



# LS RESEARCH LLC

Wireless Product Development

W66 N220 Commerce Court • Cedarburg, WI 53012 USA • Phone: 262.375.4400 • Fax: 262.375.4248 • www.lsr.com

## ENGINEERING TEST REPORT # 313038 B

### LSR Job #: C-1756

RF Exposure Compliance of:

SWF Network Module

Test Date(s):

July 18, 19, 27 and August 6, 2013

Prepared For:

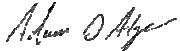
Springs Window Fashions

Attn: Tom Merker

7549 Graber Rd.

Middleton, WI 53562

**This Test Report is issued under the Authority of:** Adam Alger, EMC Engineer

Signature:  Date: 10-10-13

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Prepared For: Springs Window Fashions	Name: SWF Network Module
Report: TR 313038 B	Model: SRF-01
LSR: C-1756	Serial: N/A (engineering sample)

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## LS Research, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

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TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation  
A2LA Certificate Number: 1255.01

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Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948  
FCC Registration Number: 90756

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Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1

File Number: IC 3088-A

On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1

File Number: IC 3088

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U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility –Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2).

Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union

Telecommunication Equipment – Council Directive 99/5/EC, Annex V.

Date of Validation: November 20, 2002

Notified Body Identification Number: 1243

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## 1.0 Conformance Summary

The EUT was found to MEET the 5mm minimum test separation distance threshold for SAR test exclusion per FCC §2.1093(portable) using methods of FCC KDB 447498 D01 General RF Exposure Guidance v05r01 as a standalone device.

## 2.0 SAR Test Exclusion Threshold

SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm

1-g SAR test exclusion threshold equation:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0$$

10-g SAR test exclusion threshold equation:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 7.5$$

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### 3.0 Equipment Under Test (EUT) Information

*The following information has been supplied by the applicant.*

<b>Product Name:</b>	SWF Network Module
<b>Model Number:</b>	SRF-01
<b>Serial Number:</b>	N/A (engineering sample)
<b>FCC ID</b>	2AAVX-SRF01
<b>IC Number</b>	11392A-SRF01

#### 3.1 Product Description

A Modular 2.4 GHz RF Transceiver with PCB antenna

#### 3.2 Additional Information

EUT was pre-programmed to transmit on low (2403 MHz), middle (2440 MHz), and high channel (2467 MHz). A button was depressed to cycle between channels.

EUT fitted with a temporary RF port (U.FL) for measurement purpose only.

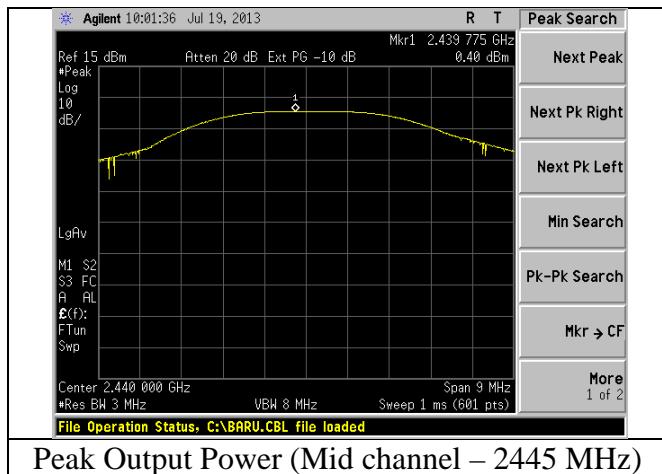
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## 4.0 RF Conducted Measurement Data

Table

Frequency (MHz)	Power (dBm)
2445	0.40

Plots

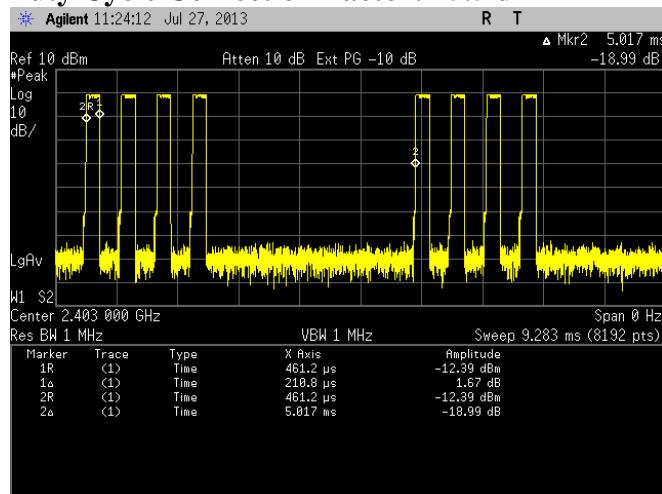


1 Pulse =  $0.2108 \text{ ms} * 4 \text{ pulses} = 0.8432 \text{ ms}$  total on time

1 Pulse train = 5.017 ms

Duty Cycle =  $20 * \log (0.8432/5.017) = -15.5 \text{ dB}$

### Duty Cycle Correction Factor: 15.5 dB



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## 5.0 SAR Test Exclusion Calculation

Description	Line #	Data	Unit	Additional Description
Transmit Packet on time:	1	0.8432	(ms)	Worst case
Packet repetition time:	2	5.017	(ms)	Worst case
Duty factor:	3	0.168069		Transmit Packet on time / Packet repetition time (1/2)
Maximum peak output power at antenna input terminal:	4	0.40	(dBm)	Measured worst case
Antenna gain:	5	5	(dBi)	Antenna gain (measured over ground plane)
Maximum peak radiated power:	6	5.400	(dBm)	Antenna terminal measured power + antenna gain (4+5)
Maximum peak radiated power:	7	3.467	(mW)	dBm to mW conversion
Prediction distance:	8	5	(mm)	Minimum test separation distance
Prediction frequency:	9	2.445	(GHz)	Measured frequency
Square root of frequency (GHz):	10	1.56365		Calculation
Duty factor applied to maximum peak radiated power (mW):	11	0.582756	(mW)	duty factor * maximum peak radiated power (11*7)
Source based power (mW) / min test separation distance (mm):	12	0.116551		Calculation (11/8)
SAR exclusion calculation:	13	0.18		Calculation (12*10)
Threshold:	14	3		
Margin:	15	2.82		Calculation (14-13)

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## 6.0 Industry Canada Low Power Exemption

RSS 102 Section 2.5 states that all transmitters that meet the output power requirements as stated in section 2.5.1 and 2.5.2 of RSS 102 are exempt from routine SAR and RF exposure evaluation.

### **Output Power Evaluation.**

Evaluation Frequency = 2445 MHz

Device Operation separation distance:  $\leq 20\text{cm}$

Maximum Effective Isotropic Radiated Power (dBm) =  $0.4\text{ dBm} + 5\text{ dBi} = 5.4\text{ dBm}$

Maximum Effective Isotropic Radiated Power (mW) =  $\log^{-1}(\text{EIRP(dBm)/10}) = 3.46\text{ mW}$

Section 2.5.1 general public use limit at for devices operating less than 20cm:

Frequency	Limit
2.2 to 3 GHz	20 mW

Conclusion:

Since the maximum effective radiated power (EIRP) is less than the applicable section limit, the Product is exempt from SAR/RF Evaluation

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## END OF REPORT

Date	Version	Comments	Person
10-10-13	V1	Final	Adam A

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