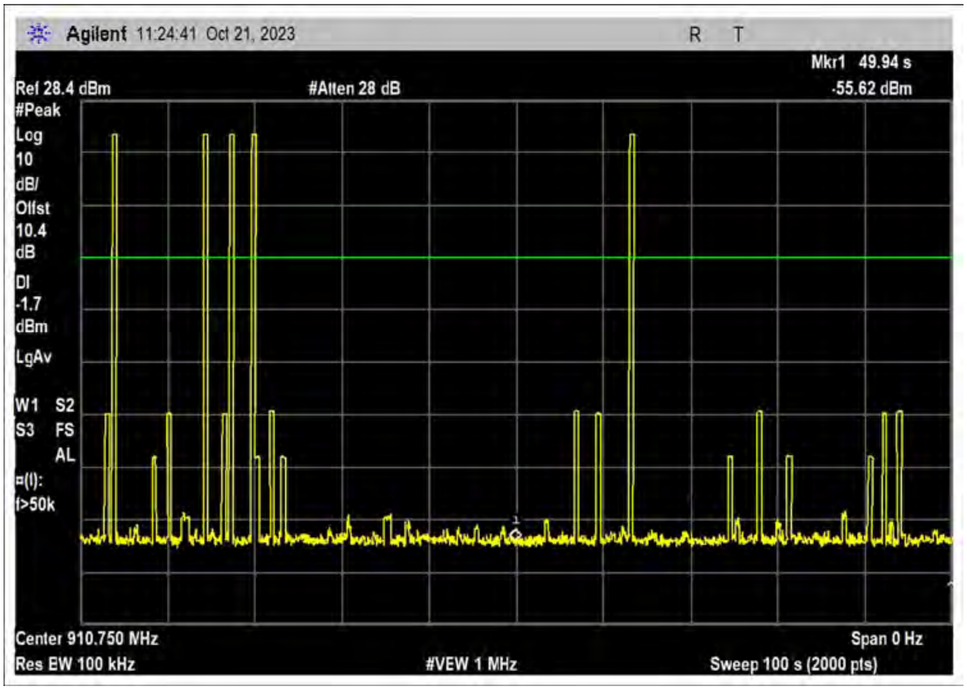
Parameter	**Value**
Observation Period (P_{obs}):	100sec
Number of RF Bursts / $P_{obs:}$:	4.4
On time of RF Burst:	399.2ms
Number of Control or other signals / P_{obs}:	Na
On time of Control or other Signals:	Na
Total Measured On Time:	351.3ms

Average of ten 100 second sweep= 4.4 event
(4.4 event /100) x 20 sec = 0.88 event/ 20 sec
On time per 20 sec = 0.88 event per 20 sec x 399.2ms = 351.3ms

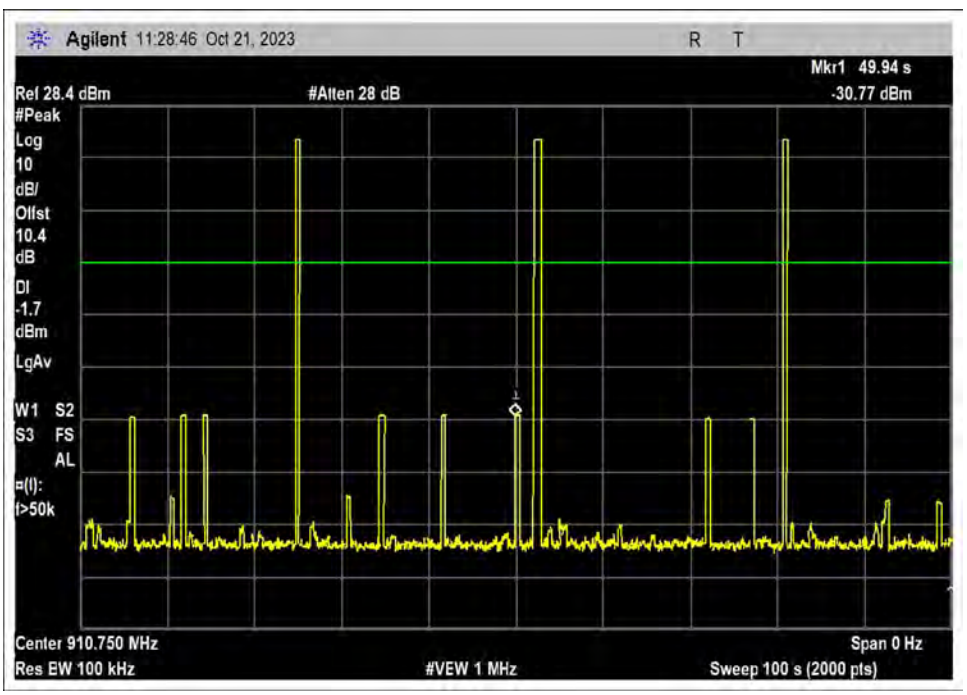
Plot(s)



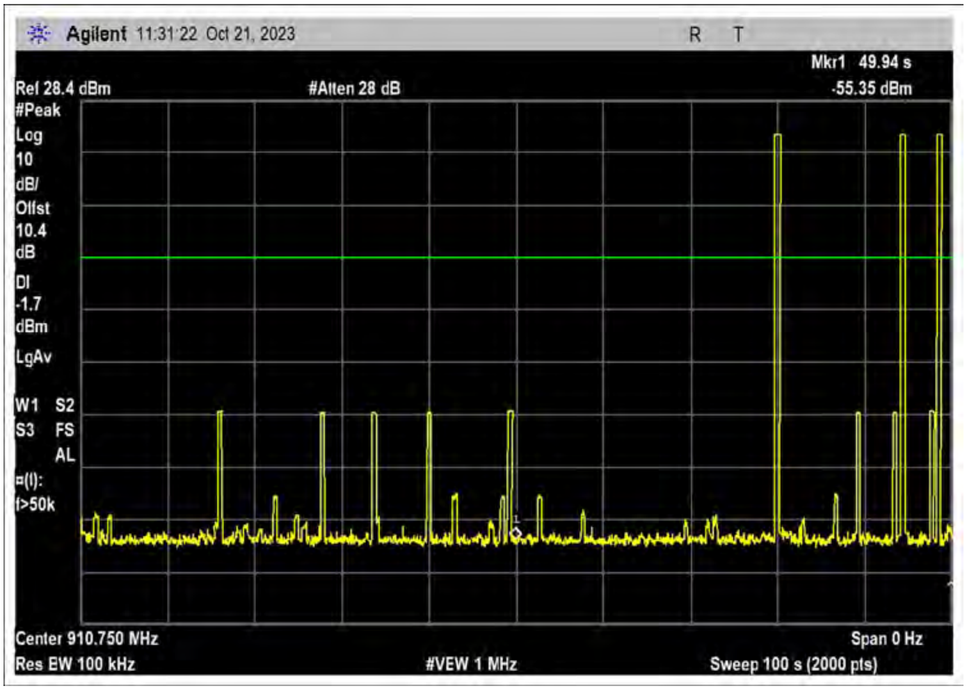
Occupancy Time Per Event



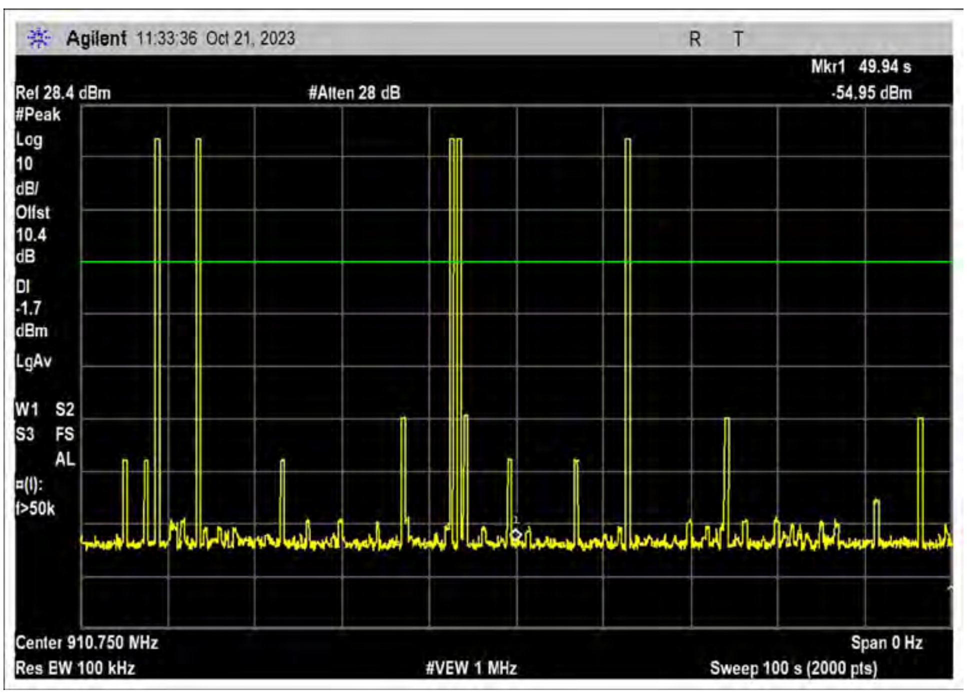
100 Second Sweep 1



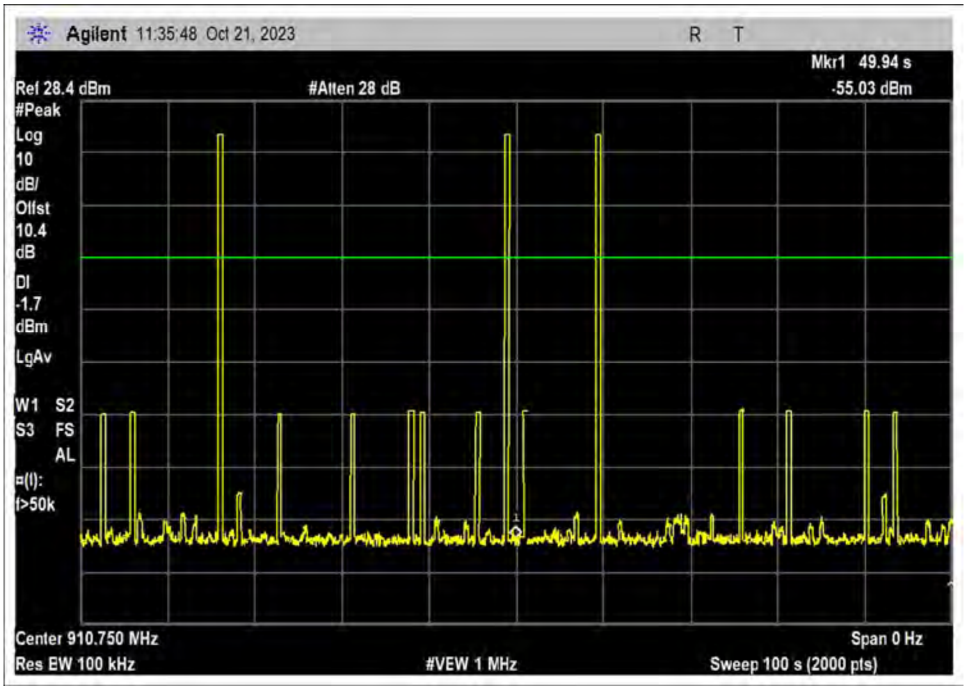
100 Second Sweep 2



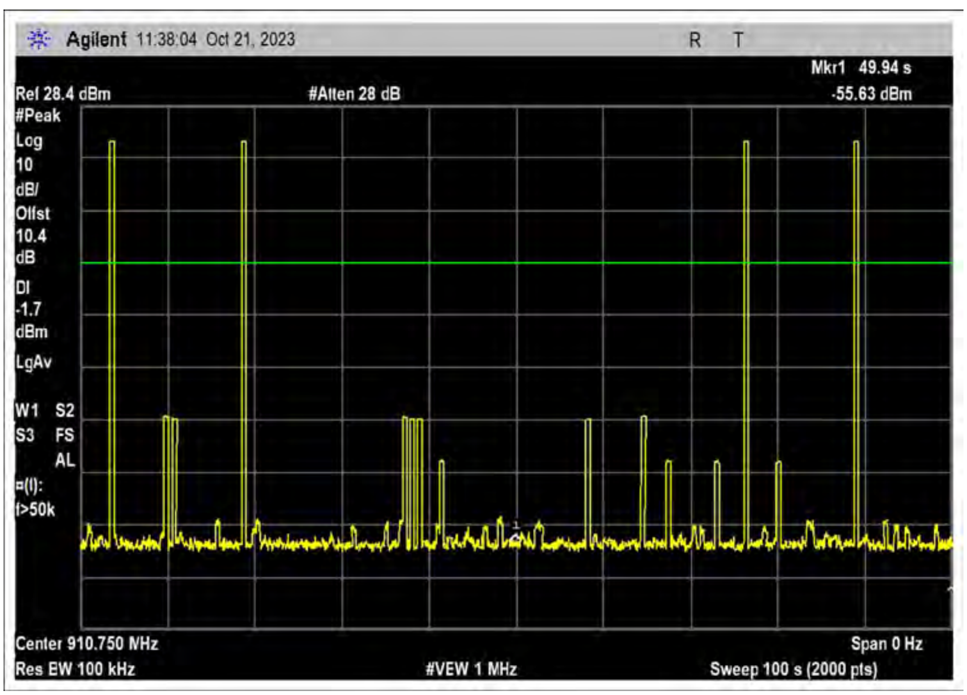
100 Second Sweep 3



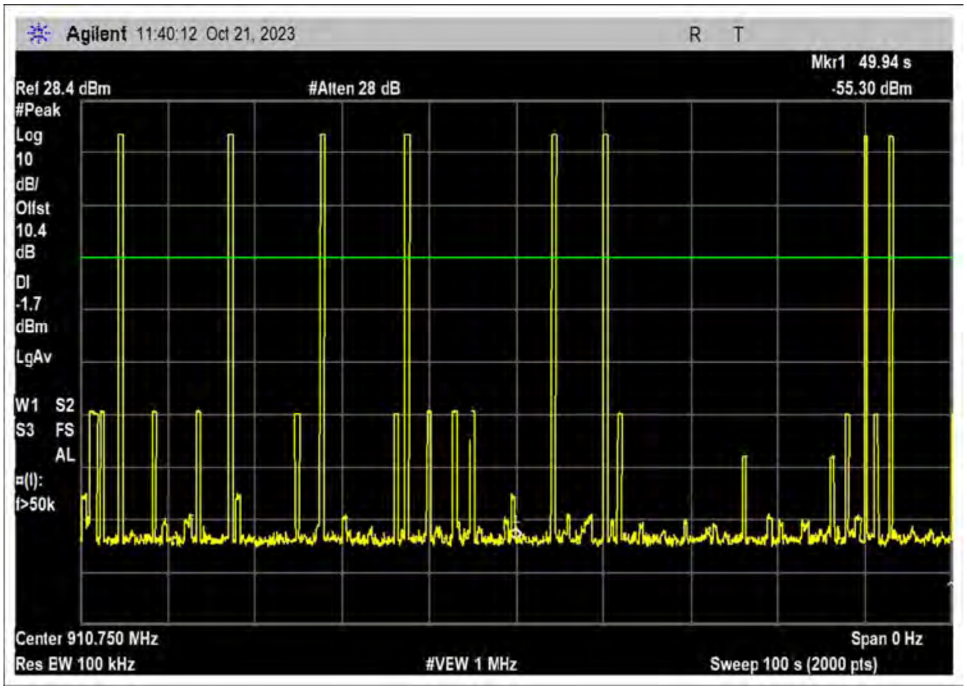
100 Second Sweep 4



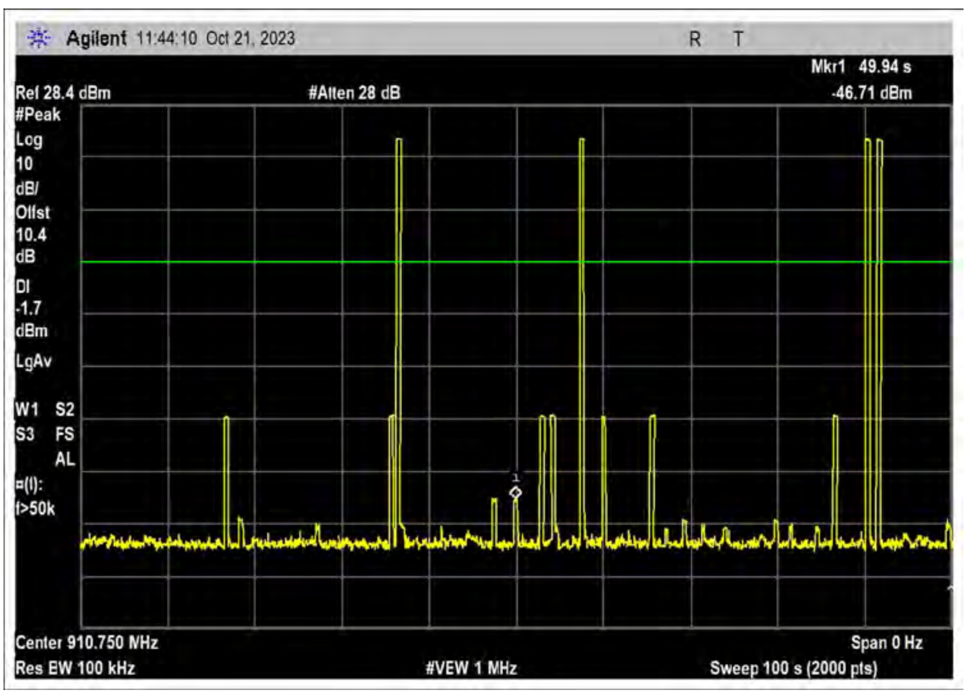
100 Second Sweep 5



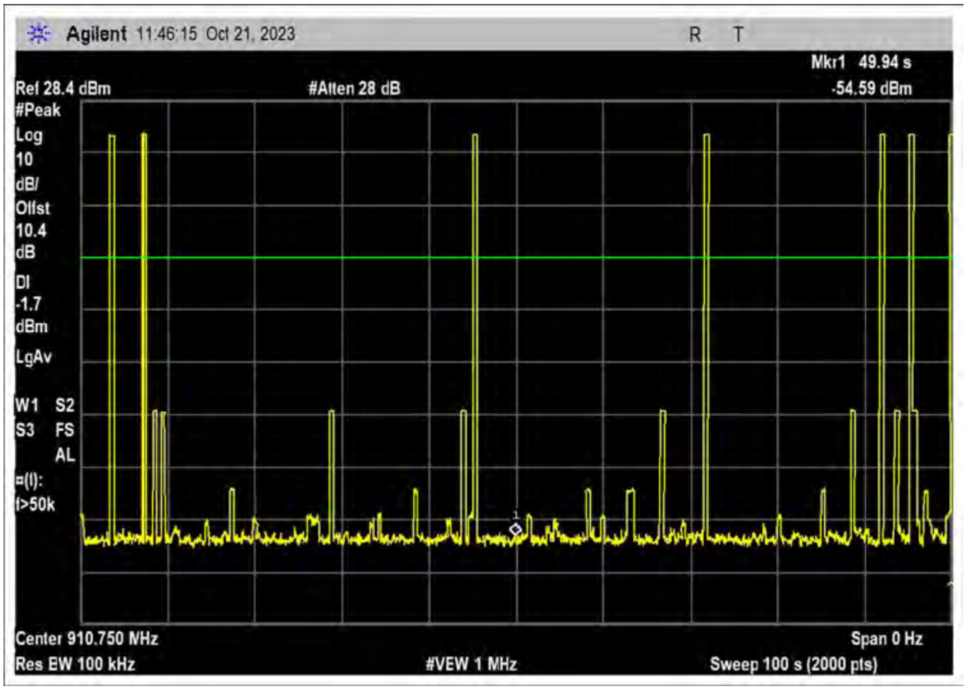
100 Second Sweep 6



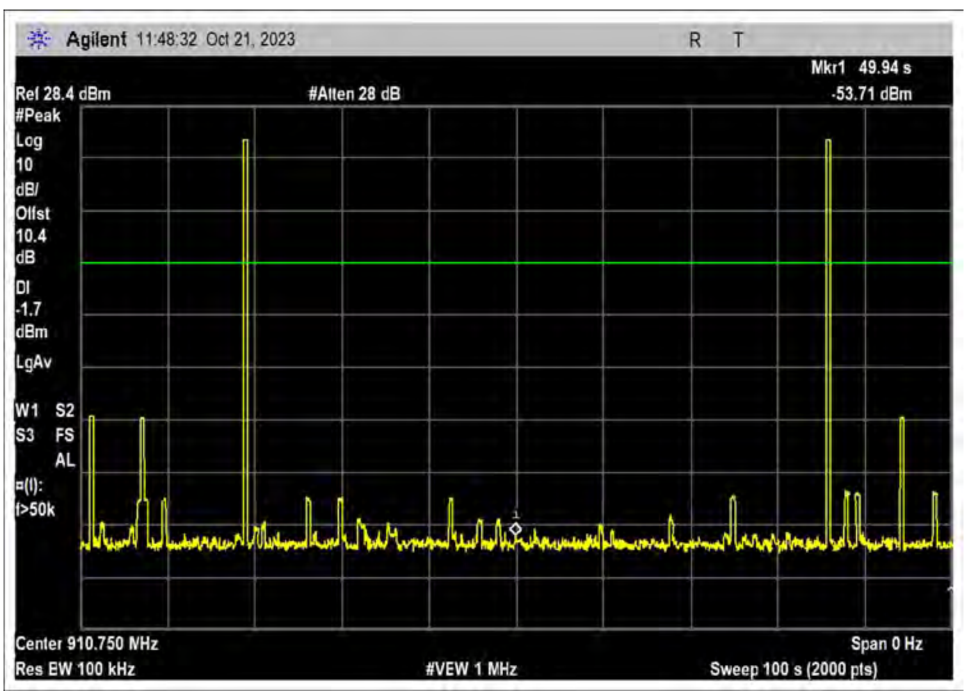
100 Second Sweep 7



100 Second Sweep 8

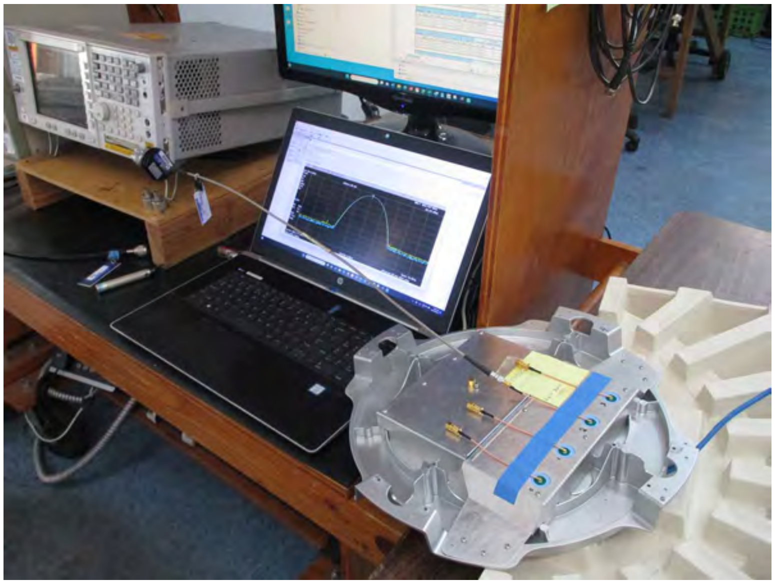


100 Second Sweep 9



100 Second Sweep 10

Test Setup Photo(s)



15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013)	Test Date(s):	10/18/2023
Configuration:	1 & 2		
Test Setup:	The equipment under test (EUT) is set on a test bench. The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT. Frequency Range of EUT: 902.75MHz-927.25MHz TX 902.75MHz, 914.75MHz, 927.25MHz TARI = 6.25us as intended. Both Antenna Pattern and associated power level evaluated.		

Environmental Conditions			
Temperature (ºC)	22.4	Relative Humidity (%):	55

Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	12/13/2022	12/13/2023
03430	Attenuator	Aeroflex/Weinschel	75A-10-12	1/14/2022	1/14/2024
07658	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	6/22/2022	6/22/2024
P07164	Multimeter	Fluke	8845A/G	8/21/2023	8/21/2025
01438	DC Power Supply	Topward	6306D	4/4/2023	4/4/2025

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)
902.75	PR-ASK	22.8	22.8	22.8	0
914.75	PR-ASK	22.8	22.8	22.8	0
927.25	PR-ASK	22.9	22.9	22.9	0

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

Parameter Definitions:

Measurements performed at input voltage Vnominal +15%. – 8%*

Parameter	Value
$V_{Nominal}$:	55.2
$V_{Minimum}$:	48
$V_{Maximum}$:	44**

**Lowest attenable voltage to maintain operation of the EUT.

Test Data Summary - RF Conducted Measurement

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

Lowest Gain, Highest Power

Ant Port	0		1		2		3		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	watt	dBm	dBi	dBm
902.75	22.8	0.1884	22.9	0.1963	22.7	0.1841	22.6	0.1803	0.7491	28.7	7.04	35.8
914.75	22.8	0.1914	22.8	0.1914	22.7	0.1845	22.6	0.1811	0.7485	28.7	7.04	35.8
927.25	22.9	0.1941	22.9	0.1945	22.7	0.1849	22.9	0.1954	0.7690	28.9	7.04	35.9

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured Total EIRP (dBm)	EIRP Limit (dBm)	Results
Lowest antenna gain, highest power setting.					
902.75	PR-ASK	Patch Array	35.8	≤ 36	Pass
914.75	PR-ASK	Patch Array	35.8	≤ 36	Pass
927.25	PR-ASK	Patch Array	35.9	≤ 36	Pass

Highest Gain, Lowest Power

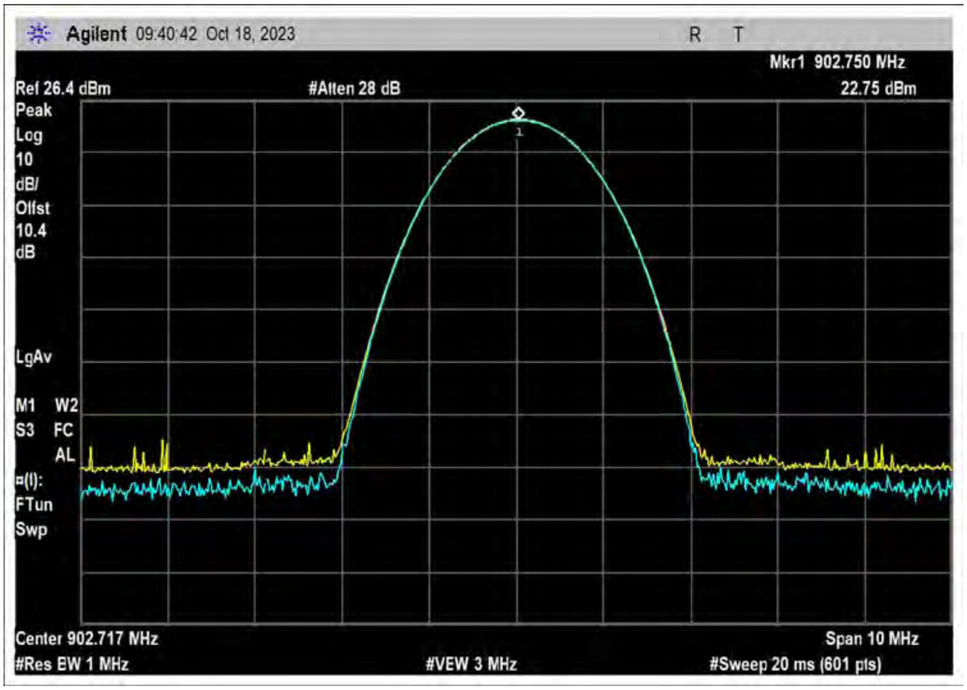
Ant Port	0		1		2		3		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	watt	dBm	dBi	dBm
902.75	21.0	0.1271	21.1	0.1294	20.7	0.1180	20.8	0.1202	0.4947	26.9	8.62	35.6
914.75	21.4	0.1380	21.2	0.1330	21.1	0.1274	21.0	0.1256	0.5240	27.2	8.62	35.8
927.25	21.4	0.1374	21.4	0.1365	21.0	0.1253	21.2	0.1318	0.5310	27.3	8.62	35.9

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured Total EIRP (dBm)	EIRP Limit (dBm)	Results
Lowest antenna gain, highest power setting.					
902.75	PR-ASK	Patch Array	35.6	≤ 36	Pass
914.75	PR-ASK	Patch Array	35.8	≤ 36	Pass
927.25	PR-ASK	Patch Array	35.9	≤ 36	Pass

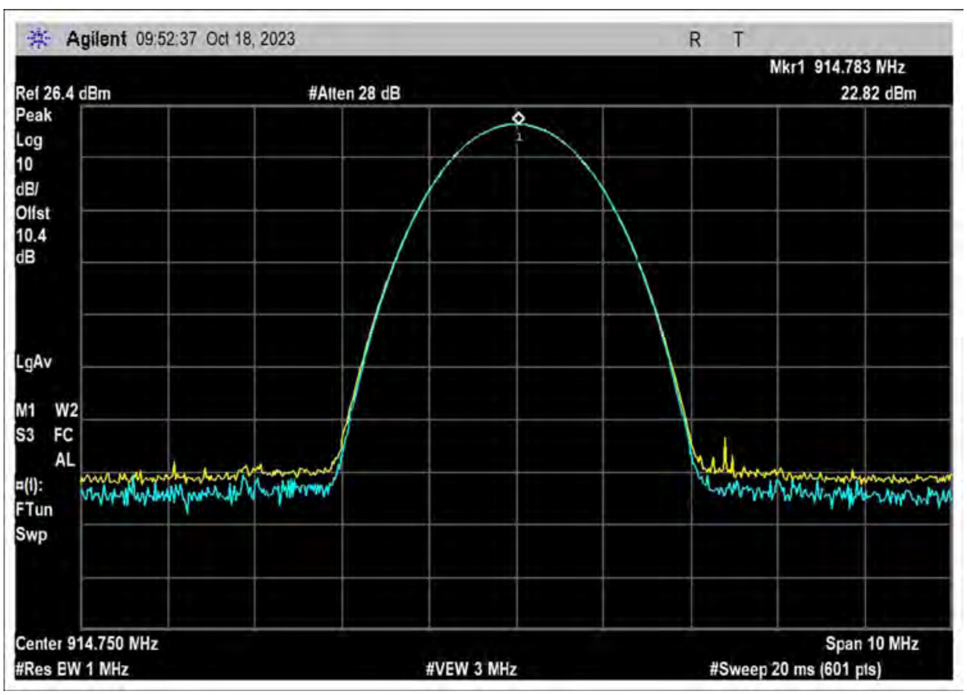
Plots

Lowest Gain, Highest Power

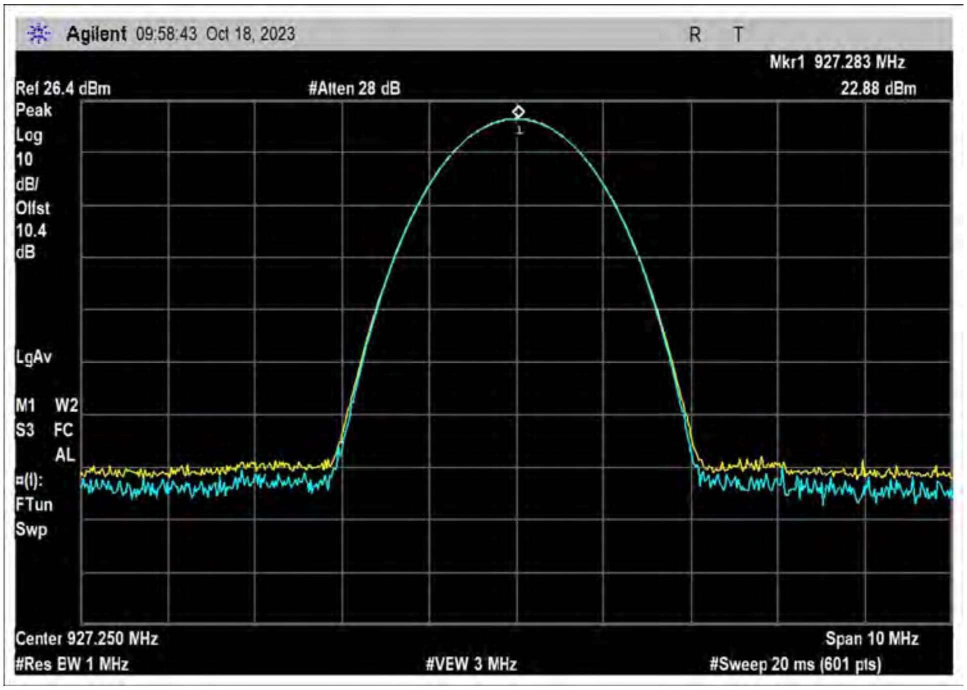
Antenna 0



Low Channel

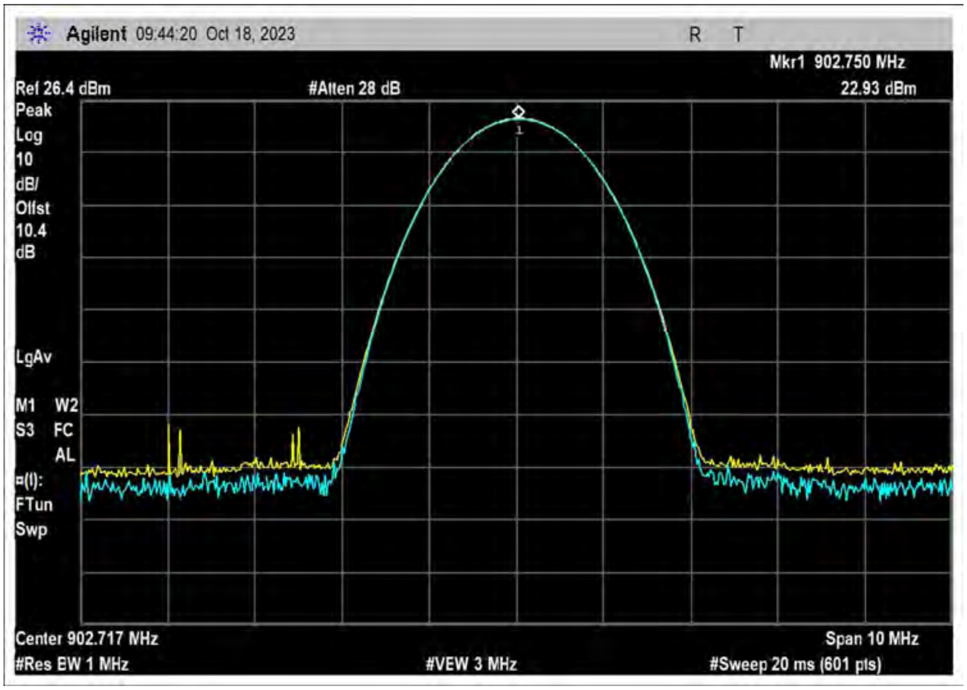


Middle Channel

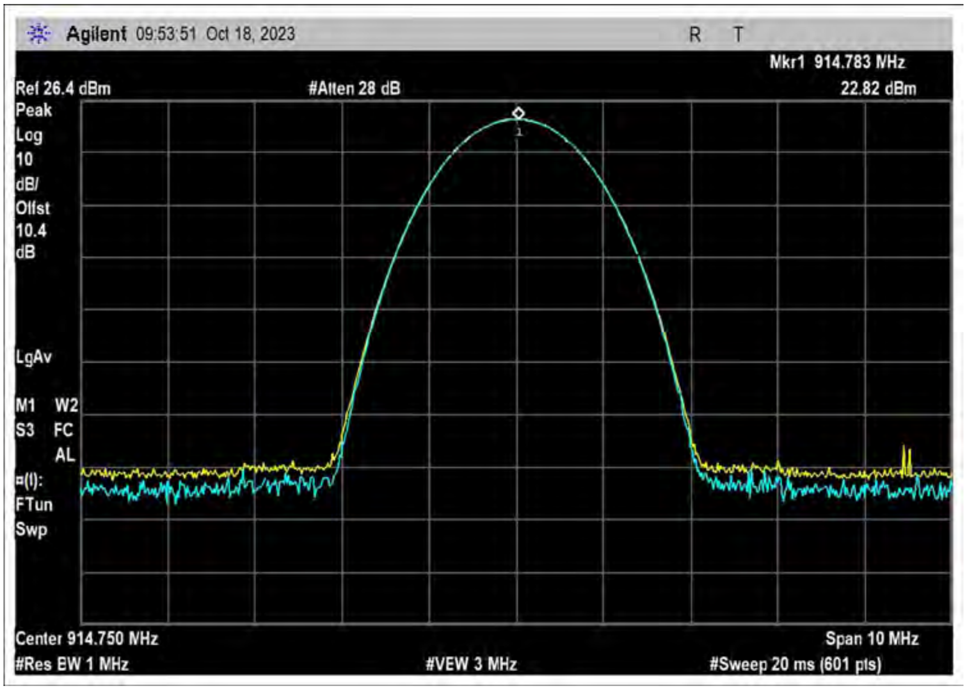


High Channel

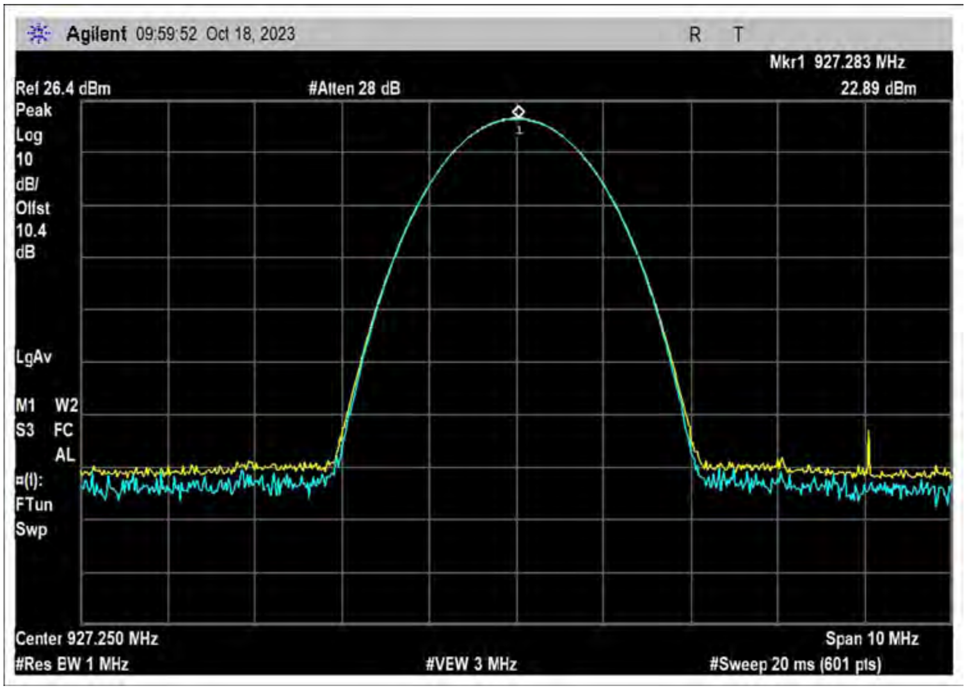
Antenna 1



Low Channel

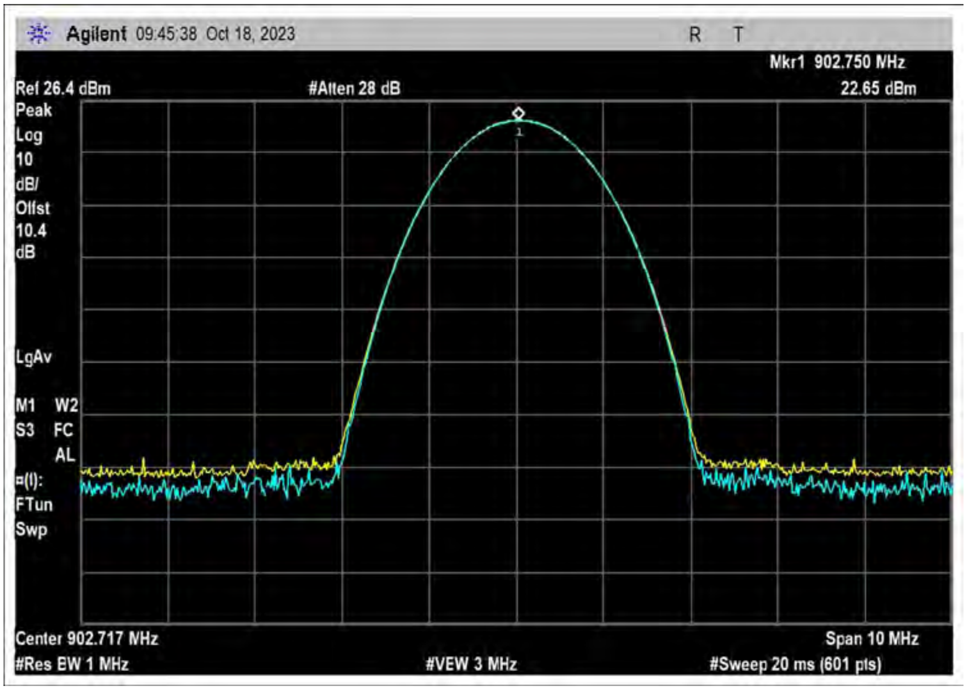


Middle Channel

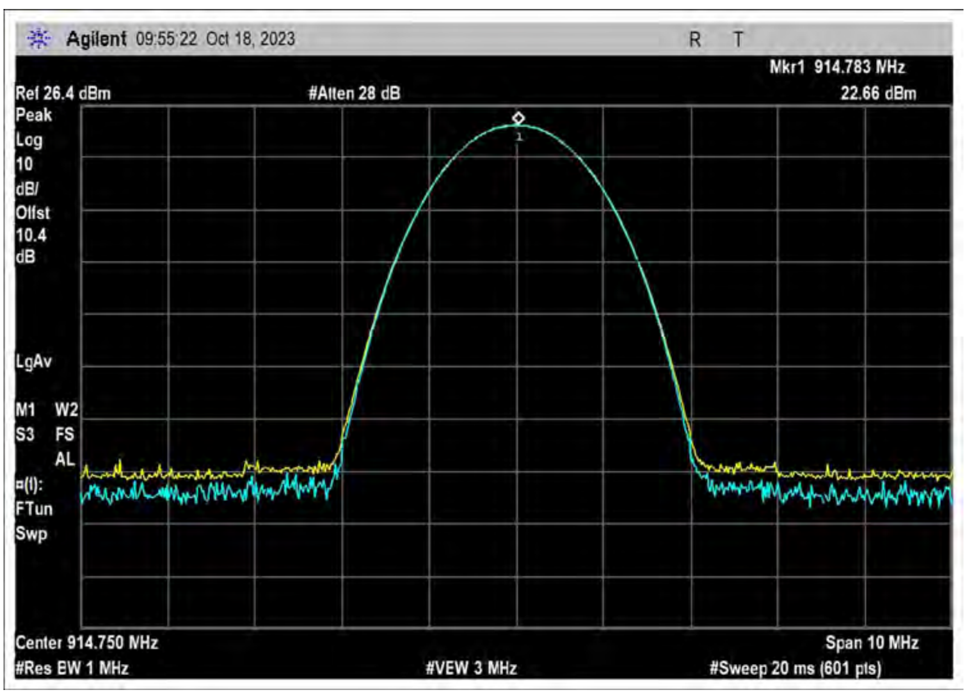


High Channel

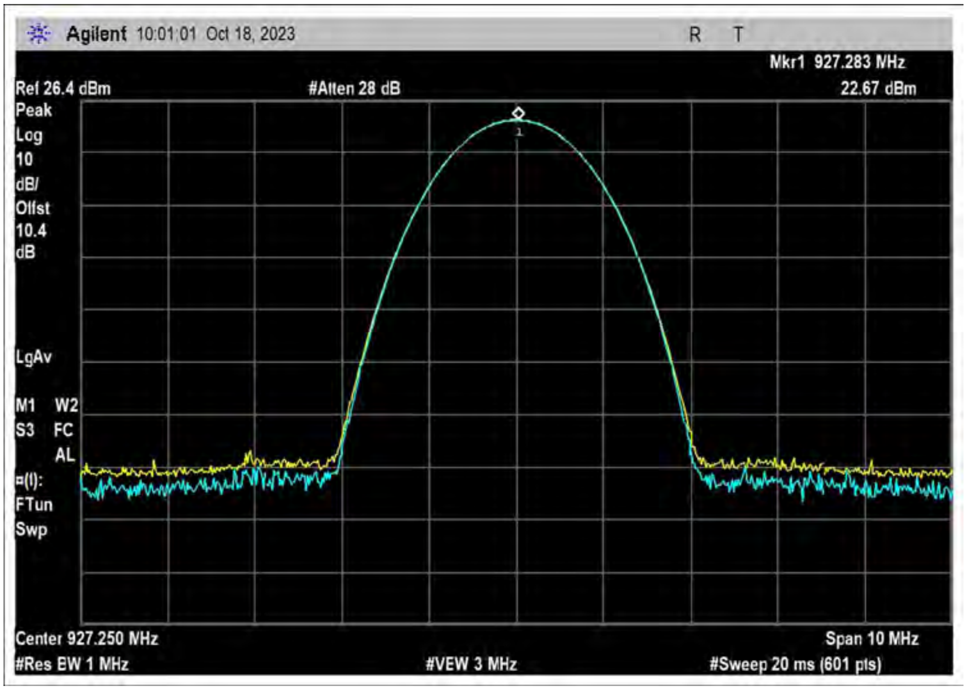
Antenna 2



Low Channel

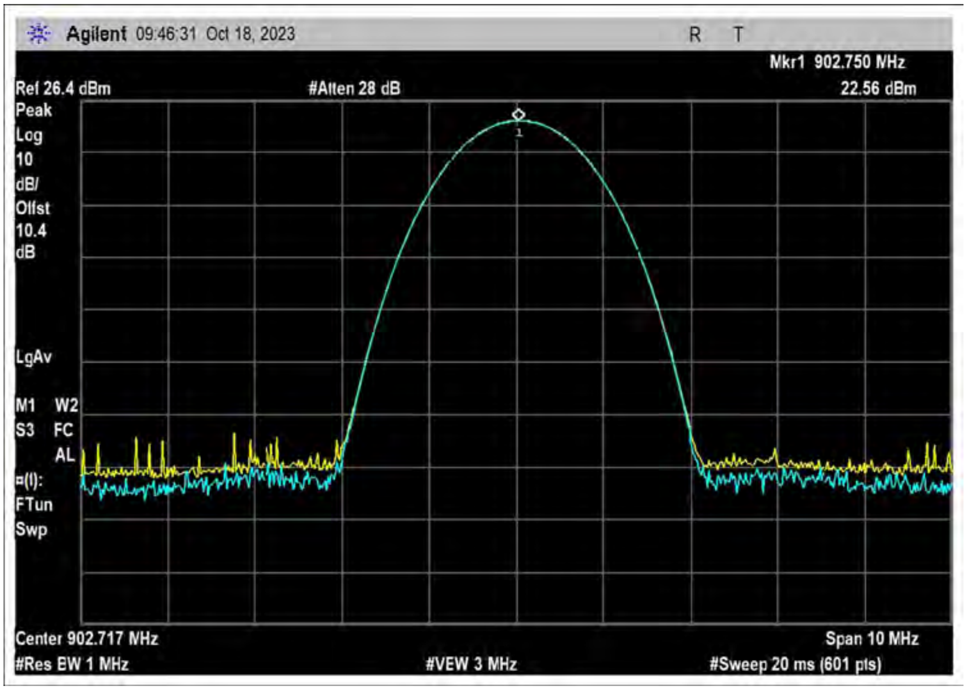


Middle Channel

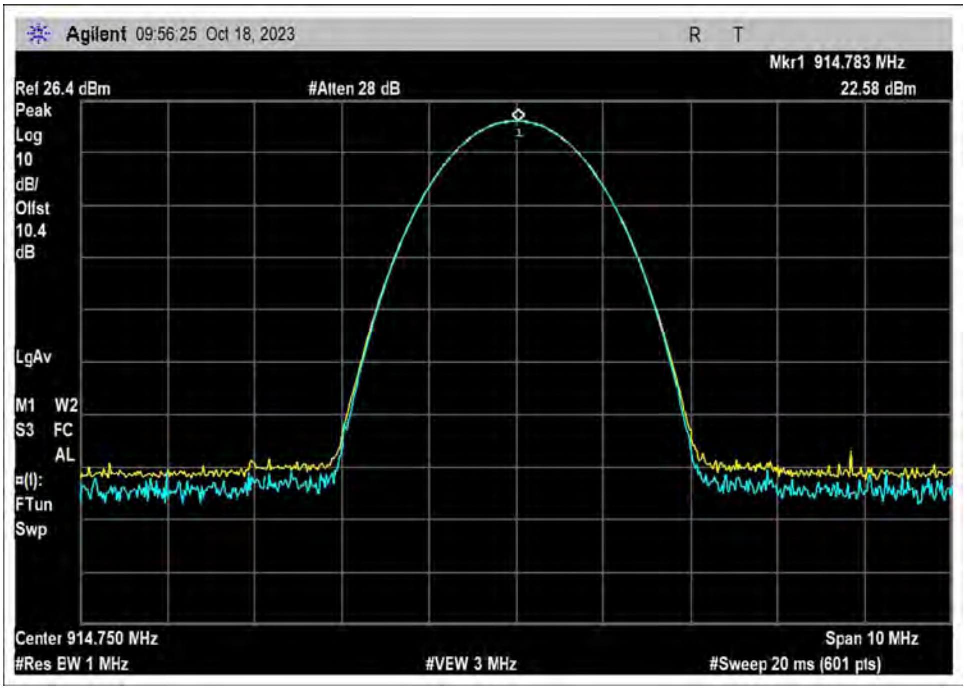


High Channel

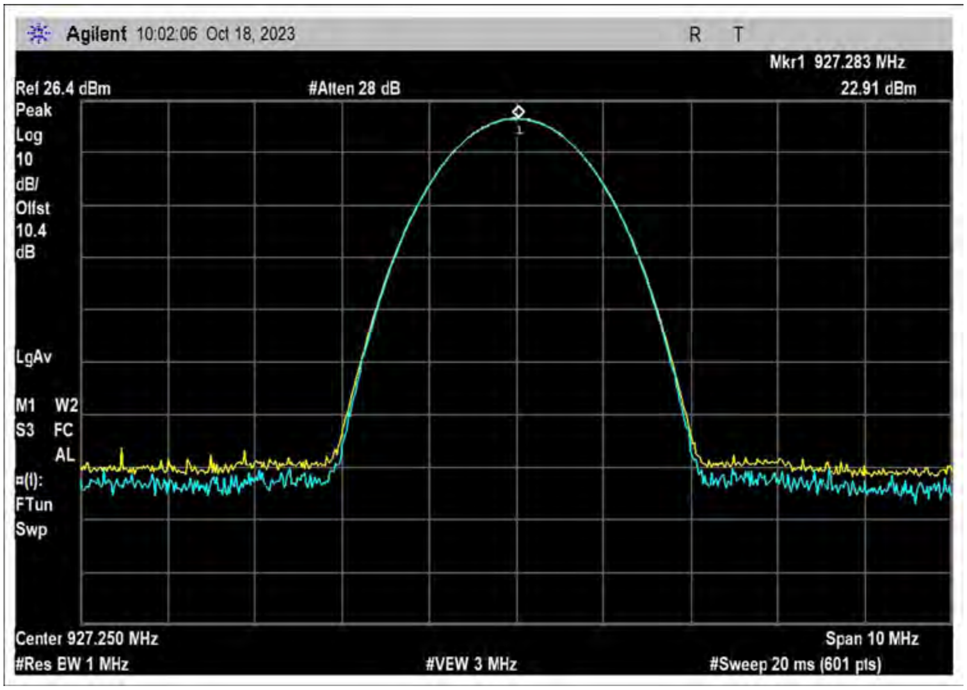
Antenna 3



Low Channel



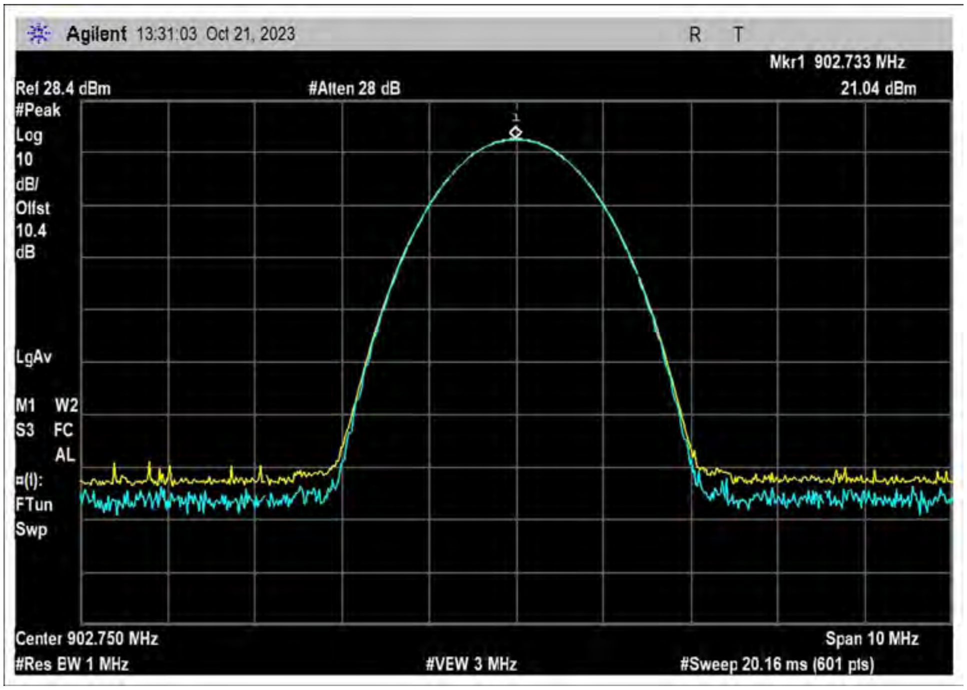
Middle Channel



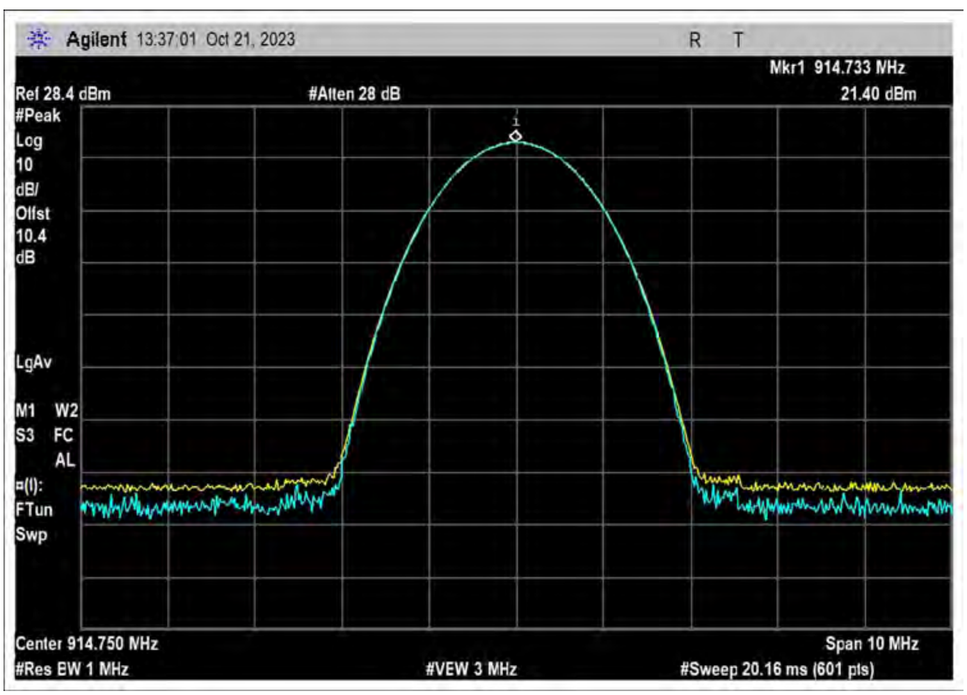
High Channel

Highest Gain, Lowest Power

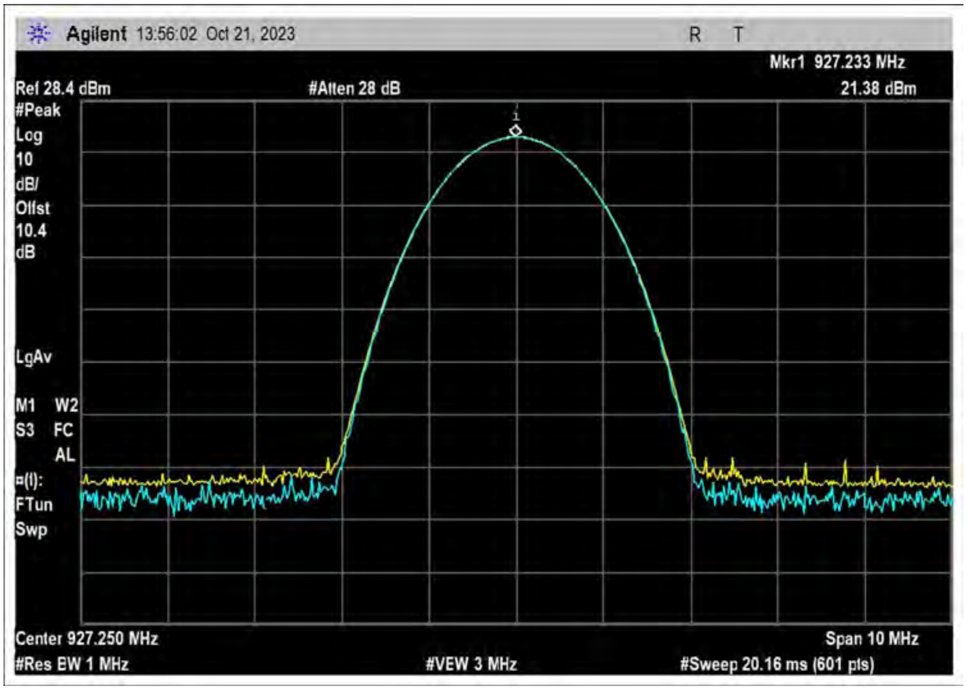
Antenna 0



Low Channel

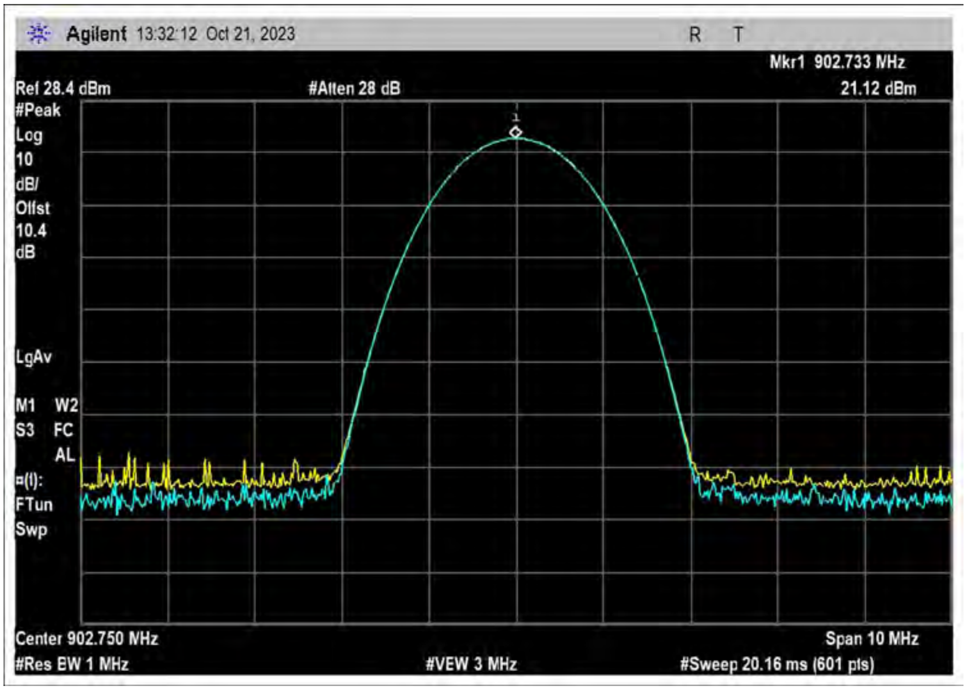


Middle Channel

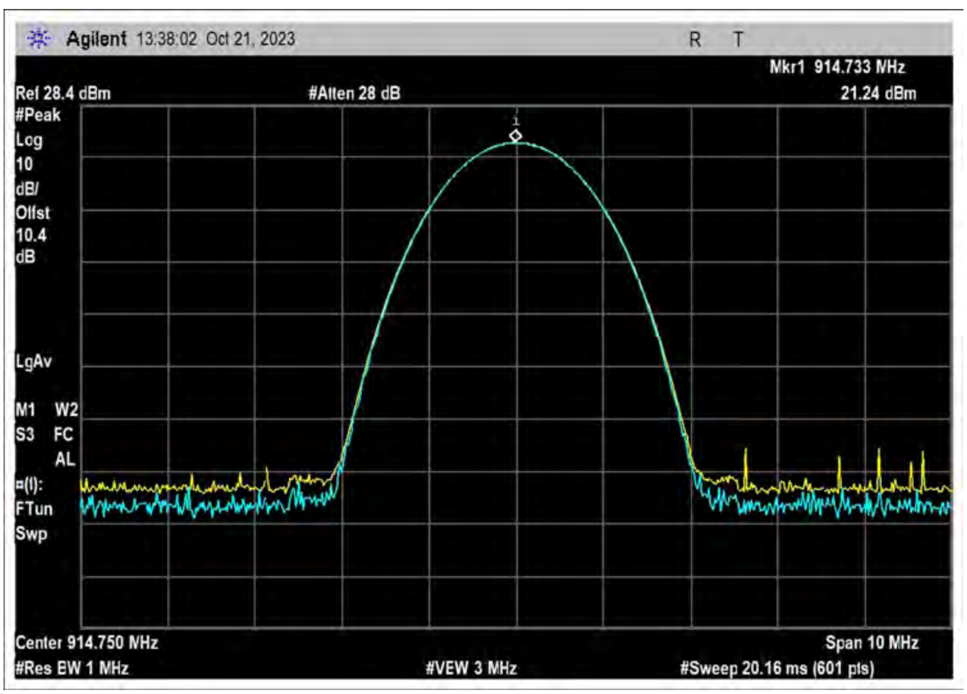


High Channel

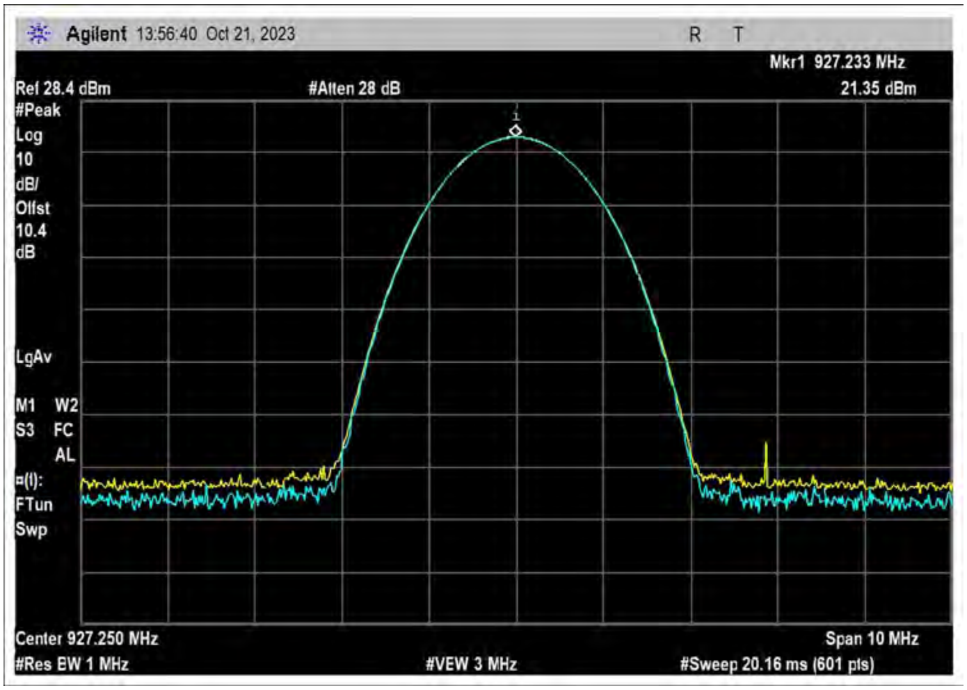
Antenna 1



Low Channel

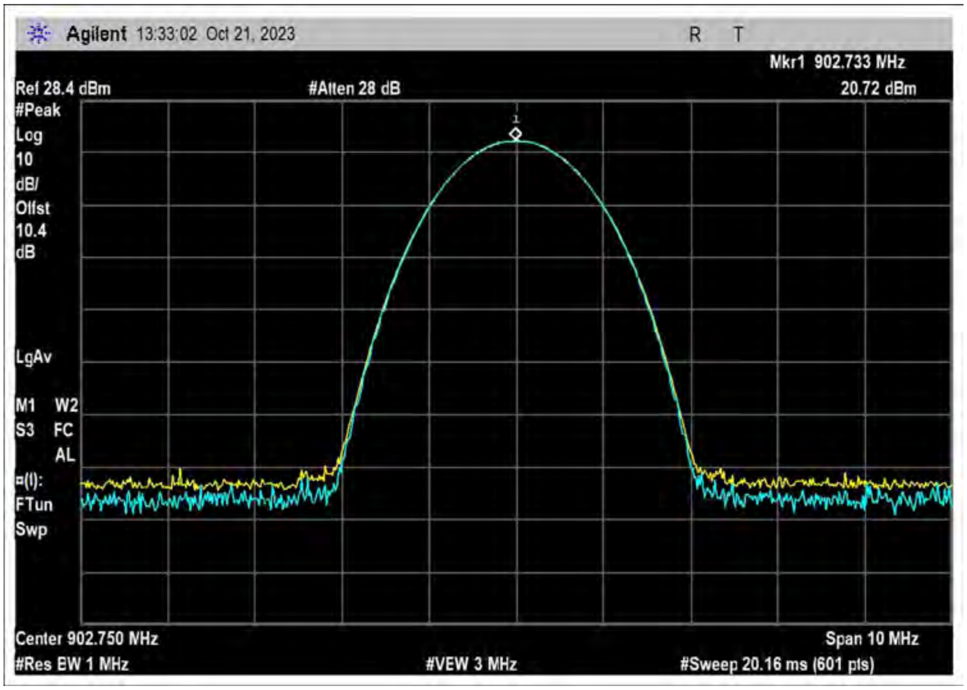


Middle Channel

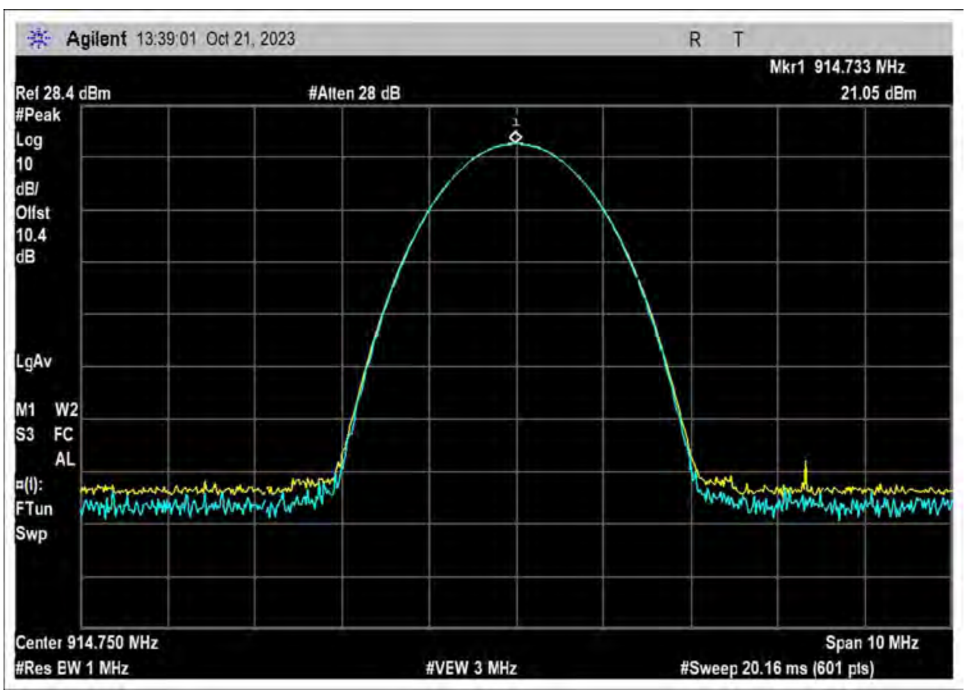


High Channel

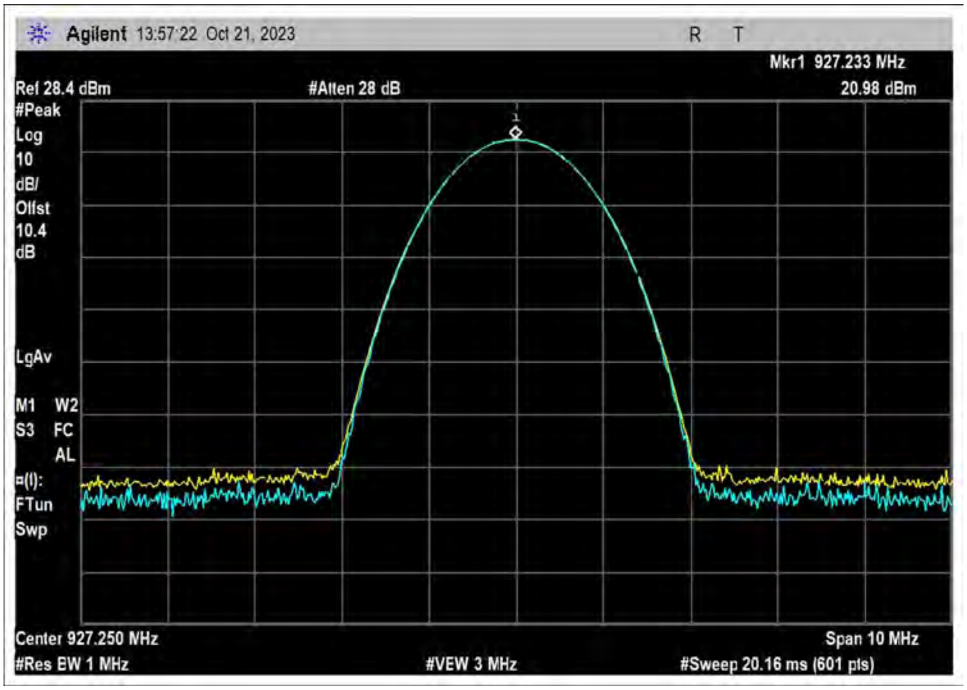
Antenna 2



Low Channel

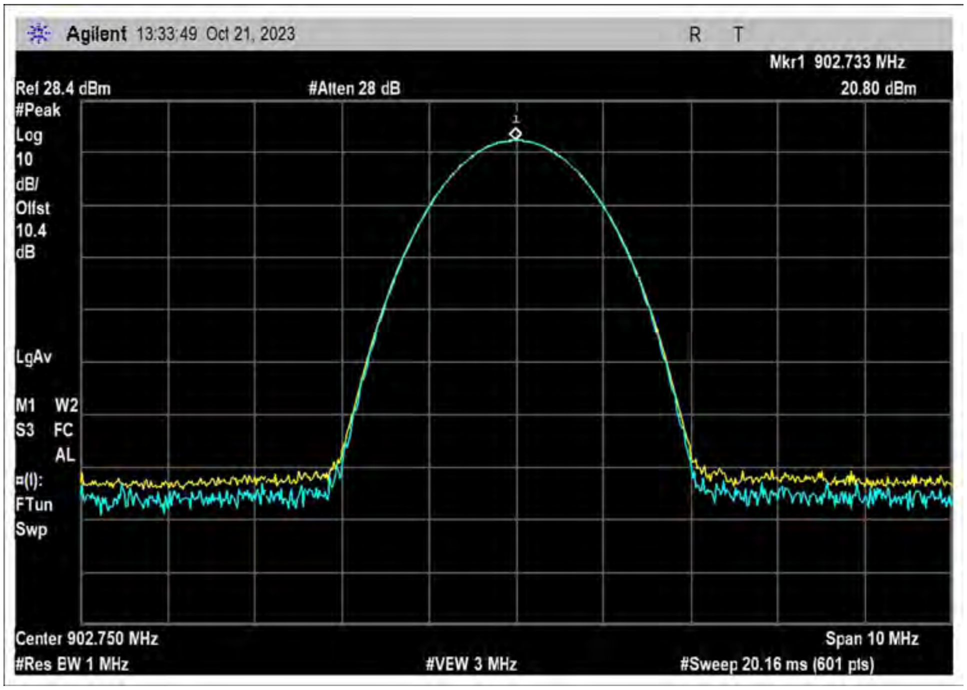


Middle Channel

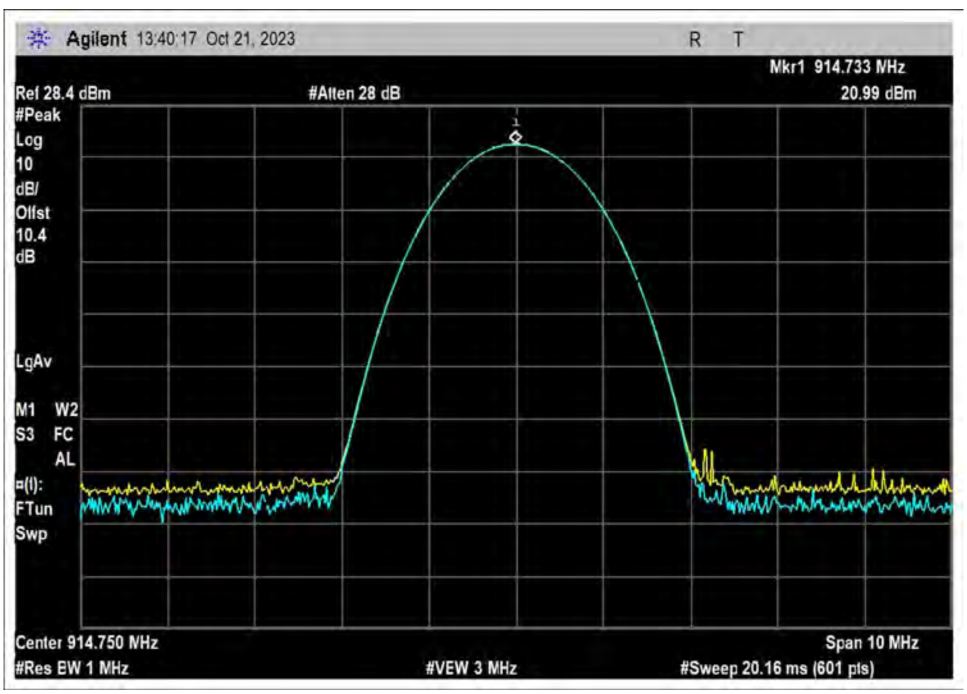


High Channel

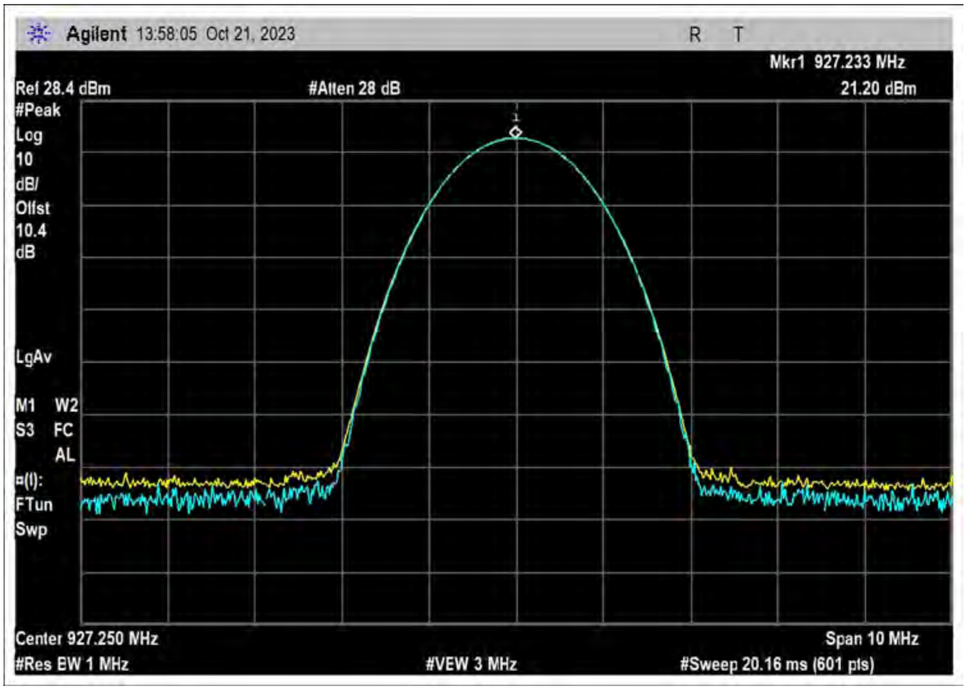
Antenna 3



Low Channel

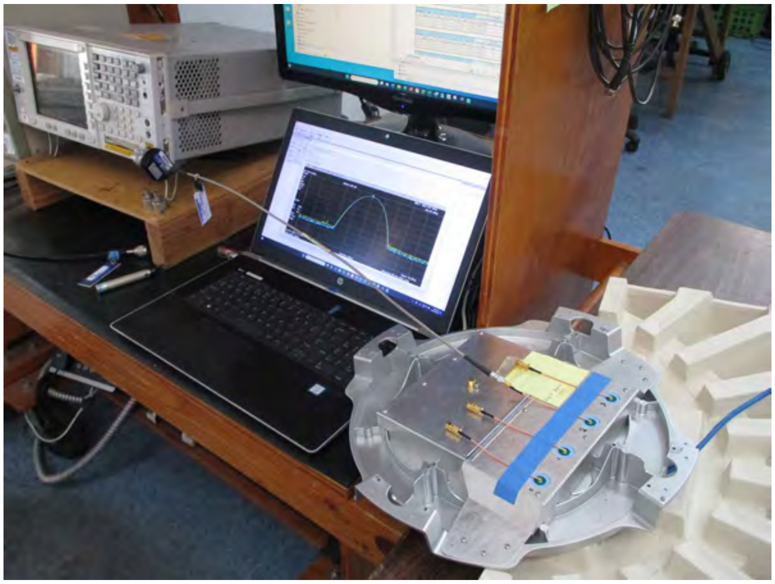


Middle Channel

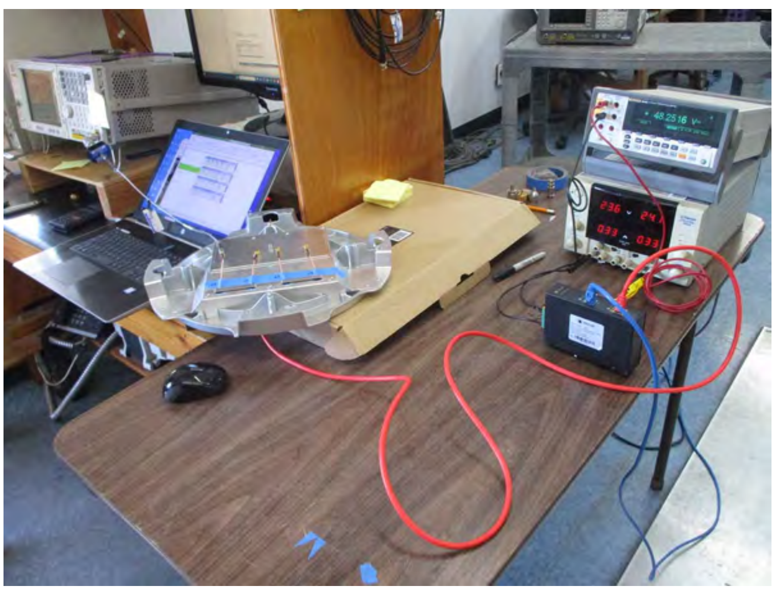


High Channel

Test Setup Photo(s)



View 1



View 2

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**108850**	Date:	10/18/2023
Test Type:	**Conducted Emissions**	Time:	16:05:37
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.20		48VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is set on a test bench.

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX 902.75MHz, 914.75MHz, 927.25MHz

LO Frequency: 915MHz

TARI = 6.25us as intended.

Firmware version: 0.85.12

Worst case Antenna Pattern and associated power level evaluated.
Lowest gain

Frequency Range of Measurement: 9kHz-10GHz
9kHz-10 000 MHz;RBW=100kHz,VBW=300 kHz.

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 22.5°C
Relative Humidity: 55%
Pressure: 99.8kPa

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T2	AN03430	Attenuator	75A-10-12	1/14/2022	1/14/2024
T3	ANP07658	Cable	32022-29094K-29094K-24TC	6/22/2022	6/22/2024

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	951.670M	58.9	+0.0	+10.1	+0.2		+0.0	69.2	110.0	-40.8	Anten Ant2_H
2	902.670M	75.2	+0.0	+10.1	+0.3		+0.0	85.6	130.0	-44.4	Anten Ant2_H
3	1805.800M	53.7	+0.0	+10.1	+0.4		+0.0	64.2	110.0	-45.8	Anten Ant0_L
4	1829.400M	51.6	+0.0	+10.1	+0.4		+0.0	62.1	110.0	-47.9	Anten Ant0_M
5	951.670M	51.5	+0.0	+10.1	+0.2		+0.0	61.8	110.0	-48.2	Anten Ant3_H
6	1854.300M	51.2	+0.0	+10.1	+0.4		+0.0	61.7	110.0	-48.3	Anten Ant0_H
7	939.500M	51.2	+0.0	+10.1	+0.3		+0.0	61.6	110.0	-48.4	Anten Ant0_H
8	1805.700M	50.6	+0.0	+10.1	+0.4		+0.0	61.1	110.0	-48.9	Anten Ant1_L
9	1805.500M	50.1	+0.0	+10.1	+0.4		+0.0	60.6	110.0	-49.4	Anten Ant2_L
10	1829.400M	49.8	+0.0	+10.1	+0.4		+0.0	60.3	110.0	-49.7	Anten Ant1_M
11	939.500M	49.9	+0.0	+10.1	+0.3		+0.0	60.3	110.0	-49.7	Anten Ant2_H
12	1854.300M	49.4	+0.0	+10.1	+0.4		+0.0	59.9	110.0	-50.1	Anten Ant1_H
13	939.500M	49.2	+0.0	+10.1	+0.3		+0.0	59.6	110.0	-50.4	Anten Ant1_H
14	1829.500M	48.9	+0.0	+10.1	+0.4		+0.0	59.4	110.0	-50.6	Anten Ant2_M
15	1829.700M	48.6	+0.0	+10.1	+0.4		+0.0	59.1	110.0	-50.9	Anten Ant3_M
16	1805.400M	48.5	+0.0	+10.1	+0.4		+0.0	59.0	110.0	-51.0	Anten Ant3_L
17	1854.200M	47.9	+0.0	+10.1	+0.4		+0.0	58.4	110.0	-51.6	Anten Ant3_H
18	1854.500M	47.8	+0.0	+10.1	+0.4		+0.0	58.3	110.0	-51.7	Anten Ant2_H
19	902.670M	67.3	+0.0	+10.1	+0.3		+0.0	77.7	130.0	-52.3	Anten Ant3_H
20	915.000M	67.0	+0.0	+10.1	+0.3		+0.0	77.4	130.0	-52.6	Anten Ant2_H
21	915.080M	66.2	+0.0	+10.1	+0.3		+0.0	76.6	130.0	-53.4	Anten Ant1_H
22	927.250M	66.1	+0.0	+10.1	+0.3		+0.0	76.5	130.0	-53.5	Anten Ant3_L
23	915.000M	65.7	+0.0	+10.1	+0.3		+0.0	76.1	130.0	-53.9	Anten Ant2_L
24	915.000M	65.5	+0.0	+10.1	+0.3		+0.0	75.9	130.0	-54.1	Anten Ant1_L

25	915.000M	64.3	+0.0	+10.1	+0.3		+0.0	74.7	130.0 Ant0_H	-55.3	Anten
26	915.000M	64.2	+0.0	+10.1	+0.3		+0.0	74.6	130.0 Ant3_H	-55.4	Anten
27	915.000M	63.0	+0.0	+10.1	+0.3		+0.0	73.4	130.0 Ant3_L	-56.6	Anten
28	927.250M	60.7	+0.0	+10.1	+0.3		+0.0	71.1	130.0 Ant2_L	-58.9	Anten
29	915.000M	59.7	+0.0	+10.1	+0.3		+0.0	70.1	130.0 Ant0_L	-59.9	Anten
30	927.300M	58.7	+0.0	+10.1	+0.3		+0.0	69.1	130.0 Ant0_L	-60.9	Anten
31	911.750M	57.4	+0.0	+10.1	+0.3		+0.0	67.8	130.0 Ant3_L	-62.2	Anten
32	911.750M	56.2	+0.0	+10.1	+0.3		+0.0	66.6	130.0 Ant2_L	-63.4	Anten
33	918.170M	56.0	+0.0	+10.1	+0.3		+0.0	66.4	130.0 Ant2_H	-63.6	Anten
34	918.250M	55.9	+0.0	+10.1	+0.3		+0.0	66.3	130.0 Ant1_H	-63.7	Anten
35	911.830M	55.6	+0.0	+10.1	+0.3		+0.0	66.0	130.0 Ant1_L	-64.0	Anten
36	902.670M	53.1	+0.0	+10.1	+0.3		+0.0	63.5	130.0 Ant0_H	-66.5	Anten
37	927.170M	52.6	+0.0	+10.1	+0.3		+0.0	63.0	130.0 Ant1_L	-67.0	Anten
38	912.000M	51.1	+0.0	+10.1	+0.3		+0.0	61.5	130.0 Ant0_L	-68.5	Anten

Band Edge

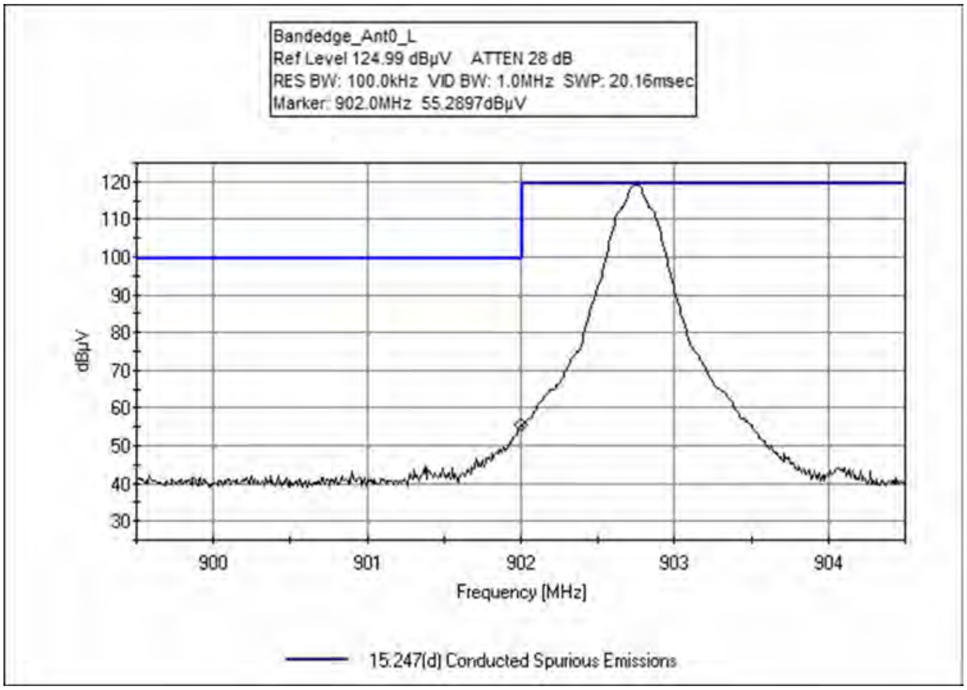
Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB. Operating Mode: Single Channel (Low and High)				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	PR-ASK Ant0	-41.5	<3	Pass
928	PR-ASK Ant0	-41.8	< 3	Pass
902	PR-ASK Ant1	-42.4	< 3	Pass
928	PR-ASK Ant1	-42.8	< 3	Pass
902	PR-ASK Ant2	-42.4	< 3	Pass
928	PR-ASK Ant2	-43.1	< 3	Pass
902	PR-ASK Ant3	-43.3	< 3	Pass
928	PR-ASK Ant3	-43.4	< 3	Pass

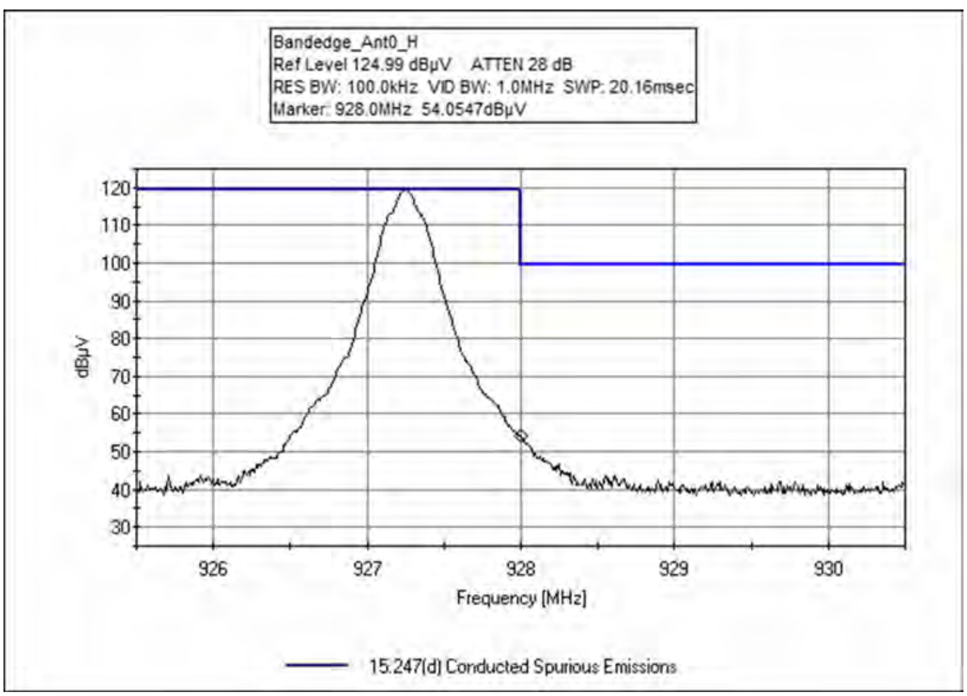
Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB. Operating Mode: Hopping				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	PR-ASK Ant0	-47.2	<3	Pass
928	PR-ASK Ant0	-46.0	< 3	Pass
902	PR-ASK Ant1	-46.2	< 3	Pass
928	PR-ASK Ant1	-53.3	< 3	Pass
902	PR-ASK Ant2	-45.8	< 3	Pass
928	PR-ASK Ant2	-45.9	< 3	Pass
902	PR-ASK Ant3	-48.1	< 3	Pass
928	PR-ASK Ant3	-46.8	< 3	Pass

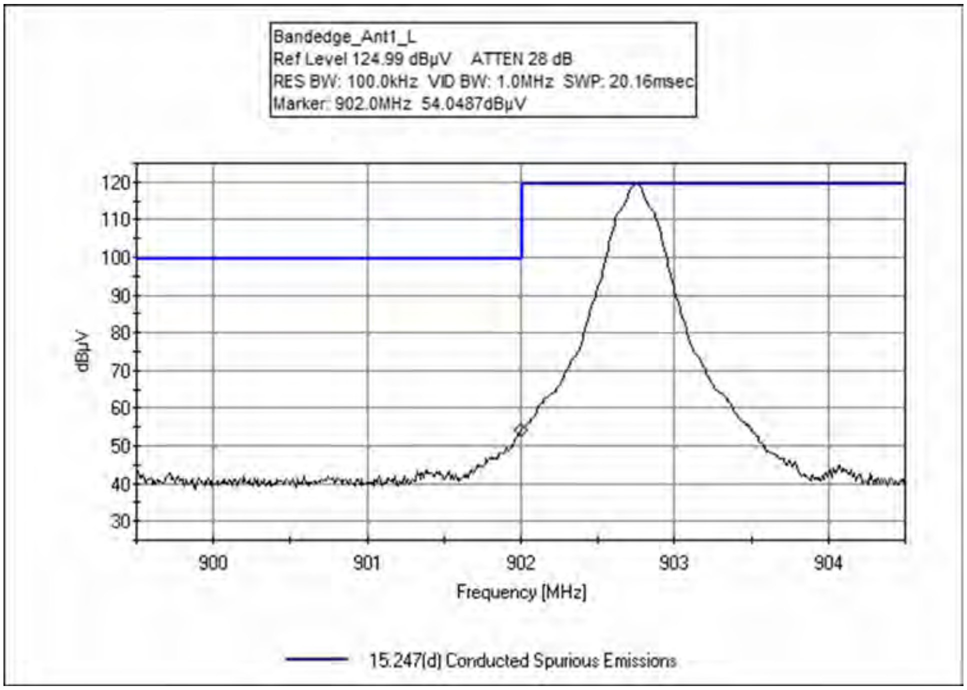
Note: dBm = dBµV- 107

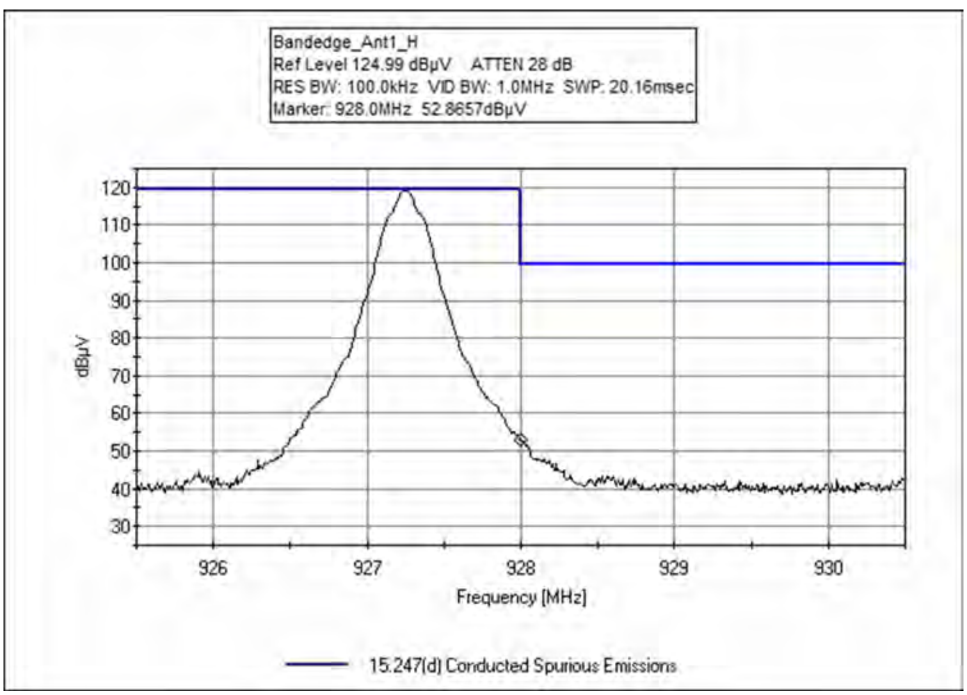
Band Edge Plots

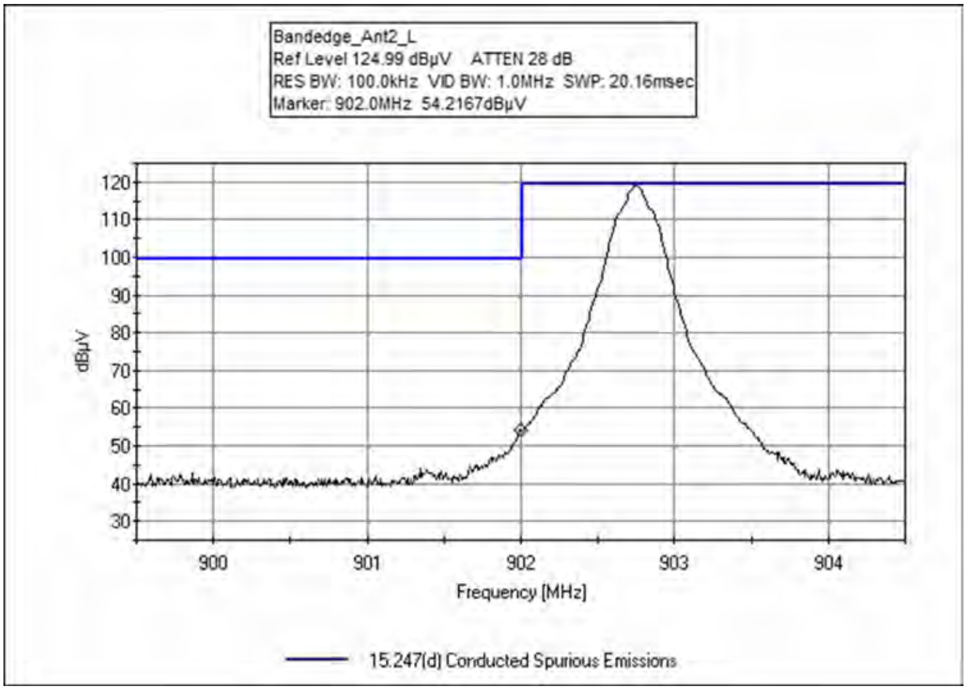
Single Channel

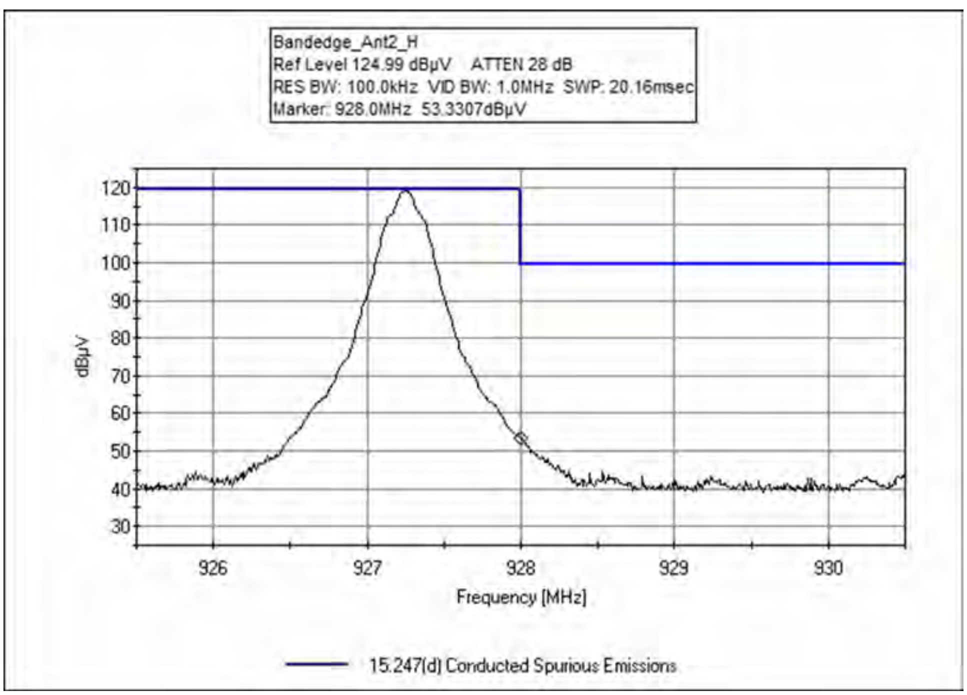


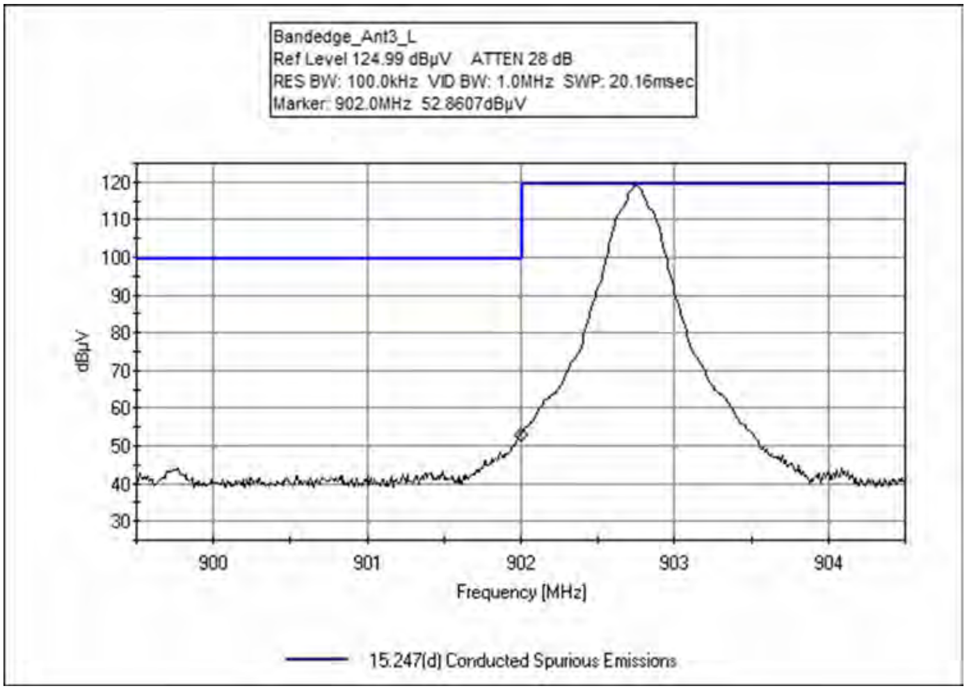


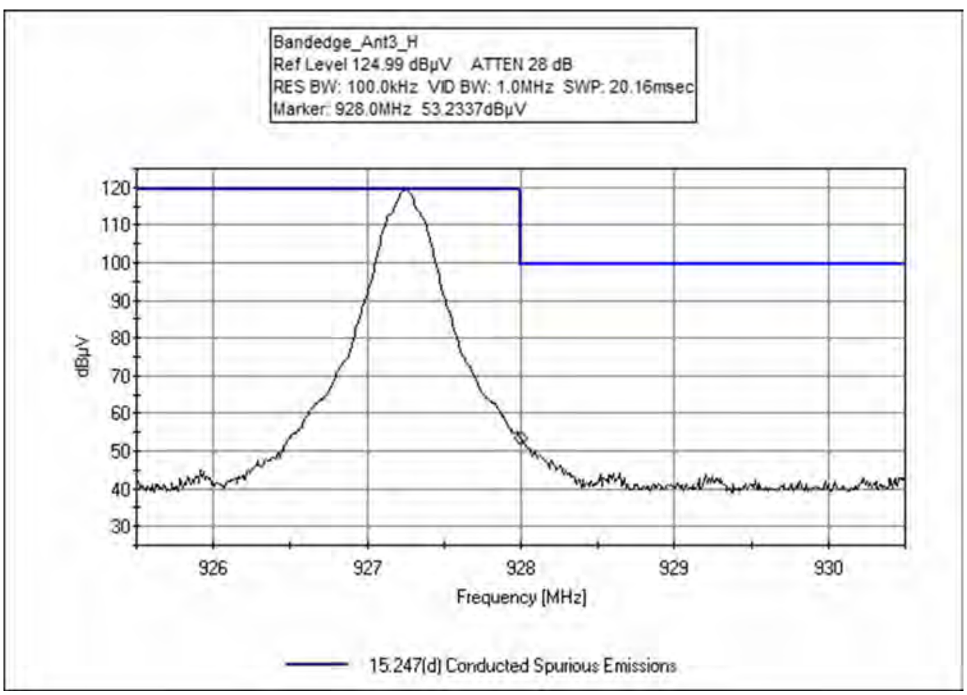

Bandedge_Ant1_L
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 54.0487dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge_Ant1_H
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 928.0MHz 52.8657dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

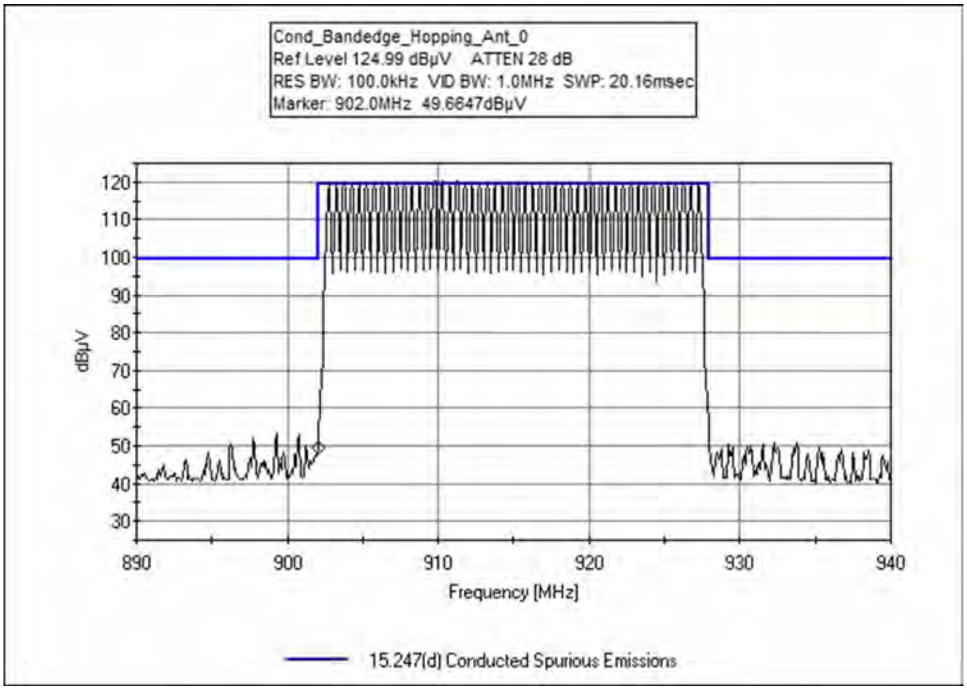

Bandedge_Ant2_L
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 54.2167dBµV
dBµV
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

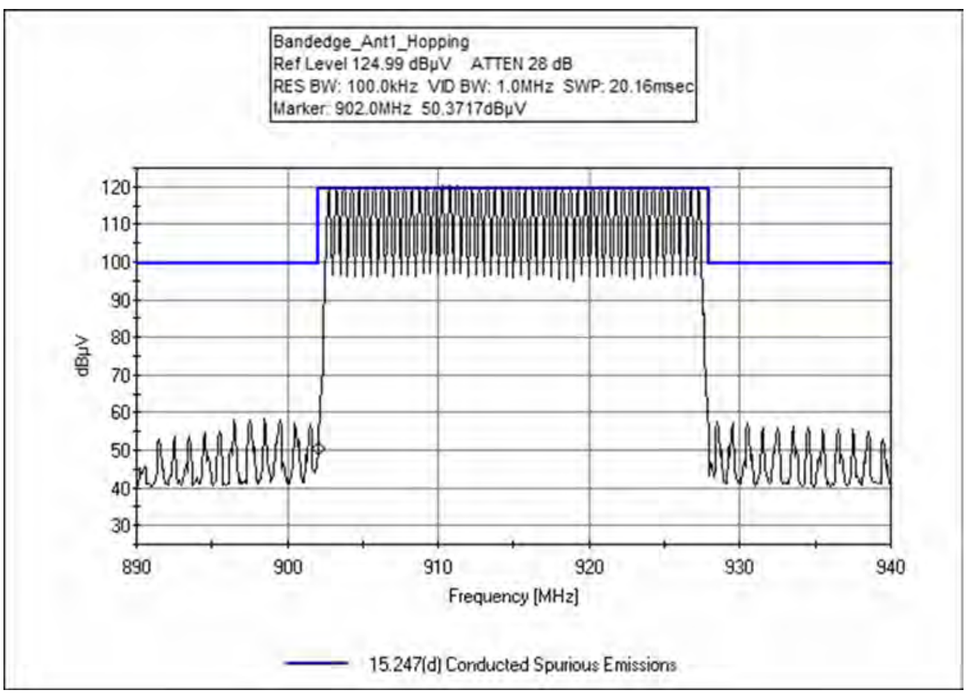

Bandedge_Ant2_H
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 928.0MHz 53.3307dBµV
dBµV
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

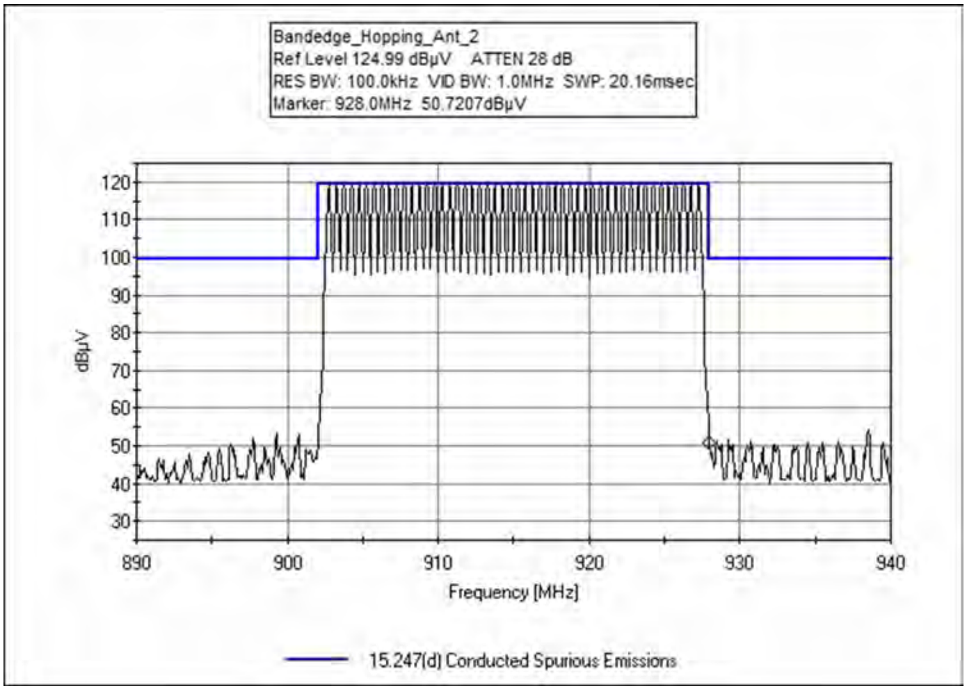

Bandedge_Ant3_L
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 52.8607dBµV
dBµV
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

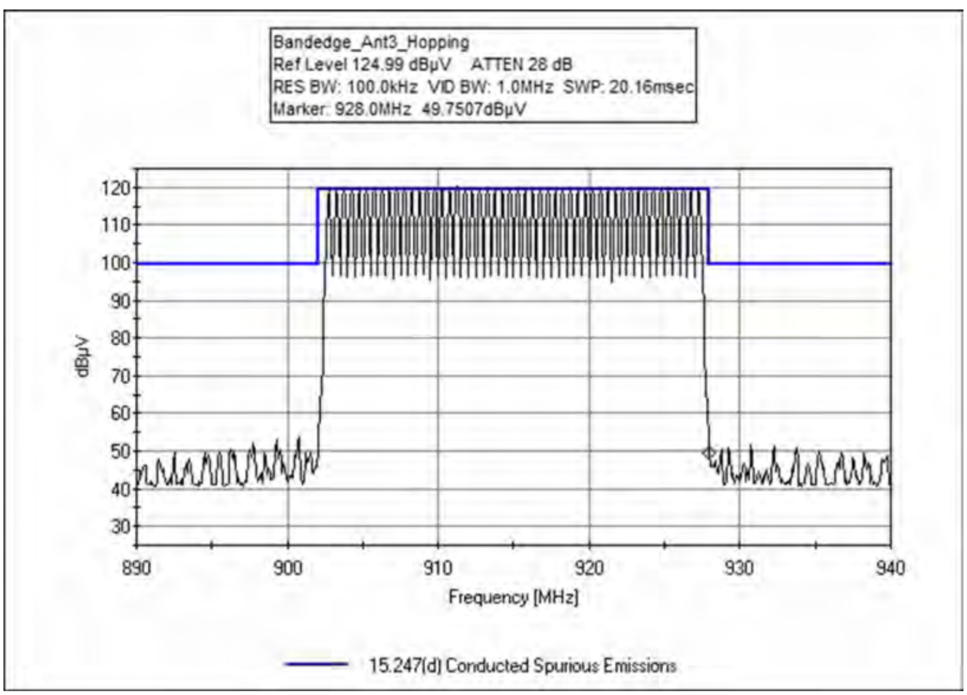

Bandedge_Ant3_H
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 928.0MHz 53.2337dBµV
dBµV
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Hopping


Cond_Bandedge_Hopping_Ant_0
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 49.6647dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
890
900
910
920
930
940
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge_Ant1_Hopping
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 50.3717dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
890
900
910
920
930
940
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge_Hopping_Ant_2
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 928.0MHz 50.7207dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
890
900
910
920
930
940
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge_Ant3_Hopping
Ref Level 124.99 dBµV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 928.0MHz 49.7507dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
890
900
910
920
930
940
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**108850**	Date:	10/21/2023
Test Type:	**Conducted Emissions**	Time:	13:18:21
Tested By:	E. Wong	Sequence#:	5
Software:	EMITest 5.03.20		48VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is set on a test bench.

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX 902.75MHz, 914.75MHz, 927.25MHz

LO Frequency: 915MHz

TARI = 6.25us as intended.

Worst case Antenna Pattern and associated power level evaluated.
Lowest gain

Frequency Range of Measurement: 902-928MHz
RBW=100kHz,VBW=300 kHz.

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 22.5°C
Relative Humidity: 55%
Pressure: 99.8kPa

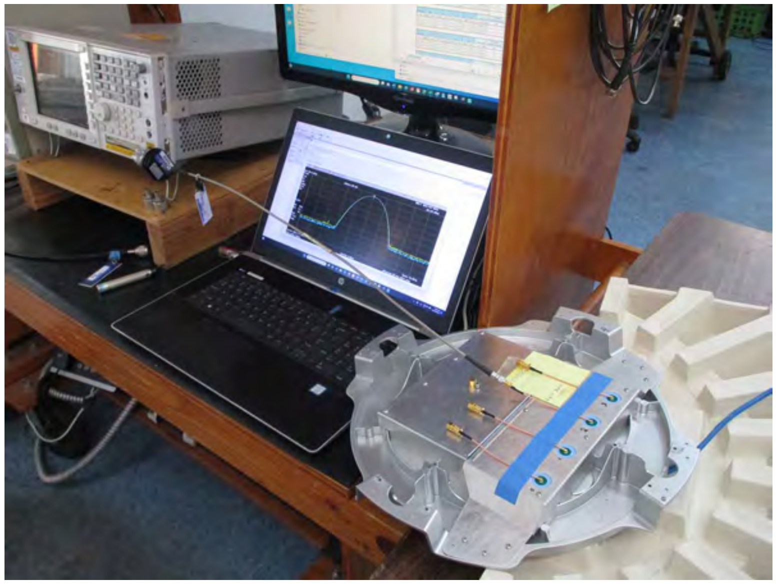
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T2	AN03430	Attenuator	75A-10-12	1/14/2022	1/14/2024
T3	ANP07658	Cable	32022-29094K-29094K-24TC	6/22/2022	6/22/2024

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	902.000M	55.1	+0.0	+10.1	+0.3		+0.0	65.5	110.0 Bandedge_Ant0_L	-44.5	Anten
2	902.000M	54.8	+0.0	+10.1	+0.3		+0.0	65.2	110.0 Bandedge_Ant1_L	-44.8	Anten
3	902.000M	54.2	+0.0	+10.1	+0.3		+0.0	64.6	110.0 Bandedge_Ant2_L	-45.4	Anten
4	928.000M	54.2	+0.0	+10.1	+0.3		+0.0	64.6	110.0 Bandedge_Ant0_H	-45.4	Anten
5	902.000M	53.8	+0.0	+10.1	+0.3		+0.0	64.2	110.0 Bandedge_Ant3_L	-45.8	Anten
6	928.000M	53.5	+0.0	+10.1	+0.3		+0.0	63.9	110.0 Bandedge_Ant1_H	-46.1	Anten
7	928.000M	53.3	+0.0	+10.1	+0.3		+0.0	63.7	110.0 Bandedge_Ant2_H	-46.3	Anten
8	928.000M	53.2	+0.0	+10.1	+0.3		+0.0	63.6	110.0 Bandedge_Ant3_H	-46.4	Anten
9	902.000M	50.8	+0.0	+10.1	+0.3		+0.0	61.2	110.0 Bandedge_Ant2_L_ Hopping	-48.8	Anten
10	928.000M	50.7	+0.0	+10.1	+0.3		+0.0	61.1	110.0 Bandedge_Ant2_H _Hopping	-48.9	Anten
11	928.000M	50.6	+0.0	+10.1	+0.3		+0.0	61.0	110.0 Bandedge_Ant0_H _Hopping	-49.0	Anten
12	902.000M	50.4	+0.0	+10.1	+0.3		+0.0	60.8	110.0 Bandedge_Ant1_L_ Hopping	-49.2	Anten
13	928.000M	49.8	+0.0	+10.1	+0.3		+0.0	60.2	110.0 Bandedge_Ant3_H _Hopping	-49.8	Anten
14	902.000M	49.4	+0.0	+10.1	+0.3		+0.0	59.8	110.0 Bandedge_Ant0_L_ Hopping	-50.2	Anten
15	902.000M	48.5	+0.0	+10.1	+0.3		+0.0	58.9	110.0 Bandedge_Ant3_L_ Hopping	-51.1	Anten
16	928.000M	43.3	+0.0	+10.1	+0.3		+0.0	53.7	110.0 Bandedge_Ant1_H _Hopping	-56.3	Anten

Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**108850**	Date:	10/20/2023
Test Type:	**Radiated Scan**	Time:	17:19:06
Tested By:	E. Wong	Sequence#:	3
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is placed on Styrofoam block.

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX 902.75MHz, 914.75MHz, 927.25MHz

LO Frequency: 915MHz

TARI = 6.25us as intended.

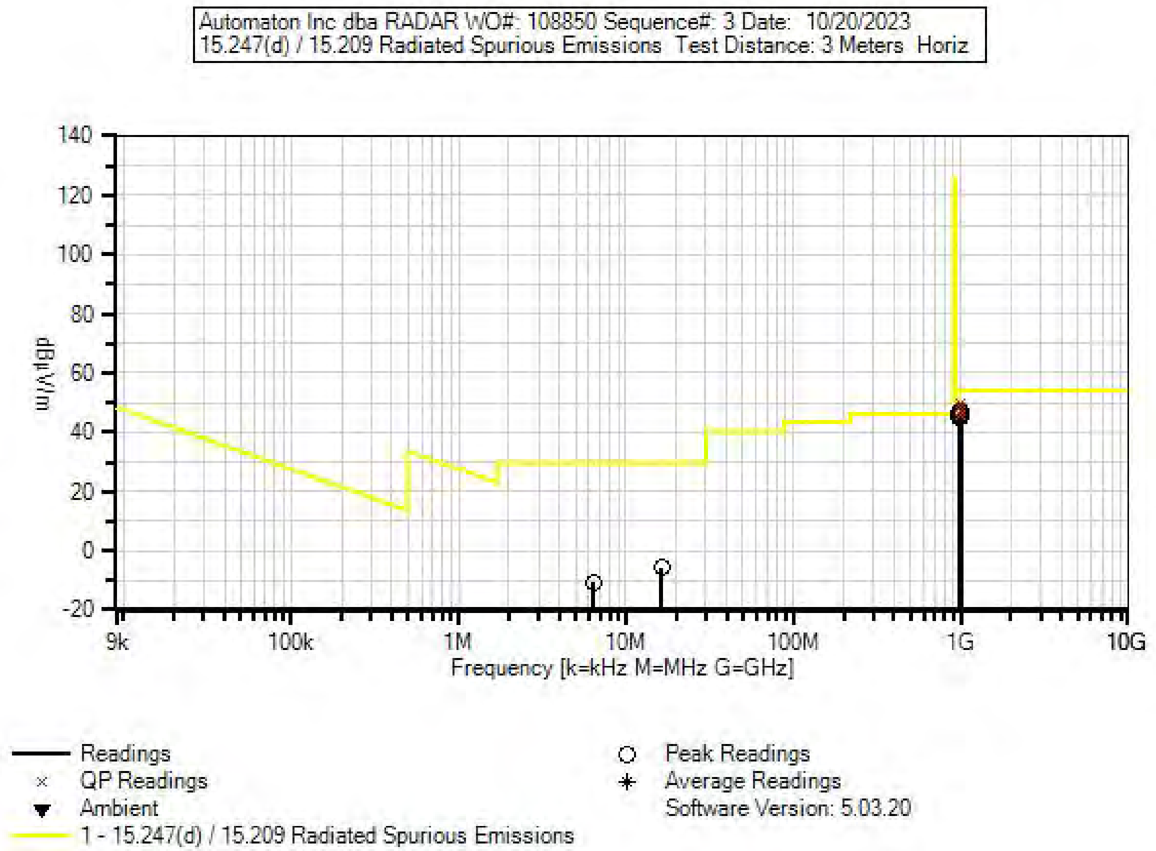
Testing both Antenna Pattern and associated power level evaluated.
Both Antenna Pattern and associated power level evaluated.

Frequency Range of Measurement: 9kHz-1GHz
9 kH -150 kHz;RBW=200 Hz,VBW=600 Hz;
150 kHz-30 MHz;RBW=9 kHz,VBW=27 kHz;
30 MHz-1000 MHz;RBW=120 kHz,VBW=360 kHz

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 24°C
Relative Humidity: 55%
Pressure: 99.8kPa

Additional evaluation was performed with the EUT lay flat on the Styrofoam. Worst case emission presented.
No signal found between 9kHz-30Mz and 30-1000MHz. Recorded data represent noise floor.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T2	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/31/2022	12/31/2024
T4	AN00309	Preamp	8447D	12/13/2021	12/13/2023
T5	ANP05050	Cable	RG223/U	12/31/2022	12/31/2024
T6	AN03430	Attenuator	75A-10-12	1/14/2022	1/14/2024
T7	ANP06664	Cable	PHASEFLEX FJR01N01036.0	3/25/2022	3/25/2024
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	998.750M QP	29.6	+0.0 +0.5	+30.9 +10.1	+6.3 +0.0	-27.5	+0.0	49.9	54.0 LowGain_L	-4.1	Horiz
2	998.667M QP	28.3	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	48.3	54.0 HiGain_L	-5.7	Horiz
^	998.750M	33.7	+0.0 +0.5	+30.9 +10.1	+6.3 +0.0	-27.5	+0.0	54.0	54.0 LowGain_L	+0.0	Horiz
^	998.667M	30.7	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	50.7	54.0 HiGain_L	-3.3	Horiz
^	998.696M	25.3	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	45.3	54.0 HiGain_H	-8.7	Horiz
6	997.850M	27.3	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	47.3	54.0 LowGain_L_LayFl at	-6.7	Horiz
7	988.843M	26.9	+0.0 +0.0	+31.1 +10.1	+6.2 +0.2	-27.4	+0.0	47.1	54.0 LowGain_M	-6.9	Vert
8	998.600M QP	27.1	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	47.1	54.0 HiGain_L	-6.9	Vert
9	996.730M	26.5	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	46.5	54.0 LowGain_M_LayFl at	-7.5	Vert
10	977.630M	26.0	+0.0 +0.0	+31.3 +10.1	+6.2 +0.2	-27.4	+0.0	46.4	54.0 LowGain_H	-7.6	Horiz
11	998.650M QP	8.0	+0.0 +0.5	+30.9 +0.0	+6.3 +0.0	+0.0	+0.0	45.7	54.0 LowGain_L_No preamp_(no signal found)	-8.3	Vert
^	998.600M	30.0	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	50.0	54.0 HiGain_L	-4.0	Vert
^	998.650M	12.0	+0.0 +0.5	+30.9 +0.0	+6.3 +0.0	+0.0	+0.0	49.7	54.0 LowGain_L_No preamp_(no signal found)	-4.3	Vert
^	998.700M	27.0	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	47.0	54.0 HiGain_M	-7.0	Vert
15	998.830M QP	7.9	+0.0 +0.5	+30.9 +0.0	+6.3 +0.0	+0.0	+0.0	45.6	54.0 LowGain_L_No preamp	-8.4	Vert
^	998.830M	12.3	+0.0 +0.5	+30.9 +0.0	+6.3 +0.0	+0.0	+0.0	50.0	54.0 LowGain_L_No preamp	-4.0	Vert
^	998.830M	25.8	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	45.8	54.0 LowGain_L_LayFl at	-8.2	Vert
18	998.467M	25.6	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	45.6	54.0 HiGain_H	-8.4	Vert
19	982.830M	25.2	+0.0 +0.0	+31.2 +10.1	+6.2 +0.2	-27.4	+0.0	45.5	54.0 LowGain_H	-8.5	Vert

20	981.670M	25.1	+0.0 +0.0	+31.2 +10.1	+6.2 +0.2	-27.4	+0.0	45.4	54.0 LowGain_M	-8.6	Horiz
21	999.600M	25.2	+0.0 +0.0	+30.9 +10.1	+6.3 +0.2	-27.5	+0.0	45.2	54.0 HiGain_M	-8.8	Horiz
22	16.350M	25.0	+0.0 +0.0	+0.0 +0.0	+0.7 +0.1	+0.0	-40.0	-5.6	29.5 LowGain_M_Noise floor	-35.1	Perpe
23	6.410M	19.9	+0.0 +0.0	+0.0 +0.0	+0.5 +0.0	+0.0	-40.0	-10.6	29.5 LowGain_M_Noise floor	-40.1	Perpe
24	19.060M	9.8	+0.0 +0.0	+0.0 +0.0	+0.7 +0.1	+0.0	-40.0	-21.4	29.5 LowGain_M_Noise floor	-50.9	Perpe

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112
Customer:	**Automaton Inc. dba RADAR**
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #:	**108850** Date: 10/21/2023
Test Type:	**Radiated Scan** Time: 10:16:10
Tested By:	E. Wong Sequence#: 4
Software:	EMITest 5.03.20

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 Styrofoam block

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX 902.75MHz, 914.75MHz, 927.25MHz

LO Frequency: 915MHz

TARI = 6.25us as intended.
Both Antenna Pattern and associated power level evaluated.

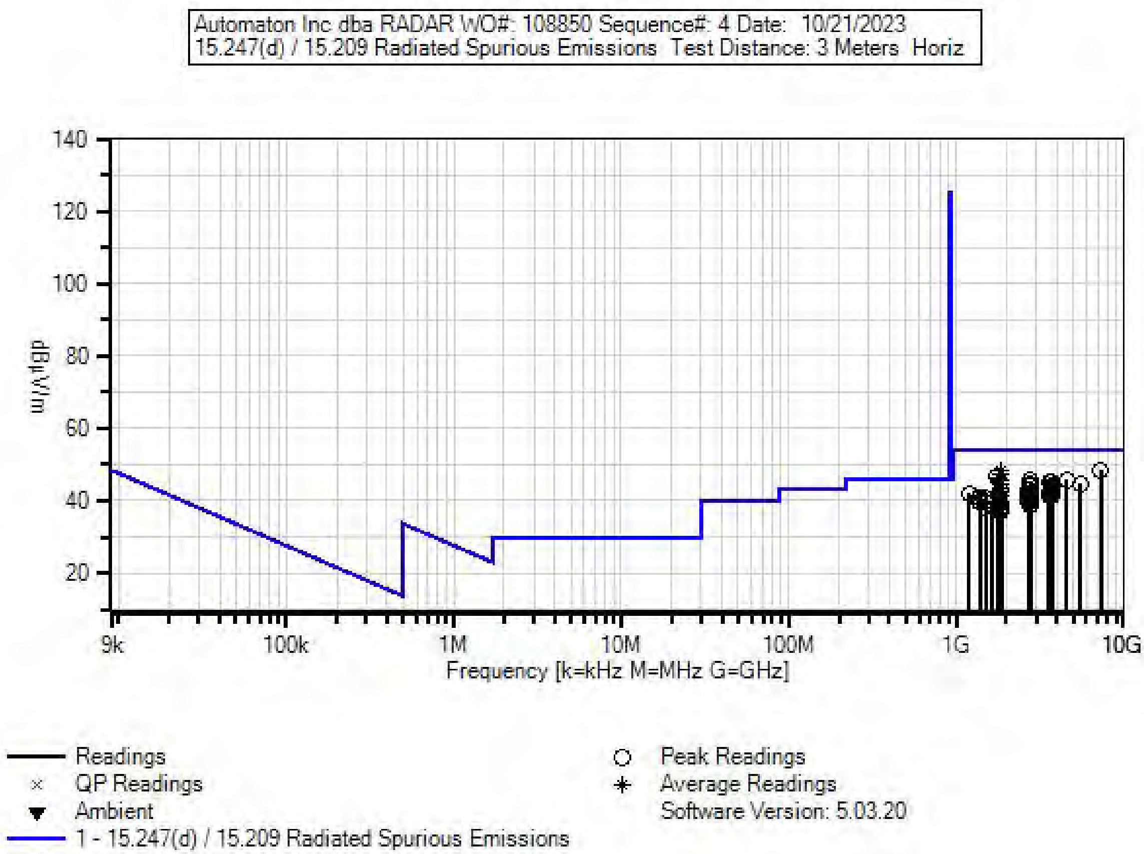
Frequency Range of Measurement: 1-10GHz
1000 MHz-10 000 MHz;RBW=1MHz,VBW=3 MHz.

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 24°C
Relative Humidity: 55%
Pressure: 99.8kPa

Additional evaluation was performed with the EUT lay flat on the Styrofoam. Worst case emission presented.

CKC LABORATORIES, INC. Testing the Future



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T2	AN00849	Horn Antenna	3115	3/21/2022	3/21/2024
T3	ANP07658	Cable	32022-29094K-29094K-24TC	6/22/2022	6/22/2024
T4	AN00786	Preamp	83017A	5/23/2022	5/23/2024
T5	ANP07692	Cable	LDF1-50	9/9/2022	9/9/2024
T6	AN03169	High Pass Filter	HM1155-11SS	5/15/2023	5/15/2025

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	1829.467M Ave	55.7	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	48.4	54.0 LowGain_M_+Harmonics of LO_	-5.6	Horiz
2	7320.027M	39.2	+0.0 +8.6	+36.3 +0.3	+0.9	-36.9	+0.0	48.4	54.0 LowGain_L_Harmonics of LO	-5.6	Horiz
3	1854.500M Ave	54.5	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	47.5	54.0 LowGain_H	-6.5	Horiz
4	1749.400M	53.9	+0.0 +3.6	+27.0 +0.4	+0.4	-38.8	+0.0	46.5	54.0 non intentional radiator	-7.5	Vert
5	1805.500M Ave	53.7	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	46.2	54.0 LowGain_L	-7.8	Horiz
6	1805.533M Ave	53.5	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	46.0	54.0 LowGain_L	-8.0	Vert
7	1829.433M Ave	53.2	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	45.9	54.0 LowGain_M_+Harmonics of LO	-8.1	Vert
8	4575.017M	43.4	+0.0 +6.4	+32.3 +0.4	+0.7	-37.4	+0.0	45.8	54.0 LowGain_L_Harmonics of LO	-8.2	Horiz
9	1829.483M Ave	53.0	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	45.7	54.0 HiGain_M+Harmonics of LO	-8.3	Horiz
^	1829.467M	59.4	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	52.1	54.0 LowGain_M_+Harmonics of LO	-1.9	Horiz
^	1829.483M	56.6	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	49.3	54.0 HiGain_M+Harmonics of LO	-4.7	Horiz
^	1829.467M	50.3	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	43.0	54.0 LayFlat_LowGain_M+Harmonics of LO	-11.0	Horiz
^	1829.417M	46.2	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	38.9	54.0 LayFlat_HiGain_M+Harmonics of LO	-15.1	Horiz
14	2781.750M	48.8	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	45.5	54.0 LayFlat_LowGain_H	-8.5	Vert
15	3600.000M	45.6	+0.0 +5.4	+31.3 +0.3	+0.6	-38.1	+0.0	45.1	54.0 non intentional radiator	-8.9	Horiz
16	3659.917M	45.0	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	44.9	54.0 LowGain_M_+Harmonics of LO	-9.1	Horiz

17	5490.020M	39.8	+0.0 +7.1	+34.0 +0.2	+0.8	-37.1	+0.0	44.8	54.0 LowGain_L_Harmonics of LO	-9.2	Horiz
18	1854.450M Ave	51.5	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	44.5	54.0 HiGain_H	-9.5	Horiz
^	1854.500M	58.6	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	51.6	54.0 LowGain_H	-2.4	Horiz
^	1854.450M	56.3	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	49.3	54.0 HiGain_H	-4.7	Horiz
^	1854.400M	46.6	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	39.6	54.0 LayFlat_LowGain_H	-14.4	Horiz
^	1854.500M	45.3	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	38.3	54.0 LayFlat_HiGain_H	-15.7	Horiz
23	2781.620M	47.8	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	44.5	54.0 HiGain_H	-9.5	Vert
24	3660.013M	44.3	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	44.2	54.0 LowGain_L_Harmonics of LO	-9.8	Horiz
25	3659.967M	44.1	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	44.0	54.0 HiGain_M+Harmonics of LO	-10.0	Horiz
26	3660.050M	44.0	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	43.9	54.0 LayFlat_HiGain_M+Harmonics of LO	-10.1	Vert
27	2781.600M	47.2	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	43.9	54.0 LayFlat_LowGain_H	-10.1	Horiz
28	3660.000M	43.9	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	43.8	54.0 LowGain_Harmonics of LO	-10.2	Horiz
29	3660.000M	43.8	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	43.7	54.0 LayFlat_LowGain_H_Harmonics of LO	-10.3	Vert
30	1854.450M Ave	50.3	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	43.3	54.0 HiGain_H	-10.7	Vert
31	3660.517M	43.3	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	43.2	54.0 HiGain_L_Harmonics of LO	-10.8	Horiz
32	3708.800M	42.5	+0.0 +5.4	+32.0 +0.4	+0.6	-37.8	+0.0	43.1	54.0 LayFlat_LowGain_H	-10.9	Horiz
33	2781.750M	46.4	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	43.1	54.0 LayFlat_HiGain_H	-10.9	Horiz
34	3709.050M	42.4	+0.0 +5.4	+32.0 +0.4	+0.6	-37.8	+0.0	43.0	54.0 LowGain_H	-11.0	Vert
35	2708.150M	46.6	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	42.8	54.0 LayFlat_LowGain_L	-11.2	Vert
36	1854.600M	49.7	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	42.7	54.0 LayFlat_HiGain_H	-11.3	Vert

37	3611.067M	43.0	+0.0 +5.4	+31.4 +0.3	+0.6	-38.1	+0.0	42.6	54.0 LowGain_L	-11.4	Vert
38	3708.783M	41.9	+0.0 +5.4	+32.0 +0.4	+0.6	-37.8	+0.0	42.5	54.0 HiGain_H	-11.5	Horiz
39	3659.900M	42.6	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	42.5	54.0 LowGain_L_Harmonics of LO	-11.5	Vert
40	1805.500M Ave	49.8	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	42.3	54.0 HiGain_L	-11.7	Vert
^	1805.533M	57.6	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	50.1	54.0 LowGain_L	-3.9	Vert
42	3708.780M	41.7	+0.0 +5.4	+32.0 +0.4	+0.6	-37.8	+0.0	42.3	54.0 HiGain_H	-11.7	Vert
43	3660.000M	42.3	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	42.2	54.0 HiGain_L_Harmonics of LO	-11.8	Vert
44	1854.500M Ave	49.2	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	42.2	54.0 LowGain_H	-11.8	Vert
45	3658.867M	42.3	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	42.2	54.0 LowGain_M_+Harmonics of LO	-11.8	Vert
46	2781.750M	45.4	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	42.1	54.0 LowGain_H	-11.9	Horiz
47	3660.000M	42.2	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	42.1	54.0 LowGain_H_Harmonics of LO	-11.9	Vert
48	3611.000M	42.4	+0.0 +5.4	+31.4 +0.3	+0.6	-38.1	+0.0	42.0	54.0 HiGain_L	-12.0	Vert
49	1199.920M	52.4	+0.0 +2.9	+25.4 +0.9	+0.3	-39.9	+0.0	42.0	54.0 non intentional radiator	-12.0	Horiz
50	3659.033M	42.1	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	42.0	54.0 HiGain_M+Harmonics of LO	-12.0	Vert
51	2708.300M	45.6	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	41.8	54.0 LowGain_L	-12.2	Vert
52	3611.000M	42.2	+0.0 +5.4	+31.4 +0.3	+0.6	-38.1	+0.0	41.8	54.0 HiGain_L	-12.2	Horiz
53	1805.433M Ave	49.2	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	41.7	54.0 LayFlat_LowGain_L	-12.3	Vert
^	1805.500M	55.5	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	48.0	54.0 HiGain_L	-6.0	Vert
^	1805.433M	53.9	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	46.4	54.0 LayFlat_LowGain_L	-7.6	Vert
^	1805.533M	52.3	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	44.8	54.0 LayFlat_HiGain_L	-9.2	Vert

57	1829.467M Ave	48.9	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	41.6	54.0 LayFlat_LowGain_M+Harmonics of LO	-12.4	Vert
^	1829.433M	56.9	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	49.6	54.0 LowGain_M_+Harmonics of LO	-4.4	Vert
^	1829.467M	53.1	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	45.8	54.0 LayFlat_LowGain_M+Harmonics of LO	-8.2	Vert
^	1829.433M	52.8	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	45.5	54.0 HiGain_M+Harmonics of LO	-8.5	Vert
^	1829.400M	51.6	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	44.3	54.0 LayFlat_HiGain_M+Harmonics of LO	-9.7	Vert
62	2744.200M	45.2	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.6	54.0 LayFlat_LowGain_M+Harmonics of LO	-12.4	Vert
63	2745.317M	45.1	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.5	54.0 HiGain_L_Harmonics of LO	-12.5	Horiz
64	3611.030M	41.9	+0.0 +5.4	+31.4 +0.3	+0.6	-38.1	+0.0	41.5	54.0 LowGain_L	-12.5	Horiz
65	2745.000M	45.1	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.5	54.0 LowGain_Harmonics of LO	-12.5	Horiz
66	3660.000M	41.6	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	41.5	54.0 LayFlat_LowGain_L_Harmonics of LO	-12.5	Vert
67	2744.200M	45.1	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.5	54.0 LayFlat_LowGain_M+Harmonics of LO	-12.5	Horiz
68	2781.800M	44.7	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	41.4	54.0 LowGain_H	-12.6	Vert
69	3658.933M	41.5	+0.0 +5.4	+31.5 +0.3	+0.6	-37.9	+0.0	41.4	54.0 LayFlat_LowGain_M+Harmonics of LO	-12.6	Vert
70	2745.000M	44.7	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.1	54.0 LayFlat_LowGain_L_Harmonics of LO	-12.9	Vert
71	2744.800M	44.7	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.1	54.0 HiGain_M+Harmonics of LO	-12.9	Horiz
72	2745.000M	44.6	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	41.0	54.0 LowGain_H_Harmonics of LO	-13.0	Vert

73	1375.500M	50.2	+0.0 +3.2	+25.7 +0.7	+0.4	-39.3	+0.0	40.9	54.0 non intentional radiator	-13.1	Horiz
74	2745.010M	44.5	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.9	54.0 LowGain_L_Harmonics of LO	-13.1	Horiz
75	2744.930M	44.5	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.9	54.0 LowGain_L_Harmonics of LO	-13.1	Vert
76	2781.617M	44.2	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	40.9	54.0 HiGain_H	-13.1	Horiz
77	2708.250M	44.5	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	40.7	54.0 HiGain_L	-13.3	Vert
78	2744.200M	44.3	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.7	54.0 LowGain_M_+Harmonics of LO	-13.3	Horiz
79	1500.200M	50.2	+0.0 +3.3	+25.4 +0.5	+0.3	-39.1	+0.0	40.6	54.0 non intentional radiator	-13.4	Vert
80	1805.500M Ave	48.1	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	40.6	54.0 HiGain_L	-13.4	Horiz
^	1805.500M	57.6	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	50.1	54.0 LowGain_L	-3.9	Horiz
^	1805.500M	53.8	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	46.3	54.0 HiGain_L	-7.7	Horiz
^	1805.500M	50.0	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	42.5	54.0 LayFlat_LowGain_L	-11.5	Horiz
^	1805.500M	48.1	+0.0 +3.6	+26.9 +0.4	+0.4	-38.8	+0.0	40.6	54.0 LayFlat_HiGain_L	-13.4	Horiz
85	2745.000M	44.2	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.6	54.0 LayFlat_LowGain_H_Harmonics of LO	-13.4	Vert
86	2708.280M	44.2	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	40.4	54.0 LowGain_L	-13.6	Horiz
87	2708.250M	44.2	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	40.4	54.0 HiGain_L	-13.6	Horiz
88	2708.300M	44.2	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	40.4	54.0 LayFlat_HiGain_L	-13.6	Vert
89	2744.150M	43.9	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.3	54.0 LowGain_M_+Harmonics of LO	-13.7	Vert
90	2744.100M	43.9	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.3	54.0 LayFlat_HiGain_M +Harmonics of LO	-13.7	Vert
91	2744.317M	43.6	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	40.0	54.0 HiGain_M+Harmonics of LO	-14.0	Vert
92	1500.200M	49.5	+0.0 +3.3	+25.4 +0.5	+0.3	-39.1	+0.0	39.9	54.0 non intentional radiator	-14.1	Horiz

93	2781.900M	43.2	+0.0 +4.7	+29.5 +0.4	+0.5	-38.4	+0.0	39.9	54.0 LayFlat_HiGain_H	-14.1	Vert
94	2708.250M	43.7	+0.0 +4.5	+29.2 +0.4	+0.5	-38.4	+0.0	39.9	54.0 LayFlat_LowGain_L	-14.1	Horiz
95	1374.800M	49.1	+0.0 +3.2	+25.7 +0.7	+0.4	-39.3	+0.0	39.8	54.0 non intentional radiator	-14.2	Vert
96	2745.000M	43.4	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	39.8	54.0 HiGain_L_Harmonics of LO	-14.2	Vert
97	1624.800M	48.8	+0.0 +3.4	+25.5 +0.3	+0.3	-38.9	+0.0	39.4	54.0 non intentional radiator	-14.6	Horiz
98	1830.000M	46.6	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	39.3	54.0 LayFlat_HiGain_H_Harmonics of LO	-14.7	Vert
99	1830.000M	46.3	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	39.0	54.0 LowGain_Harmonics of LO	-15.0	Horiz
100	1854.500M Ave	46.0	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	39.0	54.0 LayFlat_LowGain_H	-15.0	Vert
^	1854.450M	55.0	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	48.0	54.0 HiGain_H	-6.0	Vert
^	1854.500M	53.9	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	46.9	54.0 LowGain_H	-7.1	Vert
^	1854.500M	51.4	+0.0 +3.7	+27.4 +0.3	+0.4	-38.8	+0.0	44.4	54.0 LayFlat_LowGain_H	-9.6	Vert
104	2745.000M	42.5	+0.0 +4.6	+29.3 +0.4	+0.5	-38.4	+0.0	38.9	54.0 LayFlat_HiGain_H_Harmonics of LO	-15.1	Vert
105	1500.330M	47.9	+0.0 +3.3	+25.4 +0.5	+0.3	-39.1	+0.0	38.3	54.0 non intentional radiator	-15.7	Horiz
106	1830.000M	45.4	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	38.1	54.0 LayFlat_HiGain_H_Harmonics of LO	-15.9	Horiz
107	1830.000M	45.2	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.9	54.0 LayFlat_LowGain_L_Harmonics of LO	-16.1	Horiz
108	1830.000M	44.9	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.6	54.0 HiGain_L_Harmonics of LO	-16.4	Vert
109	1825.000M	44.9	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.6	54.0 LayFlat_HiGain_H_Harmonics of LO	-16.4	Vert
110	1830.007M	44.8	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.5	54.0 LowGain_L_Harmonics of LO	-16.5	Horiz

111	1830.000M	44.7	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.4	54.0 LayFlat_HiGain_H_Harmonics of LO	-16.6	Horiz
112	1830.033M	44.7	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.4	54.0 LayFlat_LowGain_H_Harmonics of LO	-16.6	Horiz
113	1830.000M	44.6	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.3	54.0 LayFlat_LowGain_H_Harmonics of LO	-16.7	Vert
114	1830.000M	44.6	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.3	54.0 LowGain_H_Harmonics of LO	-16.7	Vert
115	1830.400M	44.5	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.2	54.0 HiGain_L_Harmonics of LO	-16.8	Horiz
116	1829.930M	44.5	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.2	54.0 LowGain_L_Harmonics of LO	-16.8	Vert
117	1830.000M	44.3	+0.0 +3.6	+27.1 +0.4	+0.4	-38.8	+0.0	37.0	54.0 LayFlat_LowGain_L_Harmonics of LO	-17.0	Vert

Band Edge

Band Edge Summary: Lowest Gain, Highest Power					
Operating Mode: Single Channel (Low and High)					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Integral	32.4	<46	Pass
902	PR-ASK	Integral	69.5	<115	Pass
928	PR-ASK	Integral	67.3	< 115	Pass
960	PR-ASK	Integral	38.7	<54	Pass

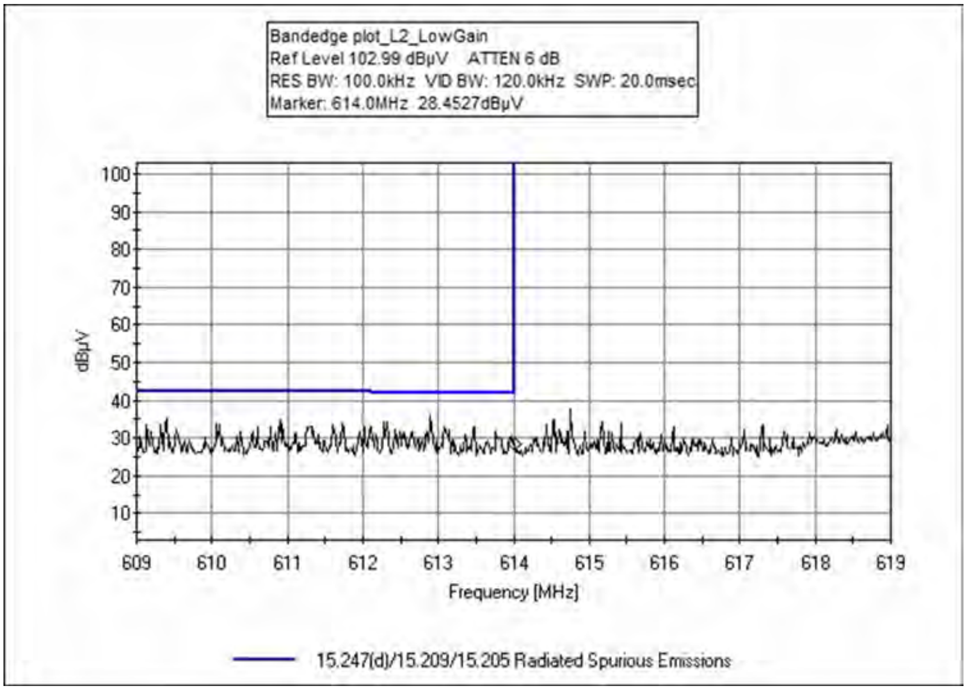
Band Edge Summary : Lowest Gain, Highest Power					
Operating Mode: Hopping					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Integral	30.9	<46	Pass
902	PR-ASK	Integral	64.8	<115	Pass
928	PR-ASK	Integral	64.5	< 115	Pass
960	PR-ASK	Integral	39.7	<54	Pass

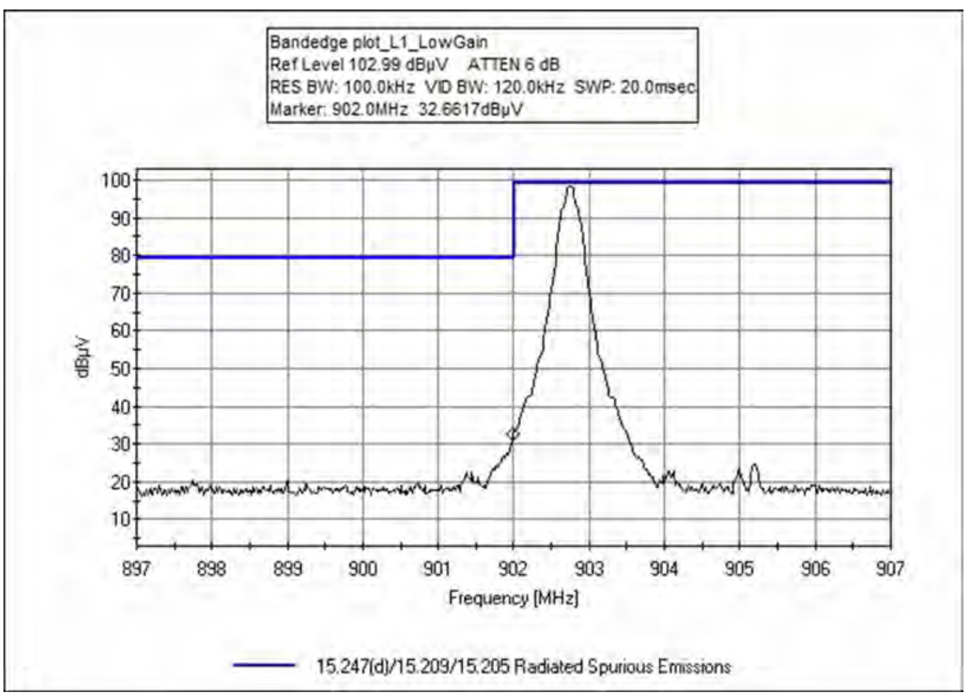
Band Edge Summary: Highest Gain, Lowest Power					
Operating Mode: Single Channel (Low and High)					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Integral	31.3	<46	Pass
902	PR-ASK	Integral	62.7	<113	Pass
928	PR-ASK	Integral	63.4	< 113	Pass
960	PR-ASK	Integral	38.7	<54	Pass

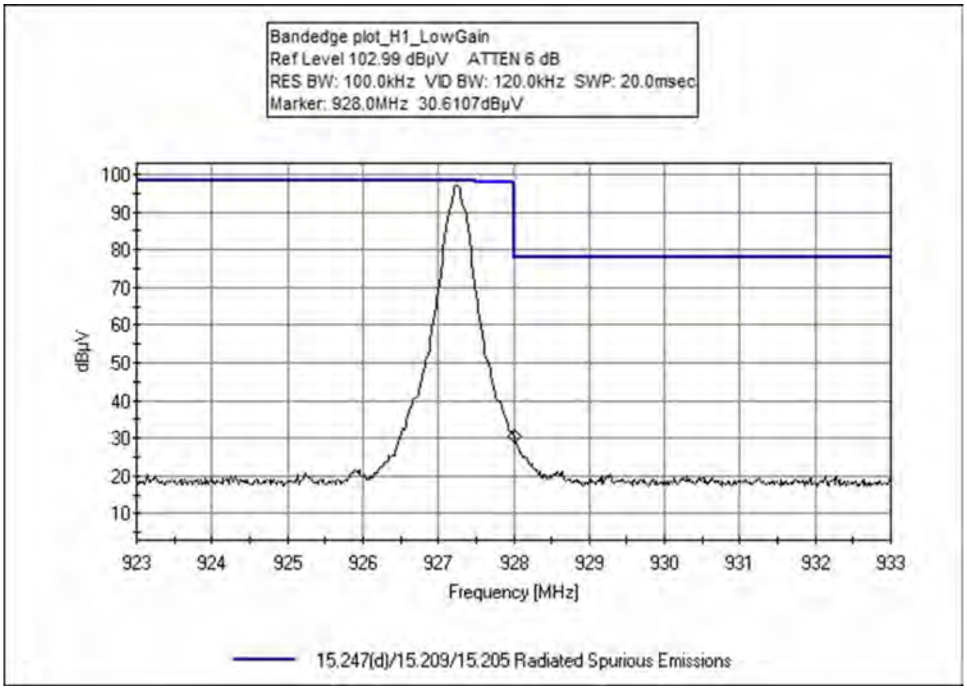
Band Edge Summary: Highest Gain, Lowest Power					
Operating Mode: Hopping					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Integral	31.6	<46	Pass
902	PR-ASK	Integral	62.3	<113	Pass
928	PR-ASK	Integral	60.8	< 113	Pass
960	PR-ASK	Integral	38.8	<54	Pass

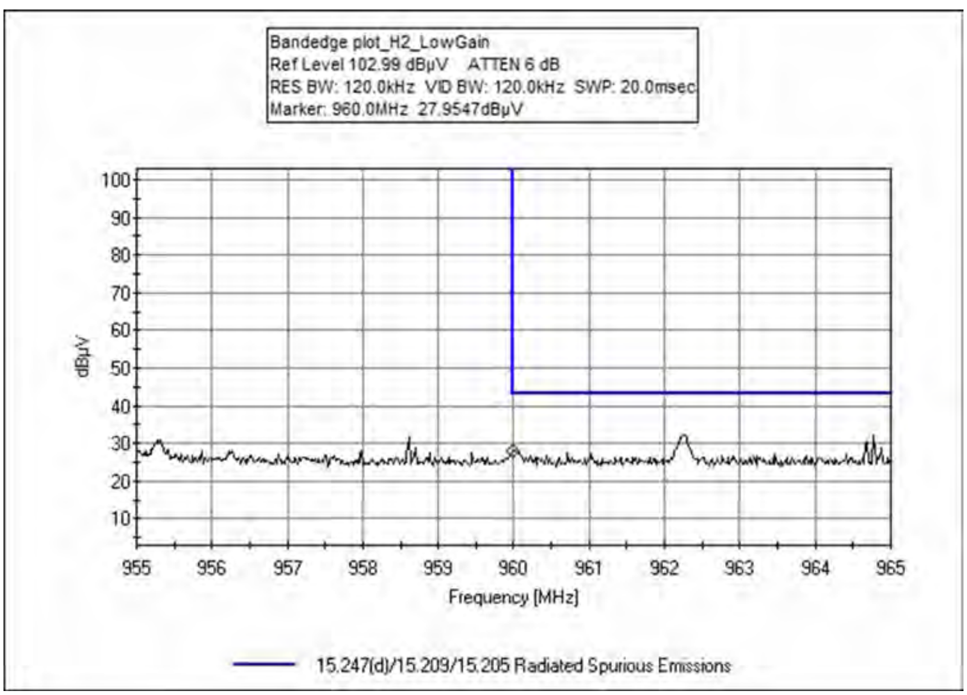
Band Edge Plots

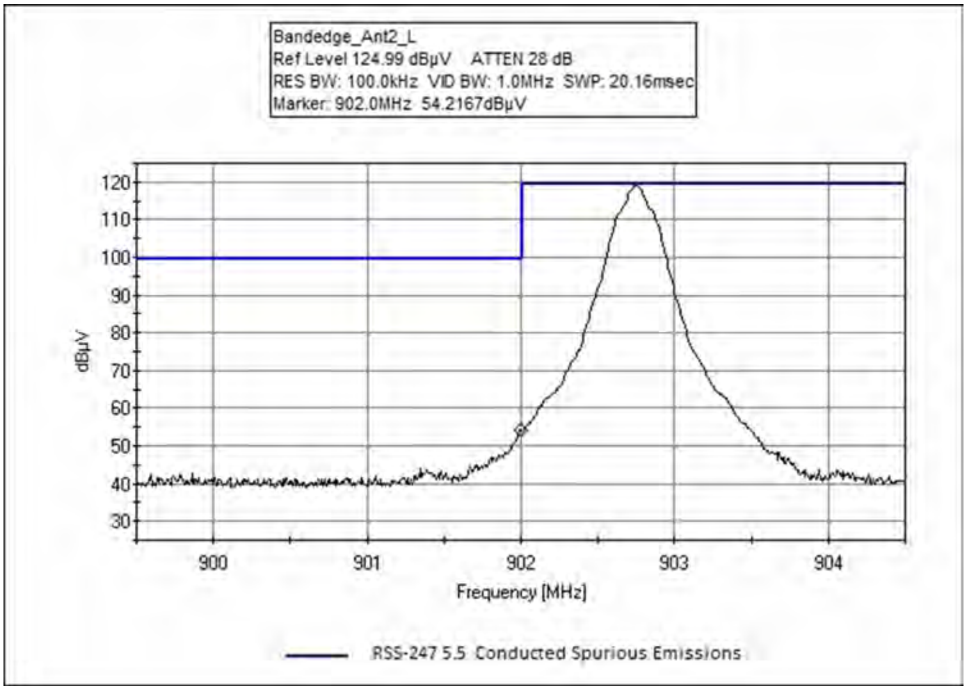
Lowest Gain, Single Channel



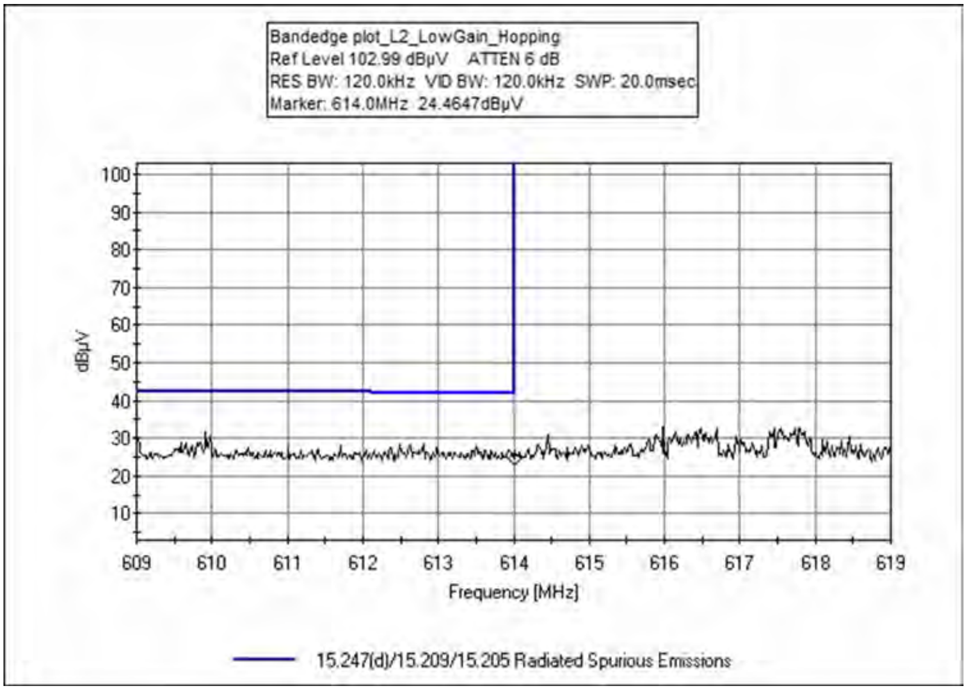


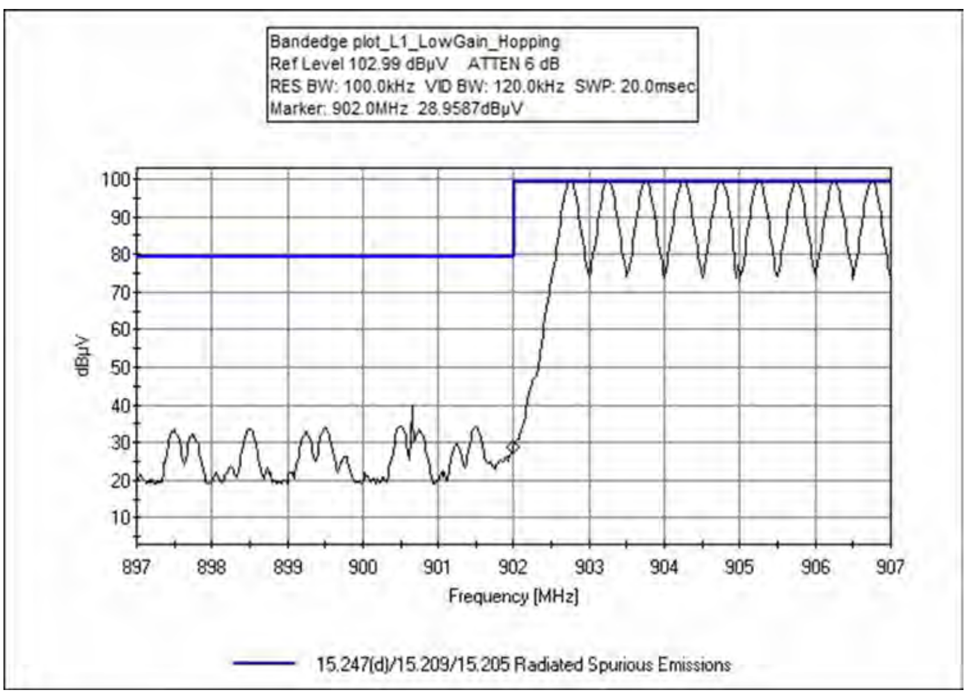

Bandedge plot_H1_LowGain
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 100.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 30.6107dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

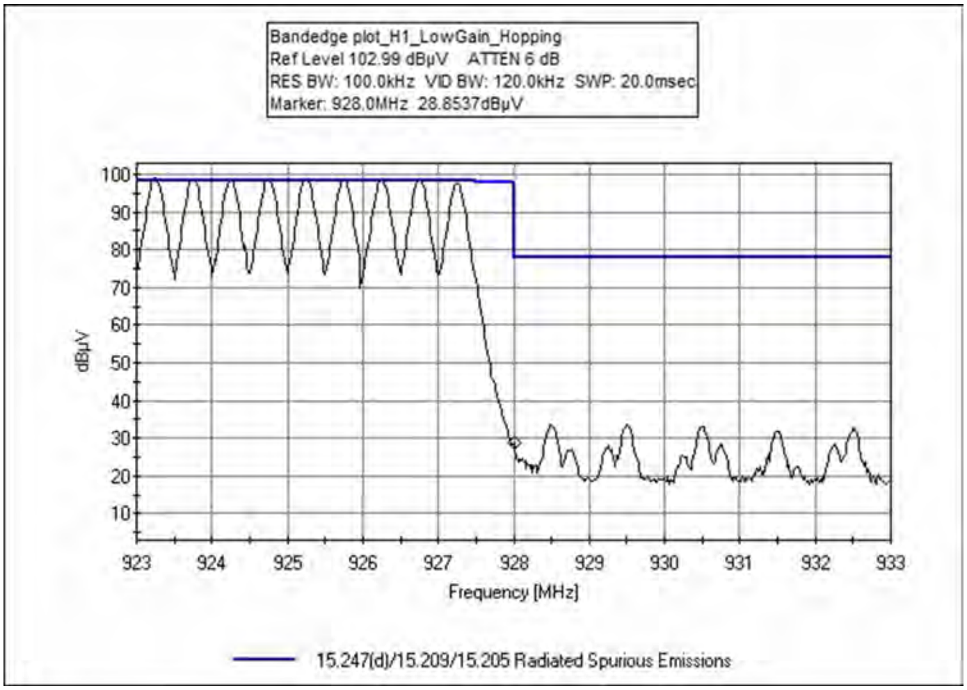

Bandedge plot_H2_LowGain
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 960.0MHz 27.9547dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

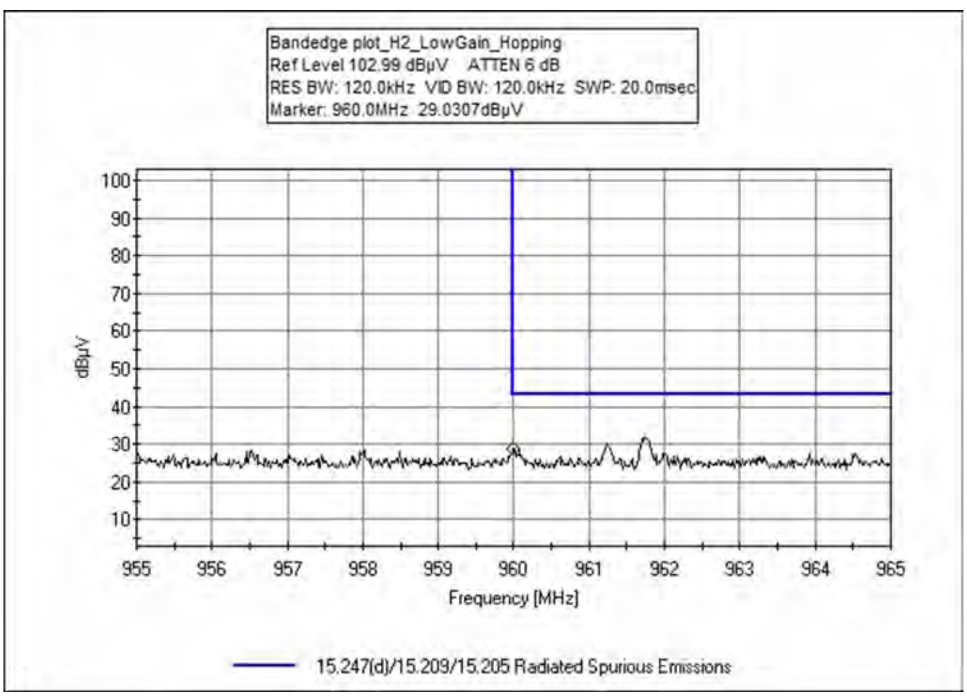

Bandedge_Ant2_L
Ref Level 124.99 dBμV ATTEN 28 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 20.16msec
Marker: 902.0MHz 54.2167dBμV
dBμV
Frequency [MHz]
RSS-247 5.5 Conducted Spurious Emissions

Lowest Gain, Hopping

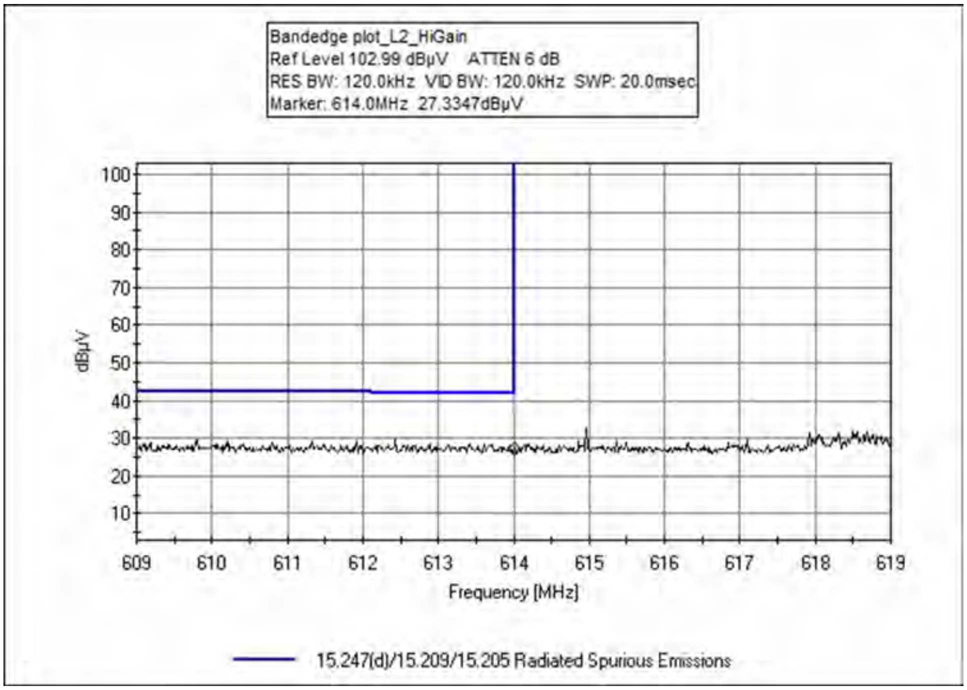


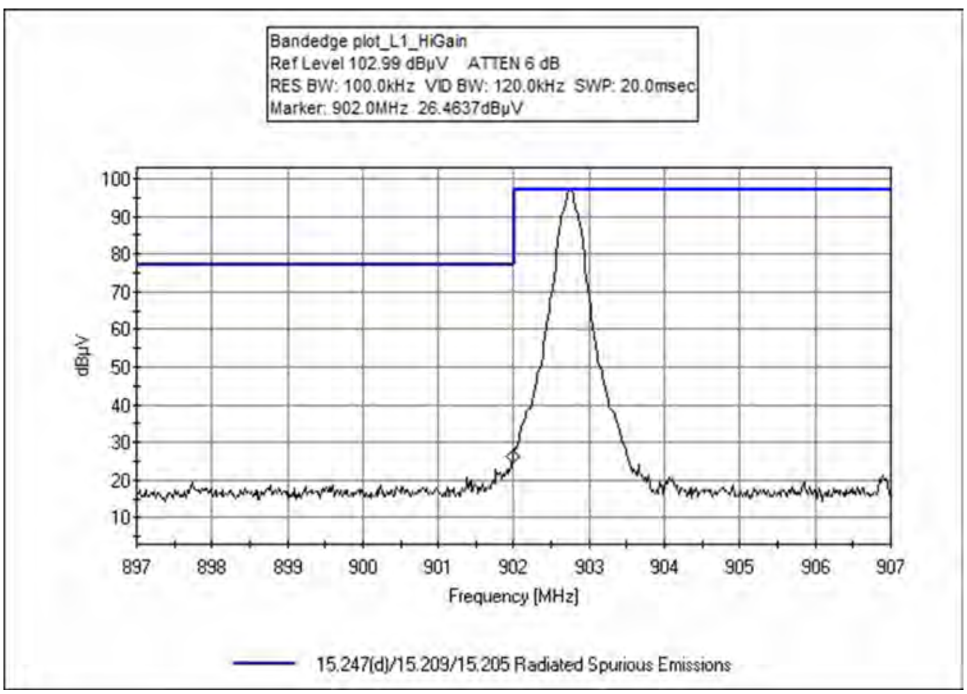


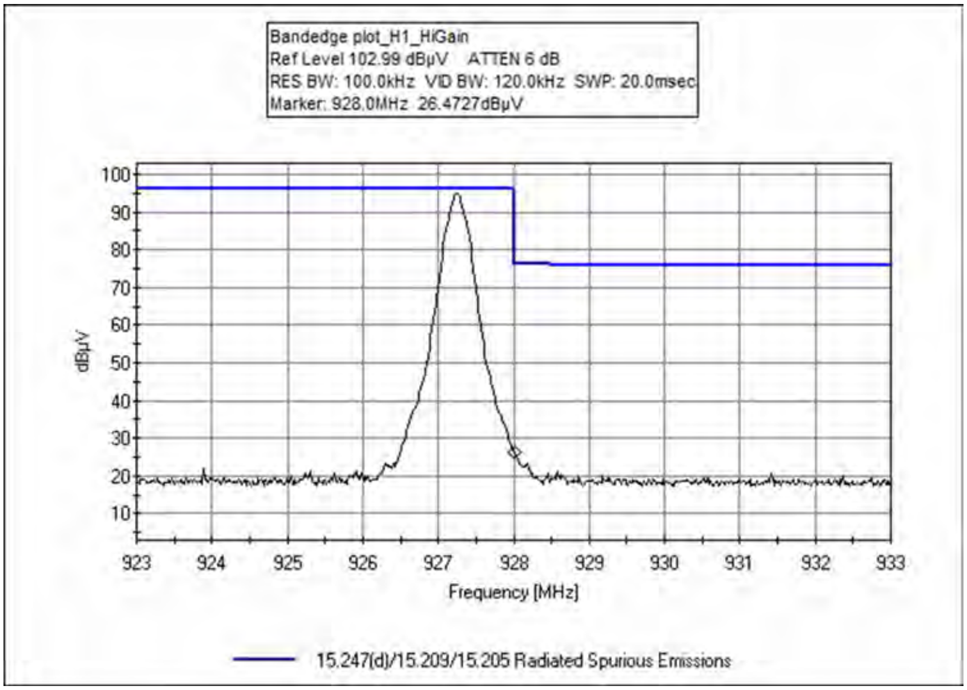

Bandedge plot_H1_LowGain_Hopping
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 100.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 28.8537dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

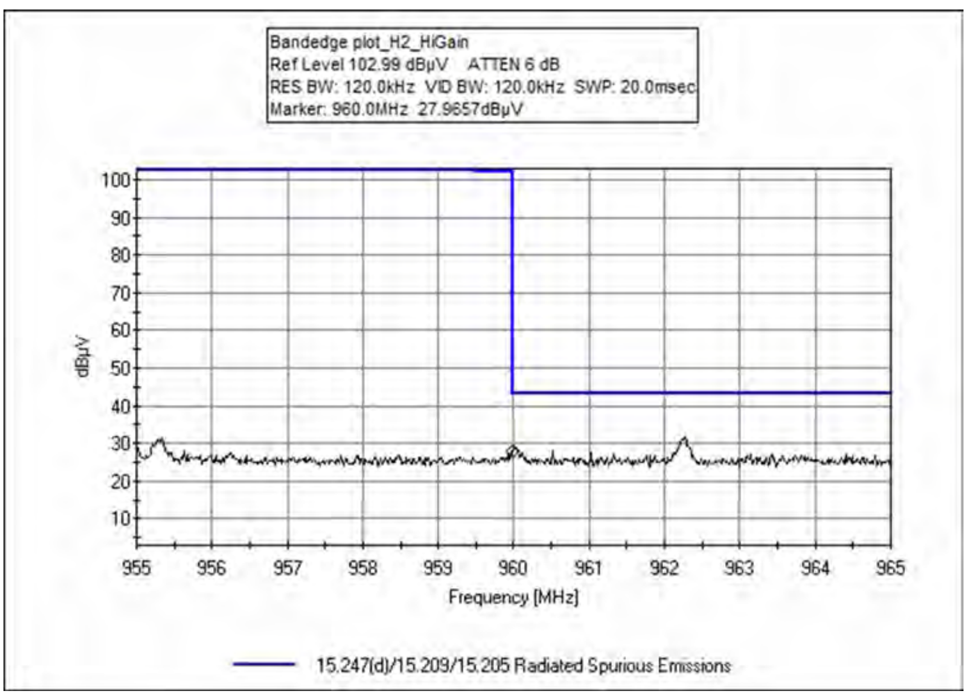

Bandedge plot_H2_LowGain_Hopping
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 960.0MHz 29.0307dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

Highest Gain, Single Channel

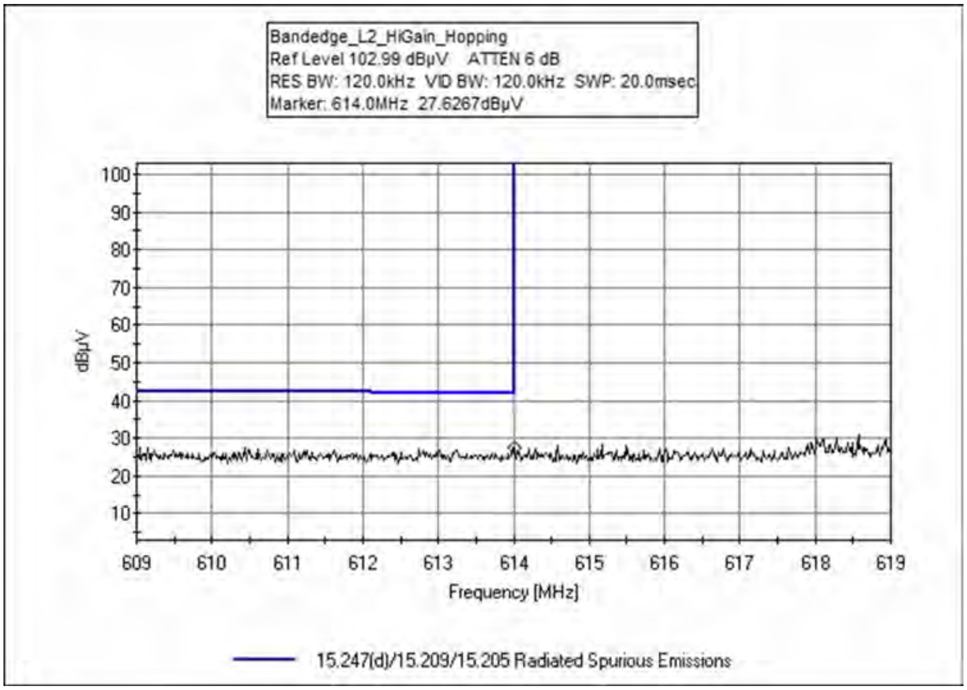


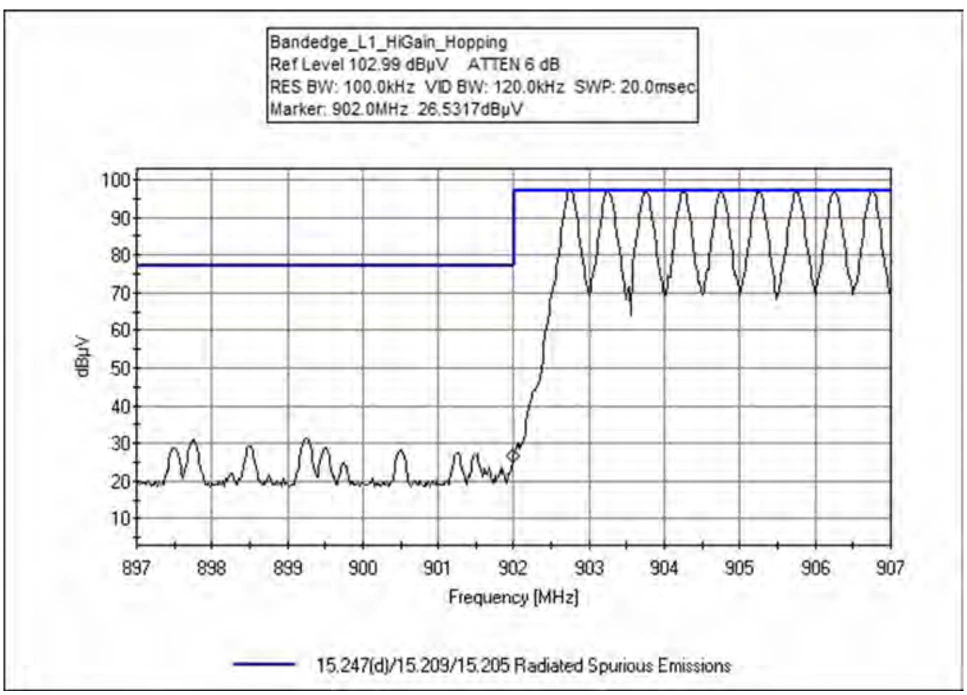


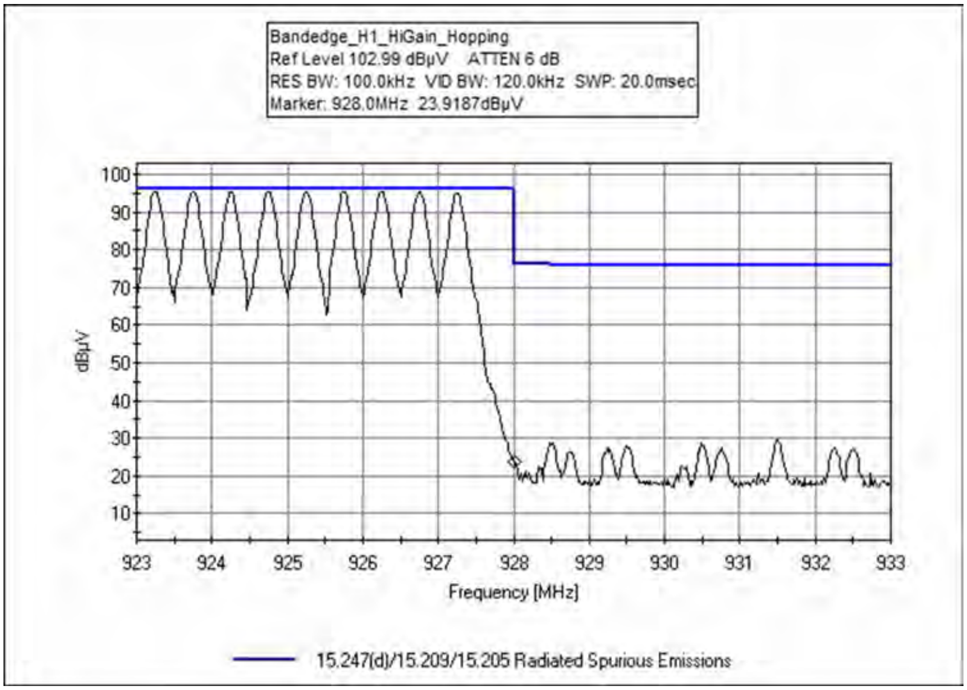

Bandedge plot_H1_HiGain
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 100.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 26.4727dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

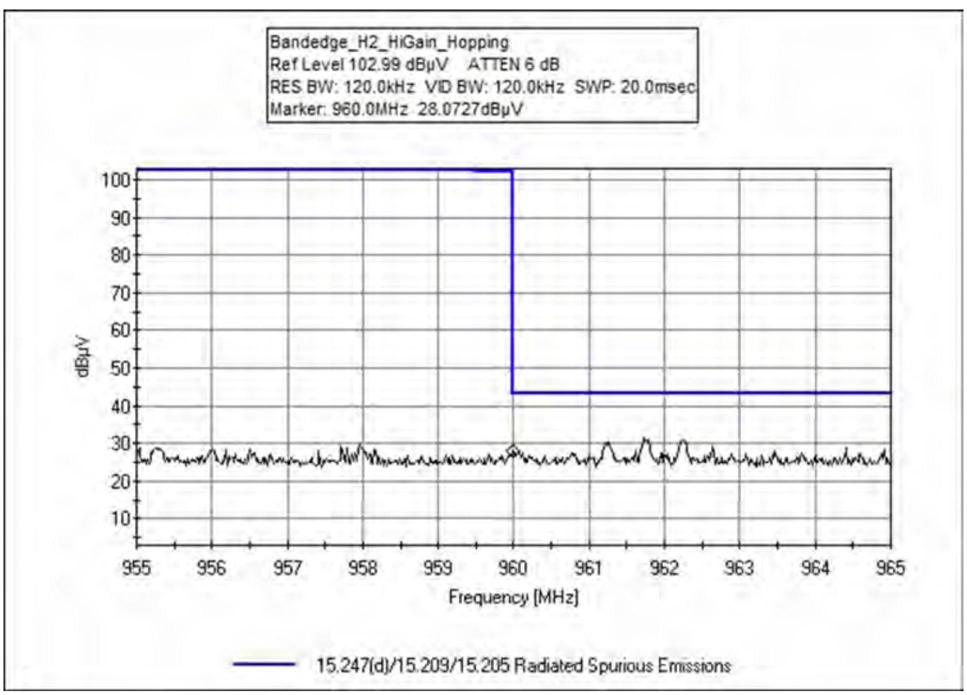

Bandedge plot_H2_HiGain
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 960.0MHz 27.9657dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

Highest Gain, Hopping






Bandedge_H1_HiGain_Hopping
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 100.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 23.9187dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions


Bandedge_H2_HiGain_Hopping
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 960.0MHz 28.0727dBµV
dBµV
Frequency [MHz]
15.247(d)/15.209/15.205 Radiated Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.247(d)/15.209/15.205 Radiated Spurious Emissions**		
Work Order #:	**108850**	Date:	10/20/2023
Test Type:	**Radiated Scan**	Time:	17:19:06
Tested By:	E. Wong	Sequence#:	3
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is placed on Styrofoam block

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX 902.75MHz, 914.75MHz, 927.25MHz

LO Frequency: 915MHz

TARI = 6.25us as intended.

Worst case Antenna Pattern, Lowest gain and associated power level evaluated.

Frequency Range of Measurement: 614-960MHz
Restricted band RBW=120 kHz,VBW=360 kHz
Non restricted band RBW=100 kHz,VBW=300 kHz

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 24°C
Relative Humidity: 55%
Pressure: 99.8kPa

Additional evaluation was performed with the EUT lay flat on the Styrofoam. Worst case emission presented.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T2	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/31/2022	12/31/2024
T4	AN00309	Preamp	8447D	12/13/2021	12/13/2023
T5	ANP05050	Cable	RG223/U	12/31/2022	12/31/2024
	AN03430	Attenuator	75A-10-12	1/14/2022	1/14/2024
	ANP06664	Cable	PHASEFLEX FJR01N01036.0	3/25/2022	3/25/2024
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	614.000M	28.4	+0.0 +0.4	+26.3	+4.7	-27.4	+0.0	32.4	46.0 Bandedge_LowGain_L2	-13.6	Horiz
2	960.000M	29.0	+0.0 +0.5	+31.4	+6.1	-27.3	+0.0	39.7	54.0 Bandedge H2_LowGain_Hopping	-14.3	Horiz
3	614.000M	27.6	+0.0 +0.4	+26.3	+4.7	-27.4	+0.0	31.6	46.0 Bandedge_L2_HiGain_Hopping	-14.4	Horiz
4	614.000M	27.3	+0.0 +0.4	+26.3	+4.7	-27.4	+0.0	31.3	46.0 Bandedge_L2_HiGain	-14.7	Horiz
5	614.000M	26.9	+0.0 +0.4	+26.3	+4.7	-27.4	+0.0	30.9	46.0 Bandedge L2_LowGain_Hopping	-15.1	Horiz
6	960.000M	28.1	+0.0 +0.5	+31.4	+6.1	-27.3	+0.0	38.8	54.0 Bandedge_H2_HiGain_Hopping	-15.2	Horiz
7	960.000M	28.0	+0.0 +0.5	+31.4	+6.1	-27.3	+0.0	38.7	54.0 Bandedge_LowGain_H2	-15.3	Horiz
8	960.000M	28.0	+0.0 +0.5	+31.4	+6.1	-27.3	+0.0	38.7	54.0 Bandedge_H2_HiGain	-15.3	Horiz
9	902.000M	33.7	+0.0 +0.5	+29.5	+5.8	+0.0	+0.0	69.5	115.0 Bandedge_LowGain_L1	-45.5	Horiz

10	928.000M	30.4	+0.0 +0.5	+30.5	+5.9	+0.0	+0.0	67.3	115.0 Bandedge_LowGain_H1	-47.7	Horiz
11	928.000M	26.5	+0.0 +0.5	+30.5	+5.9	+0.0	+0.0	63.4	113.0 Bandedge_Hi_HiGain	-49.6	Horiz
12	902.000M	29.0	+0.0 +0.5	+29.5	+5.8	+0.0	+0.0	64.8	115.0 Bandedge L1_LowGain_Hopping	-50.2	Horiz
13	902.000M	26.9	+0.0 +0.5	+29.5	+5.8	+0.0	+0.0	62.7	113.0 Bandedge_L1_HiGain	-50.3	Horiz
14	928.000M	27.6	+0.0 +0.5	+30.5	+5.9	+0.0	+0.0	64.5	115.0 Bandedge H1_LowGain_Hopping	-50.5	Horiz
15	902.000M	26.5	+0.0 +0.5	+29.5	+5.8	+0.0	+0.0	62.3	113.0 Bandedge_L1_HiGain_Hopping	-50.7	Horiz
16	928.000M	23.9	+0.0 +0.5	+30.5	+5.9	+0.0	+0.0	60.8	113.0 Bandedge_H1_HiGain_Hopping	-52.2	Horiz

Test Setup Photo(s)

0.8m

Below 1GHz, View 1

Below 1GHz, View 2

Flat View

Upright View

1.5m

Front View

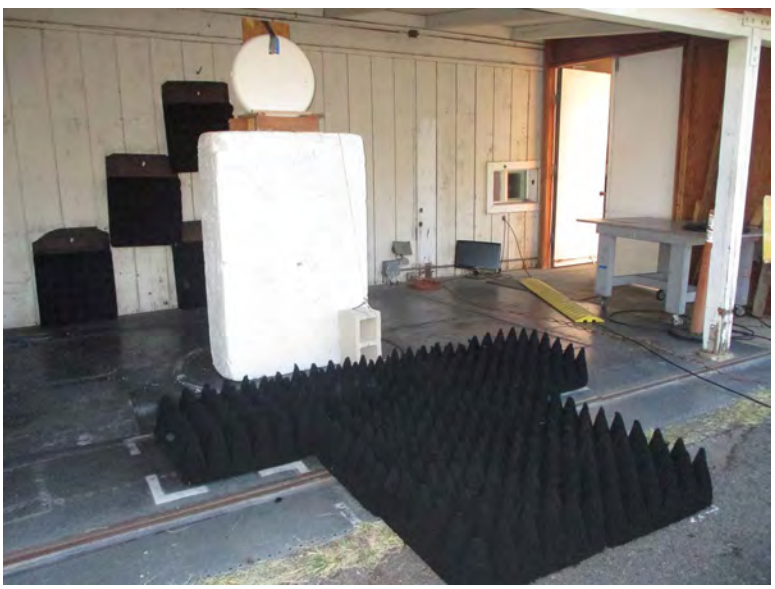
Back View

Flat View

Upright View

<u>**Above 1GHz**</u>

View 1



View 2

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**108850**	Date:	10/21/2023
Test Type:	**Conducted Emissions**	Time:	16:22:13
Tested By:	E. Wong	Sequence#:	10
Software:	EMITest 5.03.20		120/60Hz

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 set on a test bench.

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX: Hopping

LO Frequency: 915MHz

TARI = 6.25us as intended.

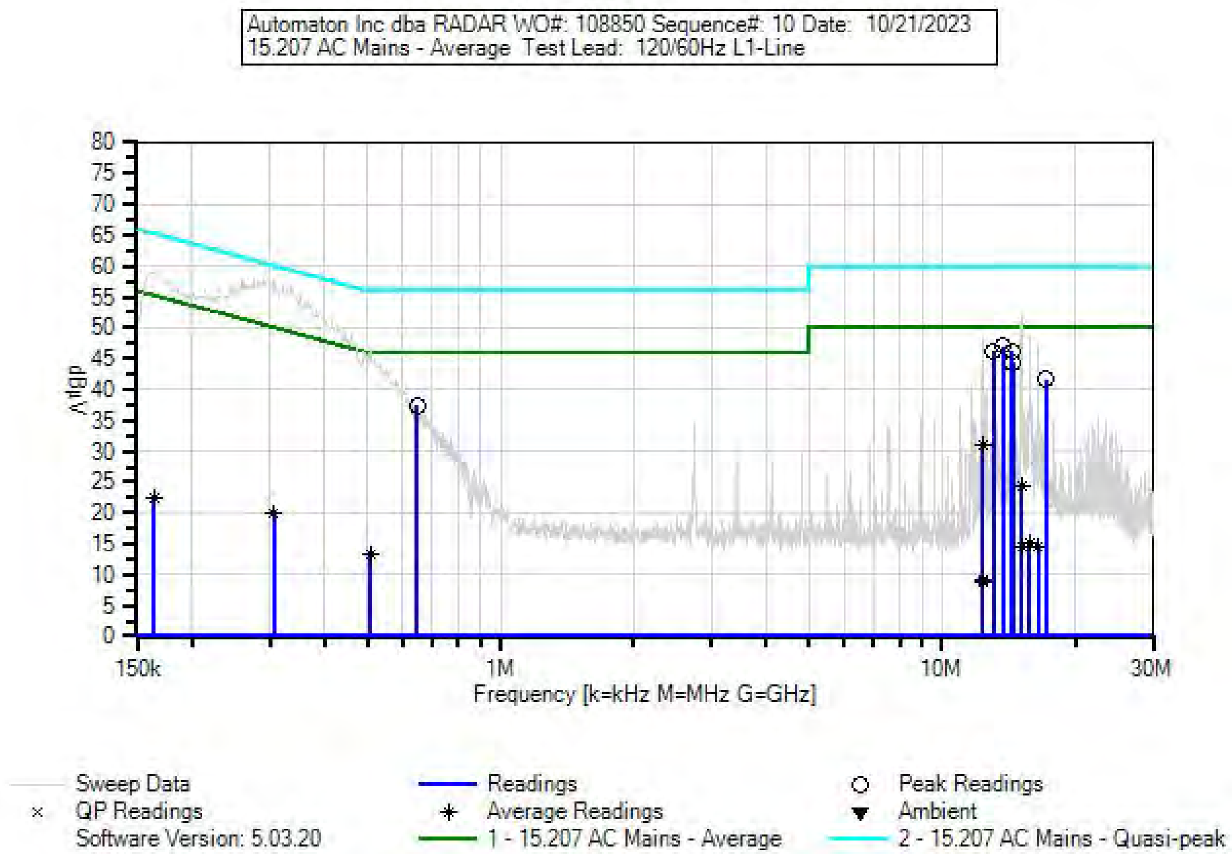
Worst case Antenna Pattern and associated power level evaluated.
Lowest gain

Frequency Range of Measurement: 150kHz- 30MHz.
150 kHz-30 MHz;RBW=9 kHz,VBW=30kHz

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 22.5°C
Relative Humidity: 55%
Pressure: 99.8kPa

Evaluation performed at the AC mains of the support DC power supply which powers the Power Over Ethernet.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T1	ANP08007	Attenuator	SA18N10W-06	10/24/2022	10/24/2024
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/2/2023	1/2/2025
T4	AN00847.1	50uH LISN-Line 1	3816/2NM	4/19/2023	4/19/2024
	AN00847.1	50uH LISN-Line 2(N)	3816/2NM	4/19/2023	4/19/2024

Measurement Data: Reading listed by margin. Test Lead: L1-Line

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.752M	40.6	+5.8	+0.3	+0.2	+0.1	+0.0	47.0	50.0	-3.0	L1-Li
2	13.031M	39.8	+5.8	+0.3	+0.2	+0.1	+0.0	46.2	50.0	-3.8	L1-Li
3	14.418M	39.8	+5.8	+0.3	+0.2	+0.1	+0.0	46.2	50.0	-3.8	L1-Li
4	14.445M	37.9	+5.8	+0.3	+0.2	+0.1	+0.0	44.3	50.0	-5.7	L1-Li
5	17.157M	35.3	+5.8	+0.3	+0.2	+0.1	+0.0	41.7	50.0	-8.3	L1-Li
6	645.953k	31.4	+5.8	+0.0	+0.2	+0.0	+0.0	37.4	46.0	-8.6	L1-Li
7	12.330M Ave	24.7	+5.8	+0.3	+0.2	+0.1	+0.0	31.1	50.0	-18.9	L1-Li
8	15.103M Ave	17.9	+5.8	+0.3	+0.2	+0.1	+0.0	24.3	50.0	-25.7	L1-Li
^	15.103M	44.8	+5.8	+0.3	+0.2	+0.1	+0.0	51.2	50.0	+1.2	L1-Li
10	306.348k Ave	14.1	+5.8	+0.0	+0.1	+0.0	+0.0	20.0	50.1	-30.1	L1-Li
^	306.348k	52.0	+5.8	+0.0	+0.1	+0.0	+0.0	57.9	50.1	+7.8	L1-Li
12	506.330k Ave	7.2	+5.8	+0.0	+0.2	+0.0	+0.0	13.2	46.0	-32.8	L1-Li
^	506.329k	40.7	+5.8	+0.0	+0.2	+0.0	+0.0	46.7	46.0	+0.7	L1-Li
14	163.816k Ave	16.2	+5.8	+0.0	+0.4	+0.0	+0.0	22.4	55.3	-32.9	L1-Li
^	163.815k	52.8	+5.8	+0.0	+0.4	+0.0	+0.0	59.0	55.3	+3.7	L1-Li
16	15.779M Ave	8.9	+5.8	+0.3	+0.2	+0.1	+0.0	15.3	50.0	-34.7	L1-Li
17	15.779M Ave	8.7	+5.8	+0.3	+0.2	+0.1	+0.0	15.1	50.0	-34.9	L1-Li
^	15.779M	42.5	+5.8	+0.3	+0.2	+0.1	+0.0	48.9	50.0	-1.1	L1-Li
19	16.499M Ave	8.3	+5.8	+0.3	+0.2	+0.1	+0.0	14.7	50.0	-35.3	L1-Li
^	16.499M	40.9	+5.8	+0.3	+0.2	+0.1	+0.0	47.3	50.0	-2.7	L1-Li

21	15.130M Ave	8.1	+5.8	+0.3	+0.2	+0.1	+0.0	14.5	50.0	-35.5	L1-Li
^	15.130M	46.0	+5.8	+0.3	+0.2	+0.1	+0.0	52.4	50.0	+2.4	L1-Li
23	12.382M Ave	2.8	+5.8	+0.3	+0.2	+0.1	+0.0	9.2	50.0	-40.8	L1-Li
^	12.382M	42.0	+5.8	+0.3	+0.2	+0.1	+0.0	48.4	50.0	-1.6	L1-Li
25	12.355M Ave	2.5	+5.8	+0.3	+0.2	+0.1	+0.0	8.9	50.0	-41.1	L1-Li
^	12.355M	41.0	+5.8	+0.3	+0.2	+0.1	+0.0	47.4	50.0	-2.6	L1-Li

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • (714) 993-6112		
Customer:	**Automaton Inc. dba RADAR**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**108850**	Date:	10/21/2023
Test Type:	**Conducted Emissions**	Time:	16:28:22
Tested By:	E. Wong	Sequence#:	11
Software:	EMITest 5.03.20		120/60Hz

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 set on a test bench .

The EUT is powered via a cat 6 network cable (nominal voltage 48Vdc) which is connected to a remotely located POE Injector. Connected to the POE Injector via cat 6 cable is a remotely located computer.

The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.

Frequency Range of EUT: 902.75MHz-927.25MHz

TX :Hopping

LO Frequency: 915MHz

TARI = 6.25us as intended.

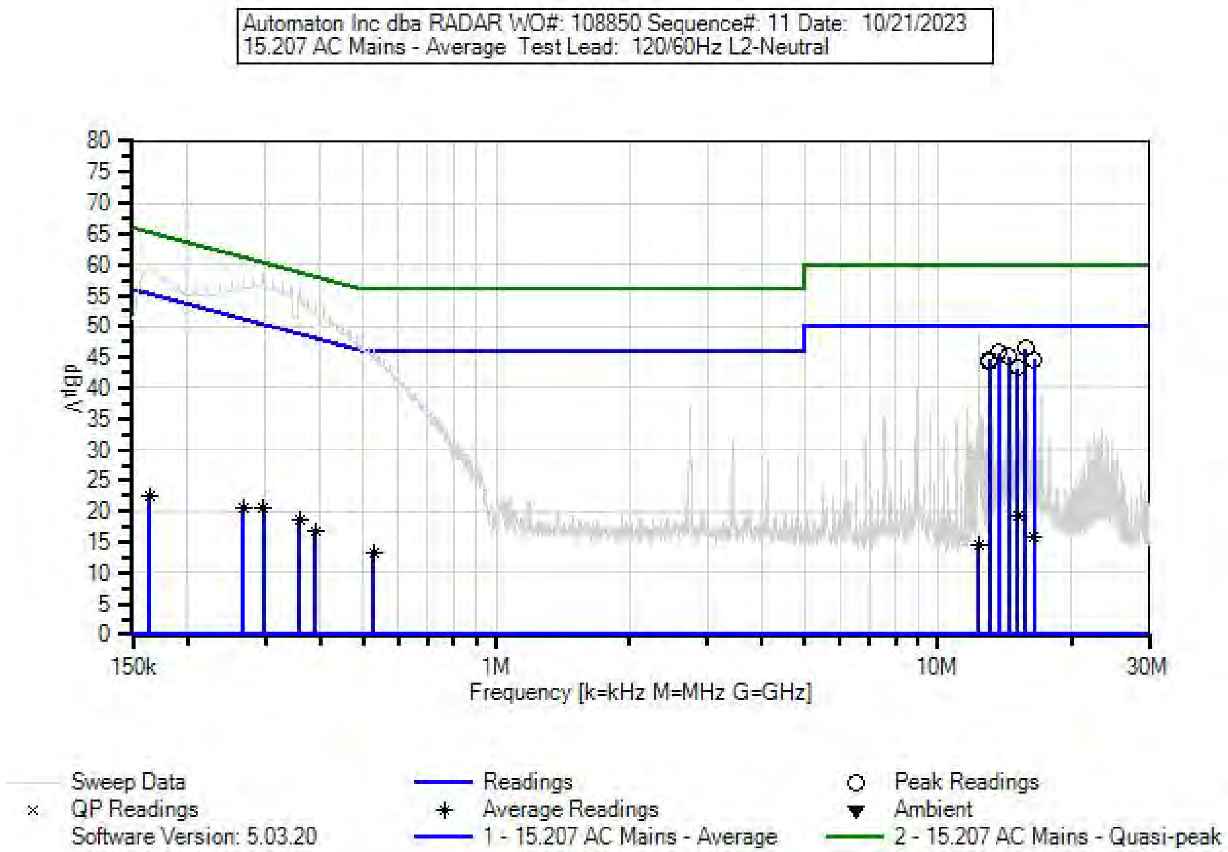
Worst case Antenna Pattern and associated power level evaluated.
Lowest gain

Frequency Range of Measurement: 150kHz-30MHz
150 kHz-30 MHz;RBW=9 kHz,VBW=30kHz

Site A
Test Method: ANSI C63.10 (2013)

Test Environment Conditions:
Temperature: 22.5°C
Relative Humidity: 55%
Pressure: 99.8kPa

Evaluation performed at the AC mains of the support DC power supply which powers the Power Over Ethernet.



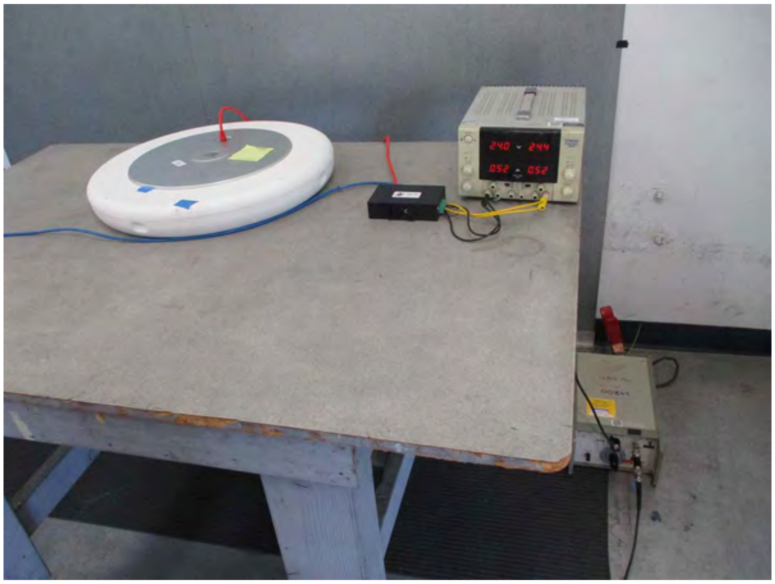
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T1	ANP08007	Attenuator	SA18N10W-06	10/24/2022	10/24/2024
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	AN02343	High Pass Filter	HE9615-150K-50-720B	1/2/2023	1/2/2025
	AN00847.1	50uH LISN-Line 1	3816/2NM	4/19/2023	4/19/2024
T4	AN00847.1	50uH LISN-Line 2(N)	3816/2NM	4/19/2023	4/19/2024

Measurement Data: Reading listed by margin. Test Lead: L2-Neutral

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	15.806M	40.0	+5.8	+0.3	+0.2	+0.1	+0.0	46.4	50.0	-3.6	L2-Ne
2	13.761M	39.4	+5.8	+0.3	+0.2	+0.1	+0.0	45.8	50.0	-4.2	L2-Ne
3	14.427M	38.7	+5.8	+0.3	+0.2	+0.1	+0.0	45.1	50.0	-4.9	L2-Ne
4	16.517M	38.2	+5.8	+0.3	+0.2	+0.1	+0.0	44.6	50.0	-5.4	L2-Ne
5	13.040M	38.2	+5.8	+0.3	+0.2	+0.1	+0.0	44.6	50.0	-5.4	L2-Ne
6	13.058M	38.0	+5.8	+0.3	+0.2	+0.1	+0.0	44.4	50.0	-5.6	L2-Ne
7	15.157M	36.8	+5.8	+0.3	+0.2	+0.1	+0.0	43.2	50.0	-6.8	L2-Ne
8	297.623k Ave	14.5	+5.8	+0.0	+0.1	+0.0	+0.0	20.4	50.3	-29.9	L2-Ne
^	297.622k	52.6	+5.8	+0.0	+0.1	+0.0	+0.0	58.5	50.3	+8.2	L2-Ne
10	358.708k Ave	12.7	+5.8	+0.0	+0.1	+0.0	+0.0	18.6	48.8	-30.2	L2-Ne
^	358.708k	50.2	+5.8	+0.0	+0.1	+0.0	+0.0	56.1	48.8	+7.3	L2-Ne
12	267.080k Ave	14.7	+5.8	+0.0	+0.2	+0.0	+0.0	20.7	51.2	-30.5	L2-Ne
^	267.080k	52.1	+5.8	+0.0	+0.2	+0.0	+0.0	58.1	51.2	+6.9	L2-Ne
14	15.121M Ave	13.0	+5.8	+0.3	+0.2	+0.1	+0.0	19.4	50.0	-30.6	L2-Ne
^	15.121M	42.5	+5.8	+0.3	+0.2	+0.1	+0.0	48.9	50.0	-1.1	L2-Ne
16	389.978k Ave	11.0	+5.8	+0.0	+0.1	+0.0	+0.0	16.9	48.1	-31.2	L2-Ne
^	389.977k	47.8	+5.8	+0.0	+0.1	+0.0	+0.0	53.7	48.1	+5.6	L2-Ne
18	163.817k Ave	16.4	+5.8	+0.0	+0.4	+0.0	+0.0	22.6	55.3	-32.7	L2-Ne
^	163.816k	53.0	+5.8	+0.0	+0.4	+0.0	+0.0	59.2	55.3	+3.9	L2-Ne
20	527.420k Ave	7.3	+5.8	+0.0	+0.2	+0.0	+0.0	13.3	46.0	-32.7	L2-Ne
^	527.419k	40.5	+5.8	+0.0	+0.2	+0.0	+0.0	46.5	46.0	+0.5	L2-Ne
22	16.499M Ave	9.4	+5.8	+0.3	+0.2	+0.1	+0.0	15.8	50.0	-34.2	L2-Ne
23	12.382M Ave	8.3	+5.8	+0.3	+0.2	+0.1	+0.0	14.7	50.0	-35.3	L2-Ne
^	12.382M	42.2	+5.8	+0.3	+0.2	+0.1	+0.0	48.6	50.0	-1.4	L2-Ne

Test Setup Photo(s)



Front View

Side View

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.