

## Retlif Testing Laboratories

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FCC/IC Test Report on

MicroStrain, Inc.
Model Number: SerialLink

**Customer Name:** MicroStrain, Inc. **Customer P.O:** 006810-00 Date of Report: September 15, 2009 **Test Report No:** R-5184N, Rev. A **Test Start Date:** June 4, 2009 Test Finish Date: June 8, 2009 **Test Technician:** Matthew Seamans **Laboratory Supervisor:** Todd Hannemann **Branch Manager:** Scott Wentworth Report Prepared By: Jamie Ramsey

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## **Certification and Signature**

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Todd Hannemann Laboratory Supervisor NARTE ATL-0255-T

Scott Wentworth Branch Manager NVLAP Approved Signatory

#### **Non-Warranty Provision**

The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

#### Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

## **Technical Information**

	Applicant		Manufacturer
Name:	MicroStrain, Inc.	Name:	MicroStrain, Inc.
Address:	459 Hurricane Lane, Suite 102	Address:	459 Hurricane Lane, Suite 102
City, State, Zip:	Williston, VT 05495	City, State,Zip:	Williston, VT 05495

## **Test Specifications:**

FCC Rules and Regulations Part 15, Subpart C, Para. 15.247

Radio Standards Specification, RSS-210, Issue 7, June, 2007 and RSS-GEN, Issue 2, June 2007

Test Procedure: ANSI C63.4:2003

	MicroStrain  Jel: SerialLink  al Number: SL30360012-0010  XJQMSLINK0001  D: 8505A-MSLINK0001  Direct Sequence Spread Spectrum Transmitter Module  Per Requirements: 6 VDC  Juency of Operation: 2400 to 2483.5MHz				
Test Sample:	2.4 GHz [	Direct Sequence Spread Spectrum Wireless Module			
Brandname:	MicroStra	nin			
Model:	SerialLink				
Serial Number:	SL303600	012-0010			
FCC ID:	XJQMSLINK0001				
IC ID:	-	8505A-MSLINK0001			
Туре:	-	Direct Sequence Spread Spectrum Transmitter Module			
Power Requirement	ents:	6 VDC			
Frequency of Op	eration:	2400 to 2483.5MHz			
Antenna/Connec	tor:	1/4 wave helical whip/reverse polarity sma connector			

## **Tests Performed**

The test methods performed on the EUT are shown below:

FCC Part 15, Subpart C	Industry Canada RSS-210 Issue 7, June 2007	Industry Canada RSS-GEN Issue 2, June 2007	Test Method
15.247(a)(2)	A8.2(a)	N/A	Bandwidth
15.247(b)(3)	A8.4(4)	N/A	Power Output
15.247(d)	A8.5	N/A	Antenna Port, Conducted Emissions
15.247(e)	A8.2(b)	N/A	Power Spectral Density
15.247 (d) 15.209(a)/15.205	A8.5	N/A	Transmitter Spurious Radiated Emissions, Restricted Bands
N/A	N/A	7.2.3	Receiver Spurious Radiated Emissions
15.207 (a)	N/A	7.2.2	Conducted Emissions, Power Leads, 150 kHz to 30 MHz

## Requirements and Test Results

## Requirement:

FCC Section 15.247(a)(2)

Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands. The minimum 6 dB bandwidths shall be at least 500 kHz.

## IC RSS-210, A8.2(a) - Digital Modulation Systems

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### Results:

The minimum 6 dB bandwidth measured 3 MHz which complies with the requirement that the Bandwidth be no less than 500 kHz.

## Requirement:

**FCC Sections 15.247(b)(3)** 

Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For systems using digital modulation in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antenna and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antenna and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

## IC RSS-210, A8.4(4) - Transmitter Output Power and e.i.r.p. Requirements

For systems employing digital modulation techniques operating in the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz, the maximum peak conducted output power shall not exceed 1 Watt. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 Watts.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (RSS-Gen).

#### · Results:

The device operates in the 2400 – 2483.5MHz band. The maximum peak output power was measured and was found to be 0.045 Watts, in compliance with the specified limit of 1 watt. As the device uses a 0dB gain antenna the EIRP limit is also met.

## Requirements and Test Results (con't)

#### Requirement:

## **FCC Section 15.247(d):**

Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) must also comply with the radiated emissions limits specified in Section 15.209(a) (see Section 15.205(c)).

#### IC RSS-210, A8.5 - Out of Band Emissions:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 of RSS-210 is not required.

#### Results:

In any 100 kHz bandwidth outside the frequency band in which the Spread spectrum intentional radiator was operating, the radio frequency power that was produced by the intentional radiator was at least 20 dB below that in the 100 kHz bandwidth within the band that contained the highest level of the desired power. Radiated emissions measurements were performed on all emissions observed during conducted measurements which fell within the restricted bands specified in 15.205(a) and were found to be in compliance with the limits specified in 15.209(a).

## Requirement:

## **FCC Section 15.247(e):**

#### Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## IC RSS-210, A8.2(b) - Digital Modulation Systems:

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0 second duration. This power spectral density shall be determined in accordance with the provisions of Section A8.4(4); (i.e. the power spectral density shall be determined using the same method for determining the conducted output power).

#### Results:

The power spectral density conducted from the intentional radiator to the antenna was not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density was determined in accordance with Section 15.247(b)(3), herein. The same method of determining the conducted output power was used to determine the power spectral density.

## Requirement:

## FCC Section 15.209(a) - Radiated Emission Limits, General Requirements

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 1.

## IC RSS-210, 2.6 - General Field Strength Limits:

Table 1 shows the general field strength limits of unwanted emissions, where applicable, for transmitters operating in accordance with the provisions specified in this RSS.

Frequency of Emission (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960	500	3

Table 1 - Radiated Emission Limits

#### Results:

The field strength of spurious radiated emissions did not exceed the limits specified in Table 1.

## Requirements and Test Results (con't)

## Requirement:

## FCC Section 15.207(a) - Conducted Limits

For an intentional radiator that is dc powered and subject to modular approval, the radio frequency voltage that is conducted back onto the power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits shown in Table 2, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of the paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

#### IC RSS-GEN, Section 7.2.2:

### **Transmitter and Receiver DC Power Lines Conducted Emission Limits**

The purpose of this test is to measure unwanted radio frequency currents induced in any DC conductor external to the module which could conduct interference to other equipment via the electrical network.

For an intentional radiator that is dc powered and subject to modular approval, the radio frequency voltage that is conducted back onto the power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network.

Frequency of Emission (MHz)	Conducted Li	mit (dBµV)
Frequency of Emission (MH2)	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
*Decreases due to logarithm of the from	equency	

Table 2 - Conducted Emission Limits

#### Results:

The conducted emissions observed did not exceed the limits specified in Table 2.

## 15.247 (i) RF Exposure

Spread Spectrum Transmitters operating under 15.247 are categorically excluded from routine environmental evaluation for demonstrating RF exposure compliance with respect to MPE or SAR limits however per 15.247(i) must be operated in a manner that ensures the public is not exposed to RF energy levels in access of the commission's guidelines. The user/installation manual contains the proper cautionary statements and specifies that the device be installed and operated so that a minimum separation distance of 20m will maintained Based on the transmitter power and maximum antenna gain (see calculation below) the 20cm separation distance exceeds the calculated distance for acceptable MPE power density levels to meet both the Occupational/Controlled Exposure and the General Population/Uncontrolled Exposure requirements of 1.1310. The calculation below uses the more stringent General Population MPE Limits.

$$S = PG$$
 $4Dsq$ 

D = Minimum Separation Distance in cm

S = Max allowed Power Density in mW/cmsq

Per 1.1310 For Frequency of 2400MHz = 1mW/cmsq

Power = Max Power Input to Antenna = 45mW

Gain = Max Power Gain of Antenna = 0dBi = 1 numeric

$$1 \text{mW/cmsq} = \frac{45 \times 1}{4 (3.14) \times Dsq} = \frac{45}{12.56 \times Dsq}$$

$$Dsq = 45 = 3.58$$
  
 $12.56 \times 1$ 

$$D = sq. root 3.58 = 1.89cm$$

### **RSS 102** RF Exposure

Per RSS-102 Section 2.5.2 RF Exposure evaluation is not required if the separation distance between the user and antenna is greater than 20cm and the EUT operates above 1.5GHz with a maximum EIRP of less than 5W. The user/installation manual contains the proper cautionary statements and specifies that the device be installed and operated so that a minimum separation distance of 20m will maintained

## **Spectrum Analyzer Desensitization Considerations**

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. FCC specified bandwidths of 100 kHz and 1 MHz were utilized below and above 1 GHz, respectively.

## **Modifications**

No Modifications were made during the course of this testing program in order to demonstrate compliance with the specified requirements.

## **Equipment Lists**

## Bandwidth

EN	Туре	Manufacturer	Description	Model No.	Cal Date	Due Date
4961B	Attenuator	Narda	DC - 18 GHz	757C-30dB	1/20/2009	1/20/2010
R425E	3 Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009	5/11/2010

## **Conducted Emissions**

EN	Туре	Manufacturer	Description	Model No.	Cal Date	<b>Due Date</b>
5030C	10 DB Atten. (50 ohm)	Narda	DC - 12.4 GHz	757C-10	7/23/2008	7/23/2009
7032	LISN	Rohde & Schwarz	N/A	ESH 3-Z5	12/16/2008	12/16/2009
R425B	Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009	5/11/2010

## Radiated Spurious Emissions

EN	Туре	Manufacturer	Description	Model No.	Cal Date	Due Date
3116	Pre-Amplifier	Miteq	0.1 GHz - 18 GHz	AFS42-35	1/21/2009	1/21/2010
3117	Power Supply	<b>B&amp;K Precision</b>	0-30 Vdc, 3.0 A	1630	1/31/2008	1/31/2010
3258	Double Ridge Guide	EMCO	1 - 18 GHz	3115	8/20/2008	8/20/2009
3430	Horn Antenna	MCS Corporation	18 GHz - 26.5 GHz	K-5039	1/12/2009	1/12/2010
4029B	Test Site Attenuation	Retlif	3 / 10 Meters	RNH	7/21/2008	7/21/2009
4961B	Attenuator	Narda	DC - 18 GHz	757C-30dB	1/20/2009	1/20/2010
5072	Preamplifier	Miteq	18 GHz-40 GHz	JS4-18004000-30	10/1/2008	10/1/2009
R425B	Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009	5/11/2010

## **Peak Power Output**

EN Type	Manufacturer	Description	Model No.	Cal Date Due Date
4961B Attenuator	Narda	DC - 18 GHz	757C-30dB	1/20/2009 1/20/2010
R425B Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009 5/11/2010

## Antenna Conducted Out of Band Emissions/ Power Spectral Density

EN Type	Manufacturer	Description	Model No.	Cal Date Due Date
4961B Attenuator	Narda	DC - 18 GHz	757C-30dB	1/20/2009 1/20/2010
R425B Spectrum Analyzer	Agilent	100 Hz - 26 5 GHz	F7405A·A	5/11/2009 5/11/2010

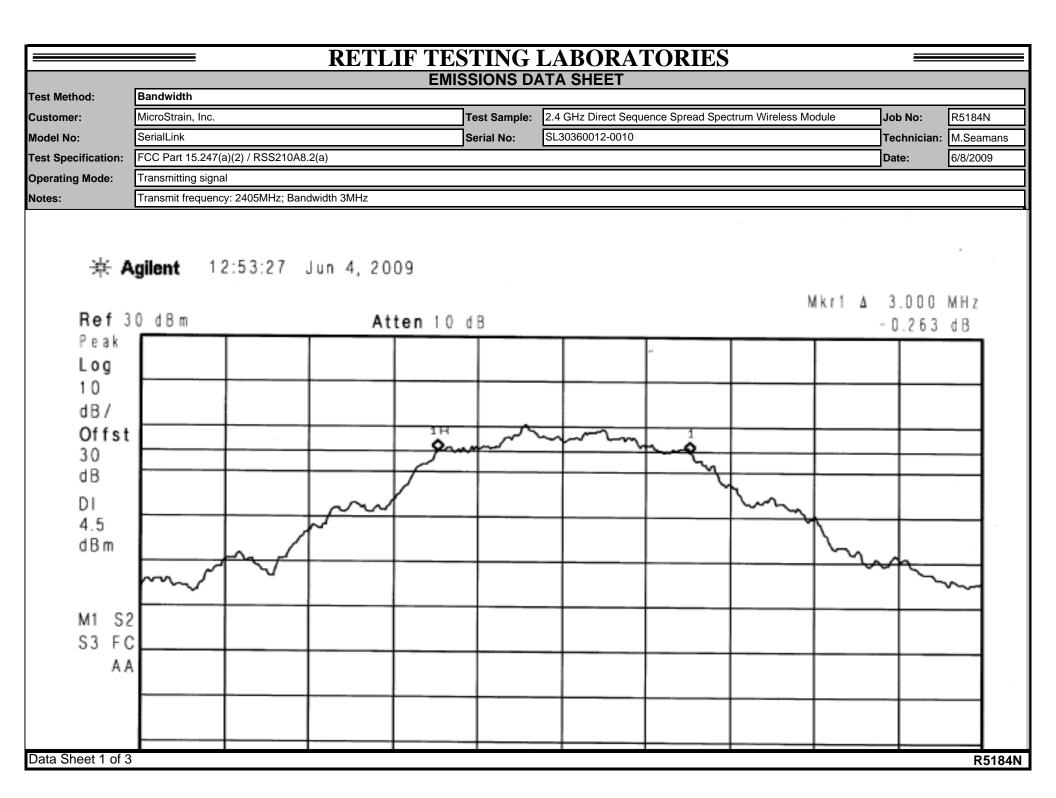
Test Photograph(s)
Bandwidth
FCC Part 15, Subpart C, Section 15.247(a)(2)
RSS-210, Section A8.2(a)

# Test Photograph(s) Bandwidth



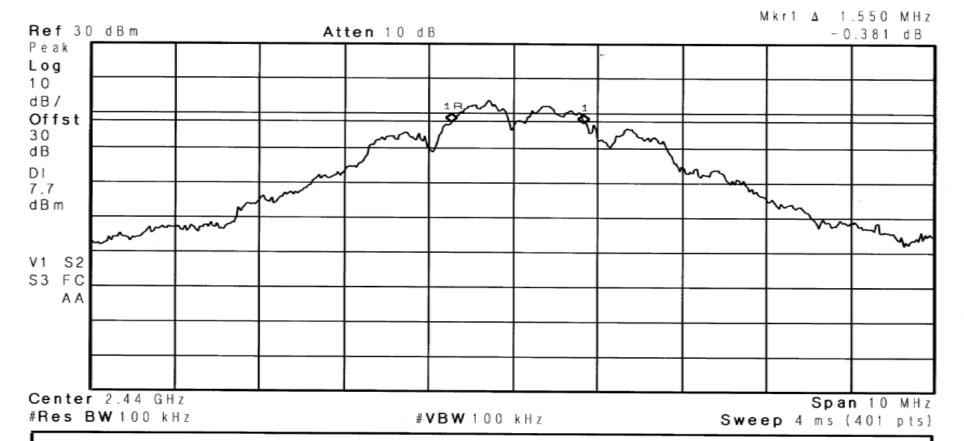
Test Setup

Test Data
Bandwidth
FCC Part 15, Subpart C, Section 15.247(a)(2)
RSS-210, Section A8.2(a)



#### RETLIF TESTING LABORATORIES **EMISSIONS DATA SHEET** Bandwidth Test Method: MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Job No: R5184N Customer: Test Sample: Model No: SerialLink Serial No: SL30360012-0010 M.Seamans Technician: FCC Part 15.247(a)(2) / RSS210A8.2(a) Test Specification: Date: 6/8/2009 Operating Mode: Transmitting signal Transmit frequency: 2440MHz; Bandwidth 1.550MHz Notes:



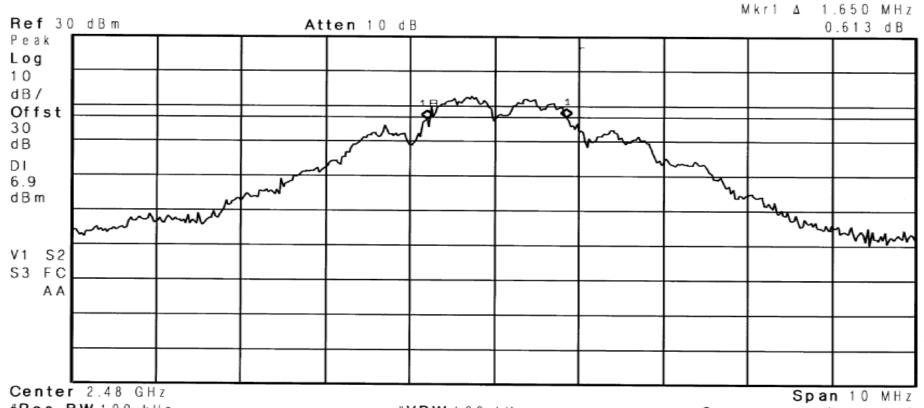


Data Sheet 2 of 3

R5184N

	<b>RETLIF TES</b>	STING 1	LABORATORIES		
	EMIS	SSIONS DA	ATA SHEET		
Test Method:	Bandwidth				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Γest Specification:	FCC Part 15.247(a)(2) / RSS210A8.2(a)			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2480MHz; Bandwidth 1.650MHz				





#Res BW 100 kHz

#**VBW** 100 kHz

Sweep 4 ms (401 pts)

Data Sheet 3 of 3

R5184N

Test Photograph(s)
Power Output
FCC Part 15, Subpart C, Section 15.247(b)(3)
RSS-210, Section A8.4(4)

# Test Photograph(s) Power Output



Test Setup

Test Data
Power Output
FCC Part 15, Subpart C, Section 15.247(b)(3)
RSS-210, Section A8.4(4)

thod:	Peak Power	Output		EIVII	SSIONS DA	ATA SHEET					
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lo:	SerialLink	10.			Serial No:	SL30360012-0010		ectrum vinciess iviodule	Technician:		
ecification:		247(b)(3) / RSS210	)A8.4(4)						Date:	6/8/20	
ng Mode:	Transmitting s										
		uency: 2405MHz; 1	14.96dBm (0.031 \	W)							
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ing mode.	Transmit frequency: 2440MHz; 1	6.56 dBm (0.045 W)											
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	EMISSIONS DATA SHEET										
ethod:	Peak Power Output  MicroStrain, Inc.  Test Sample: 2.4 GHz Direct Sequence Spread Spectrum Wireless Module										
ner:	MicroStrain, Inc.		Test Sample:		Job No:	R5184N M.Seama 6/8/2009					
No:	SerialLink	AA Q 4(4)	Serial No:	SL30360012-0010							
pecification: ing Mode:	FCC Part 15.247(b)(3) / RSS210  Transmitting signal	148.4(4)				Date:	6/8/200				
ing wode.	Transmit frequency: 2480MHz; 1	6.38dBm (0.043W)									
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M1 S2 S3 F( A)											
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Test Photograph(s)
Antenna Port Conducted Emissions
FCC Part 15, Subpart C, Section 15.247(d)
RSS-210, Section A8.5

# Test Photograph(s) Conducted Emissions



Test Setup

Test Data
Antenna Port Conducted Emissions
FCC Part 15, Subpart C, Section 15.247(d)
RSS-210, Section A8.5

					EMISSIONS D	ATA SHEET					
ethod:			ions Conducte	d							
ner:	MicroStra				Test Sample		ence Spread Spe	ctrum Wireless Module	Job No:	R5184N	
No:	SerialLin				Serial No:	SL30360012-0010			Technician:	M.Seam	
ecification:			/ RSS210A8.5						Date:	6/8/2009	
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				EMISSIONS DA	ATA SHEET						
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er:	MicroStrain, Inc.			Test Sample:	2.4 GHz Direct Sequer	ce Spread Spectrum	Wireless Module	Job No:	R5184		
o:	SerialLink			Serial No:	SL30360012-0010			Technician:	M.Sea		
ecification:	FCC Part 15.247(d	d) / RSS210A8.5						Date:	6/8/20		
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		Emissions Conduc			Test Sample:					$\overline{}$		
er:	MicroStrain, I	nc.				2.4 GHz Direct Sec		Spectrum Wireless	Module	Job No:	R5184	
o:	SerialLink				Serial No:	SL30360012-0010				Technician:		
ecification:		247(d) / RSS210A8.5								Date:	6/8/20	
g Mode:	Transmitting											
	Transmit freq	uency: 2405MHz										
-AjR-	Δailent	13:47:22	Jun 4	2009								
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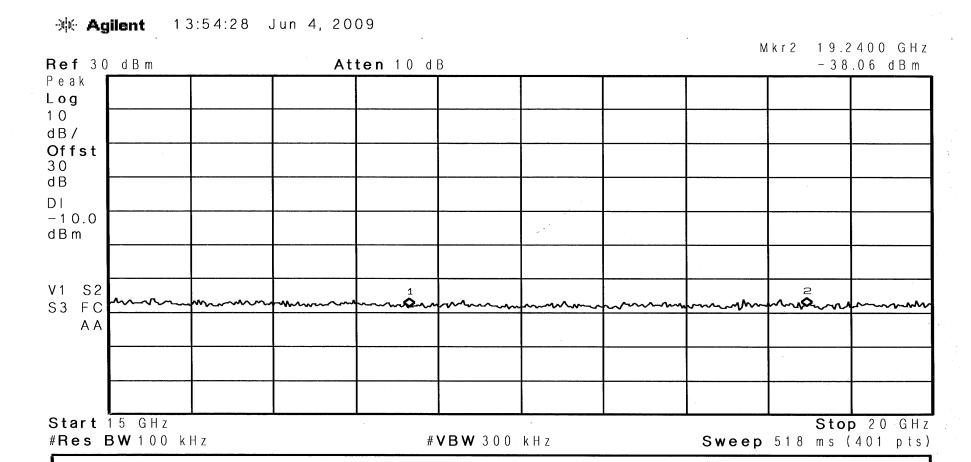
thod:	Out of Band Er	nissions Conducted	<u> </u>			TA SHEET						
er:	MicroStrain, Inc.			Test S	Sample:	2.4 GHz Direct Seque	nce Spread Spe	trum Wireless	Module	Job No:	R5184N	
lo:	SerialLink			Serial		SL30360012-0010				Technician:		
ecification:	FCC Part 15.24	7(d) / RSS210A8.5		0					=	6/8/200		
ng Mode:	Transmitting sig	nal										
	Transmit freque	ncy: 2405MHz										
	Agilent 30 dBm	13:45:07		09 t <b>en</b> 10 dB						9.6200 ( 36.37 d		
Peak												
<b>Log</b> 10												
dB/												
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	A A											
					——————————————————————————————————————	***************************************						
8+0	r <b>t</b> 5 GHz				e.			l		<b> </b> top 10	C H 7	
	s <b>BW</b> 100	k H z		# <b>V</b>	<b>BW</b> 3.0	0 k H z		Swee	<b>p</b> 518 m			
								•		,		

### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET Out of Band Emissions Conducted** Test Method: MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Job No: R5184N Customer: Test Sample: Model No: SerialLink Serial No: SL30360012-0010 M.Seamans Technician: FCC Part 15.247(d) / RSS210A8.5 Test Specification: Date: 6/8/2009 Transmitting signal Operating Mode: Transmit frequency: 2405MHz Notes: Agilent 13:50:11 Jun 4, 2009 Mkr1 12.0250 GHz -36.93 dBm Ref 30 dBm Atten 10 dB Peak Log 10 dB/ Offst 30 dΒ DΙ -10.0dBm M1 S2 S3 FC AAStart 10 GHz Stop 15 GHz #**VBW** 300 kHz **Sweep** 518 ms (401 pts) #Res BW 100 kHz Data Sheet 5 of 30 R5184N

thod:		Emissions Conducte				0.4.011 81 1.0	0 : 0			1	
er:	MicroStrain, In	C.			Test Sample:	2.4 GHz Direct Seque	ctrum Wireless Mo	dule	Job No:	R5184	
o:	SerialLink			S	erial No:	SL30360012-0010				<u></u>	M.Sea
ecification:		47(d) / RSS210A8.5								Date:	6/8/20
ng Mode:	Transmitting si										
	Transmit frequ	ency: 2405MHz									
-3K-	Agilent	1 3:51:1 3	Jun 4, 20	009							
				•			•	М	kr2 1 4	1.4300	GHz
Ref	30 dBm		A	tten 10	d B					36.23 d	
Peak											
<b>Log</b> 10			-						· · · · · · · · · · · · · · · · · · ·		
dB/	)										
Of f	s t										
30											
d B											
DI -10								-			
dBm						× **					
	S2 ~~~				2 - W	manne			~~~~	2	
	F C A A										
•											
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	rt 10 GH		· · · · · · · · · · · · · · · · · · ·		<b>!</b>				St	op 15	GHz
#Re	<b>s BW</b> 10	0 k H z			# <b>VBW</b> 3	0 0 kHz		Sweep	518 ms	s (401 <sub>j</sub>	ots)
					<del> </del>						

thod:		missions Conduc	····		Took Compile	2.4 CHz Direct Com	ionae Chrood Cr	atrum Mirals = 1	Madula	Jak Na	DEG		
er:	MicroStrain, In	C.			Test Sample:	2.4 GHz Direct Sequ SL30360012-0010	uence Spread Spe	ectrum vvireiess i		L	R518		
o:		47(d) / DSS240A9	5		Serial No:	3L3U30UU1Z-UU1U				Technician: Date:	M.Se 6/8/2		
ecification: ng Mode:	FCC Part 15.247(d) / RSS210A8.5  Transmitting signal												
ig wode.		ency: 2405MHz											
Ref	30 dBm	13:53:18	•	2009 <b>Atten</b> 1	0 dB				M k r 1	.8350 G 8.29 dB			
Peak	(								ŀ				
<b>Log</b> 10					· · · · · · · · · · · · · · · · · · ·								
ďB/													
Of f s	st												
d B						·							
DΙ													
−10 dBm													
u D III													
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	FC AA												
•									<b>_</b>				
										:			
C 1 -	1.5.011										11		
	rt 15 GH <b>s BW</b> 10				# <b>VBW</b> 3	00 kHz		Sweer	518 ms	<b>op</b> 20 G			
*****	, , ,									, ισι ρ	- 7		

#### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Test Method: Out of Band Emissions Conducted MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module R5184N Customer: Test Sample: Job No: SerialLink Serial No: SL30360012-0010 Technician: M.Seamans Model No: FCC Part 15.247(d) / RSS210A8.5 Test Specification: 6/8/2009 Date: Operating Mode: Transmitting signal Transmit frequency: 2405MHz Notes:



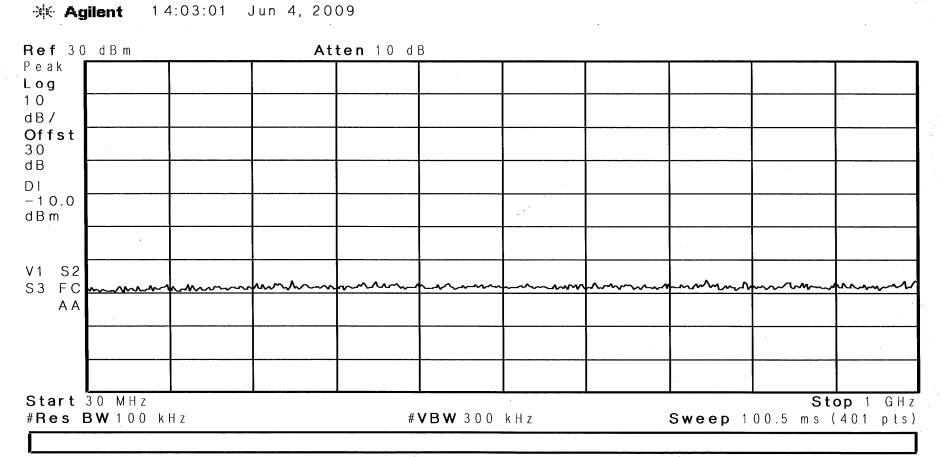
Data Sheet 8 of 30

R5184N

nd Emissions Conducted n, Inc.  5.247(d) / RSS210A8.5 ng signal equency: 2405MHz  1 3:56:35	Jun 4, 200	Test Sam Serial No  0 9		equence Spread Spectrum 0	M k r 1	Job No: Technician: Date:  2 1 . 6 4 5 0 - 3 5 . 8 0	6/8/200 G H z
5.247(d) / RSS210A8.5 g signal equency: 2405MHz	•	Serial No				Technician: Date:  2 1 . 6 4 5 0	M.Sean 6/8/200
equency: 2405MHz	•	09	SL30360012-001	0	Mkr1	Date:	6/8/200 G H z
equency: 2405MHz	•				M k r 1	21.6450	G H z
equency: 2405MHz	•				Mkr1		
1 3:56:35	•				M k r 1		
	•				M k r 1		
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GHZ OOkHz		# <b>V R</b> '	<b>V</b> 300 kHz		Sween 518		
O O RIIZ		π <b>ν</b> D	V JUU KIIZ		Cweep 310	1113 (4UI	h (2)
	i H z 0 0 k H z		i H z	1 1 1 H Z	1 1 1 1 H Z	1 1 1 1 1 1 1 1 1	тн z Stop 25

r:	Out of Band Emissions C			Test Sample:	2.4 GHz Direct Sequence	e Spread Spectrum Wireles	s Module	<b>b No:</b> R518
·· o:	SerialLink			Serial No:	SL30360012-0010	- Oprodu Opodium Wilolo		echnician: M.Se
cification:	FCC Part 15.247(d) / RSS	210A8.5						ate: 6/8/20
g Mode:	Transmitting signal							
	Transmit frequency: 2405N	ИНz						
兴	Agilent 13:5	7:27 Jun 4	1, 2009				Mkr2 24	.0500 GH
Ref	30 dBm		Atten	10 dB				4.71 dBm
Pea								
<b>Log</b> 10					·	<u> </u>		
dB/								
Of f	st							
3 0 d B			*					
DΙ								
− 1 C d B n								
Q D II	1			A ************************************				
M 1	S2	malm			~	man	&	mann
S 3	F C A A							
	rt 20 GHz			# \/ D \A/	300 kHz	C.w.a	<b>St</b> e <b>ep</b> 518 ms	op 25 GH

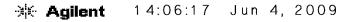
	RE		G LABORATORIES		
		EMISSIONS	DATA SHEET		
Test Method:	Out of Band Emissions Conducted				
Customer:	MicroStrain, Inc.	Test Sampl	e: 2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(d) / RSS210A8.5			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2440MHz				

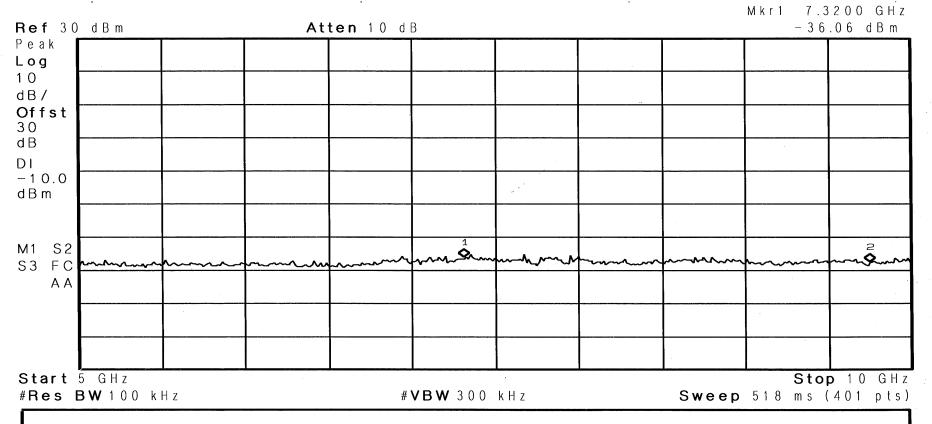


Data Sheet 11 of 30

### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET Out of Band Emissions Conducted** Test Method: MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Job No: R5184N Customer: Test Sample: Model No: SerialLink Serial No: SL30360012-0010 M.Seamans Technician: FCC Part 15.247(d) / RSS210A8.5 Test Specification: Date: 6/8/2009 Transmitting signal Operating Mode: Transmit frequency: 2440MHz Notes: **無 Agilent** 14:04:24 Jun 4, 2009 Mkr1 4.88 GHz Ref 30 dBm Atten 10 dB -20.4 dBm Peak Log 1 0 dB/ Offst 30 dΒ DΙ -10.0dBm V1 S2 S3 FC mm ΑА Start 1 GHz Stop 5 GHz #Res BW 100 kHz #**VBW** 300 kHz **Sweep** 414.4 ms (401 pts) Data Sheet 12 of 30 R5184N

	<b>RETLIF TES</b>	STING 1	LABORATORIES	=	
	EMIS	SSIONS DA	ATA SHEET		
Test Method:	Out of Band Emissions Conducted				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(d) / RSS210A8.5			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2440MHz				



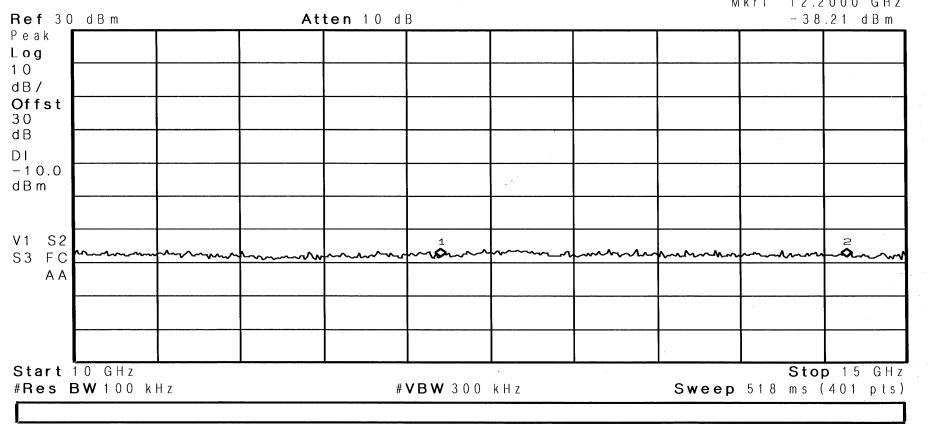


Data Sheet 13 of 30

od: ·:	MicroStrain, Inc.	nissions Conducte		1-	est Sample:	2.4 GHz Direct Se	guanca Spraad S	Spootrum Wirolos	es Modulo	Job No:	R518
:	SerialLink				est Sample: Serial No:	SL30360012-0010		spectrum vineles	55 Module		
		7(d) / RSS210A8.5			eriai NO.	0230300012 0010				Date:	6/8/2
Mode:	Transmitting sign									Dutc.	0/0/2
ouo.	Transmit freque										
-3K-	Agilent	1 4:07:22	Jun 4, 2(	009					M k r 2	9.7600	G H
	30 dBm		Α	tten 10	d B			···		- 37.47	d B m
Peak <b>Log</b>		•									
10											
dB/											
<b>Of f</b> s	st										
d B											
DΙ						-					
-10 dBm	0										
u D III											
M 1	S 2			_		2	<u> </u>				2
	C				340-44		· un				×
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								,			
	• t 5 GHz s BW 100			<u> </u>	#\/ <b>D</b> \\/ 3	300 kHz	<b>I</b>		<b>ep</b> 518	Stop 10	

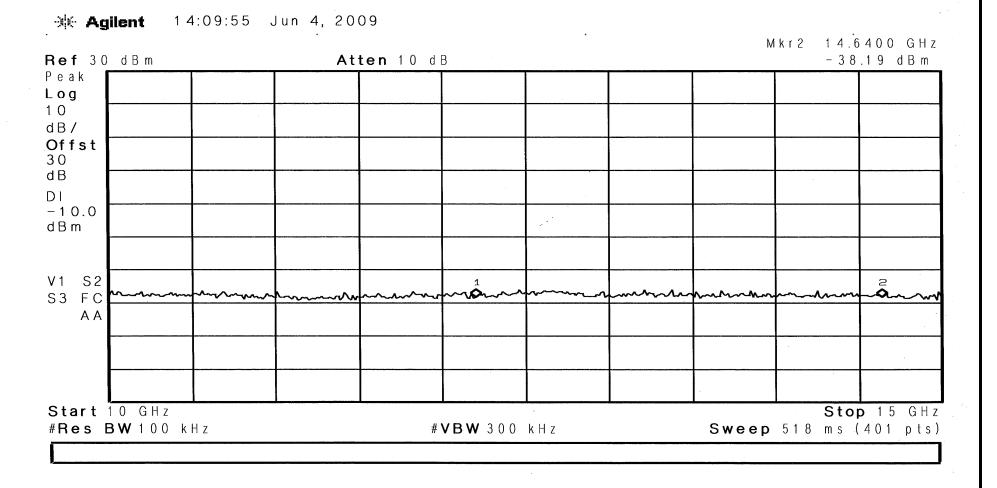
Data Sheet 14 of 30

#### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Test Method: Out of Band Emissions Conducted MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module R5184N Customer: Test Sample: Job No: SerialLink Serial No: SL30360012-0010 Technician: M.Seamans Model No: FCC Part 15.247(d) / RSS210A8.5 Test Specification: 6/8/2009 Date: Operating Mode: Transmitting signal Transmit frequency: 2440MHz Notes: Agilent 14:08:55 Jun 4, 2009 Mkr1 12.2000 GHz



Data Sheet 15 of 30

	RETLIF TES	STING I	LABORATORIES		
	EMIS	SSIONS DA	ATA SHEET		
Test Method:	Out of Band Emissions Conducted				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(d) / RSS210A8.5			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2440MHz				
				•	•



Data Sheet 16 of 30

	MicroStrain, Inc.			1	Test Sample:	2.4 GHz Direct Sequence	Spread Spectrum Wire	eless Module	Job No:	R51
	SerialLink				Serial No:	SL30360012-0010				
ication:	FCC Part 15.247	7(d) / RSS210A8.5							Date:	6/8
Mode:	Transmitting sign	nal								
	Transmit frequer	ncy: 2440MHz								
Ref	<b>Agilent</b> 30 dBm	1 4:11:27		009 (tten 10	d B			Mkr1	17.0800 -37.57 d	
Peak L <b>og</b>	·									
10										
dB/										
<b>Offs</b> 30	<sup>t</sup>	ļ								
dΒ										
DI -10.0	<u> </u>									-
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	t 15 GHz				# <b>VBW</b> 3	0 0 k H z	Sw	<b>eep</b> 518	<b>Stop</b> 20 ms (401	G H

R5184N

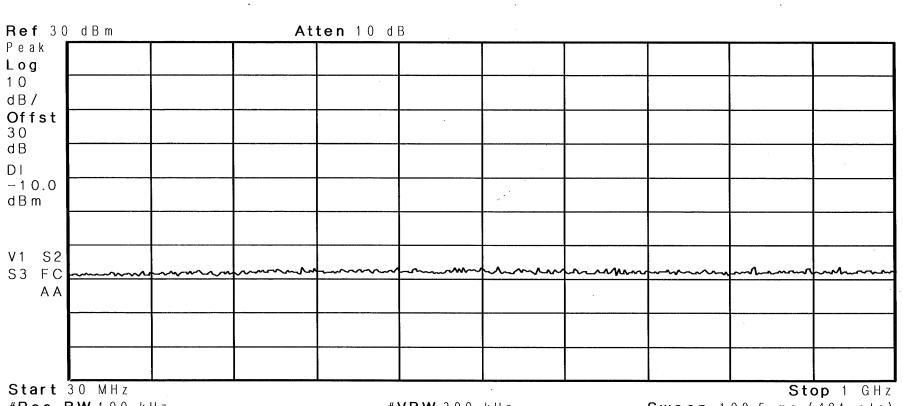
Data Sheet 17 of 30

lethod:	Out of Band Emis	sions Conducted				ATA SHEET					
mer:	MicroStrain, Inc.			Т	est Sample:	2.4 GHz Direct Seque	ence Spread Spec	trum Wireless Mo	dule .	Job No:	R5184
No:	SerialLink				erial No:	SL30360012-0010					M.Sear
pecification:	FCC Part 15.247(d	d) / RSS210A8.5									6/8/200
ing Mode:	Transmitting signal										
	Transmit frequency	y: 2440MHz									
Ref	30 dBm	4:12:36 J		09 <b>ten</b> 10	d B			М	kr2 19 -3	.5200 7.81 d	
Peak		Ì	·							1	
<b>Log</b> 10		+					:		·		
dB/											
Offs	t			-		****					
3 0 d B					_					,	
DI									·		
-10.	0										
dB m				<u> </u>							
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	62				1			_		1	
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Д	ΛA									·	
			Control Contro						-		
								*	:		
	t 15 GHz s <b>BW</b> 100 k	«Н z			# <b>VBW</b> 3	00 kHz		Sweep		op 20 (401	

er:	MicroStrain, Inc.	issions Conducte		Т	est Sample:	2.4 GHz Direct Sequ	ence Spread S	Spectrum Wireless N	Module	Job No:	R518
o:	SerialLink				Serial No:	SL30360012-0010	iono oprodu (	Spectrum vinciose i	viodaio	Technician:	
ecification:	FCC Part 15.247	(d) / RSS210A8.5								Date:	6/8/2
g Mode:	Transmitting sign	al									
	Transmit frequen	cy: 2440MHz									
<b>₩</b>	Agilent	1 4:1 4:1 6	Jun 4, 2	2009					N. i a	04.0000	0.11
Ref	30 dBm		,	Atten 10	d B				MKT1	2 1 : 9 6 0 0 - 3 7 . 5 8	
Peak											
L <b>o g</b> 1 0							1				
dB/											
Of f s 30	s t										
d B											
DΙ											
-10.	0										
dB m											
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	C mm	and a second			300 300	- Commence		my m			****
/	A A										
				NAME OF THE PARTY							·
								e.			
	t 20 GHz s BW 100	k H z			#VBW 3	300 kHz		Swee		<b>Stop</b> 25 ms (401	

					MISSIONS D	ATA SHEET					
ethod:		nissions Conducte	d								_
mer:	MicroStrain, Inc.				Test Sample:		ence Spread Spec	trum Wireless M	odule	Job No:	R5184
No:	SerialLink				Serial No:	SL30360012-0010				Technician	: M.Sea
ecification:		7(d) / RSS210A8.5								Date:	6/8/20
ing Mode:	Transmitting sig										
	Transmit freque	ncy: 2440MHz									
	Agilent . 30 dBm	1 4:1 5:1 9	Jun 4,	2009 <b>Atten</b>	1 0 d B					2 4 . 4 0 0 0 - 3 7 . 4 4	
Peak									T		
<b>Log</b> 10											
dB/											
Offs	t	WHO 2-91-									
30					<u></u>						
d B						•					
DI -10.											
dBm	~										
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7											
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	1										
	t 20 GHz s <b>BW</b> 100				# <b>VBW</b> 3	00 kHz		Sweep		<b>Stop</b> 25 ms (401	
											·

	RET			LABORATORIES	_	
Test Method:	Out of Band Emissions Conducted	EIVII	SSIUNS DA	ATA SHEET		
Customer:	MicroStrain, Inc.		Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink		Serial No:	SL30360012-0010	Technician:	M.Seamans
est Specification:	FCC Part 15.247(d) / RSS210A8.5				Date:	6/8/2009
perating Mode:	Transmitting signal					
lotes:	Transmit frequency: 2440MHz					
· <b>)</b> (-	Agilent 14:19:28 Jun 4,	2009				



**#Res BW** 100 kHz #**VBW** 300 kHz

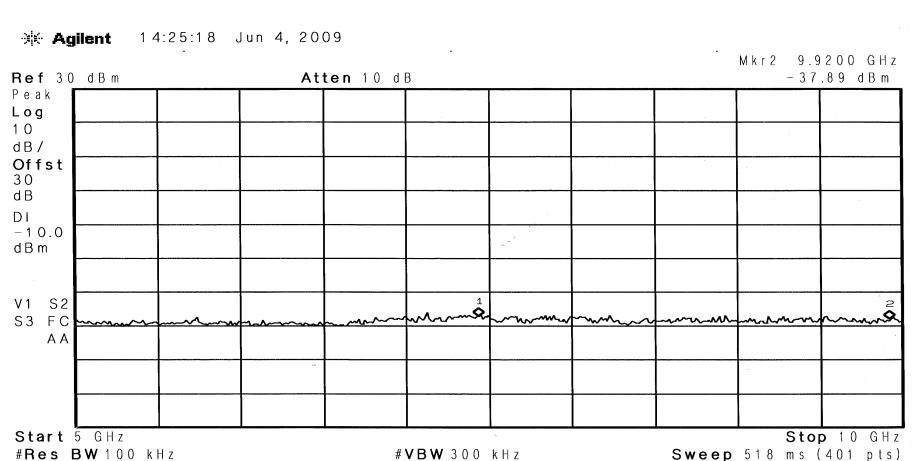
**Sweep** 100.5 ms (401 pts)

Data Sheet 21 of 30

		ssions Conducted		¬	0.4.011.01	0 16	N		<b>¬</b>	
:	MicroStrain, Inc. SerialLink			Test Sample:	2.4 GHz Direct Seq SL30360012-0010	uence Spread 8	Spectrum Wireles	s Module	Job No:	R518
: ification:	FCC Part 15.247	(d) / RSS210A8 5		Serial No:	3L30360012-0010				Technician:	6/8/20
Mode:	Transmitting signa	•							Date.	0/0/2
	Transmit frequence									
Ref	30 dBm	1 4:21:50	2009 <b>Atten</b> 1	0 dB				M k	r 1 4.96 -20.8 (	
Реа <b>Log</b>	K									
1 0					-					
dB/ <b>Off</b>	c +									
30	31									
dΒ					,			·		
D I 1 C	0									
d B n										
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V 1	S2			#						,
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	The state of the s									
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	rt 1 GHz s BW 100	k H z		# <b>VBW</b> 3	300 kHz		Swee	o 414.4	<b>Stop</b> 5 m s (401	

(ll	Out of David E	ulaalana Oanda d	٠	EIV	IISSIONS DA	ATA SHEET					
thod:		nissions Conducte	α								
er:	MicroStrain, Inc.				Test Sample:	2.4 GHz Direct Sequ	ence Spread Spe	ctrum Wireless M		Job No:	R518
lo:	SerialLink				Serial No:	SL30360012-0010				Technician:	
ecification:		7(d) / RSS210A8.5								Date:	6/8/20
ng Mode:	Transmitting sig										
	Transmit freque	ncy: 2440MHz									
Ref	30 dBm	1 4:2 4:0 3		2009 <b>Atten</b> 1	0 dB				Mkr1 7 - 3	.4400 7.07 d	
Peak											
L <b>o g</b> 10							1				
dB/											
Offs	st 🗀										
3 0 d B											
u Б D I											
– 1 0.	.0		<del>- </del>				1				
dB m								:			
\/ 4					,	1					
	S2 = C		A-d-m _ A		monte	mal	James and	L.	-mann	nham	~ <sup>2</sup>
	A A										
									'		
											_
	t 5 GHz s <b>BW</b> 100	k H z			# <b>VBW</b> 3	0 0 k H z		Sweep	<b>St</b> 518 ms	<b>op</b> 10 (401	
								· · · · · · · · · · · · · · · · · · ·		<u> </u>	
<u> </u>											

	RETLIF TES	TING I	LABORATORIES		
	EMIS	SSIONS DA	TA SHEET		
Test Method:	Out of Band Emissions Conducted				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(d) / RSS210A8.5			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2440MHz				



Data Sheet 24 of 30

ethod:	Out of Band Emissions Conducted												
er:	MicroStrain, Inc.				Test Sample:	2.4 GHz Direct Seque	Vodule	Job No:					
No:	SerialLink				Serial No:	SL30360012-0010				Technician:			
ecification:	FCC Part 15.247	(d) / RSS210A8.5								Date:	6/8/20		
ng Mode:	Transmitting signal												
	Transmit frequen	cy: 2480MHz											
	<b>Agilent</b> 1	4:29:00		009 <b>tten</b> 10	d B					2.4000 37.77 d			
Peak													
<b>Log</b> 10									· · · · · · · · · · · · · · · · · · ·				
dB/													
Offs	t												
3 0 d B													
. DI													
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	52					1 • • • • • • • • • • • • • • • • • • •					2		
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А	А												
								,					
	<b>t</b> 10 GHz							<u> </u>		top 15			
#Res	<b>BW</b> 100	k H z			# <b>VBW</b> 3	00 kHz		Sweep	518 m	s (401	pts)		

ethod:	Out of Band Emissions (	Conducted		MISSIONS DA									
ner:	MicroStrain, Inc.			Test Sample:	2.4 GHz Direct Seque	ence Spread Spe	ctrum Wireless M	odule	Job No:	R5184			
No:	SerialLink			Serial No:	SL30360012-0010			M.Sear					
ecification:	FCC Part 15.247(d) / RSS	210A8.5							Date:	6/8/200			
ing Mode:	Transmitting signal												
	Transmit frequency: 2480MHz												
	•	):02 Jun		1 O 4 D			1	v k r 2 1 4					
<b>Ret</b> Peak	30 dBm		Atten	1 0 d B	<u> </u>	T	T	- ;	37.99 d	Вm			
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dB/	1												
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Stor	<b>+</b> 1.0. G.H.7						·		1 5	C L 2			
				# <b>VBW</b> 3			Sween						
#Res				<b></b>			J J D	5 1 0 III 8	. , , , , ,	۳.٥/			
	t 10 GHz s <b>BW</b> 100 kHz			# <b>VBW</b> 3	0 0 k H z		Sweep	<b>St</b> 518 ms	op 15 s (401				

ethod:	Out of Band Emis	ssions Conducted				ATA SHEET							
ner:	MicroStrain, Inc.			Т	est Sample:	2.4 GHz Direct Sequ	ience Spread Spe	ctrum Wireless N	lodule	Job No:	R5184		
No:	SerialLink				erial No:	SL30360012-0010	, ۶۲۰			Technician:			
ecification:	FCC Part 15.247(c	d) / RSS210A8.5						Date:	6/8/20				
ng Mode:	Transmitting signal												
	Transmit frequence	y: 2480MHz											
	Agilent 1	4:31:42 J		09 ten 10 (	d B					7.3600 38.59 d			
Peak													
<b>Log</b> 10	·				•								
dB/					į		ĺ						
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DI													
−10. dBm	0												
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Stor	<b>t</b> 15 GHz					<u> </u>		***************************************		Stop 20	C L z		
	<b>BW</b> 100	k H z			# <b>VBW</b> 3			Sween		15 (401			
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										· · · · · · · · · · · · · · · · · · ·			

				EMISSION	IS DA	TA SHEET									
ethod:	Out of Band Emission	ons Conducted													
ner:	MicroStrain, Inc.			Test Sa	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wir			Module	Job No:	R5184				
No:	SerialLink	Serial N	No:	SL30360012-0010					: M.Sea						
pecification:	FCC Part 15.247(d) /	RSS210A8.5								Date:	6/8/200				
ing Mode:	Transmitting signal	Transmitting signal Transmit frequency: 2480MHz													
	Transmit frequency: 2	480MHz													
•	Agilent 14	:32:33 J	•	)9 <b>ten</b> 10 dB					Mkr2	1 9 . 8 4 0 0 - 3 7 . 4					
Peak			,,,,								0 0 111				
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Star	+ 15 CHz	<u></u>						*		 Stop 20	CUz				
	' <b>t</b> 15 GHz <b>s BW</b> 100 kH	ł z		# <b>V</b> E	<b>3 W</b> 3 (	)		Swee		ms (401					
				🗸				220		- , , , ,	F /				
<u> </u>						······································				***************************************					

r:	Out of Band Emissions Conducted  MicroStrain, Inc.  Test Sample: 2.4 GHz Direct Sequence Spread Spectrum Wireless Module												
: :	SerialLink			Serial No:	SL30360012-0010	ice opread opecitum	Wireless Module	Job No: Technician:	R5184				
· cification:													
g Mode:	FCC Part 15.247(d) / RSS210A8.5         Date:         6/8/2009           Transmitting signal												
	Transmit frequer	ncy: 2480MHz											
	<b>Agilent</b> 30 dBm	1 4:3 4:0 3	Jun 4, 2009	<b>n</b> 10 dB			M k r 1	2 2 . 3 2 0 0 - 3 6 . 5 1					
Peak	30 45 111		7110	1 10 45		I I		30.01	u D III				
Log													
10 dB/						:							
Offs	t						. ,						
30													
dB Dl													
-10.	0												
dΒm													
			:										
V1 5	52				1				2				
	C		waynaman .	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2		-rumm	mm	<u> </u>				
P	A												
				<b>A</b>									
	<b>t</b> 20 GHz						andia Made and Alexandra	Stop 25					
# D 🔿	<b>BW</b> 100	k H z		# <b>VBW</b> 3	300 kHz		Sweep 518	ms (401	pt:				

ethod:	Out of Band Er	nissions Conduc	ted		MISSIONS D								
ner:	MicroStrain, Inc.				Test Sample:	2.4 GHz Direct Sequ	equence Spread Spectrum Wireless Module			Job No:	R5184N		
No:	SerialLink					SL30360012-0010			Tech				
ecification:		7(d) / RSS210A8.5	<u> </u>		Serial No:					ļ.	M.Sean 6/8/200		
ng Mode:	Transmitting signal												
•	Transmit freque												
•	<b>Agilent</b> 30 dBm	1 4:3 4:5 7		2009 •	I O d B			١	Mkr2 24 -3	.800°0 G 7.14 dE			
Peak		<u> </u>		1					T				
Log			· · · · · · · · · · · · · · · · · · ·						<u> </u>				
10 dB/													
Offs	t												
30													
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DI -10.	0												
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V1 S	52					L				=	2		
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Α	А												
	:	Ì											
Star	<b>t</b> 20 GHz			<u> </u>					St	op 25 (	G H z		
	<b>BW</b> 100				# <b>VBW</b> 3			Sweep	518 ms				
										· F	<u> </u>		
, <b>!</b>													

Test Photograph(s)
Power Spectral Density
FCC Part 15, Subpart C, Section 15.247(e)
RSS-210, Section A8.2 (b)

# Test Photograph(s) Power Spectral Density

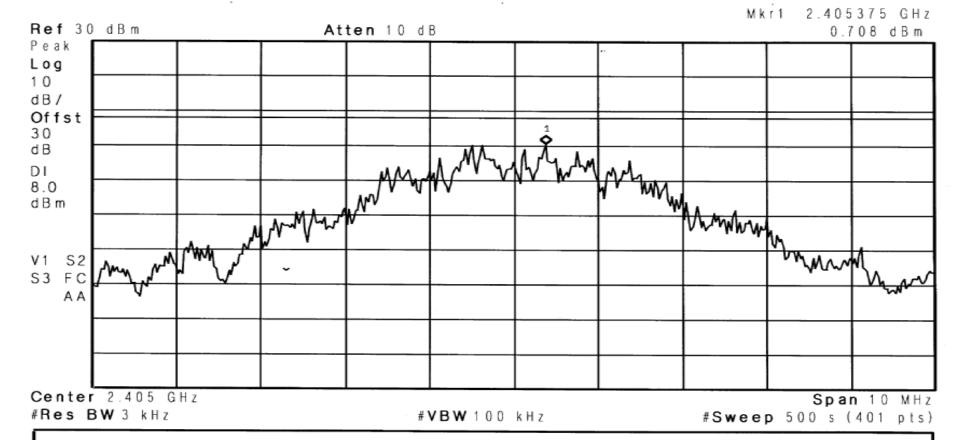


Test Setup

Test Data
Power Spectral Density
FCC Part 15, Subpart B, Section 15.247(e)
RSS-210, Section A8.2 (b)

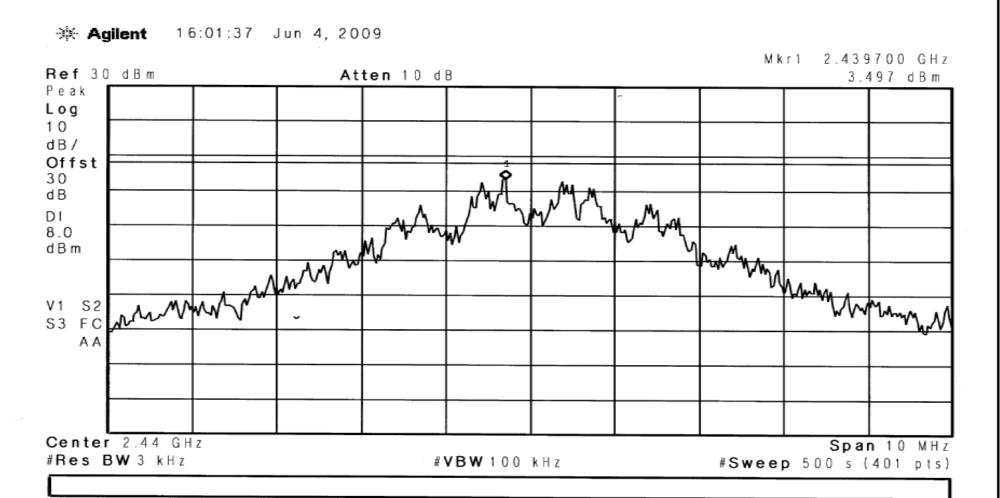
#### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Test Method: Power Spectral Density MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module R5184N Customer: Test Sample: Job No: Model No: SerialLink Serial No: SL30360012-0010 Technician: M.Seamans FCC Part 15.247(e) / RSS210A8.2(b) Test Specification: Date: 6/8/2009 Operating Mode: Transmitting signal Transmit frequency: 2405MHz Notes:





Data Sheet 1 of 3

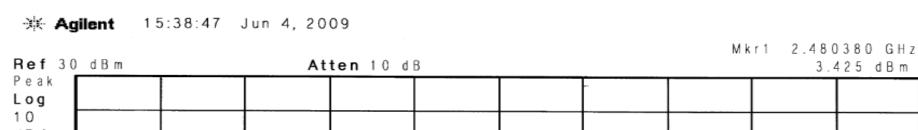
	<b>RETLIF TES</b>	STING 1	LABORATORIES		
	EMI	SSIONS DA	ATA SHEET		
Test Method:	Power Spectral Density				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(e) / RSS210A8.2(b)			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2440MHz				
	· · · · · · · · · · · · · · · · · · ·				

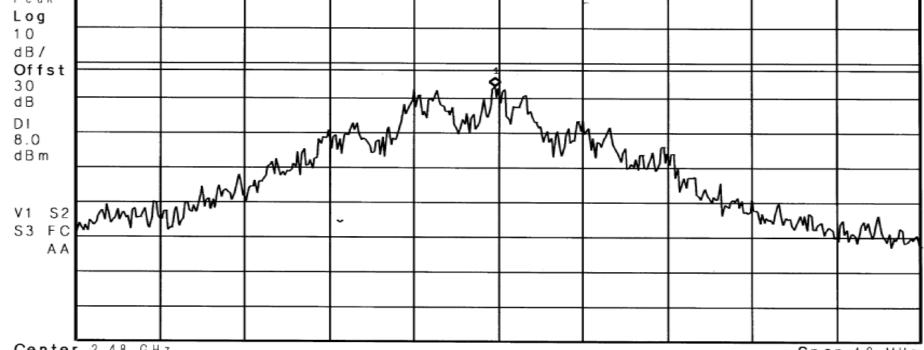


R5184N

Data Sheet 2 of 3

	<b>RETLIF TE</b>	STING 1	LABORATORIES		
	EM	ISSIONS DA	ATA SHEET		
Test Method:	Power Spectral Density				
Customer:	MicroStrain, Inc.	Test Sample:	2.4 GHz Direct Sequence Spread Spectrum Wireless Module	Job No:	R5184N
Model No:	SerialLink	Serial No:	SL30360012-0010	Technician:	M.Seamans
Test Specification:	FCC Part 15.247(e) / RSS210A8.2(b)			Date:	6/8/2009
Operating Mode:	Transmitting signal				
Notes:	Transmit frequency: 2480MHz				
					•





Center 2.48 GHz Span 10 MHz #Res BW 3 kHz #VBW 100 kHz #Sweep 500 s (401 pts)

Data Sheet 3 of 3

R5184N

3.425 dBm

Test Photograph(s)
Radiated Spurious Emissions
FCC Part 15, Subpart C, Section 15.247(d)
RSS-210, Section A8.5
RSS-Gen, Section 7.2.3

## Test Photograph(s) Radiated Spurious Emissions



Test Setup, Horizontal Antenna Polarization



Test Setup, Vertical Antenna Polarization

# Test Photograph(s) Radiated Spurious Emissions



Test Setup

Test Data
Radiated Spurious Emissions
FCC Part 15, Subpart C, Section 15.247(d)
RSS-210, Section A8.5
RSS-Gen, Section 7.2.3

		RE	TLIF	TESTI	ING LA	ABOR	ATORI	ES =					
				EMISSIC	NS DATA	SHEET							
Test Method	:	Band Edge Er	nissions Radia	ated									
Customer:		MicroStrain, Ir	nc.			Job No:	R5184N						
Test Sample	:	2.4 GHz Direc	t Sequence S	pread Spectrui	m Wireless Mo	dule							
Model No:		SerialLink				lo	CI 20260012	0010					
			M7(4) / D00 0	140.40.5		Serial No:	SL30360012-	0010					
Test Specific	cation:	FCC Part 15.2	FCC Part 15.247(d) / RSS 210 A8.5										
Operating M	ode:	Transmitting s	ignal										
Technician:		M.Seamans				Date:	9/14/2009						
Notes:		Transmit Freq	uency: 2405 a	nd 2480MHz		ı							
		Peak Detector			Testing perforn	ned at 3 Mete	rs						
Test	Antenna Position		Correction						Corrected	Spurious			
Frequency	EUT Orientation		Factor						Reading	Limit			
MHz	(H/V) - Axis	dBuV	dB						dBuV/m	dBuV/m			
2400.00 2483.50	V/Y V/Y	42.09	6.46 7.64						48.55	54.00 54.00			
2483.50	V/Y	44.02	7.64						51.66	54.00			
Data Shee	t 1 of 1									R5184N			
		<u> </u>				<u> </u>		<u> </u>	<u> </u>				

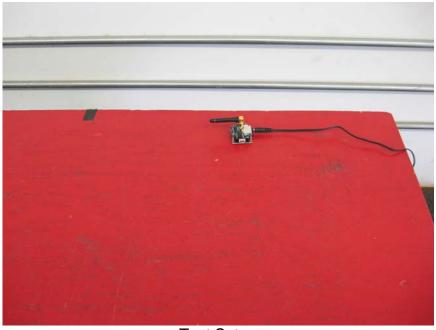
## **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Test Method: Out of Band Emissions Radiated Customer: MicroStrain, Inc. Job No: R5184N 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Test Sample: Model No: SerialLink SL30360012-0010 Serial No: FCC Part 15.247(d) / RSS 210 A8.5 **Test Specification:** Operating Mode: Transmitting signal Technician: M.Seamans Date: 6/8/2009 Notes: Transmit Frequency: 2405MHz Peak Detector Testing performed at 3 Meters Antenna Position Uncorrected Correction Spurious Corrected EUT Orientation Reading Frequency Factor Reading MHz (H/V) - Axis dBuV dΒ dBuV/m dBuV/m 4810.00 V/Z 44.04 6.02 50.06 54.00 12025.00 -54.00 19240.00 Data Sheet 1 of 1 R5184N

## **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Out of Band Emissions Radiated Test Method: Customer: MicroStrain, Inc. Job No: R5184N 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Test Sample: Model No: SerialLink SL30360012-0010 Serial No: FCC Part 15.247(d) / RSS 210 A8.5 **Test Specification:** Operating Mode: Transmitting signal Technician: M.Seamans Date: 6/8/2009 Notes: Transmit Frequency: 2440MHz Peak Detector Testing performed at 3 Meters Antenna Position Uncorrected Correction Spurious Corrected EUT Orientation Reading Frequency Factor Reading MHz (H/V) - Axis dBuV dΒ dBuV/m dBuV/m 4880.00 V/Z 44.23 6.32 50.55 54.00 7320.00 -12200.00 19520.00 54.00 Data Sheet 1 of 1 R5184N

## **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** Out of Band Emissions Radiated Test Method: Customer: MicroStrain, Inc. Job No: R5184N 2.4 GHz Direct Sequence Spread Spectrum Wireless Module Test Sample: Model No: SerialLink SL30360012-0010 Serial No: FCC Part 15.247(d) / RSS 210 A8.5 **Test Specification:** Operating Mode: Transmitting signal Technician: M.Seamans Date: 6/8/2009 Notes: Transmit Frequency: 2480MHz Peak Detector Testing performed at 3 Meters Antenna Position Uncorrected Correction Spurious Corrected EUT Orientation Reading Frequency Factor Reading MHz (H/V) - Axis dBuV dΒ dBuV/m dBuV/m 4960.00 V/Z 43.63 6.45 50.08 54.00 7440.00 -12400.00 19840.00 54.00 Data Sheet 1 of 1 R5184N

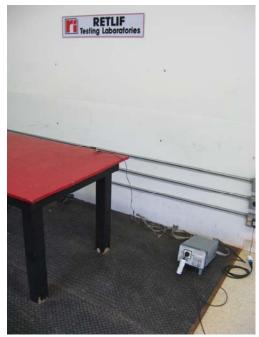
Test Photograph(s)
Conducted Emissions, Power Leads
FCC Part 15, Subpart C, Section 15.207(a)
RSS-GEN, Section 7.2.2

# Test Photograph(s) Conducted Emissions



Test Setup

# Test Photograph(s) Conducted Emissions



Test Setup

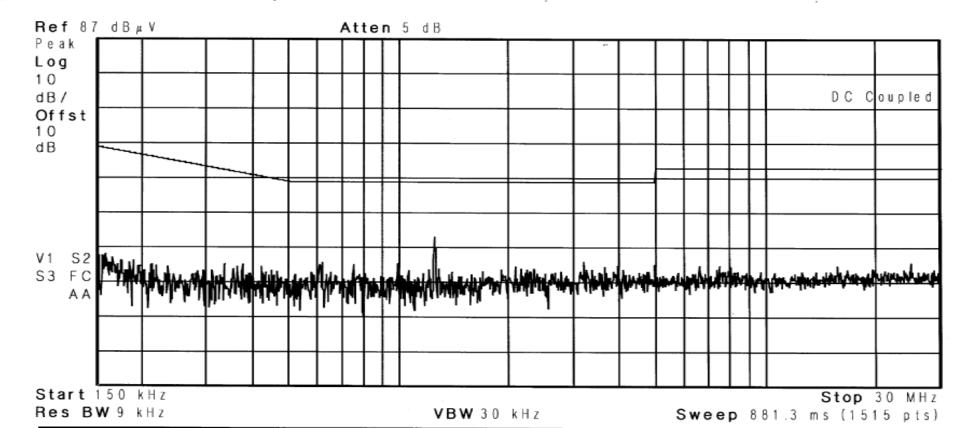


Test Setup

# Test Data Conducted Emissions, Power Leads FCC Part 15, Subpart C, Section 15.207(a) RSS-GEN, Section 7.2.2

#### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** DC Line Conducted Emissions Test Method: MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module R5184N Customer: Test Sample: Job No: Model No: SerialLink Serial No: SL30360012-0010 M.Seamans Technician: FCC Part 15,207 / RSS Gen 7,2,2 Test Specification: Date: 6/8/2009 Operating Mode: Transmitting signal Lead Tested: Positive 6VDC Notes:

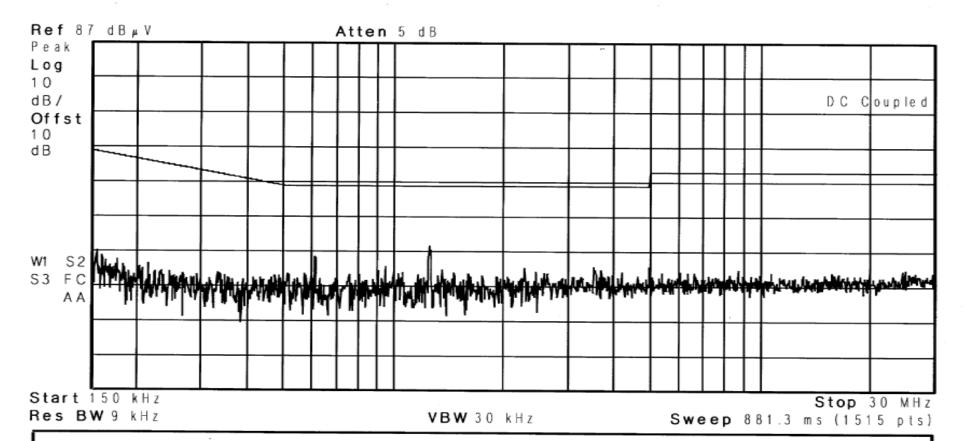




Data Sheet 1 of 2

#### **RETLIF TESTING LABORATORIES EMISSIONS DATA SHEET** DC Line Conducted Emissions Test Method: MicroStrain, Inc. 2.4 GHz Direct Sequence Spread Spectrum Wireless Module R5184N Customer: Test Sample: Job No: Model No: SerialLink Serial No: SL30360012-0010 M.Seamans Technician: FCC Part 15,207 / RSS Gen 7,2,2 Test Specification: Date: 6/8/2009 Operating Mode: Transmitting signal Lead Teated: Return 6VDC Notes:





Data Sheet 2 of 2