

# Impinj Inc.

## TEST REPORT FOR

### R700 RAIN RFID Reader Model: IPJ-R700-341

#### Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247  
(FHSS 902-928 MHz)

Report No.: 111241-44

Date of issue: May 30, 2025



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

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

Test Certificate # 803.01

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## Administrative Information

### Test Report Information

**REPORT PREPARED FOR:**

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Seattle, WA 98109

Representative: Greg Robinson  
Customer Reference Number: P057174

**REPORT PREPARED BY:**

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

Project Number: 111241

**DATE OF EQUIPMENT RECEIPT:**

May 1, 2025

**DATE(S) OF TESTING:**

May 1, 5, 9, 12, 13, and 19, 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.  
1120 Fulton Place  
Fremont, CA 94539

## 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

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
R700 RAIN RFID Reader	Impinj Inc.	IPJ-R700-341	37025110052

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Switching Power Supply	Phihong	POE29U-1AT(PL)	V220900206A2
10/100 5-Port Workgroup Switch	CISCO Systems/Linksys	EZXS55W	R9130B010877
Laptop	HP	EliteBook	B2F3DF40-89E2-40CA-8EF9-8FABI8667CB3
Laptop Charger	HP	PPP009C	WECJP0DGC69W4K
Network Switch Charger	CISCO Systems/Linksys	MKD-41750700	2682795

## General Product Information:

Description of EUT	
RFID Reader	

Product Information		Manufacturer-Provided Details
Operating Frequencies Tested:		902.75MHz – 927.25MHz
Equipment Type:		Stand-Alone Equipment
Type of Wideband System:		FHSS
Maximum Duty Cycle:		100%
Modulation Type(s):		ASK
Number of TX Chains:		1
Beamforming Type:		N/A
Antenna Type(s) and Gain:		Slimline Circular Polarized A5010 / 5dBi (Manufacturer Times-7) Slimline Circular Polarized A5020 / 2.5dBi (Manufacturer Times-7) Mini-Guardrail IPJ-A0303-0000M / -20dBi (Manufacturer Impinj) Matchbox Antenna IPJ-A0404-000 / -20dBi (Manufacturer Impinj) Circular Polarized Panel S9028PCLJ / 5.5dBi (Manufacturer RFMax)
		All antennas connected to the EUT via a cable with a stated 3dB of loss
Antenna Connection Type:		External Connector
Nominal Input Voltage:		48VDC / 120VAC at POE injector input
Firmware / Software Version(s):		8.5.1 / ItemTest 2.11
Firmware / Software Description:		Manufacturer supplied control software
Firmware / Software Setting(s):		33dBm output power setting, with minimum 3dB external cable loss.
Tune-up or Adjustment(s):		N/A
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.		

**EUT and Accessory Photo(s)**



**Support Equipment Photo(s)**

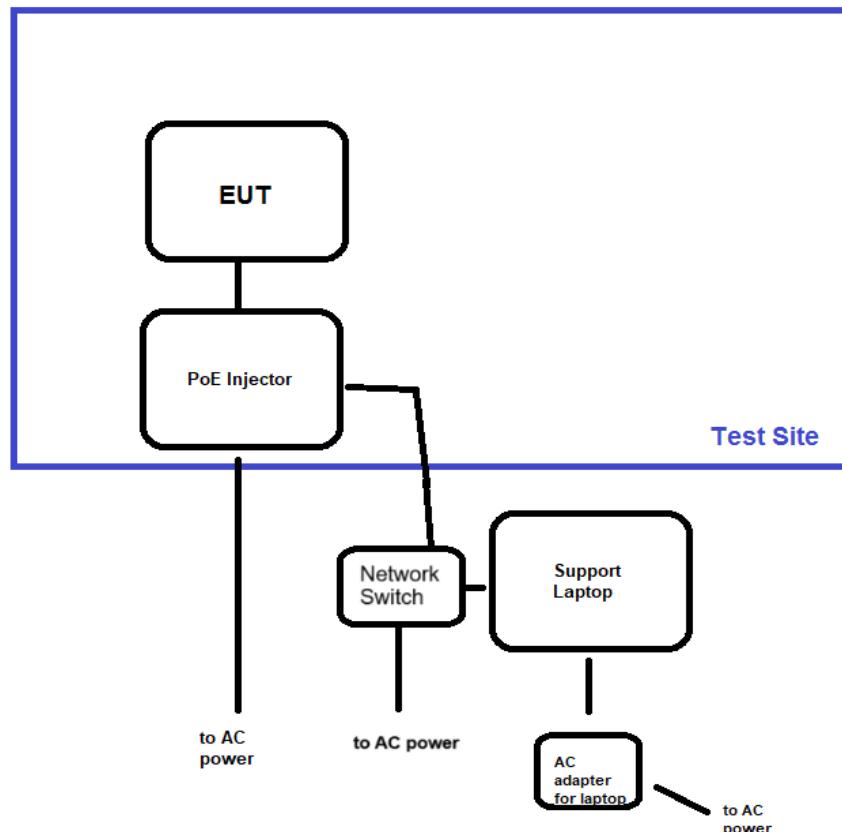


### Block Diagram of Test Setup(s)

Config#	Setup Description of Block Diagram
Conducted	EUT is placed on an 80cm support. All ports on the EUT have been terminated with the exception of antenna port 1, which will be connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmission frequencies. All antennas measured with the maximum 33dB output power generated by the unit. EUT is connected via an unshielded Ethernet cable to a POE injector providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.
Radiated	EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.

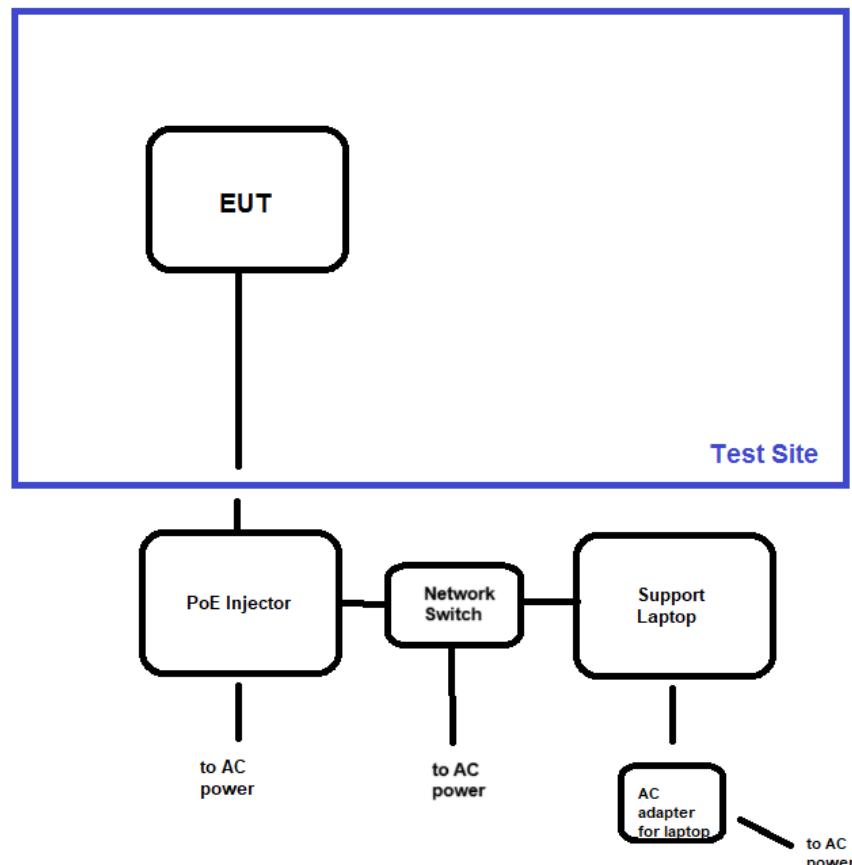
#### Conducted

#### Test Setup Block Diagram



Radiated

**Test Setup Block Diagram**



## FCC Part 15 Subpart C

### 15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Fremont Wireless Bench	Test Engineer:	Jonathan Wharton/Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2020)	Test Date(s):	5/1/2025
Configuration:	1		
Test Setup:	EUT is connected to a support laptop over Ethernet via a POE injector and network switch. It is placed directly on a non-conductive surface. Antenna port 1 is attached directly to a spectrum analyzer. Ports 2-4 are unterminated.		

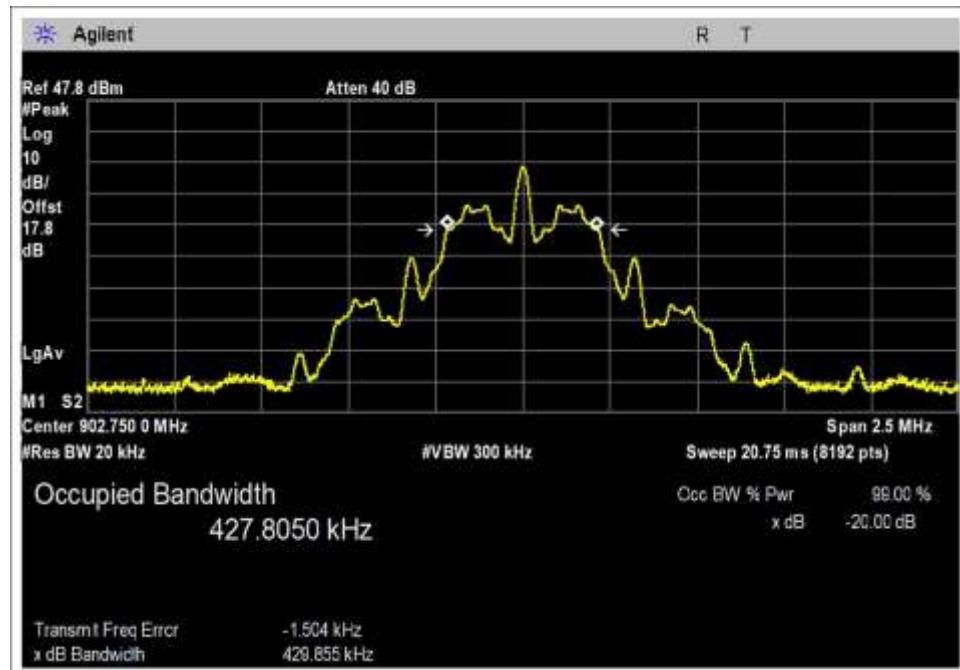
Environmental Conditions			
Temperature (°C)	21.2	Relative Humidity (%):	46

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02660	Spectrum Analyzer	Agilent	E4446A	1/7/2025	1/7/2027
P06131	Attenuator	Inmet	18N20W-20	2/2/2024	2/2/2026
P07700	Cable	Huber+Suhner	32022-29094K-29094K-72TC	8/16/2024	8/16/2026

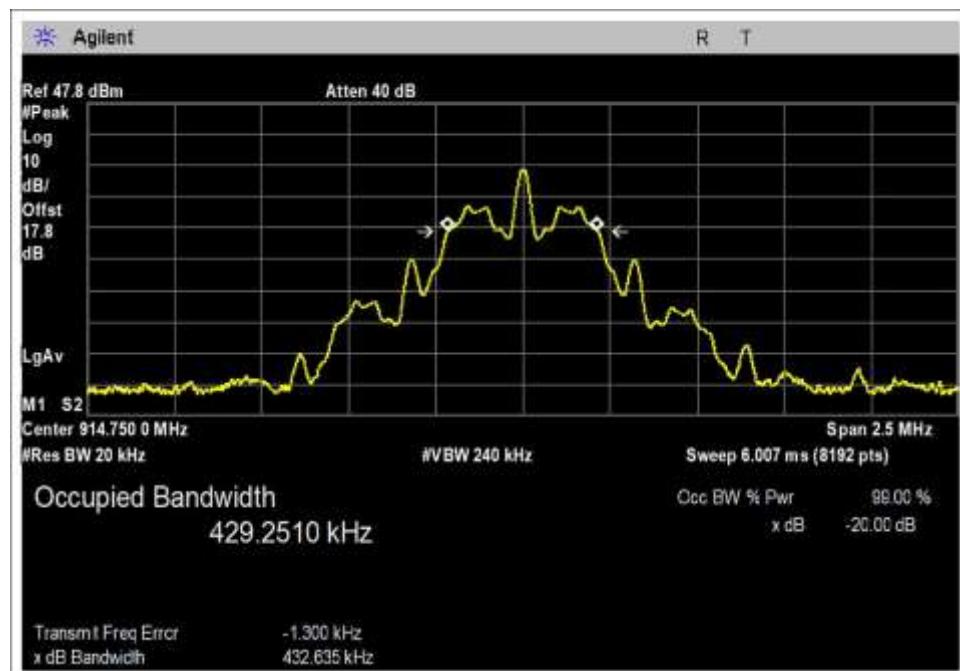
### 15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
902.75	1	ASK	429.855	≤500	Pass
914.75	1	ASK	432.635	≤500	Pass
927.25	1	ASK	432.812	≤500	Pass

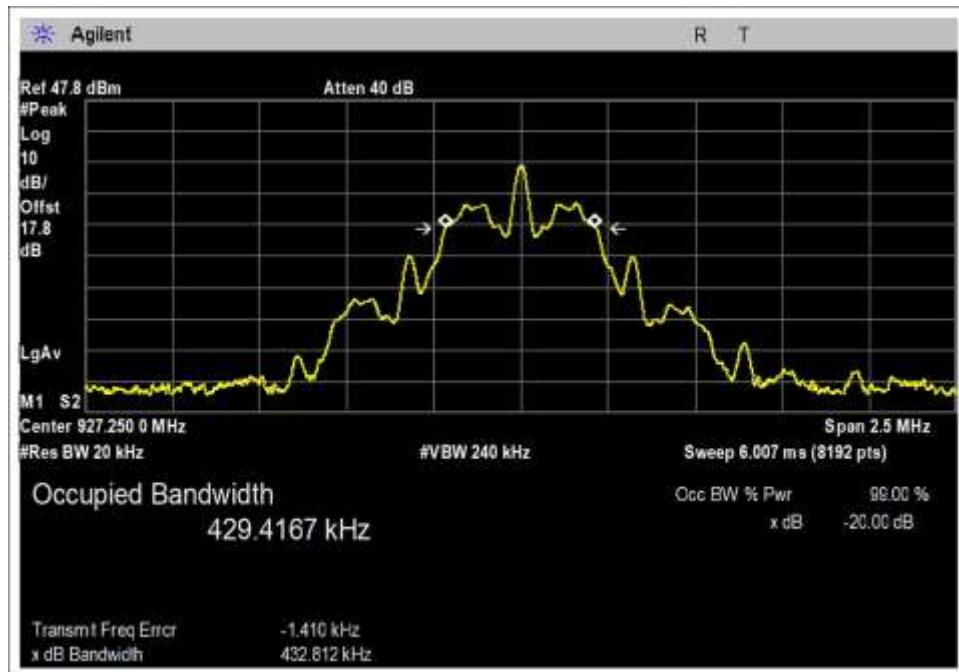
## Plot(s)



Low Channel



Middle Channel



High Channel

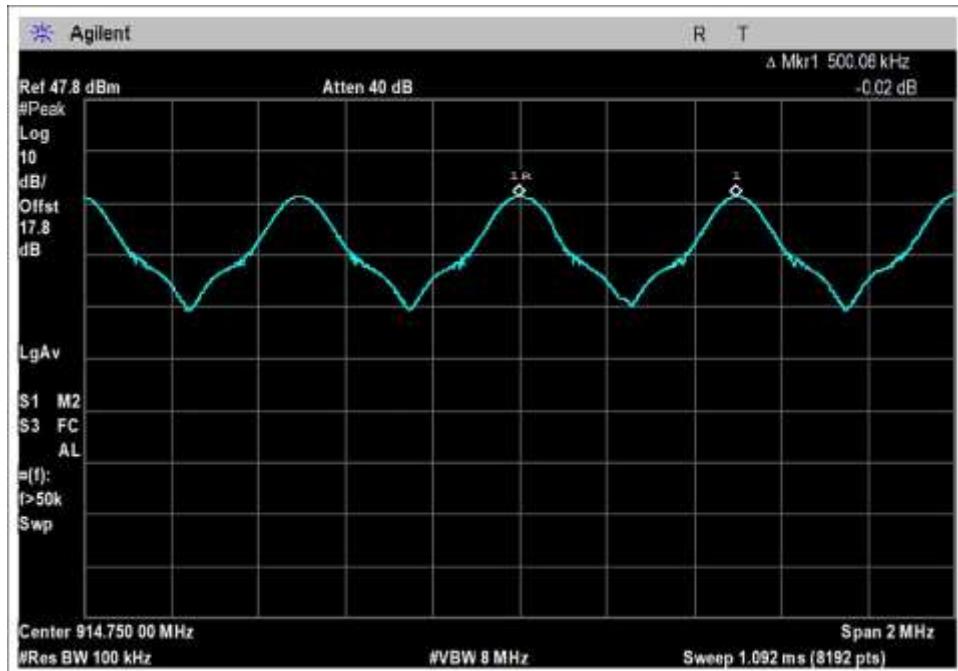
## 15.247(a)(1) Carrier Separation

### Test Data Summary

Limit applied: 20dB bandwidth of the hopping channel.

Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
1	Frequency Hopping	500.06	>432.812	Pass

### Plot(s)



Channel Separate

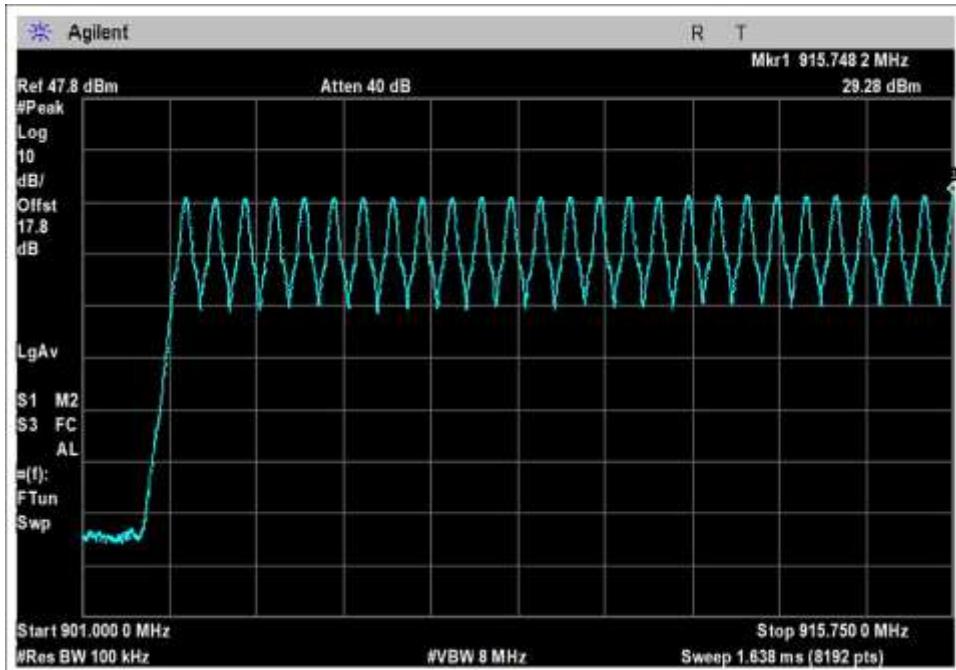
### 15.247(a)(1)(iii) Number of Channels

#### Test Data Summary

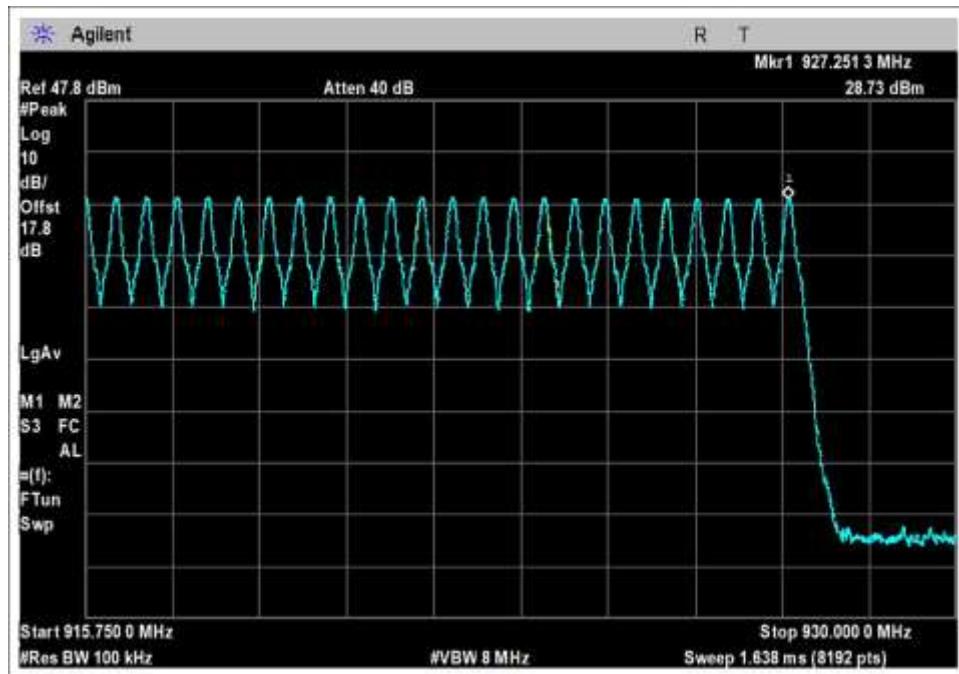
*Limit* =  $\begin{cases} 50 \text{ Channels} & |20 \text{ dB } BW < 250 \text{ kHz} \\ 25 \text{ Channels} & |20 \text{ dB } BW \geq 250 \text{ kHz} \end{cases}$

Antenna Port	Operational Mode	Measured (Channels)	Limit (Channels)	Results
1	Frequency Hopping	50	≥50	Pass

#### Plot(s)



Number Channel 1-28



Number Channel 29-50

## 15.247(a)(1)(iii) Time of Occupancy

Test Data Summary				
Observation Period, $P_{obs}$ is derived from the following:				
$P_{obs} = \begin{cases} 20 \text{ Seconds} &  20 \text{ dB BW} < 250 \text{ kHz} \\ 10 \text{ Seconds} &  20 \text{ dB BW} \geq 250 \text{ kHz} \end{cases}$				
Antenna Port	Operational Mode	Measured (ms)	Limit (ms/ $P_{obs}$ )	Results
1	Frequency Hopping	217.2	$\leq 400$	Pass

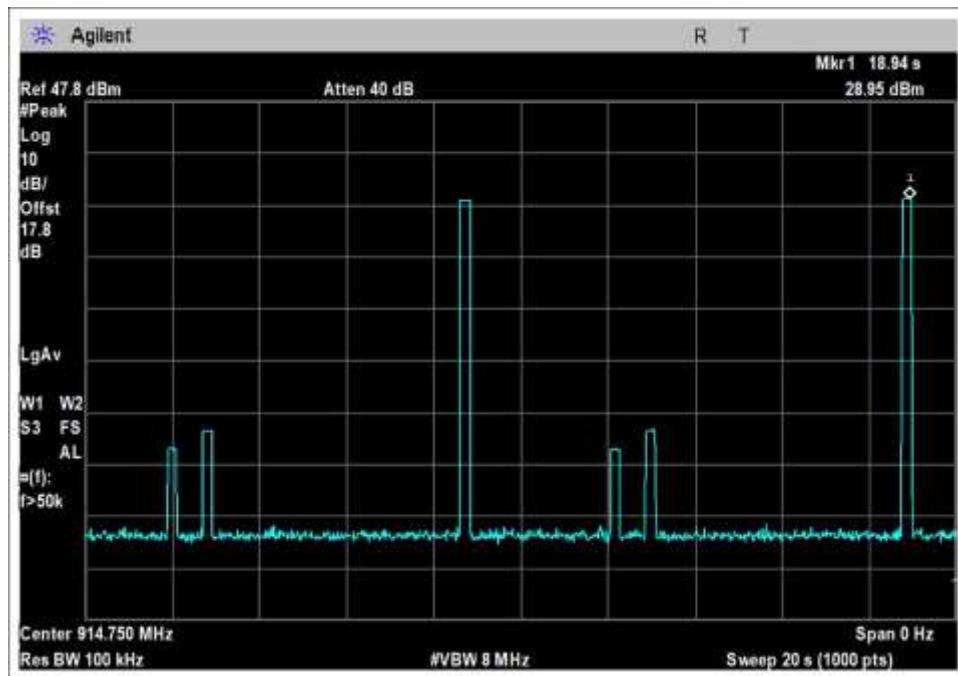
Measured results are calculated as follows:

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

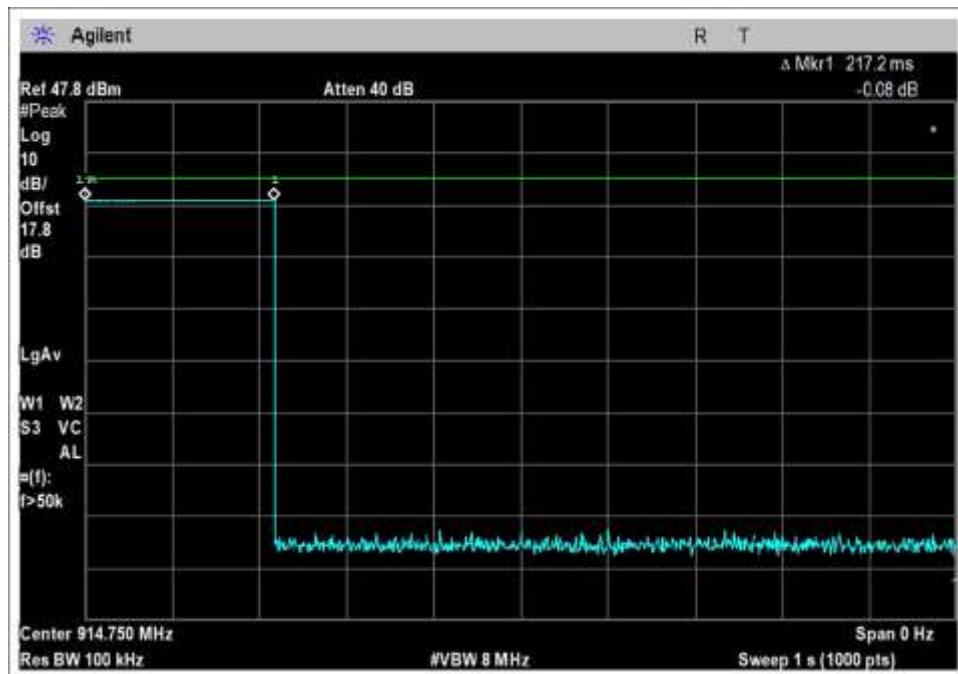
Actual Calculated Values:

Parameter	Value
Observation Period ( $P_{obs}$ ):	10
Number of RF Bursts / $P_{obs}$ :	1
On time of RF Burst:	217.2ms
Number of Control or other signals / $P_{obs}$ :	0
On time of Control or other Signals:	0
Total Measured On Time:	217.2ms

## Plot(s)



Average Occupancy



Dwell Time

**Test Setup Photo(s)**



Test Setup, View 1



Test Setup, View 2

## 15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Fremont Wireless Bench	Test Engineer:	Jonathan Wharton / Hieu Nguyenpham
Test Method:	ANSI C63.10 (2020)	Test Date(s):	5/5/2025
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode)  Test Mode: Continuously transmitting Test Setup: EUT is transmitting through the antenna port connector and is attached to the spectrum analyzer with appropriate cables/attenuation. The customer has a declared cable loss of 3dB which is accounted as a factor in the datasheet, and already factored into the RF Conducted Measurement.  Voltage variations fluctuated from 102VAC to 138V to the PoE injector.		

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	46

Test Equipment					
Asset# /	Description	Manufacturer	Model	Cal Date	Cal Due
02660	Spectrum Analyzer	Agilent	E4446A	1/7/2025	1/7/2027
P06131	Attenuator	Inmet	18N20W-20	2/2/2024	2/2/2026
P07700	Cable	Huber+Suhner	32022-29094K-29094K-72TC	8/16/2024	8/16/2026

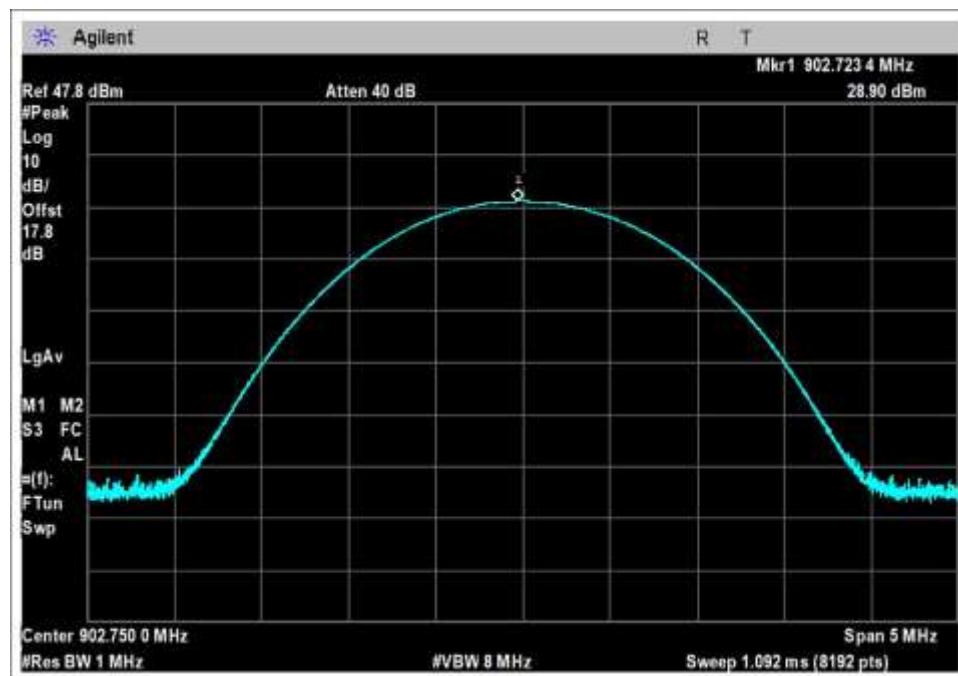
Test Data Summary - RF Conducted Measurement							
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	RF Conducted (dBm)		EIRP (dBm)		Results
			Measured	Limit	Calculated	Limit	
902.75	ASK	External/5.5dBi	28.90	≤30	34.40	≤36	Pass
915.25	ASK	External/5.5dBi	29.22	≤30	34.72	≤36	Pass
927.25	ASK	External/5.5dBi	29.33	≤30	34.83	≤36	Pass

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

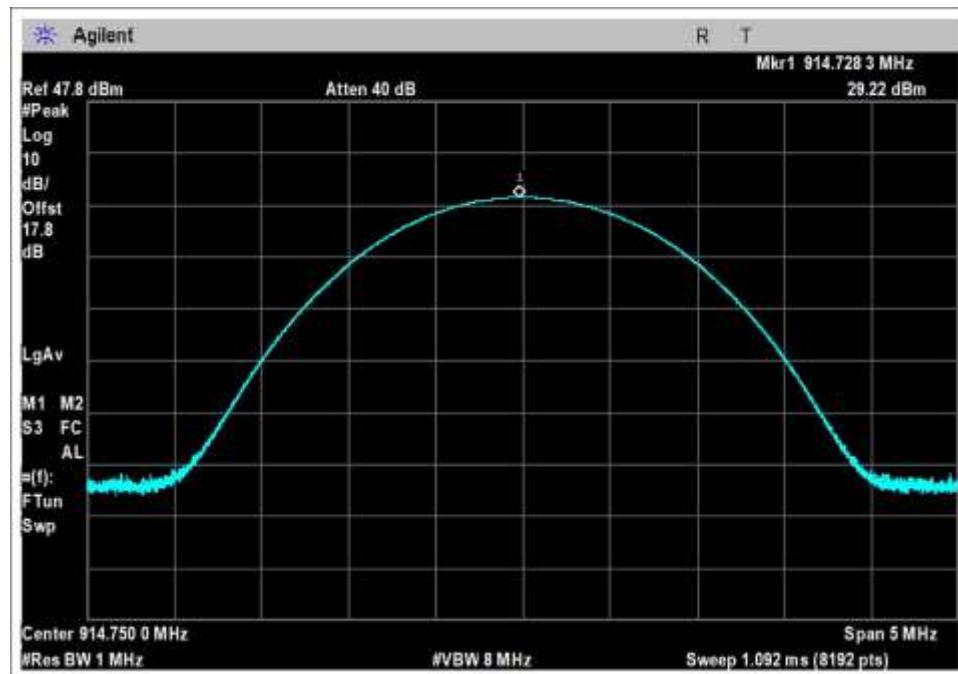
The RF conducted power limit is calculated according to the maximum allowed RF conducted power with a maximum of 6dBi gain antenna in accordance with 15.247(b):

$$\text{Limit} = 30 \text{ (or 24)} - \text{Roundup}(G - 6)$$

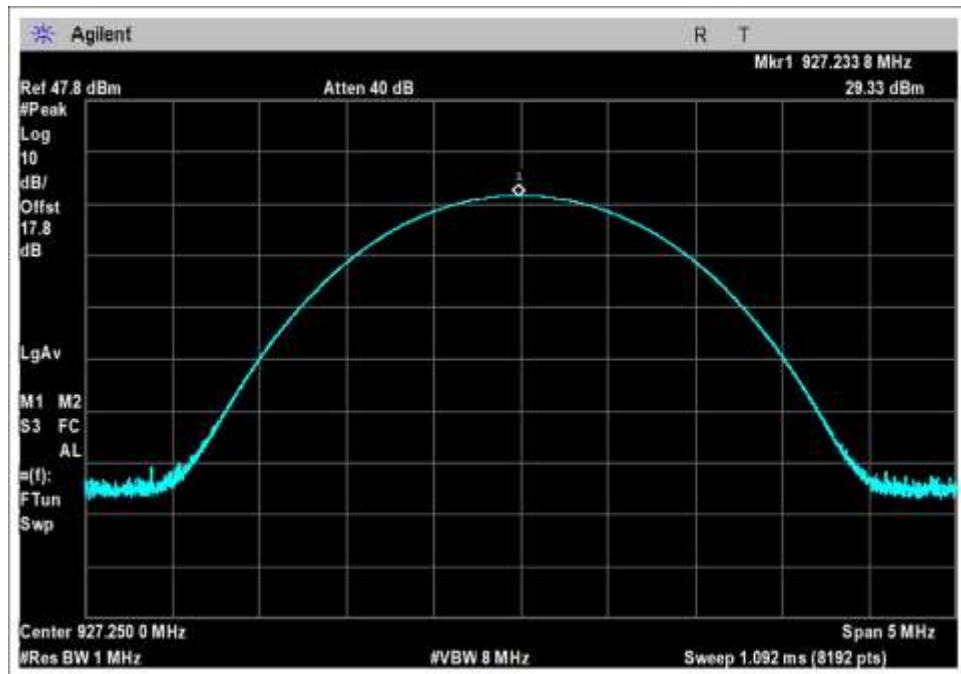
## Plots



Low Channel



Middle Channel



High Channel

### Test Setup Photo(s)



Test Setup, View 1



Test Setup, View 2

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

### Test Setup/Conditions

Test Location:	Fremont Bench	Test Engineer:	Jonathan Wharton / Hieu Nguyenpham
Test Method:	ANSI C63.10 (2020)	Test Date(s):	5/1/2025 and 5/5/2025
Configuration:	1		

### Environmental Conditions

Temperature (°C)	21	Relative Humidity (%):	46
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### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **111241** Date: **5/1/2025**  
 Test Type: **Conducted Emissions** Time: **2:51:16 PM**  
 Tested By: Hieu Nguyenpham/Jonathan Wharton Sequence#: **3**  
 Software: EMITest 5.03.20 **56VDC**

#### *Equipment Tested:*

Device	Manufacturer	Model #	S/N
Configuration 1			

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
Configuration 1			

#### *Test Conditions / Notes:*

Conducted Emission from Antenna Port  
 Frequency Range: 9kHz to 10GHz

Test Environment Conditions:

Temperature: 21.0°C

Humidity: 46%

Pressure: 101.2kPa

Highest Generation Frequency: 927.25MHz

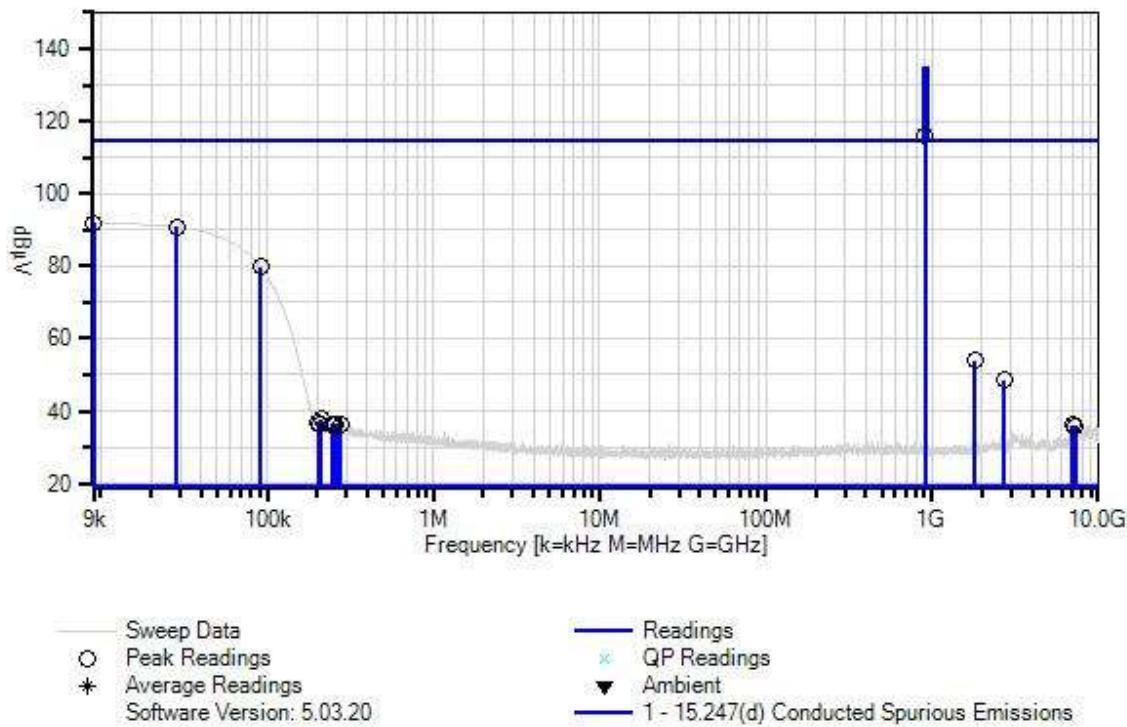
RBW=100kHz

VBW=300kHz

The EUT is set up and operated as intended. Antenna port 1 is connected straight to a Spectrum Analyzer to measure. The EUT is powered by a PoE Injector at 56VDC. The PoE is connected to an Ethernet switch and the Laptop to monitor and control the EUT during measurement

Note

Low Channel

Impinj Inc. WO#: 111241 Sequence#: 3 Date: 5/1/2025  
 15.247(d) Conducted Spurious Emissions Test Lead: 56VDC Antenna Port 1

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06131	Attenuator	18N20W-20	2/2/2024	2/2/2026
	ANP07700	Cable	32022-29094K- 29094K-72TC	8/16/2024	8/16/2026
	AN02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027

<b>Measurement Data:</b>			Reading listed by margin.			Test Lead: Antenna Port 1				
#	Freq MHz	Rdng dB $\mu$ V	dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	902.454M	116.1				+0.0	116.1	134.8	-18.7	Anten
2	9.000k	91.9				+0.0	91.9	114.8	-22.9	Anten
3	28.711k	90.8				+0.0	90.8	114.8	-24.0	Anten
4	91.594k	79.7				+0.0	79.7	114.8	-35.1	Anten
5	1805.963M	54.0				+0.0	54.0	114.8	-60.8	Anten
6	2708.319M	48.6				+0.0	48.6	114.8	-66.2	Anten
7	209.952k	37.6				+0.0	37.6	114.8	-77.2	Anten
8	201.727k	37.0				+0.0	37.0	114.8	-77.8	Anten
9	203.332k	37.0				+0.0	37.0	114.8	-77.8	Anten
10	245.059k	36.5				+0.0	36.5	114.8	-78.3	Anten
11	206.542k	36.5				+0.0	36.5	114.8	-78.3	Anten
12	209.350k	36.5				+0.0	36.5	114.8	-78.3	Anten
13	256.493k	36.4				+0.0	36.4	114.8	-78.4	Anten
14	251.879k	36.3				+0.0	36.3	114.8	-78.5	Anten
15	259.502k	36.3				+0.0	36.3	114.8	-78.5	Anten
16	275.952k	36.2				+0.0	36.2	114.8	-78.6	Anten
17	258.499k	36.0				+0.0	36.0	114.8	-78.8	Anten
18	276.755k	36.0				+0.0	36.0	114.8	-78.8	Anten
19	6993.088M	36.0				+0.0	36.0	114.8	-78.8	Anten
20	7231.275M	35.9				+0.0	35.9	114.8	-78.9	Anten

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170

Customer: **Impinj Inc.**

Specification: **15.247(d) Conducted Spurious Emissions**

Work Order #: **111241**

Date: **5/1/2025**

Test Type: **Conducted Emissions**

Time: **2:43:13 PM**

Tested By: Hieu Nguyenpham/Jonathan Wharton

Sequence#: **2**

Software: EMITest 5.03.20

**56VDC**

***Equipment Tested:***

<b>Device</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>S/N</b>
Configuration 1			

***Support Equipment:***

<b>Device</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>S/N</b>
Configuration 1			

***Test Conditions / Notes:***

Conducted Emission from Antenna Port

Frequency Range: 9kHz to 10GHz

Test Environment Conditions:

Temperature: 21.0°C

Humidity: 46%

Pressure: 101.2kPa

Highest Generation Frequency: 927.25MHz

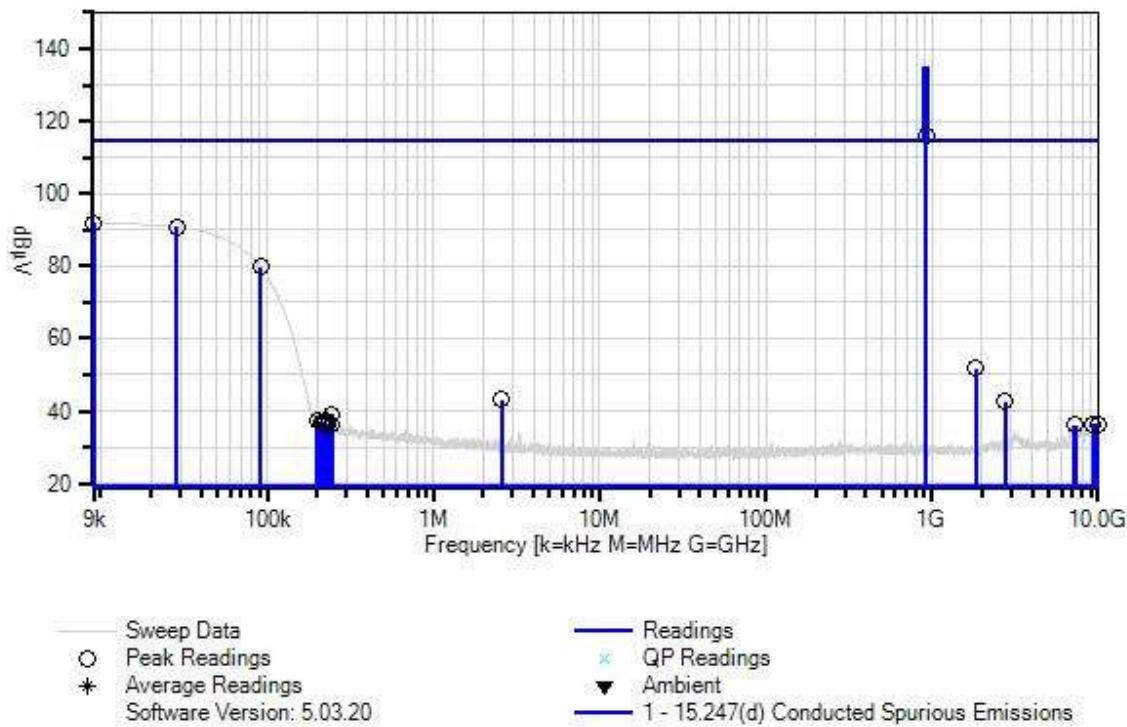
RBW=100kHz

VBW=300kHz

The EUT is set up and operated as intended. Antenna port 1 is connected straight to a Spectrum Analyzer to measure. The EUT is powered by a PoE Injector at 56VDC. The PoE is connected to an Ethernet switch and the Laptop to monitor and control the EUT during measurement

Note

Middle Channel

Impinj Inc. WO#: 111241 Sequence#: 2 Date: 5/1/2025  
 15.247(d) Conducted Spurious Emissions Test Lead: 56VDC Antenna Port 1

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06131	Attenuator	18N20W-20	2/2/2024	2/2/2026
	ANP07700	Cable	32022-29094K- 29094K-72TC	8/16/2024	8/16/2026
	AN02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027

<b>Measurement Data:</b>			Reading listed by margin.			Test Lead: Antenna Port 1				
#	Freq MHz	Rdng dB $\mu$ V	dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	914.490M	116.1				+0.0	116.1	134.8	-18.7	Anten
2	9.000k	91.9				+0.0	91.9	114.8	-22.9	Anten
3	28.711k	90.8				+0.0	90.8	114.8	-24.0	Anten
4	91.594k	79.7				+0.0	79.7	114.8	-35.1	Anten
5	1829.428M	51.7				+0.0	51.7	114.8	-63.1	Anten
6	2.578M	43.1				+0.0	43.1	114.8	-71.7	Anten
7	2744.584M	42.7				+0.0	42.7	114.8	-72.1	Anten
8	245.259k	39.0				+0.0	39.0	114.8	-75.8	Anten
9	200.925k	37.4				+0.0	37.4	114.8	-77.4	Anten
10	223.192k	37.1				+0.0	37.1	114.8	-77.7	Anten
11	210.353k	37.0				+0.0	37.0	114.8	-77.8	Anten
12	218.177k	36.7				+0.0	36.7	114.8	-78.1	Anten
13	227.205k	36.6				+0.0	36.6	114.8	-78.2	Anten
14	230.414k	36.5				+0.0	36.5	114.8	-78.3	Anten
15	9279.686M	36.5				+0.0	36.5	114.8	-78.3	Anten
16	9957.341M	36.5				+0.0	36.5	114.8	-78.3	Anten
17	242.250k	36.4				+0.0	36.4	114.8	-78.4	Anten
18	232.420k	36.1				+0.0	36.1	114.8	-78.7	Anten
19	7176.833M	36.0				+0.0	36.0	114.8	-78.8	Anten
20	7319.745M	36.0				+0.0	36.0	114.8	-78.8	Anten

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170

Customer:

**Impinj Inc.**

Specification:

**15.247(d) Conducted Spurious Emissions**

Work Order #:

**111241**

Date: 5/1/2025

Test Type:

**Conducted Emissions**

Time: 2:35:31 PM

Tested By:

Hieu Nguyenpham/Jonathan Wharton

Sequence#: 1

Software:

EMITest 5.03.20

56VDC

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Conducted Emission from Antenna Port

Frequency Range: 9kHz to 10GHz

Test Environment Conditions:

Temperature: 21.0°C

Humidity: 46%

Pressure: 101.2kPa

Highest Generation Frequency: 927.25MHz

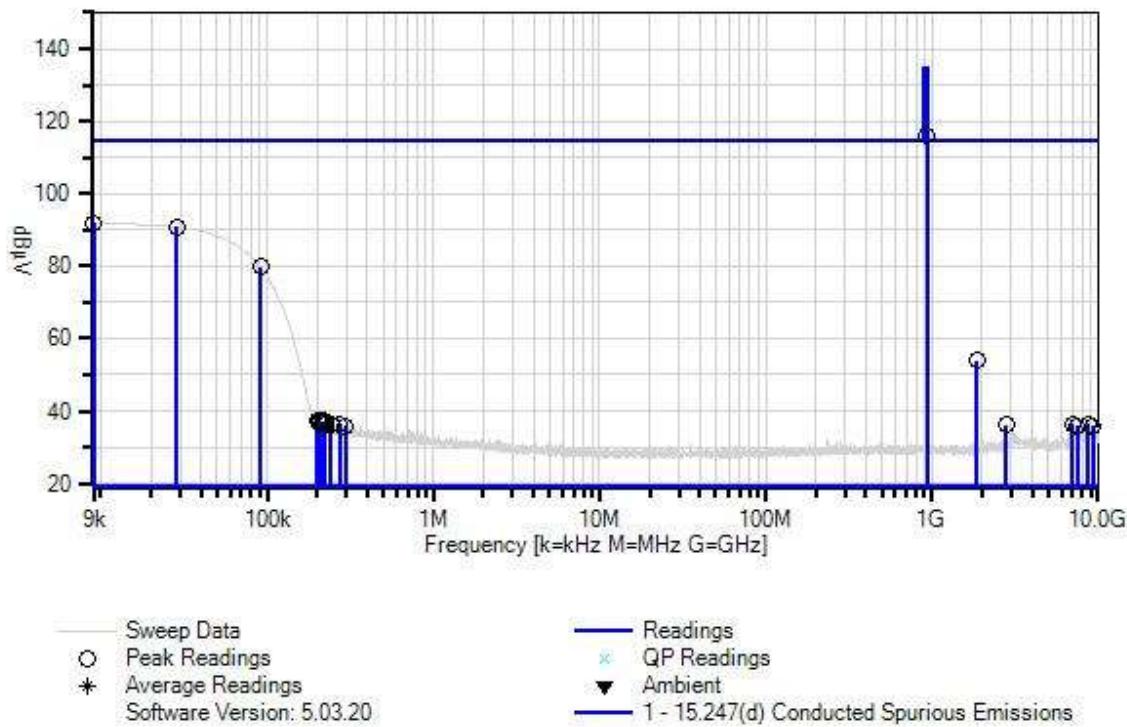
RBW=100kHz

VBW=300kHz

The EUT is set up and operated as intended. Antenna port 1 is connected straight to a Spectrum Analyzer to measure. The EUT is powered by a PoE Injector at 56VDC. The PoE is connected to an Ethernet switch and the Laptop to monitor and control the EUT during measurement

Note

High Channel

Impinj Inc. WO#: 111241 Sequence#: 1 Date: 5/1/2025  
 15.247(d) Conducted Spurious Emissions Test Lead: 56VDC Antenna Port 1

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06131	Attenuator	18N20W-20	2/2/2024	2/2/2026
	ANP07700	Cable	32022-29094K- 29094K-72TC	8/16/2024	8/16/2026
	AN02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027

<b>Measurement Data:</b>			Reading listed by margin.			Test Lead: Antenna Port 1				
#	Freq MHz	Rdng dB $\mu$ V	dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	927.196M	116.2				+0.0	116.2	134.8	-18.6	Anten
2	9.000k	91.8				+0.0	91.8	114.8	-23.0	Anten
3	28.711k	90.7				+0.0	90.7	114.8	-24.1	Anten
4	91.594k	79.7				+0.0	79.7	114.8	-35.1	Anten
5	1855.027M	53.9				+0.0	53.9	114.8	-60.9	Anten
6	201.326k	37.5				+0.0	37.5	114.8	-77.3	Anten
7	205.338k	37.1				+0.0	37.1	114.8	-77.7	Anten
8	221.186k	37.1				+0.0	37.1	114.8	-77.7	Anten
9	209.551k	36.9				+0.0	36.9	114.8	-77.9	Anten
10	6999.893M	36.5				+0.0	36.5	114.8	-78.3	Anten
11	212.961k	36.5				+0.0	36.5	114.8	-78.3	Anten
12	223.594k	36.5				+0.0	36.5	114.8	-78.3	Anten
13	217.575k	36.4				+0.0	36.4	114.8	-78.4	Anten
14	243.053k	36.3				+0.0	36.3	114.8	-78.5	Anten
15	273.545k	36.3				+0.0	36.3	114.8	-78.5	Anten
16	8653.594M	36.3				+0.0	36.3	114.8	-78.5	Anten
17	2780.849M	36.2				+0.0	36.2	114.8	-78.6	Anten
18	297.320k	35.9				+0.0	35.9	114.8	-78.9	Anten
19	9334.129M	35.9				+0.0	35.9	114.8	-78.9	Anten
20	7517.100M	35.8				+0.0	35.8	114.8	-79.0	Anten

## Band Edge

### Band Edge Summary – Single Channel Mode

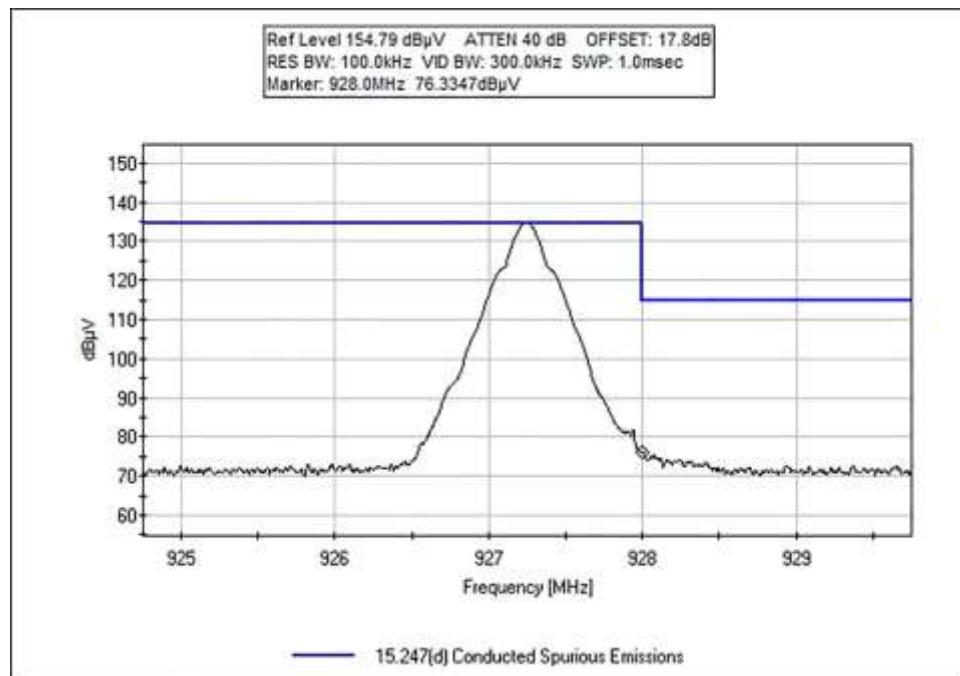
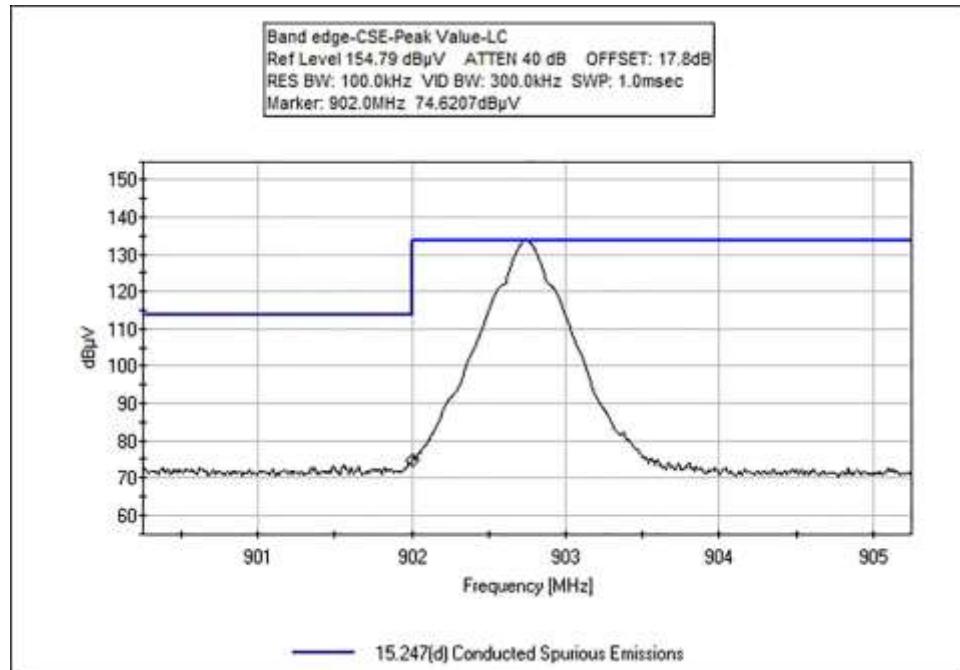
Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
902	ASK	-32.38	<8.6	Pass
928	ASK	-30.66	<7.5	Pass

### Band Edge Summary – Hopping Mode

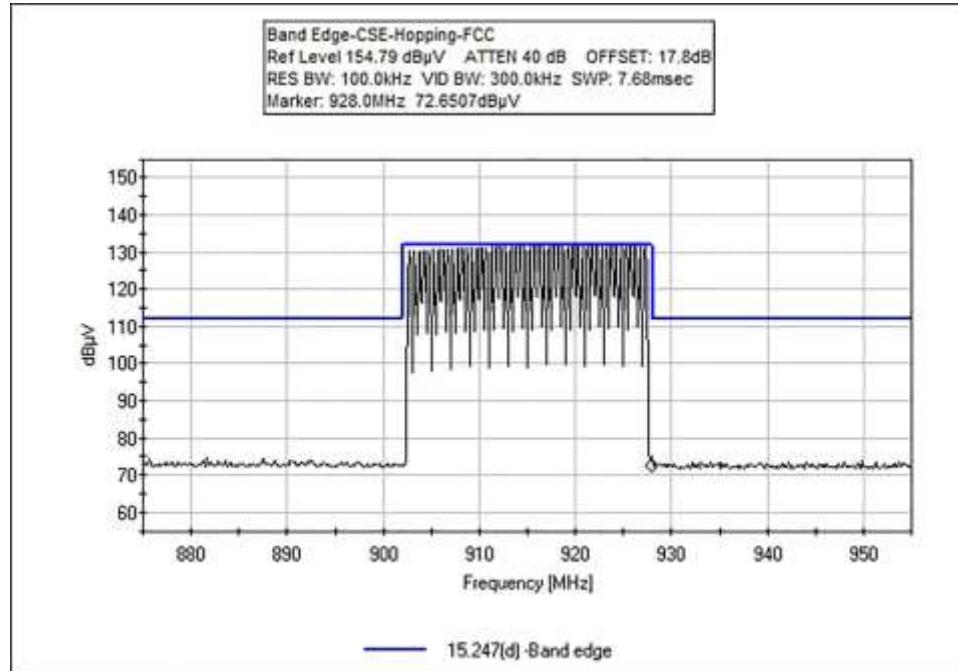
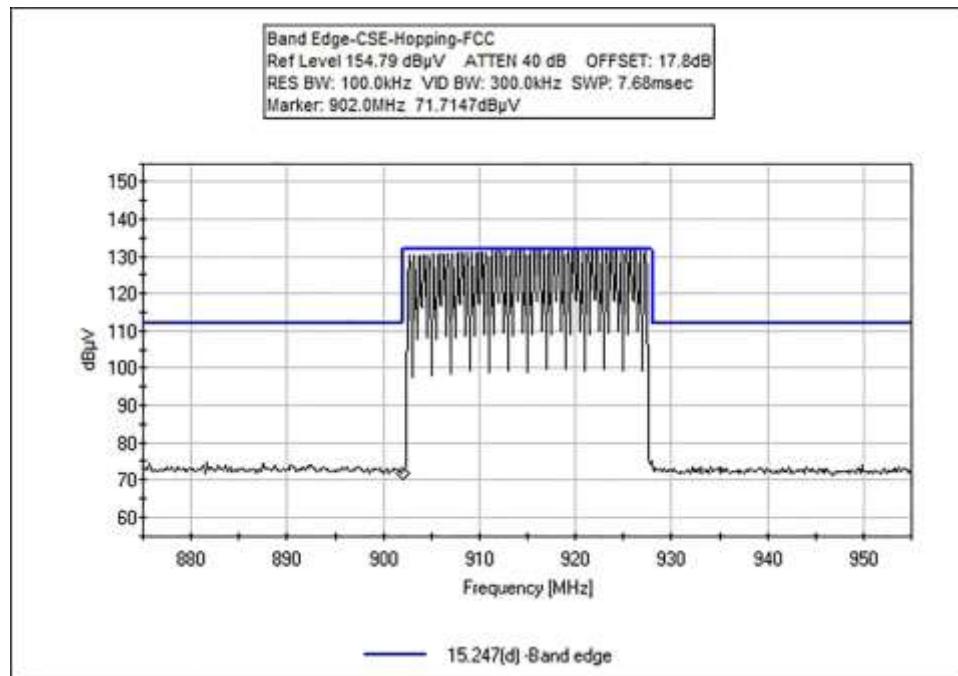
Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
902	ASK	-35.29	<5.3	Pass
928	ASK	-34.35	<5.3	Pass

## Band Edge Plots

### Single Channel Mode



### Hopping Mode



## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170  
 Customer: **Impinj Inc.**  
 Specification: Band Edge  
 Work Order #: **111241** Date: 5/5/2025  
 Test Type: **Conducted Scan** Time: 13:57:21  
 Tested By: Jonathan Wharton/Hieu Song Sequence#: 1  
 Software: Nguyenpham  
 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:**

Band Edge
Test Environment Conditions:
Temperature: 21.0°C
Humidity: 46%
Pressure: 101.2kPa
Method: ANSI C63.10 2020
The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027
	P06131	Attenuator	18N20W-20	2/2/2024	2/2/2026
	P07700	Cable	32022-29094K-29094K-72TC	8/16/2024	8/16/2026

**Measurement Data:** Reading listed by order taken.

Test Distance: None

#	Freq MHz	Rdng dB $\mu$ V	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	928.000M	76.3	+0.0	76.3	114.5	-38.2	None Single Channel
2	928.000M	72.6	+0.0	72.6	112.3	-39.7	None Hopping
3	902.000M	71.7	+0.0	71.7	112.3	-40.6	None Hopping

**Test Setup Photo(s)**



Test Setup, View 1



Test Setup, View 2

## 15.247(d) Radiated Emissions & Band Edge

Test Setup/Conditions				
Test Location:	Fremont Chamber 3	Test Engineer:	Jonathan Wharton / Hieu Nguyenpham	
Test Method:	ANSI C63.10 (2020)	Test Date(s):	5/9/2025, 5/12/2025, and 5/13/2025	
Configuration:	1			
Notes:	Emissions from all listed antennas (Slimline Circular Polarized A5010/ Slimline Circular Polarized A5020/ Mini-Guardrail IPJ-A0303-0000M/ Matchbox Antenna IPJ-A0404-000/ Circular Polarized Panel S9028PCLJ) investigated at EUT maximum output power (33dB). Datasheets from 9kHz-30MHz and 30MHz-1GHz display chamber noise floor readings collected with the Circular Polarized Panel S9028PCLJ antenna which is representative of all antenna configurations.			
Antenna mounted in a singular orientation during testing as per manufacturer setup				

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	44

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **111241** Date: **5/12/2025**  
 Test Type: **Maximized Emissions** Time: **15:06:33**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham 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			

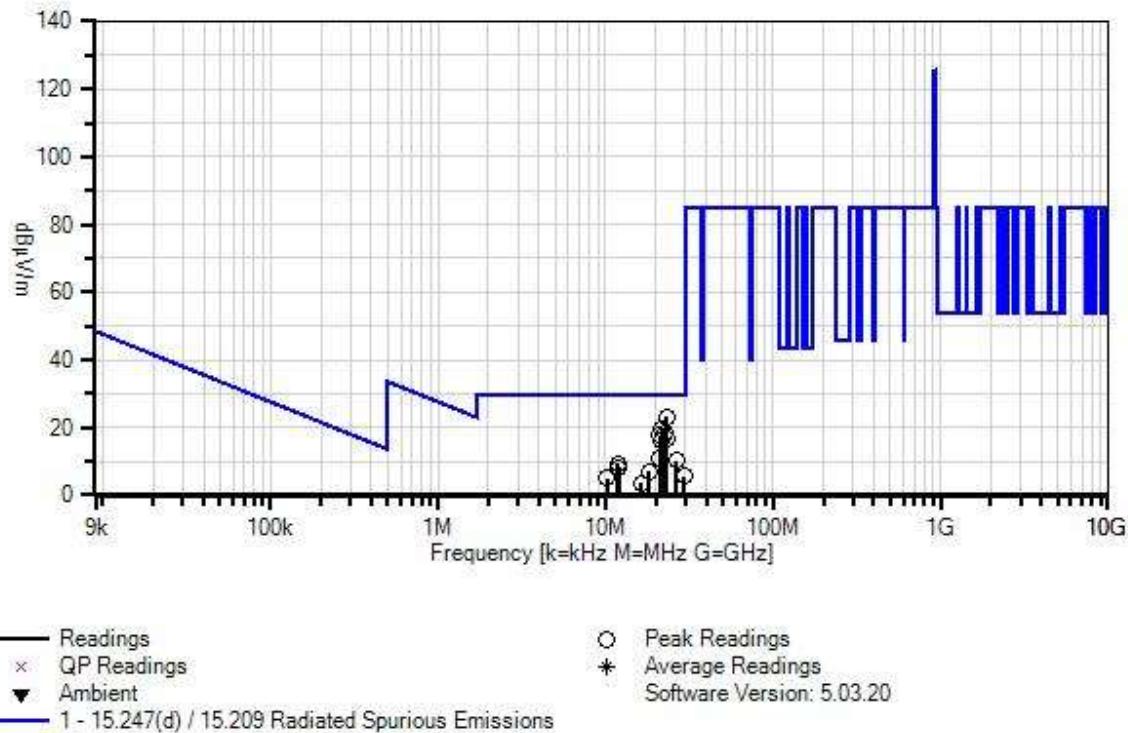
#### Test Conditions / Notes:

Radiated Spurious Emissions Frequency Range: 9kHz-30MHz  Method: ANSI C63.10  Test Environment Conditions: Temperature: 21.1°C Humidity: 43% Pressure: 101.3kPa  Channels: Low/Mid/High  Test Mode: Constant modulated transmission on a signal channel
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EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmission frequencies. EUT is connected via an unshielded Ethernet cable to a POE injection outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.

X, Y and Z orthogonalities investigated. Worst case reported. All readings maximized.

Impinj Inc. WO#: 111241 Sequence#: 3 Date: 5/12/2025  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Y

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN00432	Loop Antenna	6502	7/10/2023	7/10/2025
T4	ANP07508	Preamp	310N	4/5/2024	4/5/2026
T5	ANP01187	Cable	CNT-195	7/3/2024	7/3/2026
T6	ANP06467	Attenuator	PE7014-10	5/15/2023	5/15/2025

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6			Table	dB $\mu$ V/m	dB $\mu$ V/m		
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m		Ant
1	23.128M	54.1	+0.2	+0.4	+10.0	-32.1	-20.0	23.1	29.5	-6.4	Y
			+0.1	+10.4							
2	21.662M	50.6	+0.1	+0.4	+10.3	-32.1	-20.0	19.8	29.5	-9.7	X
			+0.1	+10.4							
3	22.884M	49.2	+0.2	+0.4	+10.0	-32.1	-20.0	18.2	29.5	-11.3	Y
			+0.1	+10.4							
4	21.052M	48.6	+0.1	+0.4	+10.3	-32.1	-20.0	17.8	29.5	-11.7	X
			+0.1	+10.4							
5	23.127M	47.8	+0.2	+0.4	+10.0	-32.1	-20.0	16.8	29.5	-12.7	X
			+0.1	+10.4							
6	21.663M	47.1	+0.1	+0.4	+10.3	-32.1	-20.0	16.3	29.5	-13.2	Y
			+0.1	+10.4							
7	21.052M	41.8	+0.1	+0.4	+10.3	-32.1	-20.0	11.0	29.5	-18.5	Y
			+0.1	+10.4							
8	26.609M	41.9	+0.2	+0.5	+9.2	-32.1	-20.0	10.2	29.5	-19.3	X
			+0.1	+10.4							
9	11.892M	39.8	+0.1	+0.3	+10.9	-32.1	-20.0	9.4	29.5	-20.1	Y
			+0.1	+10.3							
10	11.950M	38.5	+0.1	+0.3	+10.9	-32.1	-20.0	8.1	29.5	-21.4	Y
			+0.1	+10.3							
11	18.243M	37.6	+0.1	+0.4	+10.7	-32.1	-20.0	7.2	29.5	-22.3	Y
			+0.1	+10.4							
12	29.319M	38.1	+0.2	+0.5	+8.4	-32.1	-20.0	5.6	29.5	-23.9	Y
			+0.1	+10.4							
13	10.243M	35.4	+0.1	+0.3	+10.9	-32.1	-20.0	5.0	29.5	-24.5	Y
			+0.1	+10.3							
14	16.229M	34.1	+0.1	+0.4	+10.8	-32.1	-20.0	3.7	29.5	-25.8	Y
			+0.1	+10.3							

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **111241** Date: **5/13/2025**  
 Test Type: **Maximized Emissions** Time: **16:31:39**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: **2**  
 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:***

Radiated Spurious Emissions  
 Frequency Range: 30MHz-1GHz

Method: ANSI C63.10

Test Environment Conditions:

Temperature: 21.1°C

Humidity: 43%

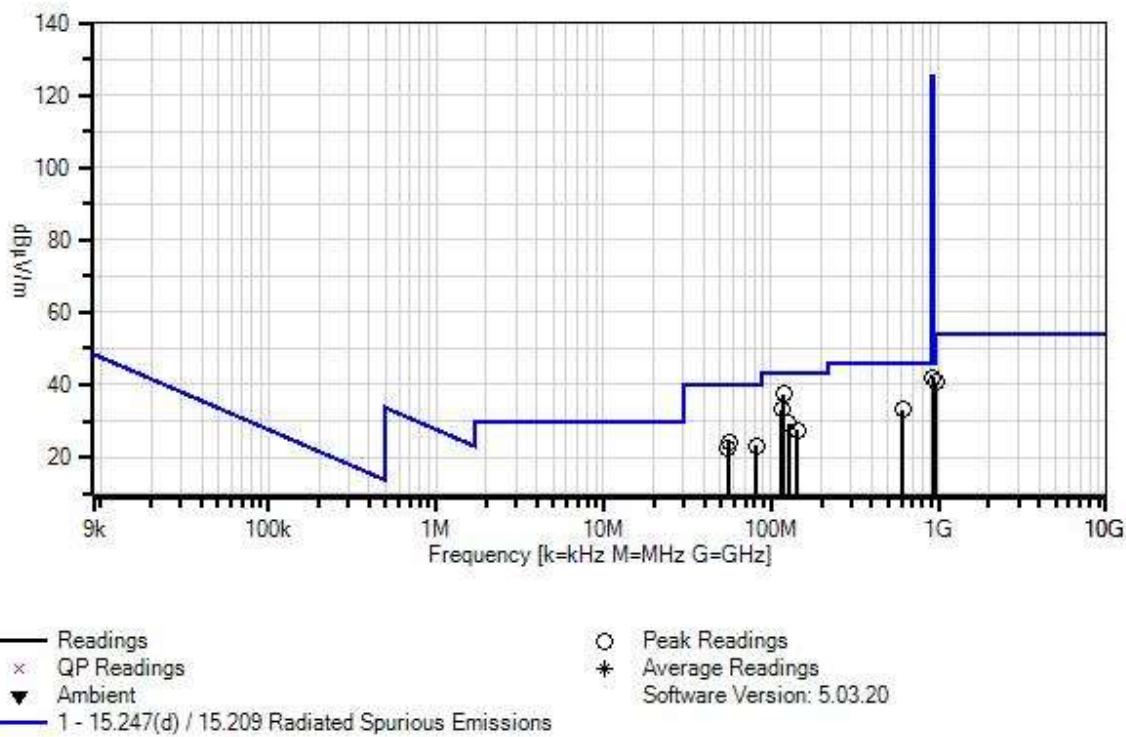
Pressure: 101.3kPa

Channels: Low/Mid/High

Test Mode: Constant modulated transmission on a signal channel

EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmission frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.

Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.

Impinj Inc. WO#: 111241 Sequence#: 2 Date: 5/13/2025  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Various

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026
T4	ANP06467	Attenuator	PE7014-10	5/15/2023	5/15/2025
T5	ANP07508	Preamp	310N	4/5/2024	4/5/2026
T6	ANP01187	Cable	CNT-195	7/3/2024	7/3/2026

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6			Table	dB $\mu$ V/m	dB $\mu$ V/m		
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	118.250M	39.6	+0.4	+1.0	+17.6	+10.4	+0.0	37.3	43.5	-6.2	Horiz
			-32.0	+0.3							Mid
2	114.940M	35.7	+0.4	+1.0	+17.4	+10.4	+0.0	33.2	43.5	-10.3	Vert
			-32.0	+0.3							Low
3	611.623M	24.0	+1.0	+2.6	+26.4	+10.5	+0.0	33.2	46.0	-12.8	Horiz
			-32.1	+0.8							Low
4	960.555M	24.3	+1.3	+3.5	+31.0	+10.5	+0.0	40.7	54.0	-13.3	Horiz
			-30.9	+1.0							High
5	127.350M	31.6	+0.4	+1.1	+17.7	+10.4	+0.0	29.4	43.5	-14.1	Horiz
			-32.1	+0.3							High
6	55.900M	32.5	+0.2	+0.7	+12.3	+10.4	+0.0	24.2	40.0	-15.8	Vert
			-32.1	+0.2							Mid
7	143.300M	29.7	+0.4	+1.1	+17.5	+10.4	+0.0	27.4	43.5	-16.1	Vert
			-32.0	+0.3							High
8	81.190M	29.9	+0.3	+0.8	+13.7	+10.4	+0.0	23.2	40.0	-16.8	Vert
			-32.1	+0.2							Low
9	55.370M	30.8	+0.2	+0.7	+12.5	+10.4	+0.0	22.7	40.0	-17.3	Vert
			-32.1	+0.2							Low
10	923.020M	27.0	+1.3	+3.4	+30.0	+10.5	+0.0	42.0	125.2	-83.2	Vert
			-31.2	+1.0							Low

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **111241** Date: 6/25/2025  
 Test Type: **Maximized Emissions** Time: 16:56:04  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: 6  
 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:***

Radiated Spurious Emissions  
1GHz-10GHz

Method: ANSI C63.10

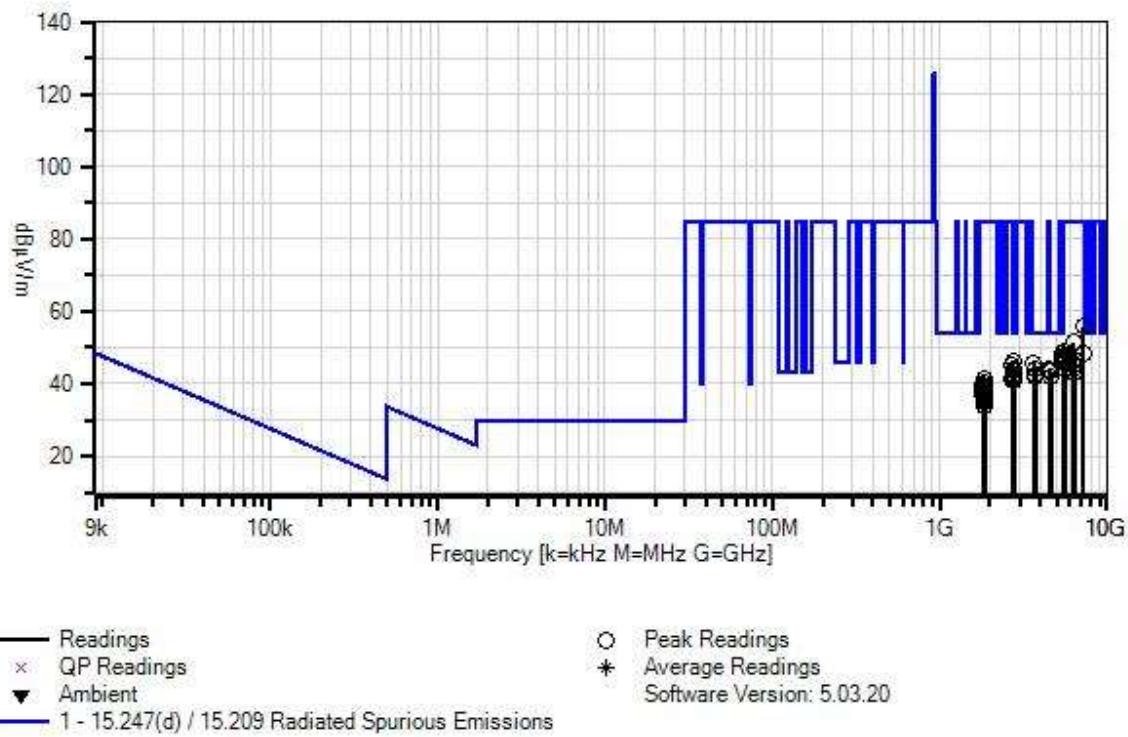
Test Environment Conditions:  
Temperature: 21.2°C  
Humidity: 43%  
Pressure: 101.7kPa

Channels: Low/Mid/High

Test Mode: Constant modulated transmission on a signal channel.

EUT is placed on an 1.5m foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to the antenna under test through an antenna cable with a known 3dB of loss at transmission frequencies. EUT is connected via an unshielded ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running Item Test software to control the output of the EUT.

Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.

Impinj Inc. WO#: 111241 Sequence#: 6 Date: 6/25/2025  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Various

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T2	AN02113ANSI	Horn Antenna	3115	2/12/2025	2/12/2027
T3	ANP06904	Cable	32022-29094K-29094K-36TC	1/9/2024	1/9/2026
T4	AN03172	High Pass Filter	HM1155-11SS	3/26/2024	3/26/2026
T5	ANP01210	Cable	FSJ1P-50A-4A	1/9/2024	1/9/2026
T6	AN03302	Cable	32026-29094K-29094K-72TC	1/9/2024	1/9/2026
T7	AN03209	Preamp	83051A	8/22/2023	8/22/2025

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7		Table	dB $\mu$ V/m	dB $\mu$ V/m		
			MHz	dB $\mu$ V	dB	dB	dB				Ant
1	5415.295M	35.9	+0.0	+33.5	+1.2	+0.2	+0.0	48.3	54.0	-5.7	Horiz
			+3.8	+2.2	-28.5						Low Channel: Antenna S9028PCLJ
2	5416.480M	34.3	+0.0	+33.5	+1.2	+0.2	+0.0	46.7	54.0	-7.3	Vert
			+3.8	+2.2	-28.5						Low Channel: Antenna IPJ- A0303-0000M
3	2744.250M	40.4	+0.0	+28.6	+0.8	+0.2	+0.0	46.3	54.0	-7.7	Horiz
			+2.7	+1.5	-27.9						Mid Channel: Antenna S9028PCLJ
4	3610.795M	37.6	+0.0	+30.9	+0.9	+0.2	+0.0	45.7	54.0	-8.3	Horiz
			+3.2	+1.7	-28.8						Low Channel: Antenna S9028PCLJ
5	2708.170M	39.3	+0.0	+28.3	+0.8	+0.2	+0.0	44.9	54.0	-9.1	Horiz
			+2.7	+1.4	-27.8						Low Channel: Antenna S9028PCLJ
6	3709.005M	35.9	+0.0	+31.3	+0.9	+0.2	+0.0	44.3	54.0	-9.7	Horiz
			+3.2	+1.7	-28.9						High Channel: Antenna S9028PCLJ
7	3659.000M	35.9	+0.0	+31.1	+0.9	+0.2	+0.0	44.2	54.0	-9.8	Horiz
			+3.2	+1.7	-28.8						Mid Channel: Antenna S9028PCLJ
8	2781.755M	37.9	+0.0	+28.9	+0.8	+0.2	+0.0	44.0	54.0	-10.0	Horiz
			+2.7	+1.5	-28.0						High Channel: Antenna S9028PCLJ
9	4513.045M	34.4	+0.0	+31.8	+1.1	+0.3	+0.0	43.8	54.0	-10.2	Horiz
			+3.5	+1.9	-29.2						Low Channel: Antenna S9028PCLJ
10	4636.200M	34.0	+0.0	+31.6	+1.1	+0.3	+0.0	43.4	54.0	-10.6	Horiz
			+3.5	+2.0	-29.1						High Channel: Antenna A5010
11	4513.730M	34.0	+0.0	+31.8	+1.1	+0.3	+0.0	43.4	54.0	-10.6	Horiz
			+3.5	+1.9	-29.2						Low Channel: Antenna IPJ- A0303-0000M

12	2781.780M	37.3	+0.0 +2.7	+28.9 +1.5	+0.8 -28.0	+0.2	+0.0	43.4	54.0	-10.6	Vert
									High Channel:		
									Antenna IPJ-		
									A0404-000		
13	3709.040M	33.9	+0.0 +3.2	+31.3 +1.7	+0.9 -28.9	+0.2	+0.0	42.3	54.0	-11.7	Horiz
									High Channel:		
									Antenna IPJ-		
									A0404-000		
14	2781.720M	36.1	+0.0 +2.7	+28.9 +1.5	+0.8 -28.0	+0.2	+0.0	42.2	54.0	-11.8	Vario
									High Channel:		
									Antenna A5010		
15	3659.000M	33.9	+0.0 +3.2	+31.1 +1.7	+0.9 -28.8	+0.2	+0.0	42.2	54.0	-11.8	Horiz
									Mid Channel:		
									Antenna IPJ-		
									A0404-000		
16	2744.250M	36.2	+0.0 +2.7	+28.6 +1.5	+0.8 -27.9	+0.2	+0.0	42.1	54.0	-11.9	Horiz
									Mid Channel:		
									Antenna IPJ-		
									A0404-000		
17	3708.960M	33.7	+0.0 +3.2	+31.3 +1.7	+0.9 -28.9	+0.2	+0.0	42.1	54.0	-11.9	Horiz
									Low Channel:		
									Antenna A5010		
18	2781.780M	36.0	+0.0 +2.7	+28.9 +1.5	+0.8 -28.0	+0.2	+0.0	42.1	54.0	-11.9	Horiz
									High Channel:		
									Antenna IPJ-		
									A0303-0000M		
19	4636.300M	32.4	+0.0 +3.5	+31.6 +2.0	+1.1 -29.1	+0.3	+0.0	41.8	54.0	-12.2	Vert
									High Channel:		
									Antenna IPJ-		
									A0303-0000M		
20	2747.160M	35.6	+0.0 +2.7	+28.6 +1.5	+0.8 -27.9	+0.2	+0.0	41.5	54.0	-12.5	Vert
									Mid Channel:		
									Antenna A5020		
21	2708.340M	35.4	+0.0 +2.7	+28.4 +1.4	+0.8 -27.8	+0.2	+0.0	41.1	54.0	-12.9	Horiz
									Low Channel:		
									Antenna A5010		
22	2781.780M	34.9	+0.0 +2.7	+28.9 +1.5	+0.8 -28.0	+0.2	+0.0	41.0	54.0	-13.0	Vert
									High Channel:		
									Antenna IPJ-		
									A0303-0000M		
23	7217.005M	39.2	+0.0 +4.5	+35.5 +2.5	+1.4 -27.5	+0.2	+0.0	55.8	84.8	-29.0	Horiz
									Low Channel:		
									Antenna		
									S9028PCLJ		
24	6318.090M	37.8	+0.0 +4.0	+34.0 +2.3	+1.3 -28.1	+0.2	+0.0	51.5	84.8	-33.3	Horiz
									Low Channel:		
									Antenna		
									S9028PCLJ		
25	5494.700M	36.9	+0.0 +3.8	+33.1 +2.2	+1.2 -28.5	+0.2	+0.0	48.9	84.8	-35.9	Vert
									Mid Channel:		
									Antenna A5020		

26	7221.980M	31.9	+0.0 +4.5	+35.5 +2.5	+1.4 -27.5	+0.2	+0.0	48.5	84.8	-36.3	Horiz
Low Channel: Antenna IPJ-A0303-0000M											
27	5488.500M	35.8	+0.0 +3.8	+33.1 +2.2	+1.2 -28.5	+0.2	+0.0	47.8	84.8	-37.0	Horiz
Mid Channel: Antenna IPJ-A0404-000											
28	5563.440M	34.6	+0.0 +3.8	+33.6 +2.2	+1.2 -28.4	+0.2	+0.0	47.2	84.8	-37.6	Vario
High Channel: Antenna A5010											
29	6410.040M	33.1	+0.0 +4.0	+34.0 +2.4	+1.3 -28.1	+0.2	+0.0	46.9	84.8	-37.9	Vert
Mid Channel: Antenna A5020											
30	5563.560M	34.0	+0.0 +3.8	+33.6 +2.2	+1.2 -28.4	+0.2	+0.0	46.6	84.8	-38.2	Vert
High Channel: Antenna IPJ-A0404-000											
31	5563.440M	33.4	+0.0 +3.8	+33.6 +2.2	+1.2 -28.4	+0.2	+0.0	46.0	84.8	-38.8	Horiz
High Channel: Antenna A5010											
32	5563.560M	32.8	+0.0 +3.8	+33.6 +2.2	+1.2 -28.4	+0.2	+0.0	45.4	84.8	-39.4	Horiz
High Channel: Antenna IPJ-A0404-000											
33	6403.250M	31.3	+0.0 +4.0	+34.0 +2.4	+1.3 -28.1	+0.2	+0.0	45.1	84.8	-39.7	Vert
Mid Channel: Antenna IPJ-A0404-000											
34	6490.820M	31.0	+0.0 +4.1	+33.8 +2.4	+1.3 -28.1	+0.2	+0.0	44.7	84.8	-40.1	Horiz
High Channel: Antenna IPJ-A0303-0000M											
35	5488.500M	31.9	+0.0 +3.8	+33.1 +2.2	+1.2 -28.5	+0.2	+0.0	43.9	84.8	-40.9	Vert
Mid Channel: Antenna IPJ-A0404-000											
36	6410.040M	29.3	+0.0 +4.0	+34.0 +2.4	+1.3 -28.1	+0.2	+0.0	43.1	84.8	-41.7	Vert
Mid Channel: Antenna A5020											
37	1831.440M	39.8	+0.0 +2.2	+26.3 +1.2	+0.7 -29.2	+0.3	+0.0	41.3	84.8	-43.5	Vert
Mid Channel: Antenna A5020											
38	1854.520M	39.0	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	40.3	84.8	-44.5	Vert
High Channel: Antenna IPJ-A0404-000											
39	1805.480M	38.0	+0.0 +2.2	+26.6 +1.2	+0.7 -29.3	+0.3	+0.0	39.7	84.8	-45.1	Horiz
Low Channel: Antenna IPJ-A0303-0000M											

40	1805.660M	37.6	+0.0 +2.2	+26.6 +1.2	+0.7 -29.3	+0.3	+0.0	39.3	84.8	-45.5	Horiz
									Low Channel:		
									Antenna		
									S9028PCLJ		
41	1829.500M	37.8	+0.0 +2.2	+26.3 +1.2	+0.7 -29.2	+0.3	+0.0	39.3	84.8	-45.5	Vert
									Mid Channel:		
									Antenna IPJ-		
									A0404-000		
42	1805.480M	37.1	+0.0 +2.2	+26.6 +1.2	+0.7 -29.3	+0.3	+0.0	38.8	84.8	-46.0	Vert
									Low Channel:		
									Antenna IPJ-		
									A0303-0000M		
43	1854.520M	37.4	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	38.7	84.8	-46.1	Vert
									High Channel:		
									Antenna IPJ-		
									A0303-0000M		
44	1829.500M	36.1	+0.0 +2.2	+26.3 +1.2	+0.7 -29.2	+0.3	+0.0	37.6	84.8	-47.2	Horiz
									Mid Channel:		
									Antenna		
									S9028PCLJ		
45	1854.480M	36.2	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	37.5	84.8	-47.3	Horiz
									Low Channel:		
									Antenna A5010		
46	1805.540M	35.5	+0.0 +2.2	+26.6 +1.2	+0.7 -29.3	+0.3	+0.0	37.2	84.8	-47.6	Horiz
									Low Channel:		
									Antenna A5010		
47	1854.505M	35.4	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	36.7	84.8	-48.1	Horiz
									High Channel:		
									Antenna		
									S9028PCLJ		
48	1829.500M	34.2	+0.0 +2.2	+26.3 +1.2	+0.7 -29.2	+0.3	+0.0	35.7	84.8	-49.1	Horiz
									Mid Channel:		
									Antenna IPJ-		
									A0404-000		
49	1854.520M	33.9	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	35.2	84.8	-49.6	Horiz
									High Channel:		
									Antenna IPJ-		
									A0303-0000M		
50	1854.520M	33.8	+0.0 +2.2	+26.1 +1.2	+0.7 -29.2	+0.3	+0.0	35.1	84.8	-49.7	Horiz
									High Channel:		
									Antenna IPJ-		
									A0404-000		
51	1831.820M	32.1	+0.0 +2.2	+26.3 +1.2	+0.7 -29.2	+0.3	+0.0	33.6	84.8	-51.2	Vert
									Mid Channel:		
									Antenna A5020		

## Band Edge

*NOTE: Reported band edge data is representative of the worst case band edge measurement (Circular Polarized Panel S9028PCLJ)*

### Band Edge Summary – Single Channel Mode

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	ASK	External, Circular Polarized Panel S9028PCLJ	44.7	<46	Pass
902			65.7	<114.2	Pass
928			68.0	<114.2	Pass
960			46.8	<54	Pass

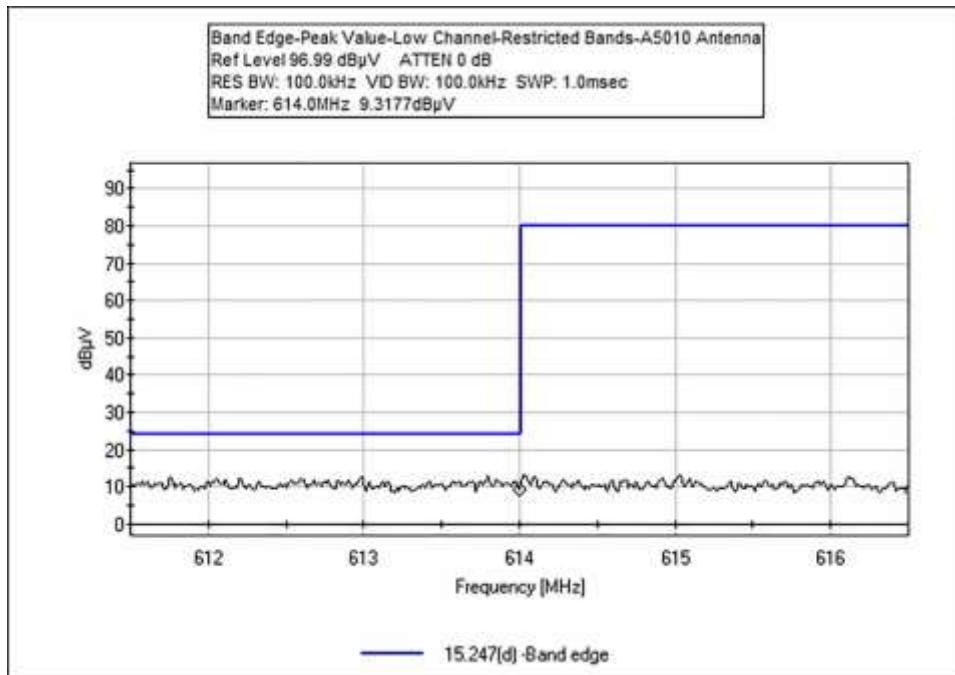
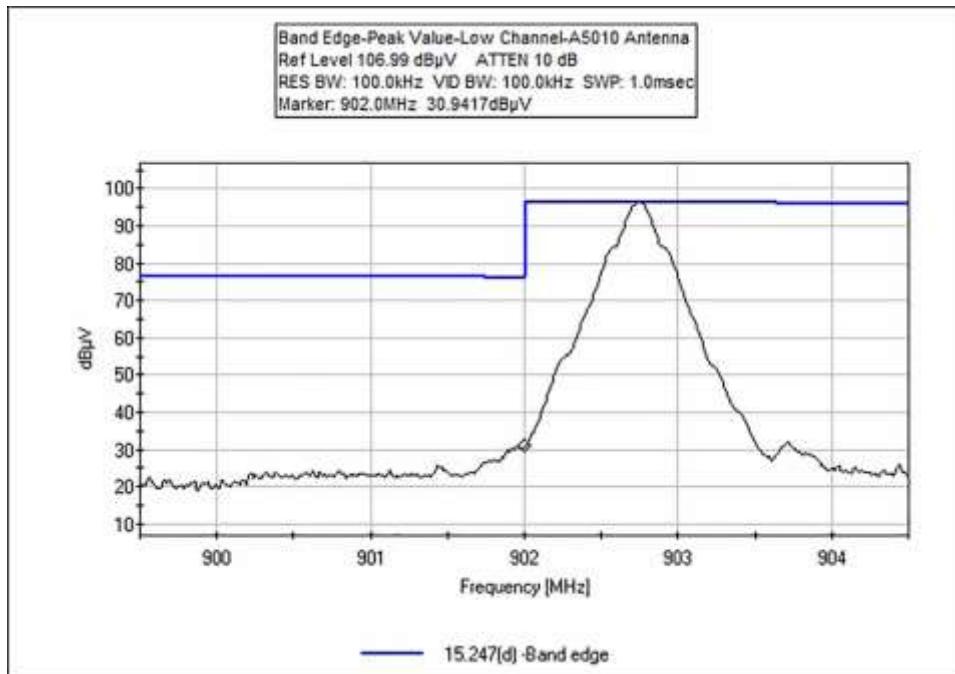
### Band Edge Summary – Hopping Mode

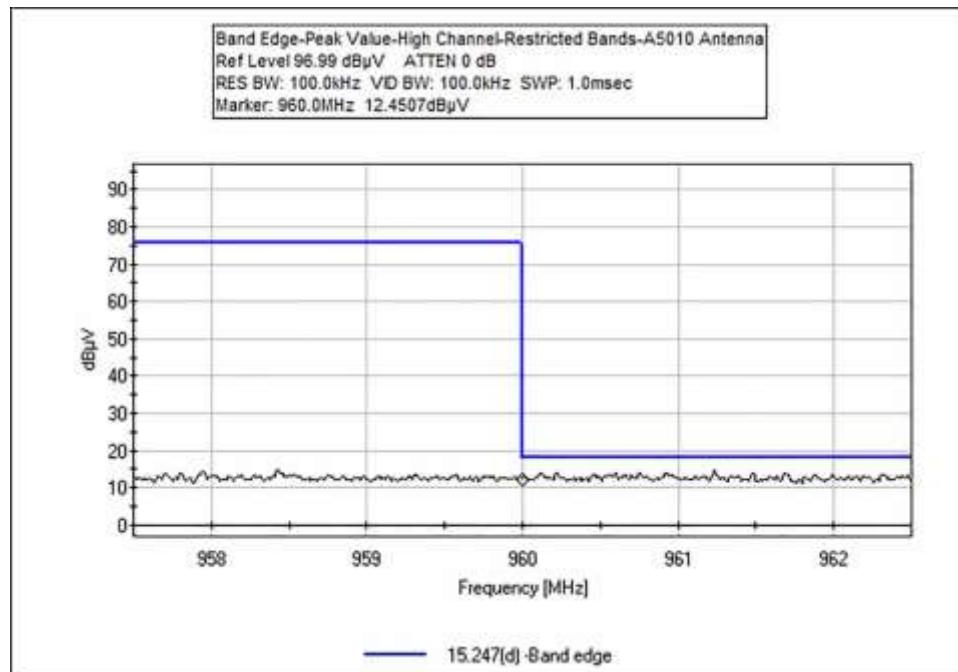
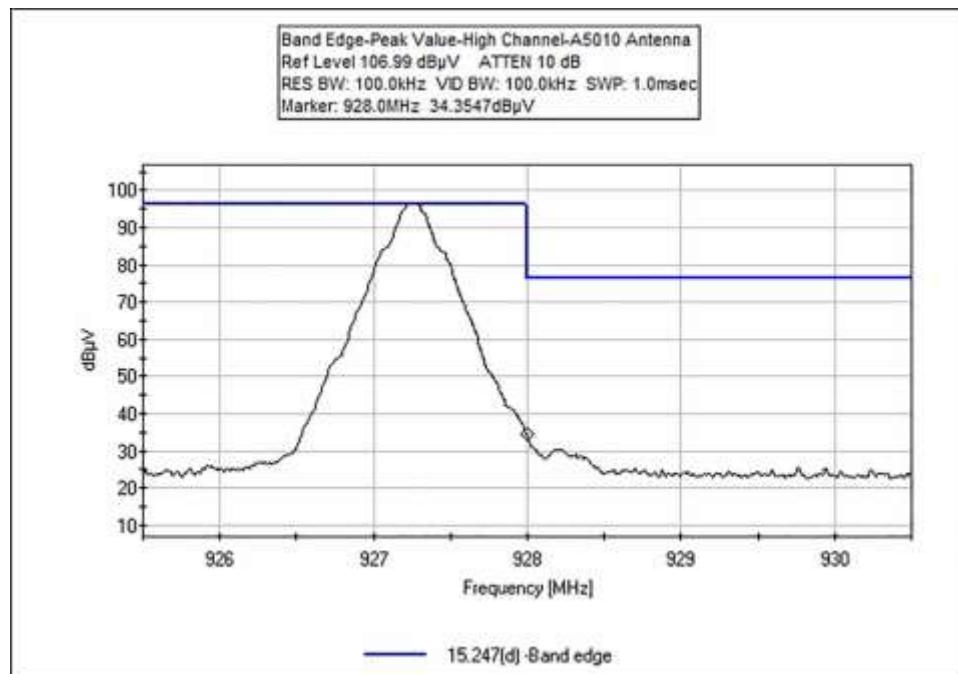
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	ASK	External, Circular Polarized Panel S9028PCLJ	42.4	<46	Pass
902			66.6	<124.3	Pass
928			75.4	<124.3	Pass
960			45.8	<54	Pass

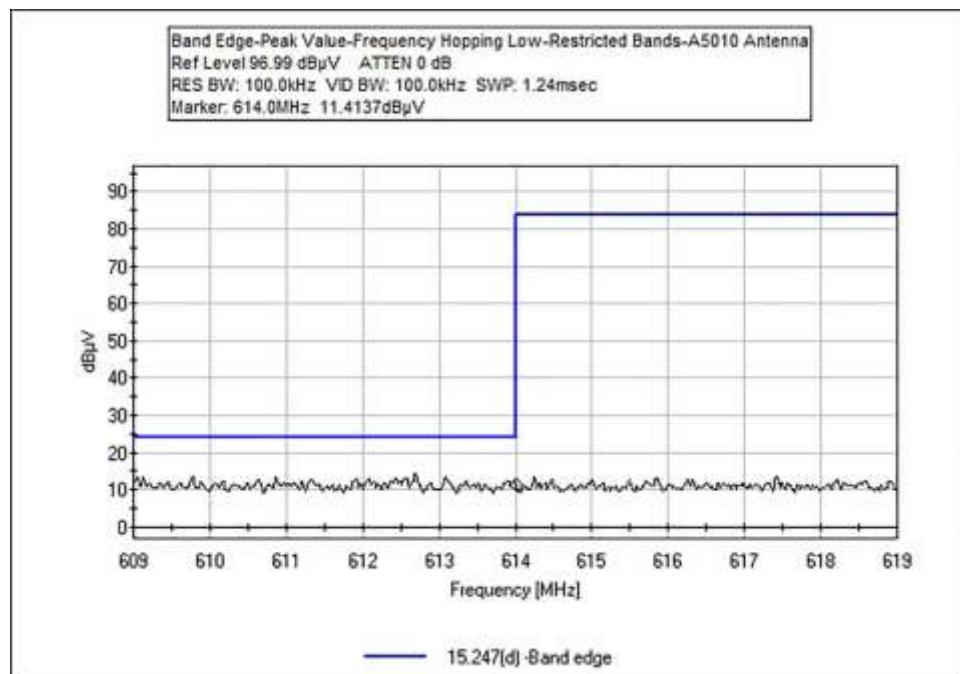
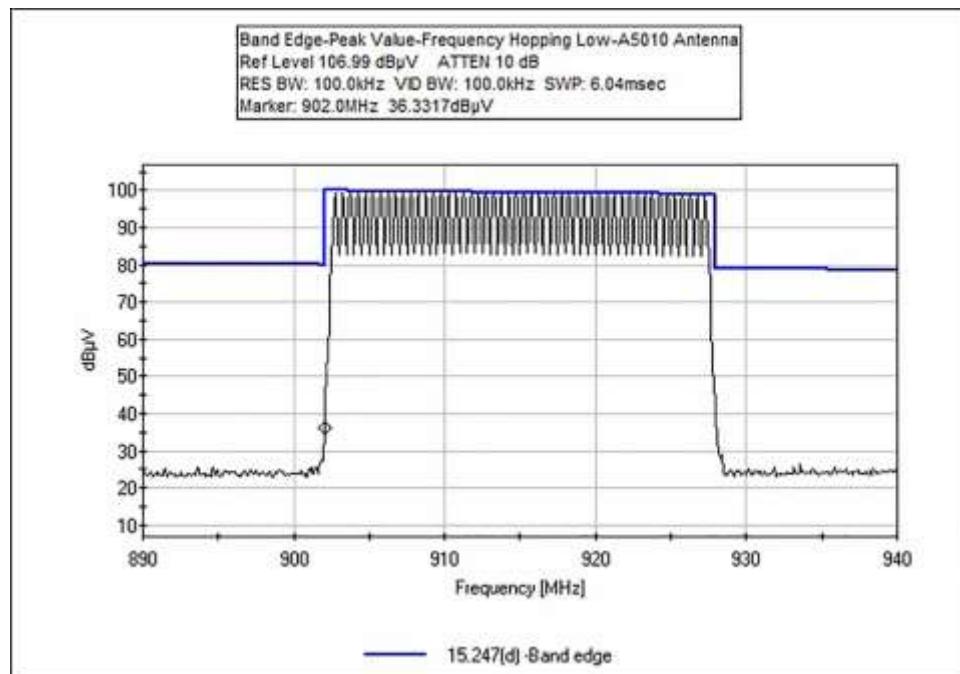
## Band Edge Plots

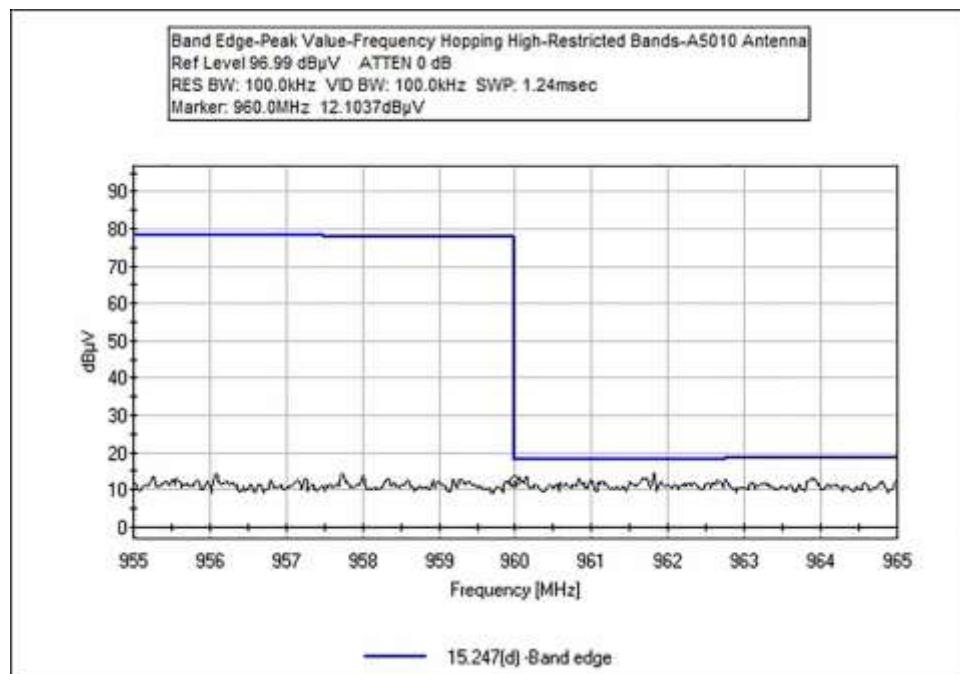
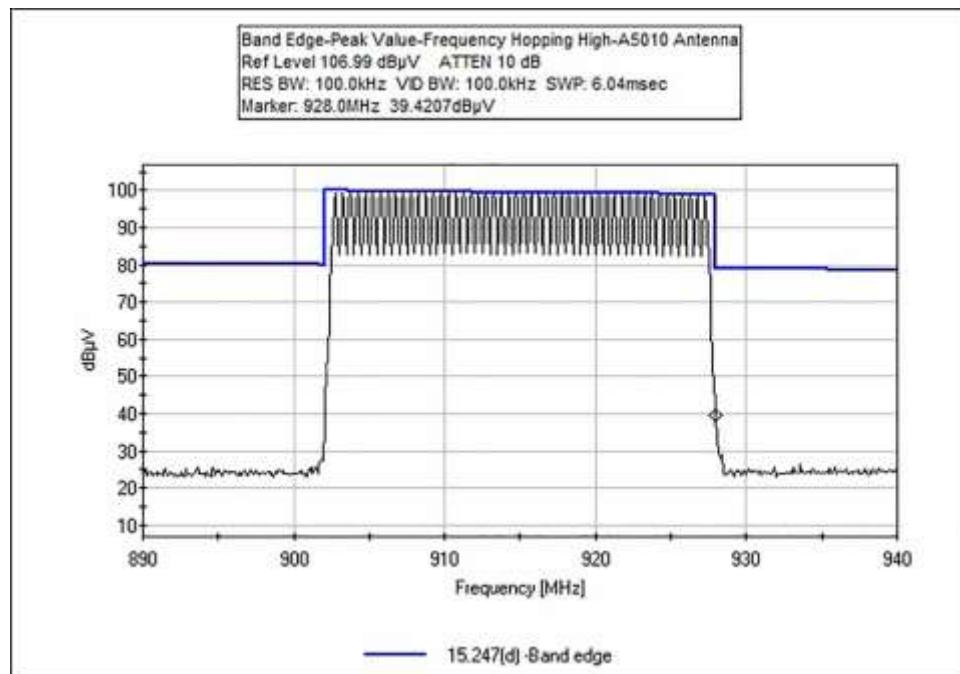
Limit is adjusted for system factors

### A5010 Antenna

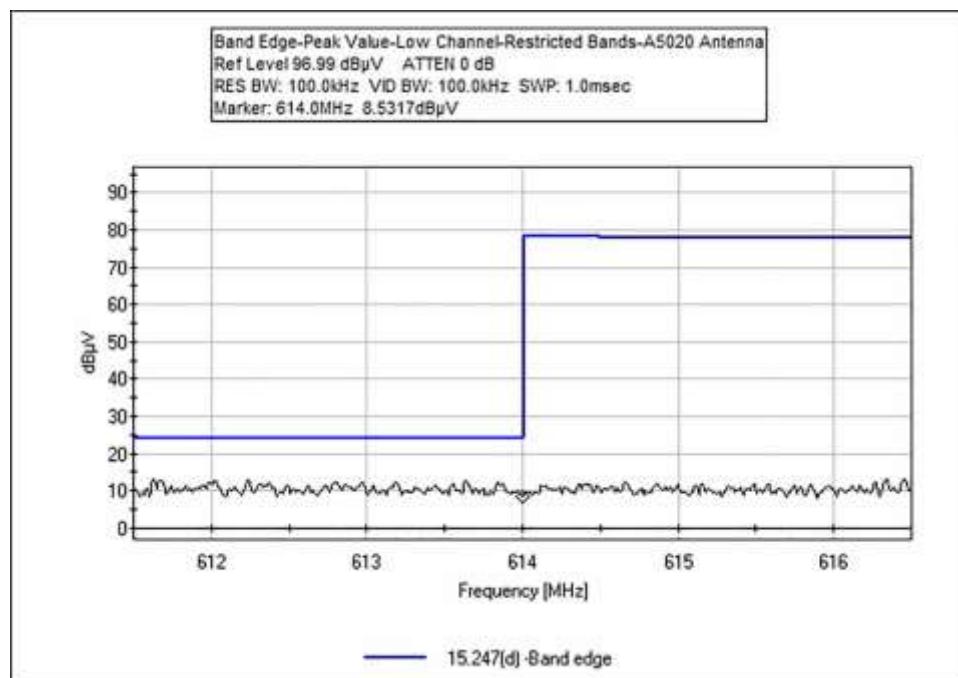
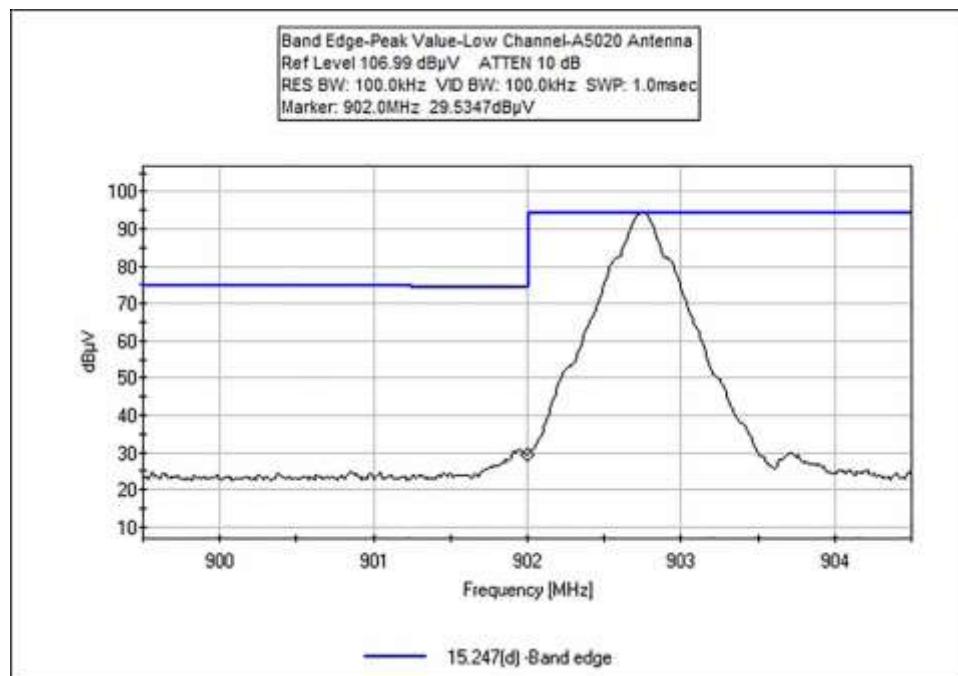


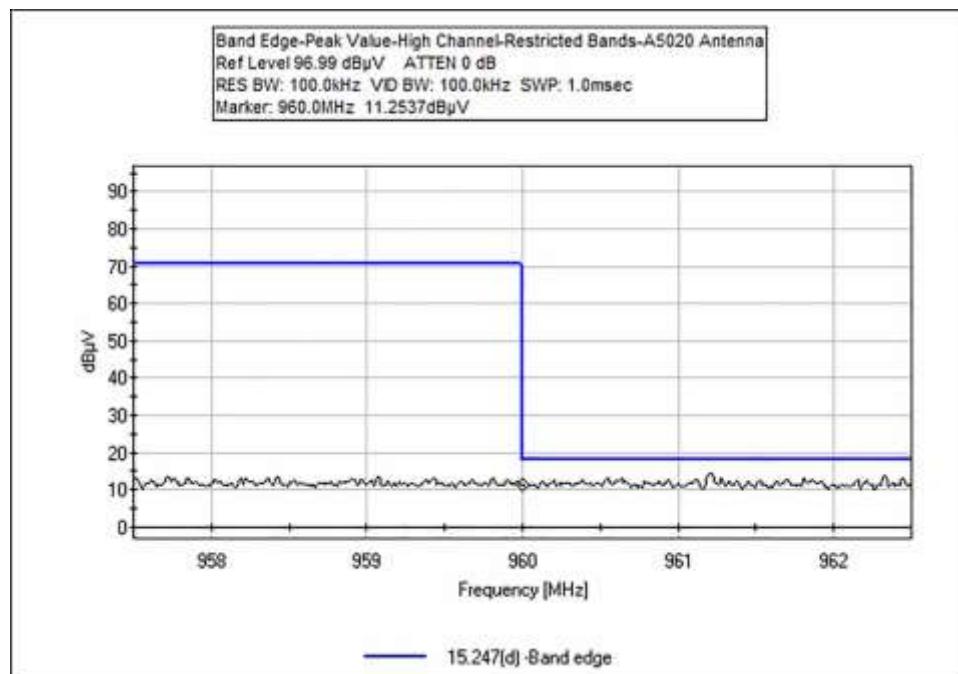
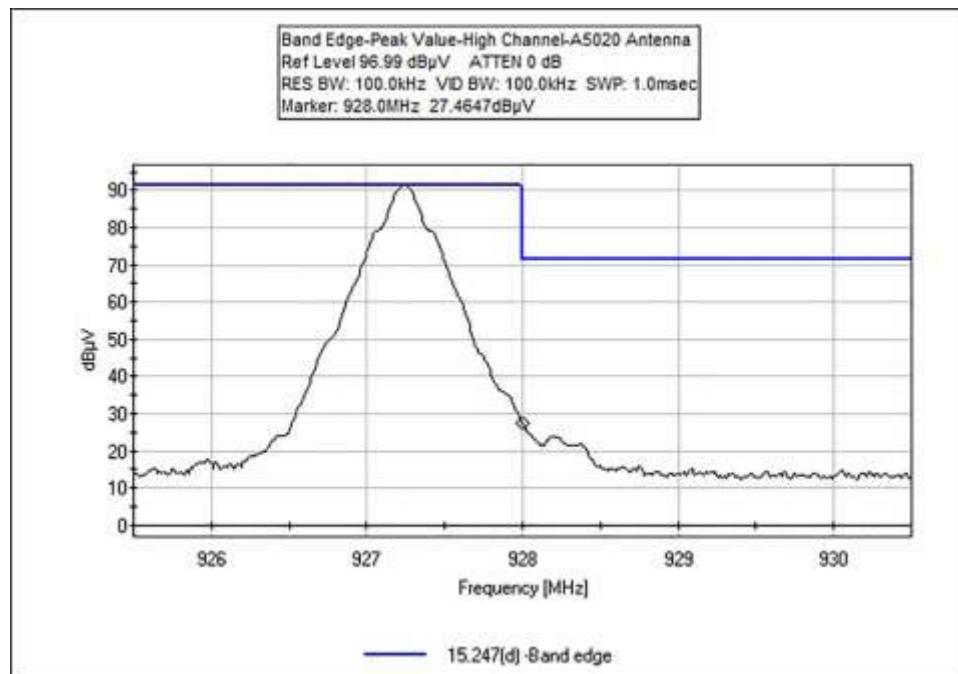


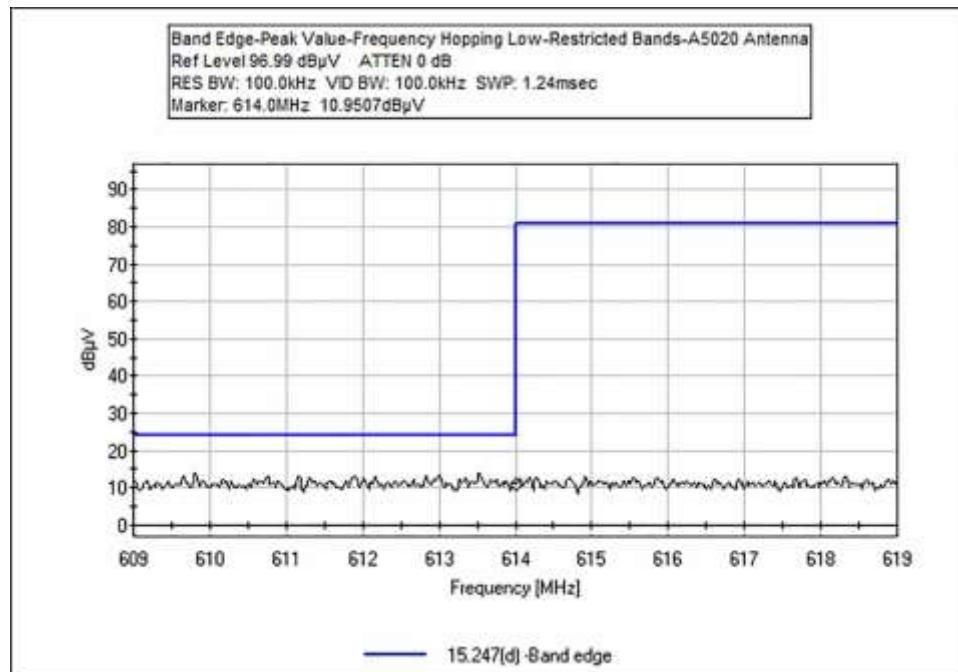
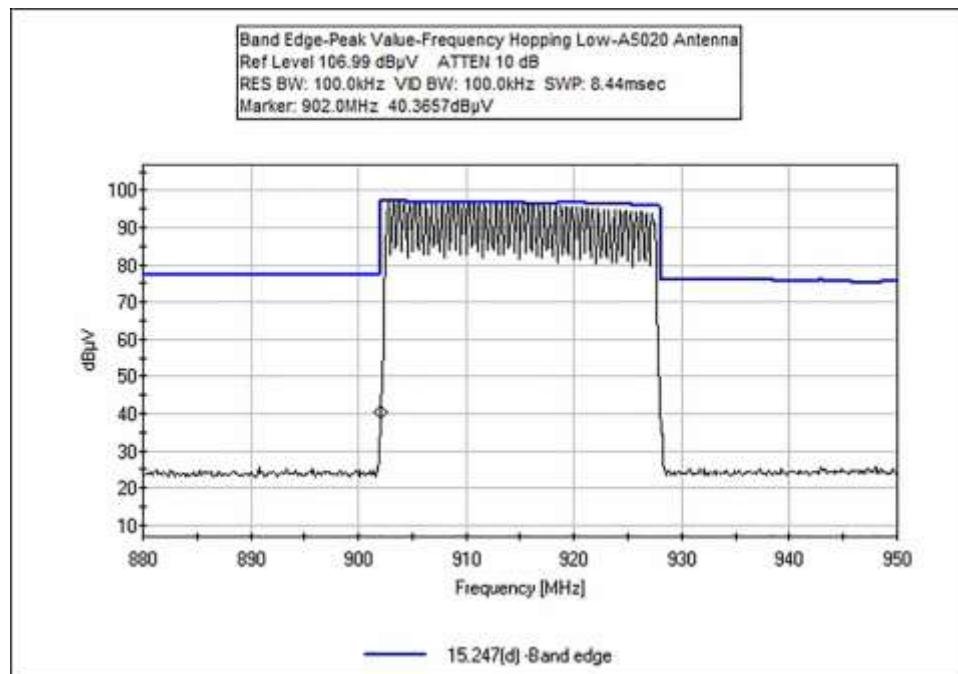


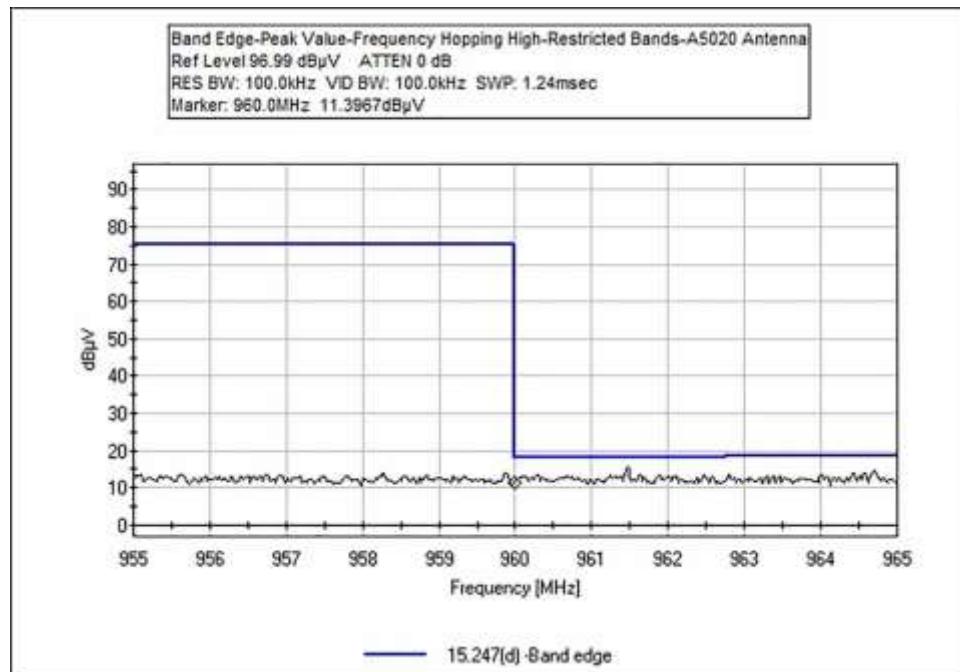
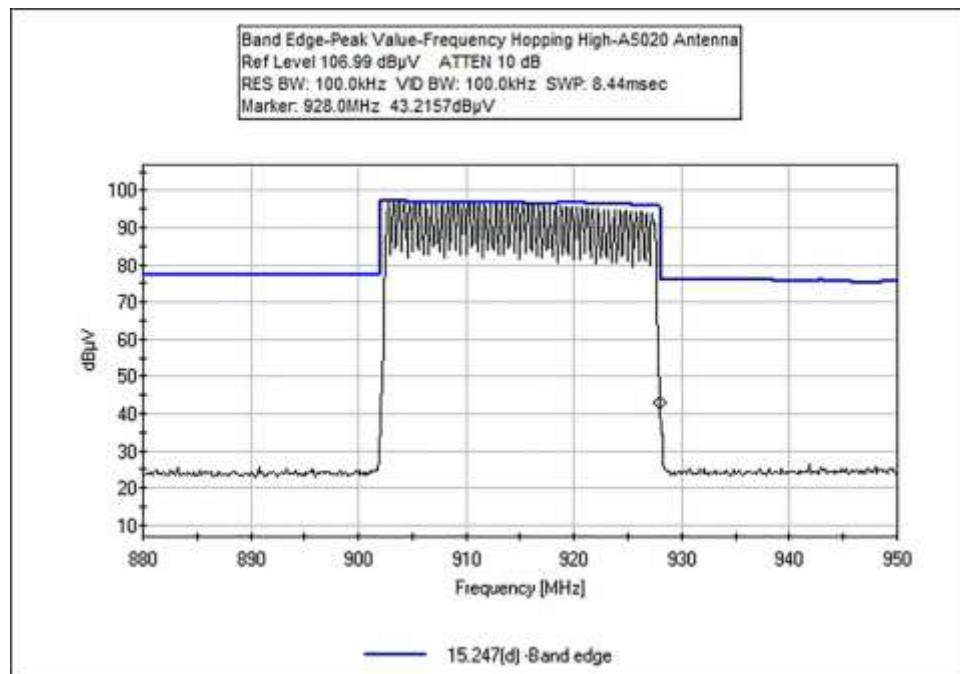


**A5020 Antenna**

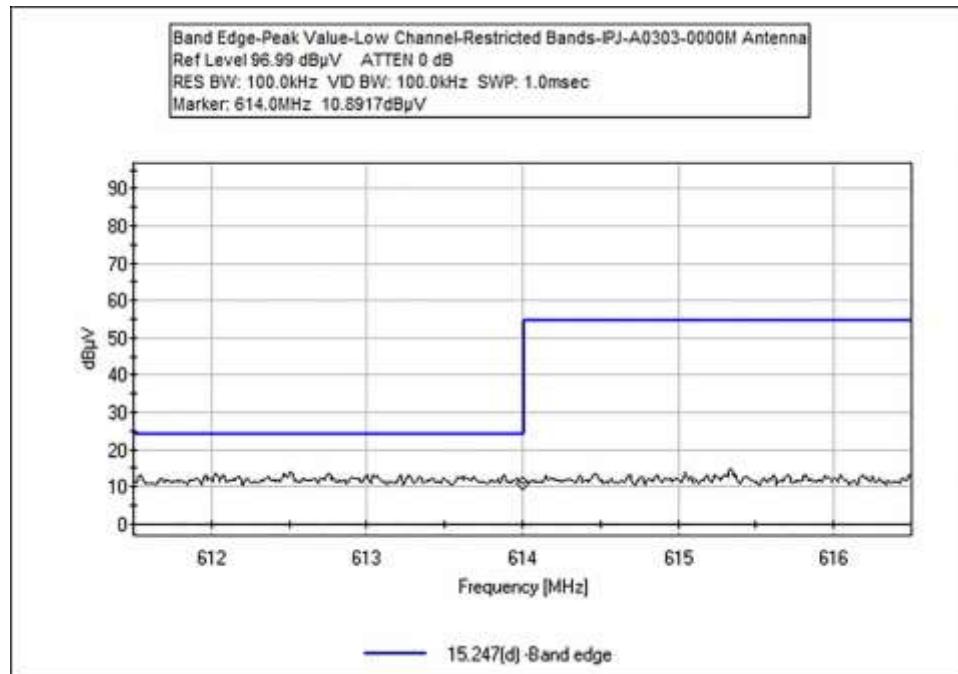
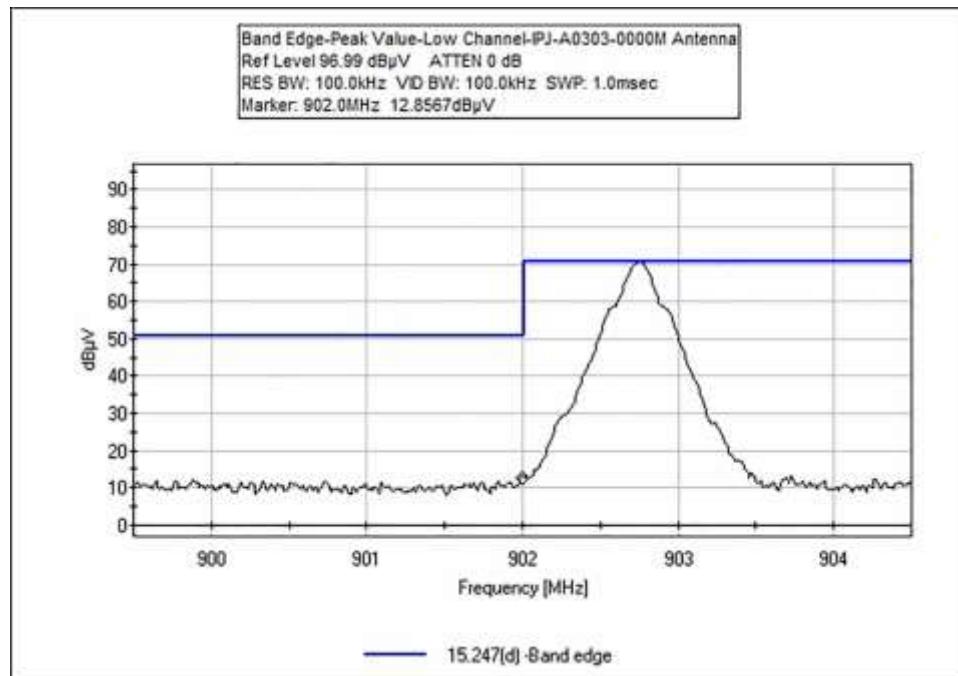


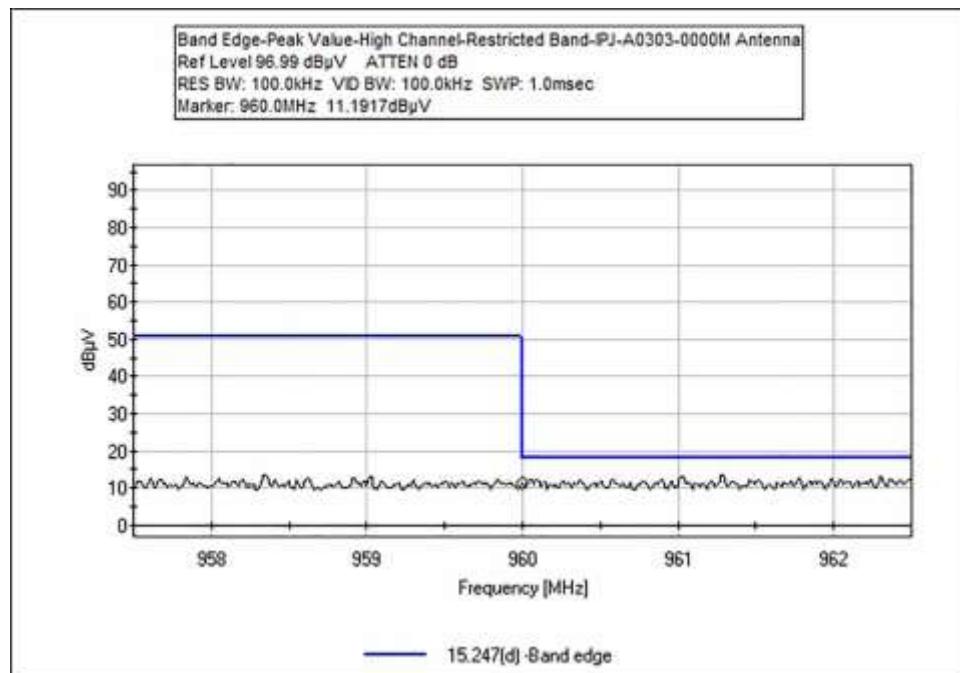
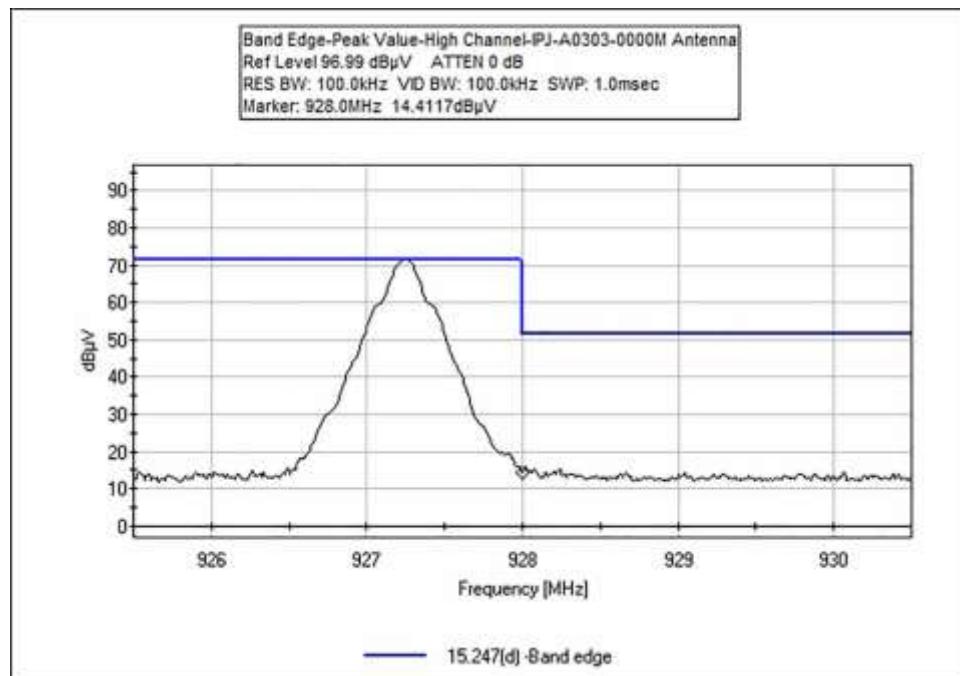


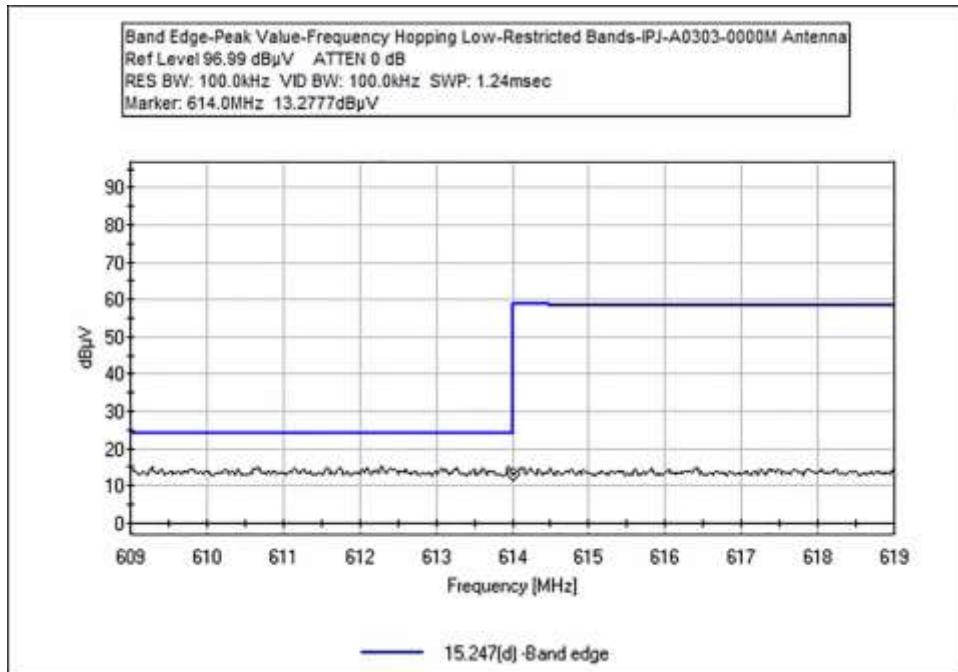
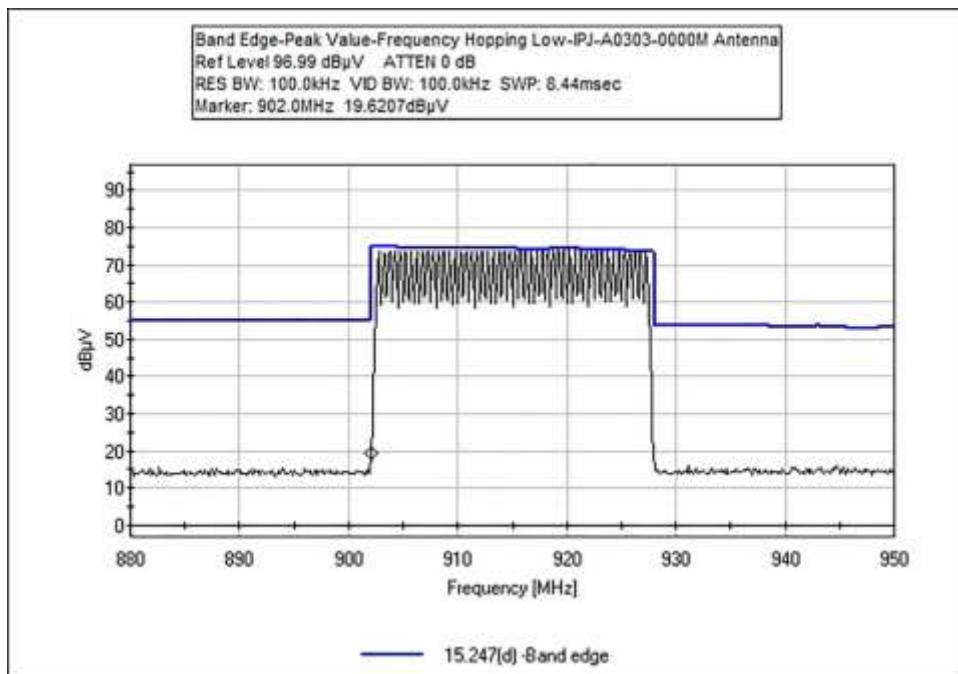


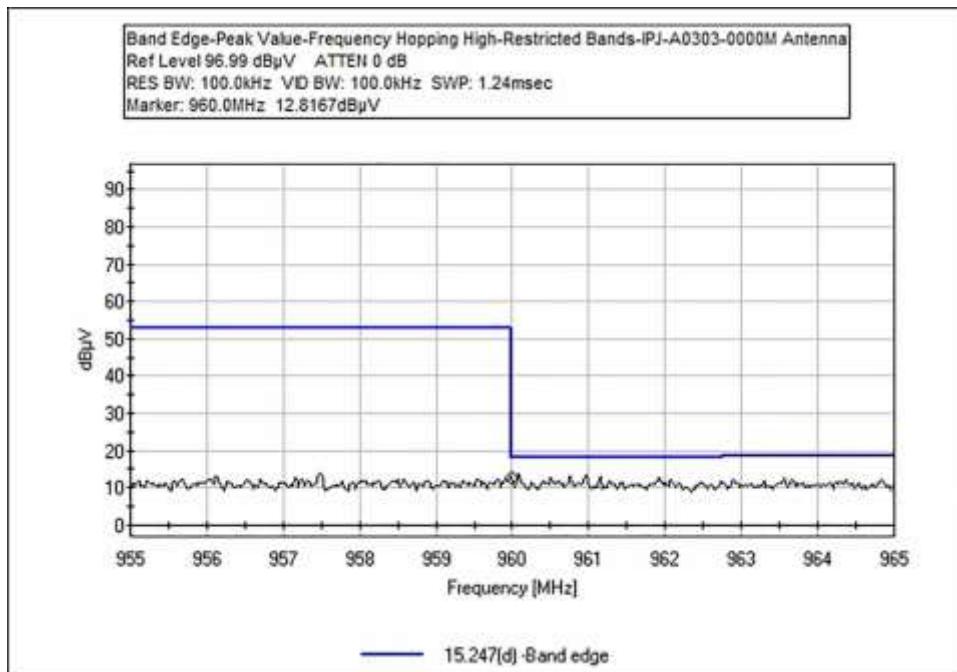
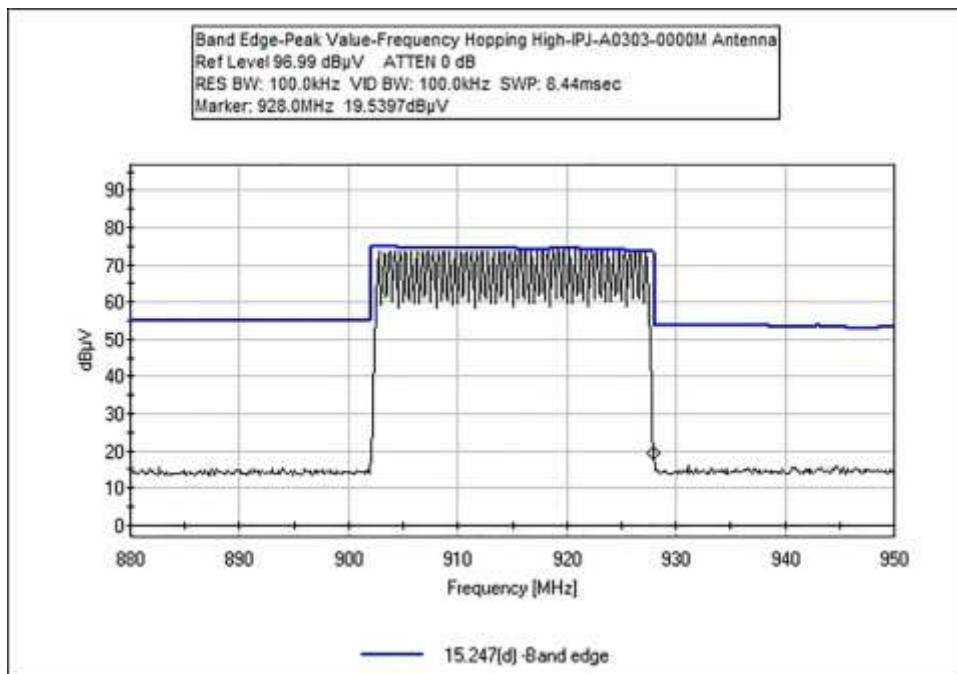


**IPJ-A0303-0000M Antenna**

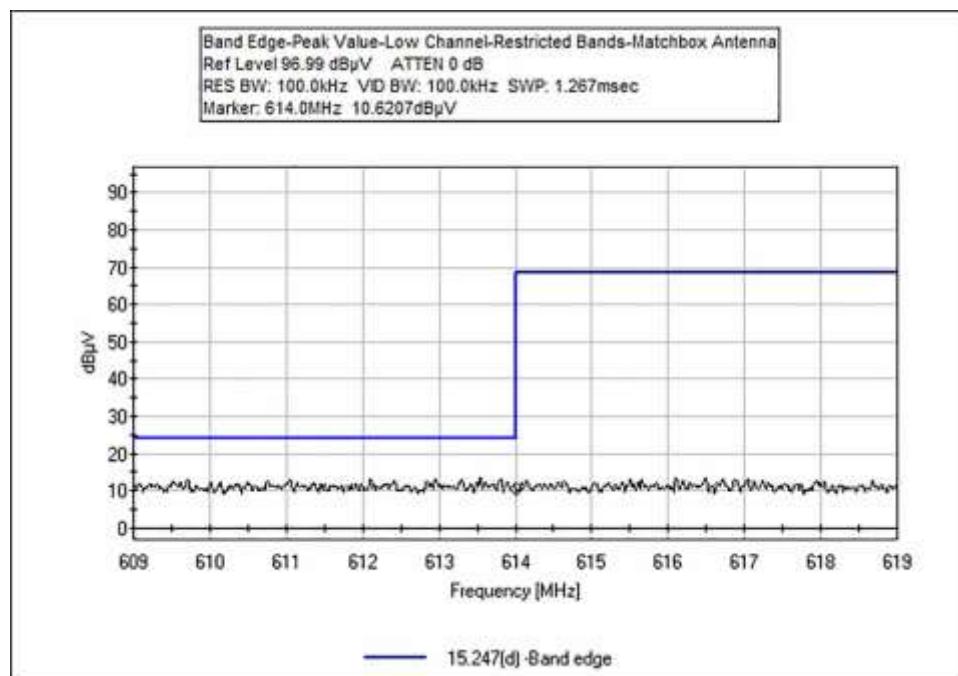
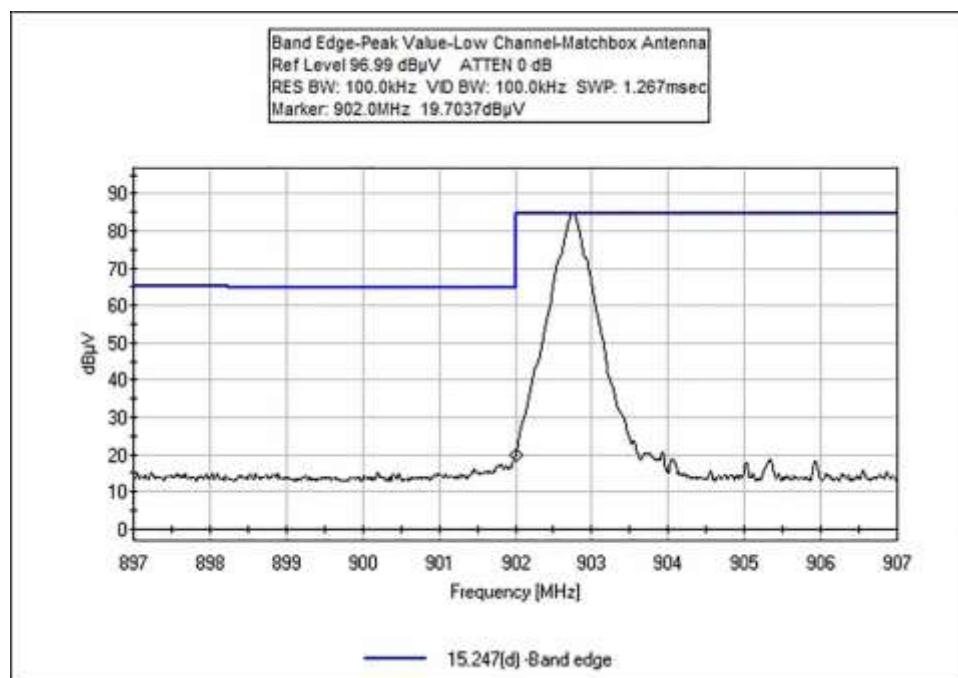


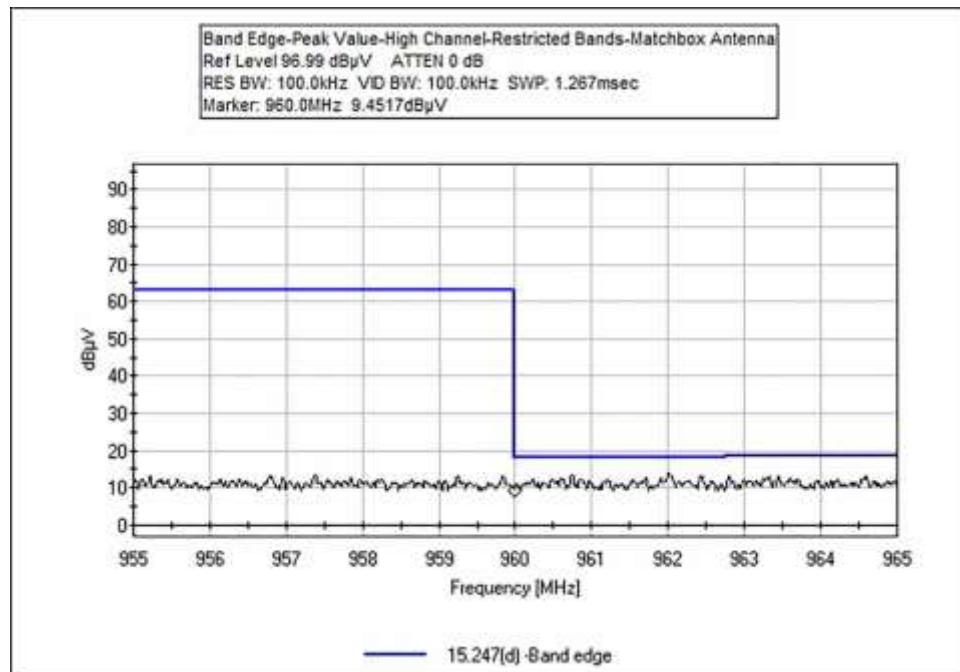
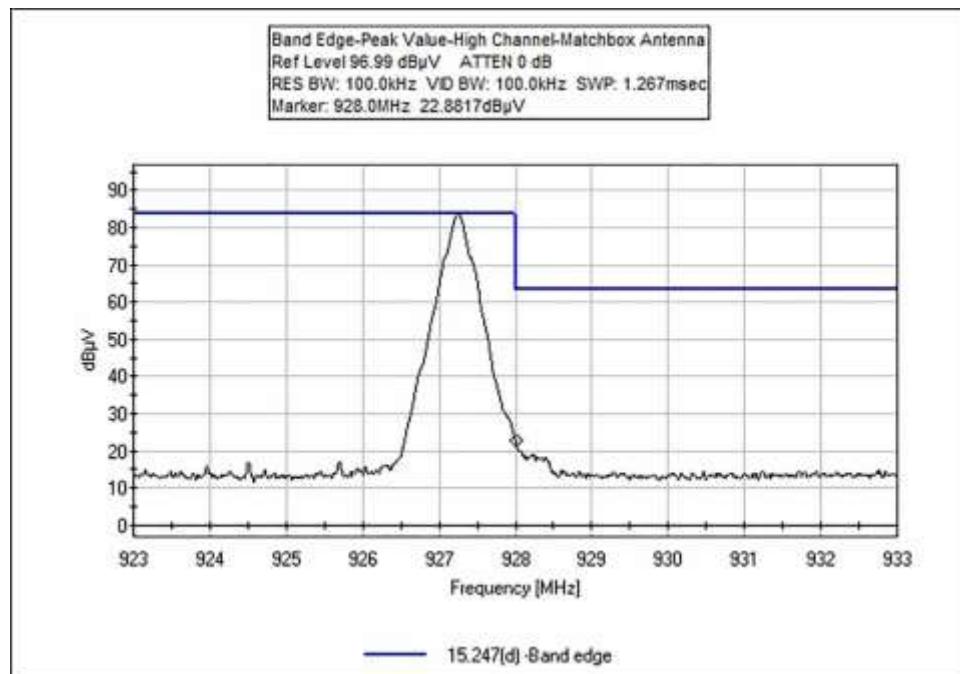


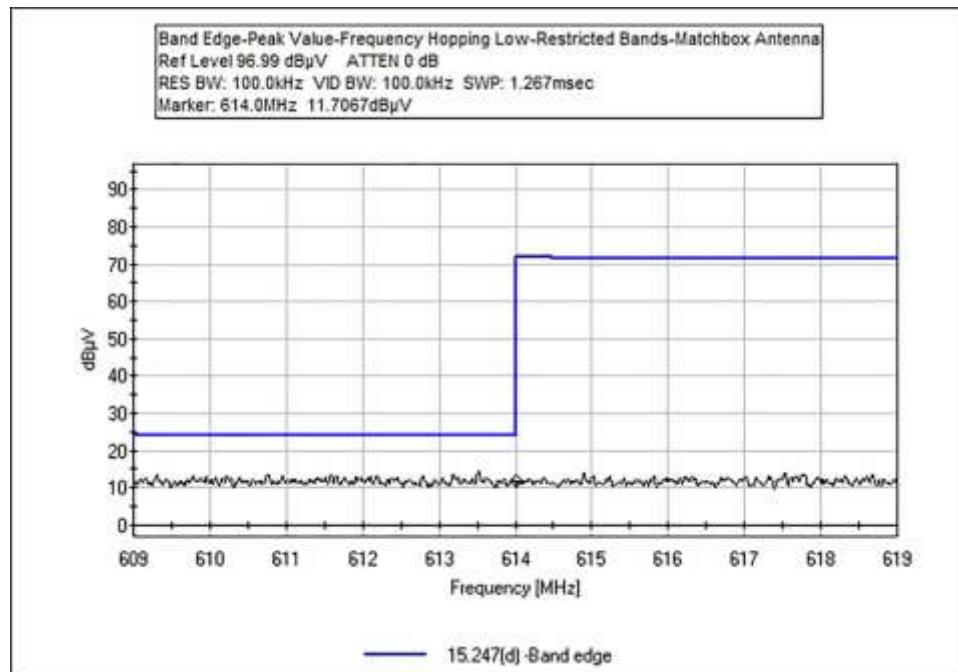
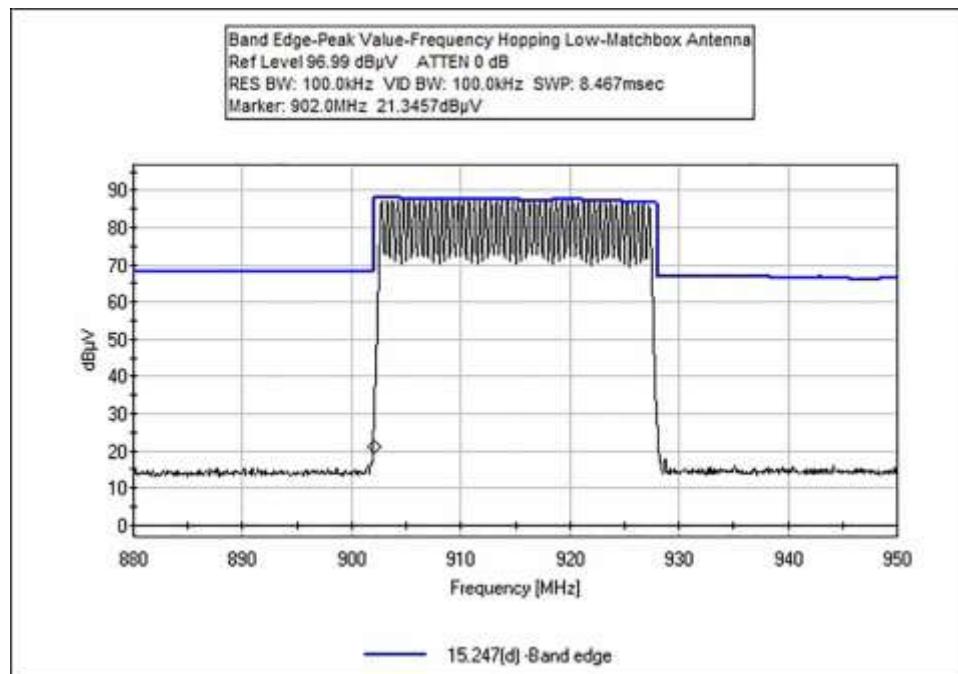


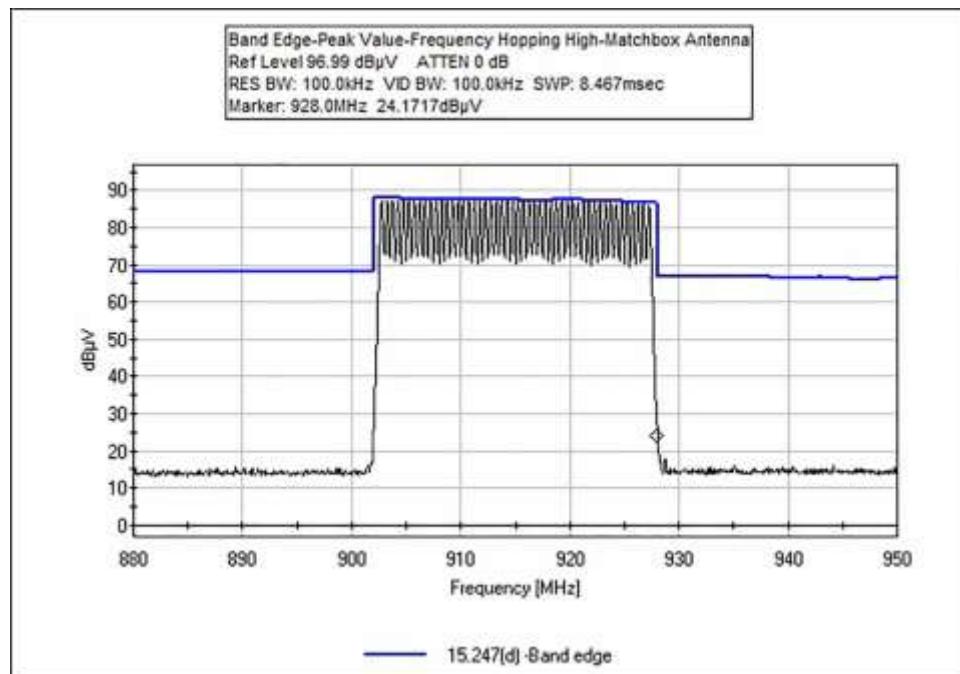


**Matchbox Antenna**

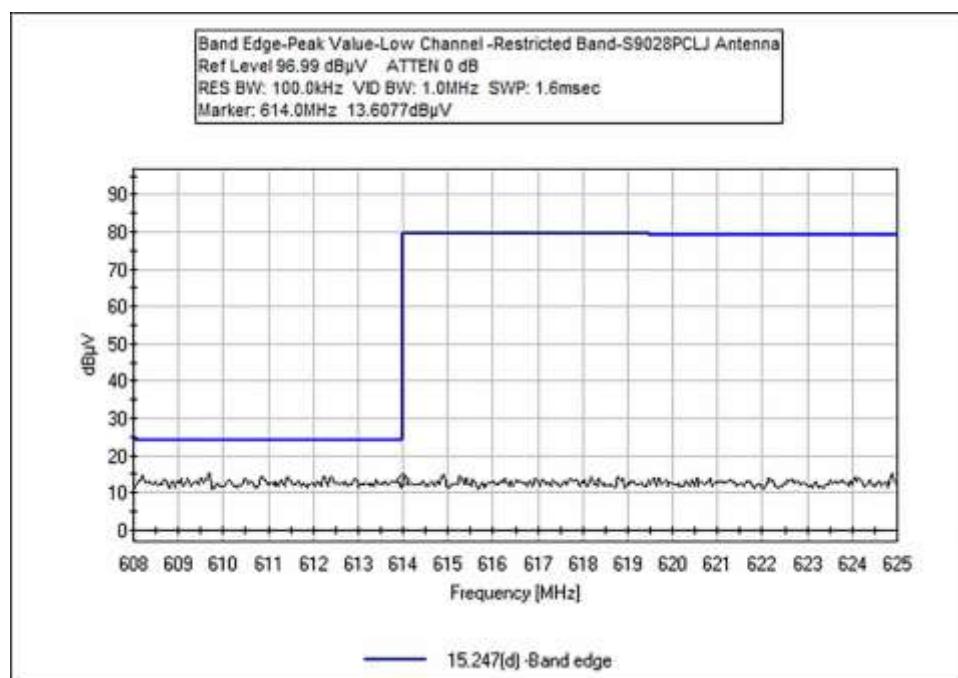
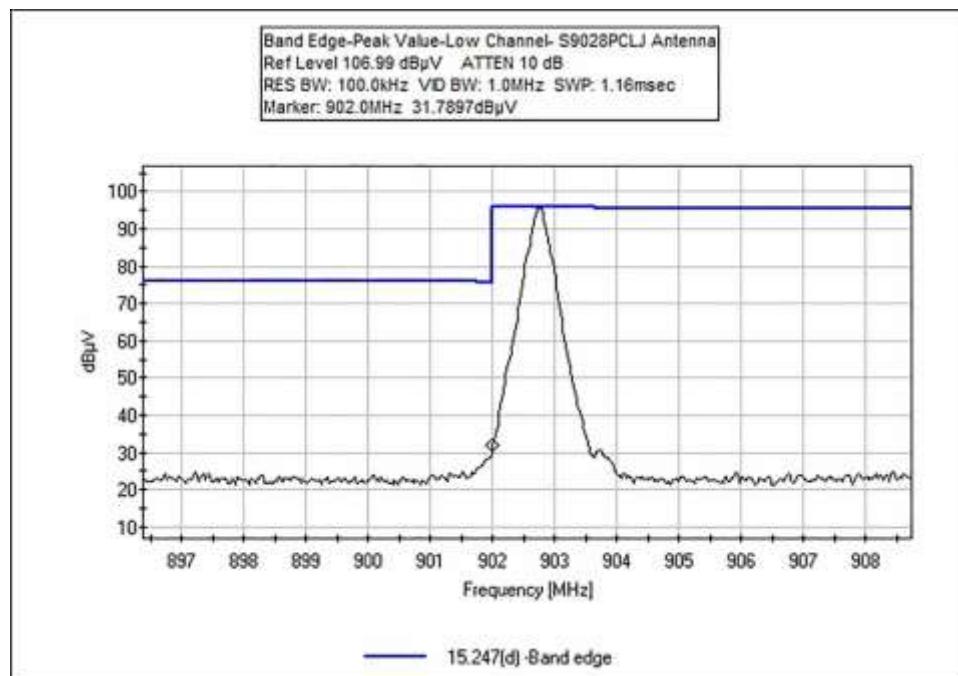


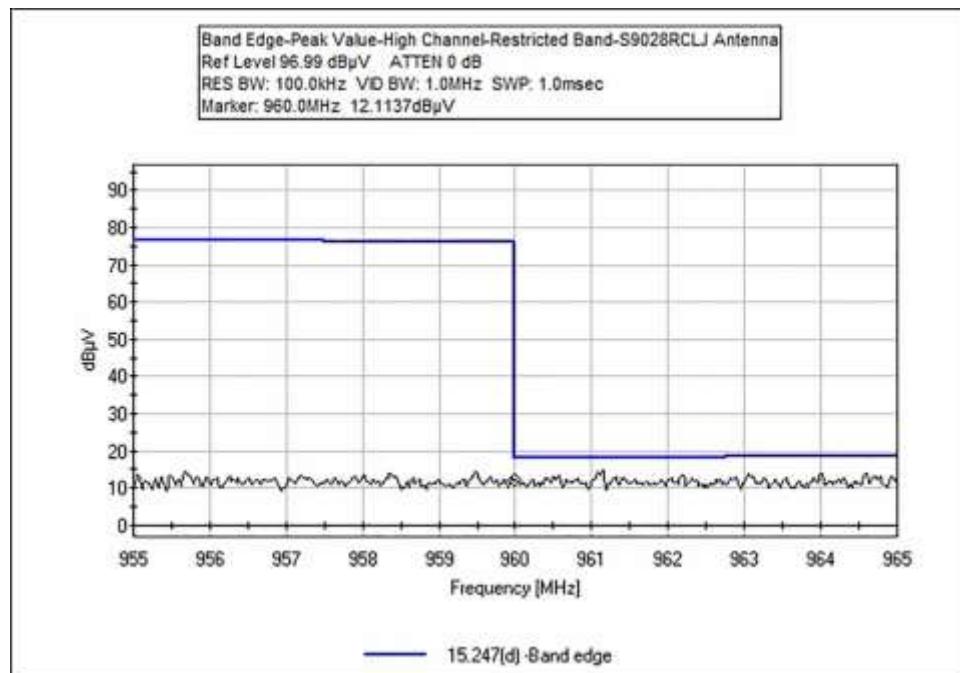
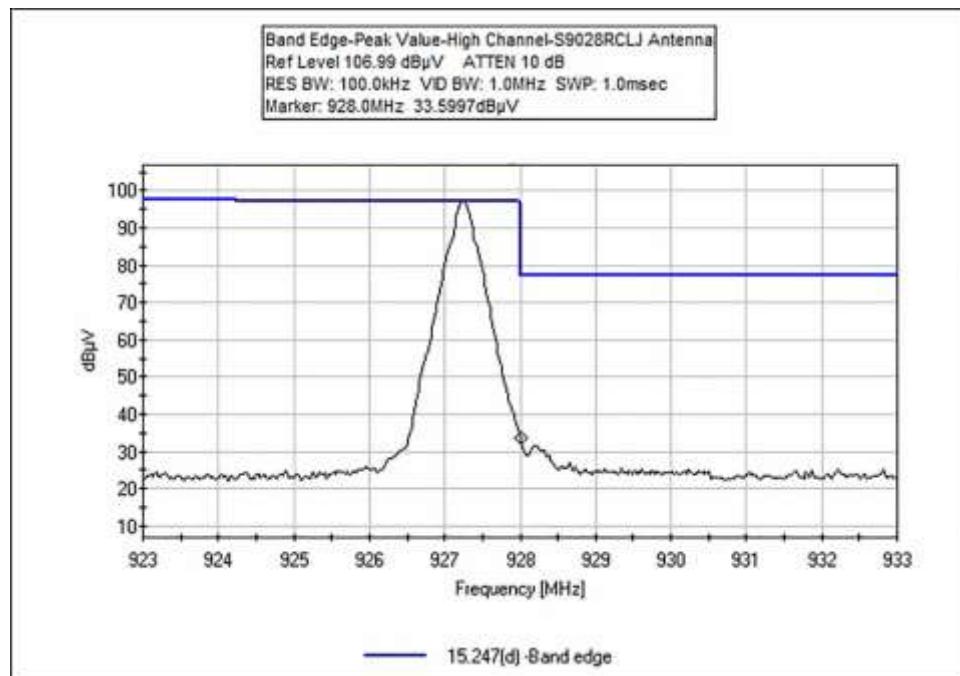


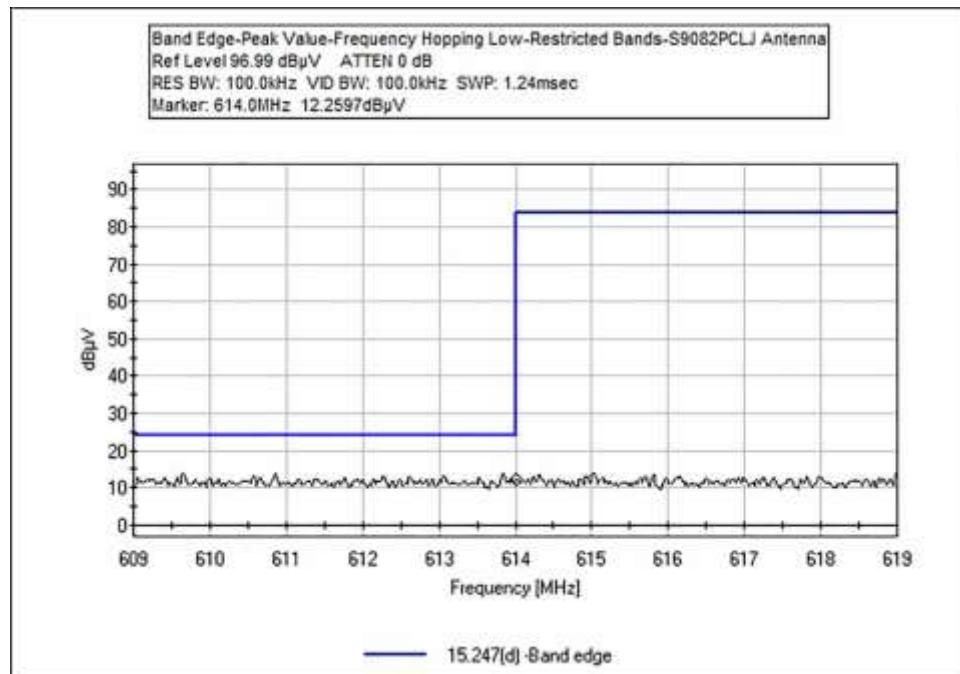
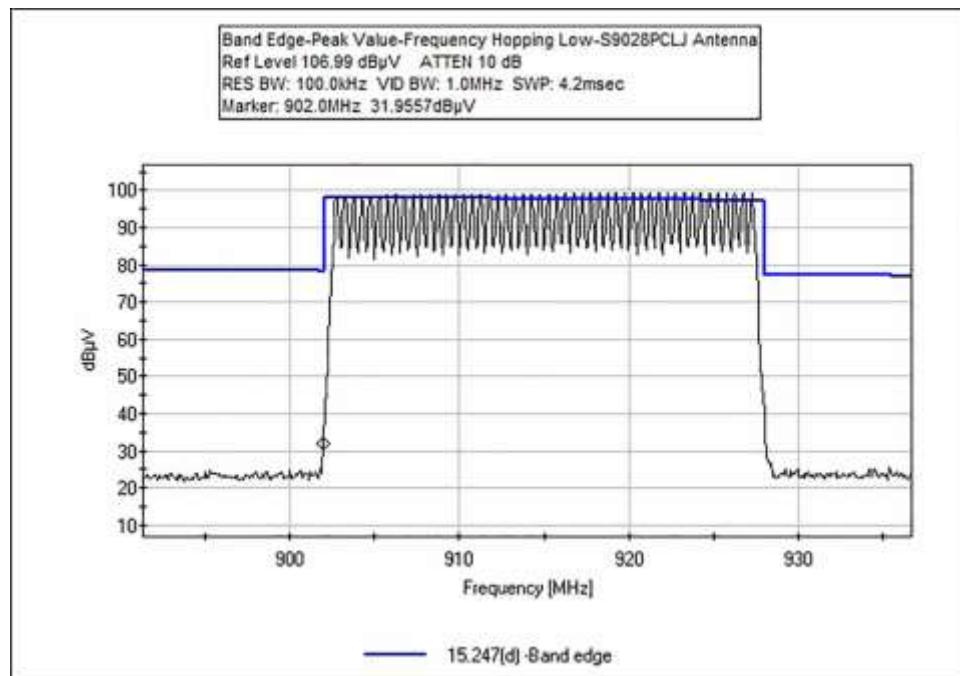


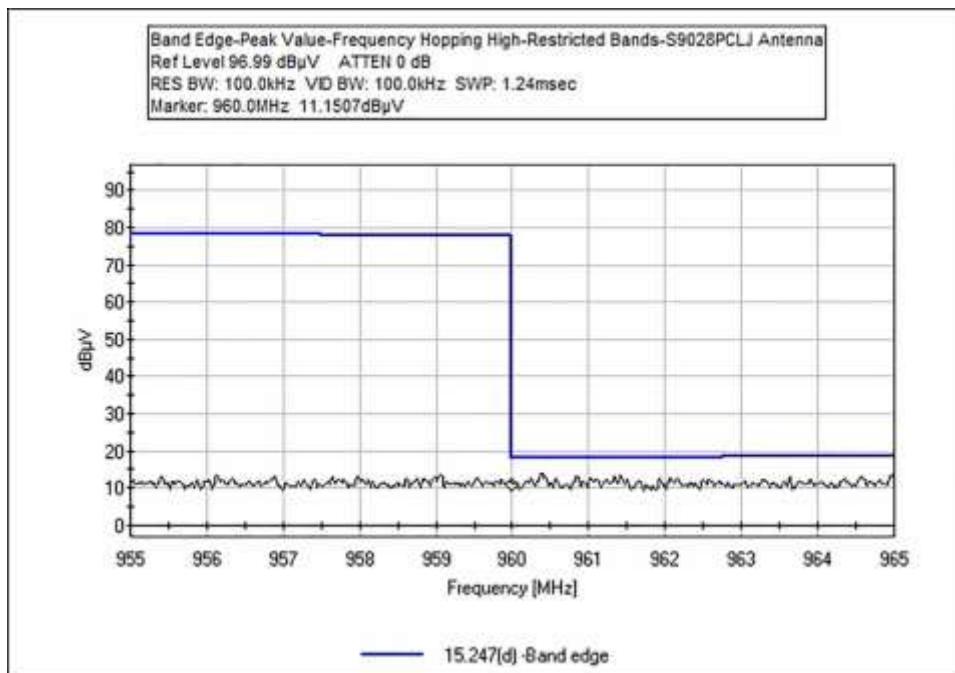
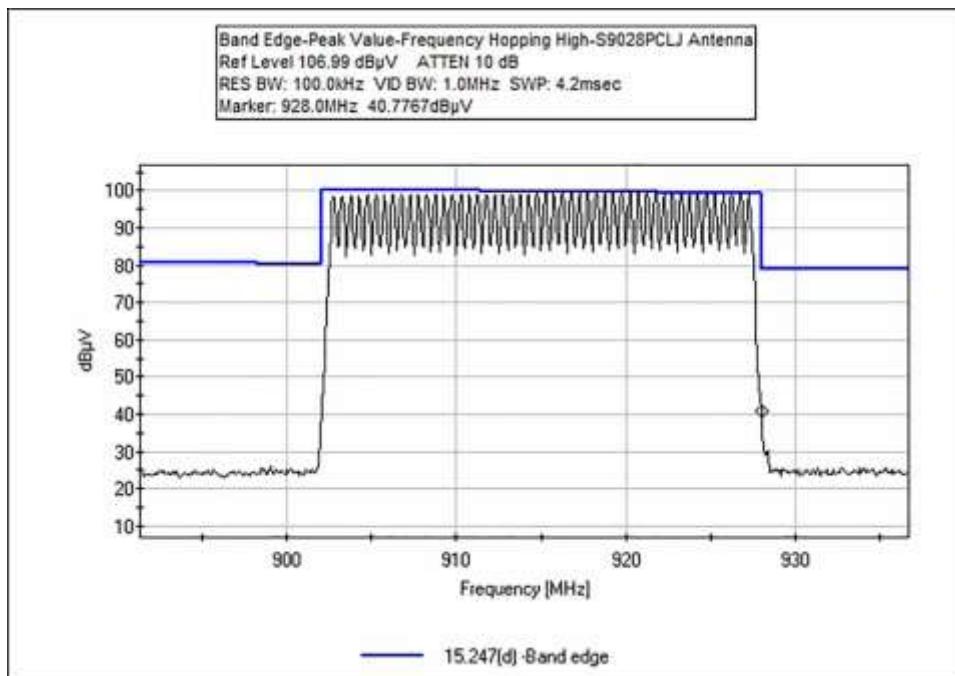


### S9028PCLJ Antenna









## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) -Band edge**  
 Work Order #: **111241** Date: 5/9/2025  
 Test Type: **Radiated Scan** Time: 09:59:26  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: 2  
 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:***

Radiated Band Edge 600MHz-1GHz  Method: ANSI C63.10  Test Environment Conditions: Temperature: 21.5°C Humidity: 48% Pressure: 102.1kPa  Channels: Low/High  Test Mode: Constant modulated transmission on a signal channel  EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a A5010 antenna through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.  Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.  A5010 Antenna
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**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	960.000M	12.1	+1.3	+3.5	+31.0	+0.0	47.9	54.0	-6.1	Horiz
2	960.000M	11.7	+1.3	+3.5	+31.0	+0.0	47.5	54.0	-6.5	Horiz
3	614.000M	11.4	+1.0	+2.6	+26.5	+0.0	41.5	54.0	-12.5	Horiz
4	614.000M	10.7	+1.0	+2.6	+26.5	+0.0	40.8	54.0	-13.2	Horiz
5	928.000M	39.4	+1.3	+3.4	+30.3	+0.0	74.4	113.9	-39.5	Horiz
6	902.000M	36.3	+1.3	+3.3	+29.3	+0.0	70.2	113.9	-43.7	Horiz
7	928.000M	34.4	+1.3	+3.4	+30.3	+0.0	69.4	113.9	-44.5	Horiz
8	902.000M	30.9	+1.3	+3.3	+29.3	+0.0	64.8	113.9	-49.1	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) -Band edge**  
 Work Order #: **111241** Date: **5/9/2025**  
 Test Type: **Radiated Scan** Time: **12:26:43**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham 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:***

Radiated Band Edge 600MHz-1GHz
Method: ANSI C63.10
Test Environment Conditions:
Temperature: 21.5°C
Humidity: 48%
Pressure: 102.1kPa
Channels: Low/High
Test Mode: Constant modulated transmission on a signal channel
EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a A5020 antenna through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injection outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.
Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.
A5020 Antenna

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	960.000M	13.2	+1.3	+3.5	+31.0		+0.0	49.0	54.0	-5.0	Horiz
2	960.000M	11.2	+1.3	+3.5	+31.0		+0.0	47.0	54.0	-7.0	Horiz
3	614.000M	12.1	+1.0	+2.6	+26.5		+0.0	42.2	54.0	-11.8	Horiz
4	614.000M	11.1	+1.0	+2.6	+26.5		+0.0	41.2	54.0	-12.8	Horiz
5	928.000M	29.2	+1.3	+3.4	+30.3		+0.0	64.2	111.1	-46.9	Horiz
6	902.000M	29.5	+1.3	+3.3	+29.3		+0.0	63.4	111.1	-47.7	Horiz
7	928.000M	27.5	+1.3	+3.4	+30.3		+0.0	62.5	111.1	-48.6	Horiz
8	902.000M	27.1	+1.3	+3.3	+29.3		+0.0	61.0	111.1	-50.1	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) -Band edge**  
 Work Order #: **111241** Date: **5/9/2025**  
 Test Type: **Radiated Scan** Time: **15:11:21**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: **4**  
 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:***

Radiated Band Edge 600MHz-1GHz
Method: ANSI C63.10
Test Environment Conditions:
Temperature: 21.5°C
Humidity: 48%
Pressure: 102.1kPa
Channels: Low/High
Test Mode: Constant modulated transmission on a signal channel
EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to an IPJ-A0303-0000M antenna through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.
Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.
IPJ-A0303-0000M Antenna

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	960.000M	14.2	+1.3	+3.5	+31.0		+0.0	50.0	54.0	-4.0	Vert
2	960.000M	12.7	+1.3	+3.5	+31.0		+0.0	48.5	54.0	-5.5	Vert
3	614.000M	11.9	+1.0	+2.6	+26.5		+0.0	42.0	54.0	-12.0	Vert
4	614.000M	11.0	+1.0	+2.6	+26.5		+0.0	41.1	54.0	-12.9	Vert
5	902.000M	19.6	+1.3	+3.3	+29.3		+0.0	53.5	88.8	-35.3	Vert
6	928.000M	14.4	+1.3	+3.4	+30.3		+0.0	49.4	88.8	-39.4	Vert
7	902.000M	14.6	+1.3	+3.3	+29.3		+0.0	48.5	88.8	-40.3	Vert
8	928.000M	11.5	+1.3	+3.4	+30.3		+0.0	46.5	88.8	-42.3	Vert

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) -Band edge**  
 Work Order #: **111241** Date: **5/9/2025**  
 Test Type: **Radiated Scan** Time: **16:41:47**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: **5**  
 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:***

Radiated Band Edge 600MHz-1GHz
Method: ANSI C63.10
Test Environment Conditions:
Temperature: 21.5°C
Humidity: 48%
Pressure: 102.1kPa
Channels: Low/High
Test Mode: Constant modulated transmission on a signal channel
EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to an Matchbox Antenna through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injection outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.
Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.
Matchbox Antenna

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T1	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T2	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T3	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	960.000M	10.0	+1.3	+3.5	+31.0		+0.0	45.8	54.0	-8.2	Horiz
2	960.000M	9.0	+1.3	+3.5	+31.0		+0.0	44.8	54.0	-9.2	Horiz
3	614.000M	13.1	+1.0	+2.6	+26.5		+0.0	43.2	54.0	-10.8	Horiz
4	614.000M	12.5	+1.0	+2.6	+26.5		+0.0	42.6	54.0	-11.4	Horiz
5	928.000M	22.9	+1.3	+3.4	+30.3		+0.0	57.9	101.9	-44.0	Horiz
6	928.000M	22.8	+1.3	+3.4	+30.3		+0.0	57.8	101.9	-44.1	Horiz
7	902.000M	21.3	+1.3	+3.3	+29.3		+0.0	55.2	101.9	-46.7	Horiz
8	902.000M	19.7	+1.3	+3.3	+29.3		+0.0	53.6	101.9	-48.3	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.247(d) -Band edge**  
 Work Order #: **111241** Date: **5/8/2025**  
 Test Type: **Radiated Scan** Time: **17:06:01**  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: **1**  
 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:***

Radiated Band Edge 600MHz-1GHz
Method: ANSI C63.10
Test Environment Conditions:
Temperature: 21.5°C
Humidity: 48%
Pressure: 102.1kPa
Channels: Low/High
Test Mode: Constant modulated transmission on a signal channel
EUT is placed on an 80cm foam support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmission frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector outside of the chamber providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.
Horizontal and Vertical polarities investigated. Worst case reported. All readings maximized.
S9028PCLJ Antenna

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03470	Spectrum Analyzer	E4440A	8/2/2023	8/2/2025
T2	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T3	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T4	AN01995	Biconilog Antenna	CBL6111C	5/16/2024	5/16/2026

**Measurement Data:**

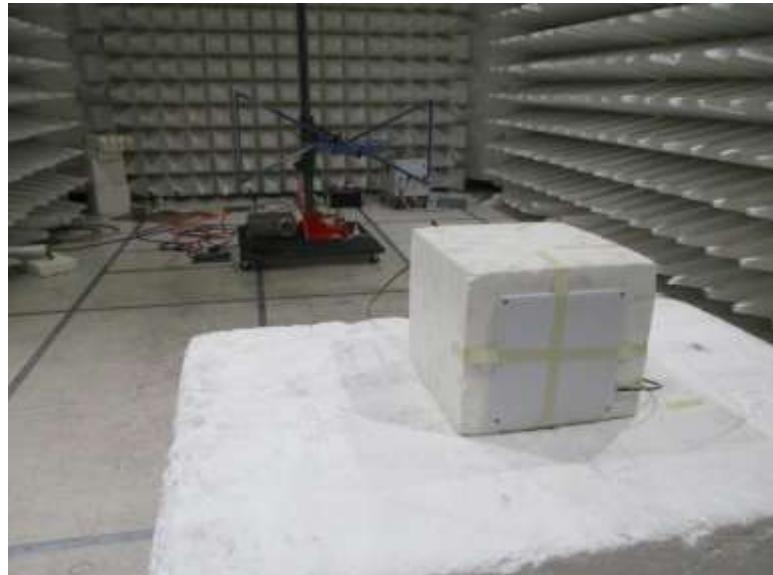
Reading listed by margin.

Test Distance: 3 Meters

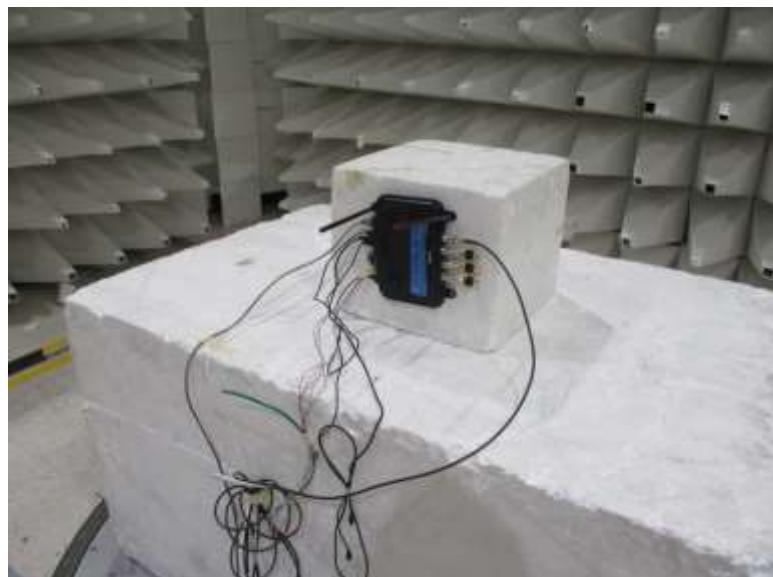
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	960.000M	12.1	+1.3	+3.5	+31.0		+0.0	47.9	54.0	-6.1	Vert
2	960.000M	11.0	+1.3	+3.5	+31.0		+0.0	46.8	54.0	-7.2	Vert
3	614.000M	14.6	+1.0	+2.6	+26.5		+0.0	44.7	54.0	-9.3	Vert
4	614.000M	12.3	+1.0	+2.6	+26.5		+0.0	42.4	54.0	-11.6	Vert
5	928.000M	40.7	+1.3	+3.4	+30.3		+0.0	75.7	114.2	-38.5	Vert
6	928.000M	33.0	+1.3	+3.4	+30.3		+0.0	68.0	114.2	-46.2	Vert
7	902.000M	31.9	+1.3	+3.3	+29.3		+0.0	65.8	114.2	-48.4	Vert
8	902.000M	31.8	+1.3	+3.3	+29.3		+0.0	65.7	114.2	-48.5	Vert

**Test Setup Photo(s)**

**A5010 Antenna**

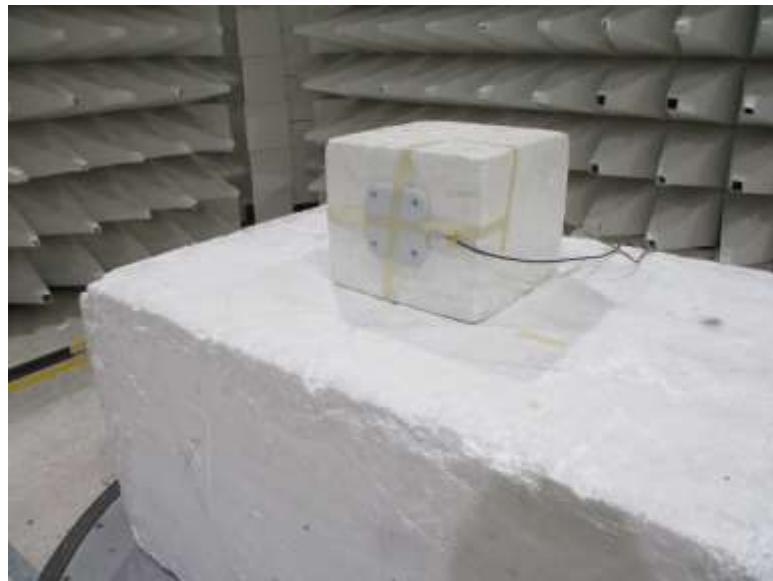


Test Setup, View 1

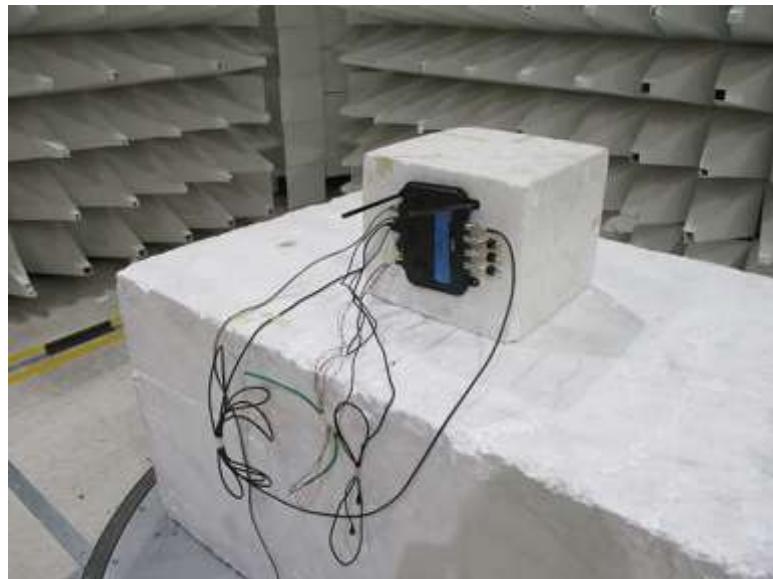


Test Setup, View 2

**A5020 Antenna**

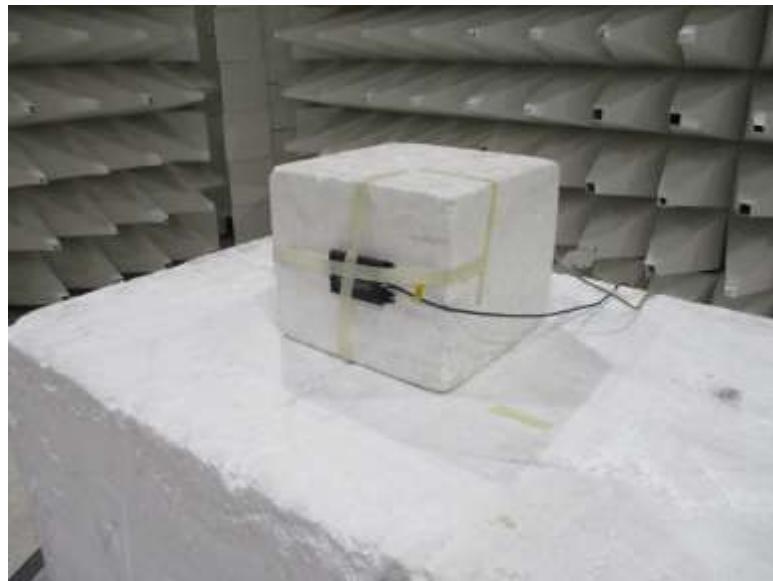


Test Setup, View 1

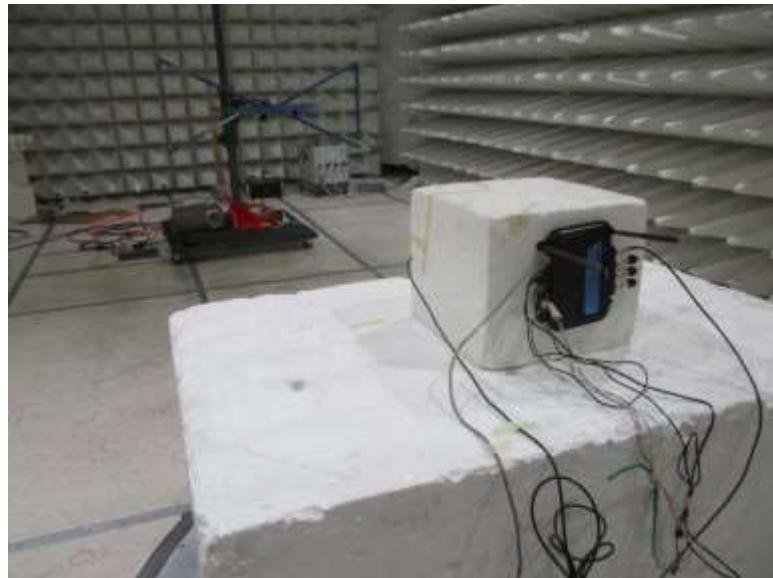


Test Setup, View 2

**IPJ-A0303-0000M Antenna**

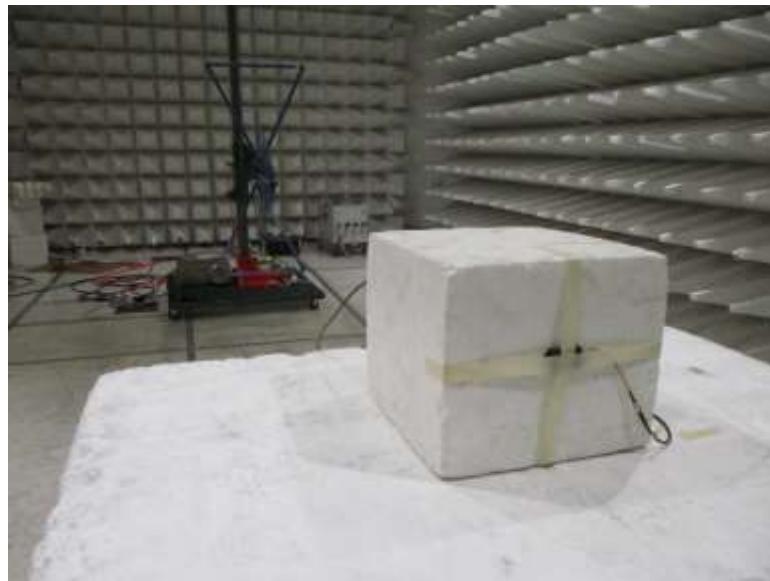


Test Setup, View 1

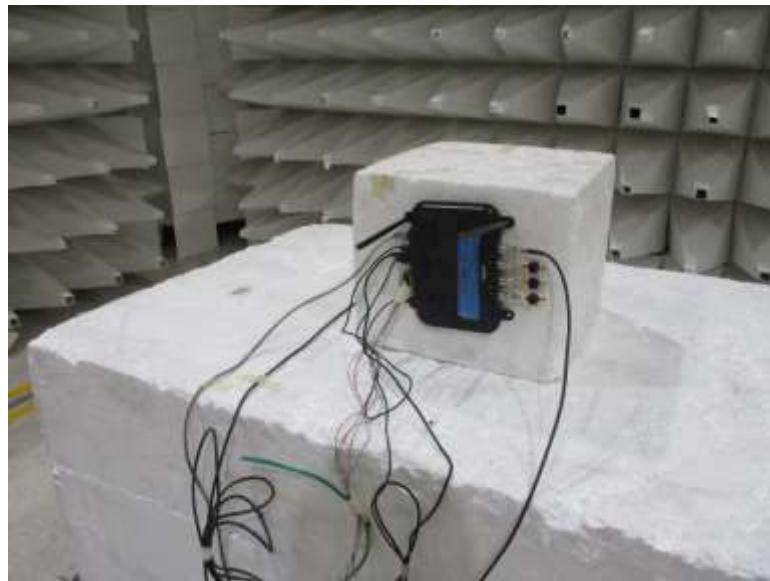


Test Setup, View 2

**Matchbox Antenna**



Test Setup, View 1



Test Setup, View 2

**S9028PCLJ Antenna**

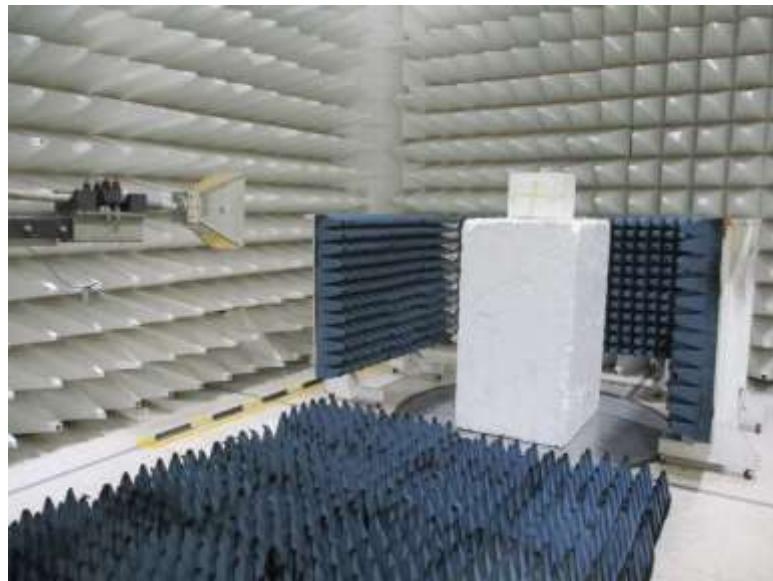


Test Setup, View 1

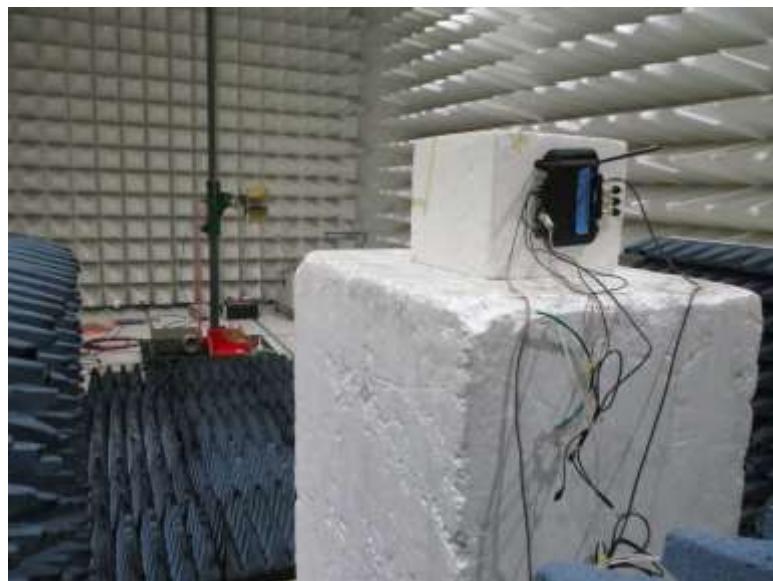


Test Setup, View 2

**Intentional FCC 1GHz-10GHz**



Test Setup, View 1



Test Setup, View 2

## 15.207 AC Conducted Emissions

### Test Setup/Conditions

Test Location:	Fremont Chamber 3	Test Engineer:	Jonathan Wharton
Test Method:	ANSI C63.10 (2020)	Test Date(s):	5/19/2025
Configuration:	1		

### Environmental Conditions

Temperature (°C)	22.8	Relative Humidity (%):	43
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### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Impinj Inc.**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **111241** Date: 5/19/2025  
 Test Type: **Conducted Emissions** Time: 18:42:01  
 Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: 5  
 Software: EMITest 5.03.20 120V 60Hz

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Conducted Emissions  
 Frequency Range: 150kHz-30MHz

Method: ANSI C63.10

Test Environment Conditions:

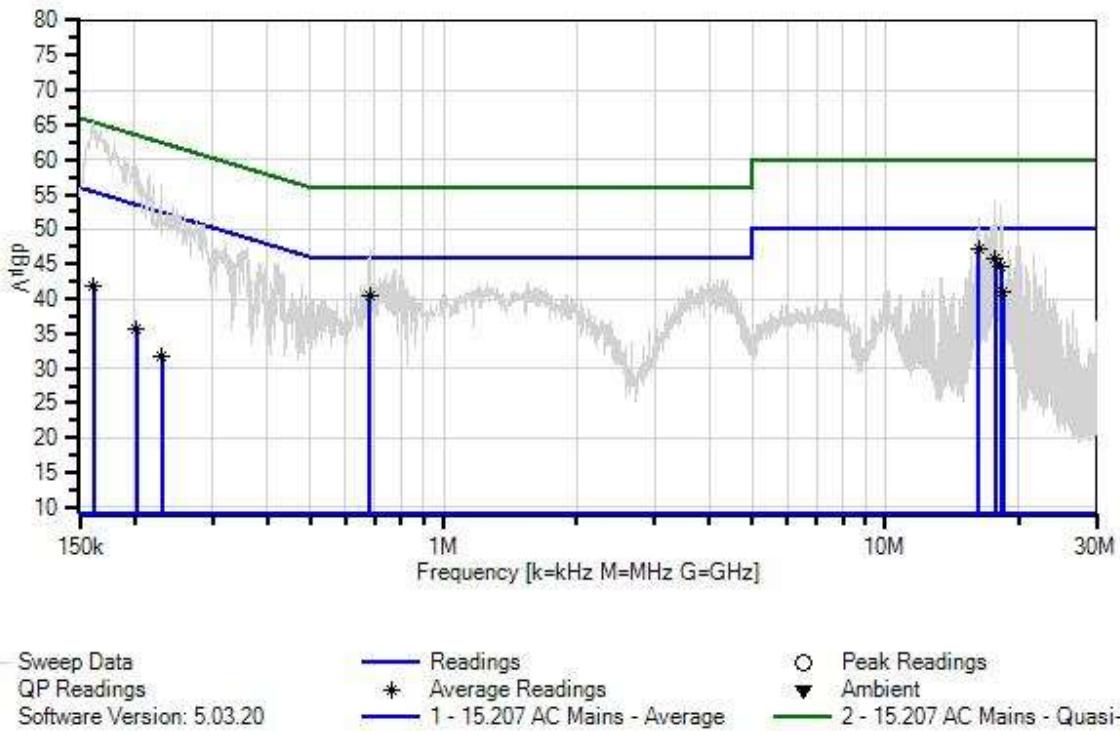
Temperature: 22.8°C

Humidity: 43%

Pressure: 101.8kPa

Test Mode: Frequency Hopping (Normal Operation)

EUT is placed on an 80cm support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.

Impinj Inc. WO#: 111241 Sequence#: 5 Date: 5/19/2025  
 15.207 AC Mains - Average Test Lead: 120V 60Hz Power High

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027
T1	ANP05258	High Pass Filter	HE9615-150K-50-720B	5/6/2024	5/6/2026
T2	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T3	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T4	ANP01211	Attenuator	23-10-34	12/2/2024	12/2/2026
T5	AN03808	50uH LISN-L1-Amplitude (dB)	NNLK 8130	10/4/2024	10/4/2026
	AN03808	50uH LISN-N-Amplitude (dB)	NNLK 8130	10/4/2024	10/4/2026

<b>Measurement Data:</b>			Reading listed by margin.				Test Lead: Power High				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar
1	16.229M Ave	36.1 +0.6	+0.1	+0.1	+0.4	+9.9	+0.0	47.2	50.0	-2.8	Power
^	16.229M	40.3 +0.6	+0.1	+0.1	+0.4	+9.9	+0.0	51.4	50.0	+1.4	Power
3	17.697M Ave	34.6 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	45.8	50.0	-4.2	Power
^	17.697M	42.7 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	53.9	50.0	+3.9	Power
5	18.247M Ave	33.4 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	44.6	50.0	-5.4	Power
^	18.247M	42.2 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	53.4	50.0	+3.4	Power
7	680.133k Ave	30.2 +0.1	+0.2	+0.0	+0.1	+9.8	+0.0	40.4	46.0	-5.6	Power
^	680.133k	37.1 +0.1	+0.2	+0.0	+0.1	+9.8	+0.0	47.3	46.0	+1.3	Power
9	18.490M Ave	29.9 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	41.1	50.0	-8.9	Power
^	18.490M	37.8 +0.7	+0.1	+0.1	+0.4	+9.9	+0.0	49.0	50.0	-1.0	Power
11	161.635k Ave	31.5 +0.1	+0.4	+0.0	+0.1	+9.7	+0.0	41.8	55.4	-13.6	Power
^	161.635k	55.1 +0.1	+0.4	+0.0	+0.1	+9.7	+0.0	65.4	55.4	+10.0	Power
13	201.632k Ave	25.5 +0.1	+0.1	+0.0	+0.1	+9.8	+0.0	35.6	53.5	-17.9	Power
^	201.631k	49.1 +0.1	+0.1	+0.0	+0.1	+9.8	+0.0	59.2	53.5	+5.7	Power
15	229.993k Ave	21.5 +0.1	+0.1	+0.0	+0.1	+9.8	+0.0	31.6	52.4	-20.8	Power
^	229.992k	46.1 +0.1	+0.1	+0.0	+0.1	+9.8	+0.0	56.2	52.4	+3.8	Power



Test Location: CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont, CA 94539 • (510) 249-1170  
Customer: **Impinj Inc.**  
Specification: **15.207 AC Mains - Average**  
Work Order #: **111241** Date: 5/19/2025  
Test Type: **Conducted Emissions** Time: 18:49:49  
Tested By: Jonathan Wharton/Hieu Nguyenpham Sequence#: 6  
Software: EMITest 5.03.20 120V 60Hz

***Equipment Tested:***

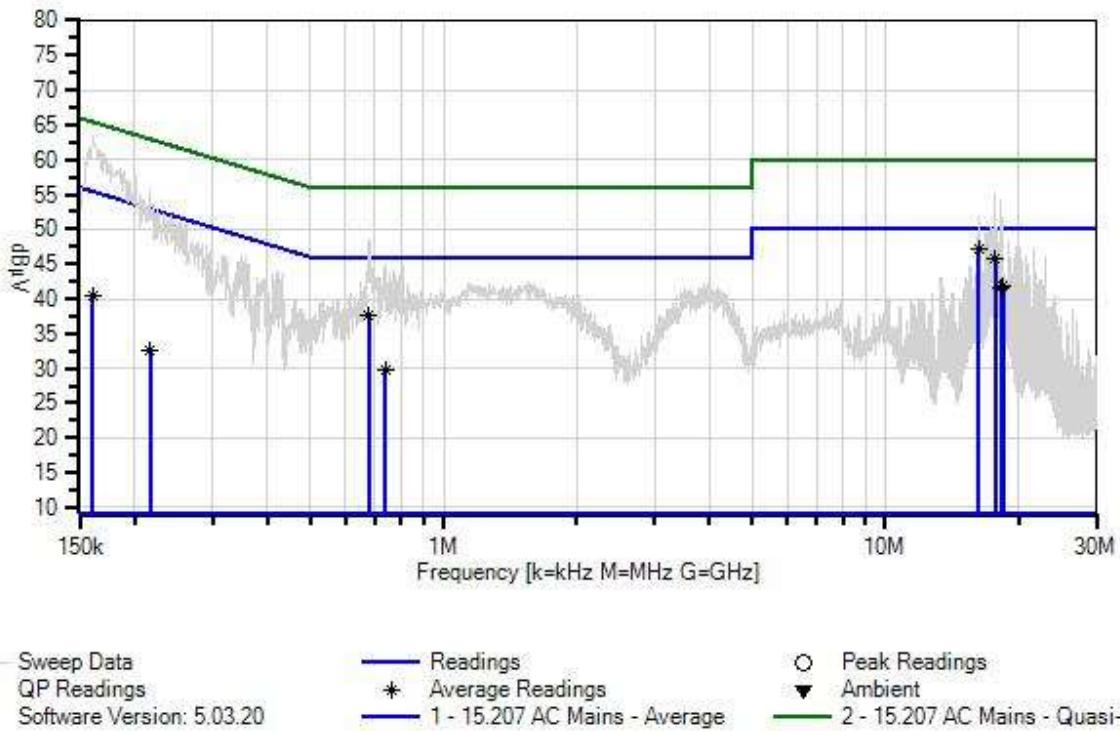
Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Conducted Emissions
Frequency Range: 150kHz-30MHz
Method: ANSI C63.10
Test Environment Conditions:
Temperature: 22.8°C
Humidity: 43%
Pressure: 101.8kPa
Test Mode: Frequency Hopping (Normal Operation)
EUT is placed on an 80cm support. EUT and antenna are fixed to the side of a non-conductive block to simulate orientation in final setup. All ports on the EUT have been terminated with the exception of antenna port 1, which is connected to a S9028PCLJ antenna (deemed worst case gain) through an antenna cable with a known 3dB of loss at transmissions frequencies. EUT is connected via an unshielded Ethernet cable to a POE injector providing 56VDC. The POE injector is connected to a network switch, which is fed by a support laptop running ItemTest software to control the output of the EUT.

Impinj Inc. WO#: 111241 Sequence#: 6 Date: 5/19/2025  
 15.207 AC Mains - Average Test Lead: 120V 60Hz Power Return

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02660	Spectrum Analyzer	E4446A	1/7/2025	1/7/2027
T1	ANP05258	High Pass Filter	HE9615-150K-50-720B	5/6/2024	5/6/2026
T2	ANP06691	Cable	PE3062-180	3/20/2024	3/20/2026
T3	ANP00880	Cable	RG214U	3/26/2024	3/26/2026
T4	ANP01211	Attenuator	23-10-34	12/2/2024	12/2/2026
	AN03808	50uH LISN-L1-Amplitude (dB)	NNLK 8130	10/4/2024	10/4/2026
T5	AN03808	50uH LISN-N-Amplitude (dB)	NNLK 8130	10/4/2024	10/4/2026

<b>Measurement Data:</b>			Reading listed by margin.				Test Lead: Power Return				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5				Table	dB $\mu$ V	dB $\mu$ V		
			MHz	dB $\mu$ V	dB	dB	dB	Table	dB $\mu$ V	dB	Ant
1	16.229M	36.0	+0.1	+0.1	+0.4	+9.9	+0.0	47.1	50.0	-2.9	Power
	Ave		+0.6								
^	16.229M	40.6	+0.1	+0.1	+0.4	+9.9	+0.0	51.7	50.0	+1.7	Power
			+0.6								
3	17.697M	34.7	+0.1	+0.1	+0.4	+9.9	+0.0	45.9	50.0	-4.1	Power
	Ave		+0.7								
^	17.697M	43.9	+0.1	+0.1	+0.4	+9.9	+0.0	55.1	50.0	+5.1	Power
			+0.7								
5	18.490M	30.6	+0.1	+0.1	+0.4	+9.9	+0.0	41.8	50.0	-8.2	Power
	Ave		+0.7								
^	18.490M	37.8	+0.1	+0.1	+0.4	+9.9	+0.0	49.0	50.0	-1.0	Power
			+0.7								
7	678.678k	27.4	+0.2	+0.0	+0.1	+9.8	+0.0	37.6	46.0	-8.4	Power
	Ave		+0.1								
^	678.677k	38.2	+0.2	+0.0	+0.1	+9.8	+0.0	48.4	46.0	+2.4	Power
			+0.1								
9	18.238M	30.3	+0.1	+0.1	+0.4	+9.9	+0.0	41.5	50.0	-8.5	Power
	Ave		+0.7								
^	18.238M	42.9	+0.1	+0.1	+0.4	+9.9	+0.0	54.1	50.0	+4.1	Power
			+0.7								
11	160.907k	30.2	+0.4	+0.0	+0.1	+9.7	+0.0	40.5	55.4	-14.9	Power
	Ave		+0.1								
^	160.907k	53.2	+0.4	+0.0	+0.1	+9.7	+0.0	63.5	55.4	+8.1	Power
			+0.1								
13	737.581k	19.5	+0.2	+0.0	+0.1	+9.8	+0.0	29.7	46.0	-16.3	Power
	Ave		+0.1								
^	737.581k	34.9	+0.2	+0.0	+0.1	+9.8	+0.0	45.1	46.0	-0.9	Power
			+0.1								
15	216.902k	22.4	+0.1	+0.0	+0.1	+9.8	+0.0	32.5	52.9	-20.4	Power
	Ave		+0.1								
^	216.901k	45.6	+0.1	+0.0	+0.1	+9.8	+0.0	55.7	52.9	+2.8	Power
			+0.1								

**Test Setup Photo(s)**



Test Setup, View 1



Test Setup, View 2

## Supplemental Information

### Measurement Uncertainty

Uncertainty Value	Parameter
5.77 dB	Radiated Emissions
0.673 dB	RF Conducted Measurements
$5.77 \times 10^{-10}$	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  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  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	( $\text{dB}\mu\text{V}$ )
+ Antenna Factor	( $\text{dB}/\text{m}$ )
+ Cable Loss	( $\text{dB}$ )
- Distance Correction	( $\text{dB}$ )
- Preamplifier Gain	( $\text{dB}$ )
= Corrected Reading	( $\text{dB}\mu\text{V}/\text{m}$ )

## 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\***