

For

Skyway 4000 Radio -2 To FCC Part 90 Subpart Y

Test Report Serial No.: SL05081801-SLK-001B

This report supersedes NONE

Remarks:

Equipment complied with the specification Equipment did not comply with the specification [X] []

.....

This Test Report is Issued Under the Authority of:

Tested by: Alvin Ilarina, Test Enginner

.....

Reviewed by: Leslie Bai, Lab Manager

Issue date: 06 September 2005

Equipment Details: Manufacturer: Solectek Corporation











Registration No. 783147

Registration No. 4842

Lab Code: KR0032 RT

Registration No. 2195

This test report may be reproduced in full only.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page2 of 34

This page has been left blank intentionally.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page3 of 34

CONTENTS

EX	ECUTIVE SUMMARY	5
1	TECHNICAL DETAILS	6
2	TESTS REQUIRED	7
3	MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS	8
4	TEST INSTRUMENTATION	27
AP	PENDIX A: EUT TEST CONDITIONS	.28
AP	PENDIX B: EXTERNAL PHOTOS	.29
AP	PENDIX C: CIRCUIT/BLOCK DIAGRAMS	.30
AP	PENDIX D: INTERNAL PHOTOS	31
AP	PENDIX F: PRODUCT DESCRIPTION	32
AP	PENDIX H: FCC LABEL LOCATION	.33
AP	PENDIX I: USER MANUAL	34



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page4 of 34

This page has been left blank intentionally.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page5 of 34

Executive Summary

The purpose of this test programme was to demonstrate compliance of the Solectek Corporation, Skyway 4000 Radio -2 against the current FCC Part 90 Subpart Y. The Skyway 4000 Radio -2 demonstrated compliance with the FCC Part 90 Subpart Y.

Solectek Corporation is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the Skyway 4000 Radio -2 User Manual.

The test has demonstrated that this unit complies with stipulated standards.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page6 of 34

1 <u>Technical Details</u>

Purpose

Applicant / Client

Manufacturer

Laboratory performing the tests

Compliance testing of Skyway 4000 Radio -2 with FCC Part 90 Subpart Y

Solectek Corporation 6370 Nancy Ridge Dr. Suite 109 San Diego, CA 92121-3212

Solectek Corporation

SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131

SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131

SL05081801-SLK-001B 30 Aug 2005 FCC Part 90 Subpart Y 30 Aug 2005 to 30 Sep 2005 1

Licensed Non-Broadcast Station Transmitter

Skyway 4000 Radio -2 Skyway 4000 Radio -2 None

KA349WAN2

Test location(s)

Test report reference number Date EUT received Standard applied Dates of test (from – to) No of Units: Equipment Category:

Trade/Product Name: Type/Model Name/No: Technical Variants:

FCC ID No.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page7 of 34

2 Tests Required

The product was tested in accordance with the following specifications. The test results recorded in this Test Report are exclusively referred to the tested sample(s).

Test Standard	Description	Pass / Fail		
47 CFR Part 90, Subpart Y				
2.1046; 90.1215(a)	Peak Output Power	Pass		
2.1046; 90.1215(a)	Peak Power Spectral Density	Pass		
2.1049; 90.210(m)	Occupied Bandwidth; Emissions Mask	Pass		
2.1051; 90.210(m)	Spurious Emissions at Antenna Terminals	Pass		
2.1053; 90.210(m)	Radiated Spurious Emissions	Pass		
2.1055(a)(1); 90.213	Frequency Stability; Temperature Variations	Pass		
2.1055(d)(1); 90.213	Frequency Stability; Voltage Variations	Pass		
TIA/EIA-603-A-2001				
ANSI C63.4: 2001				

Notes: Deviations to above standards are outlined in specific test sections if applicable. Cable loss and external attenuation are compensated for in the measurement system when applicable.



3 Measurements, Examinations and Derived Results

3.1 General observations

Equipment serial number(s)				
Module:	Part number:	Serial number:		
Skyway 4000 Radio -2	Skyway 4000 Radio -2	none		



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page9 of 34

3.2 Test Results

3.2.1 Peak Output Power

Requirement(s): 47 CFR §2.1046 and §90.1215(a)

Procedures: The peak output power was measured at the antenna terminal using Acceptable Procedures: Peak conducted transmit output power outlined in FCC DA 02-2138 Appendix A. The Average Power measurements were taken using a power meter with a sensor capable of measuring the entire bandwidth of the signal. The measurements were made for the 5MHz, 10MHz, and 20MHz bandwidths at the center frequency of the channel.

Plot #	Frequency (MHz)	Channel Bandwidth (MHz)	Peak Power (dBm)	Peak Limit (dBm)
1	4965	5	19.7	27
2	4965	10	19.0	30
3	4965	20	19.2	33



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page10 of 34



Plot 1: Peak Power 5MHz Bandwidth



Plot 2: Peak Power 10MHz Bandwidth



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page11 of 34



Plot 3: Peak Power 20MHz Bandwidth



3.2.2 Peak Power Spectral Density

Requirement(s): 47 CFR §2.1046 and §90.1215(a)

Procedures: The peak power spectral density measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, and 20MHz bandwidths at the center frequency of the channel.

Plot #	Frequency (MHz)	Channel Bandwidth (MHz)	PPSD (dBm)	Limit (dBm)
4	4965	5	16.47	21
5	4965	10	13.97	21
6	4965	20	11.47	21



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page13 of 34





Plot 4: Peak Power Spectral Density 5MHz Bandwidth

Plot 5: Peak Power Spectral Density 10MHz Bandwidth



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page14 of 34



Plot 6: Peak Power Spectral Density 20MHz Bandwidth



3.2.3 Occupied Bandwidth; Emission Mask

Requirement(s): 47 CFR §2.1049 and §90.210(m)

Procedures: The Emission Masks were measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, and 20MHz bandwidths at the center frequency of the channel.

Plot #	Frequency (MHz)	Channel Bandwidth (MHz)	Pass/Fail
7	4965	5	Pass
8	4965	10	Pass
9	4965	15	Pass





Plot 7: Emission Mask M – 5MHz Bandwidth



Plot 8: Emission Mask M – 10MHz Bandwidth



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page17 of 34



Plot 9: Emission Mask M – 20MHz Bandwidth



3.2.4 Spurious Emissions at Antenna Terminals

Requirement(s): 47 CFR §2.1051 and §90.210(m)

Procedures: The spurious emissions at the antenna terminal as measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, and 20MHz bandwidths at the center frequency of the channel.

The spurious limit was determined by:

Measured Average Output Power of EUT – 50 dBm/MHz

Plots #	Frequency (MHz)	Channel Bandwidth (MHz)	Pass/Fail
10 to 12	4965	5	Pass
13 to 15	4965	10	Pass
16 to 18	4965	20	Pass



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page19 of 34



Plot 10: Conducted Spurious 5MHz BW 1 of 3



Plot 11: Conducted Spurious 5MHz BW 2 of 3



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page20 of 34



Plot 12: Conducted Spurious 5MHz BW 3 of 3



Plot 13: Conducted Spurious 10MHz BW 1 of 3



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page21 of 34



Plot 14: Conducted Spurious 10MHz BW 2 of 3



Plot 15: Conducted Spurious 10MHz BW 3 of 3



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page22 of 34



Plot 16: Conducted Spurious 20MHz BW 1 of 3



Plot 17: Conducted Spurious 20MHz BW 2 of 3



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page23 of 34



Plot 18: Conducted Spurious 20MHz BW 3 of 3



3.2.5 Radiated Spurious Emissions

Requirement(s): 47 CFR §2.1053 and §90.210(m)

Procedures: The radiated spurious emissions were measured using signal substitution. Any spurious emission amplitude was recorded. The emission amplitude was then reproduced with another antenna and signal generator. The output power at the substitution antenna was then measured with a power meter. This reading was then added with the antenna gain to determine the EIRP of the spurious emission. The measurements were made for the 5MHz, 10MHz, and 20MHz bandwidths at the center frequency of the channel.

The spurious limit was determined by:

Measured Average Output Power of EUT - 50 dBm/MHz

EBW	Frequency	Polarization	Azimuth	Power Meter	Antenna Gain	EIRP	Limit	Margin
(MHz)	(MHz)	V/H	(degrees)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
5	9920	v	180	-55.0	10.70	-44.3	-30.4	-13.9
5	9920	н	180	-48.9	10.74	-38.16	-30.4	-7.76
5	14890	v		Noise Floor				
5	14890	н	Noise Floor					
10	9920	v	180	-52.9	10.70	-42.2	-30.6	-11.6
10	9920	н	180	-55.8	10.74	-45.06	-30.6	-14.46
10	14890	v			Noise F	loor		
10	14890	н			Noise F	loor		
20	9920	v	180	-54.9	10.70	-44.2	-30.2	-14.0
20	9920	н	180	-57.8	10.74	-47.06	-30.2	-16.86
20	14890	v	Noise Floor					
20	14890	н	Noise Floor					
Notes: NF = Noise Floor EIRP = Power Meter reading + Antenna Gain Margin = EIRP – Limit								



3.2.6 Frequency Stability; Temperature Variations

Requirement(s): 47 CFR §2.1055(a)(1) and §90.213

Procedure: The frequency stability was measured at the antenna terminal using a spectrum analyzer. The measurements were made at the 5MHz bandwidths using the frequency counter function of the spectrum analyzer. The temperature was varied from -30°C to +50°C at 10°C increments with suitable time allowed for temperature stability between measurements.

Temperature (°C)	Frequency (GHz)	ppm
+50	4.964980957	0.56
+40	4.964974171	1.93
+30	4.964975019	1.75
+20	4.964983756	0
+10	4.964990306	1.31
0	4.964995787	2.42
-10	4.965015836	6.46
-20	4.964999051	3.08
-30	4.965023808	8.06



3.2.7 Frequency Stability: Voltage Variations

Requirement(s): 47 CFR §2.1055(d)(1) and §90.213

Procedures: The frequency stability was measured at the antenna terminal using a spectrum analyzer. The measurements were made at the 5MHz bandwidth using the frequency counter function of the spectrum analyzer. The voltage was varied from +/- 15% of the nominal.

Voltage (VAC)	Frequency (GHz)	ppm
126.5	4.96497707	0.27
110	4.964978441	0
93.5	4.96497751	0.18



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page27 of 34

4 **TEST INSTRUMENTATION**

4.1 **TEST INSTRUMENTATION**

Instrument	Manufacturer	Model
Spectrum Analyzer	HP	8564E
Power Meter	HP	437B
Power Sensor	HP	8485A
Antenna	Emco	3115
Antenna	Emco	3115
Signal Generator	Wiltron	68169B
Chamber	Lingren	3m
Pre-Amplifier	HP	8449
DMM	Fluke	73111
Variac	KRM	AEEC-2090
Chamber	Tenney	TTRS
DMM	Fluke	5111



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page28 of 34

APPENDIX A: EUT TEST CONDITIONS

The following is the description of supporting equipment and details of cables used with the EUT.

Equipment Description	Cable Description
(Including Brand Name)	
PC Laptop	1. Power cord
POE Module	2. Ethernet

EUT Description	:	Skyway 4000 Radio
Model No	:	Skyway 4000 Radio
Serial No	:	none

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
	The EUT was controlled and monitored via Ethernet by a PC running a radio test program. The data rate was set at maximum at each bandwidth to simulate worse case conditions during the equipment operation.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page29 of 34

APPENDIX B: External Photos



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page30 of 34

APPENDIX C: CIRCUIT/BLOCK DIAGRAMS



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page31 of 34

APPENDIX D: Internal Photos



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page32 of 34

APPENDIX F: PRODUCT DESCRIPTION

Detail description of this product is shown in the User's Guide.



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page33 of 34

APPENDIX H: FCC LABEL LOCATION



Serial#SL05081801-SLK-001BIssue Date06 September 2005Page34 of 34

APPENDIX I: USER MANUAL