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EMC QUALIFICATION TEST REPORT

ELECTRONIC SOLUTIONS, INC.

ZW-RQ REC 908

TESTED TO CONFORM WITH:

☒ **EMISSIONS STANDARDS**

FOR

INDUSTRIAL, SCIENTIFIC AND MEDICAL (ISM)

Test Report Number:	091221-1518
Date of Issue:	March 3, 2010
Date of Test Completion:	January 15, 2010
Manufacturer's Address:	1355 Horizon Ave
	Lafayette, CO 80026
Phone:	(303) 469-9322

Approved by:

Laboratory Director

DISCLAIMERS

This report is the confidential property of the client. For the protection of our clients and ourselves, extracts from this test report cannot be produced without prior written approval from Criterion Technology. Reproduction of the complete report can be performed at the client's discretion.

The client is aware that Criterion Technology has performed testing in accordance with the applicable standard(s). Test data is accurate within ANSI parameters for Emissions testing, unless a specific level of accuracy has been defined in writing prior to testing, by Criterion Technology and the client.

Criterion Technology reports apply only to the specific Equipment Under Test (EUT) sample(s) tested under the test conditions described in this report. If the manufacturer intends to use this report as a document demonstrating compliance of this model, additional models of this product must have electrical and mechanical characteristics identical to the device tested for this report. Criterion Technology shall have no liability for any deductions, inferences, or generalizations drawn by the client or others from Criterion Technology issued reports.

Total liability is limited to the amount invoiced for the testing of this EUT and the contents of this report are not warranted.

Compliance with the appropriate governmental standards is the responsibility of the manufacturer.

Any questions regarding this report should be directed to:

Laboratory Director
Criterion Technology Corp.
P.O. Box 489
1350 Tolland Road
Rollinsville, Colorado 80474
Phone: (303) 258-0100
Fax: (303) 258-0775
mailto:laboratory_director@criteriontech.com

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The NVLAP Logo on the front cover of this report applies only to data taken for the above test methods.

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All Criterion Technology instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 9002, ISO 17025, ANSI/NCSL Z540-I-1994 and are traceable to national standards.

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EMC QUALIFICATION TEST REPORT
ZW-RQ REC 908

1.0 EXECUTIVE SUMMARY

1.1 PURPOSE

The purpose of this report is to present EMC test data and demonstrate conformity to the requirements of the prescribed standards for Emissions and/or Immunity.

1.2 CONFORMITY

The test article was tested to the standards listed in Table I with the indicated conformity status. All test methods were performed in accordance to with the standards listed.

TABLE I. EMISSIONS CONFORMITY SUMMARY

TEST TYPE	COMPLIANCE STANDARD	TESTING TECHNIQUE	TEST DESCRIPTION	PRODUCT CLASSIFICATION	CONFORMITY STATUS
EMISSIONS	FCC Part 15.107 FCC Part 15.109 FCC Part 15.205 FCC Part 15.207 FCC Part 15.209 FCC Part 15.249	☒ IEC/EN 55011	Unintentional Radiated Emissions	Class B	**PASSED**
			Intentional Radiated Emissions		**PASSED**
			Unintentional Conducted Emissions [1] Intentional Conducted Emissions [2]		**PASSED**

1.3 EQUIPMENT UNDER TEST (EUT)

EUT NAME(S): **ZW-RQ REC 908**

DOCUMENT REVISION HISTORY

REVISION #	REPORT NUMBER	DESCRIPTION OF REVISION	DATE OF REVISION
0	091221-1518	Original Report	03-03-2010

[1] Measurement of Conducted Emissions do not apply if the EUT is powered by an external DC power source.

[2] Measurement of Conducted Emissions do not apply if the EUT is powered by an external DC power source.

2.0 EMISSIONS TEST STANDARDS

FCC Part 15.107	**Class B**
FCC Part 15.109	**Class B**
FCC Part 15.205	**Class B**
FCC Part 15.207	**Class B**
FCC Part 15.209	**Class B**
FCC Part 15.247	**Class B**

2.1 ☒ UNINTENTIONAL RADIATED EMISSIONS – 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed over the frequency range of 30 MHz to 1000 MHz in the horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.109

Testing Conditions

Date of Test:	January 14, 2010
Temperature:	18° C
Relative Humidity:	33 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Rohde and Schwarz Receiver, ESVS-30
☒ Mini Circuits Pre-Amp #2
☒ Chase BiLog Antenna, Model 1121
☐ EMCO BiConnical Antenna, Model 3108 ☐ EMCO Log Periodic Antenna, Model 3146

Test Accessories: See Appendix C for support equipment details

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **30 MHz to 1000 MHz**

Minimum Margin to Limit: **-10.25** dB at **211.5753** MHz

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.2 ☒ UNINTENTIONAL RADIATED EMISSIONS – ABOVE 1GHZ

Measurements for *Radiated Emissions* were performed over the frequency range of 1 GHz to 10 GHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.109

Testing Conditions

Date of Test:	January 15, 2010
Temperature:	19° C
Relative Humidity:	35 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Rohde and Schwarz Receiver, ESVS-30
☒ Mini Circuits Pre-Amp #2
☒ Chase BiLog Antenna, Model 1121
☐ EMCO BiConnical Antenna, Model 3108
☒ Veratech Pre-Amp #3
☒ Antenna Research, Horn Antenna, Model DRG118/A
☐ EMCO Log Periodic Antenna, Model 3146

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **1 GHz to 10 GHz**

Minimum Margin to Limit: **-29.14** dB at **1626.0001** MHz

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.3 ☒ INTENTIONAL RADIATOR – RADIATED EMISSIONS

Measurements for *Radiated Emissions* were performed over the frequency range of 1 GHz to 10 GHz with horizontal and vertical antenna polarities to the requirements of:

FCC Part 15.205
FCC Part 15.209
FCC Part 15.249

Testing Conditions

Date of Test:	January 15, 2010
Temperature:	19° C
Relative Humidity:	35 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☒ Veratech Pre-Amp #3 ☒ Antenna Research, Horn Antenna, Model DRG118/A

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **1 GHz to 10 GHz**

Minimum Margin to Limit: **-2.3** dB at **9083.9** MHz

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.4 CHANNEL BANDWIDTH – 9.6KB

Measurements for bandwidth, band edges, number of channels were performed in accordance with the Operations to the Requirements of:

FCC Part 15.205
FCC Part 15.209
FCC Part 15.249

Testing Conditions

Date of Test:	January 15, 2010
Temperature:	19° C
Relative Humidity:	35 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Open Area Test Site

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B

Number of Channels: 1 Channels

Test Results of Occupied Bandwidth and 20 db Bandedges

Test Status: **PASSED** Frequency: **908.3954 MHz**

20 dB lower Bandedge:	**908.223 MHz**
20 dB upper Bandedge:	**908.601 MHz**
20 dB Occupied Channel Bandwidth:	**0.37823 MHz**

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.5 CHANNEL BANDWIDTH – 40 KB

Measurements for bandwidth, band edges, number of channels were performed in accordance with the Operations to the Requirements of:

FCC Part 15.205
FCC Part 15.209
FCC Part 15.249

Testing Conditions

Date of Test:	January 15, 2010
Temperature:	19° C
Relative Humidity:	35 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Open Area Test Site

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B

Number of Channels: 1 Channels

Test Results of Occupied Bandwidth and 20 db Bandedges

Test Status: **PASSED** Frequency: **908.3954 MHz**

20 dB lower Bandedge:	**908.1943 MHz**
20 dB upper Bandedge:	**908.5988 MHz**
20 dB Occupied Channel Bandwidth:	**0.40446 MHz**

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.6 ☒ FCC UNINTENTIONAL CONDUCTED EMISSIONS

Measurements for *Conducted Emissions* were performed over the frequency range of 150 kHz to 30 MHz to the requirements of:

FCC Part 15.107

Testing Conditions

Date of Test:	January 14, 2010
Temperature:	18° C
Relative Humidity:	33 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Shield Room

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B
Rohde and Schwarz Receiver, ESHS-30 Rohde and Schwarz LISN, ESH2-Z5

Test Accessories: See Appendix C for support equipment details

Test Results of Conducted Emissions

Test Status: **PASSED** Frequency Range: **150 kHz TO 30 MHz**

Minimum Margin to Limit: **-21.0** dB at **0.54600** MHz

Remarks

See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.7 ☒ FCC INTENTIONAL CONDUCTED EMISSIONS

Measurements for *Conducted Emissions* were performed over the frequency range of 150 kHz to 30 MHz to the requirements of:

FCC Part 15.207

Testing Conditions

Date of Test:	January 14, 2010
Temperature:	18° C
Relative Humidity:	33 %
Test Voltage:	120 VAC 60 Hz
Test Operator:	SP

Test Location

Criterion Technology Shield Room

Test Equipment

Hewlett-Packard Spectrum Analyzer, HP 8566B
Rohde and Schwarz Receiver, ESHS-30 Rohde and Schwarz LISN, ESH2-Z5

Test Accessories: See Appendix C for support equipment details

Test Results of Conducted Emissions

Test Status: **PASSED** Frequency Range: **150 kHz TO 30 MHz**

Minimum Margin to Limit: **-21.0** dB at **0.54600** MHz

Remarks

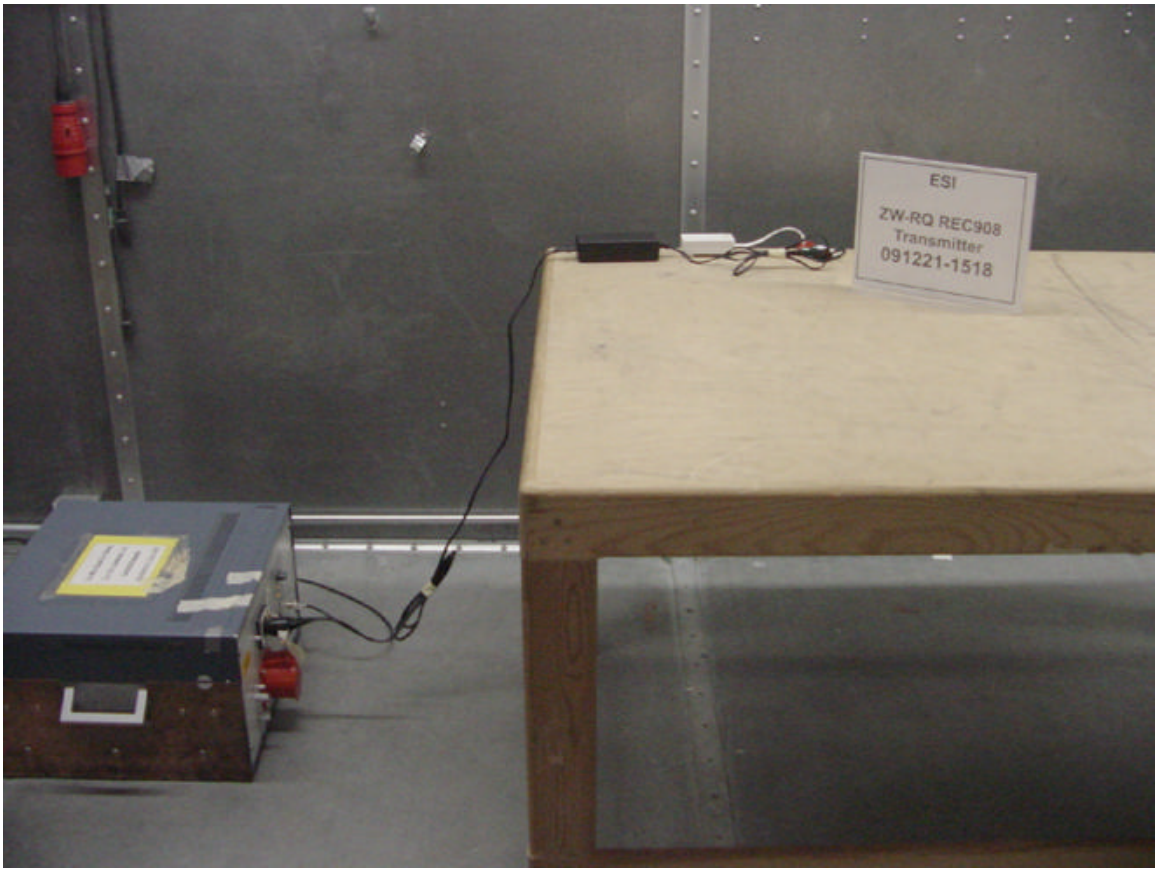
See: **APPENDIX A** for EUT Photographs
APPENDIX B for Data Sheets
APPENDIX D for Test Equipment Calibration Status

3.0 APPENDIX A: EUT PHOTOGRAPHS

3.1 UNINTENTIONAL RADIATED EMISSIONS

3.2 INTENTIONAL RADIATED EMISSIONS

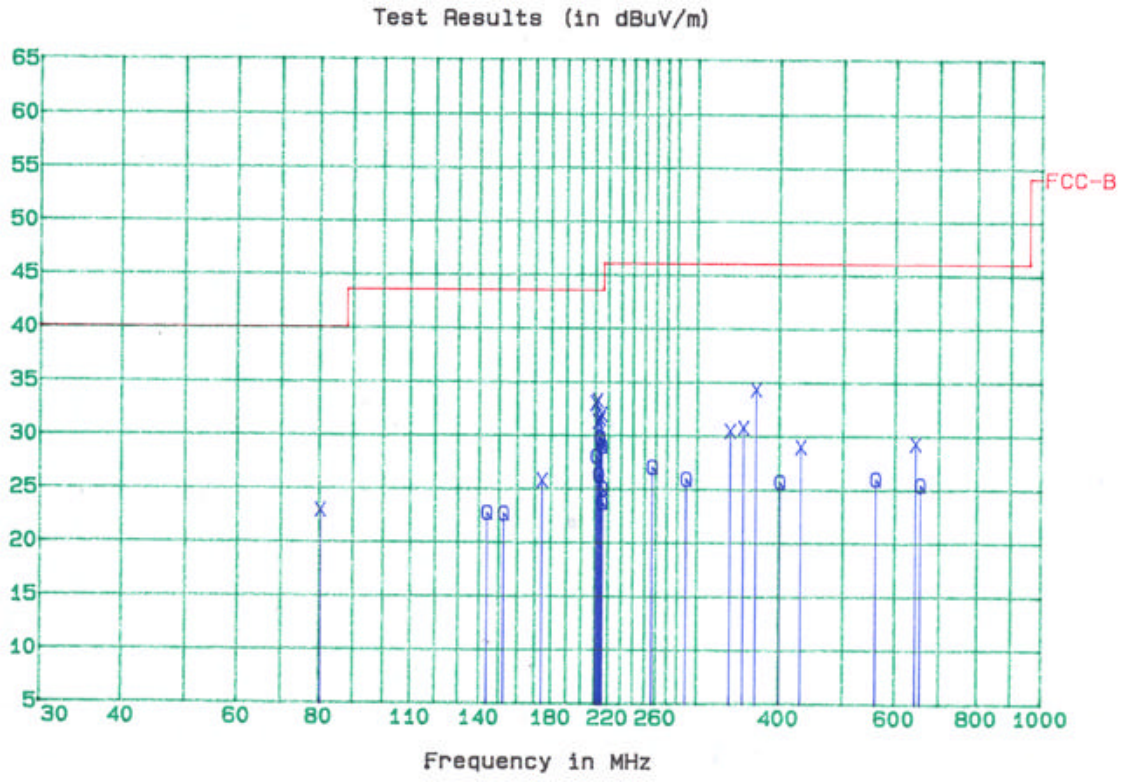
3.3 CONDUCTED EMISSSIONS



4.0 APPENDIX B: DATA SHEETS

4.1 UNINTENTIONAL RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ

Criterion Technology **Date: January 14, 2010**
EUT: ZW-RQ REC 908
Manufacturer: Electronic Solutions, Inc.
Tester: SP **SpiD: 091221-1518**
Test Information: 3 meters, 120 VAC 60 Hz, FCC part 15.109 Class B
Test Cond: Temp: 18° C **Humidity: 33 %**



4.2 UNINTENTIONAL RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ

Notes:
The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit
If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.
The following keys help to better understand the data:
TT: Turntable position in degrees
Hght: Height of antenna in centimeters
Az: Azimuth, V = Vertical, H= Horizontal

Minimum Margin to Limit: **-0.23** dB at **49.1562** MHz

Criterion Technology Thu Jan 14 15:06:16 2010
EUT: ZW-RQ REC908
Manufacturer: Electronic Solutions, Inc.
Tester: SP
Special ID: 0091221-1518
Test information: 3 meters, 120 VAC 60 Hz, FCC Part 15.109 Class B

Table 1: Scan List, sorted by margin to limit FCC-B, -21.0dB filter

Freq, MHz	Value dBuV/m	Sts	Margin to FCC-B limits (dB)	TT	Hght	Az	Comment
211.5753	33.27	m	-10.25	184	100	H	.
210.3158	32.99	m	-10.53	0	153	H	.
214.4253	31.94	m	-11.58	183	102	H	.
368.5583	34.30	m	-11.72	196	100	H	.
213.6030	31.55	m	-11.97	7	104	H	.
211.8930	31.27	m	-12.25	293	164	H	.
213.0453	29.82	q	-13.70	-7	100	H	.
213.5253	29.61	q	-13.91	179	120	H	.
214.8629	29.00	q	-14.52	90	120	H	.
352.5318	30.74	m	-15.28	176	100	H	.
210.6457	28.05	q	-15.47	271	120	H	.
336.5113	30.45	m	-15.57	187	100	H	.
644.3157	29.29	m	-16.73	271	120	H	.
431.3598	28.98	m	-17.04	1	100	H	.
80.1350	22.93	m	-17.07	82	100	V	.
212.4453	26.35	q	-17.17	271	120	H	.
174.3020	25.77	m	-17.75	97	100	V	.
215.3253	25.05	q	-18.47	179	120	H	.
256.3853	27.06	q	-18.96	179	120	H	.
215.1929	23.73	q	-19.79	179	120	H	.
560.3093	26.00	q	-20.02	-7	120	V	.
288.4353	25.96	q	-20.06	179	120	H	.
400.6094	25.69	q	-20.33	-7	100	H	.
654.9895	25.45	q	-20.57	-7	100	V	.
143.7705	22.75	q	-20.77	179	120	V	.
152.3715	22.69	q	-20.83	90	120	V	.

Table 2: Scan List for FCC-B, sorted by Frequency, -21.0dB filter

Freq, MHz	Final Value dBuV/m	Sts	Margin to FCC-B limits (dB)	TT	Hght	Az	Comment
80.1350	22.93	m	-17.07	82	100	V	.
143.7705	22.75	q	-20.77	179	120	V	.
152.3715	22.69	q	-20.83	90	120	V	.
174.3020	25.77	m	-17.75	97	100	V	.
210.3158	32.99	m	-10.53	0	153	H	.
210.6457	28.05	q	-15.47	271	120	H	.
211.5753	33.27	m	-10.25	184	100	H	.
211.8930	31.27	m	-12.25	293	164	H	.
212.4453	26.35	q	-17.17	271	120	H	.
213.0453	29.82	q	-13.70	-7	100	H	.
213.5253	29.61	q	-13.91	179	120	H	.
213.6030	31.55	m	-11.97	7	104	H	.
214.4253	31.94	m	-11.58	183	102	H	.
214.8629	29.00	q	-14.52	90	120	H	.
215.1929	23.73	q	-19.79	179	120	H	.
215.3253	25.05	q	-18.47	179	120	H	.
256.3853	27.06	q	-18.96	179	120	H	.
288.4353	25.96	q	-20.06	179	120	H	.
336.5113	30.45	m	-15.57	187	100	H	.
352.5318	30.74	m	-15.28	176	100	H	.
368.5583	34.30	m	-11.72	196	100	H	.
400.6094	25.69	q	-20.33	-7	100	H	.
431.3598	28.98	m	-17.04	1	100	H	.
560.3093	26.00	q	-20.02	-7	120	V	.
644.3157	29.29	m	-16.73	271	120	H	.
654.9895	25.45	q	-20.57	-7	100	V	.

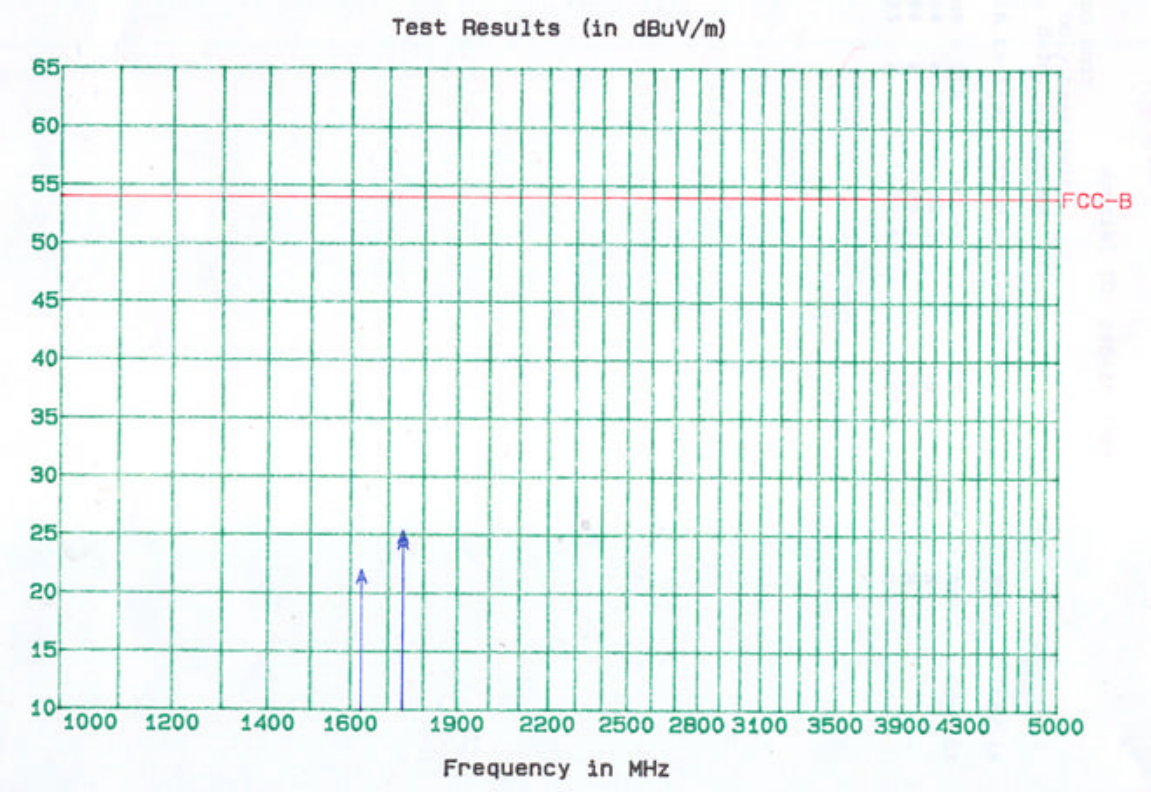
Table 3: Complete Scan List Sorted by Frequency

Freq, MHz	I-val before xducr factors dBuV	Final Value dBuV/m	Sts	TT	Hght	Az	Time	Comment
35.9900	25.21	18.21	q	179	120	V	Thu Jan 14 11:37:25 2010	.
63.8475	34.97	18.78	q	-7	100	V	Thu Jan 14 10:55:41 2010	.
63.9679	35.15	18.97	q	-7	100	V	Thu Jan 14 10:55:43 2010	.
80.1350	37.54	22.93	m	82	100	V	Thu Jan 14 14:06:50 2010	.
112.2050	29.42	19.01	q	179	120	V	Thu Jan 14 11:37:39 2010	.
121.7800	19.97	10.25	q	-7	100	V	Thu Jan 14 10:55:51 2010	.
143.7705	32.80	22.75	q	179	120	V	Thu Jan 14 11:37:43 2010	.
152.3715	33.12	22.69	q	90	120	V	Thu Jan 14 11:22:46 2010	.
174.3020	37.95	25.77	m	97	100	V	Thu Jan 14 14:23:05 2010	.
178.8920	24.79	12.73	q	179	120	V	Thu Jan 14 11:37:50 2010	.
189.4224	28.07	15.89	q	-7	100	V	Thu Jan 14 10:56:09 2010	.
208.3055	28.54	17.00	q	179	120	H	Thu Jan 14 11:30:09 2010	.
210.3158	44.50	32.99	m	0	153	H	Thu Jan 14 13:15:39 2010	.
210.4827	33.46	21.95	q	90	120	H	Thu Jan 14 11:26:43 2010	.
210.6457	39.56	28.05	q	271	120	H	Thu Jan 14 11:45:31 2010	.
211.5753	44.75	33.27	m	184	100	H	Thu Jan 14 13:11:42 2010	.
211.8930	42.75	31.27	m	293	164	H	Thu Jan 14 13:49:54 2010	.
212.4453	37.82	26.35	q	271	120	H	Thu Jan 14 11:45:38 2010	.
212.7929	30.12	18.66	q	271	120	V	Thu Jan 14 11:41:54 2010	.
213.0453	41.28	29.82	q	-7	100	H	Thu Jan 14 10:50:52 2010	.
213.5253	41.06	29.61	q	179	120	H	Thu Jan 14 11:30:30 2010	.
213.6030	43.00	31.55	m	7	104	H	Thu Jan 14 13:40:17 2010	.
214.4253	43.38	31.94	m	183	102	H	Thu Jan 14 13:08:12 2010	.
214.8629	40.43	29.00	q	90	120	H	Thu Jan 14 11:27:05 2010	.
215.1929	35.15	23.73	q	179	120	H	Thu Jan 14 11:30:39 2010	.
215.3253	36.47	25.05	q	179	120	H	Thu Jan 14 11:30:41 2010	.
215.6729	30.38	18.97	q	179	120	H	Thu Jan 14 11:30:44 2010	.
223.6356	27.46	16.64	q	179	120	H	Thu Jan 14 11:30:46 2010	.
224.3403	34.88	24.15	q	179	120	H	Thu Jan 14 11:30:48 2010	.
240.3608	33.97	24.51	q	179	120	H	Thu Jan 14 11:30:50 2010	.
243.9313	25.95	16.76	q	-7	100	V	Thu Jan 14 10:57:05 2010	.
244.1714	24.96	15.79	q	-7	100	V	Thu Jan 14 10:57:07 2010	.
249.3016	26.47	17.88	q	-7	100	V	Thu Jan 14 10:57:09 2010	.
256.3853	35.11	27.06	q	179	120	H	Thu Jan 14 11:31:00 2010	.
256.4699	29.90	21.85	q	179	120	H	Thu Jan 14 11:31:02 2010	.
258.6601	22.86	14.71	q	-7	100	V	Thu Jan 14 10:57:16 2010	.
260.6402	23.98	15.69	q	-7	100	V	Thu Jan 14 10:57:18 2010	.
263.2203	24.66	16.31	q	179	120	V	Thu Jan 14 11:39:04 2010	.
265.5301	23.14	14.68	q	-7	100	V	Thu Jan 14 10:57:23 2010	.
267.0599	23.13	14.67	q	-7	100	V	Thu Jan 14 10:57:25 2010	.
267.5399	24.46	16.00	q	179	120	V	Thu Jan 14 11:39:11 2010	.
272.4055	23.38	15.08	q	179	120	H	Thu Jan 14 11:31:17 2010	.
288.4353	33.87	25.96	q	179	120	H	Thu Jan 14 11:31:20 2010	.
304.4557	26.14	18.65	q	90	120	H	Thu Jan 14 11:27:50 2010	.
319.4858	24.00	16.74	q	-7	100	H	Thu Jan 14 10:51:50 2010	.
335.4718	28.15	21.52	q	-7	100	H	Thu Jan 14 10:51:52 2010	.

336.5113	37.05	30.45	m	187	100	H	Thu Jan 14 14:15:14 2010	.
352.5318	36.76	30.74	m	176	100	H	Thu Jan 14 13:55:06 2010	.
367.4384	29.54	23.96	q	-7	100	H	Thu Jan 14 10:51:59 2010	.
368.5583	39.85	34.30	m	196	100	H	Thu Jan 14 13:44:42 2010	.
384.6089	27.33	22.09	q	-7	100	H	Thu Jan 14 10:52:04 2010	.
399.3798	29.50	24.77	q	-7	100	H	Thu Jan 14 10:52:06 2010	.
400.6094	30.39	25.69	q	-7	100	H	Thu Jan 14 10:52:09 2010	.
431.3598	32.94	28.98	m	1	100	H	Thu Jan 14 14:18:43 2010	.
432.6493	25.34	21.43	q	-7	100	H	Thu Jan 14 10:52:13 2010	.
447.3197	26.69	23.22	q	-7	100	H	Thu Jan 14 10:52:15 2010	.
463.2698	24.97	21.91	q	-7	100	H	Thu Jan 14 10:52:18 2010	.
464.7090	25.22	22.23	q	-7	100	H	Thu Jan 14 10:52:20 2010	.
479.2553	24.94	22.23	q	-7	100	H	Thu Jan 14 10:52:22 2010	.
480.7228	23.35	20.62	q	179	120	H	Thu Jan 14 11:31:58 2010	.
494.3102	26.80	24.75	q	-5	120	V	Thu Jan 14 11:21:09 2010	.
500.3099	24.17	22.33	q	-7	100	H	Thu Jan 14 10:52:29 2010	.
544.8294	25.45	23.65	q	179	120	H	Thu Jan 14 11:32:05 2010	.
560.3093	26.89	26.00	q	-7	120	V	Thu Jan 14 11:02:08 2010	.
565.5593	23.44	22.84	q	-7	100	V	Thu Jan 14 10:58:19 2010	.
576.8694	22.43	21.74	q	179	120	H	Thu Jan 14 11:32:11 2010	.
596.3170	23.52	22.90	q	90	120	H	Thu Jan 14 11:28:39 2010	.
600.4558	20.63	20.19	q	-7	100	H	Thu Jan 14 10:52:43 2010	.
623.0394	24.42	24.57	q	-7	100	V	Thu Jan 14 10:58:28 2010	.
639.9894	21.79	22.25	q	-7	100	V	Thu Jan 14 10:58:30 2010	.
644.3157	28.81	29.29	m	271	120	H	Thu Jan 14 11:47:35 2010	.
654.9895	24.90	25.45	q	-7	100	V	Thu Jan 14 10:58:35 2010	.
671.9993	21.78	22.48	q	-7	100	V	Thu Jan 14 10:58:37 2010	.
686.9393	22.72	23.83	q	-7	100	V	Thu Jan 14 10:58:39 2010	.
734.8493	19.45	21.02	q	-7	100	V	Thu Jan 14 10:58:42 2010	.
735.9894	19.83	21.35	q	90	120	V	Thu Jan 14 11:25:25 2010	.
766.7980	19.89	21.62	q	90	120	V	Thu Jan 14 11:25:27 2010	.
768.0278	22.28	24.05	q	271	120	H	Thu Jan 14 11:47:50 2010	.
783.9884	21.35	23.37	q	271	120	H	Thu Jan 14 11:47:52 2010	.
799.9783	21.77	23.87	q	179	120	V	Thu Jan 14 11:40:35 2010	.
863.9983	21.64	24.40	q	179	120	V	Thu Jan 14 11:40:37 2010	.
895.9784	22.21	24.78	q	-7	120	V	Thu Jan 14 11:02:48 2010	.

4.3 UNINTENTIONAL RADIATED EMISSIONS PLOT – ABOVE 1 GHZ

Criterion Technology **Date: January 15, 2010**
EUT: ZW-RQ REC 908
Manufacturer: Electronic Solutions, Inc.
Tester: SP **SpiD: 091221-1518**
Test Information: 3 meters, 120 VAC 60 Hz, FCC Part 15.109 Class B
Test Cond: Temp: 19° C **Humidity: 35 %**



4.4 UNINTENTIONAL RADIATED EMISSIONS TABLE – ABOVE 1 GHZ

Notes:
The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit
If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.
The following keys help to better understand the data:
TT: Turntable position in degrees
Hght: Height of antenna in centimeters
Az: Azimuth, V = Vertical, H= Horizontal

Minimum Margin to Limit: -29.14 dB at 1738.8928 MHz

Criterion Technology Fri Jan 15 13:51:24 2010
EUT: ZW-RQ REC908
Manufacturer: Electronic Solutions, Inc.
Tester: SP
Special ID: 091221-1518
Test information: 3 meters, 120 VAC 60 Hz, FCC Part 15.109

Table 1: Scan List, sorted by margin to limit FCC-B, -40.0dB filter

Freq, MHz	Value dBuV/m	Sts	Margin to FCC-B limits(dB)	TT	Hght	Az	Comment
1738.8928	24.84	a	-29.14	367	108	H	.
1739.1901	24.35	a	-29.63	367	108	H	.
1626.0001	21.44	a	-32.54	367	108	H	.

Table 2: Scan List for FCC-B, sorted by Frequency, -40.0dB filter

Freq, MHz	Final Value dBuV/m	Sts	Margin to FCC-B limits(dB)	TT	Hght	Az	Comment
1626.0001	21.44	a	-32.54	367	108	H	.
1738.8928	24.84	a	-29.14	367	108	H	.
1739.1901	24.35	a	-29.63	367	108	H	.

Table 3: Complete Scan List Sorted by Frequency

Freq, MHz	I-val before xducr factors dBuV	Final Value dBuV/m	Sts	TT	Hght	Az	Time	Comment
1626.0001	33.45	21.44	a	367	108	H	Fri Jan 15 13:05:17 2010	.
1738.8928	35.63	24.84	a	367	108	H	Fri Jan 15 13:06:21 2010	.
1739.1901	35.14	24.35	a	367	108	H	Fri Jan 15 13:12:14 2010	.

4.5 INTENTIONAL RADIATED EMISSIONS TABLE

	Fundamental Freq (MHz)	Fval before rcvr pads	Recv. Pads db	Power Out ERP uw (dbd)	Elev	AZ	Pol	Orientation
Fundamental	908.3954	68.85	21	89.85	100	296	H	X
Fundamental	908.3954	71.51	21	92.51	100	148	H	Y
Fundamental	908.3954	70.75	21	91.75	108.2	233	V	Z

Harmonic	Frequency	F val	FCC part 15 limit	Margin to Limit (db)	Elev	AZ	Pol	Comments
2nd	1816.7908	42.89	72.51	29.62	108	246	V	Y orientation
3rd	2725.1862	36.52	54	17.48	108	238	V	Y orientation
4th	3633.5816	27.92	54	26.08	108	233	V	Y orientation noise floor
5th	4541.977	26.25	54	27.75	108	233	V	Y orientation noise floor
6th	5450.3724	29.06	54	24.94	108	366	H	Y orientation noise floor
7th	6358.7678	39.62	72.51	32.89	108	366	H	Y orientation noise floor
8th	7267.1632	41.3	54	12.70	108	366	H	Y orientation noise floor
9th	8175.5586	42.3	54	11.70	108	366	H	Y orientation noise floor
10th	9083.954	51.97	54	2.03	108	366	H	Y orientation
2nd	1816.7908	42.89	72.51	29.62	108	246	V	Y orientation

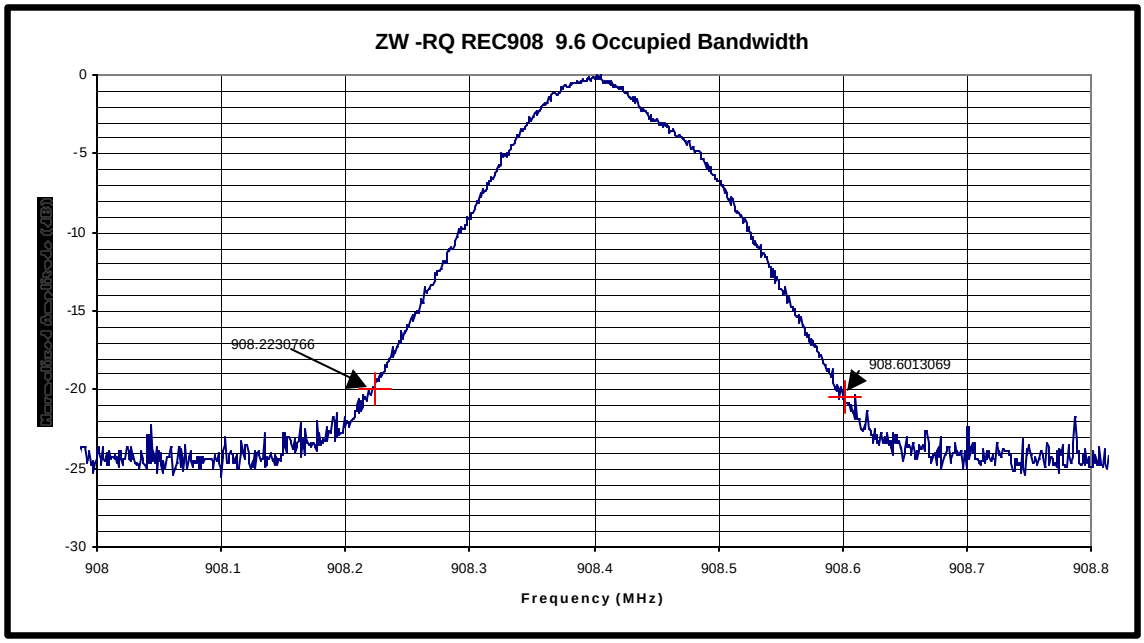
E:\Comp&More\091221-1518\Testdata\ZW RQ REC908.xls
Table top FCC Class B 3 meters 1G - 10 G
3 meters 1G - 10 G, 120VAC 60Hz, FCC Class B

4.6 CHANNEL BANDWIDTH – 9.6KB

Criterion Technology
EUT: ZW-RQ REC 908
Manufacturer: Electronic Solutions, Inc.
Tester: SP

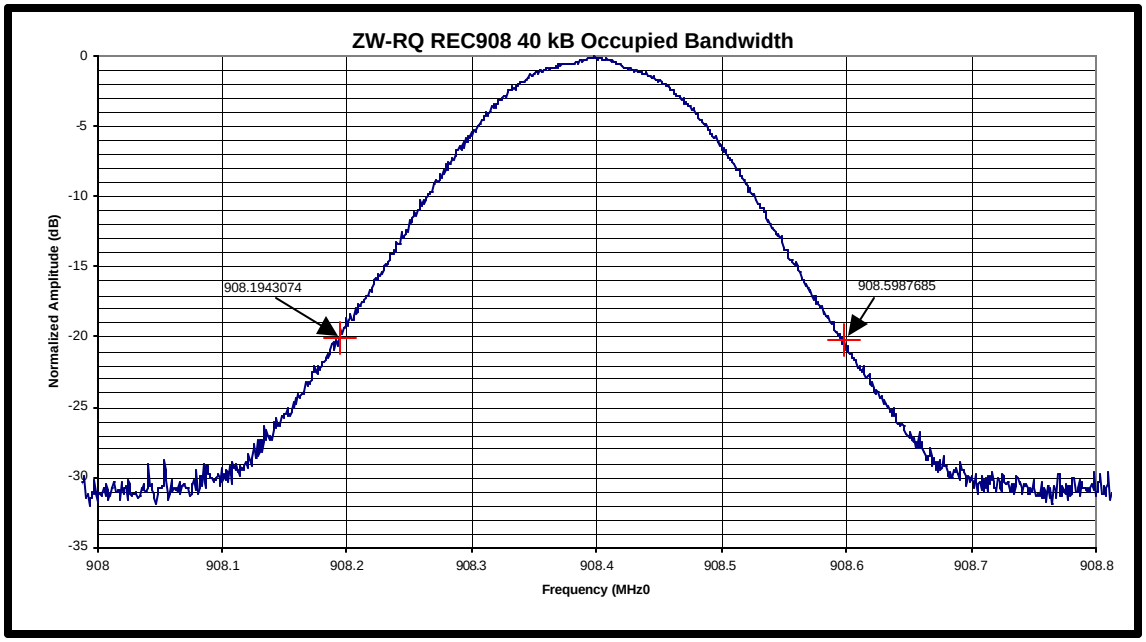
Date: January 15, 2010

SpiD: 091221-1518



4.7 CHANNEL BANDWIDTH – 40 KB

Criterion Technology **Date: January 15, 2010**
EUT: ZW-RQ REC 908
Manufacturer: Electronic Solutions, Inc.
Tester: SP **SpiD: 091221-1518**



4.8 UNINTENTIONAL CONDUCTED EMISSIONS PLOT

Criterion Technology Inc.
Conducted Emissions

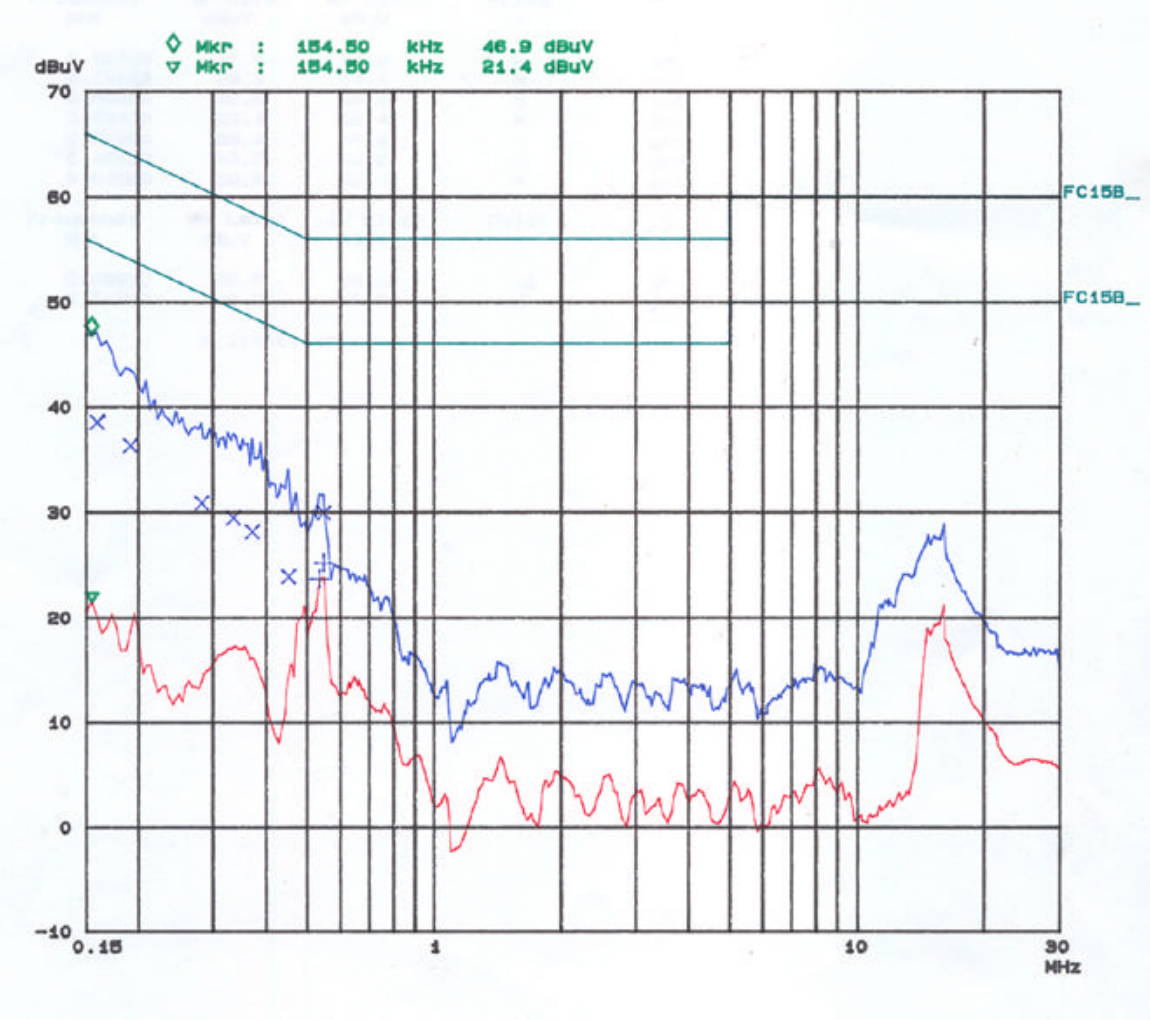
EUT:	**ZW-RQ REC 908**	**DATE: January 15, 2010**
Manuf:	**Electronic Solutions, Inc.**	
Op Cond:	**normal operation**	
Operator:	**SP**	
Test Spec:	**FCC Part 15.107 Class B**	
Test Cond:	**Temp: 19° C**	**Humidity: 35 %**
Comment:	**120VAC 60 Hz, Line**	

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO LN	OFF	60db

Final Measurement: x QP / + AV
Meas Time: 1s
Subranges: 25
Acc Margin: 25 dB

Transducer	No.	Start	Stop	Name
	2	150k	30M	Scrnrm



4.9 UNINTENTIONAL CONDUCTED EMISSIONS TABLE

Criterion Technology Inc.
Conducted Emissions

EUT: ZW-RQ REC 908 **DATE: January 15, 2010**
Manuf: Electronic Solutions, Inc.
Op Cond: normal operation
Operator: SP
Test Spec: FCC Part 15.107 Class B
Test Cond: Temp: 19° C **Humidity: 35 %**
Comment: 120VAC 60 Hz, Line

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO LN	OFF	60db

Final Measurement Results:

Indicated Phase/PE shows Configuration of max. Emission

Frequency MHz	QP Level DBuv	QP Limit DBuv	Phase -	PE -
0.15900	38.5	65.5	N	gnd
0.19050	36.2	64.0	N	gnd
0.28050	30.8	60.8	N	gnd
0.33450	29.4	59.4	N	gnd
0.37050	28.0	58.5	N	gnd
0.45150	23.7	56.8	N	gnd
0.54600	29.9	56.0	N	gnd

Frequency MHz	AV Level DBuv	AV Limit DBuv	Phase -	PE -
0.53250	23.6	46.0	L1	gnd
0.54600	25.0	46.0	N	gnd

Minimum Margin to Limit: **-21.0** dB at **0.54600** MHz

4.10 INTENTIONAL CONDUCTED EMISSIONS PLOT

Criterion Technology Inc.
Conducted Emissions

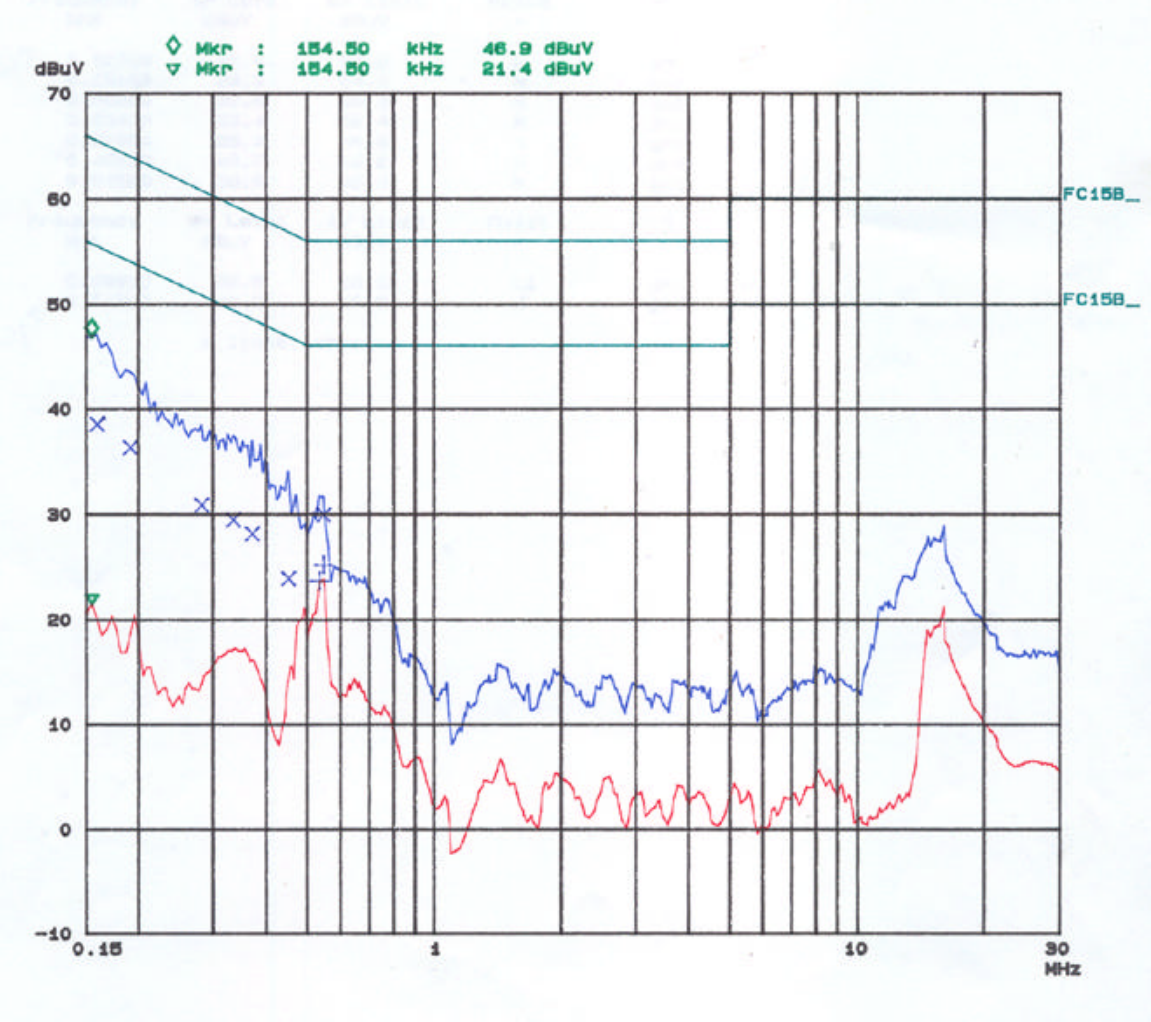
EUT:	**ZW-RQ REC 908**	**DATE: January 15, 2010**
Manuf:	**Electronic Solutions, Inc.**	
Op Cond:	**normal operation**	
Operator:	**SP**	
Test Spec:	**FCC Part 15.207 Class B**	
Test Cond:	**Temp: 19° C**	**Humidity: 35 %**
Comment:	**120VAC 60 Hz, Line**	

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO LN	OFF	60db

Final Measurement: x QP / + AV
Meas Time: 1s
Subranges: 25
Acc Margin: 25 dB

Transducer	No.	Start	Stop	Name
	2	150k	30M	Scrnrm



4.11 INTENTIONAL CONDUCTED EMISSIONS TABLE

Criterion Technology Inc.
Conducted Emissions

EUT: ZW-RQ REC 908 **DATE: January 15, 2010**
Manuf: Electronic Solutions, Inc.
Op Cond: normal operation
Operator: SP
Test Spec: FCC Part 15.207 Class B
Test Cond: Temp: 19° C **Humidity: 35 %**
Comment: 120VAC 60 Hz, Line

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	If BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	100MS	AUTO LN	OFF	60db

Final Measurement Results:

Indicated Phase/PE shows Configuration of max. Emission

Frequency MHz	QP Level DBuv	QP Limit DBuv	Phase -	PE -
0.15900	38.5	65.5	N	gnd
0.19050	36.2	64.0	N	gnd
0.28050	30.8	60.8	N	gnd
0.33450	29.4	59.4	N	gnd
0.37050	28.0	58.5	N	gnd
0.45150	23.7	56.8	N	gnd
0.54600	29.9	56.0	N	gnd

Frequency MHz	AV Level DBuv	AV Limit DBuv	Phase -	PE -
0.53250	23.6	46.0	L1	gnd
0.54600	25.0	46.0	N	gnd

Minimum Margin to Limit: **-21.0** dB at **0.54600** MHz

5.0 APPENDIX C: PRODUCT INFORMATION FORM

CRITERION TECHNOLOGY PRODUCT INFORMATION FORM

General Information **Date:** 12-23-09

Company Name: Electronic Solutions Inc
Company Address: 1355 Horizon Ave
Lafayette, CO 80026

Contacts:
Compliance Engineer: Douglas Barnes Phone: 303 663 3396 Email: _____

Test Description
De-Bug _____ Formal (Initial) X Formal (Re-Verification) _____

Market Information (Check all that Apply)
USA X Canada X Euro. Union ____ Taiwan ____ Japan ___ New Zealand ____ Australia ___
Other FCC 15.107, 15.109, 15.205, 15.207, 15.209, 15.249

Product Information
Model Number: ZW-RQ REC 908
Product Dimensions: 2" x 2" x 1"

Product Power Source:

Battery
Type _____
Redundant Power Supplies _____

AC Supply
Input Voltage Range(s) 24VDC
Phases 1 Delta ____ Wye ____
Current _____
Frequency 60 Hz
Manufacturer N/A
Model Number _____

Topology
Linear _____ Switching Mode X Switching Frequency _____

Support Equipment (if used):

Power Supply:
Manufacturer: Yubrught
Model Number: ADS-060DU024

I/O Cables – Manufacturer, P/N, Length :
Serial Port _____
Parallel Port _____
SCSI Port _____
Other 1 – 6 inch cable

Operation Software:
Name none Version Number _____

Operating Modes: (Please Include Cycle Time)
One 0 seconds

Time necessary for EUT to be exercised and able to fully respond: 0 **seconds** .

Operation Pass/Fail Criteria:
Motors (represented by lamps) will malfunction

Test Type – Emissions (Please check all that apply):

Information Technology Equipment

Class A ____
Class B ____
Oscillator/Clock Frequencies (MHz) _____

Industrial, Scientific, Medical Equipment

Class A ____
Class B ____
Oscillator/Clock Frequencies (MHz) _____

Unintentional Radiator

Class A ____
Class B _X_
Oscillator/Clock Frequencies (MHz) 16 and 32 MHz

Receiver

Type (Regen., Superhet., Direct Conv., Homodyne) _____
Local Oscillator Frequencies _____
Frequency Range _____

Intentional Radiator

Fundamental Frequency Range Z-wave 908 MHz
Local Oscillator Frequencies _____
Power Output (to antenna) _____
Integral Antenna (Yes/No) yes
Modulation Type (AM, CM, Pulse, Spread Spectrum) _____
Control Circuits (Microprocessor/Micro-controller) _____
Oscillator/Clock Frequencies (MHz) 908 MHz

6.0 APPENDIX D: TEST EQUIPMENT AND CALIBRATION STATUS

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due Date
Hewlett Packard	Signal Generator	HP 8648D	3642000145	3/7/2010
Tegam	Current Probe	925236-1	12588	1/19/2010
Microwave Technologies	Standard Gain Horn & Harmonic Mixer	12A-18 & HP1197OK	19527JE & 2332A01314	1/31/2010
EMCO	Horn	3160-08	1147	1/31/2010
Hewlett Packard	Quasi Peak Adapter	85650A	2403A07322	3/3/2010
Hewlett Packard	Spectrum Analyzer	HP 8566B	2421A00527	3/5/2010
Hewlett Packard	Spectrum Analyzer Display	HP 85662A	2403A07322	3/5/2010
Hewlett Packard	Tracking Generator	HP85645A	3210A00124	3/6/2010
Haefely Trench	ESD Gun	PESD 1600	H605100	4/3/2010
Amplifier Research	Power Amplifier	100W1000M1	20214	6/1/2010
Veratech	Preamp (AMP2)	unknown	N/A	9/18/2010
FCC	EM Clamp	F2031	309	10/2/2010
FCC	CDN	FCC-801-M3-25	9714	10/2/2010
Rohde/ Schwarz	VHF/UHF Receiver	ESVS-30	863342014	10/8/2010
Rohde/ Schwarz	LISN	ESH2-Z5	828739-001	10/8/2010
Rohde/ Schwarz	HF Receiver	ESHS-30	826003/011	10/8/2010
Solar Electronics	LISN	8012-50-R-24-BNC	892310	10/15/2010
Haefely Trench	Test Mag	Mag 100	80162	10/15/2010
Gigatronics	Power Sensor	80301A-410	1831996	10/15/2010
Gigatronics	Power Meter	8541C	1830945	10/15/2010
FCC	LISN	FCC-TLISN-T4-02	20252	11/24/2010
Califorina Instruments	AC Power Source Pacs-1	5001iX-CTS-411	55637/ 72242	3/24/2011
Haefely Trench	Surge Generator	PSURGE 6.1	083-906-07	5/26/2011
Haefely Trench	EFT Tester	PEFT Junior	583-333-51	5/26/2011
Haefely Trench	Surge Coupler	FP-Surge 32.1	083-925-05	5/26/2011
EMCO	Active Loop	6502	2626	5/28/2011
Amplifier Research	E-Field Probe	FP2080	20236	10/16/2011
Amplifier Research	E-Field Probe	FP2000	19682	10/19/2011

7.0 APPENDIX E: TEST DIRECTIVES, STANDARDS AND METHODS

7.1.1 EUROPEAN DIRECTIVES, STANDARDS AND METHODS

89/336/EEC: Council Directive of 03 May 1989 on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility, OJEC No. L 139/19-26, Aug 1993.

BS DD ENV 50204 (CENELEC): Testing and Measurement Techniques; Radiated Electromagnetic Field from Digital Radio Telephones - Immunity Test, 1996.

EN 55011 (CENELEC): ISM Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement, 2007.

EN 55014-1 (CENELEC): Part 1. Electromagnetic Compatibility Requirements for Household Appliances, Electric Tools and Similar Apparatus - Part 1. Emission - Product Family Standard, 2007.

EN 55022 (CENELEC): ITE - Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement, 2008.

CISPR 22: Information Technology Equipment – Radio Disturbance Characteristics - Limits and Methods of Measurement, 2009.

EN 55024 (CENELEC): ITE - Immunity Characteristics - Limits and Methods of Measurement, 2008.

EN 55103-1: Product Family standard for audio, video, audio - visual and entertainment lighting control apparatus for professional use. Part 1: Emissions, April 1997.

EN 55103-2: Product Family standard for audio, video, audio - visual and entertainment lighting control apparatus for professional use. Part 2: Immunity, April 1997.

EN 60601-1-2 (CENELEC): Medical Electrical Equipment. Part 1. General Requirements for Safety - Section 1.2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests, Third Edition 2007.

EN 61000-6-1: EMC- Part 6-1. Generic Standard-Immunity for residential, commercial and light-industrial Environments 2007.

EN 61000-6-2: EMC- Part 6-2. Generic Standard-Immunity for Industrial Environments, 2005.

EN 61000-6-3: EMC- Part 6-3. Generic Standard-Emissions for residential, commercial and light-industrial Environments 2007.

EN61000-6-4 (CENELEC): EMC - Generic Emission Standard, Part 6-4: Industrial Environment, 2007.

EN 61000-3-2 (CENELEC): EMC - Part 2. Limits for Harmonic Current Emissions (Equipment Input Current ≤16 A per phase), with Amendment 14, 2006.

EN 61000-3-3 (CENELEC): EMC - Part 3. Limitation of Voltage Fluctuation and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16 A, 2008.

EN 61000-4-2 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 2. Electrostatic Discharge Immunity Test, 2009.

EN 61000-4-3 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 3. Radiated, Radio-Frequency, Electromagnetic Field Immunity, 2008.

EN 61000-4-4 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 4. Electrical Fast Transient/Burst Immunity Test, 2008.

EN 61000-4-5 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 5. Surge Immunity Test, 2006.

EN 61000-4-6 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 6. Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields, 2009.

EN 61000-4-8 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 8. Power Frequency Magnetic Field Immunity Test, 1993 with the incorporation of amendment A1:2001.

EN 61000-4-11 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 11. Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, 2004

EN 61326 (CENELEC): Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements, 2005.

EN 61326-1 Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements, - Part 1: General Requriments, 2008

7.1.2 47 CFR FCC PART 15 RADIO FREQUENCY DEVICES: OCT 2009

Subpart A General.

Subpart B Unintentional Radiators.

Subpart C Intentional Radiators.

Subpart D Unlicensed Personal Communications Service Devices.

7.1.3 47 CFR FCC PART 22 PUBLIC MOBILE SERVICES: OCT 2009

7.1.4 47 CFR FCC PART 24 PERSONAL COMMUNICATIONS SERVICES: OCT 2009

7.1.5 JAPAN

VCCI V-3

7.1.6 CANADA

ICES-001: Interference-Causing Equipment Standard - ISM RF Generators, 2006.

ICES-003: Interference-Causing Equipment Standard - Digital Apparatus, 2004.

7.1.7 AUSTRALIA/NEW ZEALAND

SAA AS/NZ 3548: Limits and Methods of Measurement of Radio Disturbance Characteristics of ITE, 1997.

AS/NZS CISPR22

7.1.8 TAIWAN

CNS13438, 2006.

7.1.9 KOREA

KN22, September 29, 2005

KN 24, 1998

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