



ADDENDUM TO IMPINJ INC TEST REPORT FC06-010E

FOR THE

RFID READER CORE, IPJ-R1000-USA-0-01-01

FCC PART 15 SUBPART C SECTION 15.247
AND SUBPART B SECTION 15.109

COMPLIANCE

DATE OF ISSUE: APRIL 17, 2007

PREPARED FOR:

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

PREPARED BY:

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P.O. No.: 1841
W.O. No.: 86329

Date of test: January 25-26, 2006 and
March 28-29, 2007

Report No.: FC06-010F

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ADMINISTRATIVE INFORMATION

DATE OF TEST: January 25-26, 2006 and March 28-29, 2007

DATE OF RECEIPT: January 25, 2006 and March 28, 2007

MANUFACTURER: Impinj Inc
701 N. 34th Street
Seattle, WA 98103

REPRESENTATIVE: Mike Thomas

TEST LOCATION: CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

TEST METHOD: ANSI C63.4 (2003)

PURPOSE OF TEST: **Original Report:** To demonstrate the compliance of the Speedway Reader, IPJ-R1000, with the requirements for FCC part 15 Subpart B sections 15.107 & 15.109 Class B, Subpart C Sections 15.207, 15.209 & 15.247 and RSS-210 devices.

Addendum A: To clarify the plot on page 21 with no new testing.

Addendum B: To demonstrate the compliance of the RFID Reader, IPJ-R1000, with partial re-testing for FCC Part 15 Subpart C Sections 15.209 and 15.247 after component changes in the EUT.

Addendum C is to add limit lines to the band edge plots and revise the frequency range on page 5.

Addendum D: To demonstrate the compliance of the RFID Reader Antenna (Brickyard), IPJ-A0400-USA; RFID Reader Antenna (Guardwall), IPJ-A0401-USA and RFID Reader Antenna (Mini-Guardrail), IPJ-A0301-USA with the requirements for FCC Part 15 Subpart C Sections 15.209 & 15.247 devices with testing of new antennas.

Addendum E: To correct sequence 7 on page 12 and sequence 6 on page 18 with no new testing.

Addendum F: To demonstrate the compliance of the RFID Reader Core, IPJ-R1000-USA-0-01-01 with the requirements for FCC Part 15 Subpart C Section 15.247 devices. This EUT was re-tested with a cable attached. It will be professionally installed and the power output was measured at the end of the cable. Additional data from FC06-010A (Number of Hopping Channels, Dwell Time and Average Time of Occupancy) is included in this report because these sections were not affected by the re-testing.

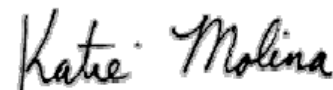
APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:

A handwritten signature in black ink, appearing to read "Joyce Walker".

Joyce Walker, Quality Assurance Administrative Manager

A handwritten signature in black ink, appearing to read "Katie Molina".

Katie Molina, Senior EMC Engineer/Lab Manager

TEST PERSONNEL:

A handwritten signature in black ink, appearing to read "Ryan Rutledge".

Ryan Rutledge, Test Technologist

A handwritten signature in black ink, appearing to read "Septimiu Apahidean".

Septimiu Apahidean, EMC Test Engineer

FCC TO CANADA STANDARD CORRELATION MATRIX

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS GEN	7.1.4	47CFR	15.203	Antenna Connector Requirements
RSS GEN	7.2.1	47CFR	15.35(c)	Pulsed Operation
RSS GEN	7.2.2	47CFR	15.207	AC Mains Conducted Emissions Requirement
RSS 210	2.1	47CFR	15.215(c)	Frequency Stability Recommendation
RSS 210	2.2	47CFR	15.205	Restricted Bands of Operation
RSS 210	2.6	47CFR	15.209	General Radiated Emissions Requirement
RSS 210	A8.1	47CFR	15.247(a)(1)	Definition of FHSS
RSS 210	A8.1	47CFR	15.247(h)	Incorporation of Intelligence
RSS 210	A8.1(1)	47CFR	15.247(a)(1)	Minimum Channel Bandwidth
RSS 210	A8.1(1)	47CFR	15.247(g)	Hopping Sequence
RSS 210	A8.1(2)	47CFR	15.247(a)(1)	Carrier Separation
RSS 210	A8.1(2)	47CFR	15.247(a)(1)	Carrier Separation 2400 Alternative
RSS 210	A8.1(3)	47CFR	15.247(a)(1)(i)	Carrier Separation
RSS 210	A8.1(3)	47CFR	15.247(a)(1)(i)	Average Time of Occupancy
RSS 210	A8.1(3)	47CFR	15.247(a)(1)(i)	Number of Hopping Channels
RSS 210	A8.1(4)	47CFR	15.247(a)(1)(iii)	Average Time of Occupancy
RSS 210	A8.1(4)	47CFR	15.247(a)(1)(iii)	Number of Hopping Channels
RSS 210	A8.1(5)	47CFR	15.247(a)(1)(ii)	Max 20dB Bandwidth
RSS 210	A8.1(5)	47CFR	15.247(a)(1)(ii)	Average Time of Occupancy
RSS 210	A8.1(5)	47CFR	15.247(a)(1)(ii)	Number of Hopping Channels
RSS 210	A8.2(1)	47CFR	15.247(a)(2)	Minimum 6dB Bandwidth
RSS 210	A8.2(2)	47CFR	15.247(e)	Peak Power Spectral Density
RSS 210	A8.3(1)	47CFR	15.247(f)	Hybrid Systems - Time of Occupancy
RSS 210	A8.3(1)	47CFR	15.247(f)	Hybrid Systems - Power Spectral Density
RSS 210	A8.4(1)	47CFR	15.247(b)(2)	RF Power Output
RSS 210	A8.4(2)	47CFR	15.247(b)(1)	RF Power Output
RSS 210	A8.4(3)	47CFR	15.247(b)(1)	RF Power Output
RSS 210	A8.4(4)	47CFR	15.247(b)(3)	RF Power Output
RSS 210	A8.4(5)	47CFR	15.247(c)(1)	Directional Gain Requirements
RSS 210	A8.4(6)	47CFR	15.247(c)(2)	Beam Steering Antennas
RSS 210	A8.5	47CFR	15.247(d)	Spurious Emissions
	4653		318736	Site File No.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply. A 25 foot Belden type 7806A cable (2.5dB loss) was used for 2007 testing.

FCC 15.31(e) Voltage Variations

Measured RF Power Output at nominal voltage and again at 85% and 115% on nominal.

FCC 15.31(m) Number Of Channels

This device was tested on three channels.

FCC 15.33(a) Frequency Ranges Tested

15.109 Radiated Emissions: 30 kHz – 1000 MHz

15.247/15.209 Radiated Emissions: 10 kHz – 10 GHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	10 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	10 GHz	1 MHz

FCC 15.203 Antenna Requirements

The antenna requires professional installation; therefore the EUT complies with Section 15.203 of the FCC rules.

EUT Operating Frequency

The EUT was operating at 902 MHz to 928 MHz.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit. The EUT is a frequency hopping device operating in the 902 – 928 MHz band.

EQUIPMENT UNDER TEST

RFID Reader Core

Manuf: Impinj
Model: IPJ-R1000-USA-0-01-01
Serial: 40306470606
FCC ID: TWYIPJR1000

AC Adapter

Manuf: CUI Inc
Model: DSA-60W-20 1 24060
Serial: DTS240250UC-P11P-DB
FCC ID: NA

RFID Reader Antenna (Mini-Guardrail)

Manuf: Impinj
Model: IPJ-A0301-USA
Serial: NA
FCC ID: NA

RFID Reader Antenna

Manuf: Cushcraft
Model: S9028PCLJ
Serial: NA
FCC ID: NA

RFID Reader Antenna (Brickyard)

Manuf: Impinj
Model: IPJ-A0400-USA
Serial: NA
FCC ID: NA

RFID Reader Antenna (Guardwall)

Manuf: Impinj
Model: IPJ-A0401-USA
Serial: NA
FCC ID: NA

UHF RFID

Manuf: Impinj, Incorporated
Model: IPJ-R1000
Serial: 40306020043
FCC ID: TWYIPJR1000 (pending)

Power Supply

Manuf: CUI Inc.
Model: DSA-60W-20 1 24060
Mfg. P/N: DTS240259U-P11P-DB
Serial: NA
FCC ID: NA

PERIPHERAL DEVICES

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

Laptop PC

Manuf: Dell
Model: Latitude D600
Serial: CN-0G5152-48643-44M-3481

Crossover Ethernet Cable (UTP)

Manuf: NA
Model: NA
Serial: NA

Laptop AC Adapter

Manuf: Dell
Model: PA-1650-05D
Serial: CN-05U092-48010-39M-016B

Laptop

Manuf: Compaq
Model: Presario V2000
Serial: CNF5391NBO

REPORT OF EMISSIONS MEASUREMENTS

TESTING PARAMETERS

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

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 to determine compliance. 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 dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit to determine compliance.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/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. 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. When conducted emissions testing was performed, a 10 dB external attenuator was used with internal offset correction in the analyzer.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED 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 "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "Q" or an "A" in the appropriate table. 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/receiver readings were recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients 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

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. 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.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable and raising and lowering the antenna from one to four meters as needed. The test engineer maximized the readings with respect to the table rotation, antenna height and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

FCC 15.109 – RADIATED EMISSIONS



Brickyard



Cushcraft



Guardwall



Mini-Guardrail

Test Data Sheets

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**

Specification: **15.109 CLASS B**

Work Order #: **86329**

Date: 3/28/2007

Test Type: **Radiated Scan**

Time: 11:58:15

Equipment: **RFID Reader Core**

Sequence#: 1

Manufacturer: Impinj

Tested By: Ryan Rutledge

Model: IPJ-R1000-USA-0-01-01

S/N: 40306470606

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna	Cushcraft	S9028PCLJ	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to RFID antenna. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator not transmitting (Unintentional Radiated Emissions). A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 30 - 1000 MHz RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
T3=AMP-AN01517-071006	

Measurement Data:

Reading listed by margin.

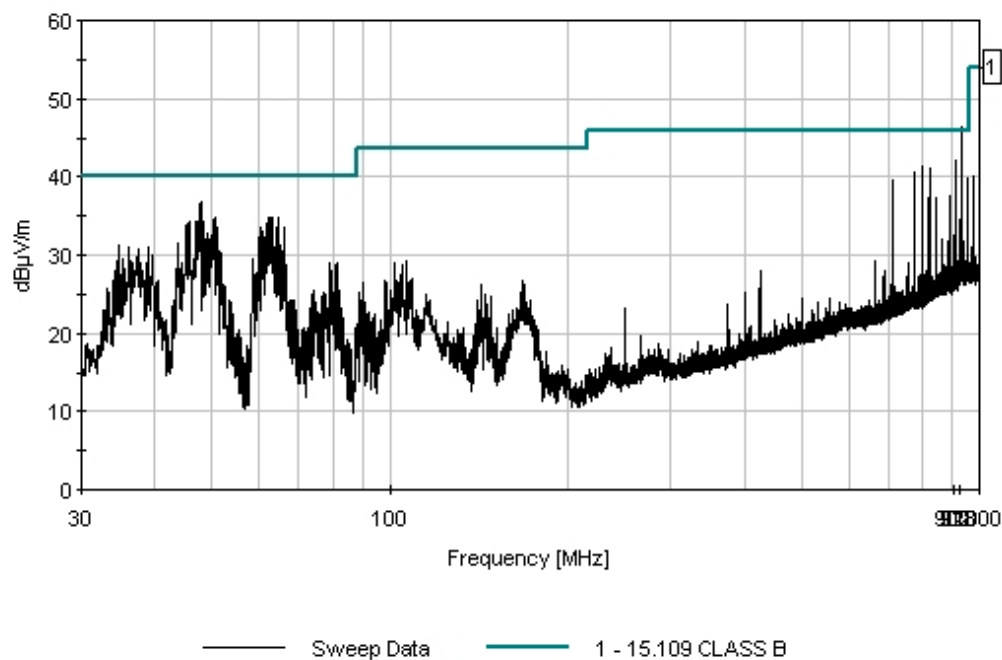
Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	955.388M	43.3	+24.0	+4.9	-27.6	+0.0	162	44.6	46.0	-1.4	Vert
QP											100
^	955.362M	46.1	+24.0	+4.9	-27.6	+0.0	162	47.4	46.0	+1.4	Vert
											100
3	822.069M	44.8	+22.6	+4.4	-28.3	+0.0	346	43.5	46.0	-2.5	Vert
QP											100
^	822.066M	46.8	+22.6	+4.4	-28.3	+0.0	346	45.5	46.0	-0.5	Vert
											100

5	799.864M	44.6	+22.3	+4.4	-28.5	+0.0	42.8	46.0	-3.2	Vert
	QP					85				100
^	799.861M	47.7	+22.3	+4.4	-28.5	+0.0	45.9	46.0	-0.1	Vert
						85				100
7	933.176M	41.6	+23.8	+4.8	-27.7	+0.0	42.5	46.0	-3.5	Vert
	QP					242				100
^	933.186M	50.2	+23.8	+4.8	-27.7	+0.0	51.1	46.0	+5.1	Vert
						242				100
9	910.966M	42.0	+23.5	+4.7	-27.8	+0.0	42.4	46.0	-3.6	Vert
	QP					312				100
^	910.948M	45.0	+23.5	+4.7	-27.8	+0.0	45.4	46.0	-0.6	Vert
						312				100
11	777.654M	42.6	+22.0	+4.3	-28.5	+0.0	40.4	46.0	-5.6	Vert
	QP					345				100
^	777.650M	44.8	+22.0	+4.3	-28.5	+0.0	42.6	46.0	-3.4	Vert
						345				100
13	48.434M	51.4	+9.7	+1.0	-27.7	+0.0	34.4	40.0	-5.6	Vert
						360				100
14	45.706M	49.0	+11.9	+1.0	-27.6	+0.0	34.3	40.0	-5.7	Vert
						360				100
15	47.037M	50.1	+10.8	+1.0	-27.6	+0.0	34.3	40.0	-5.7	Vert
						360				100
16	866.526M	40.6	+23.0	+4.5	-28.0	+0.0	40.1	46.0	-5.9	Vert
						262				100
17	45.273M	48.3	+12.3	+1.0	-27.6	+0.0	34.0	40.0	-6.0	Vert
						360				100
18	66.302M	53.8	+6.1	+1.2	-27.5	+0.0	33.6	40.0	-6.4	Vert
						360				100
19	51.063M	52.0	+8.2	+1.0	-27.7	+0.0	33.5	40.0	-6.5	Vert
						360				100
20	60.213M	54.4	+5.6	+1.1	-27.6	+0.0	33.5	40.0	-6.5	Vert
						360				100
21	64.140M	53.9	+5.9	+1.1	-27.4	+0.0	33.5	40.0	-6.5	Vert
						360				100
22	711.003M	43.0	+20.9	+4.0	-28.4	+0.0	39.5	46.0	-6.5	Vert
						360				100
23	63.374M	53.8	+5.8	+1.1	-27.5	+0.0	33.2	40.0	-6.8	Vert
						360				100
24	60.812M	53.8	+5.7	+1.1	-27.6	+0.0	33.0	40.0	-7.0	Vert
						360				100
25	61.611M	53.7	+5.7	+1.1	-27.5	+0.0	33.0	40.0	-7.0	Vert
						360				100
26	49.033M	50.3	+9.2	+1.0	-27.7	+0.0	32.8	40.0	-7.2	Vert
						360				100
27	49.665M	50.2	+8.8	+1.0	-27.7	+0.0	32.3	40.0	-7.7	Vert
						360				100
28	778.117M	39.8	+22.0	+4.3	-28.5	+0.0	37.6	46.0	-8.4	Vert
						360				100

29	64.792M	51.4	+5.9	+1.1	-27.4	+0.0	31.0	40.0	-9.0	Vert
	QP					360				100
^	64.772M	55.1	+5.9	+1.1	-27.4	+0.0	34.7	40.0	-5.3	Vert
						360				100
31	47.804M	47.5	+10.2	+1.0	-27.7	+0.0	31.0	40.0	-9.0	Vert
	QP									100
^	47.802M	53.3	+10.2	+1.0	-27.7	+0.0	36.8	40.0	-3.2	Vert
						360				100
33	50.447M	48.4	+8.4	+1.0	-27.7	+0.0	30.1	40.0	-9.9	Vert
	QP					38				100
^	50.464M	53.1	+8.4	+1.0	-27.7	+0.0	34.8	40.0	-5.2	Vert
						360				100
35	62.239M	47.7	+5.8	+1.1	-27.5	+0.0	27.1	40.0	-12.9	Vert
	QP									100
^	62.243M	55.3	+5.8	+1.1	-27.5	+0.0	34.7	40.0	-5.3	Vert
						360				100

CKC Laboratories Date: 3/28/2007 Time: 11:58:15 Impinj Inc WVO#: 86329
15.109 CLASS B Test Distance: 3 Meters Sequence#: 1 Polarity: Vert
Notes: RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to RFID antenna. DBS



Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.109 CLASS B**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/28/2007
 Time: 09:47:45
 Sequence#: 2
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna	Cushcraft	S9028PCLJ	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to RFID antenna. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator not transmitting (Unintentional Radiated Emissions). A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 30 - 1000 MHz RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

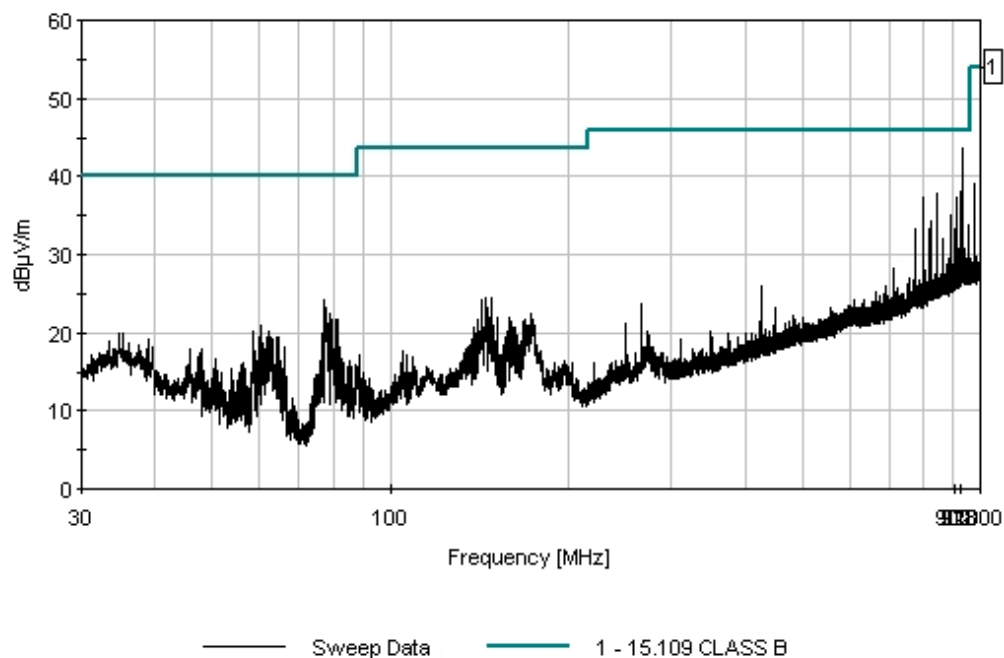
T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
T3=AMP-AN01517-071006	

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

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	933.164M	41.2	+23.8	+4.8	-27.7	+0.0	42.1	46.0	-3.9	Horiz
	QP					89				133
^	933.160M	43.0	+23.8	+4.8	-27.7	+0.0	43.9	46.0	-2.1	Horiz
						89				133
3	844.285M	39.2	+22.8	+4.5	-28.1	+0.0	38.4	46.0	-7.6	Horiz
	QP					89				133
^	844.291M	43.2	+22.8	+4.5	-28.1	+0.0	42.4	46.0	-3.6	Horiz
						89				133
5	929.450M	37.2	+23.7	+4.8	-27.7	+0.0	38.0	46.0	-8.0	Horiz
										200

6	910.982M QP	37.1	+23.5	+4.7	-27.8	+0.0 360	37.5	46.0	-8.5	Horiz 133
^	910.987M	41.1	+23.5	+4.7	-27.8	+0.0 360	41.5	46.0	-4.5	Horiz 133
8	799.868M QP	37.1	+22.3	+4.4	-28.5	+0.0 231	35.3	46.0	-10.7	Horiz 133
^	799.845M	45.0	+22.3	+4.4	-28.5	+0.0 231	43.2	46.0	-2.8	Horiz 133
10	888.792M	35.0	+23.3	+4.6	-27.9	+0.0	35.0	46.0	-11.0	Horiz 200
11	911.368M	34.5	+23.5	+4.7	-27.8	+0.0	34.9	46.0	-11.1	Horiz 200
12	927.987M	34.1	+23.7	+4.8	-27.7	+0.0	34.9	46.0	-11.1	Horiz 200
13	934.153M	34.0	+23.8	+4.8	-27.7	+0.0	34.9	46.0	-11.1	Horiz 200
14	822.110M	35.6	+22.6	+4.4	-28.3	+0.0	34.3	46.0	-11.7	Horiz 200
15	955.789M	32.4	+24.0	+4.9	-27.6	+0.0	33.7	46.0	-12.3	Horiz 200
16	955.580M	32.3	+24.0	+4.9	-27.6	+0.0	33.6	46.0	-12.4	Horiz 200
17	778.117M	35.6	+22.0	+4.3	-28.5	+0.0	33.4	46.0	-12.6	Horiz 200
18	821.587M	34.8	+22.5	+4.4	-28.3	+0.0	33.4	46.0	-12.6	Horiz 200
19	932.272M	32.5	+23.8	+4.8	-27.7	+0.0	33.4	46.0	-12.6	Horiz 200
20	777.156M	35.4	+22.0	+4.3	-28.5	+0.0	33.2	46.0	-12.8	Horiz 200
21	902.693M	33.1	+23.4	+4.6	-27.9	+0.0	33.2	46.0	-12.8	Horiz 200
22	777.517M	34.8	+22.0	+4.3	-28.5	+0.0	32.6	46.0	-13.4	Horiz 200
23	866.112M	32.4	+23.0	+4.5	-28.0	+0.0	31.9	46.0	-14.1	Horiz 200
24	926.001M	31.1	+23.7	+4.8	-27.7	+0.0	31.9	46.0	-14.1	Horiz 200
25	977.633M	37.4	+24.3	+5.0	-27.7	+0.0	39.0	54.0	-15.0	Horiz 200
26	938.857M	29.9	+23.8	+4.8	-27.7	+0.0	30.8	46.0	-15.2	Horiz 200
27	922.029M	30.1	+23.7	+4.7	-27.8	+0.0	30.7	46.0	-15.3	Horiz 200
28	938.334M	29.5	+23.8	+4.8	-27.7	+0.0	30.4	46.0	-15.6	Horiz 200
29	77.183M	43.4	+7.1	+1.3	-27.7	+0.0	24.1	40.0	-15.9	Horiz 200

CKC Laboratories Date: 3/28/2007 Time: 09:47:45 Impinj Inc WVO#: 86329
 15.109 CLASS B Test Distance: 3 Meters Sequence#: 2 Polarity: Horiz
 Notes: RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to RFID antenna. DBS



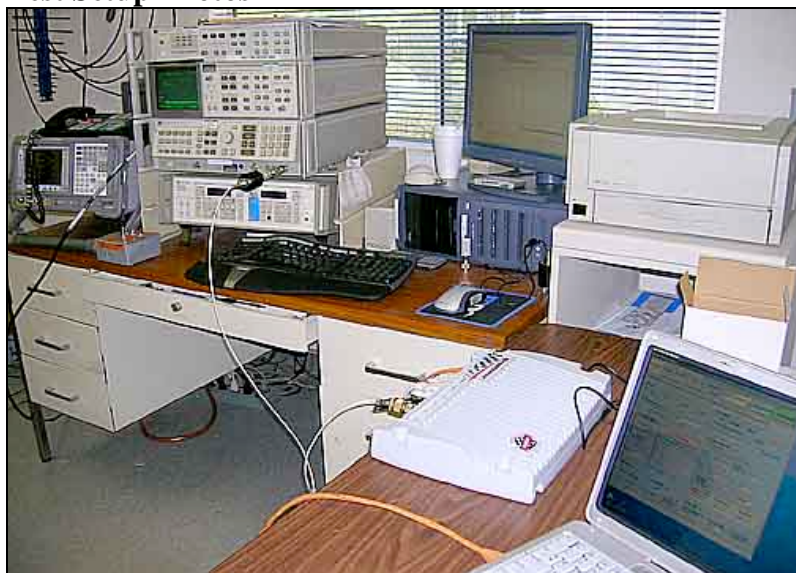
FCC 15.247(a)(1) - NUMBER OF HOPPING CHANNELS

Testing Dates: January 25-26, 2006

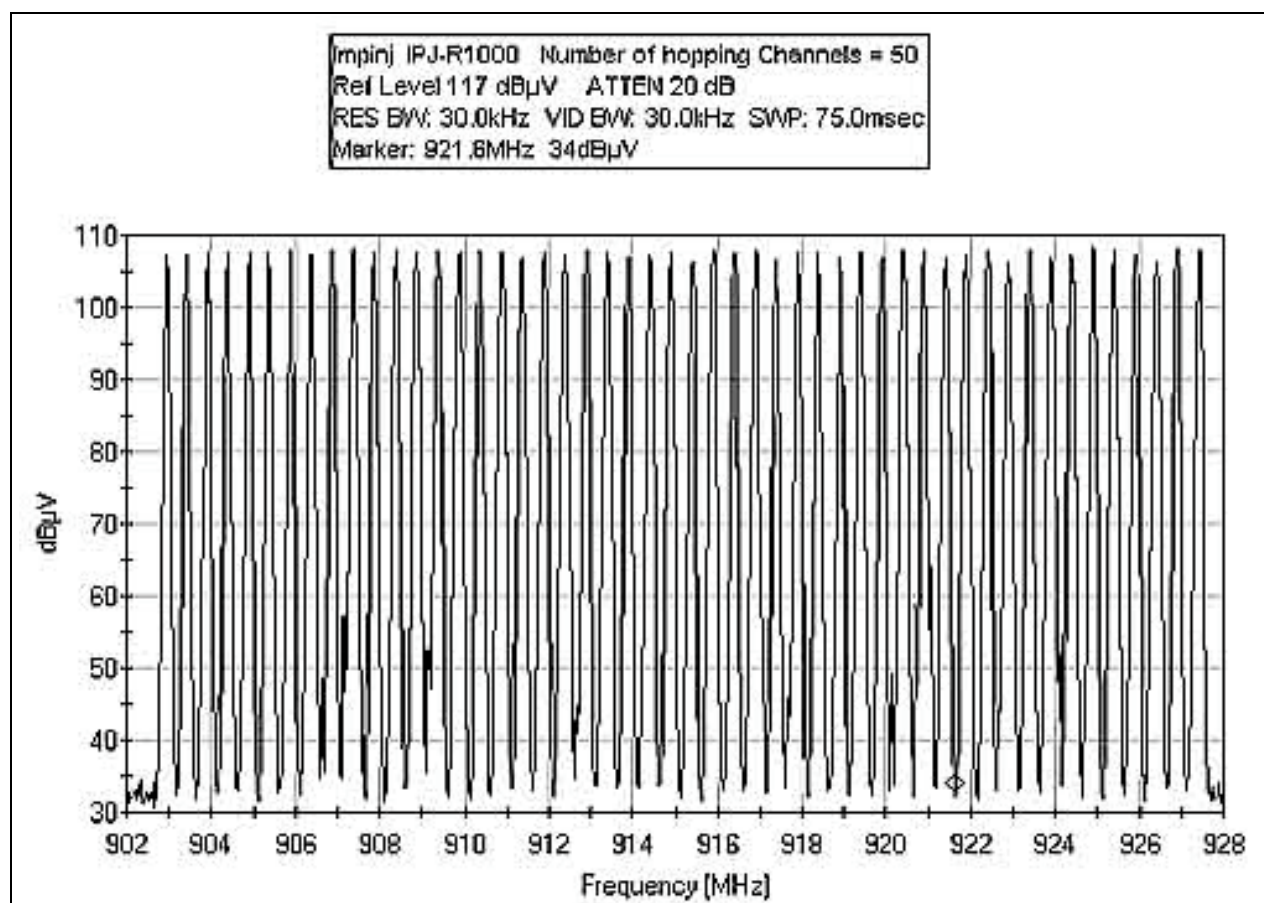
Test Equipment

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
24" SMA Cable (White)	P5183	Pasteck	NA	1-40GHz_white	122304	122306

Test Setup Photos



Test Data



Tested By: Septimiu Apahidean

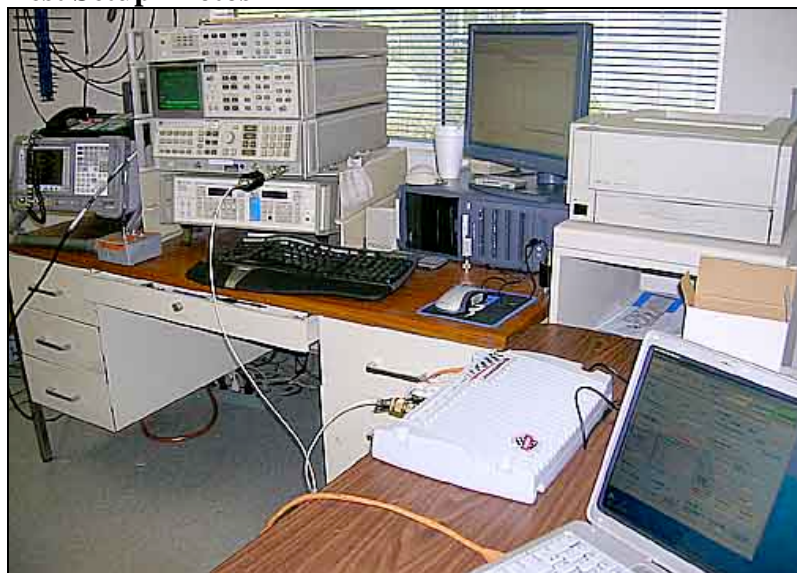
FCC 15.247(a)(1) - DWELL TIME PER HOP - SHORT

Testing Dates: January 25-26, 2006

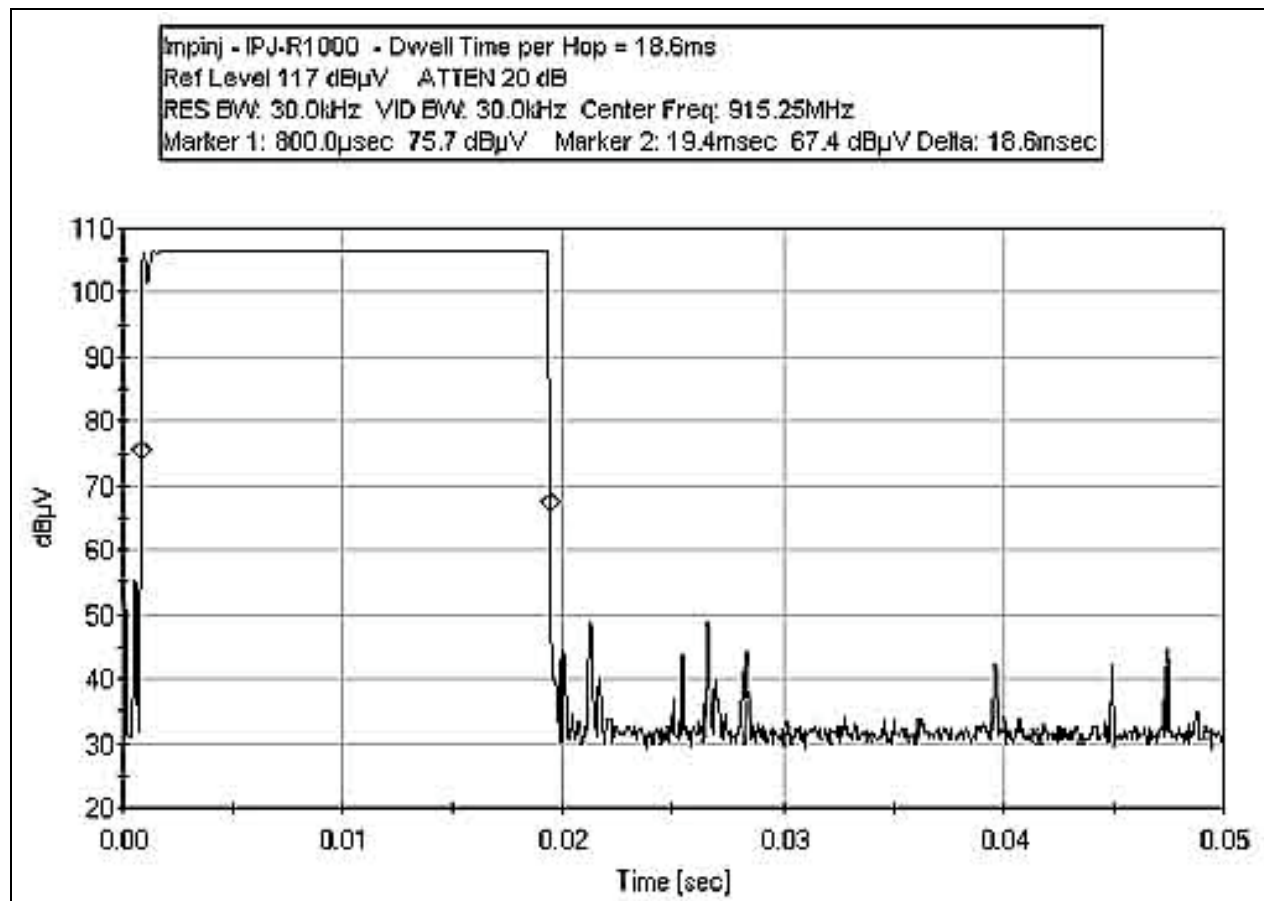
Test Equipment

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
24" SMA Cable (White)	P5183	Pasterneck	NA	1-40GHz_white	122304	122306

Test Setup Photos

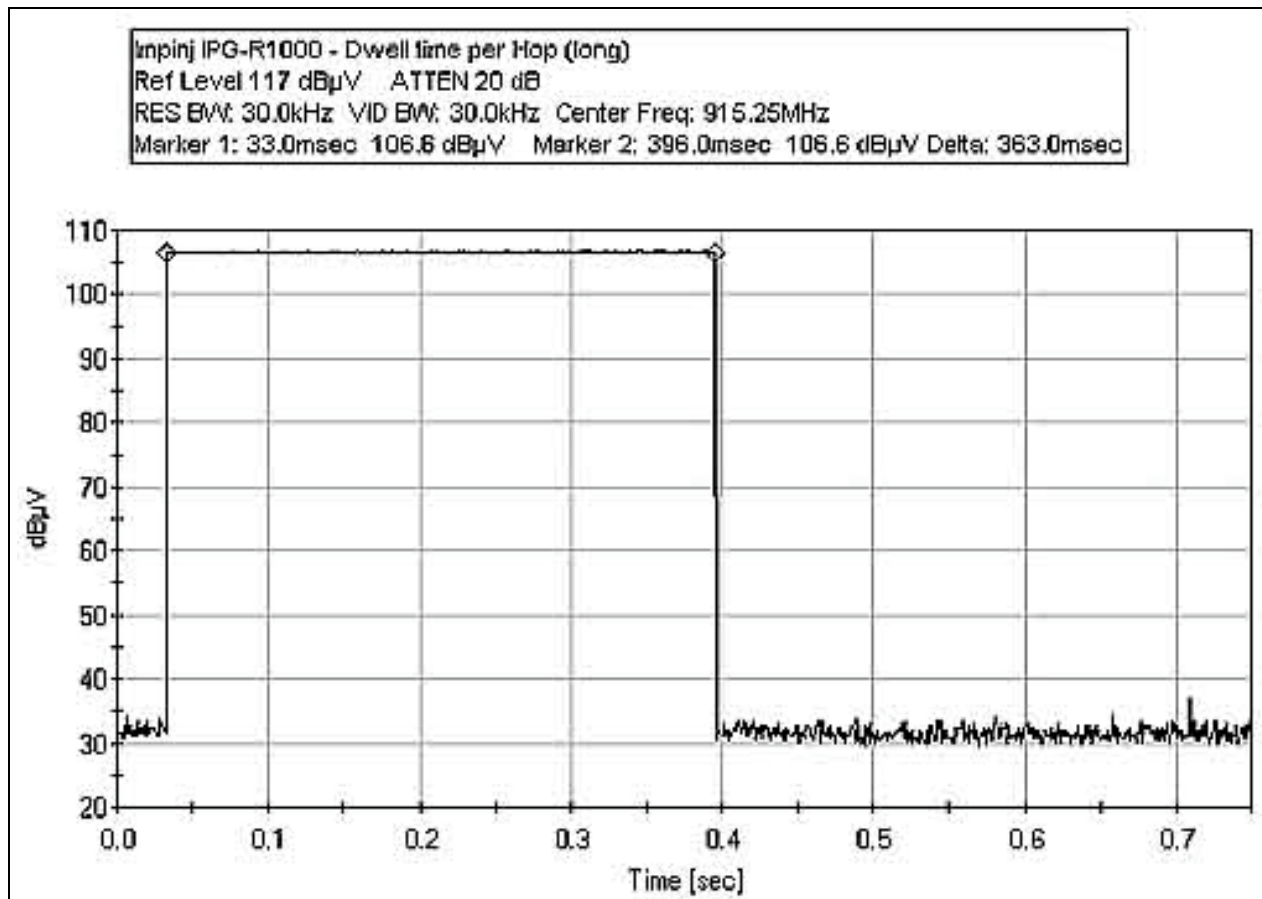


Test Data



Tested By: Septimiu Apahidean

FCC 15.247(a)(1) DWELL TIME PER HOP - LONG



Tested By: Septimiu Apahidean

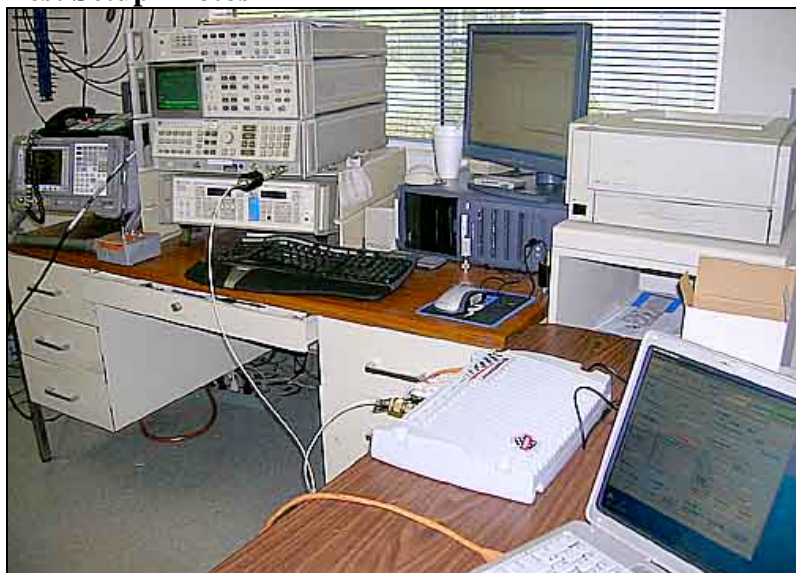
FCC 15.247(a)(1)(i) - AVERAGE TIME OF OCCUPANCY - MIN DWELL

Testing Dates: January 25-26, 2006

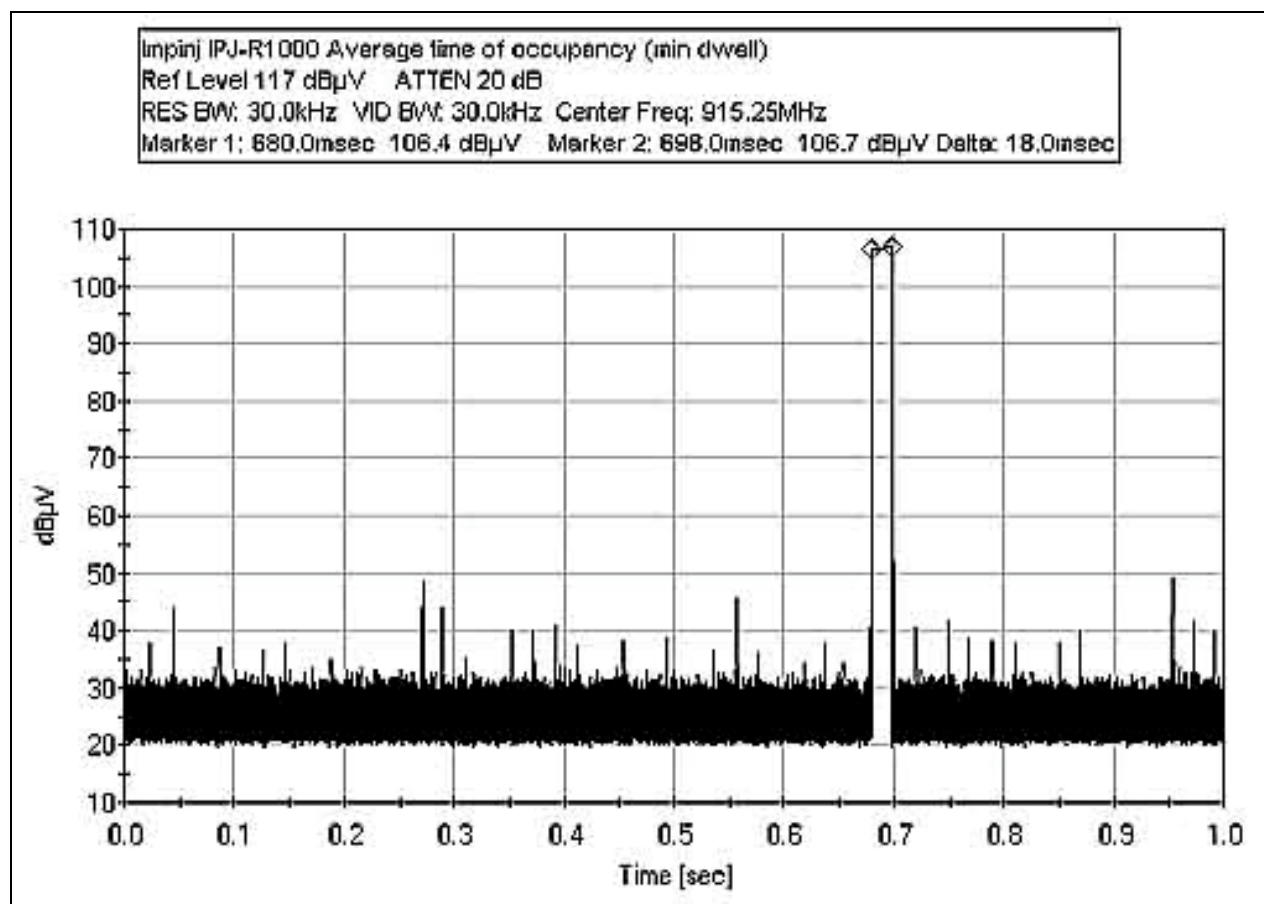
Test Equipment

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
24" SMA Cable (White)	P5183	Pasterneck	NA	1-40GHz_white	122304	122306

Test Setup Photos

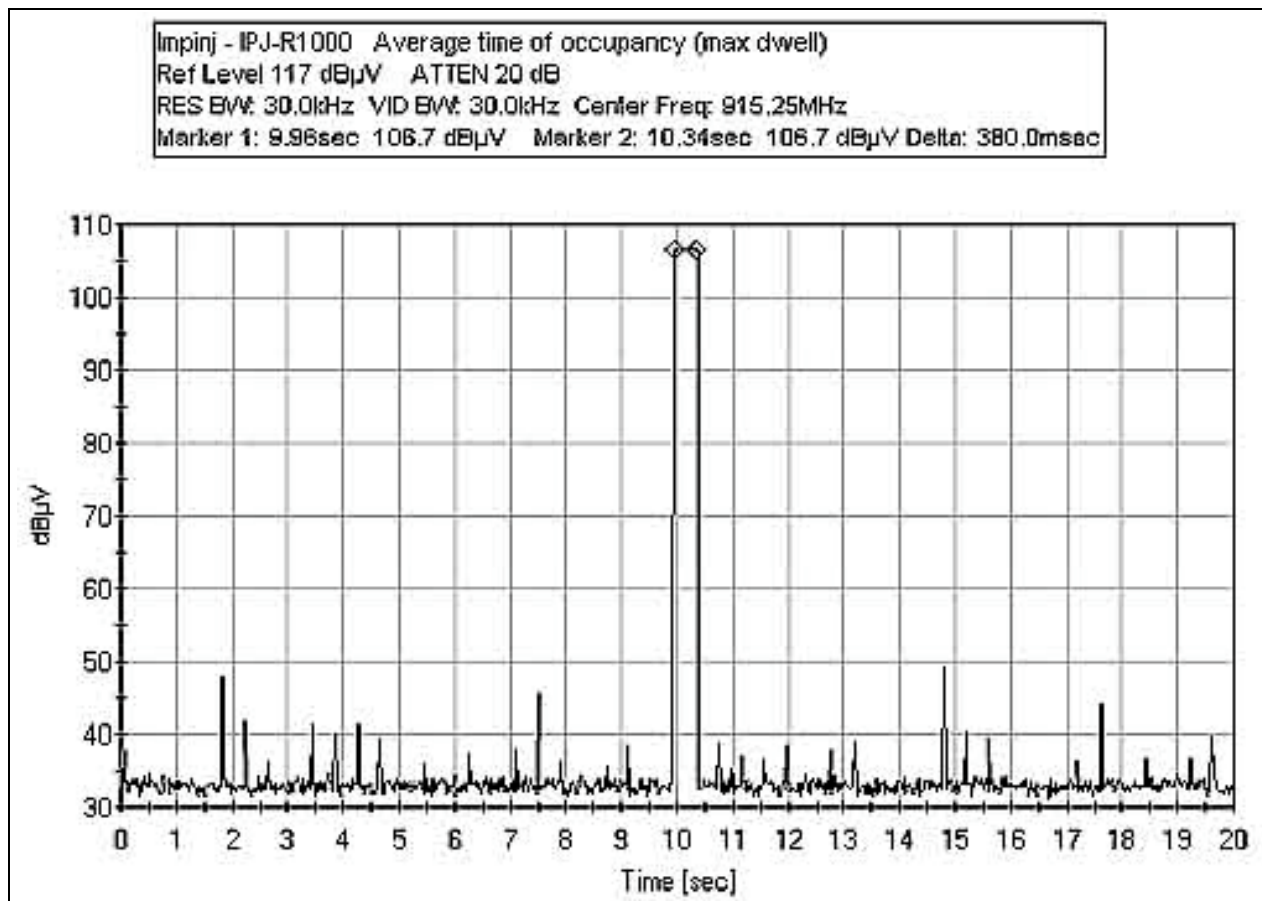


Test Data



Tested By: Septimiu Apahidean

FCC 15.247(a)(1) (i) AVERAGE TIME OF OCCUPANCY - MAX DWELL



Tested By: Septimiu Apahidean

Note: The limit per the standard is 400 milliseconds and this plot shows the unit is compliant at 380 milliseconds.

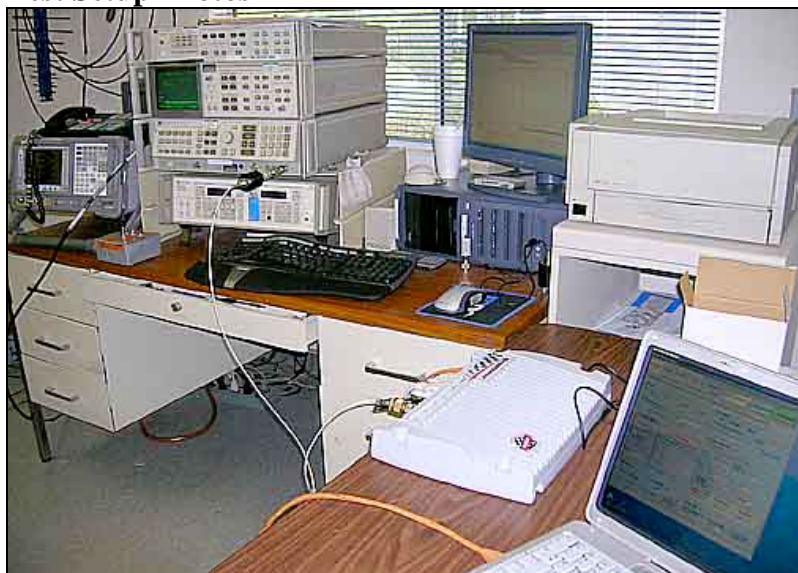
RSS-210 AVERAGE TIME OF OCCUPANCY – 10 SECONDS

Testing Dates: January 25-26, 2006

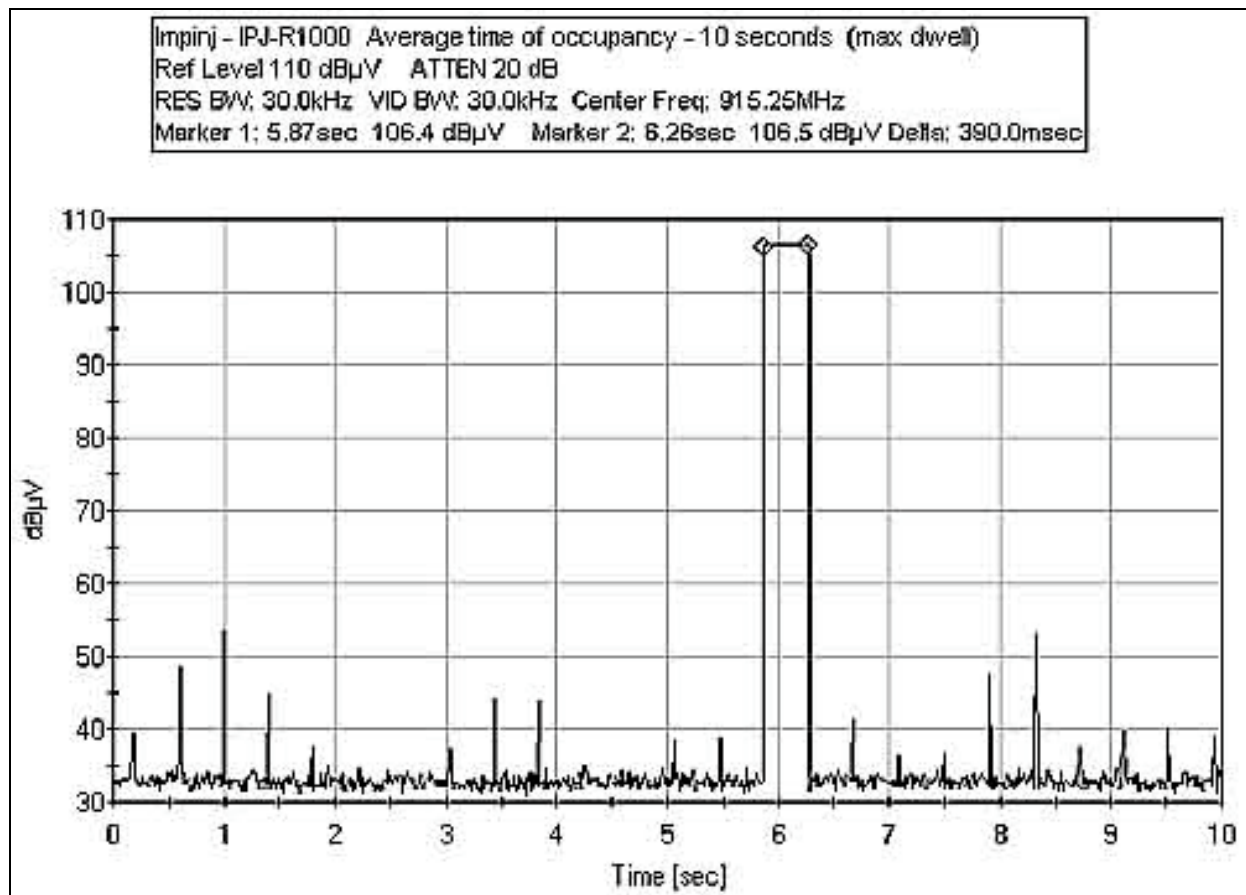
Test Equipment

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
24" SMA Cable (White)	P5183	Pasterneck	NA	1-40GHz_white	122304	122306

Test Setup Photos



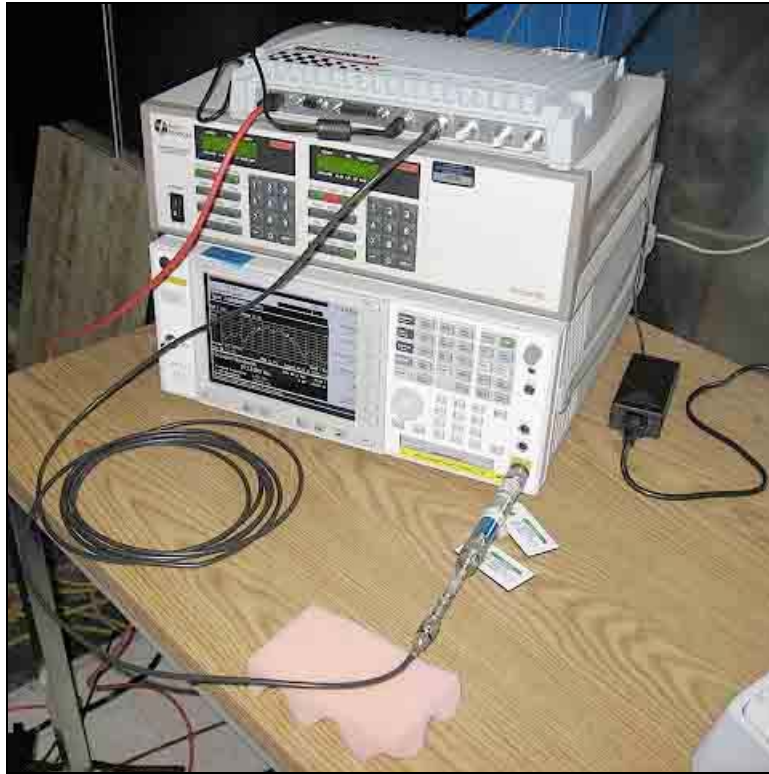
Test Data



Tested By: Septimiu Apahidean

FCC 15.247(a)(1)/RSS GEN - 99% BANDWIDTH

Test Setup Photos



Test Data Sheets

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**

Specification: **15.247(a)(1)**

Work Order #: **86329**

Date: 3/29/2007

Test Type: **Antenna Conducted Emissions**

Time: 12:26:37

Equipment: **RFID Reader Core**

Sequence#: 14

Manufacturer: Impinj

Tested By: Ryan Rutledge

Model: IPJ-R1000-USA-0-01-01

120V 60Hz

S/N: 40306470606

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Narda 20 dB 8 GHz Attenuator		12/21/2005	12/21/2007	ANP05504
Mini-Circuits 6 dB 1.5 GHz Attenuator		05/01/2006	05/01/2008	ANP05505
Weinschel 10 dB 40 GHz Attenuator	C8593	10/03/2005	10/03/2007	AN02136

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB

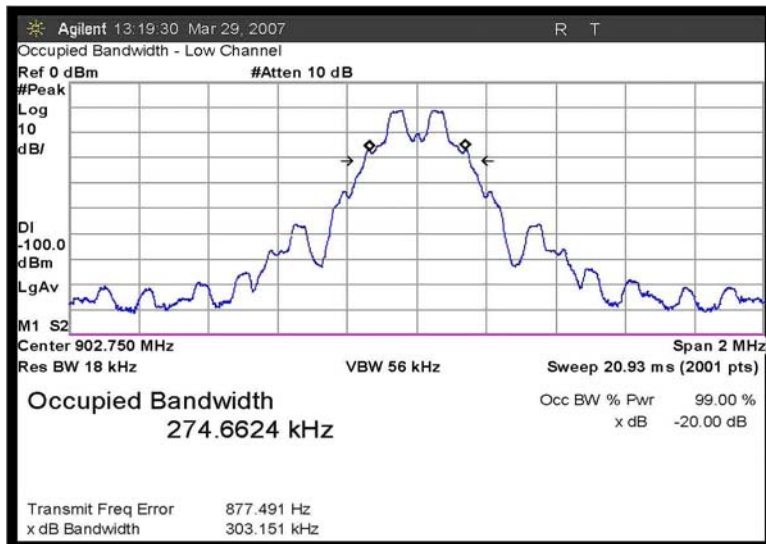
Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

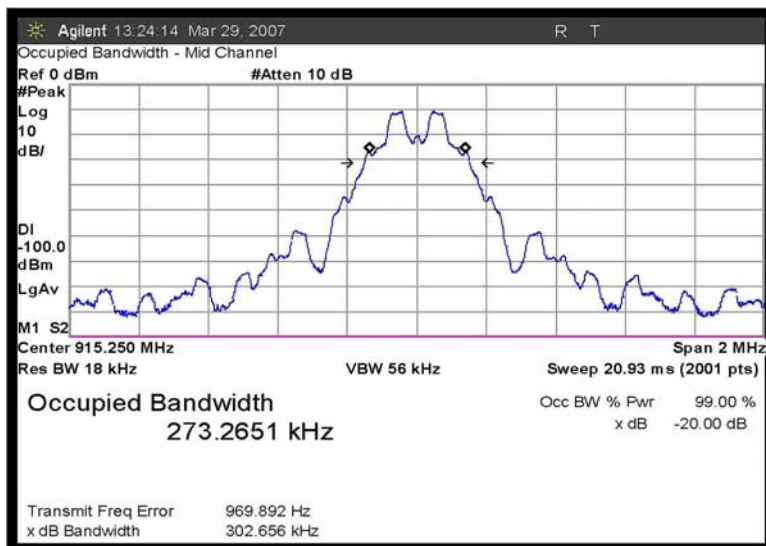
RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuation to spectrum analyzer via provided RF cable. Reader set up in bench area Interrogator transmitting at max power with modulation. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. Measuring Occupied Bandwidth. See plots for results. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz. RBW = 120 kHz; VBW = 120 kHz.

FCC 15.247(a)(1)/RSS GEN 99% BANDWIDTH - LOW CHANNEL



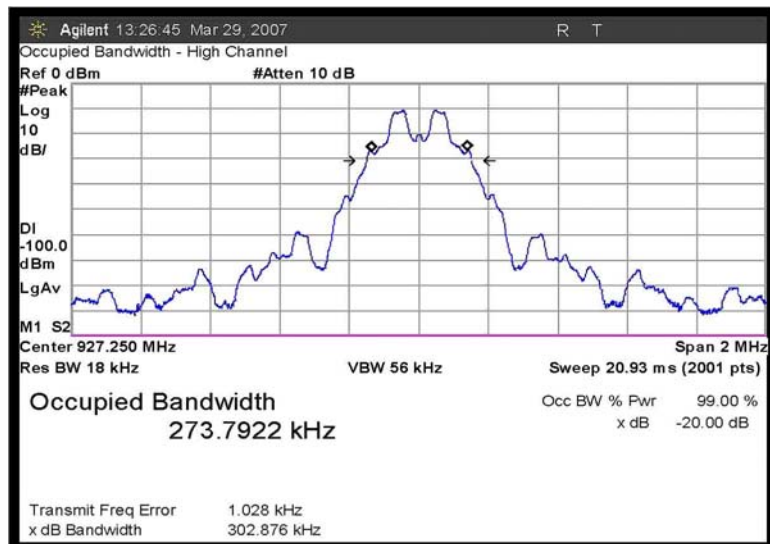
Tested By: Ryan Rutledge

FCC 15.247(a)(1)/RSS GEN 99% BANDWIDTH - MID CHANNEL



Tested By: Ryan Rutledge

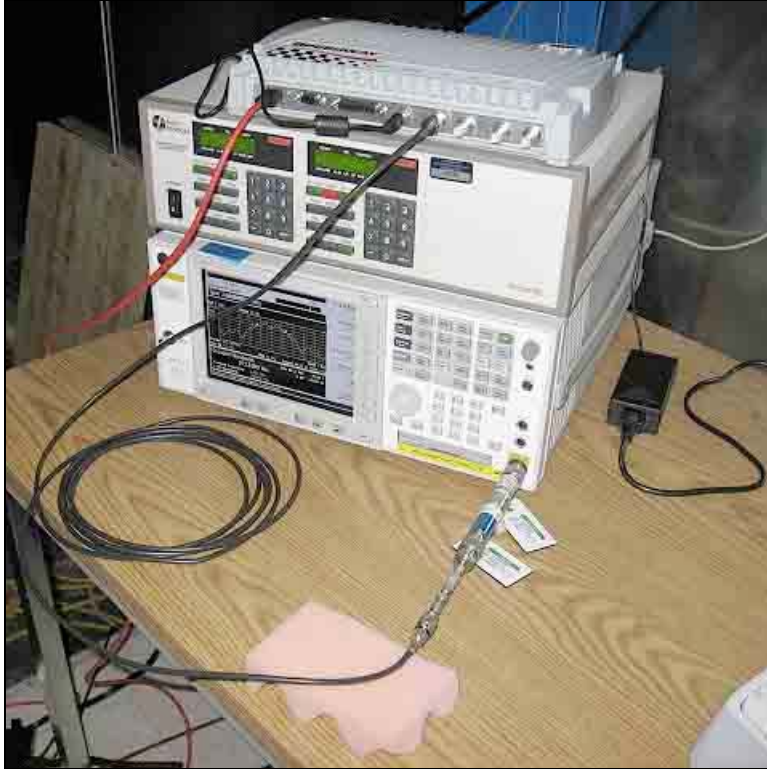
FCC 15.247(a)(1)/RSS GEN 99% BANDWIDTH - HIGH CHANNEL



Tested By: Ryan Rutledge

FCC 15.247(b)(2) – RF POWER OUTPUT

Test Setup Photos



Test Data Sheets

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717
 Customer: **Impinj Inc**
 Specification: **15.247(b)(2)**
 Work Order #: **86329**
 Test Type: **Conducted Emissions**
 Equipment: **RFID Reader Core**
 Manufacturer: Impinj
 Model: IPJ-R1000-USA-0-01-01
 S/N: 40306470606

Date: 3/29/2007
 Time: 12:16:06
 Sequence#: 13
 Tested By: Ryan Rutledge
 120V 60Hz

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Coaxial Attenuator	S/N: C8593	10/03/2005	10/03/2007	AN02136
Mini-Circuits 6 dB		05/01/2006	05/01/2008	ANP05505
1.5 GHz Attenuator				
Narda 20 dB 8 GHz		12/21/2005	12/21/2007	ANP05504
Attenuator				

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Mini-Guardrail)	Impinj	IPJ-A0301-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuation to spectrum analyzer via provided RF cable. Reader set up in bench area. Interrogator transmitting at max power without modulation. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. Measuring RF Power Output. Measuring RF Power Output at nominal voltage and again at 85% and 115% on nominal. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

T1=ATT-ANP05504-122105 - 20 dB up to 8 GHz	T2=ATT-AN02136-100305 - 10 dB up to 40 GHz
T3=ATT-ANP05505-050106 6 dB up to 1.5 GHz	

Measurement Data:

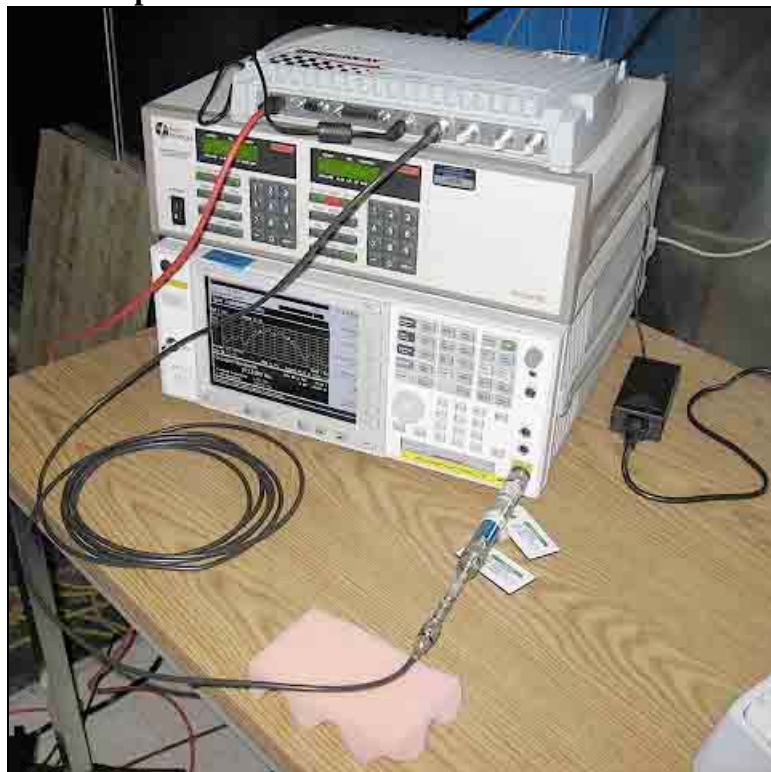
Reading listed by margin.

Test Lead: RF Output port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	927.250M	-5.9	+19.8	+9.9	+6.2	+0.0	30.0	30.0	30.0	+0.0	RF Ou
									High Channel		
2	915.249M	-6.0	+19.8	+9.9	+6.2	+0.0	29.9	29.9	30.0	-0.1	RF Ou
									Mid Channel		
3	902.749M	-6.0	+19.8	+9.9	+6.2	+0.0	29.9	29.9	30.0	-0.1	RF Ou
									Low Channel		

FCC 15.247(d) – OUT-OF-BAND EMISSIONS

Test Setup Photos



Test Data Sheets

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d) Out-of-band emissions 20 dBc**
 Work Order #: **86329** Date: 3/29/2007
 Test Type: **RF Output Measurements** Time: 15:17:41
 Equipment: **RFID Reader Core** Sequence#: 17
 Manufacturer: Impinj Tested By: Ryan Rutledge
 Model: IPJ-R1000-USA-0-01-01 120V 60Hz
 S/N: 40306470606

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Narda 20 dB 8 GHz Attenuator		12/21/2005	12/21/2007	ANP05504
Mini-Circuits 6 dB 1.5 GHz Attenuator		05/01/2006	05/01/2008	ANP05505
Weinschel 3 dB 40 GHz Attenuator	C5332	10/03/2005	10/03/2007	AN02132
Weinschel 3 dB 40 GHz Attenuator	C5335	10/03/2005	10/03/2007	AN02133
Weinschel 10 dB 40 GHz Attenuator	C8593	10/03/2005	10/03/2007	AN02136
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuation to Spectrum analyzer via provided RF cable Reader set up in bench area Interrogator transmitting at max power without modulation. Low Channel: 902.75 MHz. Measuring conducted spurious emissions. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=ATT-ANP05504-122105 - 20 dB up to 8 GHz	T2=ATT-AN02136-100305 - 10 dB up to 40 GHz
T3=ATT-ANP05505-050106 6 dB up to 1.5 GHz	T4=ATT-AN02132-100305 - 3 dB up to 40 GHz
T5=ATT-AN02133-100305 - 3 dB up to 40 GHz	T6=Filter 3GHz HP AN02745

Measurement Data:

Reading listed by margin.

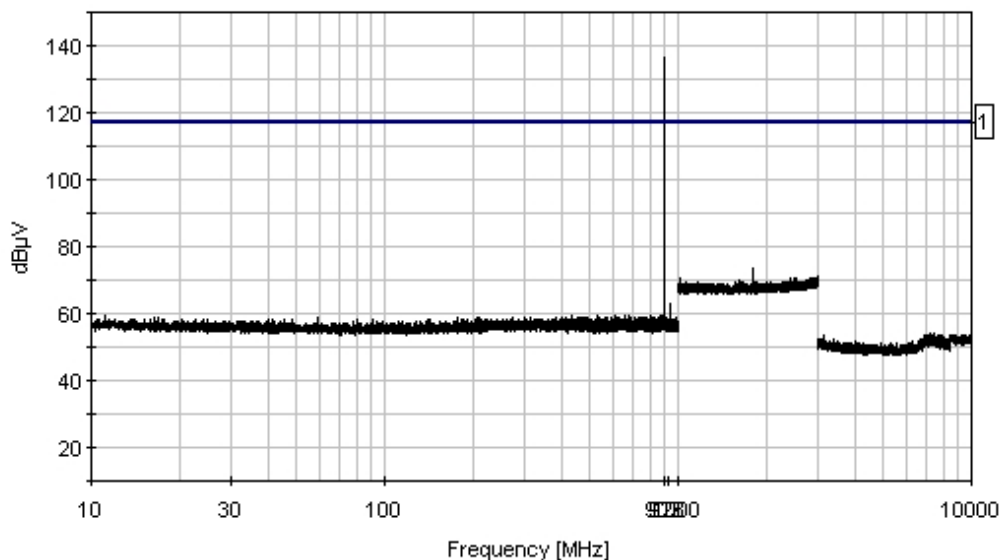
Test Lead: RF Output port

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	902.713M	100.8	+19.8	+9.9	+6.2		+0.0	136.7	117.0	+19.7	RF Ou
Fundamental											
2	1805.496M	38.1	+19.8 +2.8	+9.9	+0.0	+2.9	+0.0	73.5	117.0	-43.5	RF Ou

CKC Laboratories Date: 3/29/2007 Time: 15:17:41 Impinj Inc WO#: 86329

15.247(d) Out-of-band emissions 20 dBc Test Lead: RF Output port 120V 60Hz Sequence#: 17 Polarity: RF Output port

Notes: RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenua



1 - 15.247(d) Out-of-band emissions 20 dBc

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d) Out-of-band emissions 20 dBc**
 Work Order #: **86329**
 Test Type: **RF Output Measurements**
 Equipment: **RFID Reader Core**
 Manufacturer: Impinj
 Model: IPJ-R1000-USA-0-01-01
 S/N: 40306470606

Date: 3/29/2007
 Time: 15:27:29
 Sequence#: 20
 Tested By: Ryan Rutledge
 120V 60Hz

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Narda 20 dB 8 GHz Attenuator		12/21/2005	12/21/2007	ANP05504
Mini-Circuits 6 dB 1.5 GHz Attenuator		05/01/2006	05/01/2008	ANP05505
Weinschel 3 dB 40 GHz Attenuator	C5332	10/03/2005	10/03/2007	AN02132
Weinschel 3 dB 40 GHz Attenuator	C5335	10/03/2005	10/03/2007	AN02133
Weinschel 10 dB 40 GHz Attenuator	C8593	10/03/2005	10/03/2007	AN02136
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuation to Spectrum analyzer via provided RF cable Reader set up in bench area Interrogator transmitting at max power without modulation. Mid Channel: 915.25 MHz. Measuring conducted spurious emissions. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=ATT-ANP05504-122105 - 20 dB up to 8 GHz	T2=ATT-AN02136-100305 - 10 dB up to 40 GHz
T3=ATT-ANP05505-050106 6 dB up to 1.5 GHz	T4=ATT-AN02132-100305 - 3 dB up to 40 GHz
T5=ATT-AN02133-100305 - 3 dB up to 40 GHz	T6=Filter 3GHz HP AN02745

Measurement Data:

Reading listed by margin.

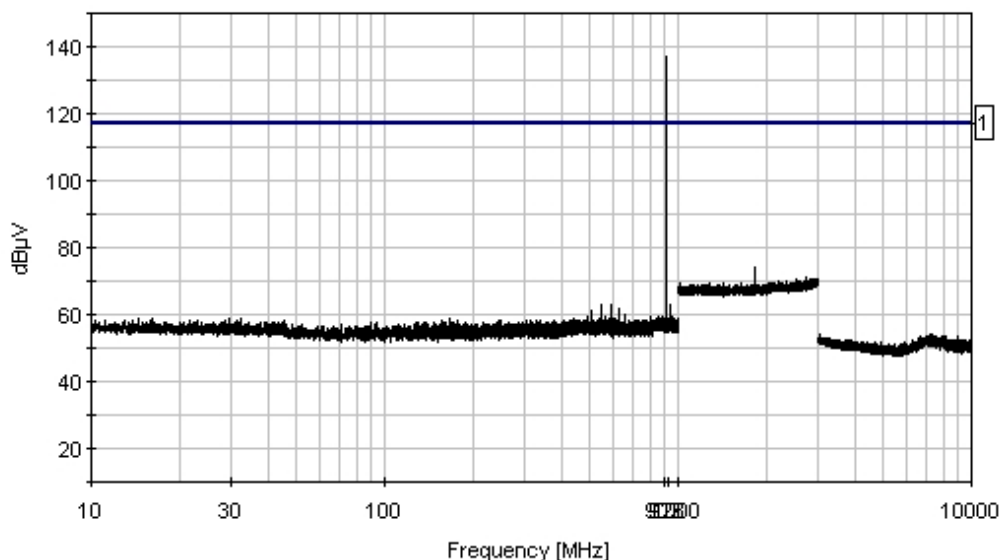
Test Lead: RF Output port

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	915.242M	100.9	+19.8	+9.9	+6.2		+0.0	136.8	117.0	+19.8	RF Ou
									Fundamental		
2	1830.372M	38.5	+19.8 +2.8	+9.9	+0.0	+2.9	+0.0	73.9	117.0	-43.1	RF Ou

CKC Laboratories Date: 3/29/2007 Time: 15:27:29 Impinj Inc WO#: 86329

15.247(d) Out-of-band emissions 20 dBc Test Lead: RF Output port 120V 60Hz Sequence#: 20 Polarity: RF Output port

Notes: RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenua



1 - 15.247(d) Out-of-band emissions 20 dBc

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d) Out-of-band emissions 20 dBc**
 Work Order #: **86329**
 Test Type: **RF Output Measurements**
 Equipment: **RFID Reader Core**
 Manufacturer: Impinj
 Model: IPJ-R1000-USA-0-01-01
 S/N: 40306470606

Date: 3/29/2007
 Time: 15:31:26
 Sequence#: 23
 Tested By: Ryan Rutledge
 120V 60Hz

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
Narda 20 dB 8 GHz Attenuator		12/21/2005	12/21/2007	ANP05504
Mini-Circuits 6 dB 1.5 GHz Attenuator		05/01/2006	05/01/2008	ANP05505
Weinschel 3 dB 40 GHz Attenuator	C5332	10/03/2005	10/03/2007	AN02132
Weinschel 3 dB 40 GHz Attenuator	C5335	10/03/2005	10/03/2007	AN02133
Weinschel 10 dB 40 GHz Attenuator	C8593	10/03/2005	10/03/2007	AN02136
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuation to Spectrum analyzer via provided RF cable Reader set up in bench area Interrogator transmitting at max power without modulation. High Channel: 927.25 MHz. Measuring conducted spurious emissions. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=ATT-ANP05504-122105 - 20 dB up to 8 GHz	T2=ATT-AN02136-100305 - 10 dB up to 40 GHz
T3=ATT-ANP05505-050106 6 dB up to 1.5 GHz	T4=ATT-AN02132-100305 - 3 dB up to 40 GHz
T5=ATT-AN02133-100305 - 3 dB up to 40 GHz	T6=Filter 3GHz HP AN02745

Measurement Data:

Reading listed by margin.

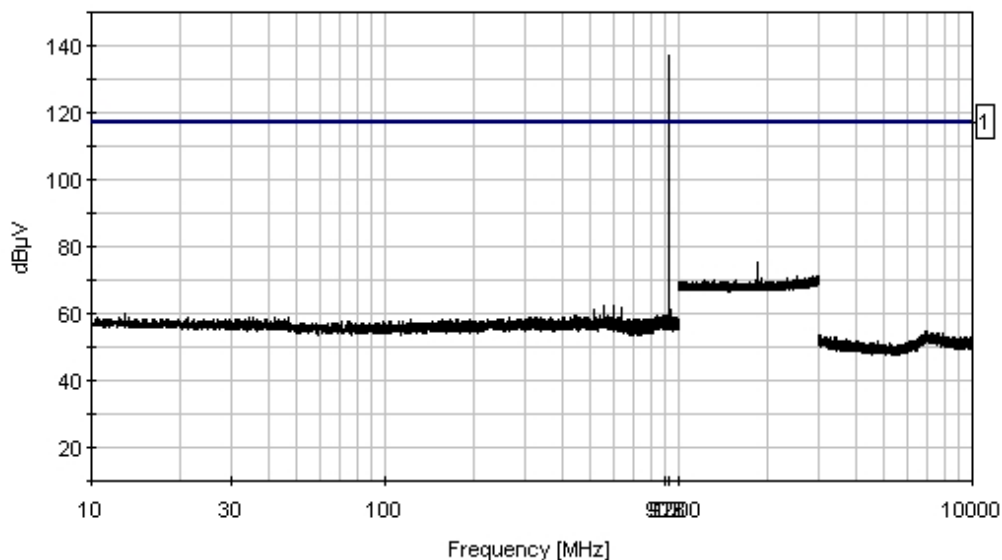
Test Lead: RF Output port

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	927.219M	100.9	+19.8	+9.9	+6.2		+0.0	136.8	117.0	+19.8	RF Ou
Fundamental											
2	1854.609M	39.8	+19.8 +2.8	+9.9	+0.0	+2.9	+0.0	75.2	117.0	-41.8	RF Ou

CKC Laboratories Date: 3/29/2007 Time: 15:31:26 Impinj Inc WO#: 86329

15.247(d) Out-of-band emissions 20 dBc Test Lead: RF Output port 120V 60Hz Sequence#: 23 Polarity: RF Output port

Notes: RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected with suitable attenuator



1 - 15.247(d) Out-of-band emissions 20 dBc

FCC 15.247(d) - BAND EDGE

Test Setup Photos



Brickyard



Cushcraft

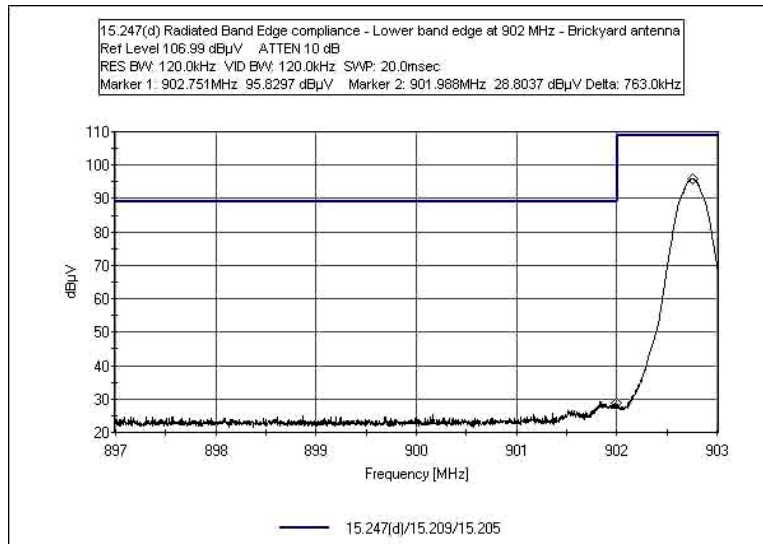


Guardwall



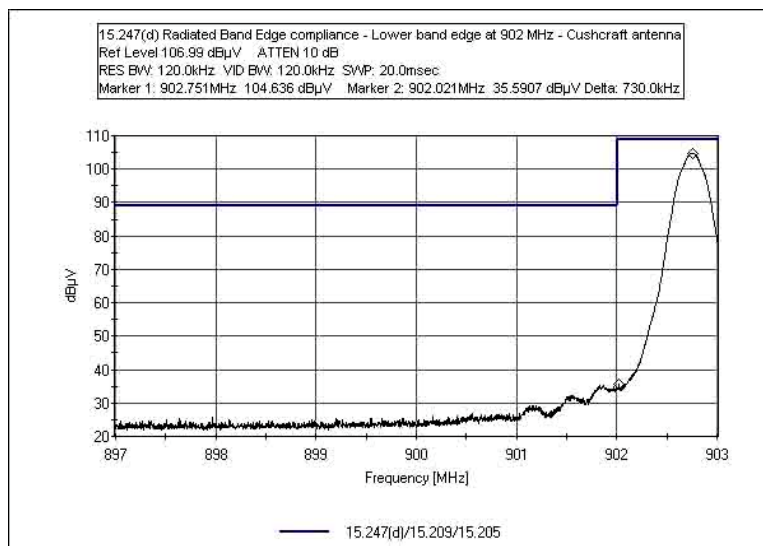
Mini-Guardrail

FCC 15.247(d) BAND EDGE - LOWER BAND 902MHz - BRICKYARD



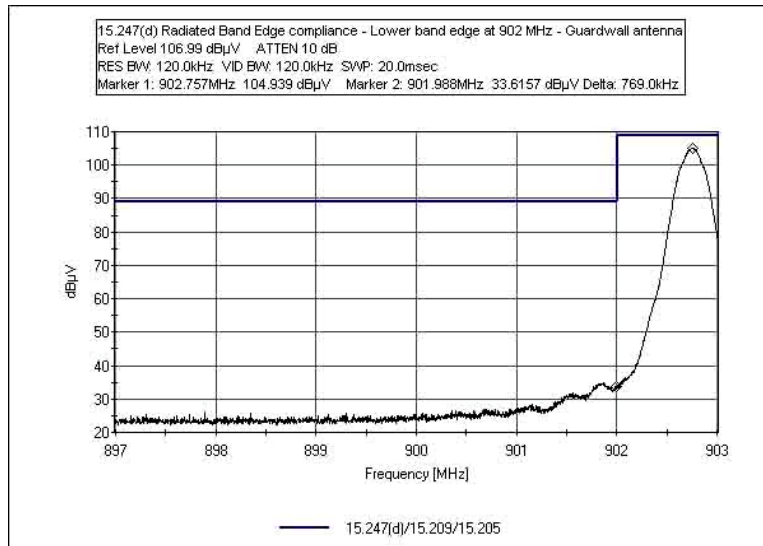
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - LOWER BAND 902MHz - CUSHCRAFT



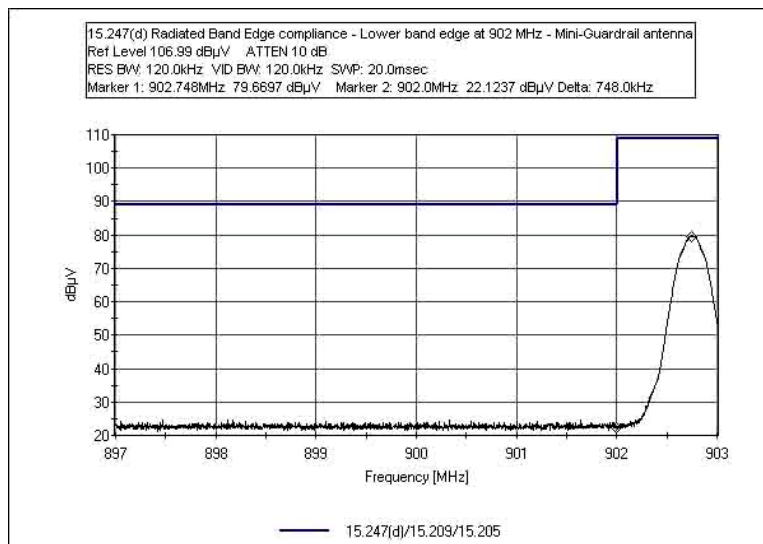
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - LOWER BAND 902MHz - GUARDWALL



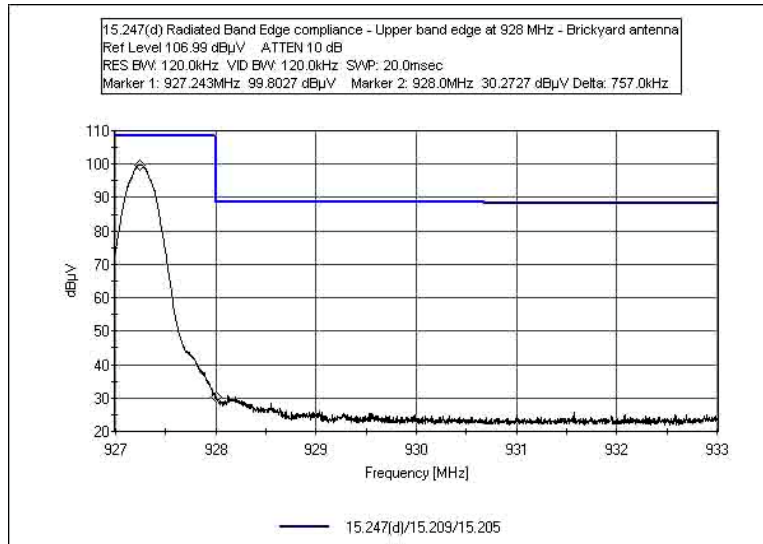
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - LOWER BAND 902MHz - MINI-GUARDRAIL



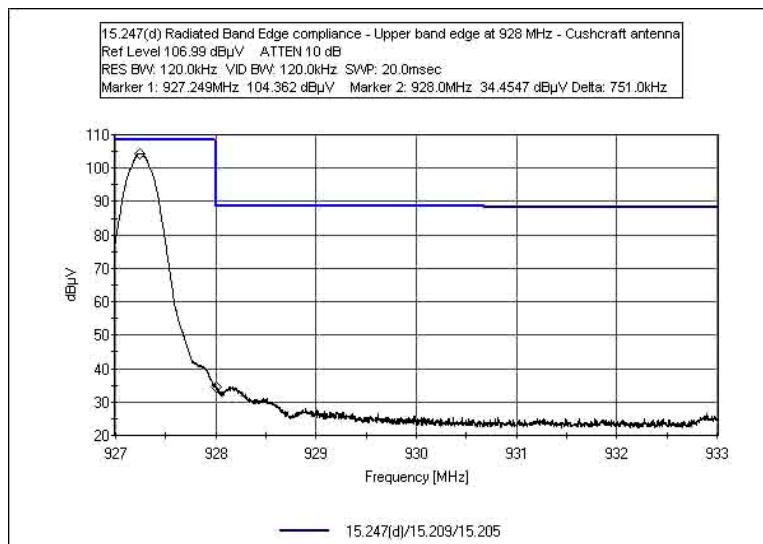
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - UPPER BAND 928MHz - BRICKYARD



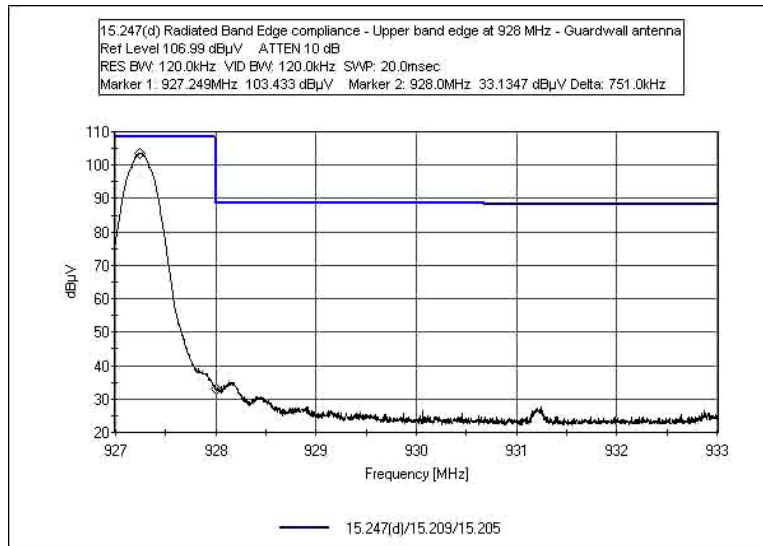
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - UPPER BAND 928MHz - CUSHCRAFT



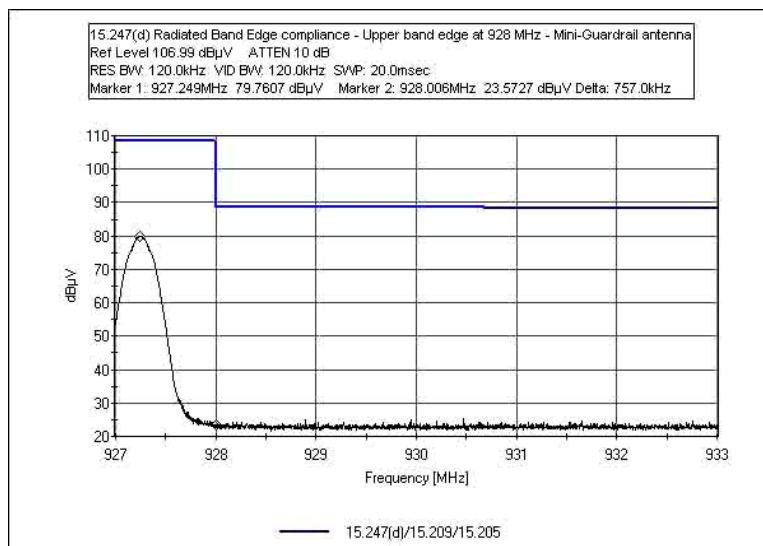
Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - UPPER BAND 928MHz - GUARDWALL



Tested By: Ryan Rutledge

FCC 15.247(d) BAND EDGE - UPPER BAND 928MHz - MINI-GUARDRAIL



Tested By: Ryan Rutledge

FCC 15.247(d)/15.209/15.205 – OATS RADIATED SPURIOUS EMISSIONS

Test Setup Photos



Brickyard



Cushcraft



Guardwall



Mini-Guardrail

Test Data Sheets

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: Impinj
 Model: IPJ-R1000-USA-0-01-01
 S/N: 40306470606

Date: 3/28/2007
 Time: 23:58:08
 Sequence#: 5
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993
EMCO 6502 Active Loop	S/N: 2156	02/20/2006	02/20/2008	AN00052
HP 83017A .5 - 26.5 GHz Pre-amp	S/N: 3123A00464	10/03/2005	10/03/2007	AN01271
30' Andrews Helix 18 GHz	S/N: N/A	06/19/2006	06/19/2008	AN05545
120" Pasternack 40 GHz Coax	S/N: N/A	05/10/2006	05/10/2008	AN05425
60" Pasternack 40 GHz Coax	S/N: N/A	05/11/2006	05/11/2008	AN05423
EMCO 3115 Horn Ant	S/N: 9606-4854	12/13/2005	12/13/2007	AN01412
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745
1 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02750

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Guardwall)	Impinj	IPJ-A0401-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Guardwall antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=AMP-AN01271-100305 - .5-26.5 GHz	T2=CAB-ANP05545-061906
T3=CAB-ANP05425-051006	T4=ANT-AN01412-121305
T5=CAB-ANP05423-051006	T6=Filter 3GHz HP AN02745
T7=Filter 1GHz HP AN02750	

Measurement Data:		Reading listed by margin.					Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5 dB	T6 dB	T7 dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	2781.765M	39.4	-33.6	+2.6	+4.2	+29.5	+0.0	50.4	54.0	-3.6	Horiz
	Ave		+2.4	+5.9	+0.0		351		High Channel		100
^	2781.750M	43.8	-33.6	+2.6	+4.2	+29.5	+0.0	54.8	54.0	+0.8	Horiz
			+2.4	+5.9	+0.0		351		High Channel		100
3	1854.498M	27.8	+0.0	+2.0	+3.5	+26.2	-10.0	49.8	54.0	-4.2	Horiz
	Ave		+0.0	+0.0	+0.3		355		High, 1m distance, no pre-amp		100
^	1854.562M	34.9	+0.0	+2.0	+3.5	+26.2	-10.0	56.9	54.0	+2.9	Horiz
			+0.0	+0.0	+0.3		355		High, 1m distance, no pre-amp		100
5	1830.508M	24.5	+0.0	+2.0	+3.5	+26.2	-10.0	46.6	54.0	-7.4	Horiz
	Ave		+0.0	+0.0	+0.4		360		Mid, 1m distance, no pre-amp		100
^	1830.600M	33.0	+0.0	+2.0	+3.5	+26.2	-10.0	55.1	54.0	+1.1	Horiz
			+0.0	+0.0	+0.4		360		Mid, 1m distance, no pre-amp		100
7	1805.495M	21.8	+0.0	+2.0	+3.4	+26.2	-10.0	43.8	54.0	-10.2	Horiz
	Ave		+0.0	+0.0	+0.4				Low, 1m distance, no pre-amp		100
^	1805.410M	32.6	+0.0	+2.0	+3.4	+26.2	-10.0	54.6	54.0	+0.6	Horiz
			+0.0	+0.0	+0.4				Low, 1m distance, no pre-amp		100
9	1854.490M	15.7	+0.0	+2.0	+3.5	+26.2	-10.0	37.7	54.0	-16.3	Vert
	Ave		+0.0	+0.0	+0.3				High, 1m distance, no pre-amp		100
^	1854.500M	27.1	+0.0	+2.0	+3.4	+26.2	-10.0	49.1	54.0	-4.9	Vert
			+0.0	+0.0	+0.4				High, 1m distance, no pre-amp		100
11	3661.000M	28.5	-33.2	+3.0	+4.8	+31.5	+0.0	37.6	54.0	-16.4	Vert
	Ave		+2.7	+0.3	+0.0		20		Mid Channel		100
^	3661.000M	39.3	-33.2	+3.0	+4.8	+31.5	+0.0	48.4	54.0	-5.6	Vert
			+2.7	+0.3	+0.0		20		Mid Channel		100
13	1805.502M	14.1	+0.0	+2.0	+3.4	+26.2	-10.0	36.1	54.0	-17.9	Vert
	Ave		+0.0	+0.0	+0.4				Low, 1m distance, no pre-amp		100
^	1805.410M	25.5	+0.0	+2.0	+3.4	+26.2	-10.0	47.5	54.0	-6.5	Vert
			+0.0	+0.0	+0.4				Low, 1m distance, no pre-amp		100

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 01:37:07
 Sequence#: 4
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993
EMCO 6502 Active Loop	S/N: 2156	02/20/2006	02/20/2008	AN00052
HP 83017A .5 - 26.5 GHz Pre-amp	S/N: 3123A00464	10/03/2005	10/03/2007	AN01271
30' Andrews Helix 18 GHz	S/N: N/A	06/19/2006	06/19/2008	AN05545
120" Pasternack 40 GHz Coax	S/N: N/A	05/10/2006	05/10/2008	AN05425
60" Pasternack 40 GHz Coax	S/N: N/A	05/11/2006	05/11/2008	AN05423
EMCO 3115 Horn Ant	S/N: 9606-4854	12/13/2005	12/13/2007	AN01412
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745
1 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02750

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna	Cushcraft	S9028PCLJ	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Cushcraft antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=AMP-AN01271-100305 - .5-26.5 GHz	T2=CAB-ANP05545-061906
T3=CAB-ANP05425-051006	T4=ANT-AN01412-121305
T5=CAB-ANP05423-051006	T6=Filter 3GHz HP AN02745
T7=Filter 1GHz HP AN02750	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1854.510M Ave	28.9	+0.0 +0.0	+2.0 +0.0	+3.5 +0.3	+26.2	-10.0	50.9	54.0 High, 1m distance, no pre-amp	-3.1	Vert 100
^	1854.540M	38.0	+0.0 +0.0	+2.0 +0.0	+3.5 +0.3	+26.2	-10.0	60.0	54.0 High, 1m distance, no pre-amp	+6.0	Vert 100
3	1830.502M Ave	27.8	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0	49.9	54.0 Mid, 1m distance, no pre-amp	-4.1	Vert 100
^	1830.495M	36.1	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0	58.2	54.0 Mid, 1m distance, no pre-amp	+4.2	Vert 100
5	1854.495M Ave	27.5	+0.0 +0.0	+2.0 +0.0	+3.5 +0.3	+26.2	-10.0 360	49.5	54.0 High, 1m distance, no pre-amp	-4.5	Horiz 100
^	1854.510M	34.0	+0.0 +0.0	+2.0 +0.0	+3.5 +0.3	+26.2	-10.0 360	56.0	54.0 High, 1m distance, no pre-amp	+2.0	Horiz 100
7	1805.505M Ave	27.3	+0.0 +0.0	+2.0 +0.0	+3.4 +0.4	+26.2	-10.0	49.3	54.0 Low, 1m distance, no pre-amp	-4.7	Vert 100
^	1805.580M	35.8	+0.0 +0.0	+2.0 +0.0	+3.4 +0.4	+26.2	-10.0	57.8	54.0 Low, 1m distance, no pre-amp	+3.8	Vert 100
9	1830.515M Ave	26.3	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0 336	48.4	54.0 Mid, 1m distance, no pre-amp	-5.6	Horiz 100
^	1830.582M	31.4	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0 336	53.5	54.0 Mid, 1m distance, no pre-amp	-0.5	Horiz 100
11	2708.265M Ave	29.2	-33.7 +2.3	+2.5 +12.6	+4.2 +0.0	+29.4	+0.0 336	46.5	54.0 Low Channel	-7.5	Vert 100
^	2708.250M	40.6	-33.7 +2.3	+2.5 +12.6	+4.2 +0.0	+29.4	+0.0 336	57.9	54.0 Low Channel	+3.9	Vert 100
13	2781.762M Ave	35.2	-33.6 +2.4	+2.6 +5.9	+4.2 +0.0	+29.5	+0.0 356	46.2	54.0 High Channel	-7.8	Vert 105
^	2781.750M	41.6	-33.6 +2.4	+2.6 +5.9	+4.2 +0.0	+29.5	+0.0 356	52.6	54.0 High Channel	-1.4	Vert 105

15	2708.252M	28.6	-33.7	+2.5	+4.2	+29.4	+0.0	45.9	54.0	-8.1	Horiz
	Ave		+2.3	+12.6	+0.0		312		Low Channel		100
^	2708.250M	40.2	-33.7	+2.5	+4.2	+29.4	+0.0	57.5	54.0	+3.5	Horiz
			+2.3	+12.6	+0.0		312		Low Channel		100
17	1805.510M	21.8	+0.0	+2.0	+3.4	+26.2	-10.0	43.8	54.0	-10.2	Horiz
	Ave		+0.0	+0.0	+0.4		319		Low, 1m distance, no pre-amp		100
^	1805.428M	28.5	+0.0	+2.0	+3.4	+26.2	-10.0	50.5	54.0	-3.5	Horiz
			+0.0	+0.0	+0.4		319		Low, 1m distance, no pre-amp		100
19	2781.755M	30.6	-33.6	+2.6	+4.2	+29.5	+0.0	41.6	54.0	-12.4	Horiz
	Ave		+2.4	+5.9	+0.0		291		High Channel		105
^	2781.750M	39.7	-33.6	+2.6	+4.2	+29.5	+0.0	50.7	54.0	-3.3	Horiz
			+2.4	+5.9	+0.0		291		High Channel		105
21	5416.498M	25.6	-33.1	+3.9	+5.8	+34.3	+0.0	40.1	54.0	-13.9	Vert
	Ave		+3.4	+0.2	+0.0		28		Low Channel		100
^	5416.500M	37.3	-33.1	+3.9	+5.8	+34.3	+0.0	51.8	54.0	-2.2	Vert
			+3.4	+0.2	+0.0		28		Low Channel		100
23	3611.015M	29.3	-33.2	+3.0	+4.8	+31.3	+0.0	38.3	54.0	-15.7	Vert
	Ave		+2.7	+0.4	+0.0		323		Low Channel		100
^	3611.000M	40.4	-33.2	+3.0	+4.8	+31.3	+0.0	49.4	54.0	-4.6	Vert
			+2.7	+0.4	+0.0		323		Low Channel		100
25	3660.995M	28.5	-33.2	+3.0	+4.8	+31.5	+0.0	37.6	54.0	-16.4	Vert
	Ave		+2.7	+0.3	+0.0		27		Mid Channel		100
^	3661.000M	39.1	-33.2	+3.0	+4.8	+31.5	+0.0	48.2	54.0	-5.8	Vert
			+2.7	+0.3	+0.0		27		Mid Channel		100
27	4636.265M	25.4	-33.1	+3.6	+5.4	+32.8	+0.0	37.5	54.0	-16.5	Vert
	Ave		+3.1	+0.3	+0.0		17		High Channel		105
^	4636.250M	37.2	-33.1	+3.6	+5.4	+32.8	+0.0	49.3	54.0	-4.7	Vert
			+3.1	+0.3	+0.0		17		High Channel		105

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 00:44:42
 Sequence#: 6
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993
EMCO 6502 Active Loop	S/N: 2156	02/20/2006	02/20/2008	AN00052
HP 83017A .5 - 26.5 GHz Pre-amp	S/N: 3123A00464	10/03/2005	10/03/2007	AN01271
30' Andrews Helix 18 GHz	S/N: N/A	06/19/2006	06/19/2008	AN05545
120" Pasternack 40 GHz Coax	S/N: N/A	05/10/2006	05/10/2008	AN05425
60" Pasternack 40 GHz Coax	S/N: N/A	05/11/2006	05/11/2008	AN05423
EMCO 3115 Horn Ant	S/N: 9606-4854	12/13/2005	12/13/2007	AN01412
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745
1 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02750

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Brickyard)	Impinj	IPJ-A0400-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Brickyard antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz

Transducer Legend:

T1=AMP-AN01271-100305 - .5-26.5 GHz	T2=CAB-ANP05545-061906
T3=CAB-ANP05425-051006	T4=ANT-AN01412-121305
T5=CAB-ANP05423-051006	T6=Filter 3GHz HP AN02745
T7=Filter 1GHz HP AN02750	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2745.755M	34.8	-33.6	+2.5	+4.2	+29.5	+0.0	48.8	54.0	-5.2	Vert
	Ave		+2.3	+9.1	+0.0		334		Mid Channel		100
^	2745.750M	41.8	-33.6	+2.5	+4.2	+29.5	+0.0	55.8	54.0	+1.8	Vert
			+2.3	+9.1	+0.0		334		Mid Channel		100
3	2745.748M	34.4	-33.6	+2.5	+4.2	+29.5	+0.0	48.4	54.0	-5.6	Horiz
	Ave		+2.3	+9.1	+0.0		289		Mid Channel		100
^	2745.750M	42.4	-33.6	+2.5	+4.2	+29.5	+0.0	56.4	54.0	+2.4	Horiz
			+2.3	+9.1	+0.0		289		Mid Channel		100
5	2781.752M	34.2	-33.6	+2.6	+4.2	+29.5	+0.0	45.2	54.0	-8.8	Horiz
	Ave		+2.4	+5.9	+0.0		300		High Channel		100
^	2781.750M	41.9	-33.6	+2.6	+4.2	+29.5	+0.0	52.9	54.0	-1.1	Horiz
			+2.4	+5.9	+0.0		300		High Channel		100
7	2781.748M	34.1	-33.6	+2.6	+4.2	+29.5	+0.0	45.1	54.0	-8.9	Vert
	Ave		+2.4	+5.9	+0.0				High Channel		100
^	2781.750M	41.3	-33.6	+2.6	+4.2	+29.5	+0.0	52.3	54.0	-1.7	Vert
			+2.4	+5.9	+0.0				High Channel		100
9	1854.510M	22.9	+0.0	+2.0	+3.5	+26.2	-10.0	44.9	54.0	-9.1	Horiz
	Ave		+0.0	+0.0	+0.3				High, 1m distance, no pre-amp		130
^	1854.518M	33.0	+0.0	+2.0	+3.5	+26.2	-10.0	55.0	54.0	+1.0	Horiz
			+0.0	+0.0	+0.3				High, 1m distance, no pre-amp		130
11	1854.510M	22.0	+0.0	+2.0	+3.5	+26.2	-10.0	44.0	54.0	-10.0	Vert
	Ave		+0.0	+0.0	+0.3		10		High, 1m distance, no pre-amp		135
^	1854.575M	30.6	+0.0	+2.0	+3.5	+26.2	-10.0	52.6	54.0	-1.4	Vert
			+0.0	+0.0	+0.3		10		High, 1m distance, no pre-amp		135
13	1805.485M	21.9	+0.0	+2.0	+3.4	+26.2	-10.0	43.9	54.0	-10.1	Vert
	Ave		+0.0	+0.0	+0.4		35		Low, 1m distance, no pre-amp		140
^	1805.525M	28.3	+0.0	+2.0	+3.4	+26.2	-10.0	50.3	54.0	-3.7	Vert
			+0.0	+0.0	+0.4		35		Low, 1m distance, no pre-amp		140
15	1830.510M	20.1	+0.0	+2.0	+3.5	+26.2	-10.0	42.2	54.0	-11.8	Vert
	Ave		+0.0	+0.0	+0.4		35		Mid, 1m distance, no pre-amp		135
^	1830.566M	31.5	+0.0	+2.0	+3.5	+26.2	-10.0	53.6	54.0	-0.4	Vert
			+0.0	+0.0	+0.4		35		Mid, 1m distance, no pre-amp		135

17	1830.498M Ave	18.7	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0	40.8	54.0 Mid, 1m distance, no pre-amp	-13.2	Horiz 135
^	1830.505M	27.0	+0.0 +0.0	+2.0 +0.0	+3.5 +0.4	+26.2	-10.0	49.1	54.0 Mid, 1m distance, no pre-amp	-4.9	Horiz 135
19	3661.005M Ave	29.6	-33.2 +2.7	+3.0 +0.3	+4.8 +0.0	+31.5	+0.0 358	38.7	54.0 Mid Channel	-15.3	Vert 100
^	3661.000M	39.9	-33.2 +2.7	+3.0 +0.3	+4.8 +0.0	+31.5	+0.0 358	49.0	54.0 Mid Channel	-5.0	Vert 100
21	3611.015M Ave	28.9	-33.2 +2.7	+3.0 +0.4	+4.8 +0.0	+31.3	+0.0 335	37.9	54.0 Low Channel	-16.1	Vert 100
^	3611.000M	39.5	-33.2 +2.7	+3.0 +0.4	+4.8 +0.0	+31.3	+0.0 335	48.5	54.0 Low Channel	-5.5	Vert 100
23	3661.032M Ave	27.3	-33.2 +2.7	+3.0 +0.3	+4.8 +0.0	+31.5	+0.0 343	36.4	54.0 Mid Channel	-17.6	Horiz 100
^	3661.000M	39.0	-33.2 +2.7	+3.0 +0.3	+4.8 +0.0	+31.5	+0.0 343	48.1	54.0 Mid Channel	-5.9	Horiz 100

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/28/2007
 Time: 23:28:32
 Sequence#: 7
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993
EMCO 6502 Active Loop	S/N: 2156	02/20/2006	02/20/2008	AN00052
HP 83017A .5 - 26.5 GHz Pre-amp	S/N: 3123A00464	10/03/2005	10/03/2007	AN01271
30' Andrews Helix 18 GHz	S/N: N/A	06/19/2006	06/19/2008	AN05545
120" Pasternack 40 GHz Coax	S/N: N/A	05/10/2006	05/10/2008	AN05425
60" Pasternack 40 GHz Coax	S/N: N/A	05/11/2006	05/11/2008	AN05423
EMCO 3115 Horn Ant	S/N: 9606-4854	12/13/2005	12/13/2007	AN01412
2.8 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02745
1 GHz HP Filter	S/N: 2	03/07/2006	03/07/2008	AN02750

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Mini-Guardrail)	Impinj	IPJ-A0301-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Mini-guardrail antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Low Channel: 902.75 MHz, Mid Channel: 915.25 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 10 MHz - 10 GHz. 10 - 30 MHz: RBW = 9 kHz; VBW = 9 kHz 30 - 1000 MHz: RBW = 120 kHz; VBW = 120 kHz 1 - 10 GHz: RBW = 1 MHz; VBW = 1 MHz.

Transducer Legend:

T1=AMP-AN01271-100305 - .5-26.5 GHz	T2=CAB-ANP05545-061906
T3=CAB-ANP05425-051006	T4=ANT-AN01412-121305
T5=CAB-ANP05423-051006	T6=Filter 3GHz HP AN02745
T7=Filter 1GHz HP AN02750	

Measurement Data:		Reading listed by margin.					Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5 dB	T6 dB	T7 dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	2745.768M	34.8	-33.6	+2.5	+4.2	+29.5	+0.0	48.8	54.0	-5.2	Horiz
	Ave		+2.3	+9.1	+0.0		3		Mid Channel		105
^	2745.780M	42.4	-33.6	+2.5	+4.2	+29.5	+0.0	56.4	54.0	+2.4	Horiz
			+2.3	+9.1	+0.0		3		Mid Channel		105
3	2708.272M	29.7	-33.7	+2.5	+4.2	+29.4	+0.0	47.0	54.0	-7.0	Horiz
	Ave		+2.3	+12.6	+0.0		329		Low Channel		105
^	2708.305M	39.6	-33.7	+2.5	+4.2	+29.4	+0.0	56.9	54.0	+2.9	Horiz
			+2.3	+12.6	+0.0		329		Low Channel		105
5	2781.775M	36.0	-33.6	+2.6	+4.2	+29.5	+0.0	47.0	54.0	-7.0	Horiz
	Ave		+2.4	+5.9	+0.0		356		High Channel		105
^	2781.740M	42.1	-33.6	+2.6	+4.2	+29.5	+0.0	53.1	54.0	-0.9	Horiz
			+2.4	+5.9	+0.0		356		High Channel		105
7	2745.788M	29.6	-33.6	+2.5	+4.2	+29.5	+0.0	43.6	54.0	-10.4	Vert
	Ave		+2.3	+9.1	+0.0		301		Mid Channel		100
^	2745.750M	39.1	-33.6	+2.5	+4.2	+29.5	+0.0	53.1	54.0	-0.9	Vert
			+2.3	+9.1	+0.0		360		Mid Channel		100
9	2781.750M	31.6	-33.6	+2.6	+4.2	+29.5	+0.0	42.6	54.0	-11.4	Vert
	Ave		+2.4	+5.9	+0.0		301		High Channel		100
^	2781.750M	41.2	-33.6	+2.6	+4.2	+29.5	+0.0	52.2	54.0	-1.8	Vert
			+2.4	+5.9	+0.0		301		High Channel		100
11	3610.990M	31.2	-33.2	+3.0	+4.8	+31.3	+0.0	40.2	54.0	-13.8	Horiz
	Ave		+2.7	+0.4	+0.0		333		Low Channel		105
^	3611.048M	39.6	-33.2	+3.0	+4.8	+31.3	+0.0	48.6	54.0	-5.4	Horiz
			+2.7	+0.4	+0.0		333		Low Channel		105
13	4576.250M	28.2	-33.2	+3.6	+5.4	+32.7	+0.0	40.1	54.0	-13.9	Horiz
	Ave		+3.1	+0.3	+0.0		334		Mid Channel		105
^	4576.250M	38.4	-33.2	+3.6	+5.4	+32.7	+0.0	50.3	54.0	-3.7	Horiz
			+3.1	+0.3	+0.0		334		Mid Channel		105
15	4636.250M	27.4	-33.1	+3.6	+5.4	+32.8	+0.0	39.5	54.0	-14.5	Vert
	Ave		+3.1	+0.3	+0.0		10		High Channel		100
^	4636.250M	37.9	-33.1	+3.6	+5.4	+32.8	+0.0	50.0	54.0	-4.0	Vert
			+3.1	+0.3	+0.0		10		High Channel		100
17	1854.490M	16.5	+0.0	+2.0	+3.5	+26.2	-10.0	38.5	54.0	-15.5	Horiz
	Ave		+0.0	+0.0	+0.3				High, 1m distance, no pre-amp		115
^	1854.438M	29.6	+0.0	+2.0	+3.5	+26.2	-10.0	51.6	54.0	-2.4	Horiz
			+0.0	+0.0	+0.3				High, 1m distance, no pre-amp		115

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 08:59:35
 Sequence#: 8
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna	Cushcraft	S9028PCLJ	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Cushcraft antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Measuring band edge compliance. Low Channel: 902.75 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz. RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
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Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	927.249M	104.4	+23.7	+4.8	+0.0 360	132.9	137.0	-4.1	Vert 114
2	902.751M	104.6	+23.4	+4.6	+0.0 5	132.6	137.0	-4.4	Vert 115
3	927.246M	103.6	+23.7	+4.8	+0.0	132.1	137.0	-4.9	Horiz 144
4	902.748M	103.4	+23.4	+4.6	+0.0	131.4	137.0	-5.6	Horiz 150

5	928.000M	34.5	+23.7	+4.8	+0.0 360	63.0	117.0	-54.0	Vert 114
6	902.000M	34.4	+23.4	+4.6	+0.0 5	62.4	117.0	-54.6	Vert 115
7	928.000M	33.4	+23.7	+4.8	+0.0	61.9	117.0	-55.1	Horiz 144
8	902.000M	31.8	+23.4	+4.6	+0.0	59.8	117.0	-57.2	Horiz 150

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 09:30:07
 Sequence#: 9
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Guardwall)	Impinj	IPJ-A0401-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Guardwall antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power. Measuring band edge compliance. Low Channel: 902.75 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz. RBW = 120 kHz; VBW = 120 kHz

Transducer Legend:

T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
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Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	902.757M	104.9	+23.4	+4.6	+0.0 4	132.9	137.0	-4.1	Horiz 136
2	927.249M	103.4	+23.7	+4.8	+0.0 360	131.9	137.0	-5.1	Horiz 138
3	927.249M	93.7	+23.7	+4.8	+0.0 332	122.2	137.0	-14.8	Vert 129
4	902.751M	92.8	+23.4	+4.6	+0.0 340	120.8	137.0	-16.2	Vert 134

5	902.000M	33.6	+23.4	+4.6	+0.0 4	61.6	117.0	-55.4	Horiz 136
6	928.000M	32.6	+23.7	+4.8	+0.0 360	61.1	117.0	-55.9	Horiz 138
7	928.000M	25.6	+23.7	+4.8	+0.0 332	54.1	117.0	-62.9	Vert 129
8	902.000M	25.3	+23.4	+4.6	+0.0 340	53.3	117.0	-63.7	Vert 134

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 10:06:47
 Sequence#: 10
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Brickyard)	Impinj	IPJ-A0400-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Brickyard antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power with modulation. Measuring band edge compliance. Low Channel: 902.75 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
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Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	927.243M	99.8	+23.7	+4.8			+0.0	128.3	137.0	-8.7	Horiz 142
2	902.751M	95.8	+23.4	+4.6			+0.0 360	123.8	137.0	-13.2	Horiz 142
3	927.249M	91.5	+23.7	+4.8			+0.0 318	120.0	137.0	-17.0	Vert 161

4	902.751M	89.7	+23.4	+4.6	+0.0 350	117.7	137.0	-19.3	Vert 118
5	928.000M	30.3	+23.7	+4.8	+0.0	58.8	117.0	-58.2	Horiz 142
6	902.000M	28.2	+23.4	+4.6	+0.0 360	56.2	117.0	-60.8	Horiz 142
7	902.000M	26.1	+23.4	+4.6	+0.0 350	54.1	117.0	-62.9	Vert 118
8	928.000M	25.2	+23.7	+4.8	+0.0 318	53.7	117.0	-63.3	Vert 161

Test Location: CKC Laboratories • 22116 23rd Dr SE • Bothell, WA 98021-4413 • 425-402-1717

Customer: **Impinj Inc**
 Specification: **15.247(d)/15.209/15.205**
 Work Order #: **86329**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader Core**
 Manufacturer: **Impinj**
 Model: **IPJ-R1000-USA-0-01-01**
 S/N: **40306470606**

Date: 3/29/2007
 Time: 10:45:45
 Sequence#: 11
 Tested By: Ryan Rutledge

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4440A	S/N: MY46186330	10/03/2007	10/03/2009	AN02872
HP 8447D PreAmp	S/N: 2944A08601	07/10/2006	07/10/2008	AN01517
Bothell 5m Cable Set	S/N: P05444	11/28/2005	11/28/2007	ANP05444
Chase BILOG	S/N: 2458	01/31/2007	01/31/2009	AN01993

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader Core*	Impinj	IPJ-R1000-USA-0-01-01	40306470606
AC Adapter	CUI Inc	DSA-60W-20 1 24060	DTS240250UC-P11P-DB
RFID Reader Antenna (Mini-Guardrail)	Impinj	IPJ-A0301-USA	

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-44M-3481
Laptop AC Adapter	Dell	PA-1650-05D	CN-05U092-48010-39M-016B
Crossover Ethernet Cable (UTP)			

Test Conditions / Notes:

RFID reader is connected to laptop via crossover cable to RTP program; RF port 1 connected to Mini-Guardrail antenna with RF cable. DB9 and DB25 cables hanging and unterminated. AC Adapter brick on ground plane underneath EUT. Interrogator transmitting at max power with modulation. Measuring band edge compliance. Low Channel: 902.75 MHz, High Channel: 927.25 MHz. A 25 foot Belden type 7806A cable (2.5dB loss) was used for testing. Frequency range under investigation: 902 MHz - 928 MHz. RBW = 120 kHz; VBW = 120 kHz.

Transducer Legend:

T1=ANT AN01993 25-1000MHz	T2=CAB-P05444-112805
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Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	927.249M	79.8	+23.7	+4.8			+0.0 34	108.3	137.0	-28.7	Horiz 100
2	902.748M	79.7	+23.4	+4.6			+0.0 29	107.7	137.0	-29.3	Horiz 100
3	902.745M	71.3	+23.4	+4.6			+0.0 320	99.3	137.0	-37.7	Vert 120

4	927.246M	67.4	+23.7	+4.8	+0.0 354	95.9	137.0	-41.1	Vert 116
5	928.000M	22.8	+23.7	+4.8	+0.0 34	51.3	117.0	-65.7	Horiz 100
6	902.000M	22.5	+23.4	+4.6	+0.0 320	50.5	117.0	-66.5	Vert 120
7	902.000M	22.1	+23.4	+4.6	+0.0 29	50.1	117.0	-66.9	Horiz 100
8	928.000M	21.3	+23.7	+4.8	+0.0 354	49.8	117.0	-67.2	Vert 116