Impinj Inc.

ADDENDUM TO TEST REPORT 95794-4

xArray
Model: IPJ-REV-R680-USA

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s) 15.207 & 15.247

Report No.: 95794-4A

Date of issue: July 9, 2014

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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 EMC 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.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Impinj Inc.
701 N. 34th Street, Suite 300
Seattle, WA 98103

Representative: John Moran
Customer Reference Number: 116099-1

REPORT PREPARED BY:

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

Project Number: 95794

DATE OF EQUIPMENT RECEIPT: May 9, 2014

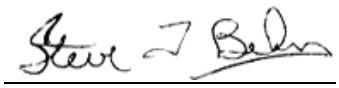
DATE(S) OF TESTING: May 9- June 17, 2014

Revision History

Original: Testing of the xArray, IPJ-REV-R680-USA to 15.207 & 15.247.
Addendum A: To add a Conducted Hopping Band Edge plot to section 15.247(d) and to correct the Average Time of Occupancy statement that's under the Figure 5 plot in section 15.247(a)(1)(i).

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment 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.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C § 15.207 & 15.247

Test Procedure/Method	Description	Modifications*	Results
15.207 / ANSI C63.4 / FHSS – DA00-705	Conducted Emissions	NA	Pass
15.247(a)(1)(i) / FHSS – DA00-705	-20dB Occupied Bandwidth	NA	Pass
15.247(a)(1)(i) / FHSS – DA00-705	Average Time of Occupancy	NA	Pass
15.247(b)(2) / FHSS – DA00-705	RF Power Output	NA	Pass
15.247(d) / FHSS – DA00-705	Conducted Spurious Emissions and Band edge	NA	Pass
15.247(d) / FHSS – DA00-705	Radiated Spurious Emissions and Band edge	NA	Pass

Modifications*/Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
Note: There are two modes for powering the EUT; POE & Brick (Switching adaptor). All testing has a set of data for each mode except 15.247(d) Conducted and Radiated Spurious Emissions / Band edge testing only has one set of data taken in the worst case configuration.
No modifications were done during testing.

***Modifications listed above must be incorporated into all production units.**

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Switching Adaptor
Manuf: CUI Inc.
Model: DSA-60W-20 1 24060
Serial: NA

Speedway Revolution
Manuf: Impinj Inc.
Model: IPJ-R220
Serial: 37013050366

PoE Switch
Manuf: D-Link
Model: DES-1008PA
Serial: F3GR187000462

xArray
Manuf: Impinj Inc.
Model: IPJ-REV-R680-USA
Serial: 40314150059

ITE Power Supply
Manuf: D-Link
Model: VAN90C-480B
Serial: 13093600198-0D

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Firewall Router
Manuf: Linksys
Model: BEFSX41
Serial: CB900E900020

POE
Manuf: Netgear
Model: FS726TP
Serial: NA
FCC ID: 1DA5895Y0031B

ITE Power Supply
Manuf: D-Link
Model: VAN90C-480B
Serial: 13093600198-0D

Laptop
Manuf: Lenovo
Model: ThinkPad X61S
Serial: NA

Switching Adaptor
Manuf: CUI Inc.
Model: DSA-60W-20 1 24060
Serial: NA

PoE Switch
Manuf: D-Link
Model: DES-1008PA
Serial: F3GR187000462

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.207 AC Mains - Average**
Work Order #: **95794** Date: 6/16/2014
Test Type: **Conducted Emissions** Time: 12:49:08 PM
Equipment: **xArray** Sequence#: 1
Manufacturer: Impinj Inc. Tested By: Steven Pittsford
Model: IPJ-REV-R680-USA 120V 60Hz
S/N: 40314150059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA
xArray*	Impinj Inc.	IPJ-REV-R680-USA	40314150059
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is in normal operation.
The EUT is powered by a Switching Adaptor. The EUT is transmitting into its antenna.

Frequency range of measurement = 150k-30MHz
CISPR Bandwidths used

Test method in accordance with FCC document: DA 00-705

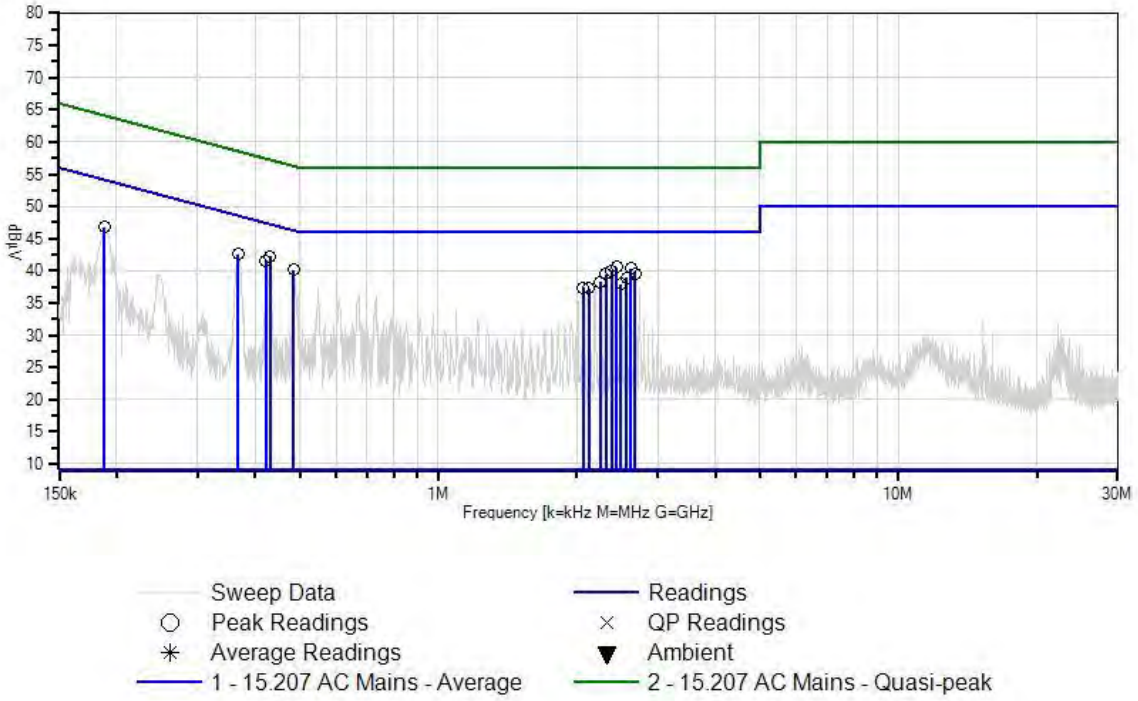
Temperature: 23°C
Pressure: 101.7kPa
Humidity: 38%

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	430.702k	32.4	+9.0 +0.2	+0.0	+0.0	+0.6	+0.0	42.2	47.2	-5.0	Line
2	2.438M	31.0	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	40.6	46.0	-5.4	Line
3	2.621M	30.7	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	40.3	46.0	-5.7	Line
4	422.702k	31.8	+9.0 +0.2	+0.0	+0.0	+0.6	+0.0	41.6	47.4	-5.8	Line
5	367.435k	32.8	+9.0 +0.1	+0.0	+0.0	+0.7	+0.0	42.6	48.6	-6.0	Line
6	2.378M	30.4	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	40.0	46.0	-6.0	Line
7	485.242k	30.4	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	40.1	46.2	-6.1	Line
8	2.680M	30.0	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	39.6	46.0	-6.4	Line
9	2.315M	29.9	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	39.5	46.0	-6.5	Line
10	2.566M	29.3	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	38.9	46.0	-7.1	Line
11	187.815k	36.0	+9.0 +0.3	+0.0	+0.0	+1.5	+0.0	46.8	54.1	-7.3	Line
12	2.251M	28.6	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	38.2	46.0	-7.8	Line
13	2.497M	28.3	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	37.9	46.0	-8.1	Line
14	2.068M	27.8	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	37.4	46.0	-8.6	Line
15	2.128M	27.7	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	37.3	46.0	-8.7	Line

CKC Laboratories, Inc. Date: 6/16/2014 Time: 12:49:08 PM Impinj Inc. WO#: 95794
Test Lead: Line 120V 60Hz Sequence#: 1 Line
Impinj Inc. xArray P/N: IPJ-REV-R680-USA



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.207 AC Mains - Average**
Work Order #: **95794** Date: 6/16/2014
Test Type: **Conducted Emissions** Time: 13:02:20
Equipment: **xArray** Sequence#: 2
Manufacturer: Impinj Inc. Tested By: Steven Pittsford
Model: IPJ-REV-R680-USA 120V 60Hz
S/N: 40314150059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
T4	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA
xArray*	Impinj Inc.	IPJ-REV-R680-USA	40314150059
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is in normal operation.
The EUT is powered by a Switching Adaptor. The EUT is transmitting into its antenna.

Frequency range of measurement = 150k-30MHz
CISPR Bandwidths used

Test method in accordance with FCC document: DA 00-705

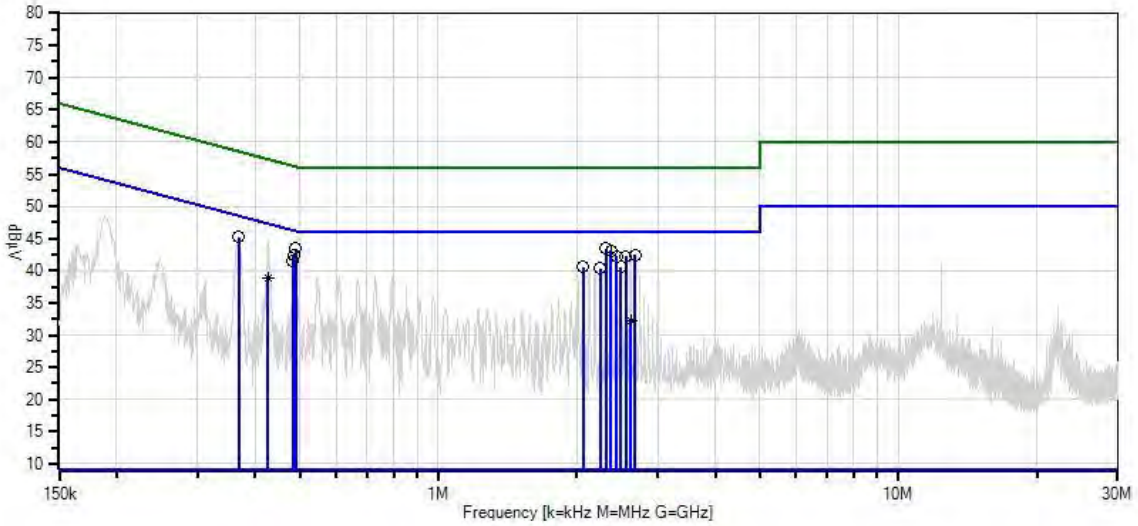
Temperature: 23°C
Pressure: 101.7kPa
Humidity: 38%

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	2.315M	33.9	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	43.4	46.0	-2.6	Neutr
2	490.332k	33.7	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	43.4	46.2	-2.8	Neutr
3	2.374M	33.6	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	43.1	46.0	-2.9	Neutr
4	368.162k	35.4	+9.0 +0.1	+0.0	+0.0	+0.7	+0.0	45.2	48.5	-3.3	Neutr
5	2.680M	33.0	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	42.5	46.0	-3.5	Neutr
6	2.561M	32.7	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	42.2	46.0	-3.8	Neutr
7	2.438M	32.7	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	42.2	46.0	-3.8	Neutr
8	485.242k	32.6	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	42.3	46.2	-3.9	Neutr
9	483.060k	31.9	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	41.6	46.3	-4.7	Neutr
10	2.068M	31.1	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	40.6	46.0	-5.4	Neutr
11	2.497M	31.1	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	40.6	46.0	-5.4	Neutr
12	2.251M	30.9	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	40.4	46.0	-5.6	Neutr
13	427.065k Ave	29.0	+9.0 +0.2	+0.0	+0.0	+0.6	+0.0	38.8	47.3	-8.5	Neutr
^	427.065k	34.9	+9.0 +0.2	+0.0	+0.0	+0.6	+0.0	44.7	47.3	-2.6	Neutr
^	424.157k	34.3	+9.0 +0.2	+0.0	+0.0	+0.6	+0.0	44.1	47.4	-3.3	Neutr
16	2.621M Ave	22.7	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	32.2	46.0	-13.8	Neutr
^	2.621M	34.5	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	44.0	46.0	-2.0	Neutr

CKC Laboratories, Inc. Date: 6/16/2014 Time: 13:02:20 Impinj Inc. WO#: 95794
Test Lead: Neutral 120V 60Hz Sequence#: 2 Neutral
Impinj Inc. xArray P/N: IPJ-REV-R680-USA



Sweep Data
Peak Readings
Average Readings
1 - 15.207 AC Mains - Average
Readings
QP Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.207 AC Mains - Average**
Work Order #: **95794** Date: 6/17/2014
Test Type: **Conducted Emissions** Time: 11:16:53
Equipment: **xArray** Sequence#: 9
Manufacturer: Impinj Inc. Tested By: Steven Pittsford
Model: IPJ-REV-R680-USA 120V 60Hz
S/N: 40314150059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016
T6	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
xArray*	Impinj Inc.	IPJ-REV-R680-USA	40314150059
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366
ITE Power Supply	D-Link	VAN90C-480B	13093600198-0D
PoE Switch	D-Link	DES-1008PA	F3GR187000462

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is in normal operation.
The EUT is powered by POE. The EUT is transmitting into its antenna.

Frequency range of measurement = 150k-30MHz
CISPR Bandwidths used

Test method in accordance with FCC document: DA 00-705

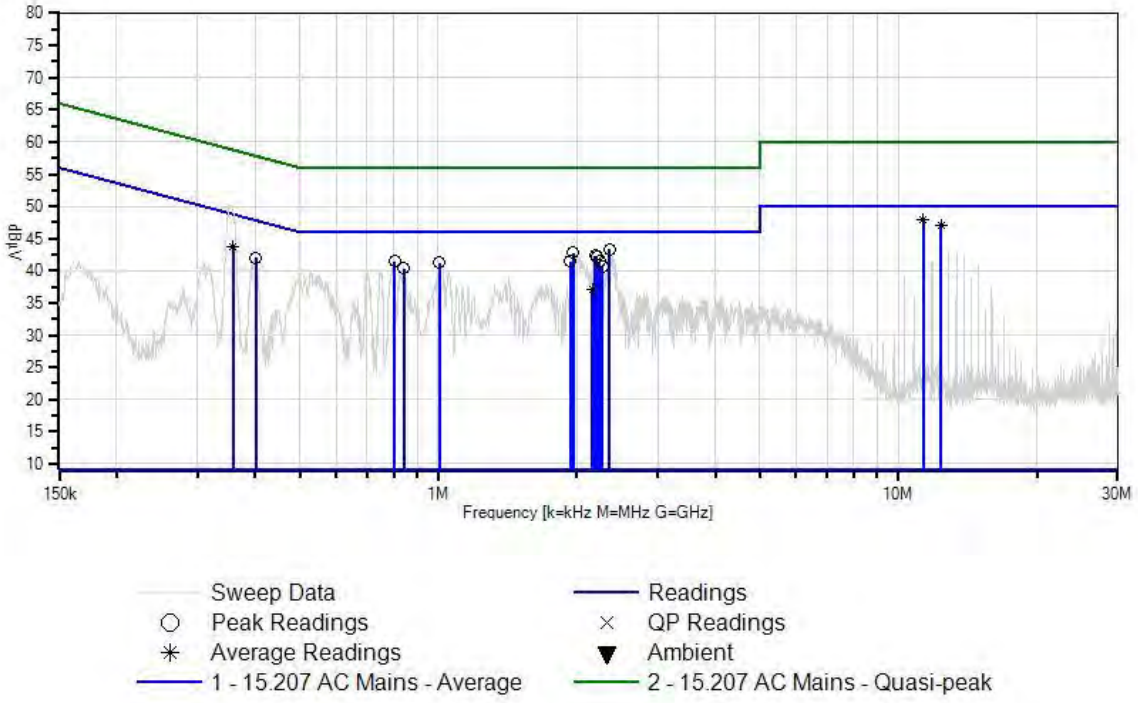
Temperature: 23°C
Pressure: 101.7kPa
Humidity: 38%

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	11.330M	38.1	+9.0	+0.1	+0.1	+0.0	+0.0	47.9	50.0	-2.1	Line
	Ave		+0.1	+0.5							
^	11.328M	39.2	+9.0	+0.1	+0.1	+0.0	+0.0	49.0	50.0	-1.0	Line
			+0.1	+0.5							
3	2.353M	33.7	+9.0	+0.1	+0.0	+0.0	+0.0	43.3	46.0	-2.7	Line
			+0.1	+0.4							
4	12.364M	37.0	+9.0	+0.1	+0.1	+0.0	+0.0	47.0	50.0	-3.0	Line
	Ave		+0.2	+0.6							
^	12.355M	37.7	+9.0	+0.1	+0.1	+0.0	+0.0	47.7	50.0	-2.3	Line
			+0.2	+0.6							
6	1.966M	33.2	+9.0	+0.1	+0.0	+0.0	+0.0	42.8	46.0	-3.2	Line
			+0.1	+0.4							
7	2.191M	32.7	+9.0	+0.1	+0.0	+0.0	+0.0	42.3	46.0	-3.7	Line
			+0.1	+0.4							
8	2.213M	32.5	+9.0	+0.1	+0.0	+0.0	+0.0	42.1	46.0	-3.9	Line
			+0.1	+0.4							
9	1.940M	31.9	+9.0	+0.1	+0.0	+0.0	+0.0	41.5	46.0	-4.5	Line
			+0.1	+0.4							
10	803.031k	31.9	+9.0	+0.0	+0.0	+0.0	+0.0	41.5	46.0	-4.5	Line
			+0.2	+0.4							
11	2.238M	31.9	+9.0	+0.1	+0.0	+0.0	+0.0	41.5	46.0	-4.5	Line
			+0.1	+0.4							
12	1.005M	31.5	+9.0	+0.1	+0.0	+0.0	+0.0	41.2	46.0	-4.8	Line
			+0.2	+0.4							
13	358.519k	33.9	+9.0	+0.0	+0.0	+0.0	+0.0	43.7	48.8	-5.1	Line
	Ave		+0.1	+0.7							
^	353.618k	40.4	+9.0	+0.0	+0.0	+0.0	+0.0	50.2	48.9	+1.3	Line
			+0.1	+0.7							
15	2.272M	31.1	+9.0	+0.1	+0.0	+0.0	+0.0	40.7	46.0	-5.3	Line
			+0.1	+0.4							
16	841.573k	30.8	+9.0	+0.0	+0.0	+0.0	+0.0	40.4	46.0	-5.6	Line
			+0.2	+0.4							
17	400.886k	32.3	+9.0	+0.0	+0.0	+0.0	+0.0	42.0	47.8	-5.8	Line
			+0.1	+0.6							
18	2.162M	27.6	+9.0	+0.1	+0.0	+0.0	+0.0	37.2	46.0	-8.8	Line
	Ave		+0.1	+0.4							
^	2.162M	33.4	+9.0	+0.1	+0.0	+0.0	+0.0	43.0	46.0	-3.0	Line
			+0.1	+0.4							

CKC Laboratories, Inc. Date: 6/17/2014 Time: 11:16:53 Impinj Inc. WO#: 95794
Test Lead: Line 120V 60Hz Sequence#: 9 Line
Impinj Inc. xArray P/N: IPJ-REV-R680-USA



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.207 AC Mains - Average**
Work Order #: **95794** Date: 6/17/2014
Test Type: **Conducted Emissions** Time: 11:13:05
Equipment: **xArray** Sequence#: 10
Manufacturer: Impinj Inc. Tested By: Steven Pittsford
Model: IPJ-REV-R680-USA 120V 60Hz
S/N: 40314150059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T4	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016
	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
T5	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
xArray*	Impinj Inc.	IPJ-REV-R680-USA	40314150059
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366
PoE Switch	D-Link	DES-1008PA	F3GR187000462
ITE Power Supply	D-Link	VAN90C-480B	13093600198-0D

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is in normal operation.
The EUT is powered by POE. The EUT is transmitting into its antenna.

Frequency range of measurement = 150k-30MHz
CISPR Bandwidths used

Test method in accordance with FCC document: DA 00-705

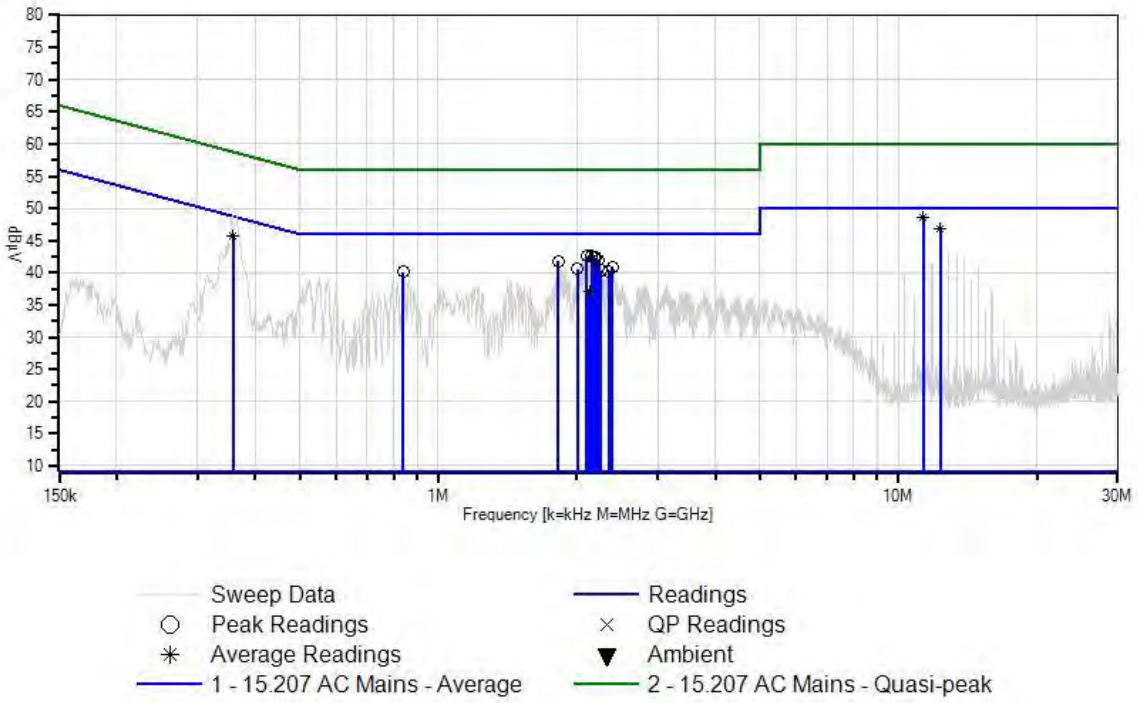
Temperature: 23°C
Pressure: 101.7kPa
Humidity: 38%

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	11.330M	38.7	+9.0	+0.1	+0.1	+0.1	+0.0	48.5	50.0	-1.5	Neutr
	Ave		+0.5								
^	11.328M	39.4	+9.0	+0.1	+0.1	+0.1	+0.0	49.2	50.0	-0.8	Neutr
			+0.5								
3	358.676k	36.0	+9.0	+0.0	+0.0	+0.1	+0.0	45.8	48.8	-3.0	Neutr
	Ave		+0.7								
^	361.617k	40.2	+9.0	+0.0	+0.0	+0.1	+0.0	50.0	48.7	+1.3	Neutr
			+0.7								
5	12.359M	36.8	+9.0	+0.1	+0.1	+0.2	+0.0	46.8	50.0	-3.2	Neutr
	Ave		+0.6								
^	12.364M	37.9	+9.0	+0.1	+0.1	+0.2	+0.0	47.9	50.0	-2.1	Neutr
			+0.6								
7	2.157M	33.2	+9.0	+0.1	+0.0	+0.1	+0.0	42.7	46.0	-3.3	Neutr
			+0.3								
8	2.106M	33.1	+9.0	+0.1	+0.0	+0.1	+0.0	42.6	46.0	-3.4	Neutr
			+0.3								
9	2.187M	32.8	+9.0	+0.1	+0.0	+0.1	+0.0	42.3	46.0	-3.7	Neutr
			+0.3								
10	2.204M	32.8	+9.0	+0.1	+0.0	+0.1	+0.0	42.3	46.0	-3.7	Neutr
			+0.3								
11	2.234M	32.4	+9.0	+0.1	+0.0	+0.1	+0.0	41.9	46.0	-4.1	Neutr
			+0.3								
12	1.821M	32.3	+9.0	+0.1	+0.0	+0.1	+0.0	41.8	46.0	-4.2	Neutr
			+0.3								
13	2.391M	31.4	+9.0	+0.1	+0.0	+0.1	+0.0	40.9	46.0	-5.1	Neutr
			+0.3								
14	2.008M	31.1	+9.0	+0.1	+0.0	+0.1	+0.0	40.6	46.0	-5.4	Neutr
			+0.3								
15	2.259M	30.8	+9.0	+0.1	+0.0	+0.1	+0.0	40.3	46.0	-5.7	Neutr
			+0.3								
16	839.391k	30.5	+9.0	+0.0	+0.0	+0.2	+0.0	40.1	46.0	-5.9	Neutr
			+0.4								
17	2.349M	30.6	+9.0	+0.1	+0.0	+0.1	+0.0	40.1	46.0	-5.9	Neutr
			+0.3								
18	2.132M	27.5	+9.0	+0.1	+0.0	+0.1	+0.0	37.0	46.0	-9.0	Neutr
	Ave		+0.3								
^	2.132M	33.4	+9.0	+0.1	+0.0	+0.1	+0.0	42.9	46.0	-3.1	Neutr
			+0.3								

CKC Laboratories, Inc. Date: 6/17/2014 Time: 11:13:05 Impinj Inc. WO#: 95794
Test Lead: Neutral 120V 60Hz Sequence#: 10 Neutral
Impinj Inc. xArray P/N: IPJ-REV-R680-USA



Test Setup Photos

Switching Adaptor

PoE Switch

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

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **FCC15.247 -20dB Bandwidth**
Work Order #: **95794** Date: 6/16/14
Test Type: **Conducted Emissions** Time: 09:02:21

EUT Information:
Manufacturer: Impinj Inc.
Equipment: xArray
Design Phase: Production Model

Engineer: S. Pittsford
Model #: IPJ-REV-R680-USA
Serial #: 40314150059
Installation: Mobile

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP05748	Attenuator	PE7004-20	4/2/2014	4/2/2016
	ANP06217	Attenuator	768-10	4/7/2014	4/7/2016
	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA
POE	NetGear	FS726TP	1DA5895Y0031B
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Test Conditions / Notes:

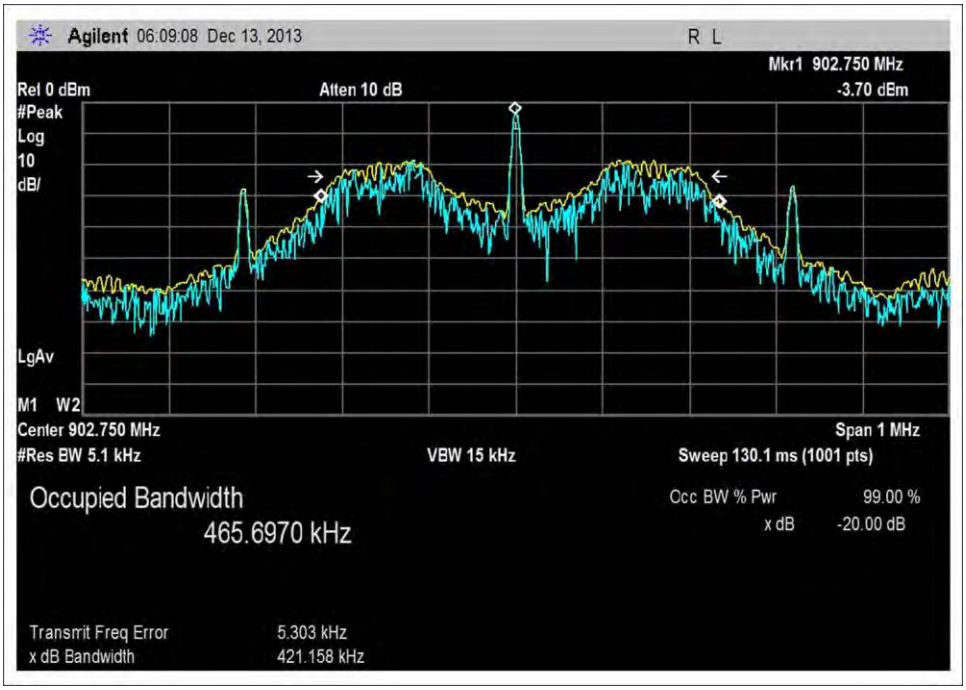
A laptop sends test command to the EUT via an Ethernet cable. The EUT is powered by a Netgear POE Model FS726TP and also using the Switching adaptor.

Frequency: 902-928MHz
Freq: 902.75MHz, 915.25MHz, 927.25MHz
Firmware setting = 31.5dBm, 31.5dBm, 31.5dBm
Test method in accordance with FCC document: DA 00-705

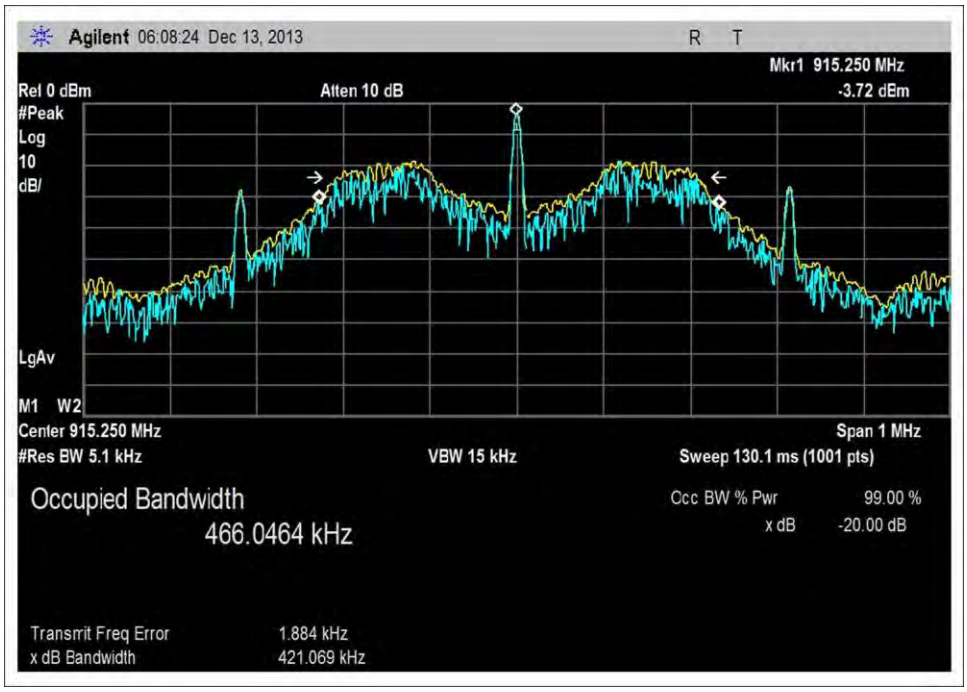
Temperature: 22°C
Pressure: 101.8kPa
Humidity: 40%

Test Data

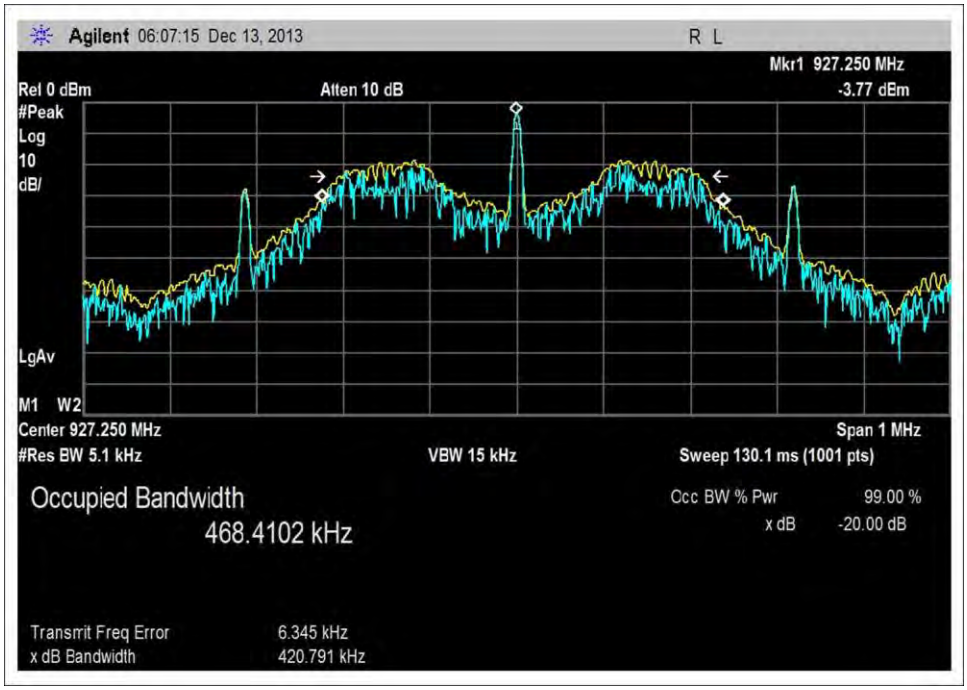
	Low Channel	Mid Channel	High Channel
-20dB OBW with POE	414.0kHz	414.1 kHz	415.5kHz
-20dB OBW with Switching adaptor	421.2kHz	421.1kHz	420.8kHz



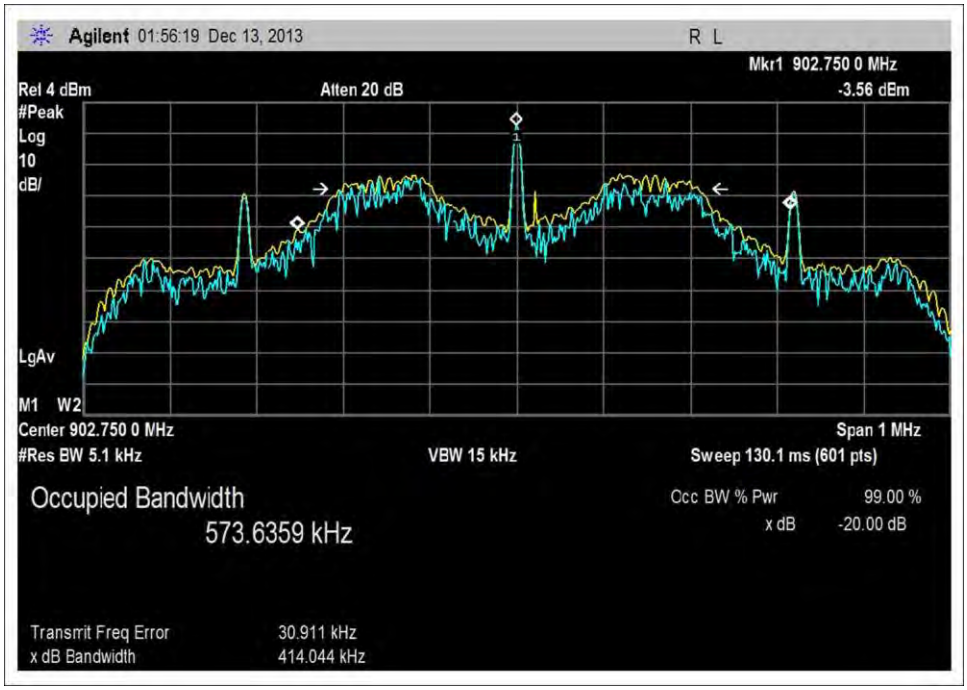
OBW Low Channel, Switching Adaptor



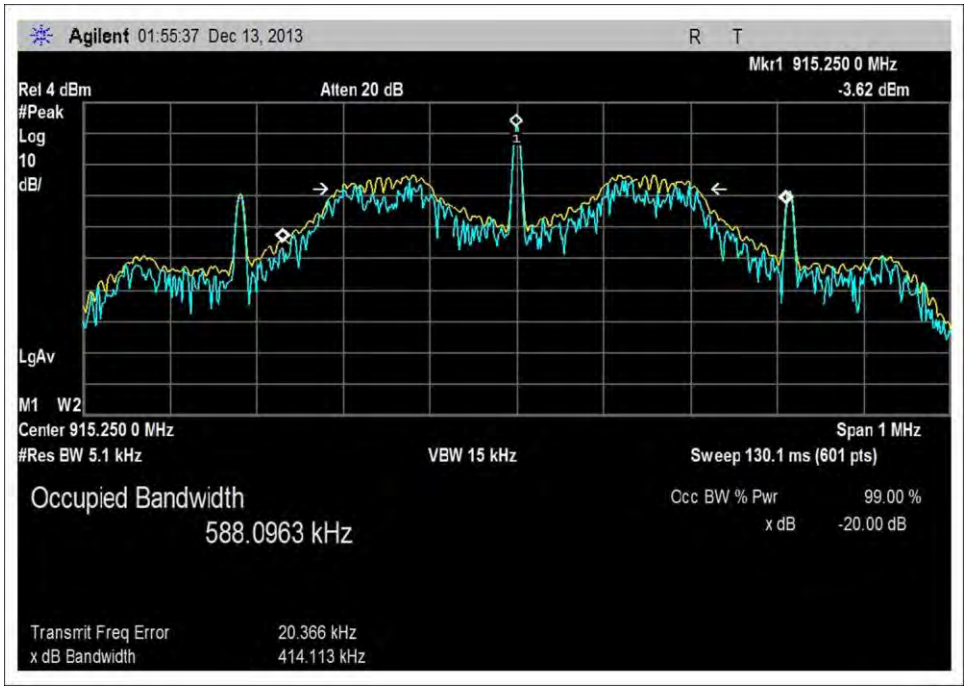
OBW Middle Channel, Switching Adaptor



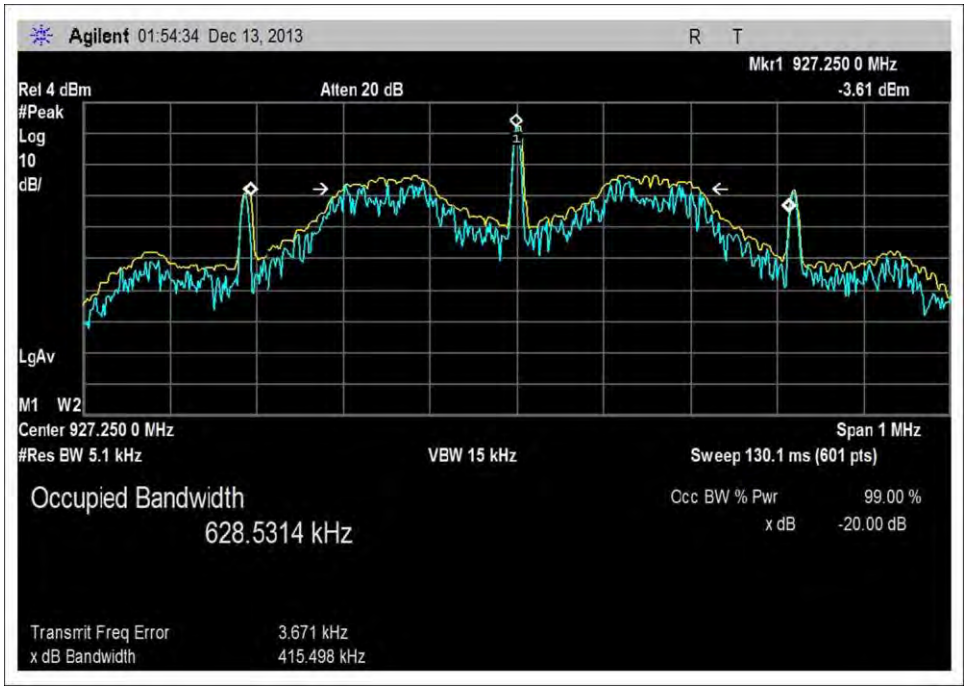
OBW High Channel, Switching Adaptor



OBW Low Channel, PoE Switch

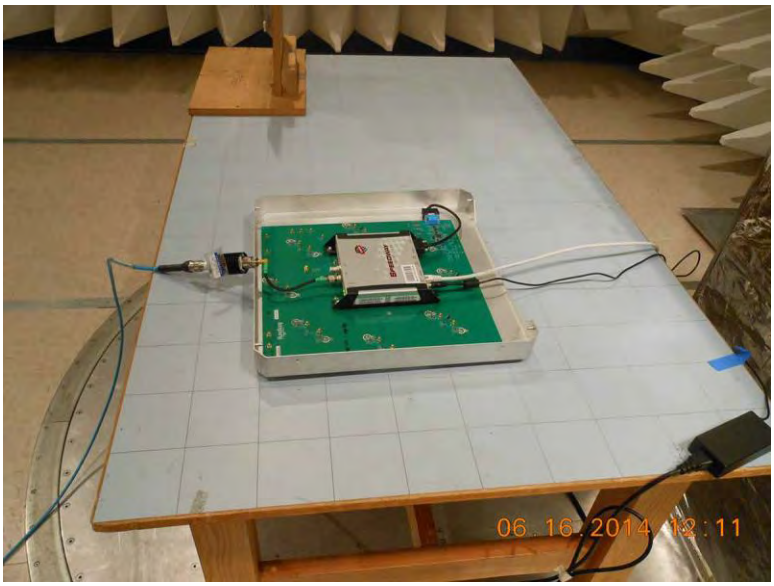


OBW Middle Channel, PoE Switch

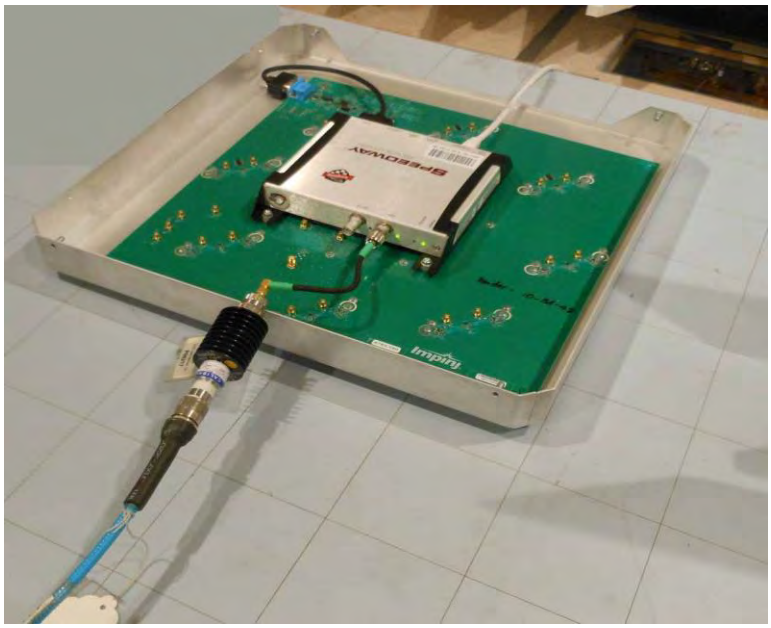


OBW High Channel, PoE Switch

Test Setup Photos



Switching Adaptor



PoE Switch

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

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.247(a)(1)(i)**
Work Order #: **95794**

Date: 6/16/14
Time: 09:02:21

EUT Information:
Manufacturer: Impinj Inc.
Equipment: xArray
Design Phase: Production Model

Engineer: S. Pittsford
Model #: IPJ-REV-R680-USA
Serial #: 40314150059
Installation: Mobile

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP05748	Attenuator	PE7004-20	4/2/2014	4/2/2016
	ANP06217	Attenuator	768-10	4/7/2014	4/7/2016
	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015

Support Devices:

Function	Manufacturer	Model #	S/N
POE	NetGear	FS726TP	1DA5895Y0031B
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is powered by a Netgear POE Model FS726TP.

Frequency: 902-928MHz
Freq: 902.75MHz, 915.25MHz, 927.25MHz

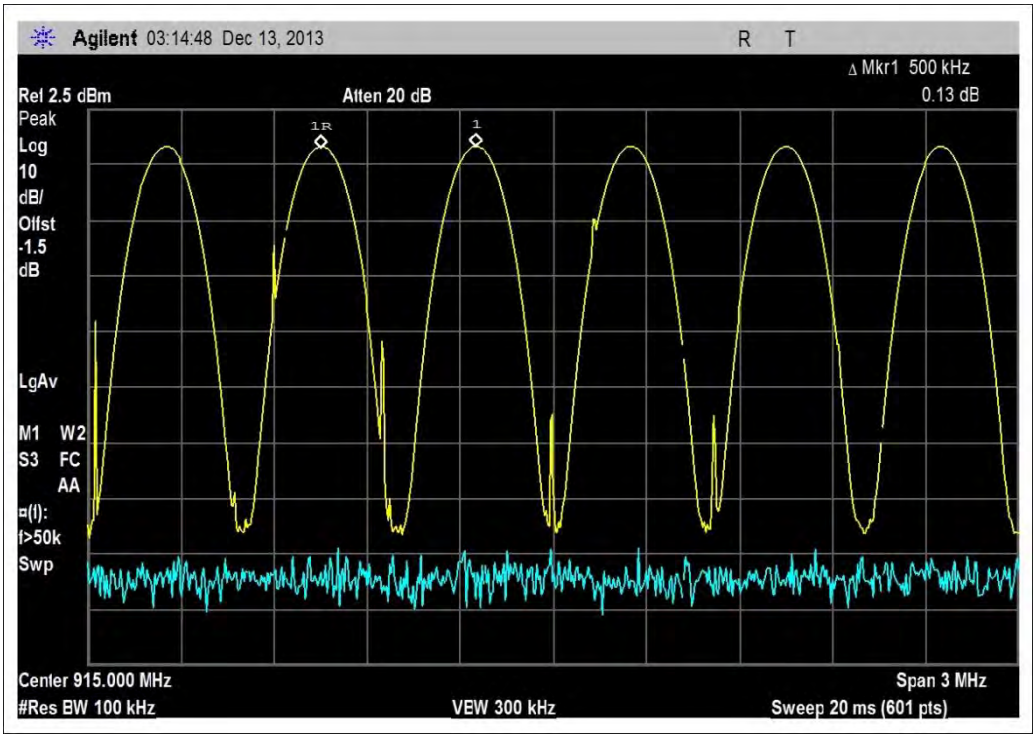
Firmware setting = 31.5dBm, 31.5dBm, 31.5dBm
Attenuator insertion loss applied for in the Spectrum Analyzer screen capture.
Test method in accordance with FCC document: DA 00-705

Temperature: 22°C
Pressure: 101.8kPa
Humidity: 40%

Test Data

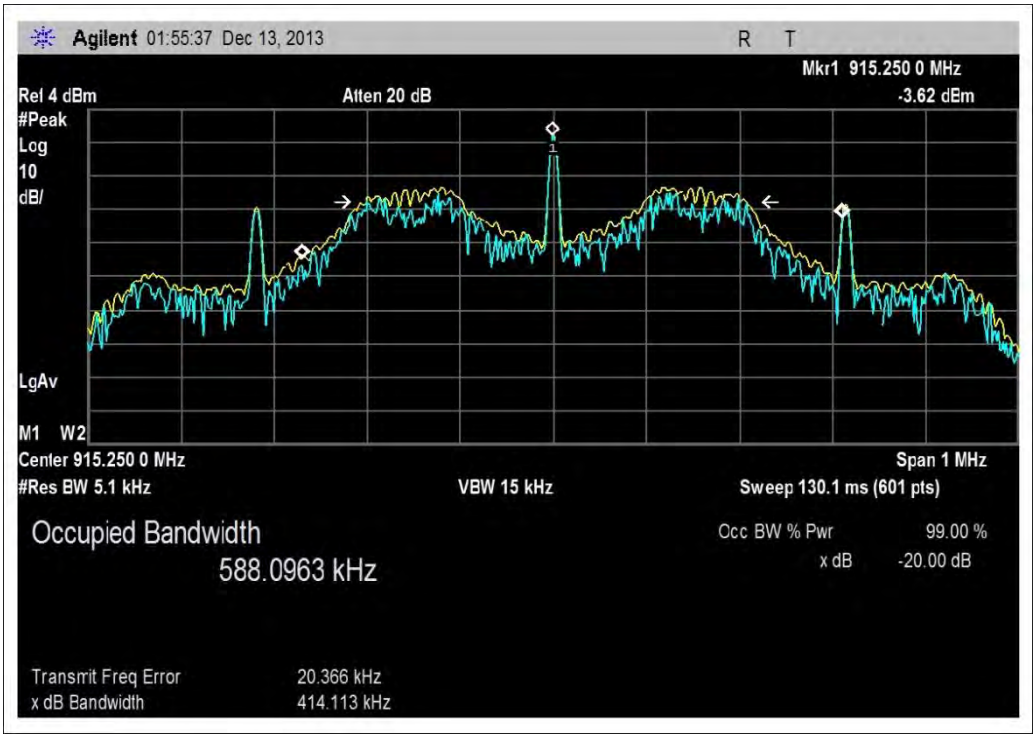
15.247(a)(1) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Frequency Separation



Channel separation = 500kHz

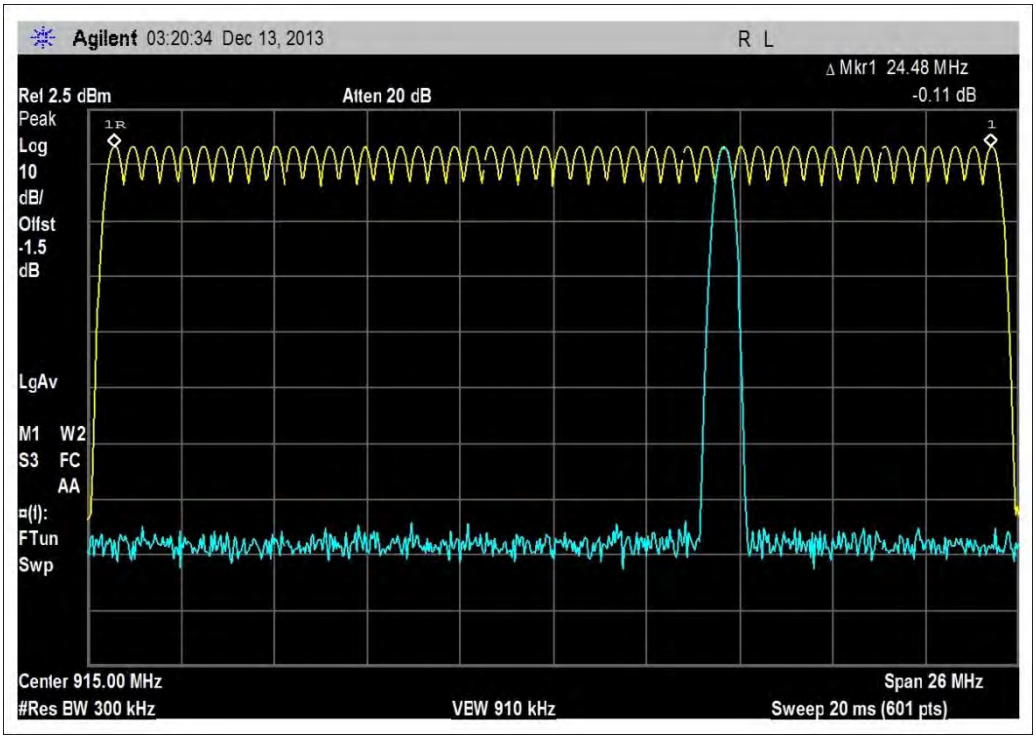
-20 dB Bandwidth



-20dB BW= 414.1kHz

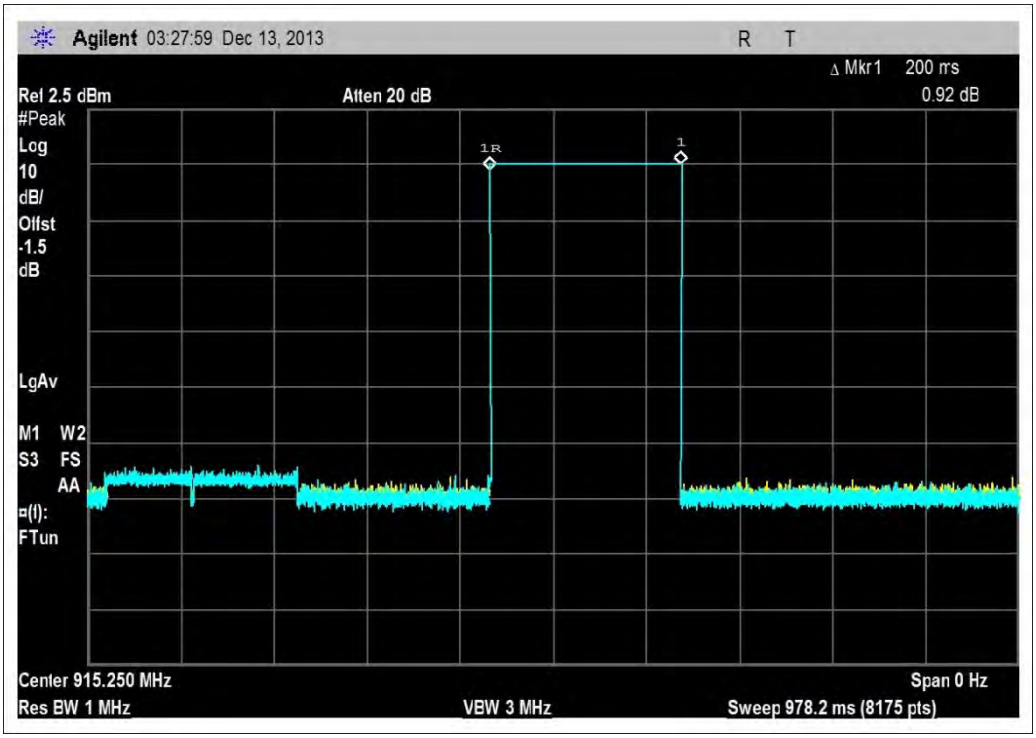
15.247(a)(1)(i) For frequency hopping systems operating in the 902-928 MHz band if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, **the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.**

Number of Hopping Channels



Total number of hopping channel = 50

Average time of occupancy



Event duration = 200ms

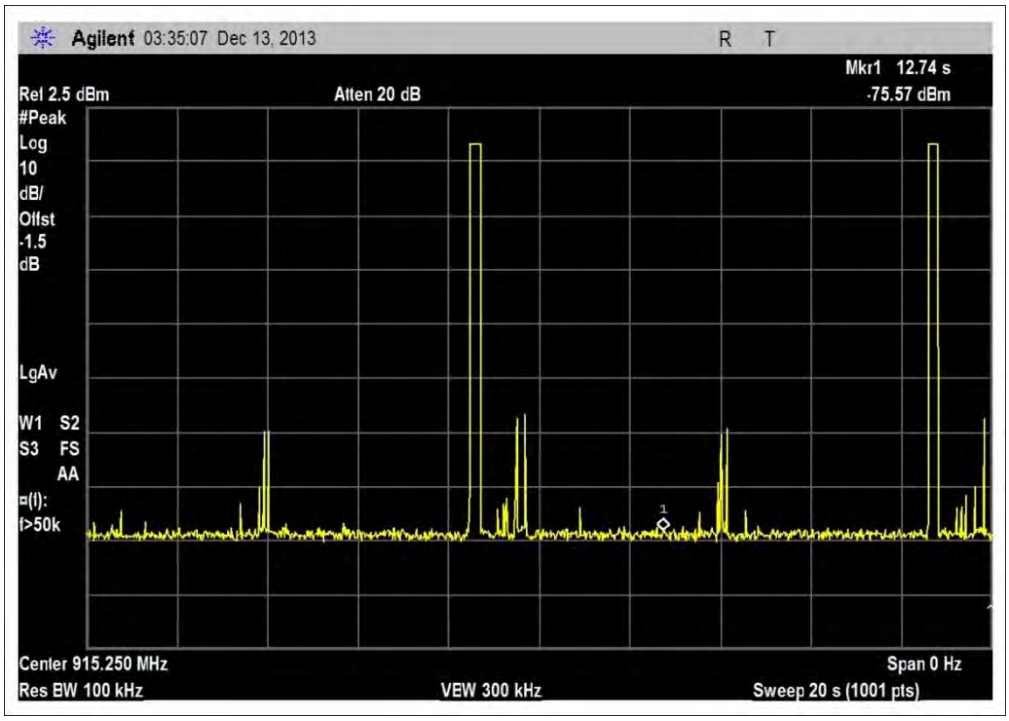


Figure 1: Number of events in 20sec sample 1

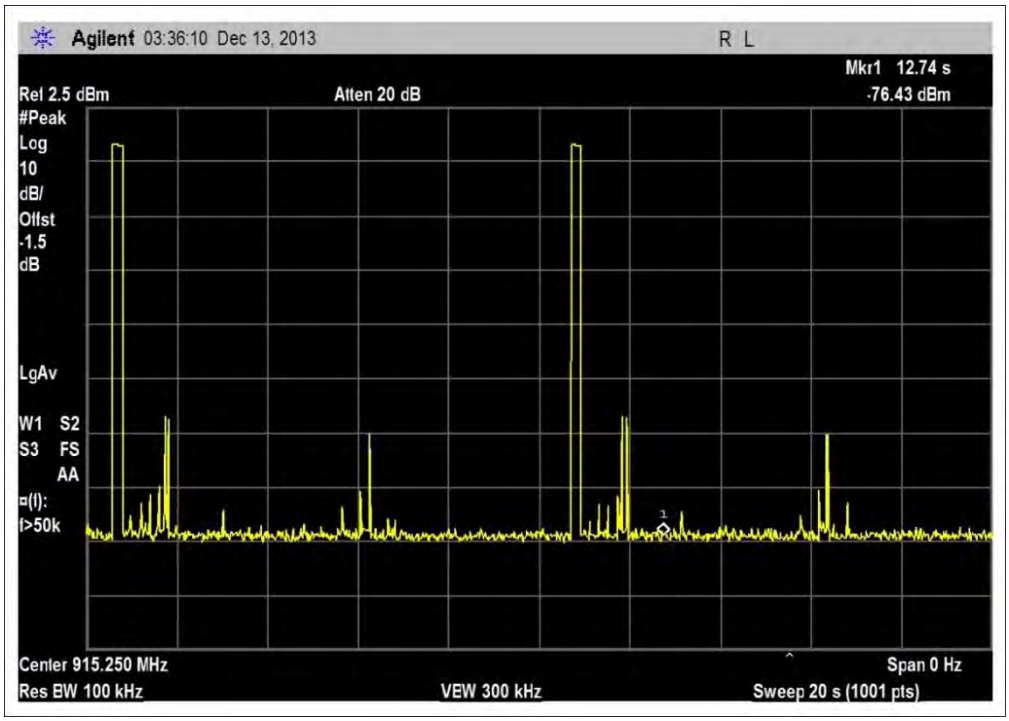


Figure 2: Number of events in 20sec sample 2

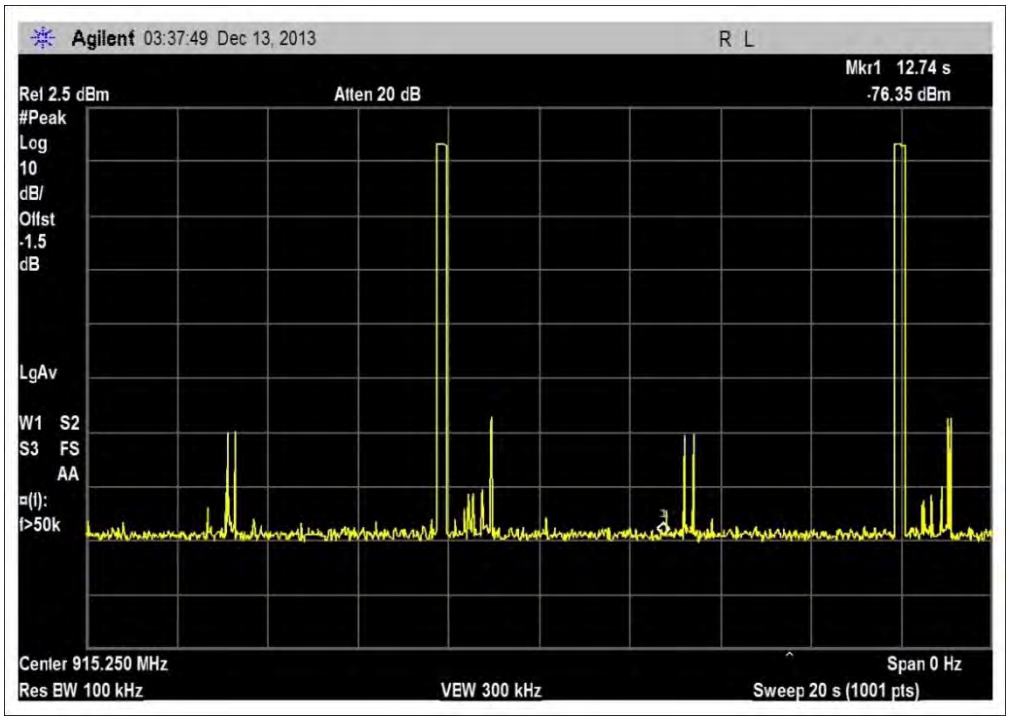


Figure 3: Number of events in 20sec sample 3

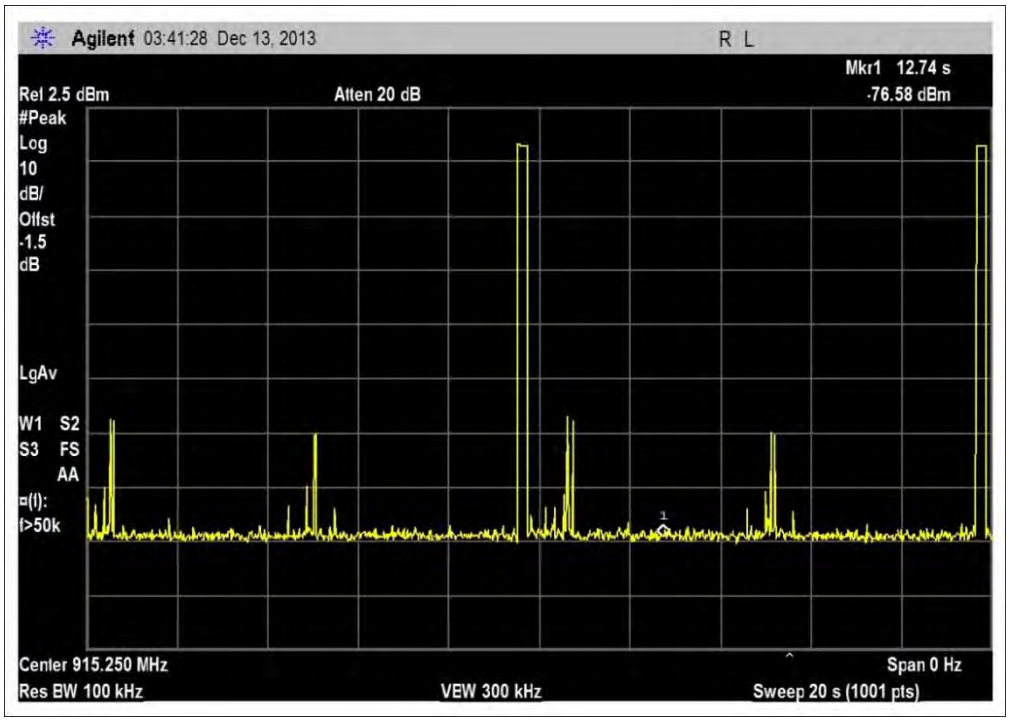


Figure 4: Number of events in 20sec sample 4

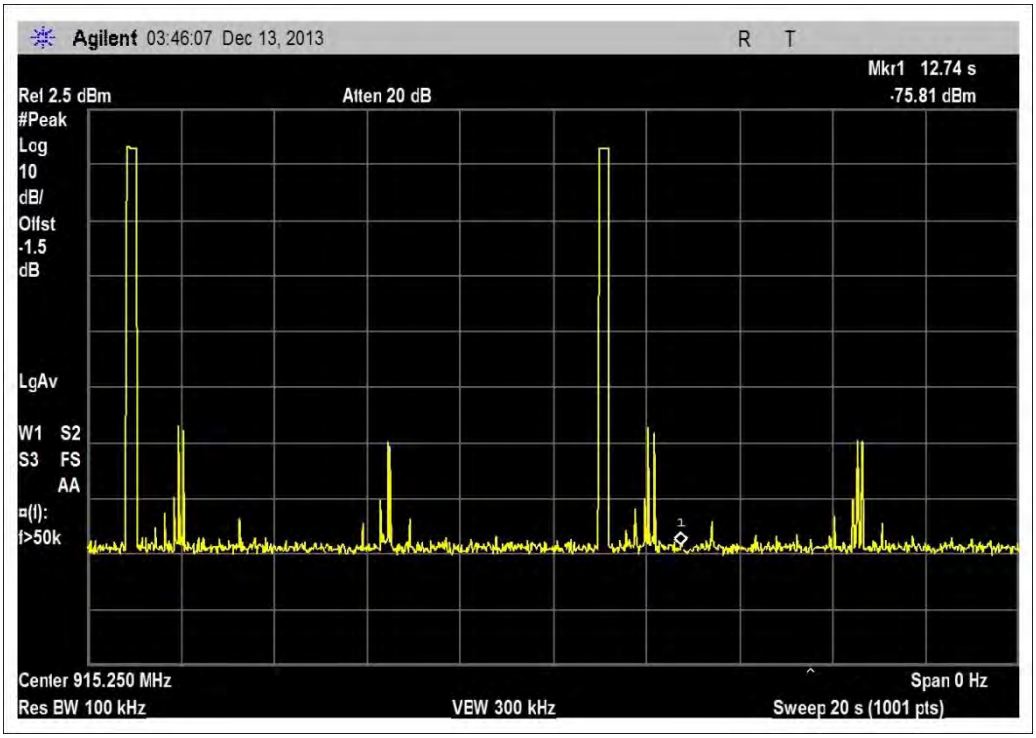


Figure 5: Number of events in 20sec sample 5

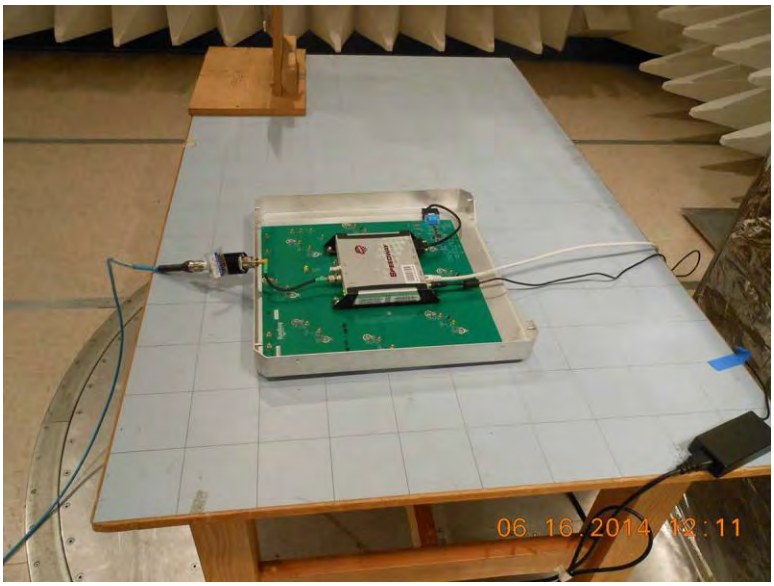
Limit: On time **shall not exceed 0.4 second**, per 10sec interval.

Five separate sweeps at 20 second were acquired, averaging 2 events per 20 second sweep or 1 event per 10second segment.

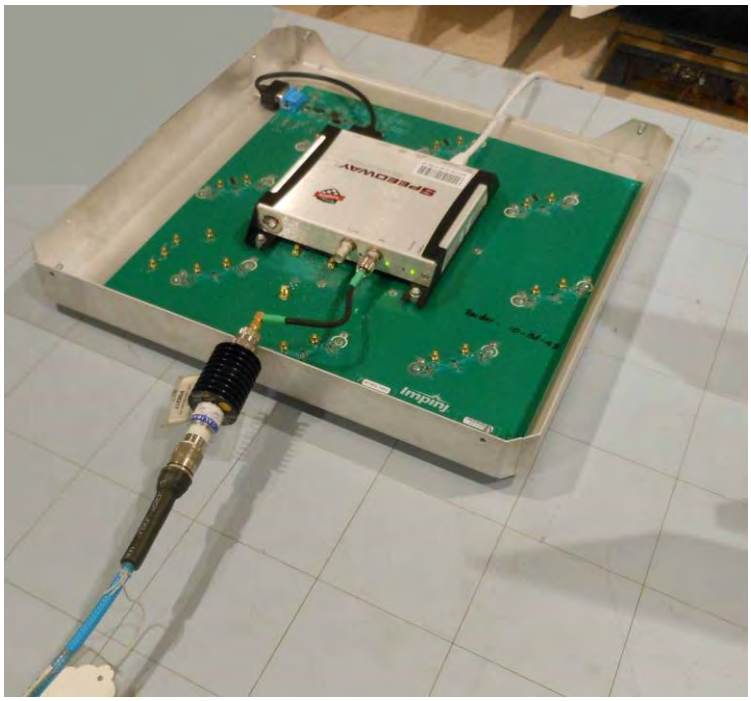
Each events on time = 200ms,

$$Ave\ Time\ of\ occupancy = \frac{0.200sec}{event} * \frac{1\ evnet}{10\ \mathrm{sec}\ interval} = \frac{0.200sec}{10\ \mathrm{sec}\ interval}$$

Test Setup Photos



Switching Adaptor



PoE Switch

15.247(b)(2) RF Power Output

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **FCC15.247 (b)(ii) Max Cond Power**
Work Order #: **95794** Date: 6/16/14
Test Type: **Conducted Emissions** Time: 09:02:21

EUT Information:
Manufacturer: Impinj Inc.
Equipment: xArray
Design Phase: Production Model

Engineer: S. Pittsford
Model #: IPJ-REV-R680-USA
Serial #: 40314150059:
Installation: Mobile

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP05748	Attenuator	PE7004-20	4/2/2014	4/2/2016
	ANP06217	Attenuator	768-10	4/7/2014	4/7/2016
	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015

Support Equipment:

Description	Manufacturer	Model	Serial
POE	NetGear	FS726TP	1DA5895Y0031B
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable. The EUT is powered by a Netgear POE Model FS726TP and also measured using the Switching power adaptor at 85%, 100% and 115% supply voltages.

Frequency: 902-928MHz

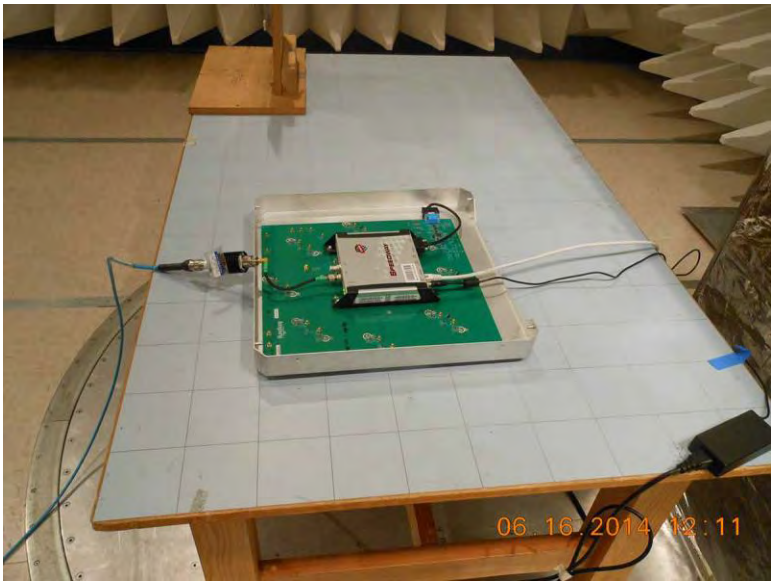
Freq: 902.75MHz, 915.25MHz, 927.25MHz
Firmware setting = 31.5dBm, 31.5dBm, 31.5dBm
Attenuator insertion loss applied for in the Spectrum Analyzer screen capture.
Test method in accordance with FCC document: DA 00-705

Temperature: 22°C
Pressure: 101.8kPa
Humidity: 40%

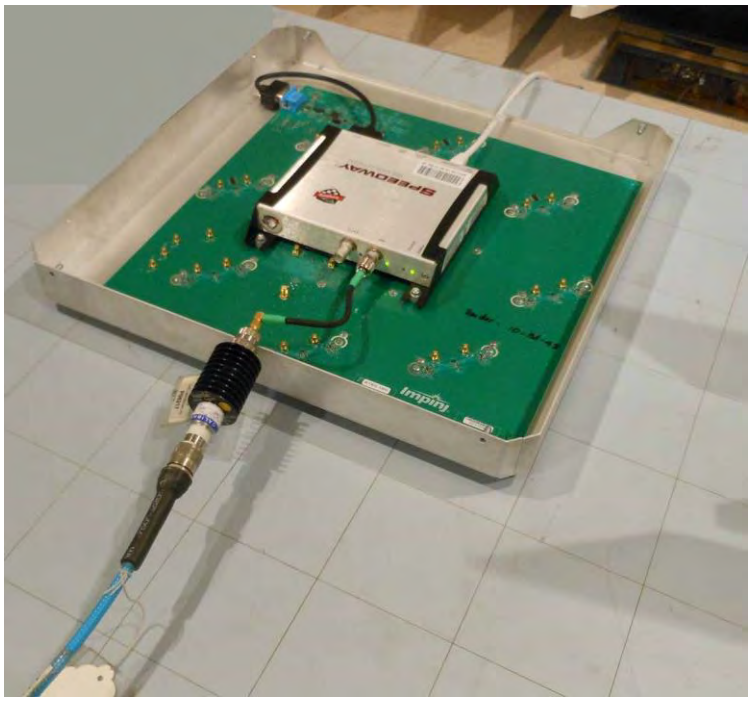
Test Data

Conducted Power					
	EUT Power Source	**Conducted Power at the RF Output Port (dBm)**	**Min Cable Loss (dB)**	**RF output power (dBm)**	**Limit (dBm)**
Low Channel	**POE**	31.36	2.0	29.36	30
Mid Channel	**POE**	31.32	2.0	29.32	30
High Channel	**POE**	31.28	2.0	29.28	30
Low Channel	**Power Brick** Supply Voltage = 85%	31.35	2.0	29.35	30
Mid Channel	**Power Brick** Supply Voltage = 85%	31.48	2.0	29.48	30
High Channel	**Power Brick** Supply Voltage = 85%	31.56	2.0	29.56	30
Low Channel	**Power Brick** Supply Voltage = 100%	31.28	2.0	29.28	30
Mid Channel	**Power Brick** Supply Voltage = 100%	31.54	2.0	29.54	30
High Channel	**Power Brick** Supply Voltage = 100%	31.55	2.0	29.55	30
Low Channel	**Power Brick** Supply Voltage = 115%	31.37	2.0	29.37	30
Mid Channel	**Power Brick** Supply Voltage = 115%	31.58	2.0	29.58	30
High Channel	**Power Brick** Supply Voltage = 115%	31.54	2.0	29.54	30

Test Setup Photos



Switching Adaptor



PoE Switch

15.247(d) Conducted Spurious Emissions and Band edge

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **FCC Part 15.247(d) Conducted Spurious emission**
Work Order #: **95794** Date: 6/16/14
Test Type: **Conducted Emissions** Time: 09:02:21

EUT Information:
Manufacturer: Impinj Inc.
Equipment: xArray
Design Phase: Production Model

Engineer: S. Pittsford
Model #: IPJ-REV-R680-USA
Serial #: 40314150059:
Installation: Mobile

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP05748	Attenuator	PE7004-20	4/2/2014	4/2/2016
	ANP06217	Attenuator	768-10	4/7/2014	4/7/2016
	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015

Support Equipment:

Description	Manufacturer	Model	Serial
POE	NetGear	FS726TP	1DA5895Y0031B
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

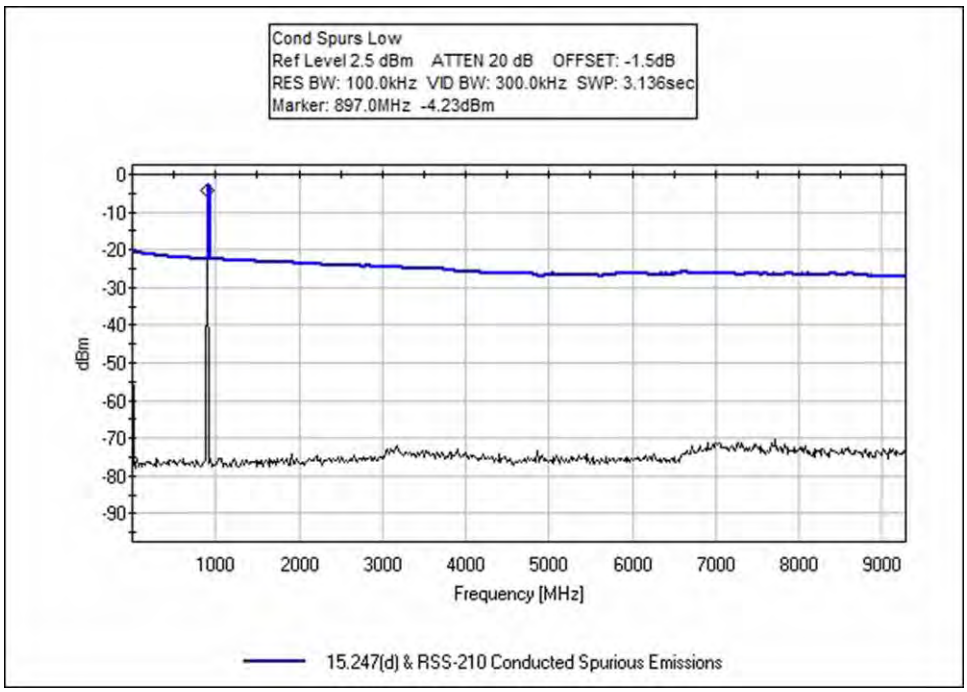
Test Conditions / Notes:

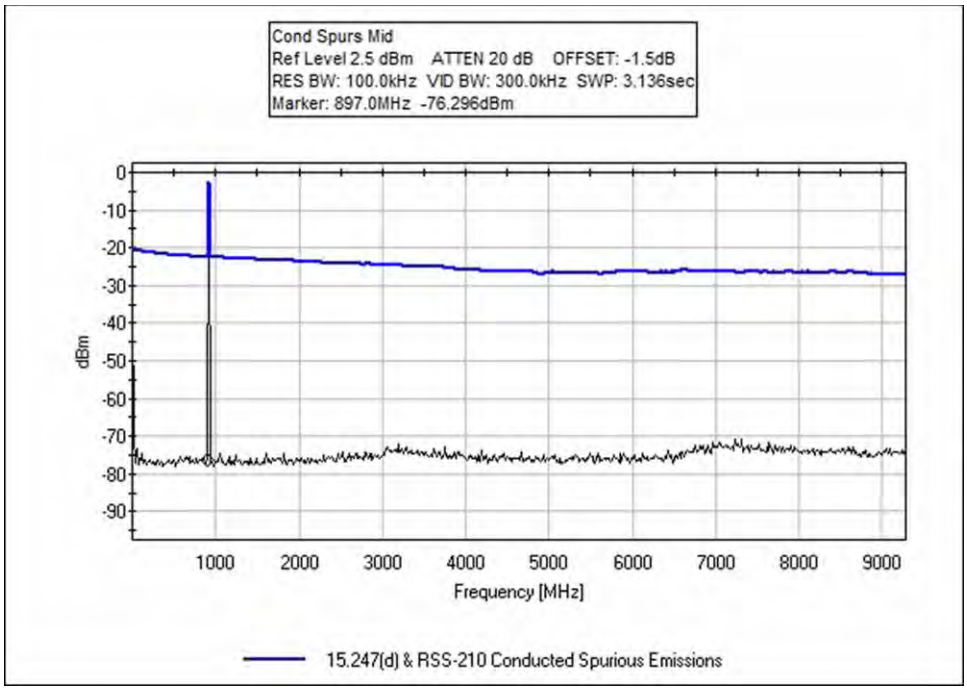
A laptop sends test command to the EUT via an Ethernet cable. The EUT is powered by POE and by switching adaptor. Only worst case is reported.
Frequency: 902-928MHz

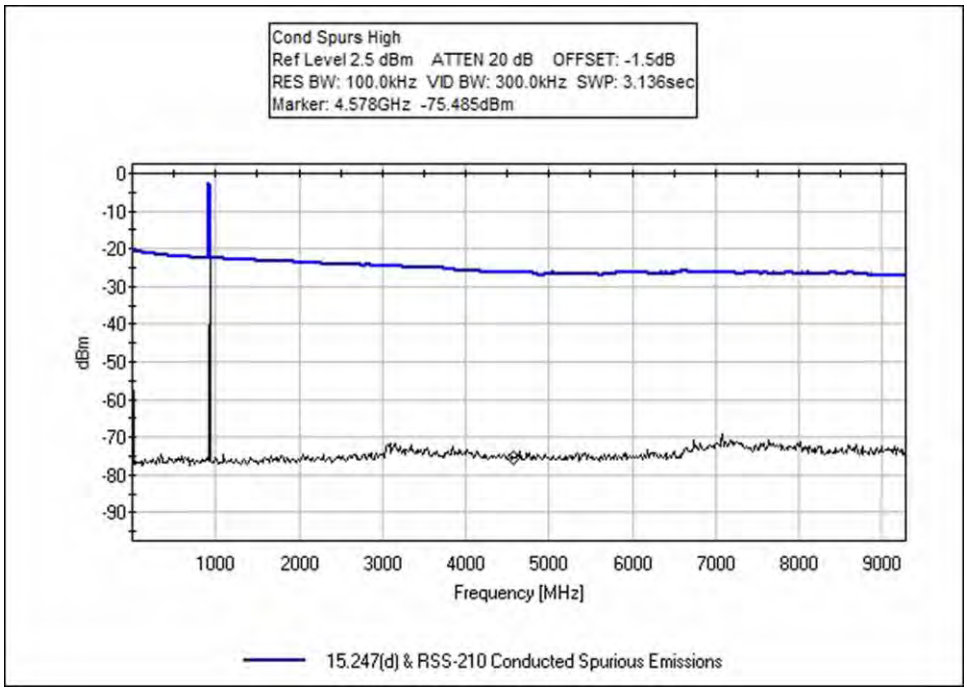
Freq: 902.75MHz, 915.25MHz, 927.25MHz
Firmware setting = 31.5dBm, 31.5dBm, 31.5dBm
Attenuator insertion loss applied for in the Spectrum Analyzer screen capture.
Test method in accordance with FCC document: DA 00-705

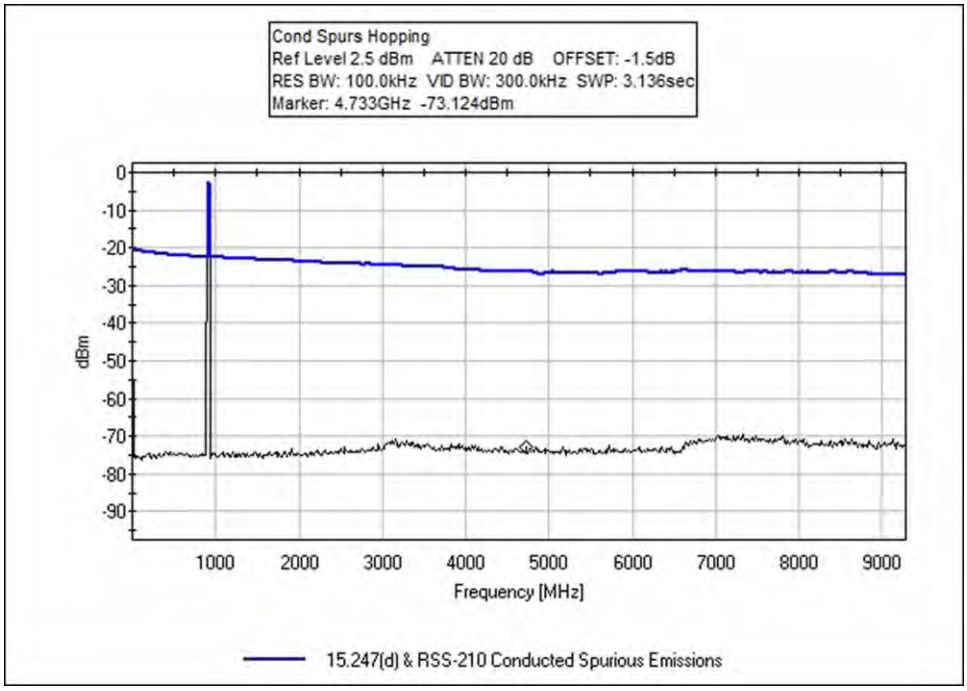
Temperature: 22°C
Pressure: 101.8kPa
Humidity: 40%

Test Data

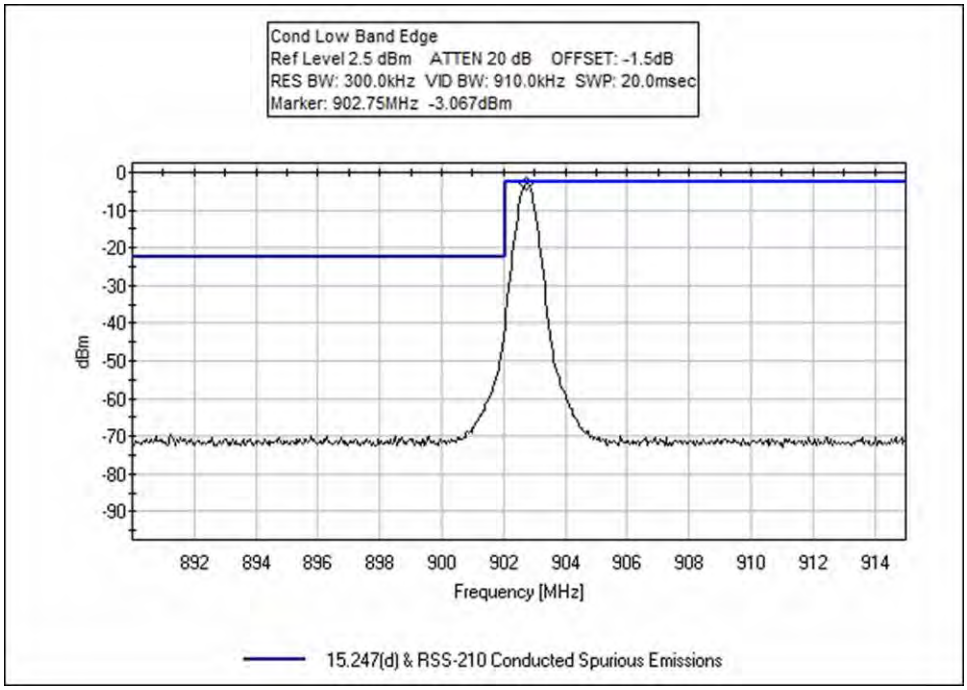

Cond Spurs Low
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.136sec
Marker: 897.0MHz -4.23dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions

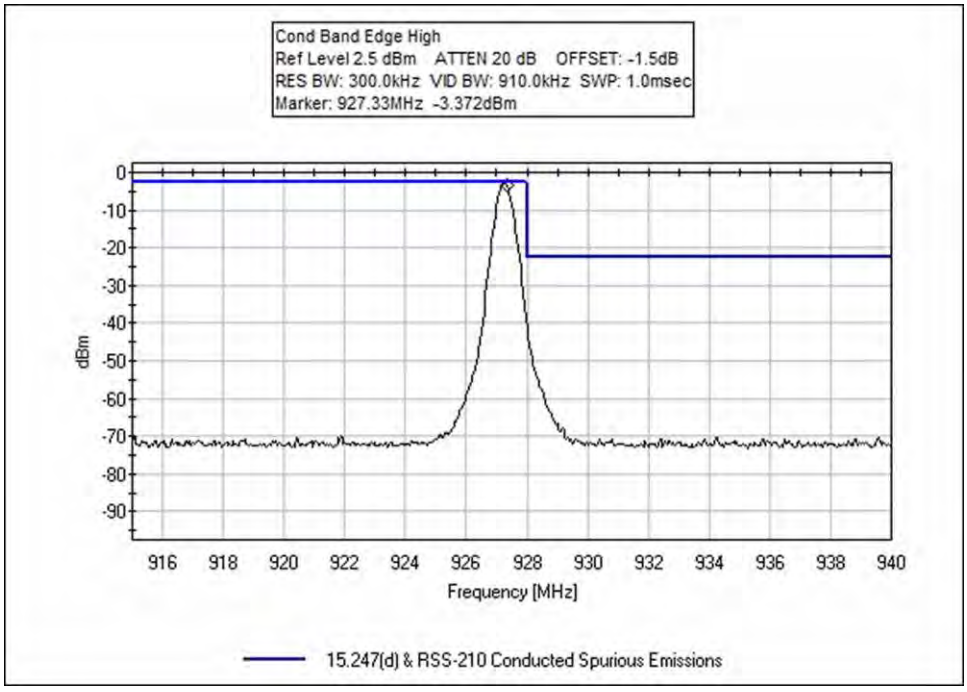

Cond Spurs Mid
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.136sec
Marker: 897.0MHz -76.296dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions

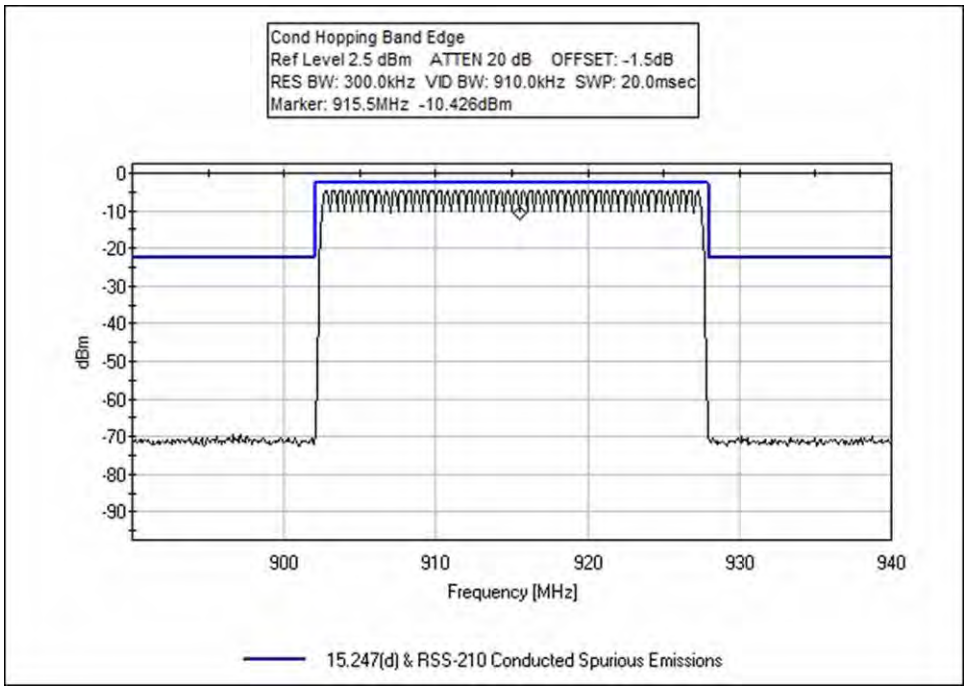

Cond Spurs High
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.136sec
Marker: 4.578GHz -75.485dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions


Cond Spurs Hopping
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.136sec
Marker: 4.733GHz -73.124dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions

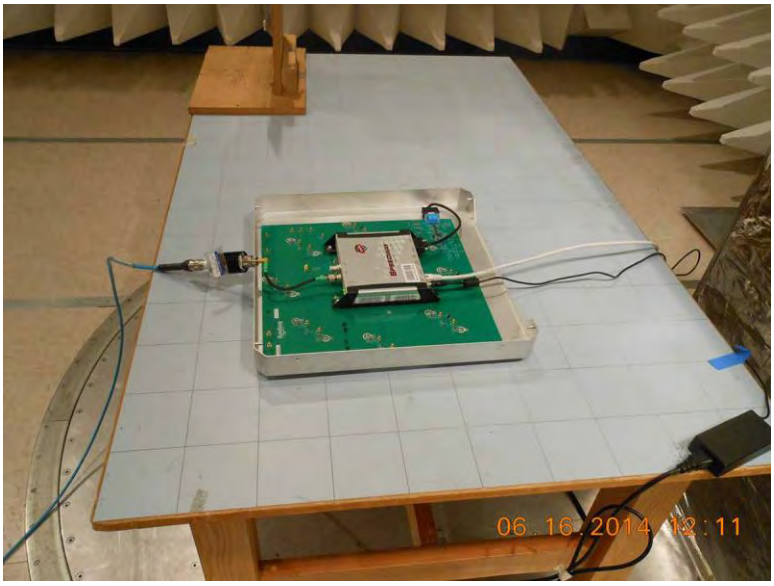
Band edge


Cond Low Band Edge
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 300.0kHz VID BW: 910.0kHz SWP: 20.0msec
Marker: 902.75MHz -3.067dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
892 894 896 898 900 902 904 906 908 910 912 914
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions

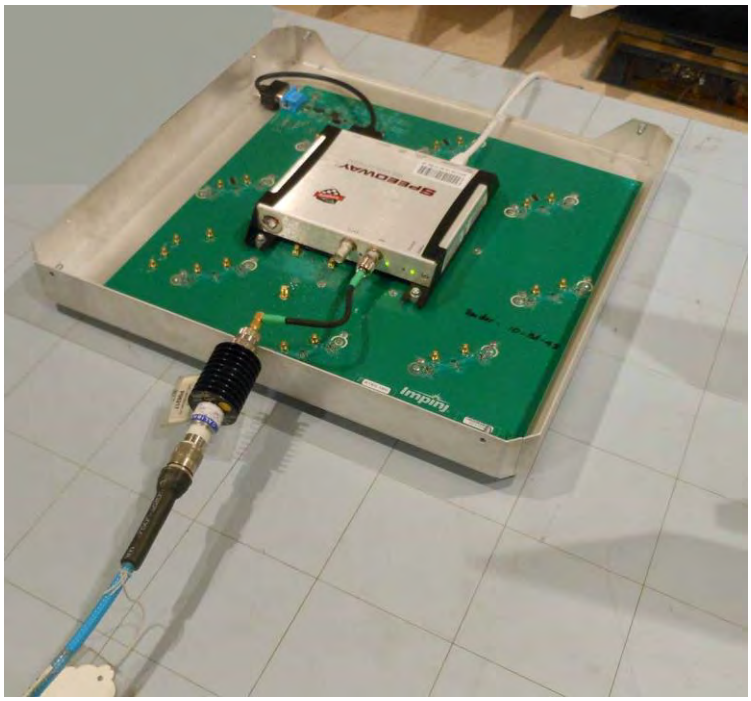

Cond Band Edge High
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 300.0kHz VID BW: 910.0kHz SWP: 1.0msec
Marker: 927.33MHz -3.372dBm
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
916 918 920 922 924 926 928 930 932 934 936 938 940
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions


Cond Hopping Band Edge
Ref Level 2.5 dBm ATTEN 20 dB OFFSET: -1.5dB
RES BW: 300.0kHz VID BW: 910.0kHz SWP: 20.0msec
Marker: 915.5MHz -10.426dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
dBm
900
910
920
930
940
Frequency [MHz]
15.247(d) & RSS-210 Conducted Spurious Emissions

Test Setup Photos



Switching Adaptor



PoE Switch

15.247(d) Radiated Spurious Emissions and Band edge

Test Setup & Conditions / Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Impinj Inc.**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #: **95794** Date: 6/17/2014
Test Type: **Radiated Scan** Time: 10:14:15
Equipment: **xArray** Sequence#: 6
Manufacturer: Impinj Inc. Tested By: Steven Pittsford
Model: IPJ-REV-R680-USA
S/N: 40314150059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02307	Preamp	8447D	3/14/2014	3/14/2016
T2	ANP05748	Attenuator	PE7004-20	4/2/2014	4/2/2016
T3	ANP05360	Cable	RG214	12/3/2012	12/3/2014
T4	ANP05963	Cable	RG-214	2/21/2014	2/21/2016
T5	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T6	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T7	AN01992	Biconilog Antenna	CBL6111C	8/1/2012	8/1/2014
T8	AN03209	Preamp	83051A	3/5/2013	3/5/2015
T9	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	9/16/2013	9/16/2015
T10	ANP05547	Cable	Heliax	9/7/2012	9/7/2014
T11	AN03170	High Pass Filter	HM1155-11SS	10/14/2013	10/14/2015
T12	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
xArray*	Impinj Inc.	IPJ-REV-R680-USA	40314150059
Speedway Revolution	Impinj Inc.	IPJ-R220	37013050366

Support Devices:

Function	Manufacturer	Model #	S/N
Firewall Router	Linksys	BEFSX41	CB900E900020
Laptop	Lenovo	ThinkPad X61S	NA
POE	Netgear	FS726TP	NA
Switching Adaptor	CUI Inc.	DSA-60W-20 1 24060	NA

Test Conditions / Notes:

A laptop sends test command to the EUT via an Ethernet cable.
The EUT is powered by POE and by switching adaptor. Only worst case is reported.
Transmit antenna tested with boresight and furthest right off beam states in vertical polarity. Only worst case is reported. The EUT is transmitting into its antenna.
Low, Mid and High channels investigated.

Frequency range of measurement = 9k-9.28GHz
30-1000MHz RBW=VBW=100kHz
1-9.28GHz RBW=VBW=1MHz
CISPR Bandwidths used below 30MHz

Test method in accordance with FCC document: DA 00-705

Temperature: 23°C
Pressure: 101.7kPa
Humidity: 38%

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	250.000M	38.1	-27.1	+19.9	+1.0	+0.7	+0.0	45.2	46.0	-0.8	Horiz
	QP		+0.5	+0.0	+12.1	+0.0	129				114
			+0.0	+0.0	+0.0	+0.0					
^	250.000M	39.2	-27.1	+19.9	+1.0	+0.7	+0.0	46.3	46.0	+0.3	Horiz
			+0.5	+0.0	+12.1	+0.0	172				163
			+0.0	+0.0	+0.0	+0.0					
3	37.670M	28.5	-28.0	+19.9	+0.4	+0.3	+0.0	35.8	40.0	-4.2	Vert
			+0.2	+0.0	+14.5	+0.0	359				112
			+0.0	+0.0	+0.0	+0.0					
4	250.200M	34.1	-27.1	+19.9	+1.0	+0.7	+0.0	41.2	46.0	-4.8	Horiz
			+0.5	+0.0	+12.1	+0.0	17				117
			+0.0	+0.0	+0.0	+0.0					
5	5416.534M	38.1	+0.0	+0.0	+0.0	+0.0	+0.0	47.5	54.0	-6.5	Vert
			+2.7	+0.0	+0.0	-30.2			Low		107
			+32.9	+3.8	+0.2	+0.0					
6	2745.685M	43.0	+0.0	+0.0	+0.0	+0.0	+0.0	46.0	54.0	-8.0	Horiz
			+1.4	+0.0	+0.0	-30.2	360		Mid		109
			+28.8	+2.7	+0.3	+0.0					
7	108.480M	30.2	-27.8	+19.9	+0.7	+0.5	+0.0	34.4	43.5	-9.1	Vert
			+0.3	+0.0	+10.6	+0.0	360				99
			+0.0	+0.0	+0.0	+0.0					
8	4578.955M	37.4	+0.0	+0.0	+0.0	+0.0	+0.0	43.8	54.0	-10.2	Vert
			+2.2	+0.0	+0.0	-31.0	16		Mid		110
			+31.4	+3.5	+0.3	+0.0					
9	4513.819M	37.6	+0.0	+0.0	+0.0	+0.0	+0.0	43.6	54.0	-10.4	Horiz
			+2.1	+0.0	+0.0	-31.0			Low		107
			+31.2	+3.4	+0.3	+0.0					

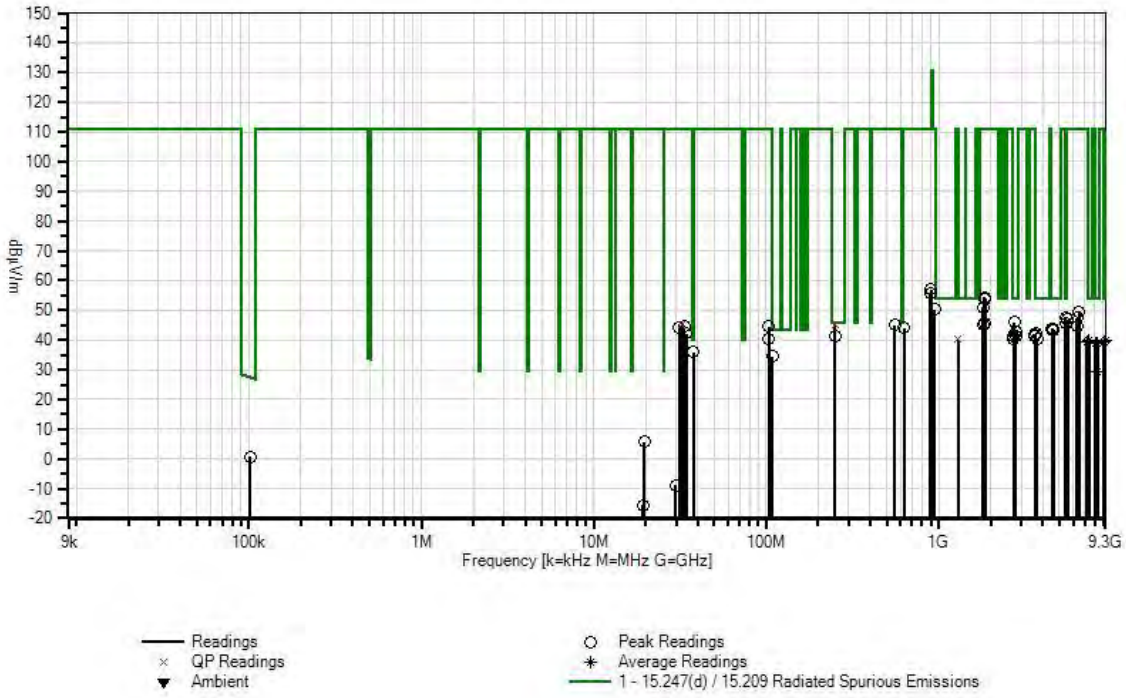
10	4636.196M	36.8	+0.0	+0.0	+0.0	+0.0	+0.0	43.4	54.0	-10.6	Horiz
			+2.2	+0.0	+0.0	-31.0			High		104
			+31.6	+3.5	+0.3	+0.0					
11	2781.850M	39.3	+0.0	+0.0	+0.0	+0.0	+0.0	42.6	54.0	-11.4	Horiz
			+1.5	+0.0	+0.0	-30.2			High		104
			+28.9	+2.8	+0.3	+0.0					
12	3658.208M	38.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.1	54.0	-11.9	Vert
			+1.6	+0.0	+0.0	-30.9	360		Mid		110
			+29.8	+3.2	+0.3	+0.0					
13	3610.742M	38.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.0	54.0	-12.0	Horiz
			+1.6	+0.0	+0.0	-30.9	360		Low		107
			+29.7	+3.2	+0.3	+0.0					
14	2708.505M	38.5	+0.0	+0.0	+0.0	+0.0	+0.0	41.3	54.0	-12.7	Horiz
			+1.4	+0.0	+0.0	-30.2	7		Low		111
			+28.6	+2.7	+0.3	+0.0					
15	2781.690M	37.9	+0.0	+0.0	+0.0	+0.0	+0.0	41.2	54.0	-12.8	Vert
			+1.5	+0.0	+0.0	-30.2	360		High		113
			+28.9	+2.8	+0.3	+0.0					
16	3611.148M	37.2	+0.0	+0.0	+0.0	+0.0	+0.0	41.1	54.0	-12.9	Vert
			+1.6	+0.0	+0.0	-30.9			Low		108
			+29.7	+3.2	+0.3	+0.0					
17	2708.430M	37.5	+0.0	+0.0	+0.0	+0.0	+0.0	40.3	54.0	-13.7	Vert
			+1.4	+0.0	+0.0	-30.2			Low		108
			+28.6	+2.7	+0.3	+0.0					
18	3709.100M	36.3	+0.0	+0.0	+0.0	+0.0	+0.0	40.2	54.0	-13.8	Horiz
			+1.6	+0.0	+0.0	-31.0	359		High		104
			+29.8	+3.2	+0.3	+0.0					
19	7418.317M	23.6	+0.0	+0.0	+0.0	+0.0	+0.0	39.8	54.0	-14.2	Vert
	Ave		+2.5	+0.0	+0.0	-28.2	2		High		104
			+37.4	+4.4	+0.1	+0.0					
^	7418.317M	38.6	+0.0	+0.0	+0.0	+0.0	+0.0	54.8	54.0	+0.8	Vert
			+2.5	+0.0	+0.0	-28.2	360		High		104
			+37.4	+4.4	+0.1	+0.0					
21	7322.000M	24.0	+0.0	+0.0	+0.0	+0.0	+0.0	39.7	54.0	-14.3	Vert
	Ave		+2.4	+0.0	+0.0	-28.2			Mid		110
			+37.0	+4.3	+0.2	+0.0					
^	7322.000M	38.9	+0.0	+0.0	+0.0	+0.0	+0.0	54.6	54.0	+0.6	Vert
			+2.4	+0.0	+0.0	-28.2			Mid		110
			+37.0	+4.3	+0.2	+0.0					
23	9152.500M	22.7	+0.0	+0.0	+0.0	+0.0	+0.0	39.5	54.0	-14.5	Vert
	Ave		+2.8	+0.0	+0.0	-27.6			Mid		110
			+36.7	+4.7	+0.2	+0.0					
^	9152.500M	36.6	+0.0	+0.0	+0.0	+0.0	+0.0	53.4	54.0	-0.6	Vert
			+2.8	+0.0	+0.0	-27.6			Mid		110
			+36.7	+4.7	+0.2	+0.0					
25	9027.259M	22.8	+0.0	+0.0	+0.0	+0.0	+0.0	39.2	54.0	-14.8	Vert
	Ave		+2.7	+0.0	+0.0	-27.6			Low		106
			+36.4	+4.7	+0.2	+0.0					
^	9027.259M	37.0	+0.0	+0.0	+0.0	+0.0	+0.0	53.4	54.0	-0.6	Vert
			+2.7	+0.0	+0.0	-27.6	60		Low		106
			+36.4	+4.7	+0.2	+0.0					

27	8124.419M	23.1	+0.0	+0.0	+0.0	+0.0	+0.0	39.1	54.0	-14.9	Horiz
	Ave		+2.5	+0.0	+0.0	-28.1			Low		106
			+36.9	+4.6	+0.1	+0.0					
^	8124.419M	37.8	+0.0	+0.0	+0.0	+0.0	+0.0	53.8	54.0	-0.2	Horiz
			+2.5	+0.0	+0.0	-28.1	127		Low		106
			+36.9	+4.6	+0.1	+0.0					
29	8345.250M	23.0	+0.0	+0.0	+0.0	+0.0	+0.0	38.9	54.0	-15.1	Horiz
	Ave		+2.6	+0.0	+0.0	-28.0	360		High		104
			+36.5	+4.6	+0.2	+0.0					
^	8345.250M	37.8	+0.0	+0.0	+0.0	+0.0	+0.0	53.7	54.0	-0.3	Horiz
			+2.6	+0.0	+0.0	-28.0	129		High		104
			+36.5	+4.6	+0.2	+0.0					
31	8237.250M	13.4	+0.0	+0.0	+0.0	+0.0	+0.0	29.2	54.0	-24.8	Vert
	Ave		+2.5	+0.0	+0.0	-28.1	232		Mid		110
			+36.7	+4.6	+0.1	+0.0					
^	8237.250M	36.7	+0.0	+0.0	+0.0	+0.0	+0.0	52.5	54.0	-1.5	Vert
			+2.5	+0.0	+0.0	-28.1	360		Mid		110
			+36.7	+4.6	+0.1	+0.0					
33	101.919k	71.2	+0.0	+0.0	+0.0	+0.0	-80.0	0.8	27.4	-26.6	Paral
			+0.0	+0.0	+0.0	+0.0	296				134
			+0.0	+0.0	+0.0	+9.6					
34	892.300M	35.9	-27.4	+20.0	+2.0	+1.5	+0.0	55.8	110.8	-55.0	Horiz
			+0.9	+0.0	+22.9	+0.0					99
			+0.0	+0.0	+0.0	+0.0					
35	1830.631M	54.0	+0.0	+0.0	+0.0	+0.0	+0.0	54.4	110.8	-56.4	Horiz
			+1.2	+0.0	+0.0	-30.6			Mid		99
			+27.2	+2.2	+0.4	+0.0					
36	1854.500M	53.6	+0.0	+0.0	+0.0	+0.0	+0.0	54.2	110.8	-56.6	Horiz
			+1.2	+0.0	+0.0	-30.6	360		High		114
			+27.4	+2.2	+0.4	+0.0					
37	1830.631M	53.2	+0.0	+0.0	+0.0	+0.0	+0.0	53.6	110.8	-57.2	Vert
			+1.2	+0.0	+0.0	-30.6	367		Mid		123
			+27.2	+2.2	+0.4	+0.0					
38	1805.485M	50.7	+0.0	+0.0	+0.0	+0.0	+0.0	50.9	110.8	-59.9	Horiz
			+1.2	+0.0	+0.0	-30.6	360		Low		114
			+27.0	+2.2	+0.4	+0.0					
39	948.400M	29.5	-27.3	+20.0	+2.1	+1.5	+0.0	50.2	110.8	-60.6	Vert
			+0.9	+0.0	+23.5	+0.0	360				99
			+0.0	+0.0	+0.0	+0.0					
40	6490.594M	37.6	+0.0	+0.0	+0.0	+0.0	+0.0	49.5	110.8	-61.3	Horiz
			+2.3	+0.0	+0.0	-28.8			High		104
			+34.1	+4.1	+0.2	+0.0					
41	6319.236M	36.1	+0.0	+0.0	+0.0	+0.0	+0.0	47.5	110.8	-63.3	Horiz
			+2.4	+0.0	+0.0	-29.1	360		Low		107
			+33.9	+4.0	+0.2	+0.0					
42	5563.443M	37.3	+0.0	+0.0	+0.0	+0.0	+0.0	46.9	110.8	-63.9	Vert
			+2.6	+0.0	+0.0	-30.0			High		104
			+33.0	+3.8	+0.2	+0.0					
43	5491.500M	36.4	+0.0	+0.0	+0.0	+0.0	+0.0	45.8	110.8	-65.0	Vert
			+2.6	+0.0	+0.0	-30.1	360		Mid		110
			+32.9	+3.8	+0.2	+0.0					

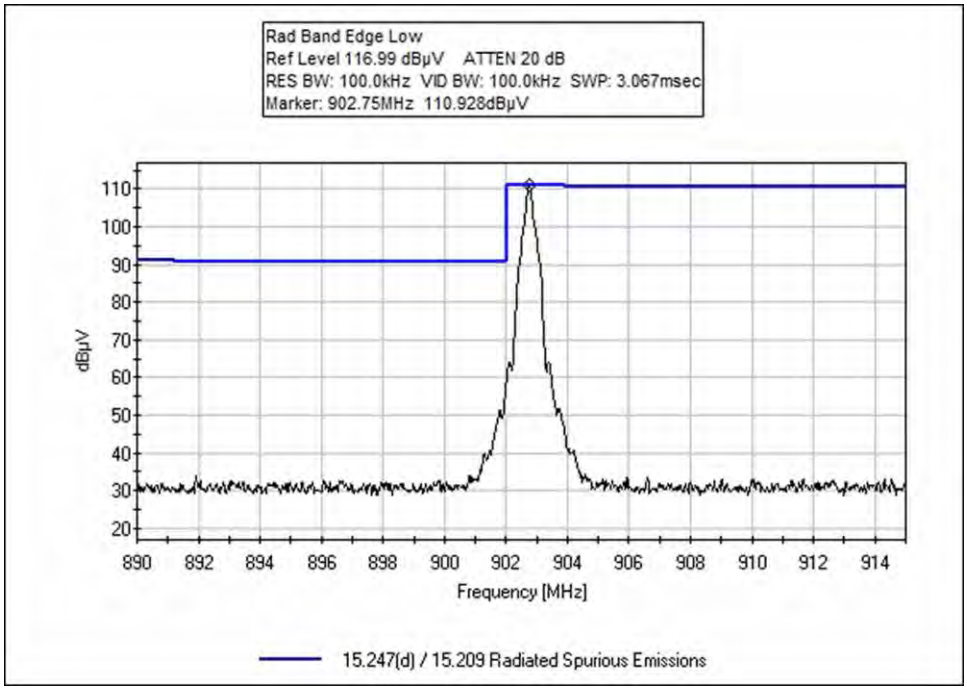
44	1854.535M	45.1	+0.0	+0.0	+0.0	+0.0	+0.0	45.7	110.8	-65.1	Vert
			+1.2	+0.0	+0.0	-30.6			High		113
			+27.4	+2.2	+0.4	+0.0					
45	1805.485M	45.1	+0.0	+0.0	+0.0	+0.0	+0.0	45.3	110.8	-65.5	Vert
			+1.2	+0.0	+0.0	-30.6	360		Low		100
			+27.0	+2.2	+0.4	+0.0					
46	32.378M	35.3	-28.0	+19.9	+0.3	+0.2	+0.0	45.1	110.8	-65.7	Vert
	QP		+0.2	+0.0	+17.2	+0.0	359				98
			+0.0	+0.0	+0.0	+0.0					
^	32.378M	35.6	-28.0	+19.9	+0.3	+0.2	+0.0	45.4	110.8	-65.4	Vert
			+0.2	+0.0	+17.2	+0.0	359				98
			+0.0	+0.0	+0.0	+0.0					
48	554.800M	31.0	-28.3	+20.0	+1.6	+1.2	+0.0	45.0	110.8	-65.8	Horiz
			+0.7	+0.0	+18.8	+0.0					117
			+0.0	+0.0	+0.0	+0.0					
49	33.390M	35.4	-28.0	+19.9	+0.3	+0.3	+0.0	44.8	110.8	-66.0	Vert
			+0.2	+0.0	+16.7	+0.0	359				112
			+0.0	+0.0	+0.0	+0.0					
50	103.675M	40.8	-27.8	+19.9	+0.6	+0.4	+0.0	44.5	110.8	-66.3	Horiz
			+0.3	+0.0	+10.3	+0.0	360				188
			+0.0	+0.0	+0.0	+0.0					
51	6406.750M	32.7	+0.0	+0.0	+0.0	+0.0	+0.0	44.5	110.8	-66.3	Vert
			+2.4	+0.0	+0.0	-28.9	311		Mid		110
			+34.0	+4.1	+0.2	+0.0					
52	31.370M	33.9	-28.0	+19.9	+0.3	+0.2	+0.0	44.2	110.8	-66.6	Vert
			+0.2	+0.0	+17.7	+0.0	359				112
			+0.0	+0.0	+0.0	+0.0					
53	628.800M	29.0	-28.2	+20.0	+1.6	+1.2	+0.0	44.1	110.8	-66.7	Vert
			+0.7	+0.0	+19.8	+0.0					99
			+0.0	+0.0	+0.0	+0.0					
54	34.420M	33.3	-28.0	+19.9	+0.3	+0.3	+0.0	42.2	110.8	-68.6	Vert
			+0.2	+0.0	+16.2	+0.0	359				112
			+0.0	+0.0	+0.0	+0.0					
55	103.680M	36.8	-27.8	+19.9	+0.6	+0.4	+0.0	40.5	110.8	-70.3	Vert
			+0.3	+0.0	+10.3	+0.0	358				99
			+0.0	+0.0	+0.0	+0.0					
56	1291.112M	42.8	+0.0	+0.0	+0.0	+0.0	+0.0	40.1	110.8	-70.7	Vert
	QP		+1.1	+0.0	+0.0	-30.7	359				99
			+24.5	+1.8	+0.6	+0.0					
57	9272.500M	22.9	+0.0	+0.0	+0.0	+0.0	+0.0	40.0	110.8	-70.8	Vert
	Ave		+2.8	+0.0	+0.0	-27.7			High		112
			+37.0	+4.8	+0.2	+0.0					
^	9272.500M	37.9	+0.0	+0.0	+0.0	+0.0	+0.0	55.0	110.8	-55.8	Vert
			+2.8	+0.0	+0.0	-27.7	360		High		112
			+37.0	+4.8	+0.2	+0.0					
59	7222.257M	24.2	+0.0	+0.0	+0.0	+0.0	+0.0	39.4	110.8	-71.4	Horiz
	Ave		+2.4	+0.0	+0.0	-28.2	360		Low		106
			+36.6	+4.3	+0.1	+0.0					
^	7222.257M	39.7	+0.0	+0.0	+0.0	+0.0	+0.0	54.9	110.8	-55.9	Horiz
			+2.4	+0.0	+0.0	-28.2	360		Low		106
			+36.6	+4.3	+0.1	+0.0					

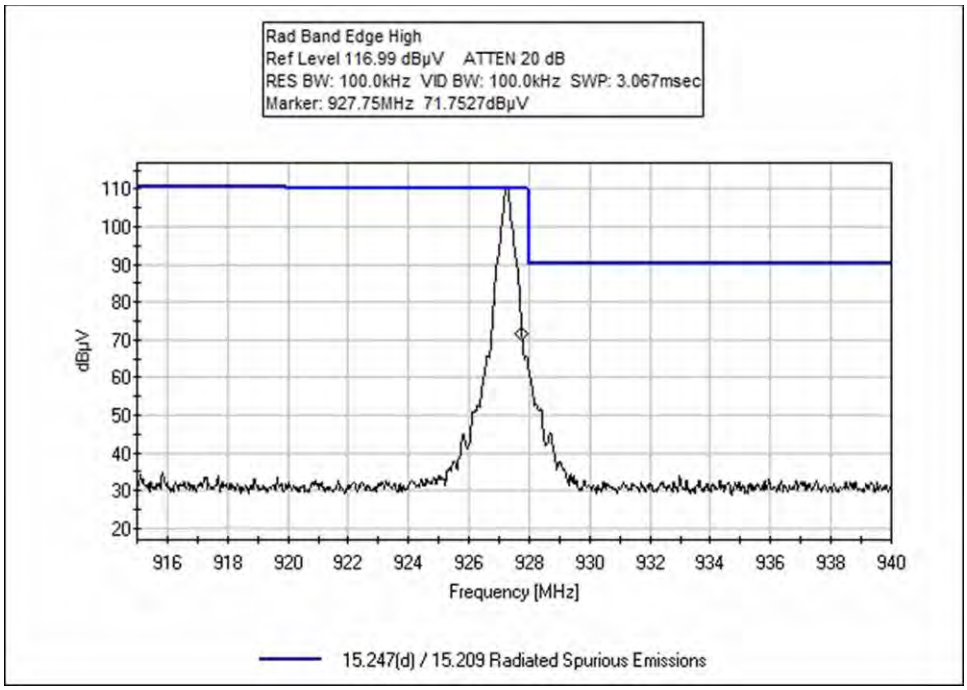
61	904.900M	37.0	-27.4 +0.9 +0.0	+20.0 +0.0 +0.0	+2.0 +23.0 +0.0	+1.5 +0.0 +0.0	+0.0 360	57.0	130.8	-73.8	Horiz 99
62	19.563M	38.0	+0.0 +0.1 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +7.7	-40.0 230	5.8	110.8	-105.0	Paral 134
63	29.850M	26.4	+0.0 +0.2 +0.0	+0.0 +0.0 +0.1	+0.0 +0.0 +0.0	+0.0 +0.0 +4.5	-40.0	-8.8	110.8	-119.6	Paral 134
64	19.323M	16.5	+0.0 +0.1 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +7.8	-40.0 360	-15.6	110.8	-126.4	Paral 134

CKC Laboratories, Inc. Date: 6/17/2014 Time: 10:14:15 Impinj Inc. WO#: 95794
Test Distance: 3 Meters Sequence#: 6 Vert
Impinj Inc. xArray P/N: IPJ-REV-R680-USA



Band edge

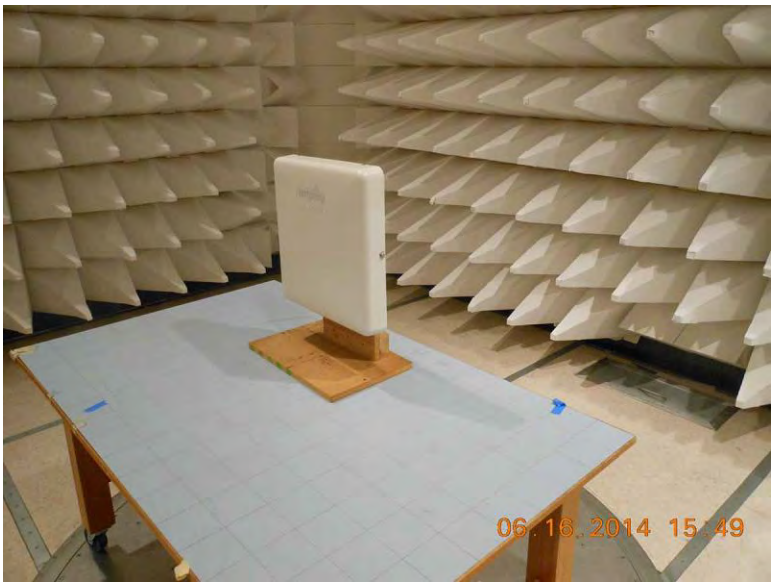

Rad Band Edge Low
Ref Level 116.99 dBµV ATTEN 20 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.067msec
Marker: 902.75MHz 110.928dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Rad Band Edge High
Ref Level 116.99 dBµV ATTEN 20 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.067msec
Marker: 927.75MHz 71.7527dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photos

Switching Adaptor

Switching Adaptor



PoE Switch

PoE Switch

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties 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.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	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 carrot ("^") 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.