Engineering and Testing for EMC Compliance

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Certification Application Report
FCC Part 15.231 & Industry Canada RSS-210

Test Lab:	Applicant:
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FCC ID	S3N-SR65XX	**Test Report Date**	January 13, 2009
IC	7953A-SR65XX		
Platform	N/A	**RTL Work Order Number**	2008229
Model	SR65XX	**RTL Quote Number**	QRTL08-451A

FCC Classification	DSC – Part 15 Security/Remote Control Transmitter
FCC Rule Part(s)	Part 15.231: Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz (10-01-07)
Industry Canada Standard	RSS-210 Issue 7 June 2007: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)
Digital Interface Information	Digital Interface was found to be compliant

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
315	N/A	N/A	385KF1D

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Furthermore, there was no deviation from, additions to, or exclusions from the applicable parts of FCC Part 2, FCC Part 15, Industry Canada RSS-210, and ANSI C63.4.

Signature: _____ Date: January 13, 2009

Typed/Printed Name: Desmond A. Fraser Position: President

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1 General Information

1.1 Scope

FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

IC RSS-210 Section A1.1: Momentarily Operated Devices

1.2 Modifications

N/A.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories, Inc. (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Thermokon Sensortechnik GmbH, Model SR65XX, FCC ID: S3N-SR65XX, IC: 7953A-SR65XX. A Family Certification is being requested for Industry Canada.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 315 MHz was tested and investigated from 9 kHz to the 10th harmonic. The test results relate only to the item that was tested.

The antenna transmits, receives, and is externally attached. The IF, LO, and up to the 2nd LO, were investigated and tested, and found to be compliant for unintentional emissions compliance.

2.2 Exercising the EUT

The EUT was adapted to continuously transmit with a 30 ms long train of pulses within 100 ms for testing purposes. The carrier was also checked to verify that the information was being transmitted. There were no deviations from the test standard(s) and/or methods.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail Or N/A
FCC 15.207	AC Line Conducted Emissions	N/A
FCC 15.231(a)	Radiated Emissions	Pass
FCC 15.231(c)	20 dB Bandwidth	Pass

2.4 Test System Details

The test sample was received by RTL on January 9, 2009. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the following table.

Table 2-2: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Transmitter	Thermokon Sensortechnik GmbH	SR65XX	N/A	S3N-SR65XX	N/A	18746
Transmitter	Thermokon Sensortechnik GmbH	SR65XX	N/A	S3N-SR65XX	N/A	18747

2.5 Configuration of Tested System

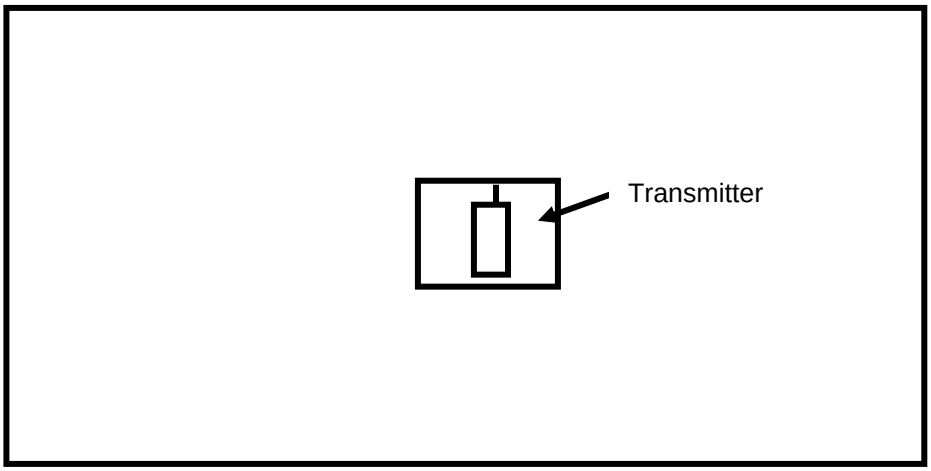

Figure 2-1: Worst Case Configuration of System under Test

3 Duty Cycle Calculation - FCC 15.35(c), RSS-Gen 4.5

Manufacturer's attestation of duty cycle:

A standard transmission consists of 3 ASK (OOK) data packets. Each one lasts 1.208 ms with ~50% on/off duty cycle. Thus, the transmitter is transmitting 0.6 ms during each of the three data packets, for a total of 1.8 ms for each standard transmission. Because the standard transmission occurs at a period longer than 100 ms, section 15.35(c) limits the period (for calculating the average) to 100 ms.

The duty cycle correction factor is -20 log (3 * 0.6 ms / 100 ms) = -34.9 dB

Plot 3-1: Pulse Width

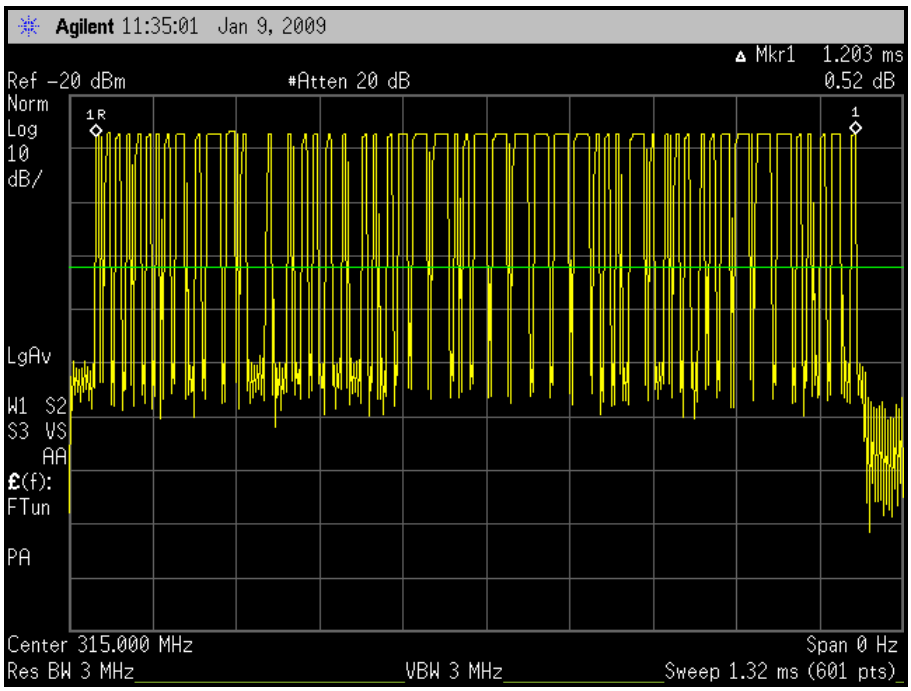

Table 3-1: Duty Cycle Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	January 9, 2009
EMC Test Engineer	Signature	Date of Test

4 Transmitter Deactivation - FCC 15.231(a)(1)/(2), RSS-210 A1.1.1(a)/(b)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Manufacturer's attestation: The EUT can be activated manually or automatically, and the requirements above are fulfilled inherently. The transmitter sends only a short packet which lasts for only a few tens of milliseconds. Thus, it deactivates itself within the 5 second limit.

Plot 4-1: Transmitter Deactivation

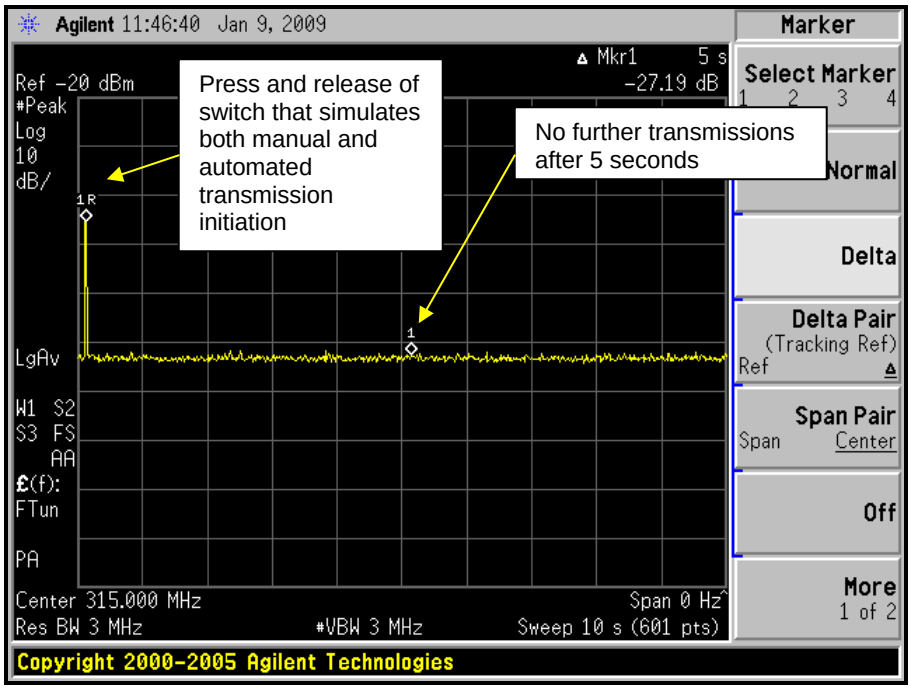

Table 4-1: Transmitter Deactivation Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	January 9, 2008
EMC Test Engineer	Signature	Date of Test

5 Modulated Bandwidth – FCC 15.231(c) & IC RSS-210 A1.1.3

5.1 Modulated Bandwidth Test Procedure

The minimum 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz, and the video bandwidth set at 30 kHz. The 20 dB bandwidth was measured using the delta marker function.

5.2 FCC §15.231(c) Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3 Modulated Bandwidth Test Data

Table 5-1: 20 dB Modulated Bandwidths

20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
385	0.25% of 315000 = 787.5	-402.5

Plot 5-1: Modulated Bandwidth

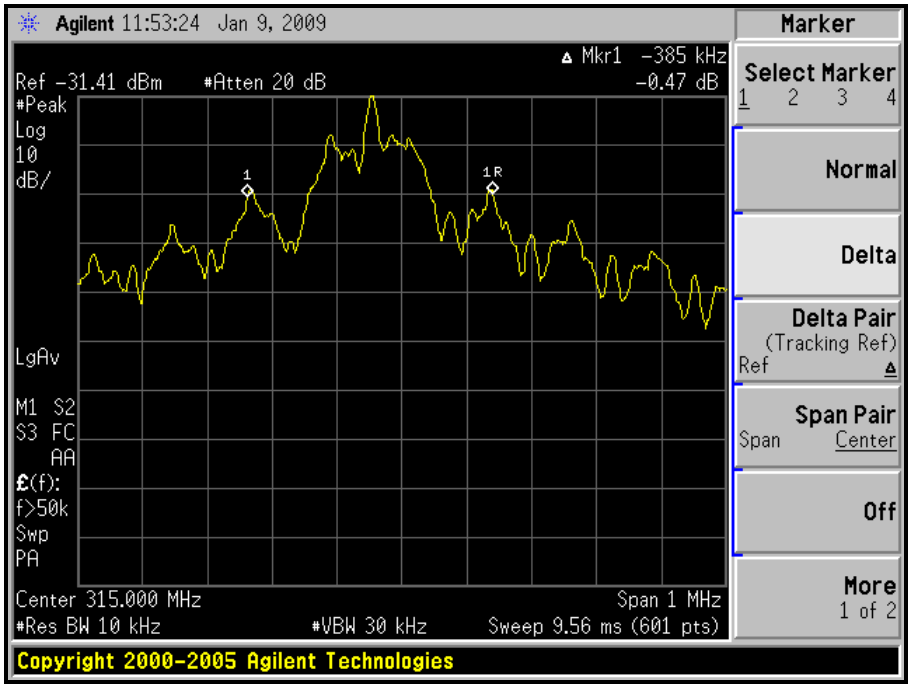

Table 5-2: Modulated Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	January 9, 2009
EMC Test Engineer	Signature	Date of Test

6 Radiated Emissions – FCC 15.109, 15.231 & IC RSS-210 A1.1.2

6.1 Radiated Fundamental Emissions Test Procedure

Radiated Emissions of the Fundamentals were tested at three meters, and meet the requirements of 6,042 uV/m in average mode, and 20 dB higher in peak mode. The limit is calculated from a linear interpolation between 3,750 and 12,500 uV/m, and from 260 - 470 MHz. The EUT was tested in all three orthogonal planes. Measurement was based on a peak detector, and an average value was calculated based on the duty cycle.

6.1.1 Radiated Fundamental Emissions Limits Test Data

Table 6-1: Radiated Fundamental Emissions

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Detector	Pol	Site Correction Factor (dB)	Duty Cycle Correction (dB)	Corrected Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
315	98.1	Peak	H	-10.3	N/A	87.8	95.6	-7.8
315	98.1	Average	H	-10.3	-34.9	52.9	75.6	-22.7

6.2 Radiated Harmonics/Spurious Emissions – FCC 5.231 & IC RSS-210 A1.1.2

6.2.1 Radiated Emissions Harmonics/Spurious Test Procedure

Radiated emissions of the harmonics were tested at three meters. The EUT was tested in the 3 orthogonal planes with the receive antenna in both polarities.

6.2.2 Radiated Harmonics/Spurious Emissions Test Data

All emissions were more than 20 dB below the limit; per 15.31(o) no data is being reported.

Table 6-2: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900811	Rhein Tech Labs, Inc.	PR-1040	Amplifier	1003	7/8/09
900791	Chase	CBL6111B	Bilog antenna 30 MHz–2000 MHz	N/A	12/12/10
901215	Hewlett Packard	EMC Analyzer	Analyzer 9kHz-12.8GHz	3826A00144	10/23/09
900772	EMCO	3161-02	Horn Antenna 2-4 GHz	9804-1044	6/13/10
901364	MITEQ	JS4-01002600-36-5P	Amplifier 0.1-26 GHz	849863	12/3/09
901516	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/17/09
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/17/09
900913	Hewlett Packard	8546A	Analyzer 9 kHz-6.5 GHz	3325A00159	4/15/09

Test Personnel:

Dan Baltzell		January 11, 2009
Test Engineer	Signature	Date of Test

7 Conducted Limits – FCC §15.207 & IC RSS-Gen

7.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

7.2 Test Limits

Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

7.3 Conducted Emissions Test Data

N/A – EUT is battery operated.

8 Conclusion

The data in this measurement report shows that Thermokon Sensortechnik GmbH Model SR65XX; FCC ID: S3N-SR65XX, IC: 7953A-SR65XX, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules, and Industry Canada RSS-210.