Automaton Inc. dba RADAR

TEST REPORT FOR

RFID Sensor Operating in the UHF Band
Model: RS550

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928 MHz)

Report No.: 110388-10

Date of issue: March 13, 2025

Test Certificate # 803.01

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

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

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Administrative Information

Test Report Information

REPORT PREPARED FOR:

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

Representative: Craig Owens
Customer Reference Number: 2845-SD1

REPORT PREPARED BY:

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

Project Number: 110388

DATE OF EQUIPMENT RECEIPT: December 12, 2024
DATE(S) OF TESTING: January 28 & 30. 2025 and
February 4, 7, 17 & 18, 2025

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 – 15.207 & 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

Equipment Tested:

Device	Manufacturer	Model #	S/N
RFID sensor operating in the UHF band	Automaton Inc. dba RADAR	RS550	000761

Support Equipment:

Device	Manufacturer	Model #	S/N
PoE+ Switch	Netgear	GS308PP	76G12BDK030A9
NUC	Intel	NUC8HN	BTHN009003HU
USB to Ethernet Adapter	LIONWEI	LIUC0517	24239
Laptop	Dell	Inspiron 16 76109	NA
Wired Keyboard	Dell	KB216t3	CN-0081N8-LO300-25G-0EJ9-A01
LED Monitor	ViewSonic	VA2246MH-LEC	V1W2135A1003

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
RFID sensor operating in the UHF band	Automaton Inc. dba RADAR	RS550	000765

Support Equipment:

Device	Manufacturer	Model #	S/N
PoE+ Switch	Netgear	GS308PP	76G12BDK030A9
NUC	Intel	NUC8HN	BTHN009003HU
USB to Ethernet Adapter	LIONWEI	LIUC0517	24239
Laptop	Dell	Inspiron 16 76109	NA
Wired Keyboard	Dell	KB216t3	CN-0081N8-LO300-25G-0EJ9-A01
LED Monitor	ViewSonic	VA2246MH-LEC	V1W2135A1003

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
RFID sensor operating in the UHF band	Automaton Inc. dba RADAR	RS550	000761

Support Equipment:

Device	Manufacturer	Model #	S/N
High PoE Injector/Switch	Tycon Systems	POE-INJ-1000-WT	23520113
NUC	Intel	NUC8HN	BTHN009003HU
USB to Ethernet Adapter	LIONWEI	LIUC0517	24239
Laptop	Dell	Inspiron 16 76109	NA
Wired Keyboard	Dell	KB216t3	CN-0081N8-LO300-25G-0EJ9-A01
LED Monitor	ViewSonic	VA2246MH-LEC	V1W2135A1003

General Product Information:

Description of EUT
RFID sensor operating in the UHF band

Product Information	Manufacturer-Provided Details
Operating Frequencies Tested:	902.75MHz to 927.25MHz
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Maximum Duty Cycle:	98% or better
Modulation Type(s):	PR-ASK *
Number of TX Chains:	7
Beamforming Type:	Digital
Antenna Type(s) and Gain:	Patch Array 5.4 dBi to 6.6 dBi (measured ant gain + beamforming gain as provided by the manufacturer)
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	48 VDC from PoE
Firmware / Software Version(s):	2.127.0
Firmware / Software Description:	Real Time Operating System : Controls all functions related to reading the price tag and communication with the system host.
Firmware / Software Setting(s):	RTOS reads onboard EEPROM for calibration constants and serial number
Tune-up or Adjustment(s):	NONE: Each sensor has its own unique serial number and calibration file stored on board within an eeprom.
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
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

EUT Photo(s)

View 1

View 2

View 3

View 4

View 5

View 6

Support Equipment Photo(s)

Laptop

LED Monitor

NUC

PoE Injector

PoE Switch

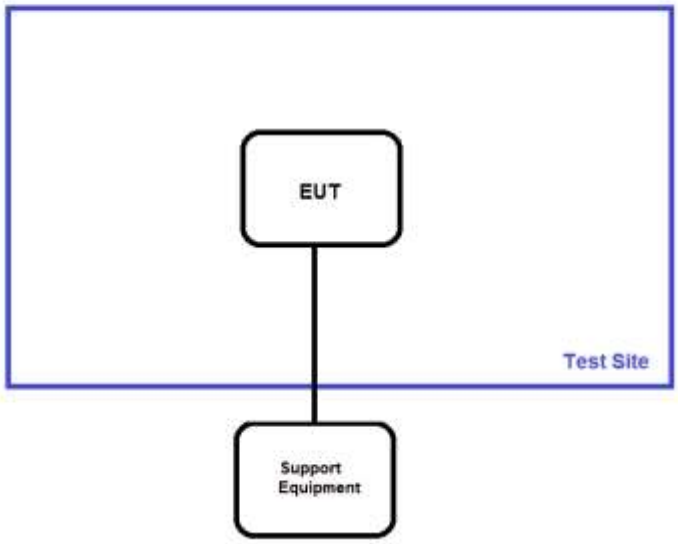
USB Adapter

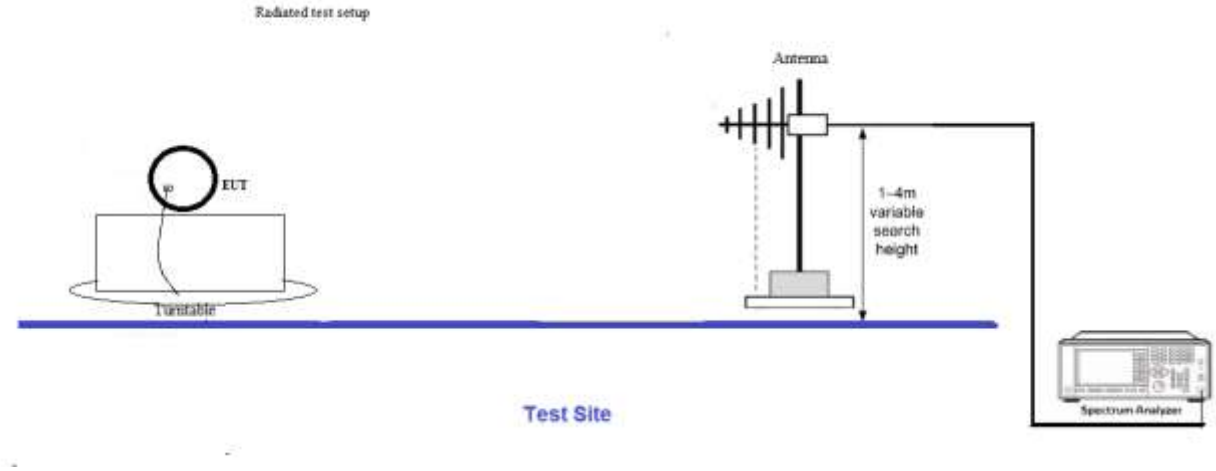
Wired Keyboard

Block Diagram of Test Setup(s)

Configuration#	Setup Description of Block Diagram
1	Conducted testing
2	Radiated testing

Test Setup Block Diagram





FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	E. Wong S. Yamamoto
Test Method:	ANSI C63.10 (2020)	Test Date(s):	1/28/2025 2/4/2025
Configuration:	1		
Test Setup:	The equipment under test (EUT) is set on a test bench. The EUT is powered via a unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT. The EUT is programmed to continuously hop on the same channel. For this test, it is the low, middle, and high channels listed below. Frequency range of EUT: 902.75MHz to 927.25MHz TX Low 902.75MHz, Middle 914.75MHz, High 927.25MHz LO Freq = 915MHz TARI = 6.25us Firmware = 2.127.0 Low Power setting. Streams 0, 1, 2, 3 and 0,4,5,6. Site D ANSI C63.10 2020 Test Environment Conditions: Temperature: 25°C, Humidity: 44%, Pressure: 99kPa		

Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	44

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03834	Spectrum Analyzer	Agilent	E4448A	5/6/2024	5/6/2026
03634	Spectrum Analyzer	Agilent	E4445A	3/21/2024	3/21/2025
03432	Attenuator	Aeroflex/Weinschel	90-30-34	11/1/2023	11/1/2025
07657	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	7/3/2024	7/3/2026

15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
902.75	0	PR-ASK	186.007	≤500	Pass
914.75	0	PR-ASK	186.032	≤500	Pass
927.25	0	PR-ASK	186.250	≤500	Pass
902.75	1	PR-ASK	186.121	≤500	Pass
914.75	1	PR-ASK	186.178	≤500	Pass
927.25	1	PR-ASK	186.302	≤500	Pass
902.75	2	PR-ASK	186.650	≤500	Pass
914.75	2	PR-ASK	186.164	≤500	Pass
927.25	2	PR-ASK	186.442	≤500	Pass
902.75	3	PR-ASK	186.166	≤500	Pass
914.75	3	PR-ASK	186.208	≤500	Pass
927.25	3	PR-ASK	186.513	≤500	Pass
902.75	0	PR-ASK	186.003	≤500	Pass
914.75	0	PR-ASK	186.025	≤500	Pass
927.25	0	PR-ASK	186.411	≤500	Pass
902.75	4	PR-ASK	186.023	≤500	Pass
914.75	4	PR-ASK	186.000	≤500	Pass
927.25	4	PR-ASK	186.287	≤500	Pass
902.75	5	PR-ASK	186.227	≤500	Pass
914.75	5	PR-ASK	186.083	≤500	Pass
927.25	5	PR-ASK	186.248	≤500	Pass
902.75	6	PR-ASK	186.250	≤500	Pass
914.75	6	PR-ASK	186.000	≤500	Pass
927.25	6	PR-ASK	186.166	≤500	Pass

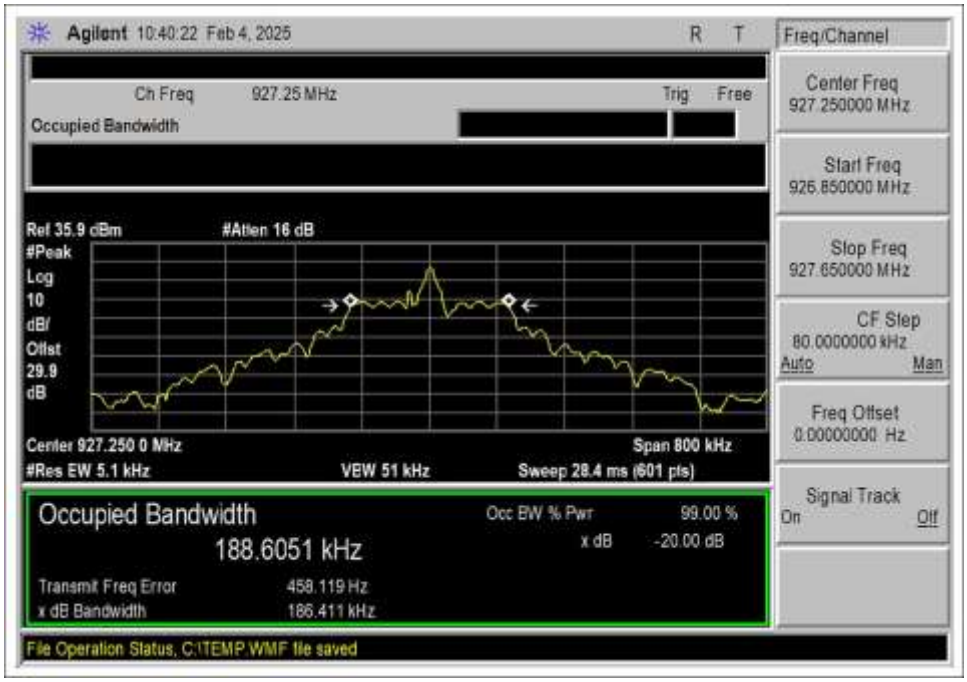
Measured in hopping mode instead of constant transmit on one channel due to limitation of test script in single channel constant transmit mode.

Plot(s)

Antenna 0, 0123, Low Power, High Channel

Antenna 0, 0123, Low Power, Low Channel

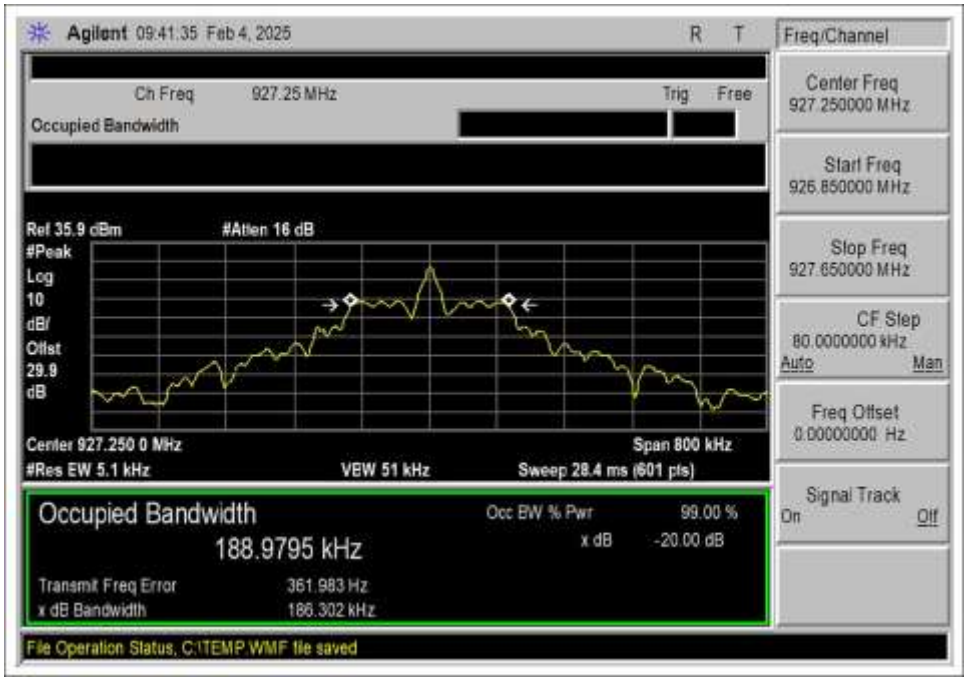
Antenna 0, 0123, Low Power, Middle Channel



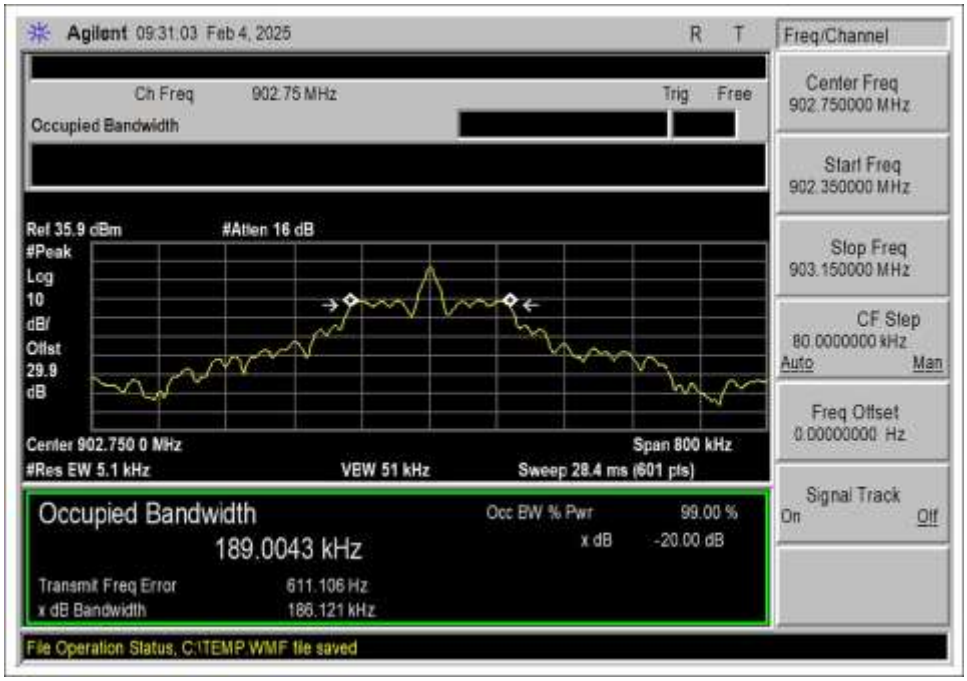
Antenna 0, 0456, Low Power, High Channel

Antenna 0, 0456, Low Power, Low Channel

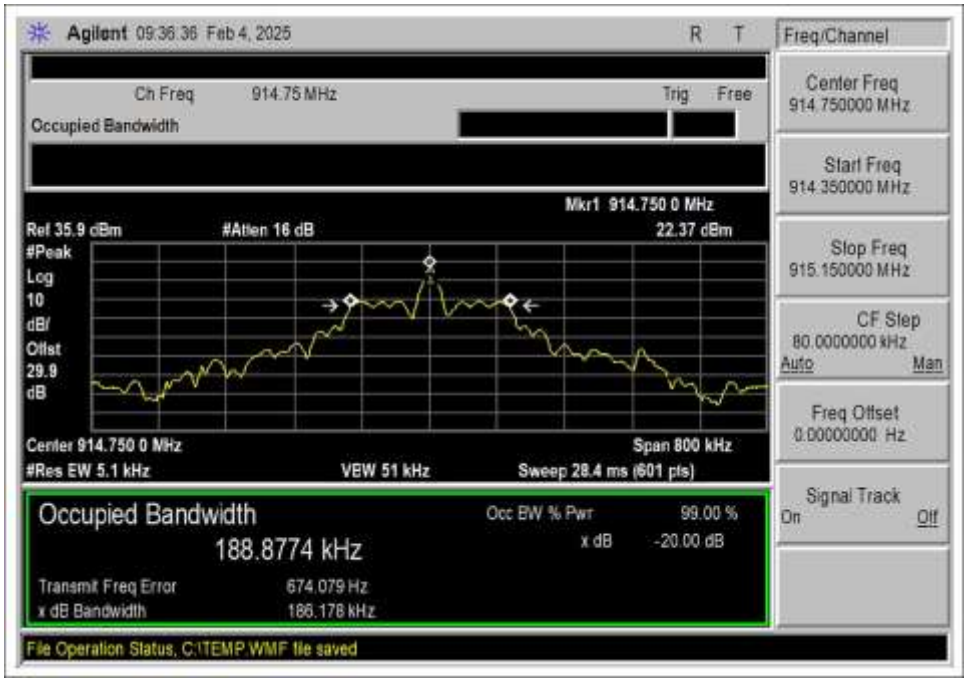
Antenna 0, 0456, Low Power, Middle Channel



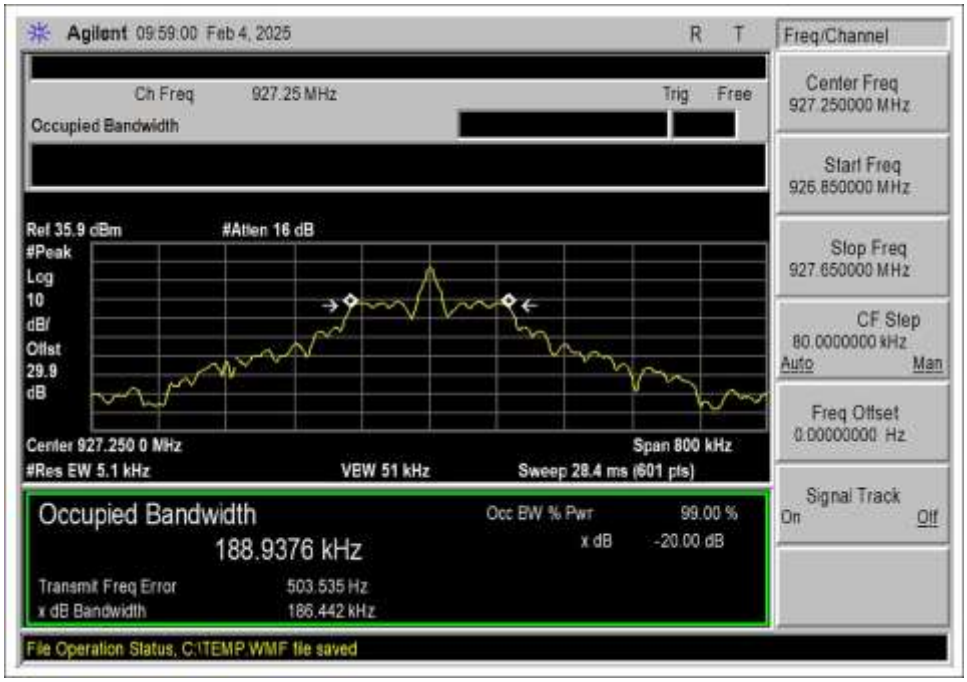
Antenna 1, 0123, Low Power, High Channel



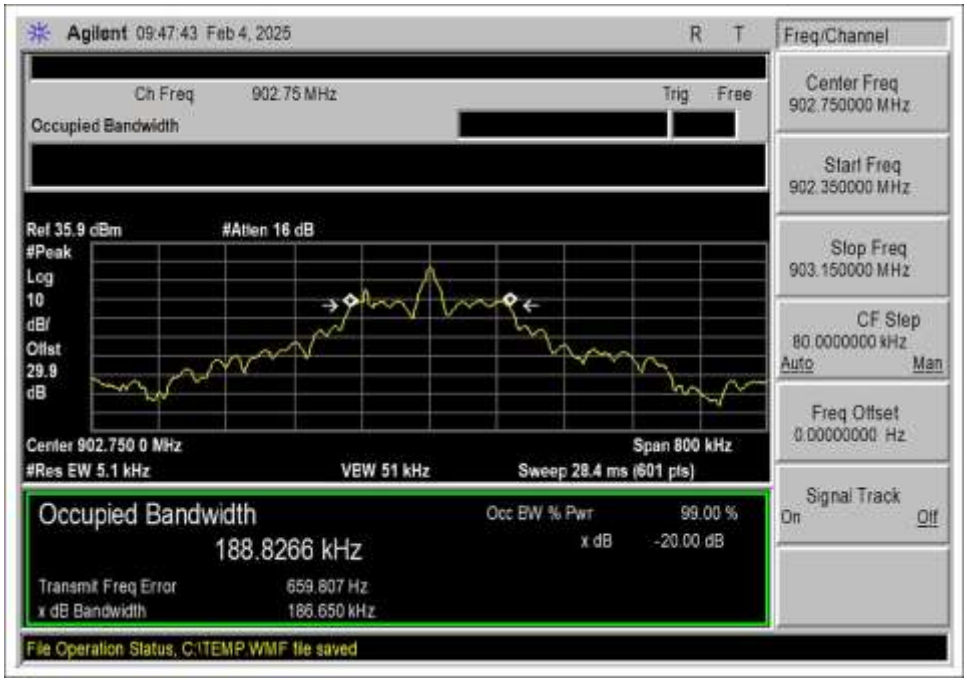
Antenna 1, 0123, Low Power, Low Channel



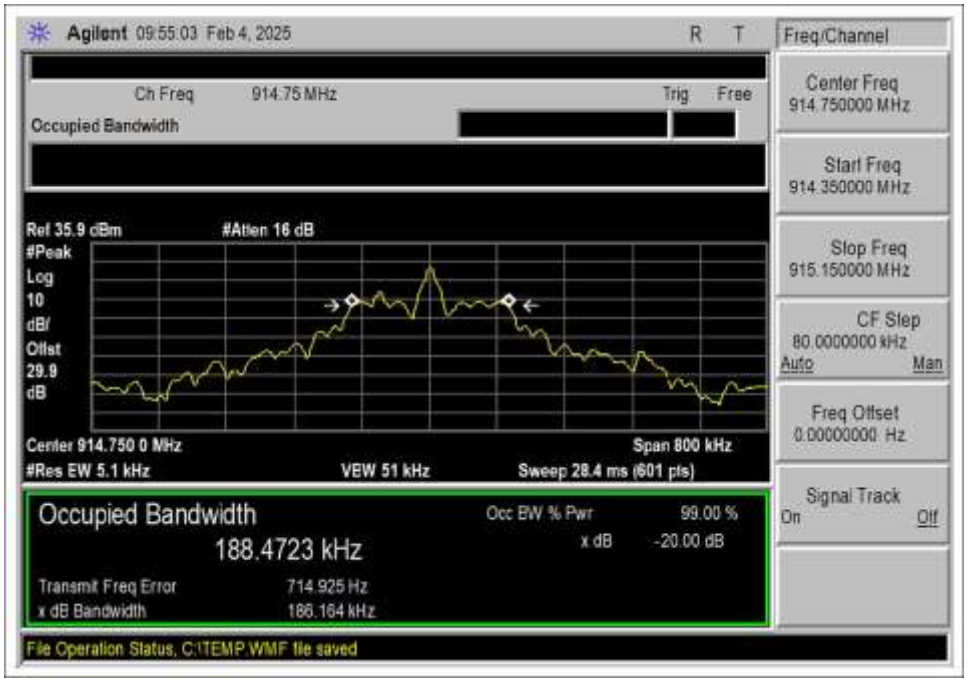
Antenna 1, 0123, Low Power, Middle Channel



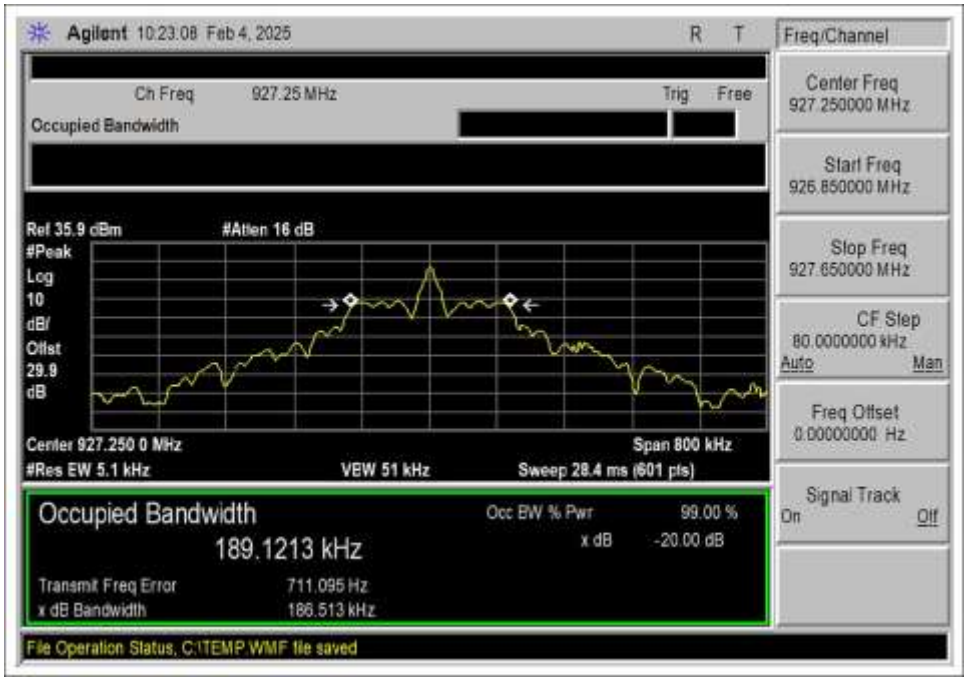
Antenna 2, 0123, Low Power, High Channel



Antenna 2, 0123, Low Power, Low Channel



Antenna 2, 0123, Low Power, Middle Channel

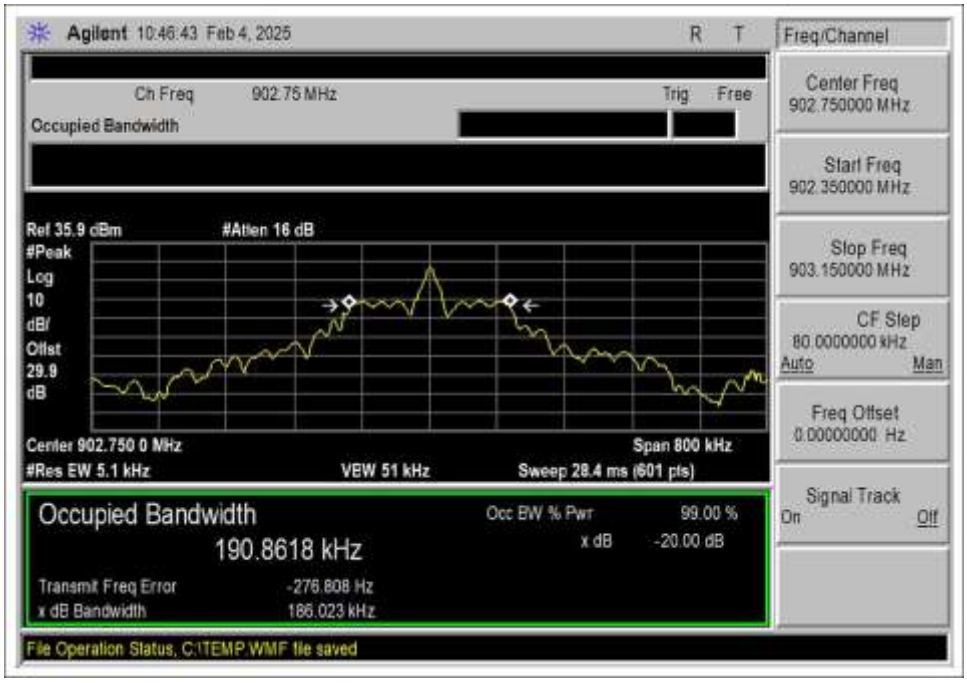


Antenna 3, 0123, Low Power, High Channel

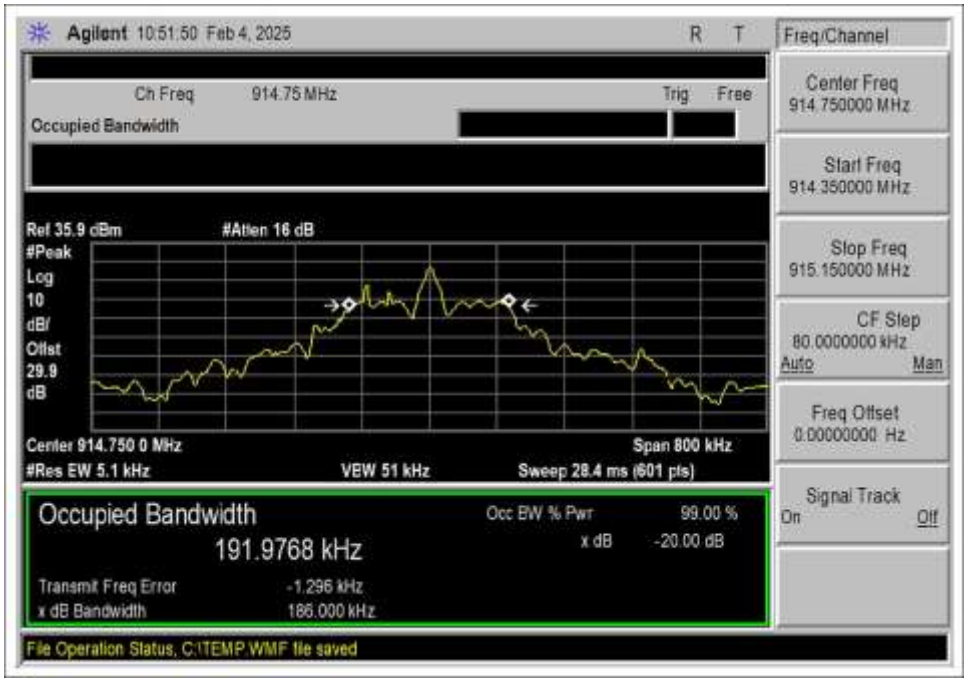
Antenna 3, 0123, Low Power, Low Channel

Antenna 3, 0123, Low Power, Middle Channel

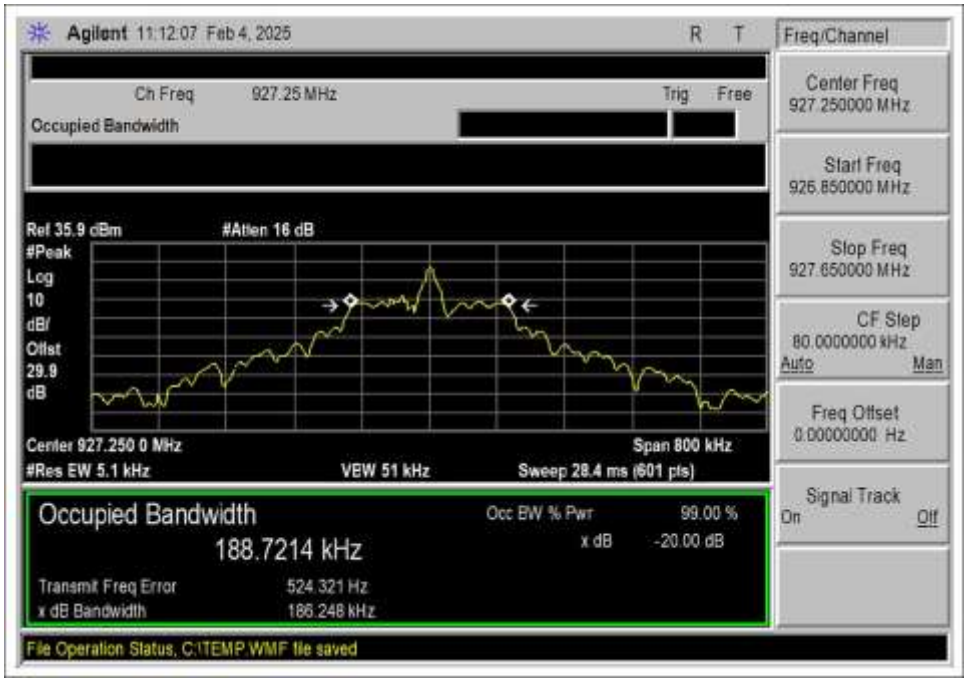
Antenna 4, 0456, Low Power, High Channel



Antenna 4, 0456, Low Power, Low Channel

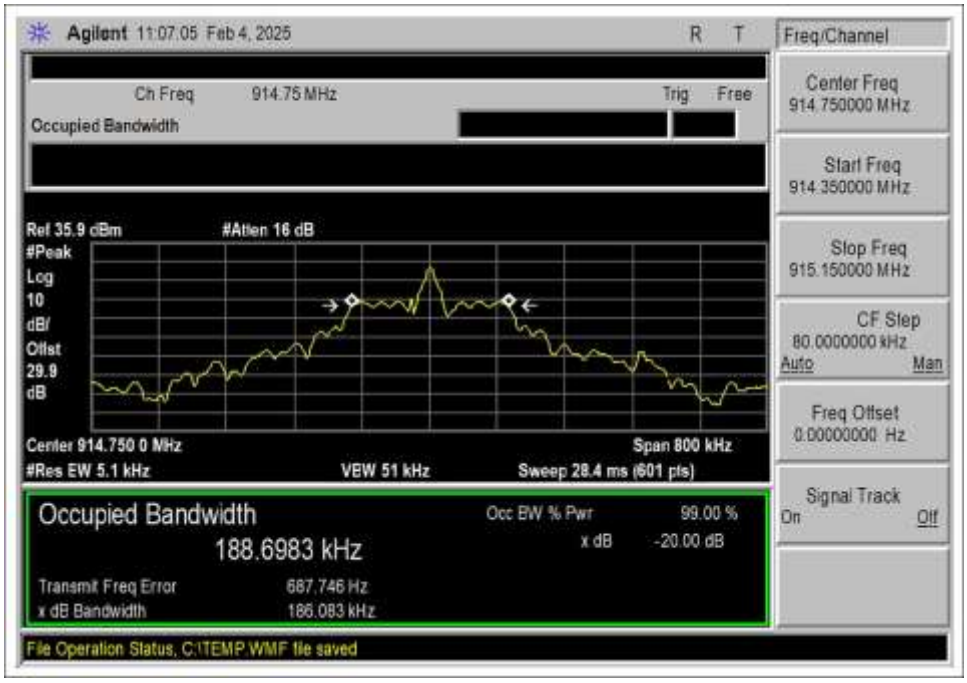


Antenna 4, 0456, Low Power, Middle Channel

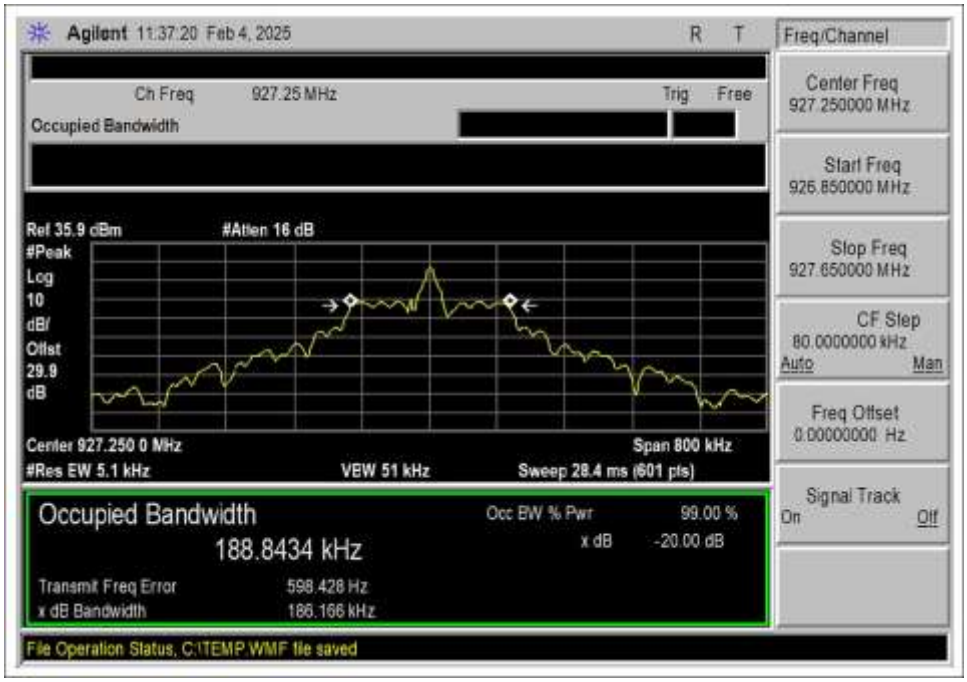


Antenna 5, 0456, Low Power, High Channel

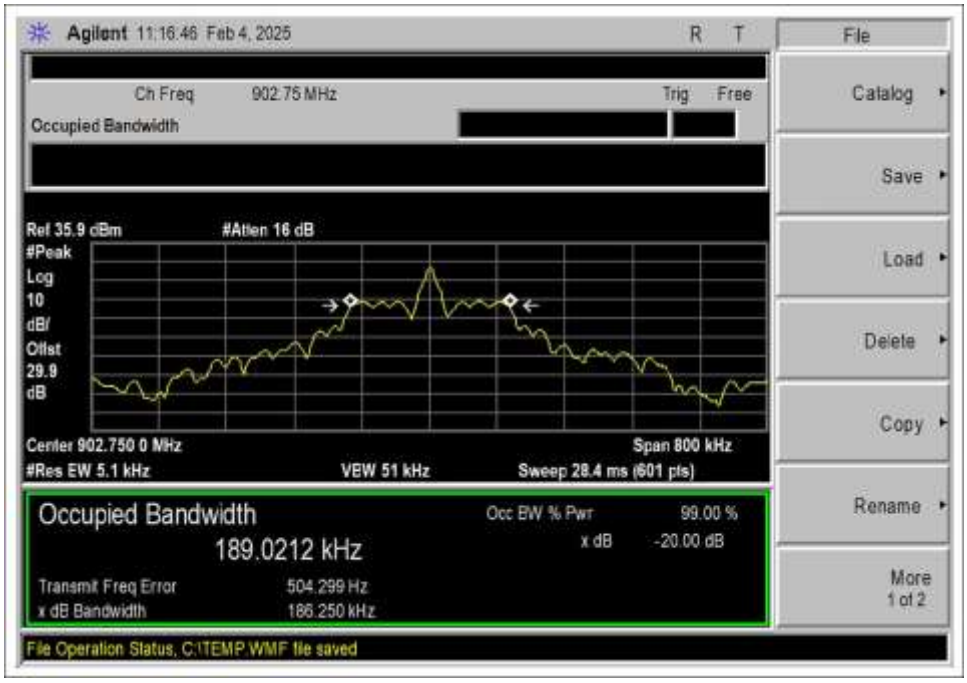
Antenna 5, 0456, Low Power, Low Channel



Antenna 5, 0456, Low Power, Middle Channel



Antenna 6, 0456, Low Power, High Channel



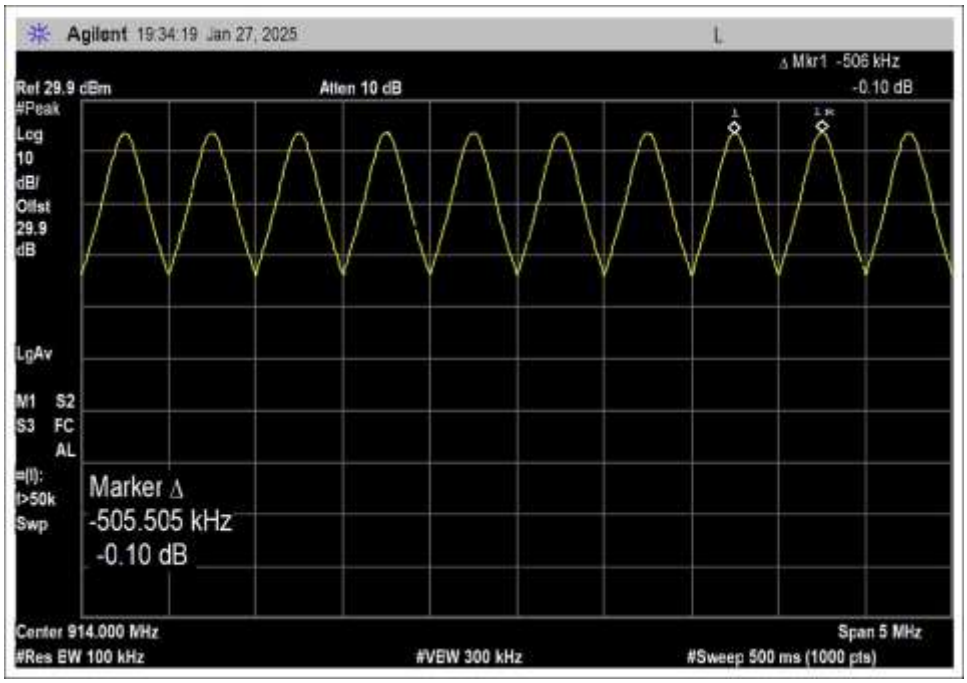
Antenna 6, 0456, Low Power, Low Channel

Antenna 6, 0456, Low Power, Middle 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**
0	PR-ASK	505.505	> 186.7	Pass

Plot(s)

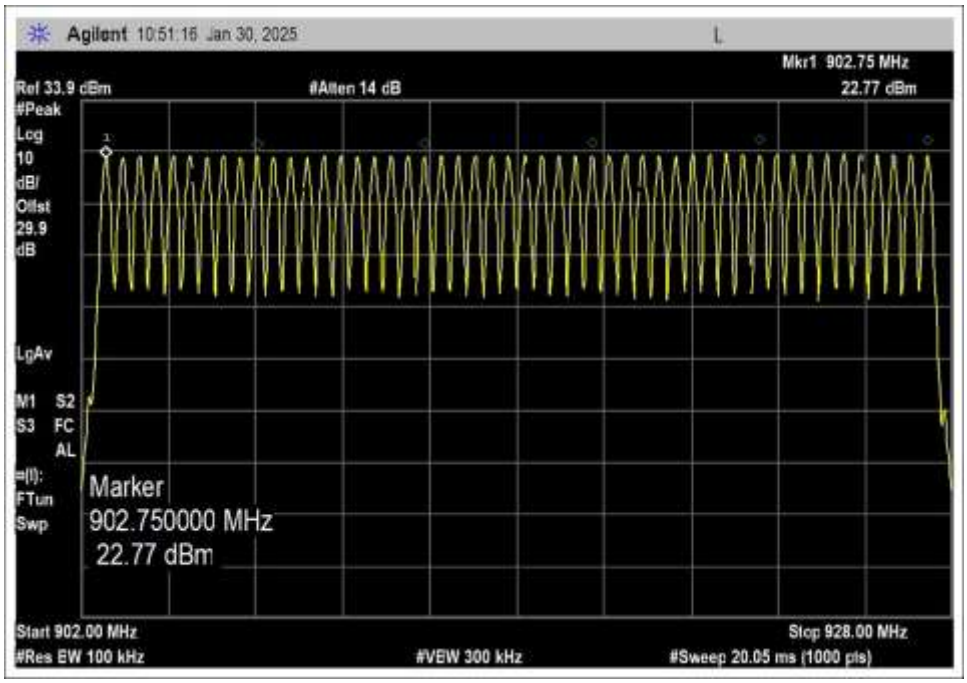


Channel Separation

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

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

Plot(s)



Number of Hopping Channels

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

Test Data Summary				
Observation Period, P_{obs} is derived from the following: $P_{Obs} = \begin{cases} 20\ Seconds & 20\ dB\ BW < 250kHz \\ 10\ Seconds & 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (ms)**	**Limit (ms/P_{obs})**	**Results**
0	PR-ASK	391.437088	≤400	0

Measured results are calculated as follows:

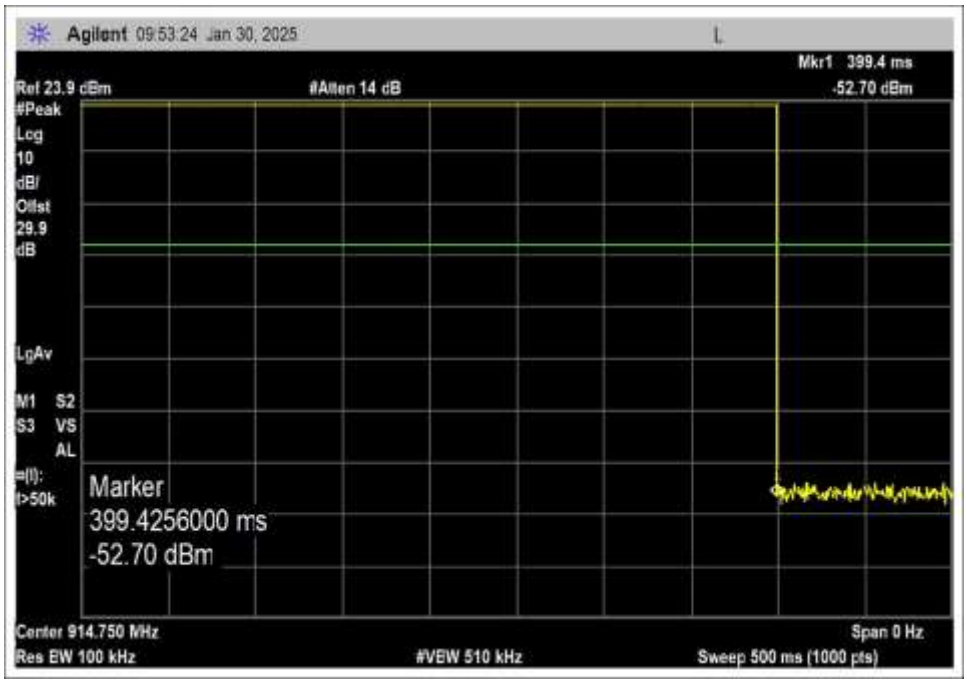
$$Dwell\ time = \left(\sum_{Bursts} RF\ Burst\ On\ Time + \sum_{Control} Control\ Signal\ On\ time \right)\Big|_{P_{obs}}$$

Actual Values:

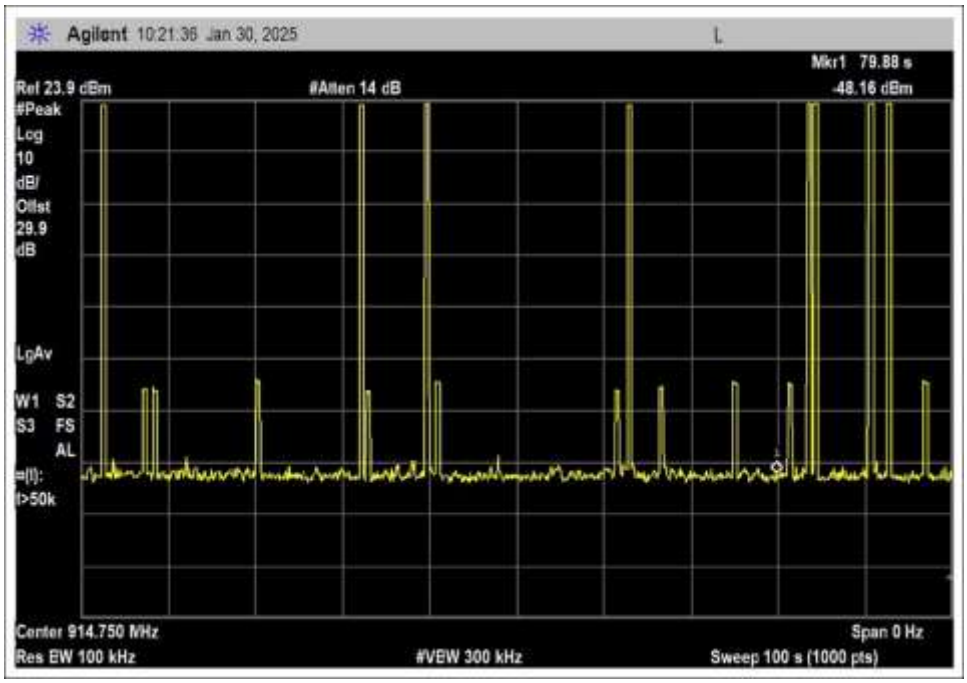
Parameter	Value
Observation Time:	100 seconds
Number of RF Bursts / Observation Time:*	4.9
On time of one RF Burst:	399.4256ms
Number of Control or other signals / P_{obs}:	NA
On time of Control or other Signals:	NA
Total Measured On Time:**	0.391437088

* This value is the average number of RF bursts occurring in 100 seconds (calculated from ten 100 second sweeps)
**(Number of RF Bursts/Pobs x On time RF Burst) or 0.98 x 399.4256ms = 391.437088ms

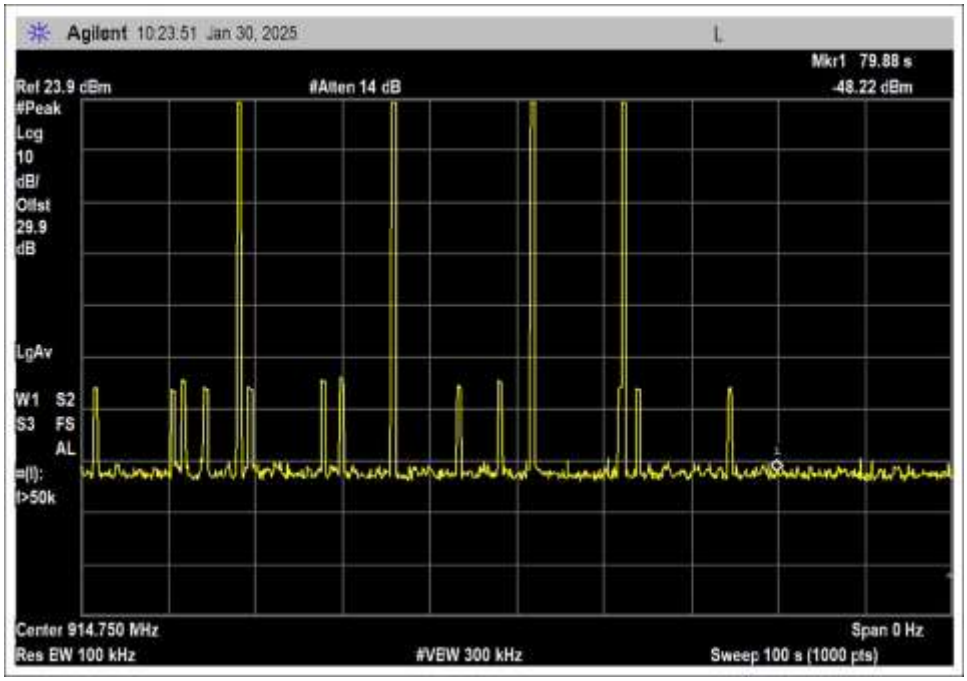
Plot(s)



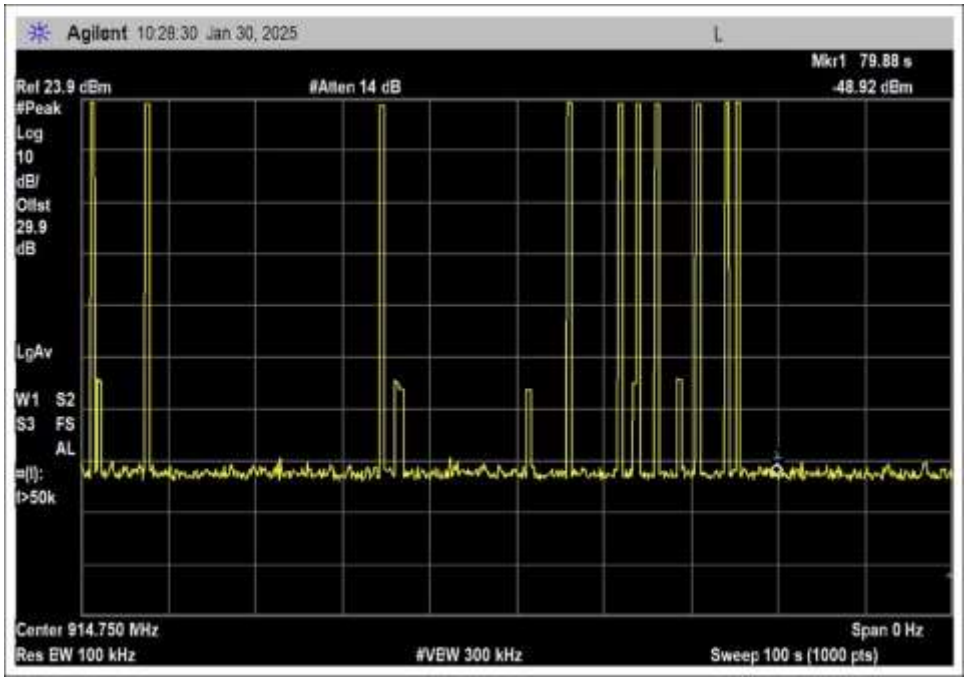
Single Burst



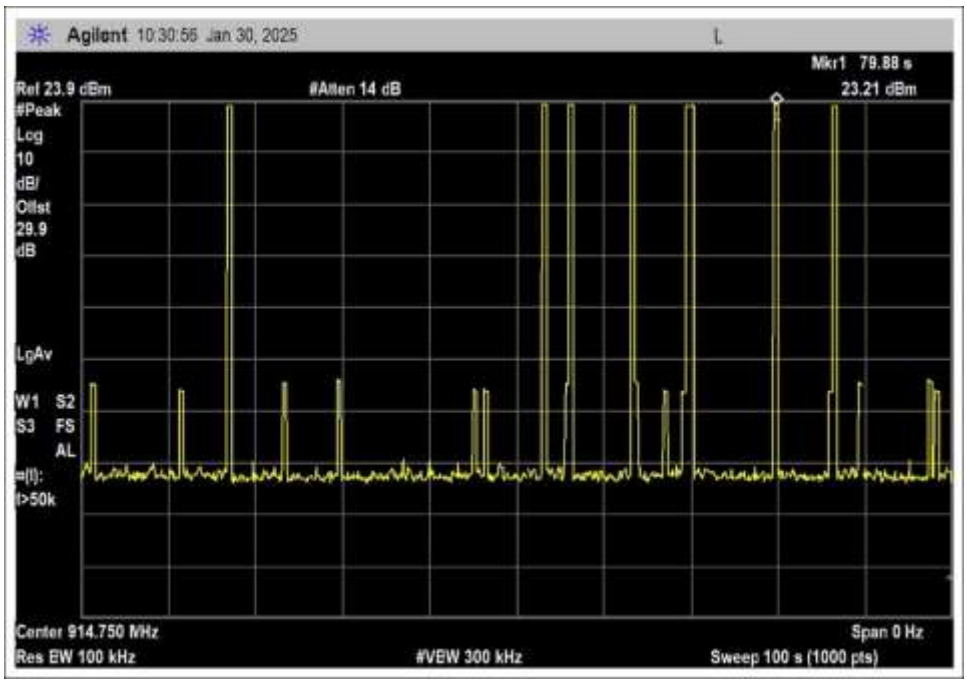
Time of Occupancy 1, 8 Burst



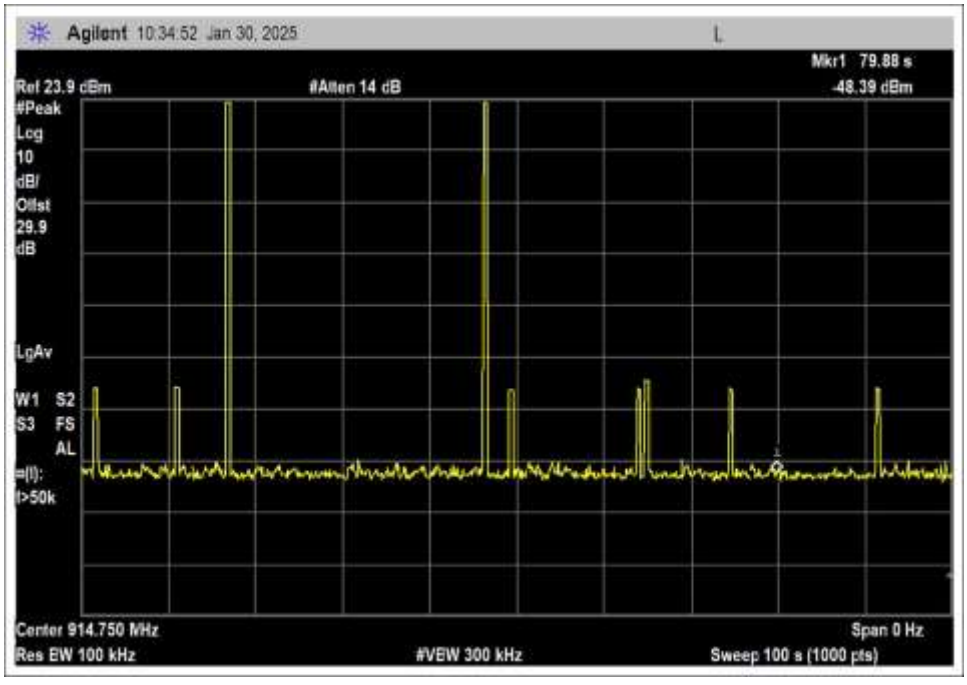
Time of Occupancy 2, 4 Burst



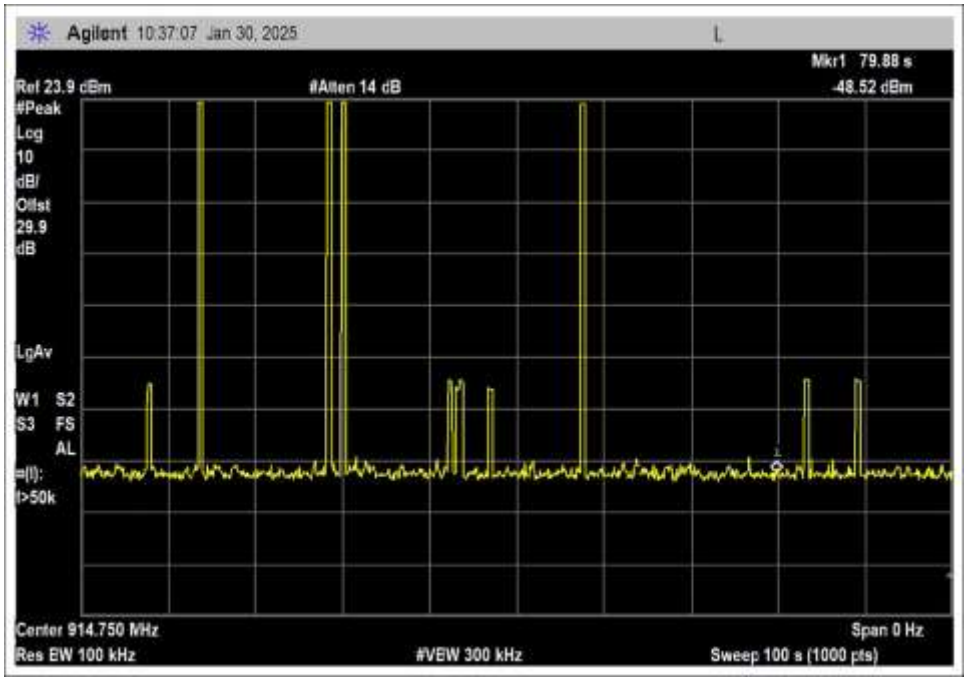
Time of Occupancy 3, 10 Burst



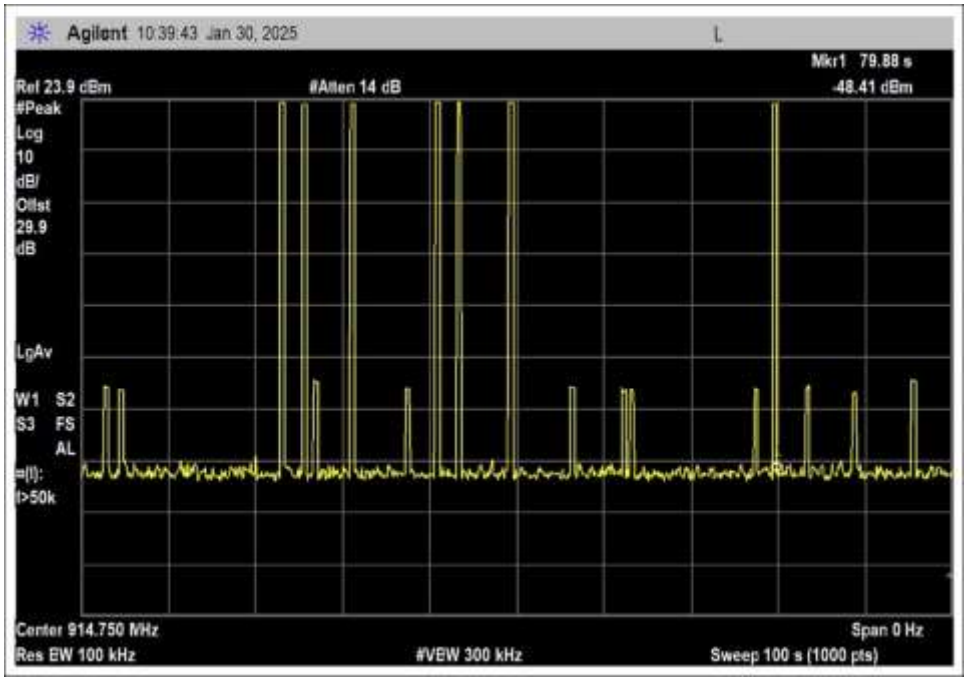
Time of Occupancy 4, 8 Burst



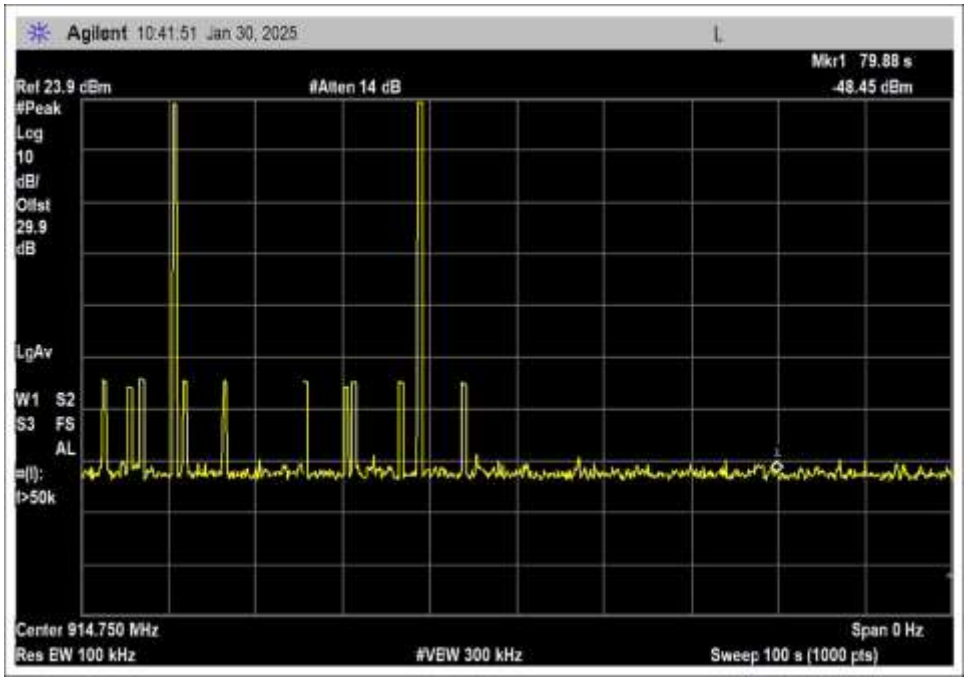
Time of Occupancy 5, 2 Burst



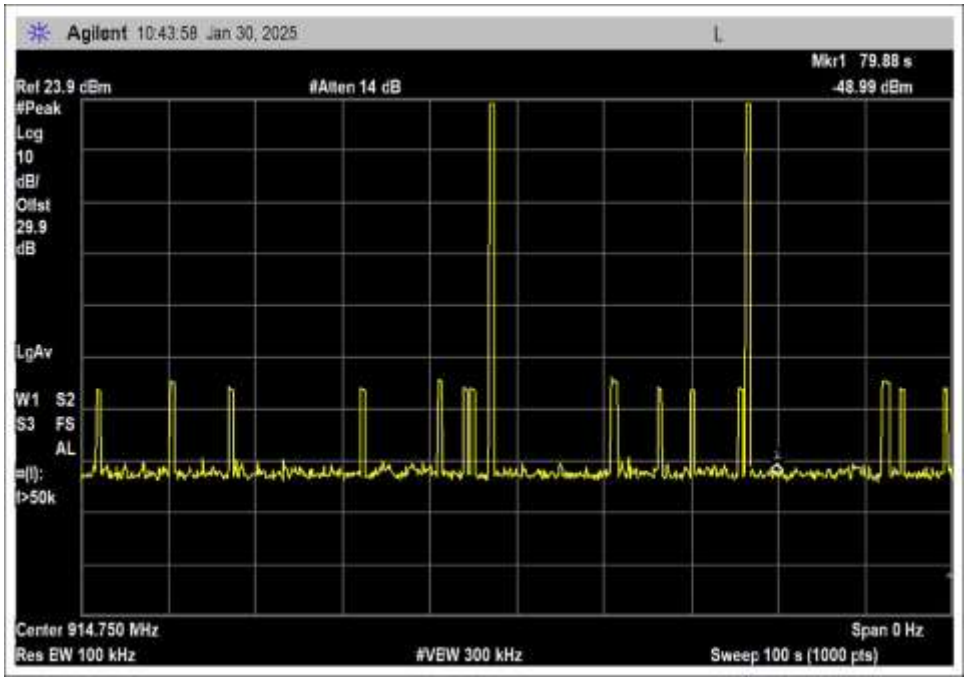
Time of Occupancy 6, 4 Burst



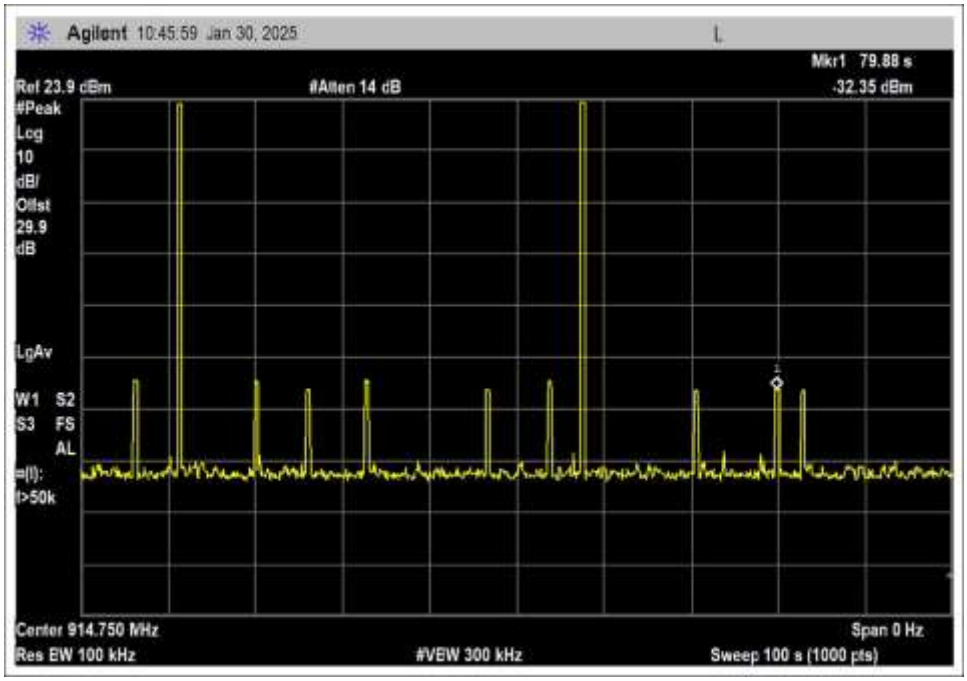
Time of Occupancy 7, 7 Burst



Time of Occupancy 8, 2 Burst



Time of Occupancy 9, 2 Burst



Time of Occupancy 10, 2 Burst

Test Setup Photo(s)

15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2020)	Test Date(s):	2/4/2025
Configurations:	1, 3		
Test Setup:	The equipment under test (EUT) is set on a test bench. The EUT is powered via an unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT. The EUT is programmed to continuously hop on the same channel. For this test, it is the low, middle, and high channels listed below. Frequency range of EUT: 902.75MHz to 927.25MHz TX Low 902.75MHz, Middle 914.75MHz, High 927.25MHz LO freq = 915MHz TARI = 6.25us Firmware = 2.127.0 Low and High Power settings. Streams 0, 1, 2, 3 and 0,4,5,6. Site D ANSI C63.10 2020 Test Environment Conditions: Temperature: 25°C, Humidity: 44%, Pressure: 99kPa		

Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	44

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03834	Spectrum Analyzer	Agilent	E4448A	5/6/2024	5/6/2026
03432	Attenuator	Aeroflex/Weinschel	90-30-34	11/1/2023	11/1/2025
07657	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	7/3/2024	7/3/2026
07164	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	23.28	23.37	23.26	0.11
914.75	PR-ASK	23.30	23.17	23.21	0.13
927.25	PR-ASK	22.95	22.85	22.89	0.10

Test performed using operational mode with the highest output power, representing worst case.
ANT0 Low Gain (5.4 dBi) High Power

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
$V_{Nominal}$:	48
$V_{Minimum}$:	42
$V_{Maximum}$:	57

Test Data Summary - RF Conducted Measurement
$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 50\ Channels \\ 24dBm\ Conducted/30dBm\ EIRP \mid < 50\ Channels\ (\min 25) \end{cases}$
This equipment has seven output ports. Stream 0 antenna port 0, Stream 1 antenna ports 1, 2. Stream 2 antenna ports 3, 4, Stream 3 antenna ports 5, 6. There is a switch between ports 1 and 4, 2 and 5, and 3 and 6.

Ant Port	0		1		2		3		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	w att	dBm	dBi	dBm
902.75	22.7	0.1871	22.7	0.1845	22.6	0.1832	22.5	0.1782	0.7330	28.7	6.6	35.3
914.75	22.6	0.1824	22.6	0.1820	22.4	0.1754	22.5	0.1795	0.7192	28.6	6.6	35.2
927.25	22.2	0.1671	22.3	0.1702	22.1	0.1633	22.2	0.1648	0.6654	28.2	6.6	34.8

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	RF Conducted (dBm)	EIRP (dBm)		Results
			Measured	Calculated	Limit	
Highest antenna gain, lowest power setting, stream 1						
902.75	PR-ASK	Patch array/ 6.6	28.7	35.3	≤36	Pass
914.75	PR-ASK	Patch array/ 6.6	28.6	35.2	≤36	Pass
927.25	PR-ASK	Patch array/ 6.6	28.2	34.8	≤36	Pass

Measured in hopping mode instead of constant transmit on one channel due to limitation of test script in single channel constant transmit mode

EIRP is calculated as RF conducted power (dBm) + antenna gain (dBi)

Ant Port	0		4		5		6		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	w att	dBm	dBi	dBm
902.75	22.8	0.1892	22.56	0.1803	22.55	0.1799	22.5	0.1778	0.7273	28.6	6.6	35.2
914.75	22.6	0.1828	22.54	0.1795	22.39	0.1734	22.53	0.1791	0.7147	28.5	6.6	35.1
927.25	22.4	0.1730	22.37	0.1726	22.27	0.1687	22.27	0.1687	0.6829	28.3	6.6	34.9

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	RF Conducted (dBm)	EIRP (dBm)		Results
			Measured	Calculated	Limit	
Highest antenna gain, lowest power setting, stream 2						
902.75	PR-ASK	Patch array/ 6.6	28.6	35.2	≤36	Pass
914.75	PR-ASK	Patch array/ 6.6	28.5	35.1	≤36	Pass
927.25	PR-ASK	Patch array/ 6.6	28.3	34.9	≤36	Pass

Measured in hopping mode instead of constant transmit on one channel due to limitation of test script in single channel constant transmit mode

EIRP is calculated as RF conducted power (dBm) + antenna gain (dBi)

Ant Port	0		1		2		3		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	w att	dBm	dBi	dBm
902.75	23.4	0.2173	23.1	0.2056	23.1	0.2018	23.0	0.2014	0.8261	**29.2**	5.4	34.6
914.75	23.2	0.2075	23.0	0.2014	23.0	0.2014	23.1	0.2037	0.8139	29.1	5.4	34.5
927.25	22.9	0.1928	23.0	0.1986	22.7	0.1862	22.7	0.1854	0.7629	28.8	5.4	34.2

Lowest antenna gain, highest power setting, stream 1						
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	RF Conducted (dBm)	EIRP (dBm)		Results
			Measured	Calculated	Limit	
902.75	PR-ASK	Patch array/ 5.4	29.2	34.6	≤36	Pass
914.75	PR-ASK	Patch array/ 5.4	29.1	34.5	≤36	Pass
927.25	PR-ASK	Patch array/ 5.4	28.8	34.2	≤36	Pass

Measured in hopping mode instead of constant transmit on one channel due to limitation of test script in single channel constant transmit mode

EIRP is calculated as RF conducted power (dBm) + antenna gain (dBi)

Ant Port	0		4		5		6		Linear sum		Ant gain Beamforming gain	Total EIRP
Freq	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	w att	dBm	dBi	dBm
902.75	23.5	0.2213	23.18	0.2080	23.09	0.2037	23.09	0.2037	0.8367	29.2	5.4	34.6
914.75	23.2	0.2075	23.18	0.2080	23.09	0.2037	23.12	0.2051	0.8243	29.2	5.4	34.6
927.25	23.0	0.1995	22.98	0.1986	22.91	0.1954	22.91	0.1954	0.7890	29.0	5.4	34.4

Lowest antenna gain, highest power setting, stream 2						
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**RF Conducted (dBm)**	**EIRP (dBm)**		**Results**
			Measured	**Calculated**	**Limit**	
902.75	PR-ASK	Patch array/ 5.4	29.2	34.6	≤36	Pass
914.75	PR-ASK	Patch array/ 5.4	29.2	34.6	≤36	Pass
927.25	PR-ASK	Patch array/ 5.4	29.0	34.4	≤36	Pass

Measured in hopping mode instead of constant transmit on one channel due to limitation of test script in single channel constant transmit mode

EIRP is calculated as RF conducted power (dBm) + antenna gain (dBi)

Plots

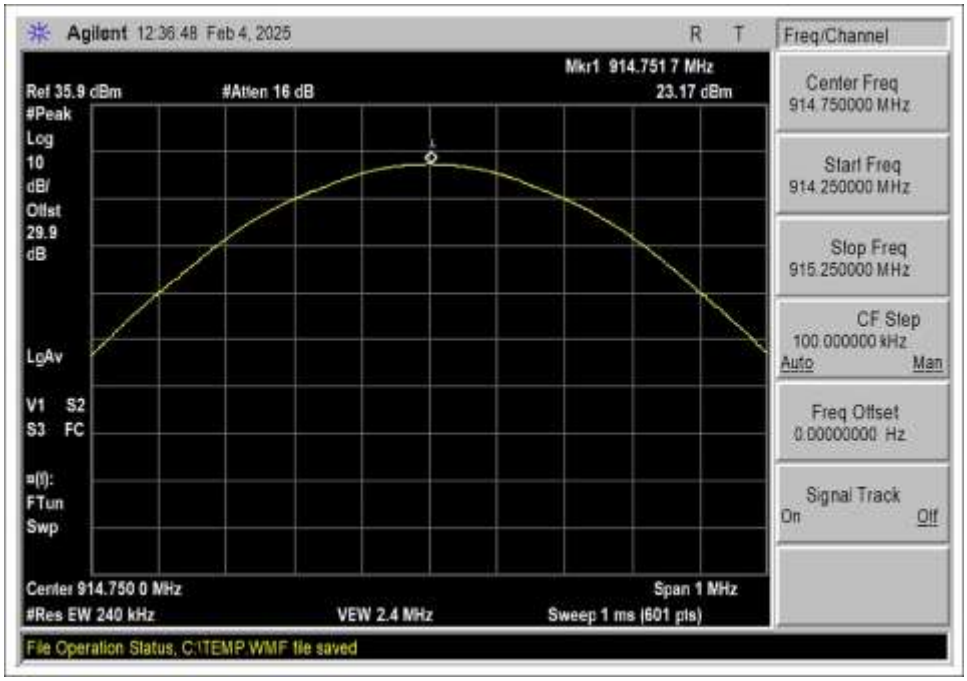
Antenna 0, 0123, High Power, High Channel

Antenna 0, 0123, High Power, Low Channel

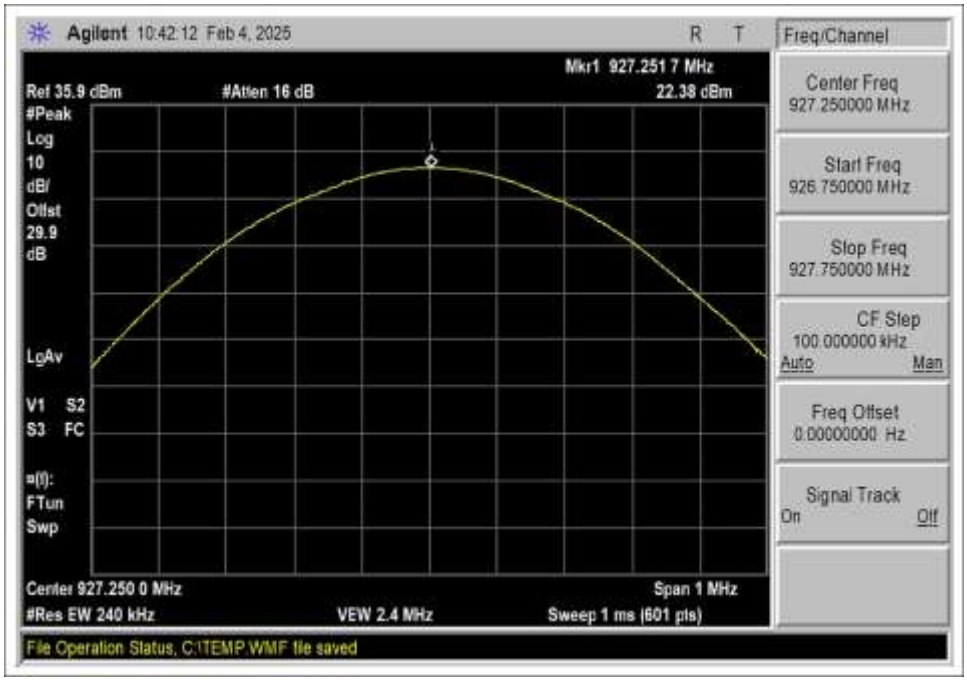
Antenna 0, 0123, High Power, Middle Channel

Antenna 0, 0456, High Power, High Channel

Antenna 0, 0456, High Power, Low Channel



Antenna 0, 0456, High Power, Middle Channel

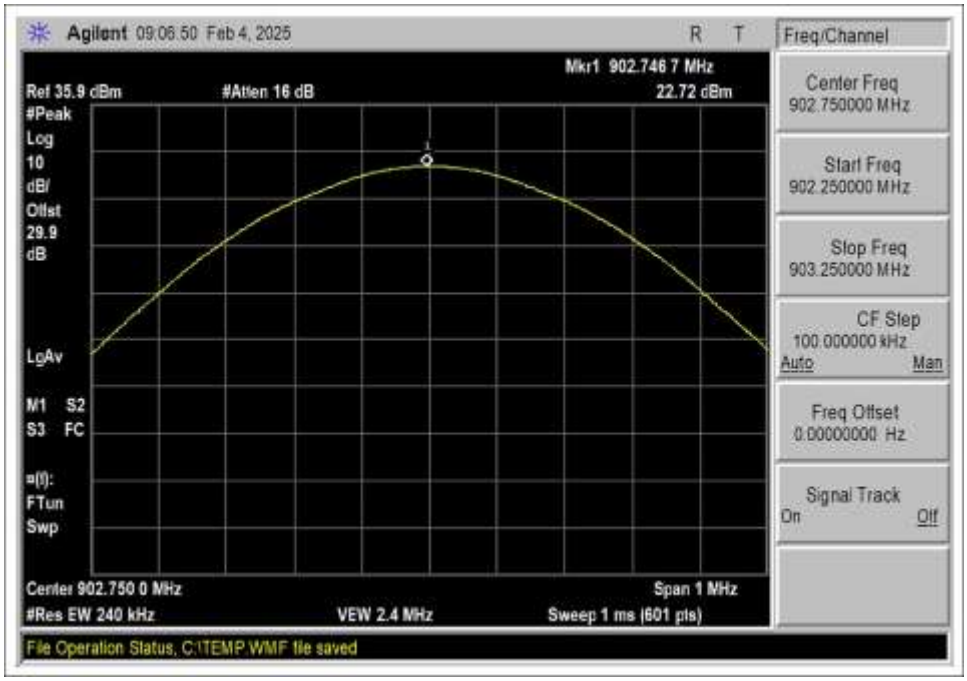


Antenna 0, 0456, Low Power, High Channel

Antenna 0, 0456, Low Power, Low Channel

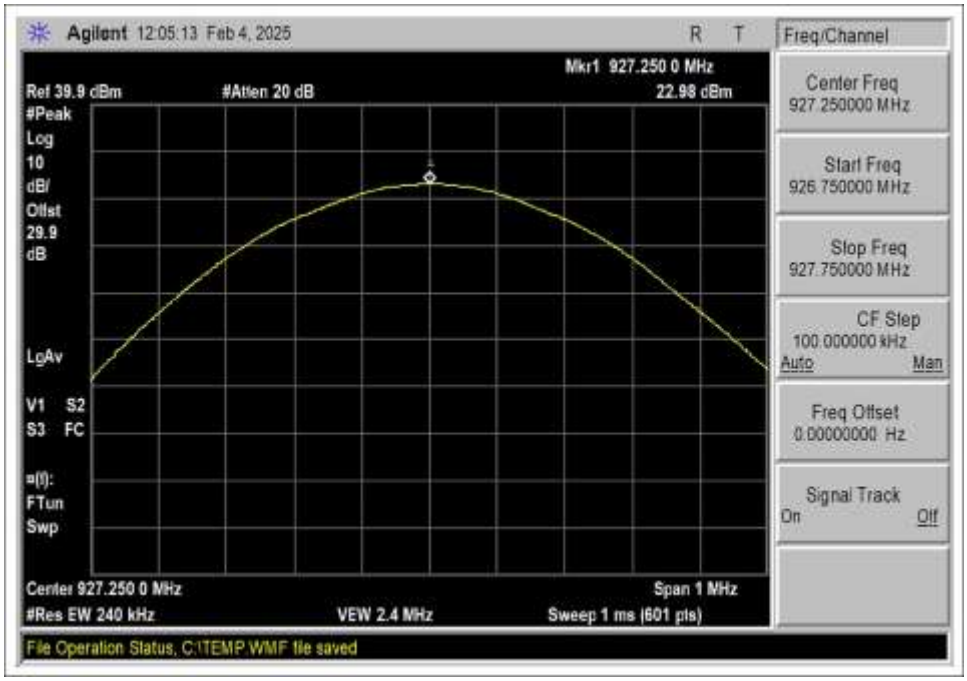
Antenna 0, 0456, Low Power, Middle Channel

Antenna 0, Low Power, High Channel

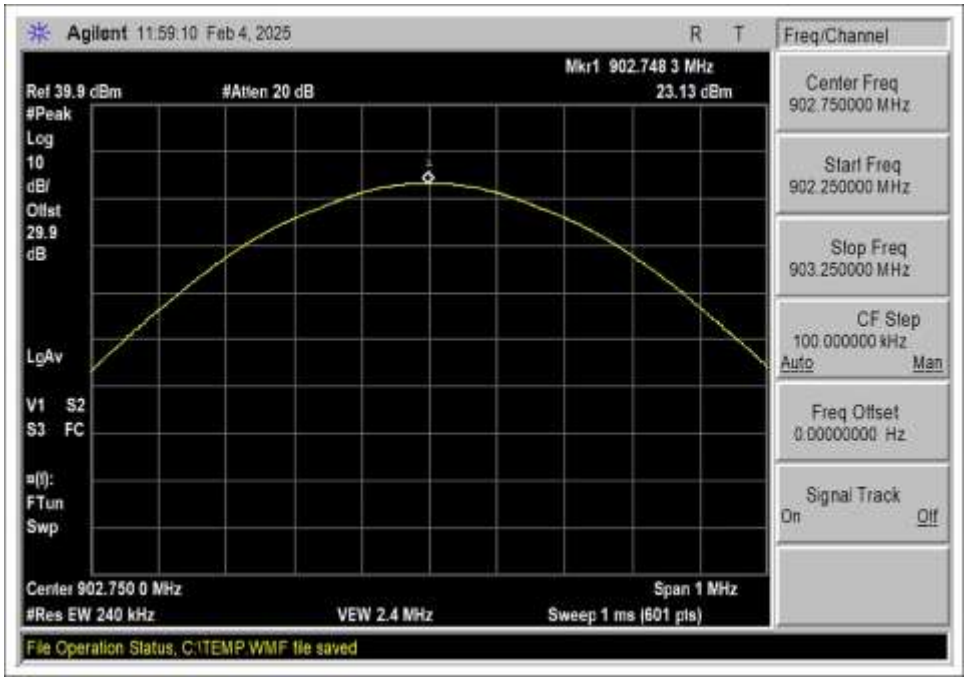


Antenna 0, Low Power, Low Channel

Antenna 0, Low Power, Middle Channel

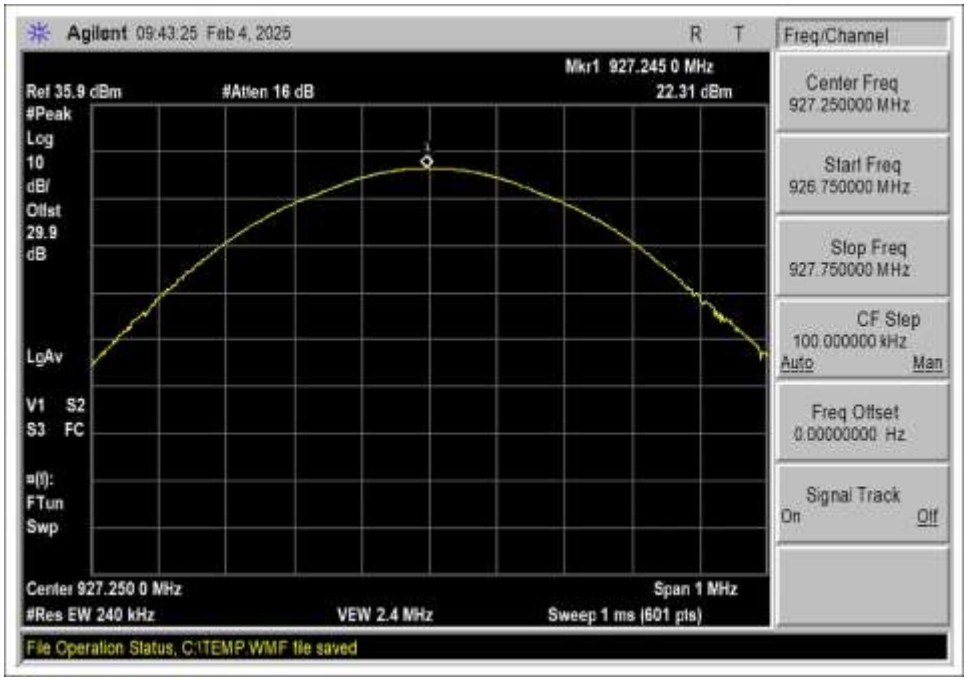


Antenna 1, 0123, High Power, High Channel



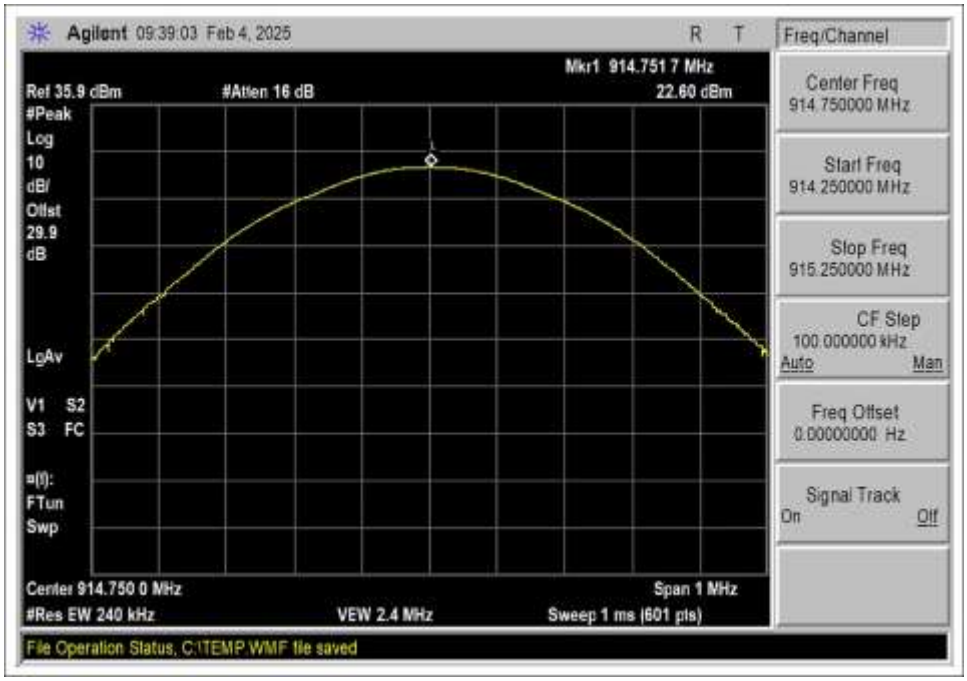
Antenna 1, 0123, High Power, Low Channel

Antenna 1, 0123, High Power, Middle Channel

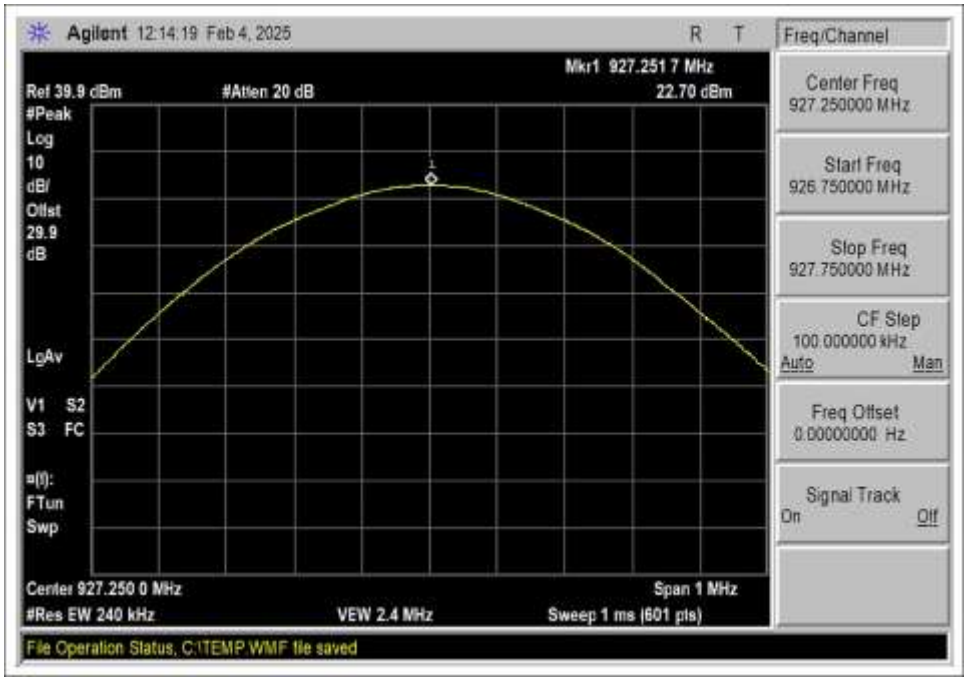


Antenna 1, 0123, Low Power, High Channel

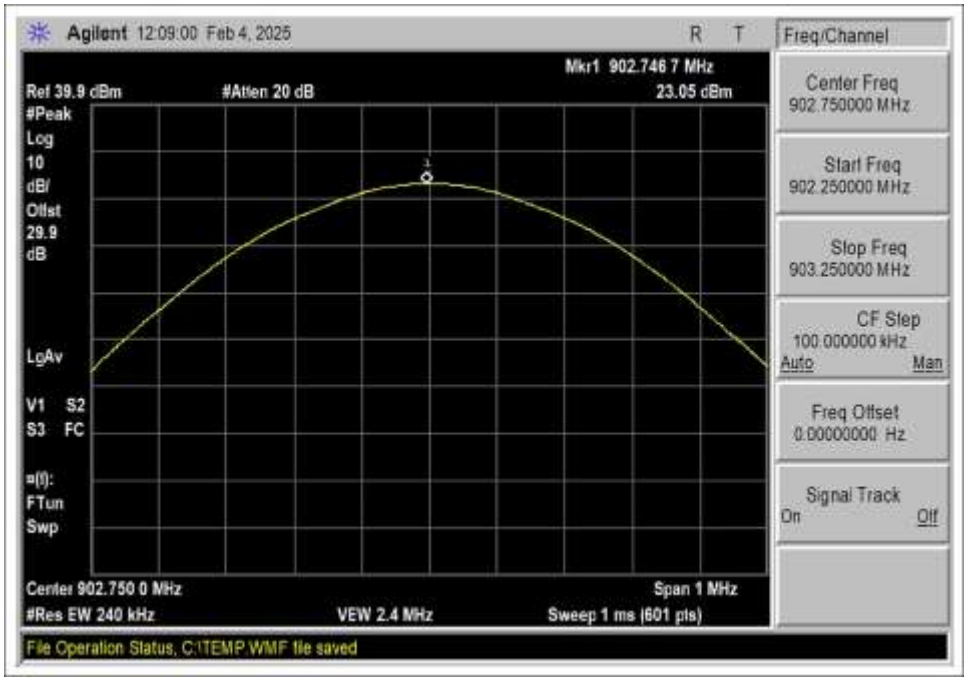
Antenna 1, 0123, Low Power, Low Channel



Antenna 1, 0123, Low Power, Middle Channel

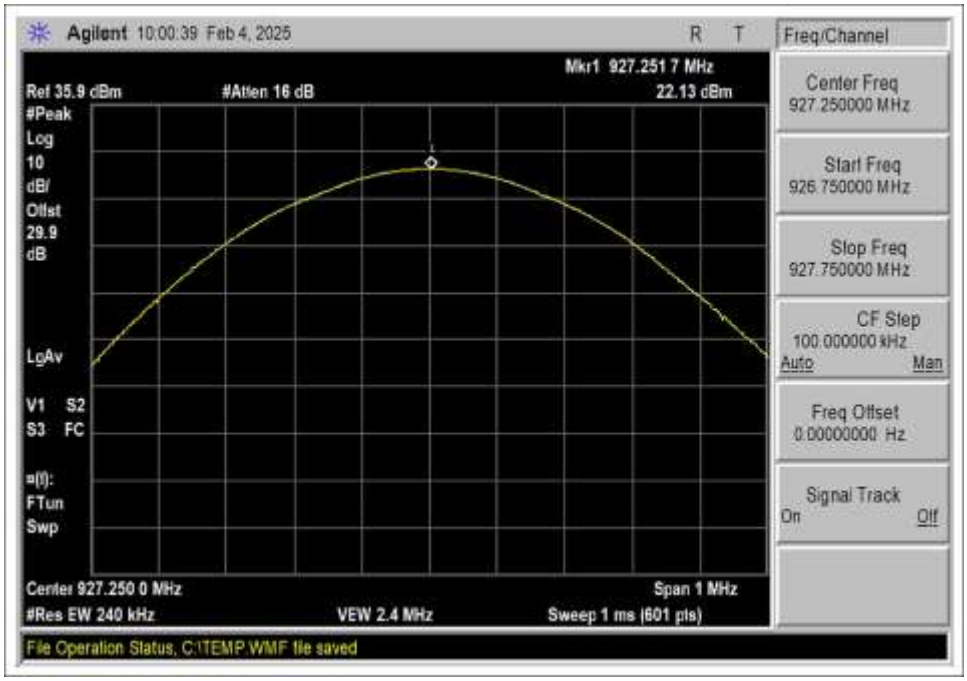


Antenna 2, 0123, High Power, High Channel



Antenna 2, 0123, High Power, Low Channel

Antenna 2, 0123, High Power, Middle Channel



Antenna 2, Low Power, High Channel

Antenna 2, Low Power, Low Channel

Antenna 2, Low Power, Middle Channel

Antenna 3, 0123, High Power, High Channel

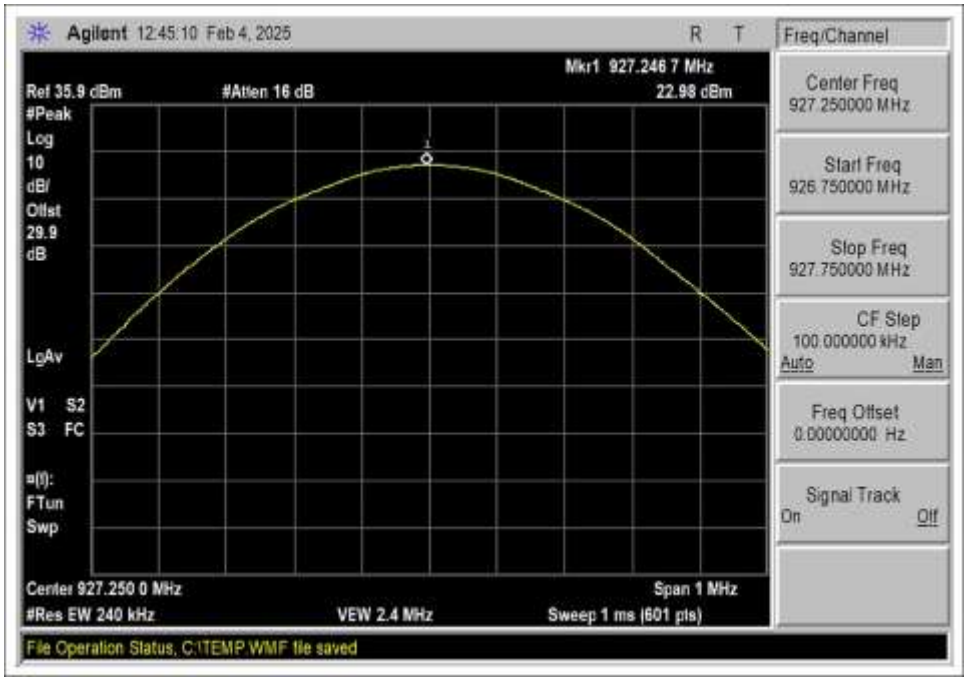
Antenna 3, 0123, High Power, Low Channel

Antenna 3, 0123, High Power, Middle Channel

Antenna 3, Low Power, High Channel

Antenna 3, Low Power, Low Channel

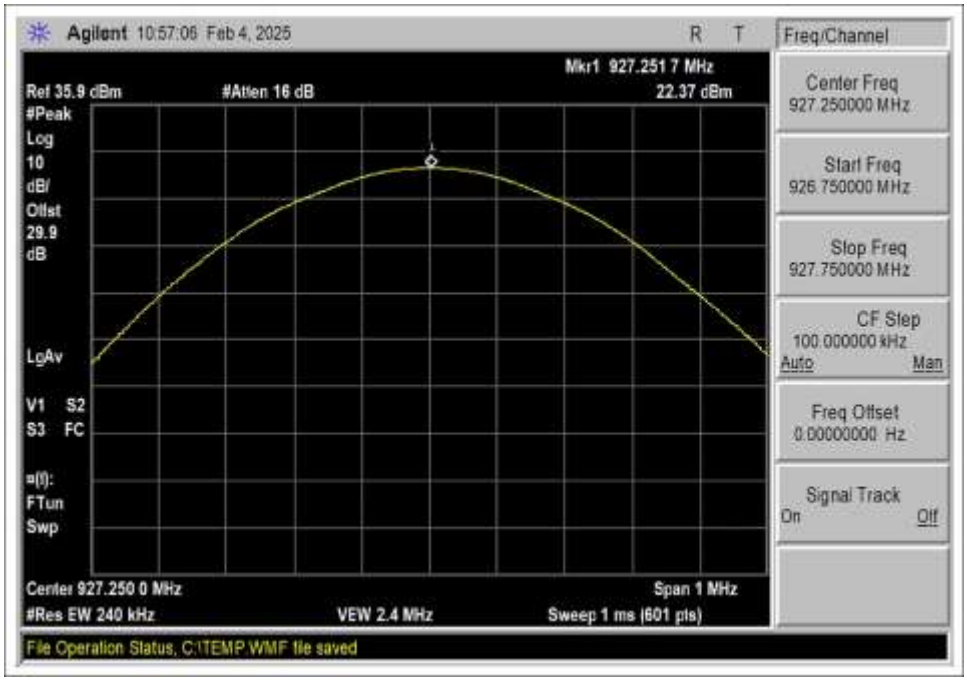
Antenna 3, Low Power, Middle Channel



Antenna 4, 0456, High Power, High Channel

Antenna 4, 0456, High Power, Low Channel

Antenna 4, 0456, High Power, Middle Channel



Antenna 4, 0456, Low Power, High Channel

Antenna 4, 0456, Low Power, Low Channel

Antenna 4, 0456, Low Power, Middle Channel

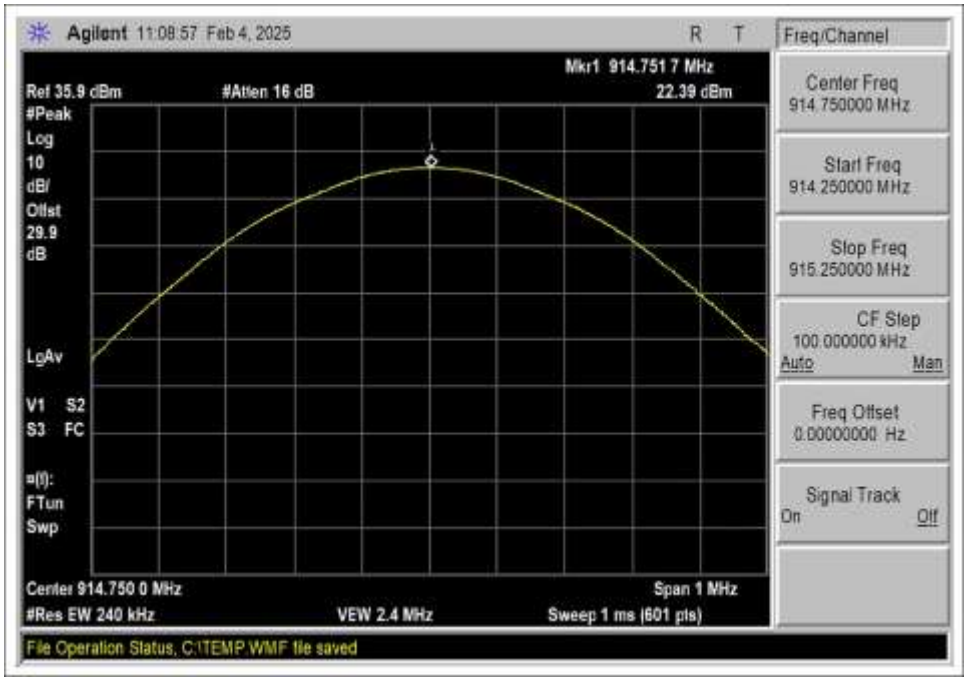
Antenna 5, 0456, High Power, High Channel

Antenna 5, 0456, High Power, Low Channel

Antenna 5, 0456, High Power, Middle Channel

Antenna 5, 0456, Low Power, High Channel

Antenna 5, 0456, Low Power, Low Channel



Antenna 5, 0456, Low Power, Middle Channel

Antenna 6, 0456, High Power, High Channel

Antenna 6, 0456, High Power, Low Channel

Antenna 6, 0456, High Power, Middle Channel

Antenna 6, 0456, Low Power, High Channel

Antenna 6, 0456, Low Power, Low Channel

Antenna 6, 0456, Low Power, Middle Channel

Test Setup / Conditions / Data

15.247(d) RF Conducted Emissions & Band Edge

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2020)	Test Date(s):	1/30/2025
Configuration:	1		

Environmental Conditions			
Temperature (ºC)	25	Relative Humidity (%):	44

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 #: **110388** Date: 2/4/2025
Test Type: **Conducted Emissions** Time: 15:17:27
Tested By: S. Yamamoto 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 unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.
The EUT is set to continuously hop on the same channel. For this test purpose it is the low, middle, and high channels listed below.

Frequency range of data sheet and test 9kHz to 9.28GHz.
RBW=100kHz
VBW=300kHz

Frequency range of EUT: 902.75MHz to 927.25MHz

TX Low 902.75MHz, Middle 914.75MHz, High 927.25MHz

LO freg = 915MHz

TARI = 6.25us

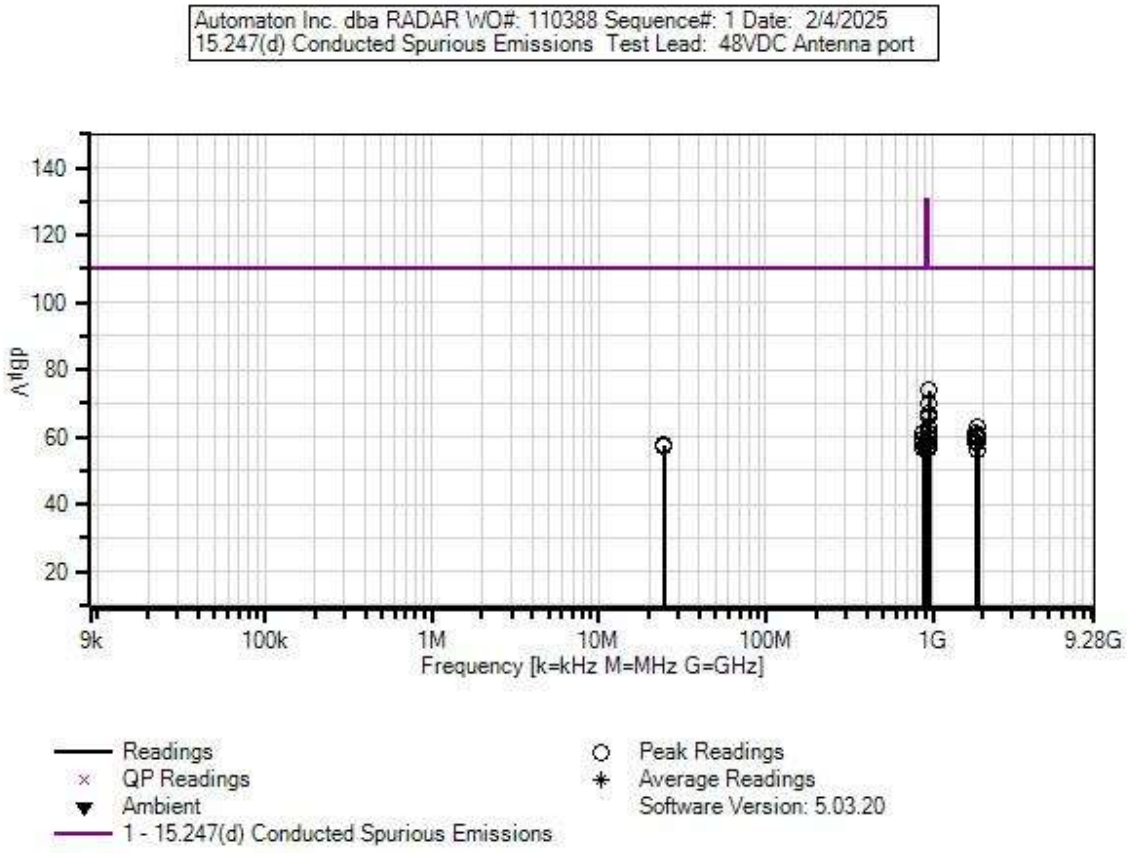
Firmware = 2.127.0

High Power setting. Streams 0, 1, 2, 3 setting. Worst case setting.
This data represents compliance for the following possible configurations:
High power 0,1,2,3
High power 0,4,5,6
Low power 0,1,2,3
Low power 0,4,5,6

Test Environment Conditions:
Temperature: 25°C
Humidity: 44%
Pressure: 99kPa

Site D

Test Method: ANSI C63.10 2020



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T2	AN03432	Attenuator	90-30-34	11/1/2023	11/1/2025
T3	ANP07657	Cable	32022-29094K-29094K-24TC	7/3/2024	7/3/2026

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	951.750M	43.9	+0.0	+29.6	+0.3		+0.0	73.8	110.4	-36.6	Anten
2	951.743M	40.1	+0.0	+29.6	+0.3		+0.0	70.0	110.4	-40.4	Anten
3	951.743M	37.4	+0.0	+29.6	+0.3		+0.0	67.3	110.4	-43.1	Anten
4	939.500M	35.9	+0.0	+29.6	+0.3		+0.0	65.8	110.4	-44.6	Anten
5	951.756M	33.3	+0.0	+29.6	+0.3		+0.0	63.2	110.4	-47.2	Anten
6	1829.505M	32.8	+0.0	+29.6	+0.4		+0.0	62.8	110.4	-47.6	Anten
7	939.500M	32.9	+0.0	+29.6	+0.3		+0.0	62.8	110.4	-47.6	Anten
8	878.266M	31.6	+0.0	+29.6	+0.3		+0.0	61.5	110.4	-48.9	Anten
9	1805.483M	31.4	+0.0	+29.7	+0.4		+0.0	61.5	110.4	-48.9	Anten
10	939.520M	31.5	+0.0	+29.6	+0.3		+0.0	61.4	110.4	-49.0	Anten
11	1805.497M	31.3	+0.0	+29.7	+0.4		+0.0	61.4	110.4	-49.0	Anten
12	878.290M	31.2	+0.0	+29.6	+0.3		+0.0	61.1	110.4	-49.3	Anten
13	1854.508M	30.8	+0.0	+29.6	+0.4		+0.0	60.8	110.4	-49.6	Anten
14	939.500M	30.4	+0.0	+29.6	+0.3		+0.0	60.3	110.4	-50.1	Anten
15	1805.508M	29.9	+0.0	+29.7	+0.4		+0.0	60.0	110.4	-50.4	Anten
16	1829.478M	29.9	+0.0	+29.6	+0.4		+0.0	59.9	110.4	-50.5	Anten
17	939.475M	29.9	+0.0	+29.6	+0.3		+0.0	59.8	110.4	-50.6	Anten
18	1854.495M	29.8	+0.0	+29.6	+0.4		+0.0	59.8	110.4	-50.6	Anten
19	939.533M	29.7	+0.0	+29.6	+0.3		+0.0	59.6	110.4	-50.8	Anten
20	1829.504M	29.4	+0.0	+29.6	+0.4		+0.0	59.4	110.4	-51.0	Anten
21	878.283M	29.4	+0.0	+29.6	+0.3		+0.0	59.3	110.4	-51.1	Anten
22	1829.511M	28.6	+0.0	+29.6	+0.4		+0.0	58.6	110.4	-51.8	Anten
23	939.490M	28.6	+0.0	+29.6	+0.3		+0.0	58.5	110.4	-51.9	Anten
24	1854.523M	28.5	+0.0	+29.6	+0.4		+0.0	58.5	110.4	-51.9	Anten

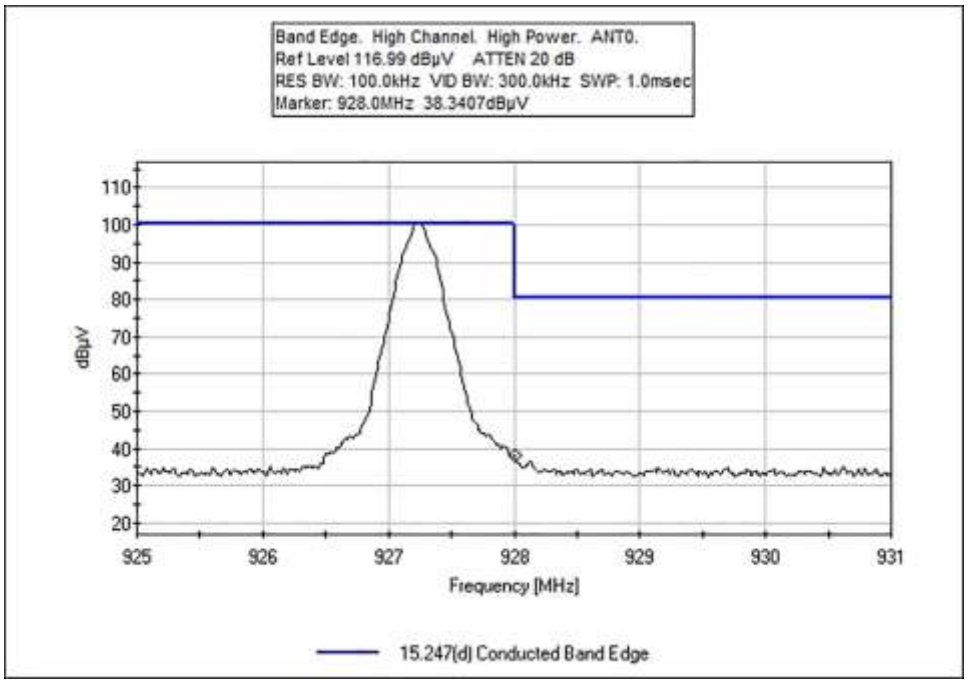
25	878.283M	28.5	+0.0	+29.6	+0.3	+0.0	58.4	110.4	-52.0	Anten
26	1805.502M	28.3	+0.0	+29.7	+0.4	+0.0	58.4	110.4	-52.0	Anten
27	24.500M	28.1	+0.0	+29.5	+0.1	+0.0	57.7	110.4	-52.7	Anten
28	932.267M	27.2	+0.0	+29.6	+0.3	+0.0	57.1	110.4	-53.3	Anten
29	24.480M	27.5	+0.0	+29.5	+0.1	+0.0	57.1	110.4	-53.3	Anten
30	890.450M	27.1	+0.0	+29.6	+0.3	+0.0	57.0	110.4	-53.4	Anten
31	951.750M	26.9	+0.0	+29.6	+0.3	+0.0	56.8	110.4	-53.6	Anten
32	878.270M	26.7	+0.0	+29.6	+0.3	+0.0	56.6	110.4	-53.8	Anten
33	930.550M	26.6	+0.0	+29.6	+0.3	+0.0	56.5	110.4	-53.9	Anten
34	1854.519M	26.1	+0.0	+29.6	+0.4	+0.0	56.1	110.4	-54.3	Anten

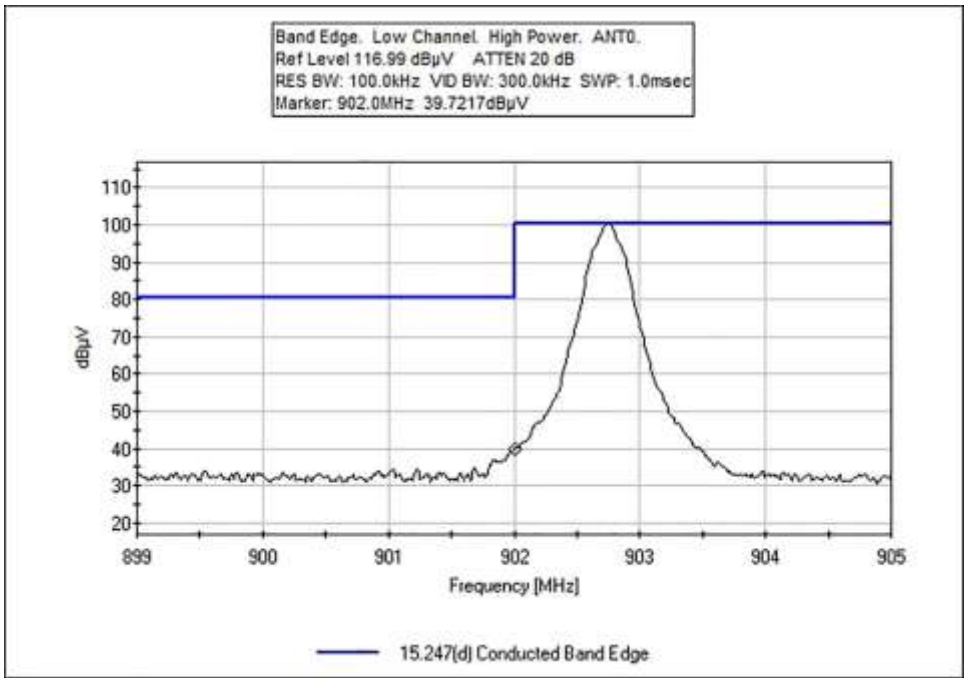
Band Edge

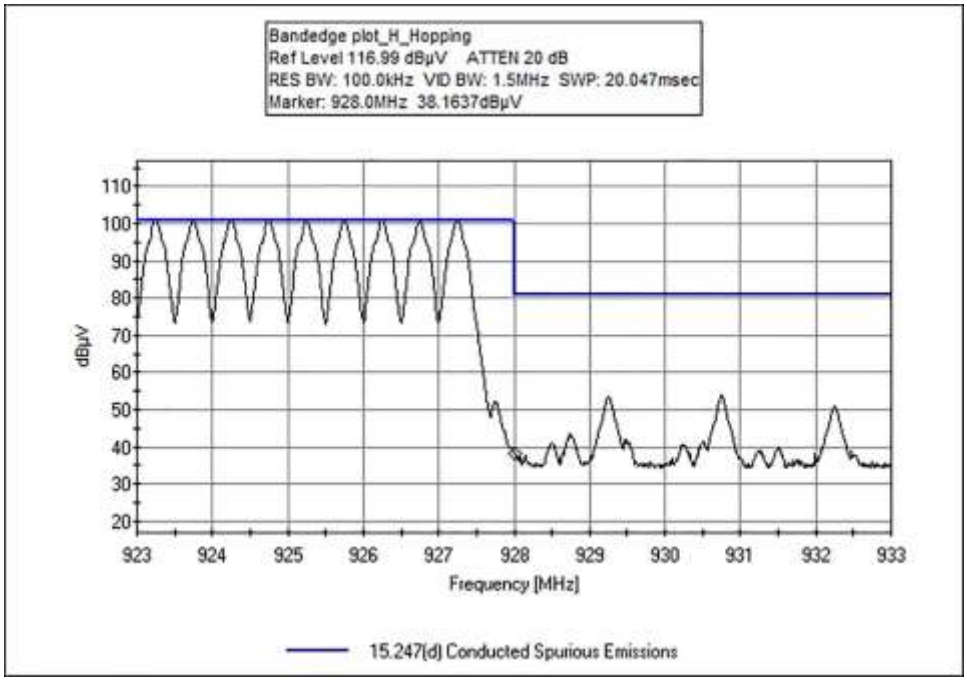
Band Edge Summary – Single Channel Mode				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	PR-ASK	-40.8	< 3.4	Pass
928	PR-ASK	-42.2	< 3.4	Pass

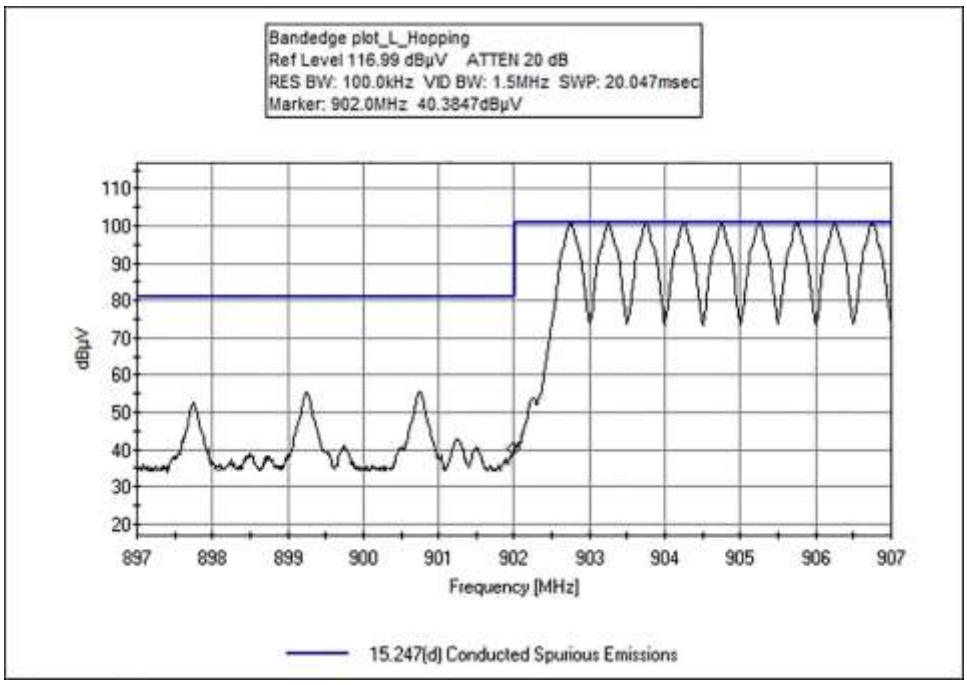
Band Edge Summary – Hopping Mode				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	PR-ASK	-40.1	< 3.4	Pass
928	PR-ASK	-42.3	< 3.4	Pass

Band Edge Plots




Band Edge. Low Channel. High Power. ANT0.
Ref Level 116.99 dBµV ATTEN 20 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 902.0MHz 39.7217dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
899
900
901
902
903
904
905
Frequency [MHz]
15.247(d) Conducted Band Edge


Bandedge plot_H_Hopping
Ref Level 116.99 dBµV ATTEN 20 dB
RES BW: 100.0kHz VID BW: 1.5MHz SWP: 20.047msec
Marker: 928.0MHz 38.1637dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
923
924
925
926
927
928
929
930
931
932
933
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Bandedge plot_L_Hopping
Ref Level 116.99 dBµV ATTEN 20 dB
RES BW: 100.0kHz VID BW: 1.5MHz SWP: 20.047msec
Marker: 902.0MHz 40.3847dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
897
898
899
900
901
902
903
904
905
906
907
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 Band Edge**		
Work Order #:	**110388**	Date:	2/4/2025
Test Type:	**Conducted Emissions**	Time:	16:47:22
Tested By:	E. Wong	Sequence#:	2
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 unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.
The EUT is set to continuously hop on the same channel for the low, middle, and high channels listed below.
The EUT is set to hop on all channels for the hopping data.

Frequency range of EUT: 902.75MHz to 927.25MHz
TX Low 902.75MHz, Middle 914.75MHz, High 927.25MHz
LO freg = 915MHz
TARI = 6.25us
Firmware = 2.127.0

High Power setting. Stream 0.

Test Environment Conditions:
Temperature: 25°C
Humidity: 44%
Pressure: 99kPa

Site A

Test Method: ANSI C63.10 2020

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T1	AN03432	Attenuator	90-30-34	11/1/2023	11/1/2025
T2	ANP07657	Cable	32022-29094K-29094K-24TC	7/3/2024	7/3/2026

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	902.000M	40.4	+29.6	+0.3			+0.0	70.3	110.4	-40.1	Anten
2	902.000M	39.7	+29.6	+0.3			+0.0	69.6	110.4	-40.8	Anten
3	928.000M	38.3	+29.6	+0.3			+0.0	68.2	110.4	-42.2	Anten
4	928.000M	38.2	+29.6	+0.3			+0.0	68.1	110.4	-42.3	Anten

Test Setup Photo(s)

15.247(d) Radiated Emissions & Band Edge

Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2020)	Test Date(s):	2/18/2025
Configuration:	2		

Environmental Conditions			
Temperature (ºC)	17	Relative Humidity (%):	44

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 #: **110388** Date: 2/10/2025
Test Type: **Radiated Scan** Time: 10:57:06
Tested By: S. Yamamoto Sequence#: 6
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 set stand alone on the Styrofoam table top .

The EUT is powered via a unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency hopping, and modulation of the EUT.
The EUT is set to continuously hop on the same channel. For this test purpose it is the low, middle, and high channels listed below.
The EUT is tested both oriented horizontally facing downward and vertically facing outward.

Frequency range of data sheet and test 9kHz to 9.28GHz.
For RB, RBW=1MHz VBW=3MHz
For NRB, RBW=100kHz VBW=300kHz

Frequency range of EUT: 902.75MHz to 927.25MHz

TX Low 902.75MHz, Middle 914.75MHz, High 927.25MHz

TARI = 6.25us

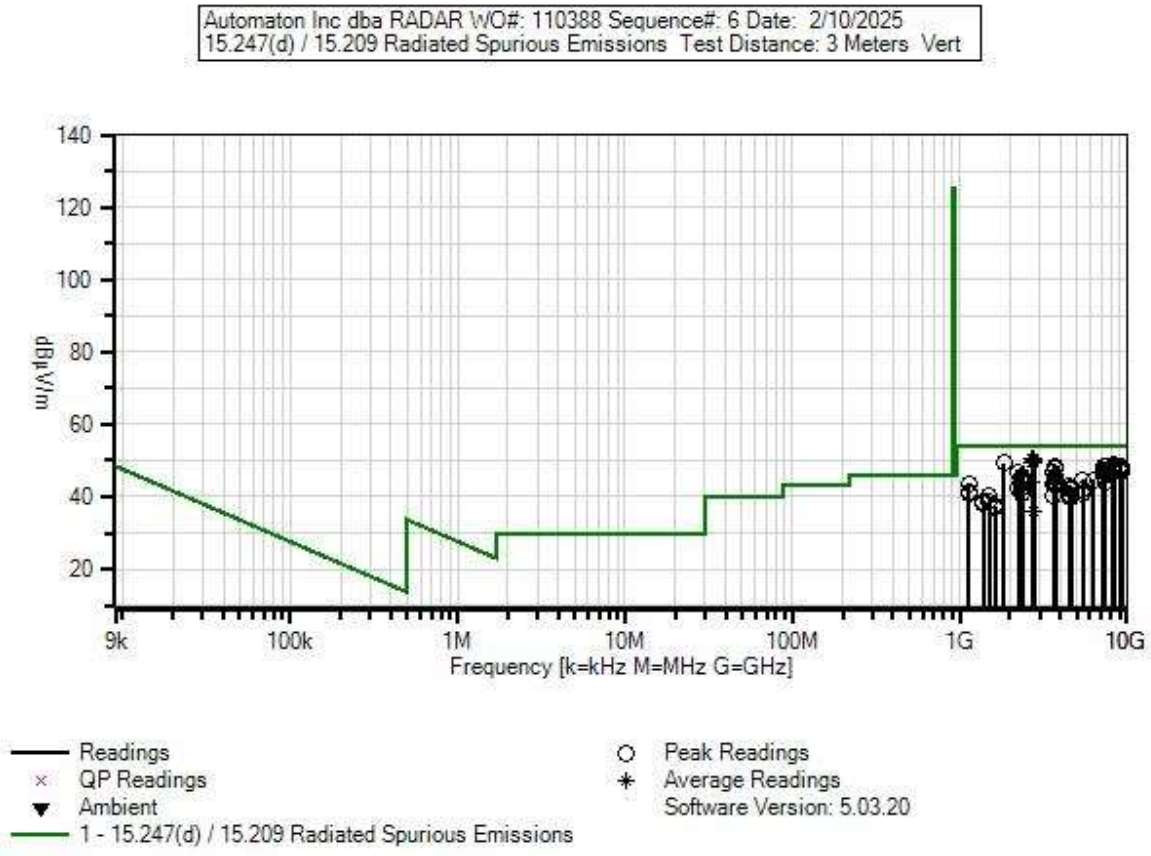
Firmware = 2.127.0

High Power setting. Streams 0, 1, 2, 3 setting.

Test Environment Conditions:
Temperature: 17°C
Humidity: 44%
Pressure: 99kPa

Site D

Test Method: ANSI C63.10 2020



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T1	ANP04382	Cable	LDF-50	6/4/2024	6/4/2026
T2	ANP08191	Cable	ANDL1-PNMNM-50	11/11/2024	11/11/2026
T3	AN01646	Horn Antenna	3115	3/8/2024	3/8/2026
T4	AN00787	Preamp	83017A	6/27/2023	6/27/2025
T5	ANP07655	Cable	32022-29094K-29094K-24TC	7/20/2024	7/20/2026
T6	ANP07660	Cable	32022-29094K-29094K-24TC	7/20/2024	7/20/2026
T7	ANP08079	Band Pass Filter	BRC50722	11/2/2023	11/2/2025
T8	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	5/15/2023	5/15/2025
	AN00010	Preamp	8447D	1/2/2024	1/2/2026
	AN00314	Loop Antenna	6502	5/3/2024	5/3/2026
	AN03628	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026
	ANP01911	Cable-Amplitude +15C to +45C (dB)	RG214/U	1/4/2024	1/4/2026
	ANP01911	Cable-Amplitude -15C to +15C (dB)	RG214/U	1/4/2024	1/4/2026
	ANP06985	Cable	Sucoflex 104A	9/12/2024	9/12/2026
	ANP07657	Cable	32022-29094K-29094K-24TC	7/3/2024	7/3/2026

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

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2744.250M	42.6	+5.8 +0.4	+3.7 +0.0	+28.8 +0.0	-39.8 +9.1	+0.0	50.6	54.0	-3.4	Vert
	Ave										
^	2744.250M	47.1	+5.8 +0.4	+3.7 +0.0	+28.8 +0.0	-39.8 +9.1	+0.0	55.1	54.0	+1.1	Vert
^	2744.242M	44.1	+5.8 +0.4	+3.7 +0.0	+28.8 +0.0	-39.8 +9.1	+0.0	52.1	54.0	-1.9	Vert
4	2708.253M	38.6	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	50.5	54.0	-3.5	Vert
	Ave										
^	2708.253M	48.7	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	60.6	54.0	+6.6	Vert
^	2708.250M	42.8	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	54.7	54.0	+0.7	Vert

7	2744.250M	42.0	+5.8	+3.7	+28.8	-39.8	+0.0	50.0	54.0	-4.0	Horiz
	Ave		+0.4	+0.0	+0.0	+9.1					
^	2744.250M	46.1	+5.8	+3.7	+28.8	-39.8	+0.0	54.1	54.0	+0.1	Horiz
			+0.4	+0.0	+0.0	+9.1					
^	2744.272M	41.8	+5.8	+3.7	+28.8	-39.8	+0.0	49.8	54.0	-4.2	Horiz
			+0.4	+0.0	+0.0	+9.1					
10	2781.750M	44.1	+5.9	+3.7	+28.9	-39.8	+0.0	49.4	54.0	-4.6	Horiz
	Ave		+0.4	+0.0	+0.0	+6.2					
^	2781.750M	49.8	+5.9	+3.7	+28.9	-39.8	+0.0	55.1	54.0	+1.1	Horiz
			+0.4	+0.0	+0.0	+6.2					
^	2781.748M	42.5	+5.9	+3.7	+28.9	-39.8	+0.0	47.8	54.0	-6.2	Horiz
			+0.4	+0.0	+0.0	+6.2					
13	2708.248M	37.4	+5.8	+3.7	+28.7	-39.8	+0.0	49.3	54.0	-4.7	Horiz
	Ave		+0.4	+0.0	+0.0	+13.1					
14	2781.750M	44.0	+5.9	+3.7	+28.9	-39.8	+0.0	49.3	54.0	-4.7	Vert
	Ave		+0.4	+0.0	+0.0	+6.2					
^	2781.750M	50.6	+5.9	+3.7	+28.9	-39.8	+0.0	55.9	54.0	+1.9	Vert
			+0.4	+0.0	+0.0	+6.2					
^	2781.750M	45.6	+5.9	+3.7	+28.9	-39.8	+0.0	50.9	54.0	-3.1	Vert
			+0.4	+0.0	+0.0	+6.2					
17	1829.497M	53.8	+4.9	+2.9	+26.7	-39.6	+0.0	49.3	54.0	-4.7	Vert
			+0.3	+0.3	+0.0	+0.0					
18	8232.745M	31.8	+11.7	+6.4	+37.3	-39.6	+0.0	48.9	54.0	-5.1	Vert
			+0.8	+0.0	+0.0	+0.5					
19	8345.246M	30.9	+11.7	+6.4	+37.6	-39.5	+0.0	48.5	54.0	-5.5	Horiz
			+0.9	+0.0	+0.0	+0.5					
20	9027.494M	28.6	+12.3	+6.7	+38.5	-39.3	+0.0	48.5	54.0	-5.5	Vert
			+0.9	+0.0	+0.0	+0.8					
21	3658.999M	43.7	+7.3	+4.4	+31.6	-39.8	+0.0	48.4	54.0	-5.6	Vert
			+0.5	+0.0	+0.0	+0.7					
22	7418.059M	32.9	+11.3	+6.1	+36.5	-39.5	+0.0	48.3	54.0	-5.7	Vert
			+0.7	+0.0	+0.0	+0.3					
23	7417.997M	32.8	+11.3	+6.1	+36.5	-39.5	+0.0	48.2	54.0	-5.8	Vert
			+0.7	+0.0	+0.0	+0.3					
24	9147.495M	28.1	+12.4	+6.8	+38.4	-39.3	+0.0	48.1	54.0	-5.9	Horiz
			+0.9	+0.0	+0.0	+0.8					
25	9027.495M	28.2	+12.3	+6.7	+38.5	-39.3	+0.0	48.1	54.0	-5.9	Horiz
			+0.9	+0.0	+0.0	+0.8					
26	9147.494M	28.1	+12.4	+6.8	+38.4	-39.3	+0.0	48.1	54.0	-5.9	Vert
			+0.9	+0.0	+0.0	+0.8					
27	7317.998M	32.8	+11.2	+6.0	+36.5	-39.5	+0.0	48.1	54.0	-5.9	Horiz
			+0.8	+0.0	+0.0	+0.3					
28	8124.745M	31.2	+11.6	+6.4	+37.2	-39.6	+0.0	48.0	54.0	-6.0	Vert
			+0.8	+0.0	+0.0	+0.4					
29	9027.494M	28.1	+12.3	+6.7	+38.5	-39.3	+0.0	48.0	54.0	-6.0	Horiz
			+0.9	+0.0	+0.0	+0.8					
30	8345.245M	30.4	+11.7	+6.4	+37.6	-39.5	+0.0	48.0	54.0	-6.0	Vert
			+0.9	+0.0	+0.0	+0.5					
31	9147.494M	27.6	+12.4	+6.8	+38.4	-39.3	+0.0	47.6	54.0	-6.4	Horiz
			+0.9	+0.0	+0.0	+0.8					
32	3708.998M	42.5	+7.4	+4.4	+32.0	-39.8	+0.0	47.6	54.0	-6.4	Vert
			+0.5	+0.0	+0.0	+0.6					

33	9027.492M	27.7	+12.3 +0.9	+6.7 +0.0	+38.5 +0.0	-39.3 +0.8	+0.0	47.6	54.0	-6.4	Vert
34	7222.000M	32.5	+11.2 +0.8	+6.0 +0.0	+36.1 +0.0	-39.4 +0.2	+0.0	47.4	54.0	-6.6	Vert
35	7221.995M	32.4	+11.2 +0.8	+6.0 +0.0	+36.1 +0.0	-39.4 +0.2	+0.0	47.3	54.0	-6.7	Horiz
36	9272.495M	27.2	+12.5 +0.9	+6.8 +0.0	+38.3 +0.0	-39.2 +0.7	+0.0	47.2	54.0	-6.8	Vert
37	8124.744M	30.4	+11.6 +0.8	+6.4 +0.0	+37.2 +0.0	-39.6 +0.4	+0.0	47.2	54.0	-6.8	Horiz
38	8232.745M	30.0	+11.7 +0.8	+6.4 +0.0	+37.3 +0.0	-39.6 +0.5	+0.0	47.1	54.0	-6.9	Horiz
39	2250.190M	49.5	+5.4 +0.4	+3.3 +0.4	+27.6 +0.0	-39.7 +0.0	+0.0	46.9	54.0	-7.1	Vert
40	9147.496M	26.9	+12.4 +0.9	+6.8 +0.0	+38.4 +0.0	-39.3 +0.8	+0.0	46.9	54.0	-7.1	Vert
41	7317.996M	31.4	+11.2 +0.8	+6.0 +0.0	+36.5 +0.0	-39.5 +0.3	+0.0	46.7	54.0	-7.3	Vert
42	9272.495M	26.7	+12.5 +0.9	+6.8 +0.0	+38.3 +0.0	-39.2 +0.7	+0.0	46.7	54.0	-7.3	Horiz
43	7417.996M	31.2	+11.3 +0.7	+6.1 +0.0	+36.5 +0.0	-39.5 +0.3	+0.0	46.6	54.0	-7.4	Horiz
44	3610.999M	42.4	+7.2 +0.5	+4.3 +0.0	+31.3 +0.0	-39.9 +0.8	+0.0	46.6	54.0	-7.4	Vert
45	2321.310M	48.1	+5.5 +0.4	+3.4 +0.4	+27.8 +0.0	-39.8 +0.0	+0.0	45.8	54.0	-8.2	Horiz
46	3708.998M	40.5	+7.4 +0.5	+4.4 +0.0	+32.0 +0.0	-39.8 +0.6	+0.0	45.6	54.0	-8.4	Vert
47	7317.996M	30.3	+11.2 +0.8	+6.0 +0.0	+36.5 +0.0	-39.5 +0.3	+0.0	45.6	54.0	-8.4	Vert
48	2344.100M	47.3	+5.6 +0.4	+3.4 +0.4	+28.1 +0.0	-39.8 +0.0	+0.0	45.4	54.0	-8.6	Vert
49	3658.998M	40.3	+7.3 +0.5	+4.4 +0.0	+31.6 +0.0	-39.8 +0.7	+0.0	45.0	54.0	-9.0	Horiz
50	3708.999M	39.8	+7.4 +0.5	+4.4 +0.0	+32.0 +0.0	-39.8 +0.6	+0.0	44.9	54.0	-9.1	Horiz
51	6319.248M	33.4	+9.8 +0.7	+5.7 +0.0	+34.4 +0.0	-39.5 +0.3	+0.0	44.8	54.0	-9.2	Vert
52	5416.496M	35.4	+8.8 +0.6	+5.0 +0.0	+34.1 +0.0	-39.4 +0.3	+0.0	44.8	54.0	-9.2	Vert
53	5416.496M	35.0	+8.8 +0.6	+5.0 +0.0	+34.1 +0.0	-39.4 +0.3	+0.0	44.4	54.0	-9.6	Horiz
54	2321.200M	46.6	+5.5 +0.4	+3.4 +0.4	+27.8 +0.0	-39.8 +0.0	+0.0	44.3	54.0	-9.7	Vert
55	3658.983M	39.5	+7.3 +0.5	+4.4 +0.0	+31.6 +0.0	-39.8 +0.7	+0.0	44.2	54.0	-9.8	Horiz
56	2708.248M Ave	32.0	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	43.9	54.0	-10.1	Horiz
^	2708.248M	48.2	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	60.1	54.0	+6.1	Horiz
^	2708.248M	41.3	+5.8 +0.4	+3.7 +0.0	+28.7 +0.0	-39.8 +13.1	+0.0	53.2	54.0	-0.8	Horiz

59	7417.998M	28.5	+11.3 +0.7	+6.1 +0.0	+36.5 +0.0	-39.5 +0.3	+0.0	43.9	54.0	-10.1	Horiz
60	2344.460M	45.7	+5.6 +0.4	+3.4 +0.4	+28.1 +0.0	-39.8 +0.0	+0.0	43.8	54.0	-10.2	Horiz
61	3708.998M	38.7	+7.4 +0.5	+4.4 +0.0	+32.0 +0.0	-39.8 +0.6	+0.0	43.8	54.0	-10.2	Horiz
62	3610.998M	39.5	+7.2 +0.5	+4.3 +0.0	+31.3 +0.0	-39.9 +0.8	+0.0	43.7	54.0	-10.3	Horiz
63	3659.013M	38.9	+7.3 +0.5	+4.4 +0.0	+31.6 +0.0	-39.8 +0.7	+0.0	43.6	54.0	-10.4	Vert
64	1125.010M	52.5	+3.7 +0.2	+2.3 +0.3	+24.9 +0.4	-40.8 +0.0	+0.0	43.5	54.0	-10.5	Vert
65	3610.998M	39.3	+7.2 +0.5	+4.3 +0.0	+31.3 +0.0	-39.9 +0.8	+0.0	43.5	54.0	-10.5	Horiz
66	4513.726M	36.3	+8.3 +0.6	+4.6 +0.0	+32.3 +0.0	-39.6 +0.3	+0.0	42.8	54.0	-11.2	Vert
67	2375.040M	43.9	+5.7 +0.4	+3.4 +0.4	+28.4 +0.0	-39.8 +0.0	+0.0	42.4	54.0	-11.6	Vert
68	4636.248M	35.3	+8.4 +0.6	+4.7 +0.0	+32.6 +0.0	-39.5 +0.2	+0.0	42.3	54.0	-11.7	Vert
69	2249.620M	44.8	+5.4 +0.4	+3.3 +0.4	+27.6 +0.0	-39.7 +0.0	+0.0	42.2	54.0	-11.8	Horiz
70	4573.748M	35.5	+8.3 +0.6	+4.7 +0.0	+32.4 +0.0	-39.6 +0.2	+0.0	42.1	54.0	-11.9	Horiz
71	4636.249M	35.0	+8.4 +0.6	+4.7 +0.0	+32.6 +0.0	-39.5 +0.2	+0.0	42.0	54.0	-12.0	Horiz
72	5416.497M	32.6	+8.8 +0.6	+5.0 +0.0	+34.1 +0.0	-39.4 +0.3	+0.0	42.0	54.0	-12.0	Horiz
73	4573.747M	35.3	+8.3 +0.6	+4.7 +0.0	+32.4 +0.0	-39.6 +0.2	+0.0	41.9	54.0	-12.1	Vert
74	1125.010M	50.1	+3.7 +0.2	+2.3 +0.3	+24.9 +0.4	-40.8 +0.0	+0.0	41.1	54.0	-12.9	Horiz
75	1125.010M	50.0	+3.7 +0.2	+2.3 +0.3	+24.9 +0.4	-40.8 +0.0	+0.0	41.0	54.0	-13.0	Horiz
76	4513.749M	34.5	+8.3 +0.6	+4.6 +0.0	+32.3 +0.0	-39.6 +0.3	+0.0	41.0	54.0	-13.0	Horiz
77	5416.497M	31.4	+8.8 +0.6	+5.0 +0.0	+34.1 +0.0	-39.4 +0.3	+0.0	40.8	54.0	-13.2	Vert
78	2375.021M	42.1	+5.7 +0.4	+3.4 +0.4	+28.4 +0.0	-39.8 +0.0	+0.0	40.6	54.0	-13.4	Horiz
79	4513.747M	34.0	+8.3 +0.6	+4.6 +0.0	+32.3 +0.0	-39.6 +0.3	+0.0	40.5	54.0	-13.5	Horiz
80	3610.997M	36.1	+7.2 +0.5	+4.3 +0.0	+31.3 +0.0	-39.9 +0.8	+0.0	40.3	54.0	-13.7	Vert
81	4636.247M	33.2	+8.4 +0.6	+4.7 +0.0	+32.6 +0.0	-39.5 +0.2	+0.0	40.2	54.0	-13.8	Horiz
82	4513.752M	33.6	+8.3 +0.6	+4.6 +0.0	+32.3 +0.0	-39.6 +0.3	+0.0	40.1	54.0	-13.9	Vert
83	4636.247M	33.0	+8.4 +0.6	+4.7 +0.0	+32.6 +0.0	-39.5 +0.2	+0.0	40.0	54.0	-14.0	Vert
84	1500.013M	47.0	+4.3 +0.3	+2.6 +0.3	+25.4 +0.0	-39.9 +0.0	+0.0	40.0	54.0	-14.0	Vert

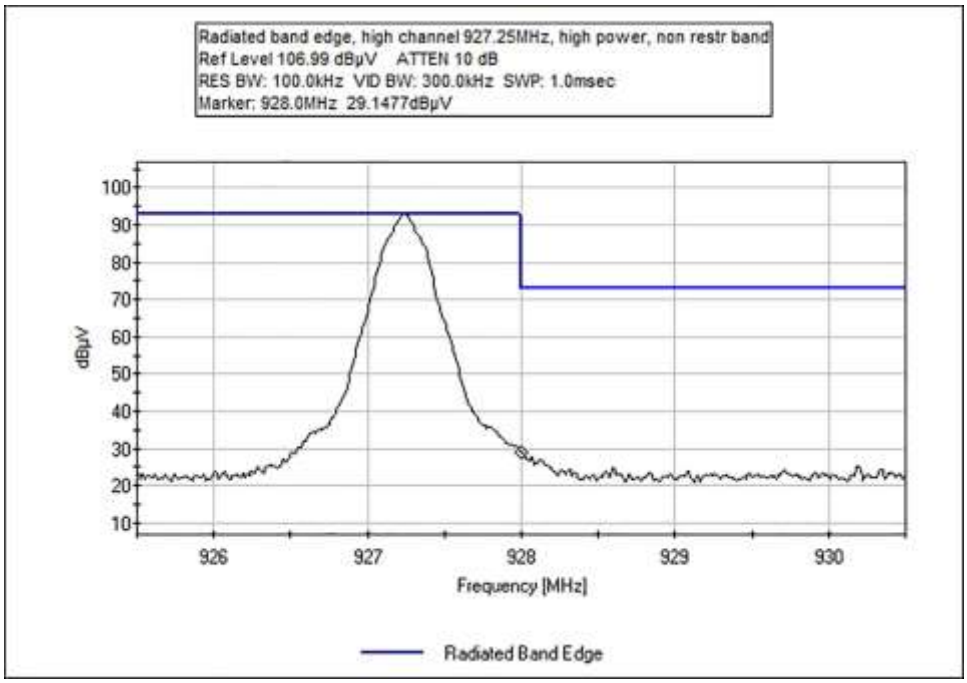
85	4573.747M	33.2	+8.3	+4.7	+32.4	-39.6	+0.0	39.8	54.0	-14.2	Horiz
			+0.6	+0.0	+0.0	+0.2					
86	4573.748M	33.2	+8.3	+4.7	+32.4	-39.6	+0.0	39.8	54.0	-14.2	Vert
			+0.6	+0.0	+0.0	+0.2					
87	1500.013M	45.6	+4.3	+2.6	+25.4	-39.9	+0.0	38.6	54.0	-15.4	Horiz
			+0.3	+0.3	+0.0	+0.0					
88	1374.991M	45.4	+4.1	+2.5	+25.4	-40.0	+0.0	38.5	54.0	-15.5	Vert
			+0.3	+0.3	+0.5	+0.0					
89	1375.012M	45.0	+4.1	+2.5	+25.4	-40.0	+0.0	38.1	54.0	-15.9	Horiz
			+0.3	+0.3	+0.5	+0.0					
90	1625.013M	43.8	+4.5	+2.7	+25.5	-39.7	+0.0	37.4	54.0	-16.6	Vert
			+0.3	+0.3	+0.0	+0.0					
91	1625.014M	43.5	+4.5	+2.7	+25.5	-39.7	+0.0	37.1	54.0	-16.9	Horiz
			+0.3	+0.3	+0.0	+0.0					
92	2730.217M	26.6	+5.8	+3.7	+28.8	-39.8	+0.0	36.1	54.0	-17.9	Horiz
	Ave		+0.4	+0.0	+0.0	+10.6					
^	2730.217M	55.3	+5.8	+3.7	+28.8	-39.8	+0.0	64.8	54.0	+10.8	Horiz
			+0.4	+0.0	+0.0	+10.6					

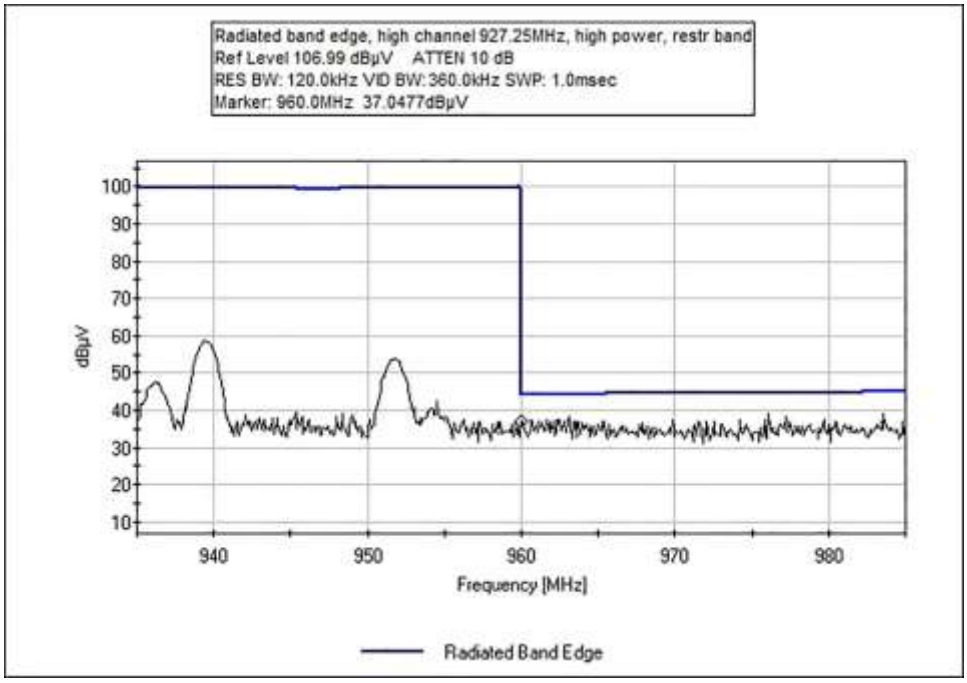
Band Edge

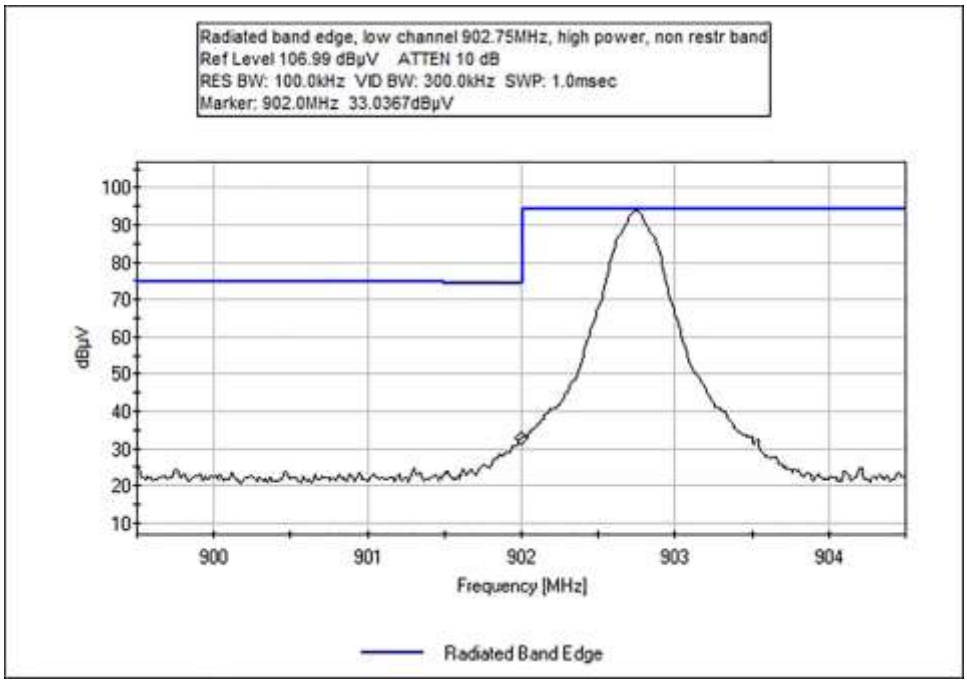
Band Edge Summary – Single Channel Mode					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Patch Array	42.0	<46	Pass
902			68.2	<109.6	Pass
928			65.5	< 109.6	Pass
960			47.8	<54	Pass

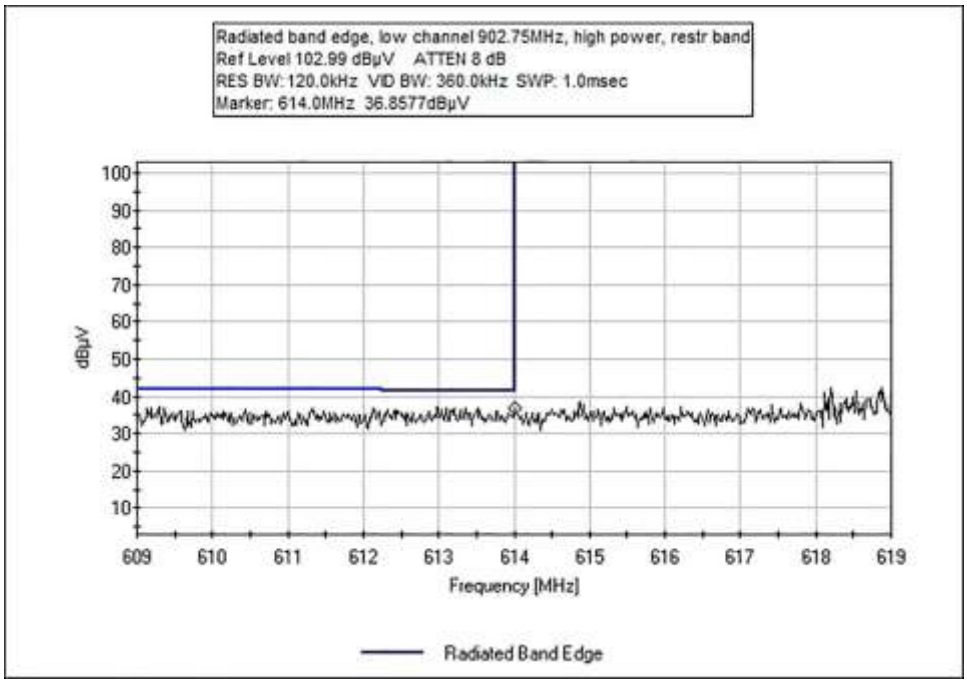
Band Edge Summary – Hopping Mode					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	PR-ASK	Patch Array	41.2	<46	Pass
902			68.9	<109.6	Pass
928			66.0	< 109.6	Pass
960			46.1	<54	Pass

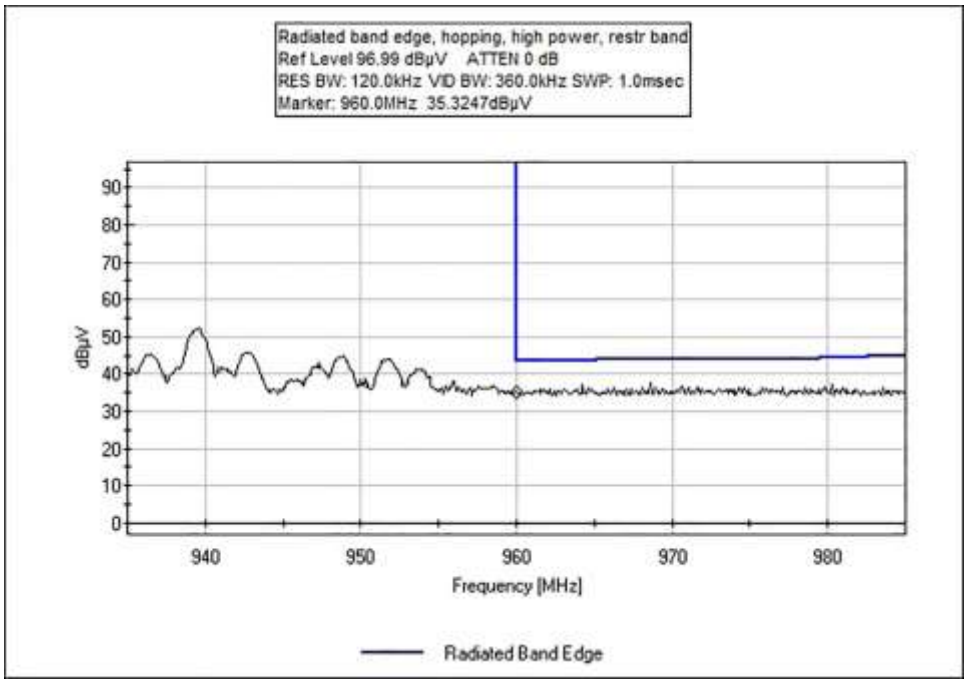
Band Edge Plots

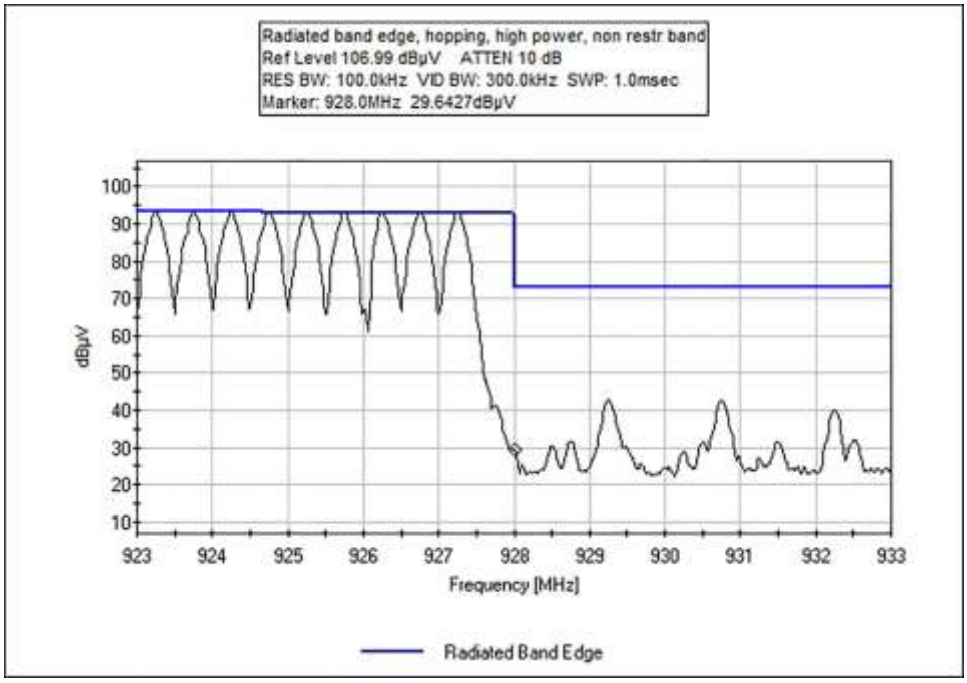


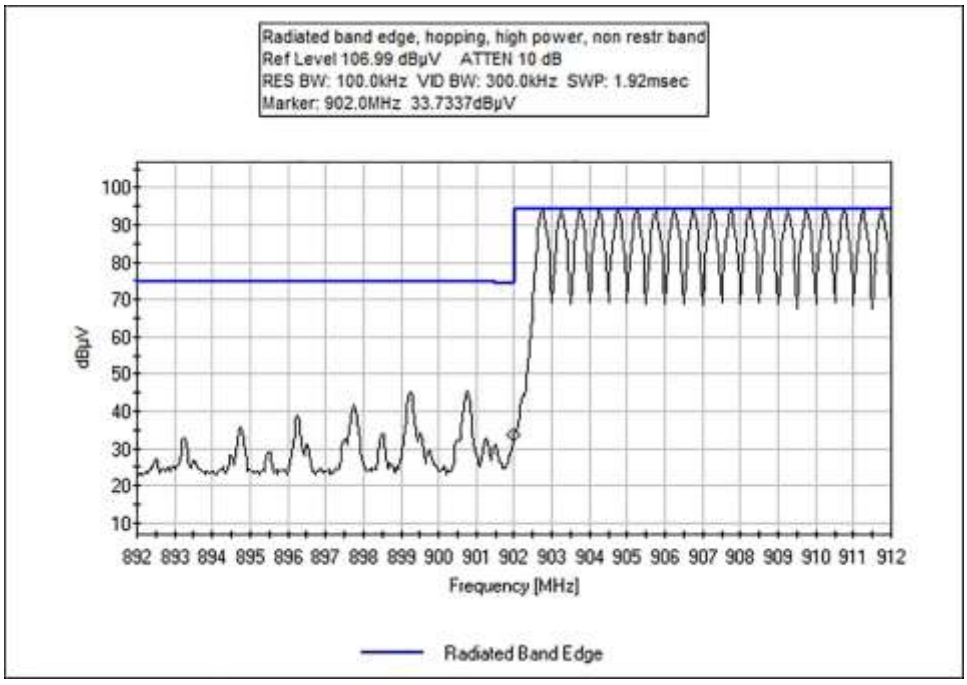

Radiated band edge, high channel 927.25MHz, high power, restr band
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 120.0kHz VID BW:360.0kHz SWP: 1.0msec
Marker: 960.0MHz 37.0477dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
940
950
960
970
980
Frequency [MHz]
Radiated Band Edge

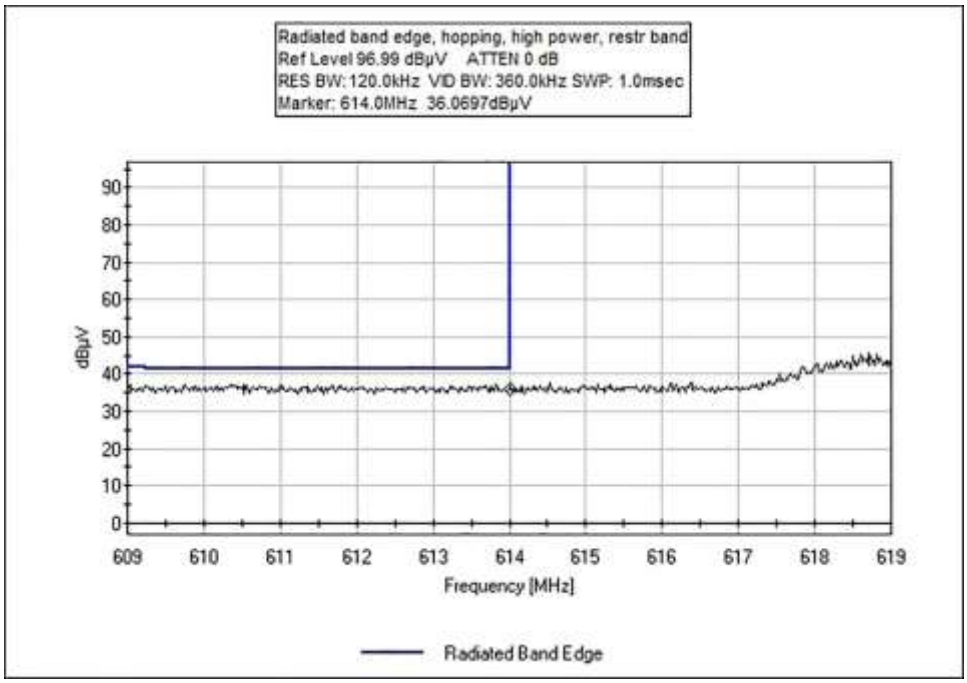

Radiated band edge, low channel 902.75MHz, high power, non restr band
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 902.0MHz 33.0367dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
901
902
903
904
Frequency [MHz]
Radiated Band Edge


Radiated band edge, low channel 902.75MHz, high power, restr band
Ref Level 102.99 dBµV ATTEN 8 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 1.0msec
Marker: 614.0MHz 36.8577dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
609
610
611
612
613
614
615
616
617
618
619
Frequency [MHz]
Radiated Band Edge


Radiated band edge, hopping, high power, restr band
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 1.0msec
Marker: 960.0MHz 35.3247dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
940
950
960
970
980
Frequency [MHz]
Radiated Band Edge


Radiated band edge, hopping, high power, non restr band
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 928.0MHz 29.6427dBµV
dBµV
Frequency [MHz]
Radiated Band Edge


Radiated band edge, hopping, high power, non restr band
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.92msec
Marker: 902.0MHz 33.7337dBµV
dBµV
Frequency [MHz]
Radiated Band Edge


Radiated band edge, hopping, high power, restr band
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 1.0msec
Marker: 614.0MHz 36.0697dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
609
610
611
612
613
614
615
616
617
618
619
Frequency [MHz]
Radiated 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:	**Radiated Band Edge**		
Work Order #:	**110388**	Date:	2/17/2025
Test Type:	**Radiated Scan**	Time:	09:44:12
Tested By:	S. Yamamoto	Sequence#:	8
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 set stand alone on the Styrofoam table top .

The EUT is powered via a unshielded 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 NUC and to the NUC a laptop computer. The computer is used to set frequency channel, frequency, hopping, and modulation of the EUT.
The EUT is tested at the LH channels and also when hopping. For the LH channels the EUT is set to continuously hop on the same channel. For this test purpose it is the low, and high channels listed below.
The EUT is oriented horizontally facing downward.

Frequency range of data sheet and test 1GHz to 9.28GHz.
For RB, RBW=120kHz VBW=360kHz
For NRB, RBW=100kHz VBW=300kHz

Frequency range of EUT: 902.75MHz to 927.25MHz

TX Low 902.75MHz, High 927.25MHz

TARI = 6.25us

Firmware = 2.127.0

High Power setting. Streams 0, 1, 2, 3 setting.

Test Environment Conditions:
Temperature: 22°C
Humidity: 43%
Pressure: 99kPa

Site D

Test Method: ANSI C63.10 2020

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T1	ANP04382	Cable	LDF-50	6/4/2024	6/4/2026
T2	ANP01911	Cable-Amplitude +15C to +45C (dB)	RG214/U	1/4/2024	1/4/2026
T3	AN03628	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026
T4	ANP08079	Band Pass Filter	BRC50722	11/2/2023	11/2/2025
T5	ANP06985	Cable	Sucoflex 104A	9/12/2024	9/12/2026
T6	AN00010	Preamp	8447D	1/2/2024	1/2/2026
T7	ANP07655	Cable	32022-29094K-29094K-24TC	7/20/2024	7/20/2026
T8	ANP07657	Cable	32022-29094K-29094K-24TC	7/3/2024	7/3/2026

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

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	614.000M	36.9	+2.6 +0.3	+2.4 -28.0	+27.1 +0.1	+0.3 +0.3	+0.0	42.0	46.0	-4.0	Horiz
2	614.000M	36.1	+2.6 +0.3	+2.4 -28.0	+27.1 +0.1	+0.3 +0.3	+0.0	41.2	46.0	-4.8	Horiz
3	960.000M	37.0	+3.3 +0.3	+3.2 -27.4	+30.2 +0.2	+0.7 +0.3	+0.0	47.8	54.0	-6.2	Horiz
4	960.000M	35.3	+3.3 +0.3	+3.2 -27.4	+30.2 +0.2	+0.7 +0.3	+0.0	46.1	54.0	-7.9	Horiz
5	902.000M	33.7	+3.3 +0.0	+3.1 +0.0	+28.8 +0.0	+0.0 +0.0	+0.0	68.9	109.6	-40.7	Horiz
6	902.000M	33.0	+3.3 +0.0	+3.1 +0.0	+28.8 +0.0	+0.0 +0.0	+0.0	68.2	109.6	-41.4	Horiz
7	928.000M	29.6	+3.3 +0.0	+3.2 +0.0	+29.9 +0.0	+0.0 +0.0	+0.0	66.0	109.6	-43.6	Horiz
8	928.000M	29.1	+3.3 +0.0	+3.2 +0.0	+29.9 +0.0	+0.0 +0.0	+0.0	65.5	109.6	-44.1	Horiz

Test Setup Photo(s)

Below 1GHz, Front View

Below 1GHz, Back View

Above 1GHz

15.207 AC Conducted Emissions

Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2020)	Test Date(s):	2/7/2025
Configuration:	2		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	55

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 #: **110388** Date: 2/7/2025
Test Type: **Conducted Emissions** Time: 09:11:30
Tested By: S. Yamamoto Sequence#: 3
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 and support equipment are placed adjacent to each other on the table top. The connections are as follows: Support laptop is connected to NUC via unshielded cat 6 cable. NUC is connected to PoE+ switch via unshielded cat 6 cable. PoE+ switch is connected to EUT via unshielded cat 6 cable.

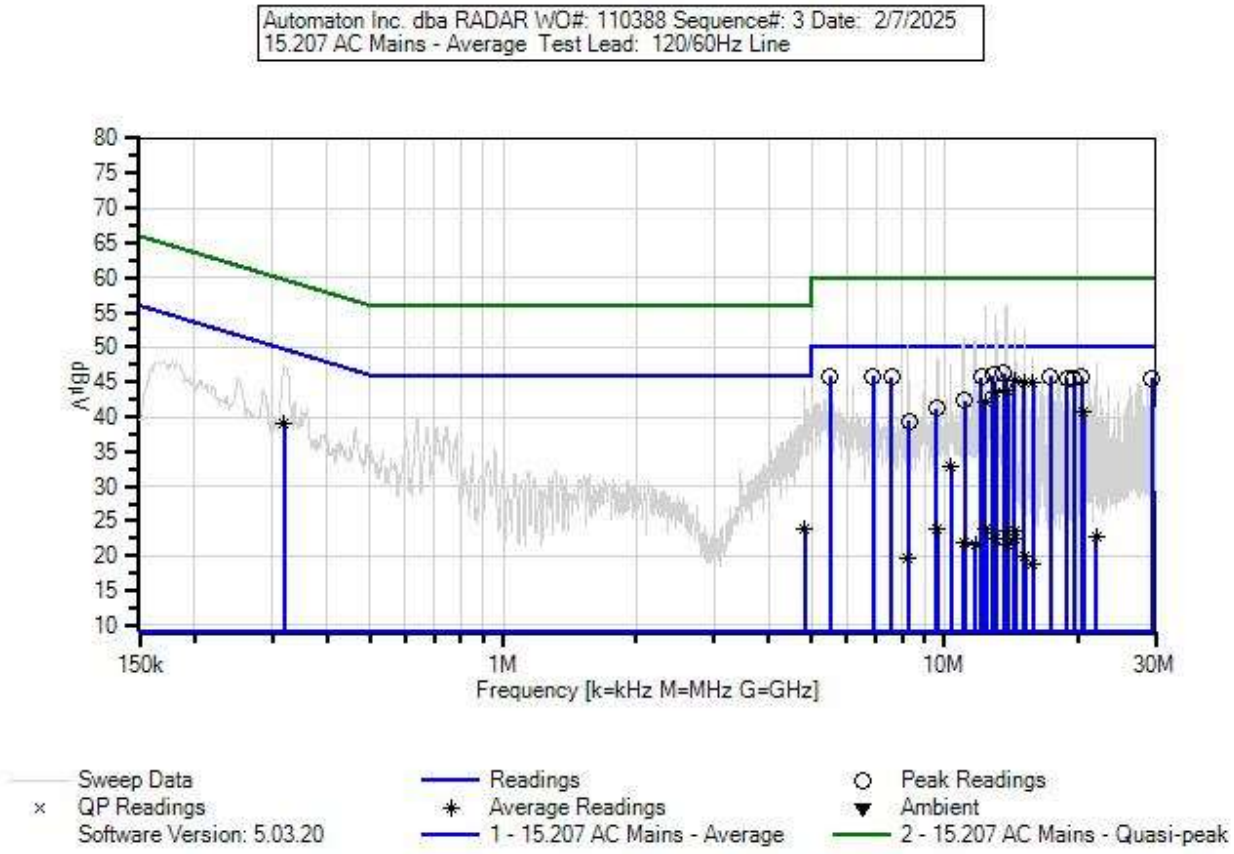
The EUT is setup with high power, low gain. Streams 0123.
Modulation: tari 6.25us.
Frequency hopping on all channels (902.75MHz to 927.25MHz).

Frequency range of measurement = 150kHz to 30MHz.
RBW=9 kHz
VBW=30kHz

Test Environment Conditions:
Temperature: 23°C
Humidity: 55%
Pressure: 99kPa

Site D

Test Method: ANSI C63.10-2020



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T1	AN02343	High Pass Filter	HE9615-150K-50-720B	1/10/2025	1/10/2027
T2	ANP07336	Cable	2249-Y-240	1/10/2025	1/10/2027
T3	ANP06085	Attenuator	SA18N10W-09	10/28/2024	10/28/2026
T4	AN00847.1	50uH LISN-Line 1	3816/2NM	5/8/2024	5/8/2025
	AN00847.1	50uH LISN-Line 2(N)	3816/2NM	5/8/2024	5/8/2025

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.598M	39.9	+0.2	+0.3	+5.8	+0.1	+0.0	46.3	50.0	-3.7	Line
2	12.842M	39.6	+0.2	+0.3	+5.8	+0.1	+0.0	46.0	50.0	-4.0	Line
3	6.896M	39.7	+0.1	+0.2	+5.8	+0.1	+0.0	45.9	50.0	-4.1	Line
4	5.517M	39.7	+0.1	+0.2	+5.8	+0.0	+0.0	45.8	50.0	-4.2	Line
5	17.382M	39.3	+0.2	+0.4	+5.8	+0.1	+0.0	45.8	50.0	-4.2	Line
6	12.094M	39.3	+0.2	+0.3	+5.8	+0.1	+0.0	45.7	50.0	-4.3	Line
7	7.589M	39.5	+0.1	+0.2	+5.8	+0.1	+0.0	45.7	50.0	-4.3	Line
8	20.400M	39.2	+0.2	+0.4	+5.8	+0.1	+0.0	45.7	50.0	-4.3	Line
9	19.643M	39.1	+0.2	+0.4	+5.8	+0.1	+0.0	45.6	50.0	-4.4	Line
10	29.472M	38.8	+0.3	+0.5	+5.8	+0.1	+0.0	45.5	50.0	-4.5	Line
11	18.896M	39.0	+0.2	+0.4	+5.8	+0.1	+0.0	45.5	50.0	-4.5	Line
12 Ave	14.357M	38.8	+0.2	+0.3	+5.8	+0.1	+0.0	45.2	50.0	-4.8	Line
^	14.357M	41.2	+0.2	+0.3	+5.8	+0.1	+0.0	47.6	50.0	-2.4	Line
^	14.355M	40.1	+0.2	+0.3	+5.8	+0.1	+0.0	46.5	50.0	-3.5	Line
15 Ave	15.868M	38.5	+0.2	+0.3	+5.8	+0.1	+0.0	44.9	50.0	-5.1	Line
^	15.868M	43.2	+0.2	+0.3	+5.8	+0.1	+0.0	49.6	50.0	-0.4	Line
17 Ave	15.112M	38.4	+0.2	+0.3	+5.8	+0.1	+0.0	44.8	50.0	-5.2	Line
^	15.112M	43.5	+0.2	+0.3	+5.8	+0.1	+0.0	49.9	50.0	-0.1	Line
^	15.112M	39.6	+0.2	+0.3	+5.8	+0.1	+0.0	46.0	50.0	-4.0	Line
20 Ave	13.853M	37.3	+0.2	+0.3	+5.8	+0.1	+0.0	43.7	50.0	-6.3	Line
^	13.854M	39.6	+0.2	+0.3	+5.8	+0.1	+0.0	46.0	50.0	-4.0	Line
^	13.853M	38.7	+0.2	+0.3	+5.8	+0.1	+0.0	45.1	50.0	-4.9	Line
23 Ave	13.097M	37.0	+0.2	+0.3	+5.8	+0.1	+0.0	43.4	50.0	-6.6	Line
^	13.097M	45.2	+0.2	+0.3	+5.8	+0.1	+0.0	51.6	50.0	+1.6	Line

25	11.084M	36.0	+0.1	+0.3	+5.8	+0.1	+0.0	42.3	50.0	-7.7	Line
26	12.341M Ave	35.7	+0.2	+0.3	+5.8	+0.1	+0.0	42.1	50.0	-7.9	Line
^	12.341M	40.5	+0.2	+0.3	+5.8	+0.1	+0.0	46.9	50.0	-3.1	Line
28	9.570M	34.9	+0.1	+0.3	+5.8	+0.1	+0.0	41.2	50.0	-8.8	Line
29	20.652M Ave	34.2	+0.2	+0.4	+5.8	+0.1	+0.0	40.7	50.0	-9.3	Line
^	20.652M	41.2	+0.2	+0.4	+5.8	+0.1	+0.0	47.7	50.0	-2.3	Line
31	8.311M	33.2	+0.1	+0.2	+5.8	+0.1	+0.0	39.4	50.0	-10.6	Line
32	318.627k Ave	32.9	+0.2	+0.0	+5.8	+0.0	+0.0	38.9	49.7	-10.8	Line
^	318.627k	41.3	+0.2	+0.0	+5.8	+0.0	+0.0	47.3	49.7	-2.4	Line
34	10.328M Ave	26.5	+0.1	+0.3	+5.8	+0.1	+0.0	32.8	50.0	-17.2	Line
^	10.328M	41.1	+0.1	+0.3	+5.8	+0.1	+0.0	47.4	50.0	-2.6	Line
36	4.824M Ave	17.8	+0.1	+0.2	+5.8	+0.0	+0.0	23.9	46.0	-22.1	Line
^	4.824M	38.4	+0.1	+0.2	+5.8	+0.0	+0.0	44.5	46.0	-1.5	Line
38	9.643M Ave	17.5	+0.1	+0.3	+5.8	+0.1	+0.0	23.8	50.0	-26.2	Line
^	9.643M	42.4	+0.1	+0.3	+5.8	+0.1	+0.0	48.7	50.0	-1.3	Line
40	12.418M Ave	17.4	+0.2	+0.3	+5.8	+0.1	+0.0	23.8	50.0	-26.2	Line
^	12.418M	49.6	+0.2	+0.3	+5.8	+0.1	+0.0	56.0	50.0	+6.0	Line
42	14.454M Ave	17.3	+0.2	+0.3	+5.8	+0.1	+0.0	23.7	50.0	-26.3	Line
^	14.454M	45.9	+0.2	+0.3	+5.8	+0.1	+0.0	52.3	50.0	+2.3	Line
44	13.788M Ave	17.2	+0.2	+0.3	+5.8	+0.1	+0.0	23.6	50.0	-26.4	Line
^	13.788M	49.5	+0.2	+0.3	+5.8	+0.1	+0.0	55.9	50.0	+5.9	Line
46	22.049M Ave	16.1	+0.2	+0.4	+5.8	+0.2	+0.0	22.7	50.0	-27.3	Line
^	22.049M	41.3	+0.2	+0.4	+5.8	+0.2	+0.0	47.9	50.0	-2.1	Line
48	13.085M Ave	16.2	+0.2	+0.3	+5.8	+0.1	+0.0	22.6	50.0	-27.4	Line
^	13.085M	48.1	+0.2	+0.3	+5.8	+0.1	+0.0	54.5	50.0	+4.5	Line

50 Ave	14.481M	16.2	+0.2	+0.3	+5.8	+0.1	+0.0	22.6	50.0	-27.4	Line
^	14.481M	43.6	+0.2	+0.3	+5.8	+0.1	+0.0	50.0	50.0	+0.0	Line
52 Ave	11.040M	15.7	+0.1	+0.3	+5.8	+0.1	+0.0	22.0	50.0	-28.0	Line
^	11.040M	45.2	+0.1	+0.3	+5.8	+0.1	+0.0	51.5	50.0	+1.5	Line
54 Ave	11.716M	15.4	+0.1	+0.3	+5.8	+0.1	+0.0	21.7	50.0	-28.3	Line
^	11.716M	44.8	+0.1	+0.3	+5.8	+0.1	+0.0	51.1	50.0	+1.1	Line
56 Ave	13.806M	15.3	+0.2	+0.3	+5.8	+0.1	+0.0	21.7	50.0	-28.3	Line
^	13.806M	49.2	+0.2	+0.3	+5.8	+0.1	+0.0	55.6	50.0	+5.6	Line
58 Ave	15.184M	13.5	+0.2	+0.3	+5.8	+0.1	+0.0	19.9	50.0	-30.1	Line
^	15.184M	46.2	+0.2	+0.3	+5.8	+0.1	+0.0	52.6	50.0	+2.6	Line
60 Ave	8.274M	13.6	+0.1	+0.2	+5.8	+0.1	+0.0	19.8	50.0	-30.2	Line
^	8.274M	44.1	+0.1	+0.2	+5.8	+0.1	+0.0	50.3	50.0	+0.3	Line
62 Ave	15.842M	12.5	+0.2	+0.3	+5.8	+0.1	+0.0	18.9	50.0	-31.1	Line
^	15.842M	42.0	+0.2	+0.3	+5.8	+0.1	+0.0	48.4	50.0	-1.6	Line

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 #:	**110388**	Date:	2/7/2025
Test Type:	**Conducted Emissions**	Time:	09:43:55
Tested By:	S. Yamamoto	Sequence#:	4
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 and support equipment are placed adjacent to each other on the table top. The connections are as follows: Support laptop is connected to NUC via unshielded cat 6 cable. NUC is connected to PoE+ switch via unshielded cat 6 cable. PoE+ switch is connected to EUT via unshielded cat 6 cable.

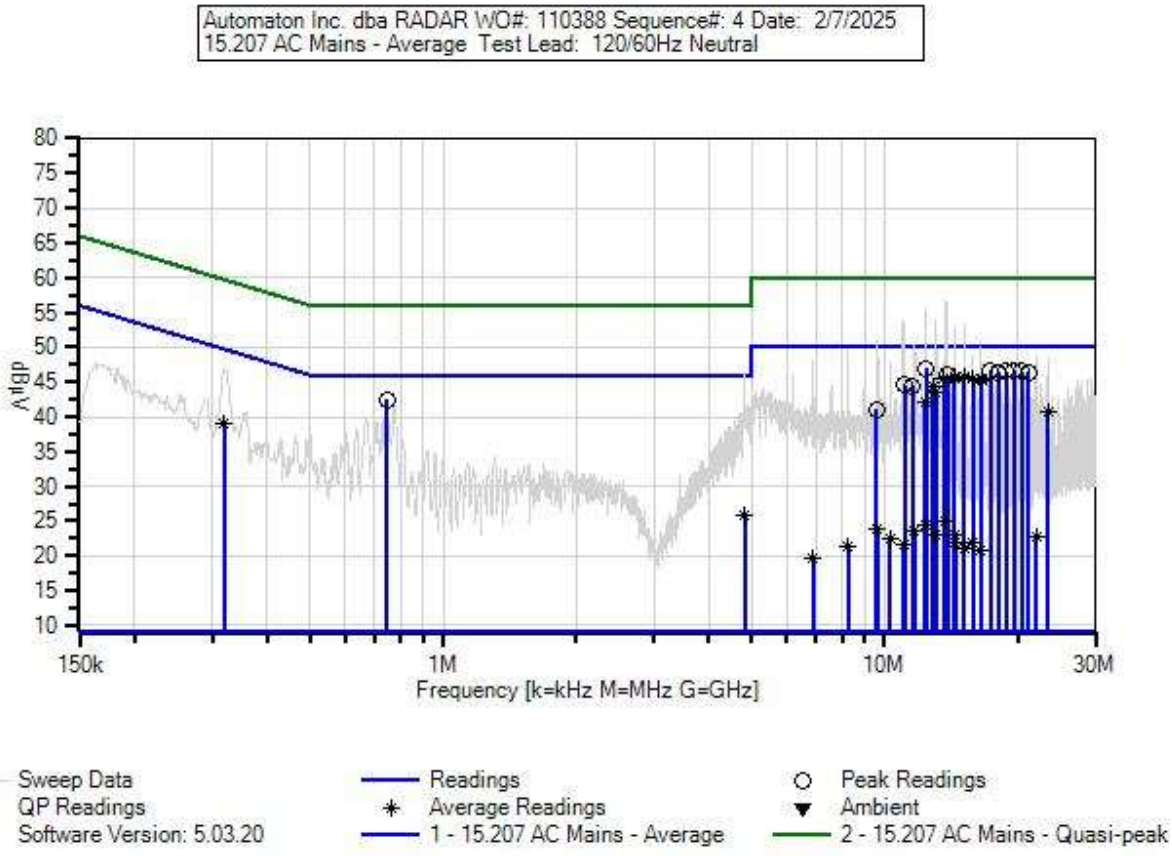
The EUT is setup with high power, low gain. Streams 0123.
Modulation: tari 6.25us.
Frequency hopping on all channels (902.75MHz to 927.25MHz).

Frequency range of measurement = 150kHz to 30MHz.
RBW=9 kHz
VBW=30kHz

Test Environment Conditions:
Temperature: 23°C
Humidity: 55%
Pressure: 99kPa

Site D

Test Method: ANSI C63.10-2020



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03834	Spectrum Analyzer	E4448A	5/6/2024	5/6/2026
T1	AN02343	High Pass Filter	HE9615-150K-50-720B	1/10/2025	1/10/2027
T2	ANP07336	Cable	2249-Y-240	1/10/2025	1/10/2027
T3	ANP06085	Attenuator	SA18N10W-09	10/28/2024	10/28/2026
	AN00847.1	50uH LISN-Line 1	3816/2NM	5/8/2024	5/8/2025
T4	AN00847.1	50uH LISN-Line 2(N)	3816/2NM	5/8/2024	5/8/2025

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	12.418M	40.5	+0.2	+0.3	+5.8	+0.1	+0.0	46.9	50.0	-3.1	Neutr
2	17.373M	40.1	+0.2	+0.4	+5.8	+0.2	+0.0	46.7	50.0	-3.3	Neutr
3	19.643M	40.1	+0.2	+0.4	+5.8	+0.2	+0.0	46.7	50.0	-3.3	Neutr
4	20.400M	40.0	+0.2	+0.4	+5.8	+0.2	+0.0	46.6	50.0	-3.4	Neutr
5	18.887M	39.9	+0.2	+0.4	+5.8	+0.2	+0.0	46.5	50.0	-3.5	Neutr
6	745.581k	36.4	+0.2	+0.1	+5.8	+0.0	+0.0	42.5	46.0	-3.5	Neutr
7	21.157M	39.8	+0.2	+0.4	+5.8	+0.2	+0.0	46.4	50.0	-3.6	Neutr
8	18.130M	39.8	+0.2	+0.4	+5.8	+0.2	+0.0	46.4	50.0	-3.6	Neutr
9	13.851M	39.6	+0.2	+0.3	+5.8	+0.1	+0.0	46.0	50.0	-4.0	Neutr
10	15.111M Ave	39.4	+0.2	+0.3	+5.8	+0.2	+0.0	45.9	50.0	-4.1	Neutr
^	15.111M	45.8	+0.2	+0.3	+5.8	+0.2	+0.0	52.3	50.0	+2.3	Neutr
12	14.354M Ave	39.3	+0.2	+0.3	+5.8	+0.2	+0.0	45.8	50.0	-4.2	Neutr
13	15.866M Ave	39.1	+0.2	+0.3	+5.8	+0.2	+0.0	45.6	50.0	-4.4	Neutr
^	15.866M	41.9	+0.2	+0.3	+5.8	+0.2	+0.0	48.4	50.0	-1.6	Neutr
15	14.354M Ave	39.1	+0.2	+0.3	+5.8	+0.2	+0.0	45.6	50.0	-4.4	Neutr
^	14.354M	40.8	+0.2	+0.3	+5.8	+0.2	+0.0	47.3	50.0	-2.7	Neutr
^	14.354M	40.3	+0.2	+0.3	+5.8	+0.2	+0.0	46.8	50.0	-3.2	Neutr
18	13.598M Ave	39.1	+0.2	+0.3	+5.8	+0.1	+0.0	45.5	50.0	-4.5	Neutr
^	13.598M	41.3	+0.2	+0.3	+5.8	+0.1	+0.0	47.7	50.0	-2.3	Neutr
20	16.621M Ave	38.9	+0.2	+0.3	+5.8	+0.2	+0.0	45.4	50.0	-4.6	Neutr
21	16.621M Ave	38.7	+0.2	+0.3	+5.8	+0.2	+0.0	45.2	50.0	-4.8	Neutr
^	16.621M	41.3	+0.2	+0.3	+5.8	+0.2	+0.0	47.8	50.0	-2.2	Neutr
^	16.621M	41.1	+0.2	+0.3	+5.8	+0.2	+0.0	47.6	50.0	-2.4	Neutr
24	11.081M	38.3	+0.1	+0.3	+5.8	+0.1	+0.0	44.6	50.0	-5.4	Neutr

25	11.585M	38.1	+0.1	+0.3	+5.8	+0.1	+0.0	44.4	50.0	-5.6	Neutr
26	12.842M Ave	37.9	+0.2	+0.3	+5.8	+0.1	+0.0	44.3	50.0	-5.7	Neutr
^	12.842M	40.6	+0.2	+0.3	+5.8	+0.1	+0.0	47.0	50.0	-3.0	Neutr
28	13.095M Ave	37.0	+0.2	+0.3	+5.8	+0.1	+0.0	43.4	50.0	-6.6	Neutr
^	13.095M	45.6	+0.2	+0.3	+5.8	+0.1	+0.0	52.0	50.0	+2.0	Neutr
30	12.341M Ave	35.6	+0.2	+0.3	+5.8	+0.1	+0.0	42.0	50.0	-8.0	Neutr
^	12.341M	43.2	+0.2	+0.3	+5.8	+0.1	+0.0	49.6	50.0	-0.4	Neutr
32	9.569M	34.7	+0.1	+0.3	+5.8	+0.2	+0.0	41.1	50.0	-8.9	Neutr
33	23.420M Ave	34.2	+0.2	+0.4	+5.8	+0.2	+0.0	40.8	50.0	-9.2	Neutr
^	23.422M	41.7	+0.2	+0.4	+5.8	+0.2	+0.0	48.3	50.0	-1.7	Neutr
^	23.420M	40.9	+0.2	+0.4	+5.8	+0.2	+0.0	47.5	50.0	-2.5	Neutr
36	318.848k Ave	33.0	+0.2	+0.0	+5.8	+0.0	+0.0	39.0	49.7	-10.7	Neutr
^	318.848k	40.9	+0.2	+0.0	+5.8	+0.0	+0.0	46.9	49.7	-2.8	Neutr
38	4.819M Ave	19.5	+0.1	+0.2	+5.8	+0.1	+0.0	25.7	46.0	-20.3	Neutr
^	4.819M	39.8	+0.1	+0.2	+5.8	+0.1	+0.0	46.0	46.0	+0.0	Neutr
40	13.779M Ave	18.6	+0.2	+0.3	+5.8	+0.1	+0.0	25.0	50.0	-25.0	Neutr
^	13.779M	50.5	+0.2	+0.3	+5.8	+0.1	+0.0	56.9	50.0	+6.9	Neutr
42	12.391M Ave	18.0	+0.2	+0.3	+5.8	+0.1	+0.0	24.4	50.0	-25.6	Neutr
^	12.391M	49.1	+0.2	+0.3	+5.8	+0.1	+0.0	55.5	50.0	+5.5	Neutr
44	9.643M Ave	17.5	+0.1	+0.3	+5.8	+0.2	+0.0	23.9	50.0	-26.1	Neutr
^	9.643M	44.6	+0.1	+0.3	+5.8	+0.2	+0.0	51.0	50.0	+1.0	Neutr
46	11.679M Ave	17.4	+0.1	+0.3	+5.8	+0.1	+0.0	23.7	50.0	-26.3	Neutr
^	11.679M	44.0	+0.1	+0.3	+5.8	+0.1	+0.0	50.3	50.0	+0.3	Neutr
48	13.067M Ave	16.7	+0.2	+0.3	+5.8	+0.1	+0.0	23.1	50.0	-26.9	Neutr
^	13.067M	47.7	+0.2	+0.3	+5.8	+0.1	+0.0	54.1	50.0	+4.1	Neutr

50 Ave	14.436M	16.4	+0.2	+0.3	+5.8	+0.2	+0.0	22.9	50.0	-27.1	Neutr
^	14.436M	46.6	+0.2	+0.3	+5.8	+0.2	+0.0	53.1	50.0	+3.1	Neutr
52 Ave	22.022M	16.2	+0.2	+0.4	+5.8	+0.2	+0.0	22.8	50.0	-27.2	Neutr
^	22.022M	42.3	+0.2	+0.4	+5.8	+0.2	+0.0	48.9	50.0	-1.1	Neutr
54 Ave	10.310M	16.1	+0.1	+0.3	+5.8	+0.2	+0.0	22.5	50.0	-27.5	Neutr
^	10.310M	41.2	+0.1	+0.3	+5.8	+0.2	+0.0	47.6	50.0	-2.4	Neutr
56 Ave	15.815M	15.5	+0.2	+0.3	+5.8	+0.2	+0.0	22.0	50.0	-28.0	Neutr
^	15.815M	42.3	+0.2	+0.3	+5.8	+0.2	+0.0	48.8	50.0	-1.2	Neutr
58 Ave	14.472M	15.3	+0.2	+0.3	+5.8	+0.2	+0.0	21.8	50.0	-28.2	Neutr
^	14.472M	42.2	+0.2	+0.3	+5.8	+0.2	+0.0	48.7	50.0	-1.3	Neutr
60 Ave	11.022M	15.2	+0.1	+0.3	+5.8	+0.1	+0.0	21.5	50.0	-28.5	Neutr
^	11.022M	47.4	+0.1	+0.3	+5.8	+0.1	+0.0	53.7	50.0	+3.7	Neutr
62 Ave	8.265M	15.2	+0.1	+0.2	+5.8	+0.1	+0.0	21.4	50.0	-28.6	Neutr
^	8.265M	43.3	+0.1	+0.2	+5.8	+0.1	+0.0	49.5	50.0	-0.5	Neutr
64 Ave	15.157M	14.5	+0.2	+0.3	+5.8	+0.2	+0.0	21.0	50.0	-29.0	Neutr
^	15.157M	46.9	+0.2	+0.3	+5.8	+0.2	+0.0	53.4	50.0	+3.4	Neutr
66 Ave	16.535M	14.3	+0.2	+0.3	+5.8	+0.2	+0.0	20.8	50.0	-29.2	Neutr
^	16.535M	43.5	+0.2	+0.3	+5.8	+0.2	+0.0	50.0	50.0	+0.0	Neutr
68 Ave	6.887M	13.5	+0.1	+0.2	+5.8	+0.1	+0.0	19.7	50.0	-30.3	Neutr
^	6.887M	41.8	+0.1	+0.2	+5.8	+0.1	+0.0	48.0	50.0	-2.0	Neutr

Test Setup Photo(s)

Front View

Back View

Supplemental Information

Measurement Uncertainty

Uncertainty Value	Parameter
5.77 dB	Radiated Emissions
0.673 dB	RF Conducted Measurements
5.77×10^{-10}	Frequency Deviation
0.00005 s	Time Deviation
3.18 dB	Mains Conducted Emissions

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.

End of Report