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Job Number:	1001351660
Project Number:	11CA11377
File Number:	MC15343
Date:	March 24, 2011
Revision Date:	May 12, 2011
Model:	CSW24V, CSL24V

Electromagnetic Compatibility Test Report

For

Chamberlain Group Inc.

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Job #: 1001351660
Model Number:
Client Name:

File #: MC15343
CSW24V, CSL24V
Chamberlain Group Inc.

Project #: 11CA11377

Page 2 of 70

Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.**
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Northbrook, IL 60062

Tests Performed For: **Chamberlain Group Inc.**
845 Larch Av
Elmhurst, IL 60126

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Test Report Date: **March 24, 2011**
Revision Date: **May 12, 2011**

Product Type: **Gate Operator with Short Range Transceiver**

Product standards: **FCC Part 15, Subpart C, 15.247, & RSS-210**

Model Numbers: **CSW24V, CSL24V**

Sample Serial Number: **Board I9**

EUT Category: **Frequency Hopping Spread Spectrum Transmitter**

Testing Start Date: **March 15, 2011**

Date Testing Complete: **March 24, 2011**

Overall Results: Compliant

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
05-12-2011	Corrected Fundamental Limit, Added note Battery mode, Added IC standard	VP	MF

1.0 G E N E R A L - Product Description**1.1 Equipment Description**

The CSW24V is a swinging gate operator that powers on 120VAC 60Hz and has a 24V battery backup. The CSL24V is a sliding gate operator that powers on 120VAC 60Hz and has a 24V battery backup. Both models have a transceiver that shall operate in the 902-928 MHz band and hop equally in 50 pseudo-random frequencies lying in this band.

1.2 Device Configuration During Test**1.2.1 Equipment Used During Test:**

Use	Product Type	Manufacturer	Model	Comments
EUT	Swinging Gate Operator with Transceiver	Chamberlain Group Inc.	CSW24V	Board I9 used for testing
EUT	Sliding Gate Operator with Transceiver	Chamberlain Group Inc.	CSL24V	Board I9 used for testing
EUT	Printed Circuit Board Assembly	Chamberlain Group Inc.	1D6597	None
EUT	Expansion Board Assembly	Chamberlain Group Inc.	1D6686	None
EUT	Surge/Filter Board Assembly	Chamberlain Group Inc.	1D7078	None
Note: EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)				

1.2.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC	N	N	None
Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports					

1.2.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description
902-928	Frequency Hopping Spread Spectrum Transceiver

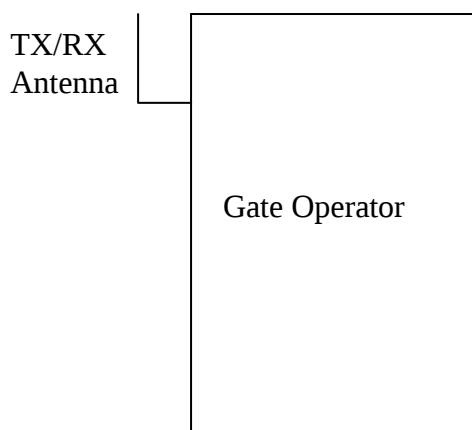
1.2.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120Vac	-	-	60Hz	Single Phase	None

Note: All testing was performed in AC powered configuration because it was determined to be worst case in comparison to Battery powered mode.

1.3 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.4 EUT Configurations

Mode #	Description
1	EUT in 10m chamber on 80cm support powered by AC input.
2	EUT on test bench powered by AC input
3	EUT on 80cm support powered by AC input through LISNs.

1.5 EUT Operation Modes

Mode #	Description
1	EUT Transmitting on either Low, Middle or High Channels
2	EUT Transmitting in hopping mode (all channels)
3	EUT in IDLE / Standby / Receive Mode

2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Deviations from standard test methods

None

2.2 Device Modifications Necessary for Compliance

None

2.3 Reference Standards

Standard Number	Standard Name	Standard Date
FCC Part 15, Subpart C, 15.247	Code of Federal Regulations, Part 15, Radio Frequency Devices	2010
RSS-210, Issue 8	License-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment	December 2010
RSS-Gen, Issue 3	General Requirements and Information for the Certification of Radiocommunication Equipment	December 2010

2.4 Results Summary

This product is considered Class B

Requirement – Test	Requirement – Test	Result (Compliant / Non-Compliant)*
Spurious Emissions	47 CFR Part 15.247(d)	Compliant
	RSS-210 A8.5	
	RSS-Gen 7.2.1 and 7.2.3	
Band-Edge Compliance	47 CFR Part 15.247(d)	Compliant
	RSS-210 A8.5	
Maximum Peak Output Power	47 CFR Part 15.247(b)(2)	Compliant
	RSS-210 A8.4(1)	
Dwell Time	47 CFR Part 15.247(a)(1)(i)	Compliant
	RSS-210 A8.1(c)	
Number of Hopping Frequency	47 CFR Part 15.247(a)(1)(i)	Compliant
	RSS-210 A8.1(c)	
20dB Bandwidth	47 CFR Part 15.247(a)(1)(i)	Compliant
	RSS-210 A8.1(c)	
Carrier Frequency Separation	47 CFR Part 15.247(a)(1)	Compliant
	RSS-210 A8.1(b)	
Conducted Emissions	47 CFR Part 15.207	Compliant
	RSS-Gen 7.2.4	
Radiated Emissions	47 CFR Part 15.207	Compliant
	RSS-Gen 7.2.5	

Test Engineer:



Reviewer:



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Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST RESULTS

The emissions tests were performed according to following regulations:

----- United States -----

Code of Federal Regulations Title 47	Part 15, Subpart B, Radio Frequency Devices
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----- Canada -----

Radio Standards specifications	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
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Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150
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Measurement Uncertainty

Test	Uncertainty
Conducted Emissions	0.3 dB
Radiated Emissions	1.2 dB

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)

Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)

Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.1 Test Conditions and Results – SPURIOUS EMISSIONS (Antenna Conducted and Radiated)

Test Description	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 emission limits specified in Section 15.209(a) (see Section15.205(c)).		
Basic Standard	47 CFR Part 15.247(d) RSS-210, A8.5 RSS-Gen 7.2.1 and 7.2.3		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance and / or antenna port	
Fully configured sample scanned over the following frequency range	1GHz – 10GHz	3 meter distance and / or antenna port	
Limits (Antenna Conducted)			
All emissions must be 20dB below the level of the fundamental frequency.			
Limits (Radiated – Restricted Bands Only)			
Frequency (MHz)	Limit (dBµV/m)		
	Quasi-Peak	Average	
	General Emissions	Fundamental	Spurious
30 – 88	29.54	-	-
88 – 216	33.06	-	-
216-960	35.56	-	-
960-1000	43.52	-	-
1,000-25,000	-	-	54
Supplementary information: Below 1GHz, spectrum was checked. All emissions related to the transmitter below 1GHz are not in the restricted band therefore only antenna conducted limits apply (20dB below the peak level of the fundamental).			

Table 1 SPURIOUS EMISSIONS EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1 and 2	1
Supplementary information: None		

Table 2 SPURIOUS CONDUCTED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

Table 3 SPURIOUS RADIATED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Bicon Antenna	Chase	VBA6106A	EMC4078	Dec. 2, 2010	Dec. 31, 2010
Log-P Antenna	Chase	UPA6109	EMC4313	June 1, 2010	June, 30, 2011
Spectrum Analyzer	Rhode & Schwartz	FSEK	EMC4182	Dec. 28, 2010	Dec. 30, 2011
Antenna Array	UL	BOMS	EMC4276	Oct. 21, 2010	Oct. 21, 2011

Test setup for SPURIOUS EMISSIONS – Antenna conducted

See Appendix B, Figure 34 for test setup photo

Test setup for SPURIOUS EMISSIONS – Radiated

See Appendix B, Figure 35 for test setup photo

Figure 1 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode Low Channel.

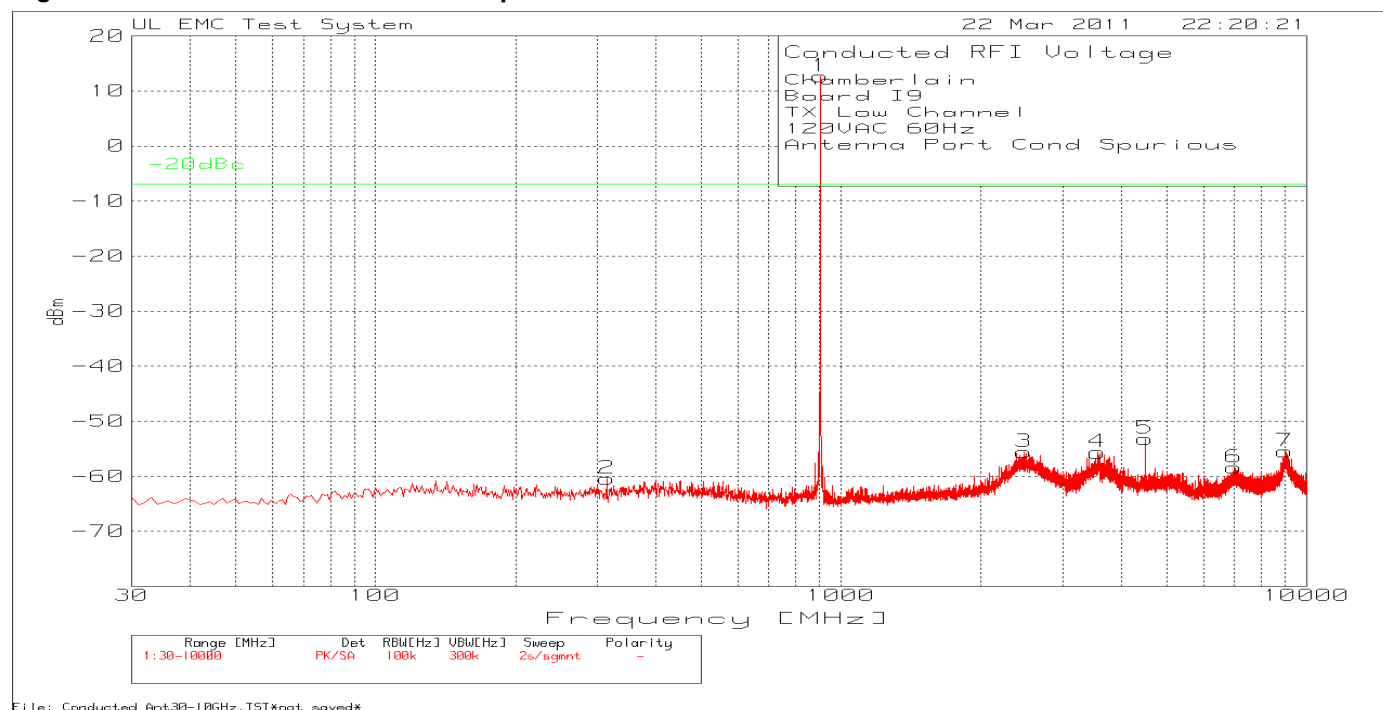


Figure 2 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode Middle Channel.

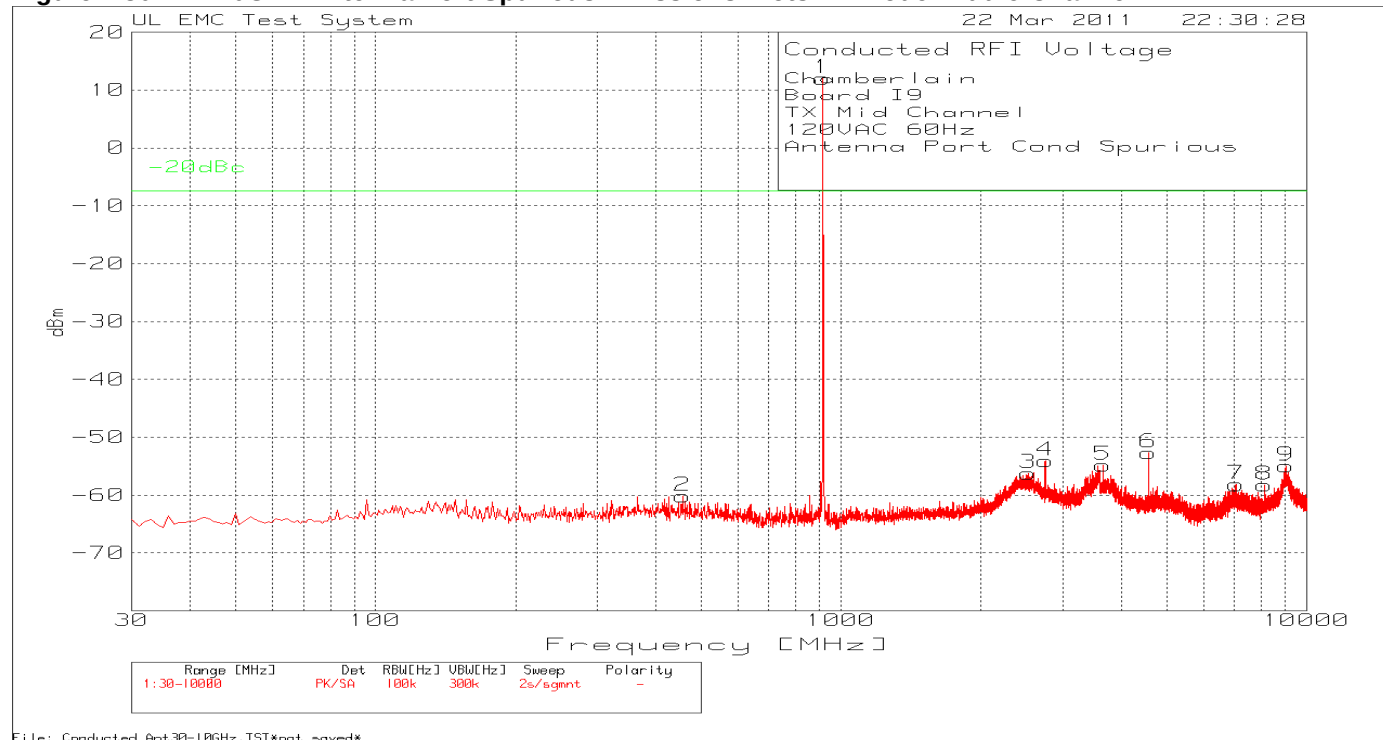
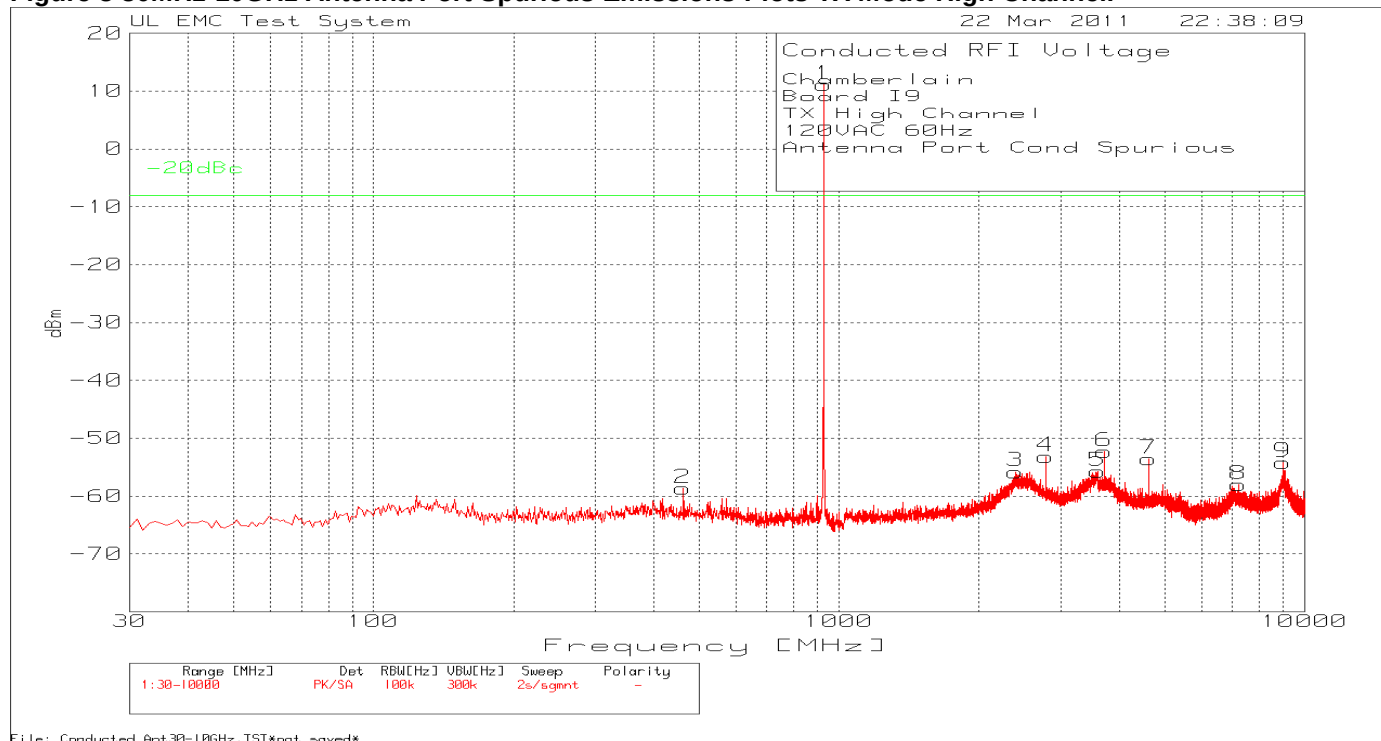


Figure 3 30MHz-10GHz Antenna Port Spurious Emissions Plots TX Mode High Channel.



No Spurious Emissions within 20dB of the limit were recorded.

Figure 4 Radiated Spurious Emissions below 30-200MHz, Low Channel, CSW24V

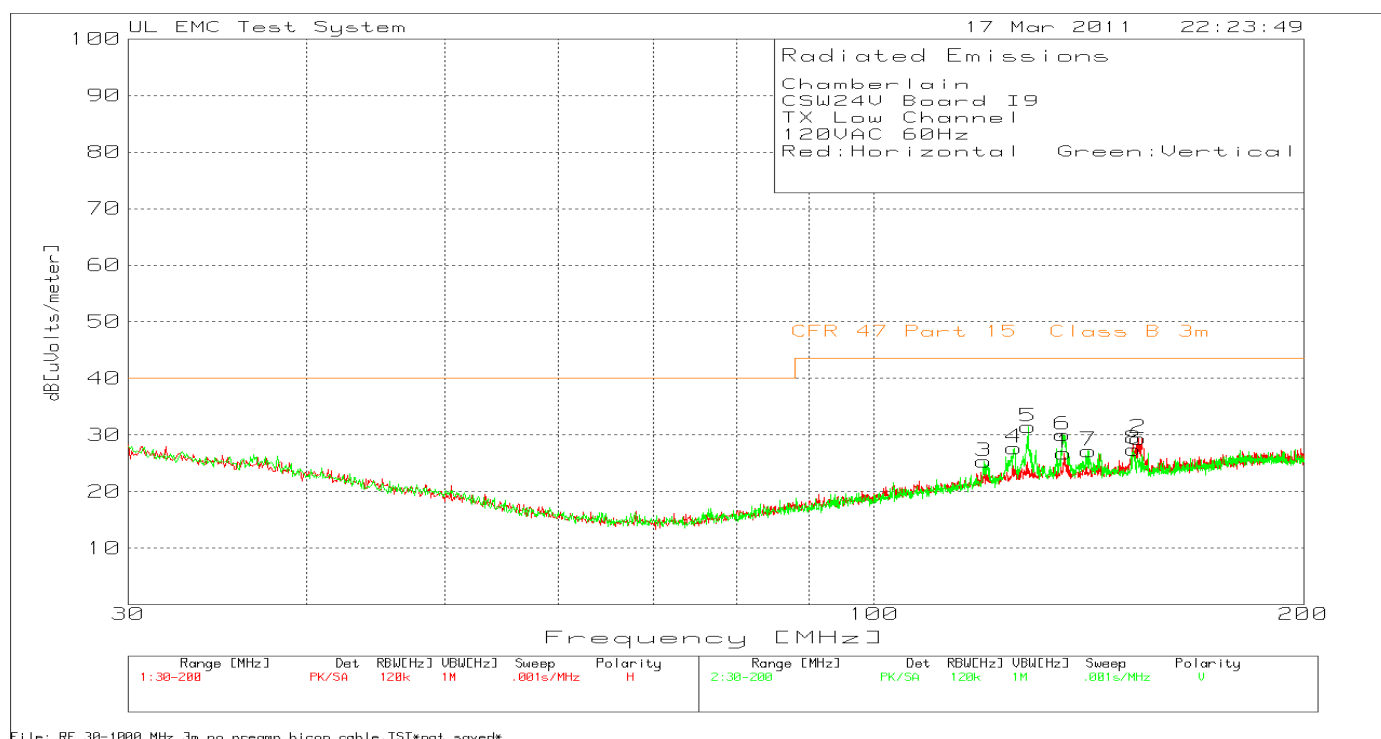


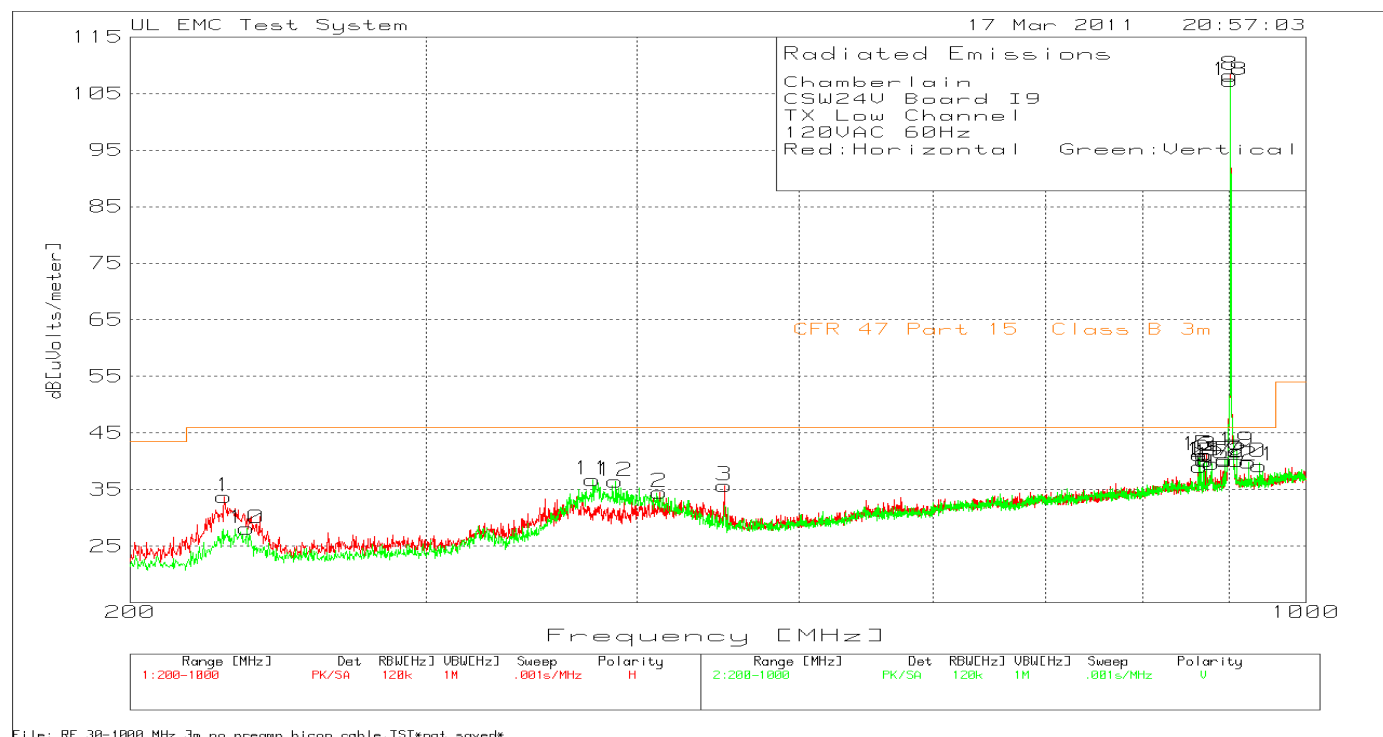
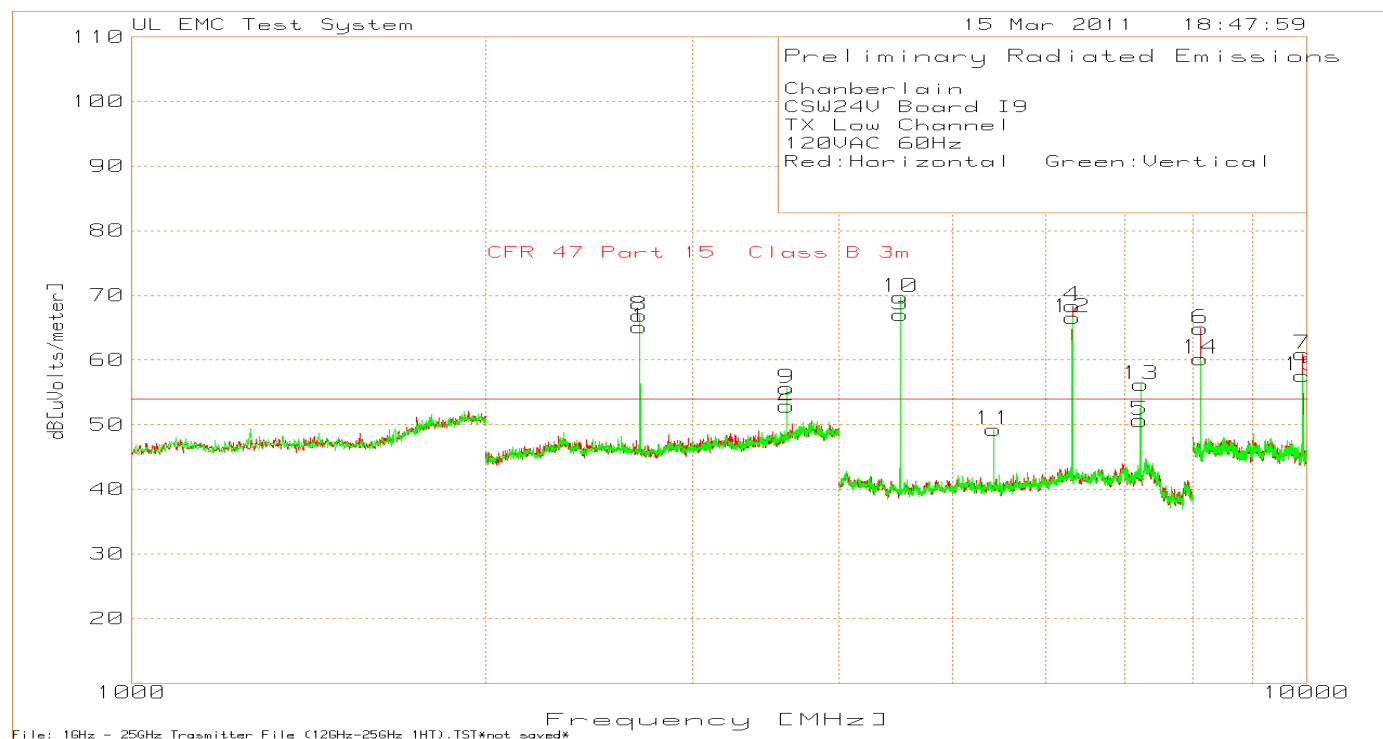
Figure 5 Radiated Spurious Emissions below 200-1000MHz, Low Channel, CSW24V**Figure 6 Radiated Spurious Emissions above 1GHz, Low Channel, CSW24V**

Table 4 Radiated Spurious Emissions below 30-200MHz, Low Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX Low Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]						
	[MHz]	[dB(uV)]		[dB]	[dB]							
Bicon Horizontal 30 - 200MHz												
1	135.7721	11.34	PK	1.3	14.2	26.84			43.5	-16.66	401	Horz
2	153.1884	13.28	PK	1.5	14.6	29.38			43.5	-14.12	100	Horz
Bicon Vertical 30 - 200MHz												
3	119.2904	11.12	PK	1.3	12.9	25.32			43.5	-18.18	100	Vert
4	125.3223	12.9	PK	1.3	13.5	27.7			43.5	-15.8	201	Vert
5	128.2109	16.42	PK	1.3	13.7	31.42			43.5	-12.08	100	Vert
6	135.5172	14.5	PK	1.3	14.2	30			43.5	-13.5	100	Vert
7	141.2944	11.42	PK	1.4	14.4	27.22			43.5	-16.28	201	Vert
8	151.999	11.48	PK	1.4	14.6	27.48			43.5	-16.02	201	Vert
LIMIT 1: NONE												
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 5 Radiated Spurious Emissions below 200-1000MHz, Low Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX Low Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	227.4484	20.36	PK	1.8	11.6	33.76	-	-	46	-12.24	100	Horz
2	412.6582	15.49	PK	2.5	16.5	34.49	-	-	46	-11.51	100	Horz
3	451.0326	15.82	PK	2.5	17.4	35.72	-	-	46	-10.28	100	Horz
4	865.4231	12.24	PK	3.8	23	39.04	-	-	46	-6.96	400	Horz
5	870.2199	14.41	PK	3.7	23	41.11	-	-	46	-4.89	100	Horz
6	872.6183	14.16	PK	3.8	23	40.96	-	-	46	-5.04	100	Horz
7	895.0033	13.2	PK	3.8	23.1	40.1	-	-	46	-5.9	100	Horz
8	902.1985	81.28	PK	3.8	23.1	108.18	-31.55	76.63	94	-17.37	201	Horz
9	909.6602	13.03	PK	3.8	23.3	40.13	-	-	46	-5.87	201	Horz
LogP Vertical 200 - 1000MHz												
10	234.6436	14.7	PK	1.8	11.6	28.1	-	-	46	-17.9	301	Vert
11	376.6822	18.51	PK	2.4	15.8	36.71	-	-	46	-9.29	100	Vert
12	388.6742	18	PK	2.4	16.1	36.5	-	-	46	-9.5	100	Vert
13	864.6236	14.28	PK	3.8	23	41.08	-	-	46	-4.92	301	Vert
14	869.9534	13.36	PK	3.7	23	40.06	-	-	46	-5.94	100	Vert
15	872.6183	13.41	PK	3.8	22.9	40.11	-	-	46	-5.89	400	Vert
16	879.547	12.8	PK	3.9	22.9	39.6	-	-	46	-6.4	100	Vert
17	895.0033	13.71	PK	3.8	22.9	40.41	-	-	46	-5.59	201	Vert
18	902.1985	80.45	PK	3.8	23	107.25	-31.55	75.7	94	-18.3	201	Vert
19	909.6602	15	PK	3.8	23	41.8	-	-	46	-4.2	201	Vert
20	924.8501	12.73	PK	3.8	23.3	39.83	-	-	46	-6.17	201	Vert
21	938.974	11.92	PK	3.9	23.4	39.22	-	-	46	-6.78	201	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 6 Radiated Spurious Emissions above 1GHz, Low Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX Low Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction		[dB]		
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]				
2 - 4GHz 2000 - 4000MHz												
1	2706.707	38.89	PK	4.16	22.1	65.15	-31.55	33.6	54	-20.4	99	Horz
2	3609.61	24.48	PK	5.22	23.2	52.9	-31.55	21.35	54	-32.65	150	Horz
4 - 8GHz 4000 - 8000MHz												
3	4509.673	91.36	PK	-52.16	27.8	67	-31.55	35.45	54	-18.55	100	Horz
4	6316.211	87.06	PK	-47.84	29.2	68.42	Limit not applicable, not in restricted band.				100	Horz
5	7218.145	67.47	PK	-46.62	29.8	50.65	Limit not applicable, not in restricted band.				100	Horz
8 - 12GHz 8000 - 10000MHz												
6	8118.118	77.75	PK	-49.04	36.2	64.91	-31.55	33.36	54	-20.64	150	Horz
7	9925.926	73.69	PK	-49.17	36.4	60.92	Limit not applicable, not in restricted band.				150	Horz
2 - 4GHz 2000 - 4000MHz												
8	2706.707	40.64	PK	4.16	22.1	66.9	-31.55	35.35	54	-18.65	150	Vert
9	3609.61	27.21	PK	5.22	23.2	55.63	-31.55	24.08	54	-29.92	100	Vert
4 - 8GHz 4000 - 8000MHz												
10	4509.673	94.11	PK	-52.16	27.8	69.75	-31.55	38.2	54	-15.8	100	Vert
11	5414.276	71.36	PK	-49.98	27.9	49.28	-31.55	17.73	54	-36.27	150	Vert
12	6316.211	85.19	PK	-47.84	29.2	66.55	Limit not applicable, not in restricted band.				150	Vert
13	7220.814	72.88	PK	-46.6	29.9	56.18	Limit not applicable, not in restricted band.				150	Vert
8 - 12GHz 8000 - 10000MHz												
14	8118.118	73.05	PK	-49.04	36.2	60.21	-31.55	28.66	54	-25.34	150	Vert
15	9925.926	70.29	PK	-49.17	36.4	57.52	Limit not applicable, not in restricted band.				100	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m												
PK - Peak detector												
File: 1GHz - 25GHz Transmitter File (12GHz-25GHz 1HT).TST*not saved*												

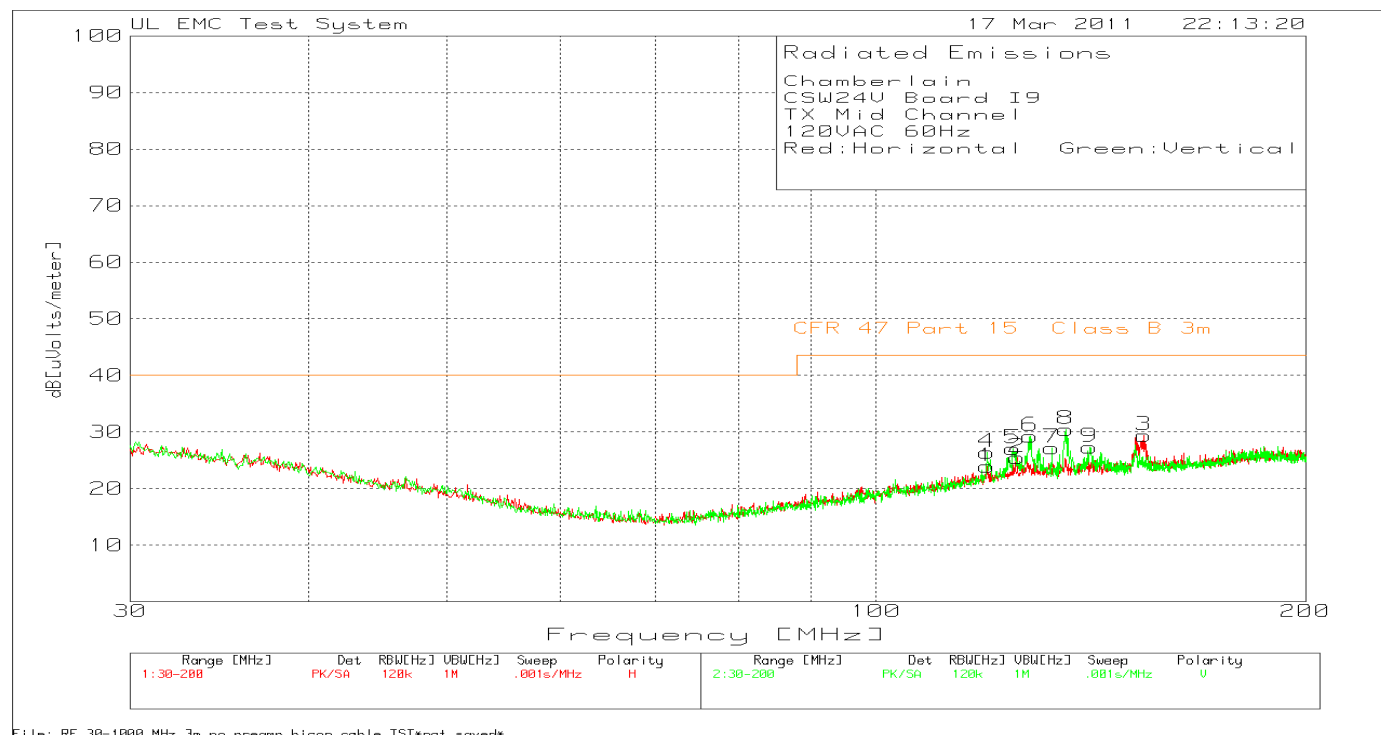
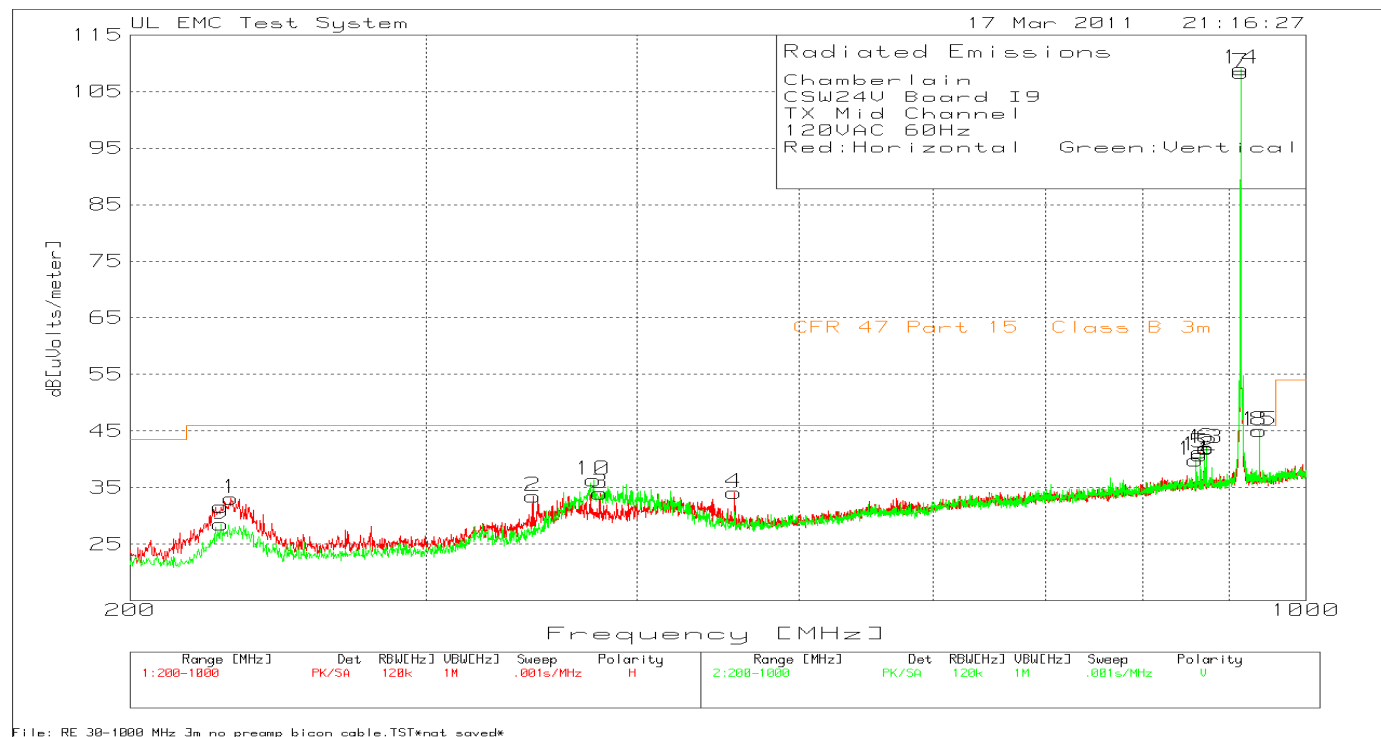
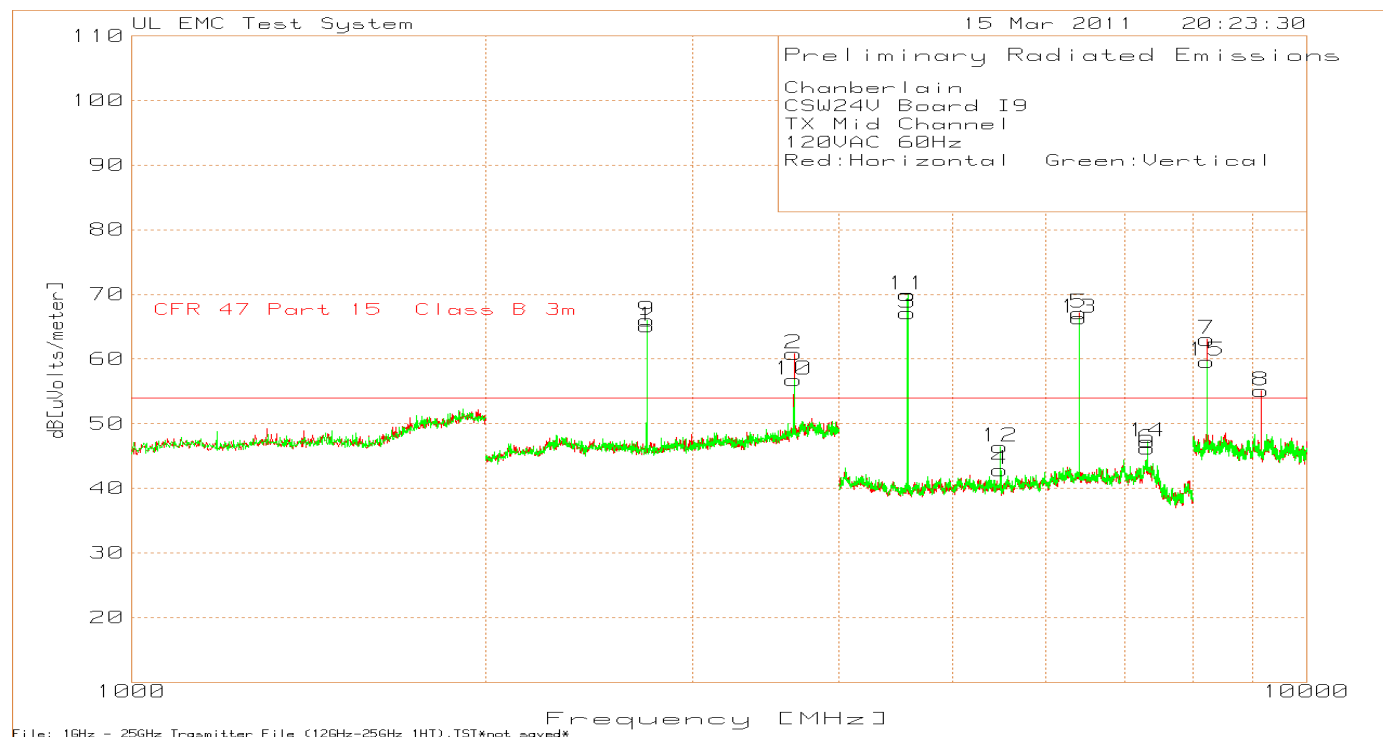
Figure 7 Radiated Spurious Emissions below 30-200MHz, Middle Channel, CSW24V**Figure 8 Radiated Spurious Emissions below 200-1000MHz, Middle Channel, CSW24V**

Figure 9 Radiated Spurious Emissions above 1GHz, Middle Channel, CSW24V**Table 7 Radiated Spurious Emissions below 30-200MHz, Middle Channel, CSW24V**

Chamberlain										
CSW24V Board I9										
TX Mid Channel										
120VAC 60Hz										
Red:Horizontal Green:Vertical										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Bicon Horizontal 30 - 200MHz										
1	119.6302	9.69	PK		1.3	12.9	23.89	43.5	-19.61	100 Horz
2	125.5772	10.71	PK		1.3	13.5	25.51	43.5	-17.99	201 Horz
3	154.1229	13.28	PK		1.5	14.6	29.38	43.5	-14.12	201 Horz
Bicon Vertical 30 - 200MHz										
4	119.6302	12.17	PK		1.3	12.9	26.37	43.5	-17.13	100 Vert
5	124.6427	12.25	PK		1.3	13.5	27.05	43.5	-16.45	100 Vert
6	128.1259	14.29	PK		1.3	13.7	29.29	43.5	-14.21	200 Vert
7	132.7136	11.84	PK		1.3	14.1	27.24	43.5	-16.26	100 Vert
8	135.8571	14.98	PK		1.3	14.2	30.48	43.5	-13.02	100 Vert
9	141.2094	11.5	PK		1.4	14.4	27.3	43.5	-16.2	100 Vert
LIMIT 1: NONE										
LIMIT 2: CFR 47 Part 15 Class B 3m										
PK - Peak detector										

Table 8 Radiated Spurious Emissions below 200-1000MHz, Middle Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX Mid Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	229.5803	19.58	PK	1.8	11.7	33.08	-	-	46	-12.92	100	Horz
2	347.1019	15.57	PK	2.3	15.6	33.47	-	-	46	-12.53	200	Horz
3	380.4131	15.9	PK	2.4	15.7	34	-	-	46	-12	301	Horz
4	457.4284	14.04	PK	2.6	17.5	34.14	-	-	46	-11.86	100	Horz
5	865.6895	14.42	PK	3.8	23	41.22	-	-	46	-4.78	401	Horz
6	872.6183	15.28	PK	3.8	23	42.08	-	-	46	-3.92	100	Horz
7	914.7235	81.19	PK	3.9	23.3	108.39	-31.55	76.84	94	-17.16	200	Horz
8	938.441	17.53	PK	3.9	23.6	45.03	-	-	46	-0.97	401	Horz
LogP Vertical 200 - 1000MHz												
9	226.3824	15.39	PK	1.8	11.4	28.59	-	-	46	-17.41	301	Vert
10	376.9487	18.14	PK	2.4	15.8	36.34	-	-	46	-9.66	100	Vert
11	860.6262	13.14	PK	3.7	23	39.84	-	-	46	-6.16	301	Vert
12	865.6895	13.9	PK	3.8	23	40.7	-	-	46	-5.3	100	Vert
13	872.3518	15.27	PK	3.7	23	41.97	-	-	46	-4.03	401	Vert
14	914.7235	82.02	PK	3.9	23.1	109.02	-31.55	77.47	94	-16.53	201	Vert
15	938.441	17.79	PK	3.9	23.4	45.09	-	-	46	-0.91	100	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 9 Radiated Spurious Emissions above 1GHz, Middle Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX Mid Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]				
2 - 4GHz 2000 - 4000MHz												
1	2744.745	38.85	PK	4.13	22.1	65.08	-31.57	33.51	54	-20.49	100	Horz
2	3659.66	31.78	PK	5.64	23.4	60.82	-31.57	29.25	54	-24.75	100	Horz
4 - 8GHz 4000 - 8000MHz												
3	4573.716	91.14	PK	-51.68	27.7	67.16	-31.57	35.59	54	-18.41	100	Horz
4	5488.993	64.68	PK	-49.9	28.1	42.88	Limit not applicable, not in restricted band.				100	Horz
5	6404.27	85.16	PK	-47.26	29.2	67.1	Limit not applicable, not in restricted band.				100	Horz
6	7319.546	61.38	PK	-45.74	30.6	46.24	-31.57	14.67	54	-39.33	100	Horz
8 - 12GHz 8000 - 10000MHz												
7	8232.232	74.61	PK	-47.98	36.4	63.03	-31.57	31.46	54	-22.54	150	Horz
8	9147.147	69.08	PK	-50.25	36.3	55.13	-31.57	23.56	54	-30.44	150	Horz
2 - 4GHz 2000 - 4000MHz												
9	2744.745	39.77	PK	4.13	22.1	66	-31.57	34.43	54	-19.57	100	Vert
10	3659.66	27.71	PK	5.64	23.4	56.75	-31.57	25.18	54	-28.82	100	Vert
4 - 8GHz 4000 - 8000MHz												
11	4573.716	93.9	PK	-51.68	27.7	69.92	-31.57	38.35	54	-15.65	100	Vert
12	5488.993	68.21	PK	-49.9	28.1	46.41	Limit not applicable, not in restricted band.				100	Vert
13	6404.27	84.43	PK	-47.26	29.2	66.37	Limit not applicable, not in restricted band.				100	Vert
14	7319.546	62.4	PK	-45.74	30.6	47.26	-31.57	15.69	54	-38.31	200	Vert
8 - 12GHz 8000 - 10000MHz												
15	8232.232	71.23	PK	-47.98	36.4	59.65	-31.57	28.08	54	-25.92	150	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m												
PK - Peak detector												
File: 1GHz - 25GHz Trasmitter File (12GHz-25GHz 1HT).TST*not saved*												

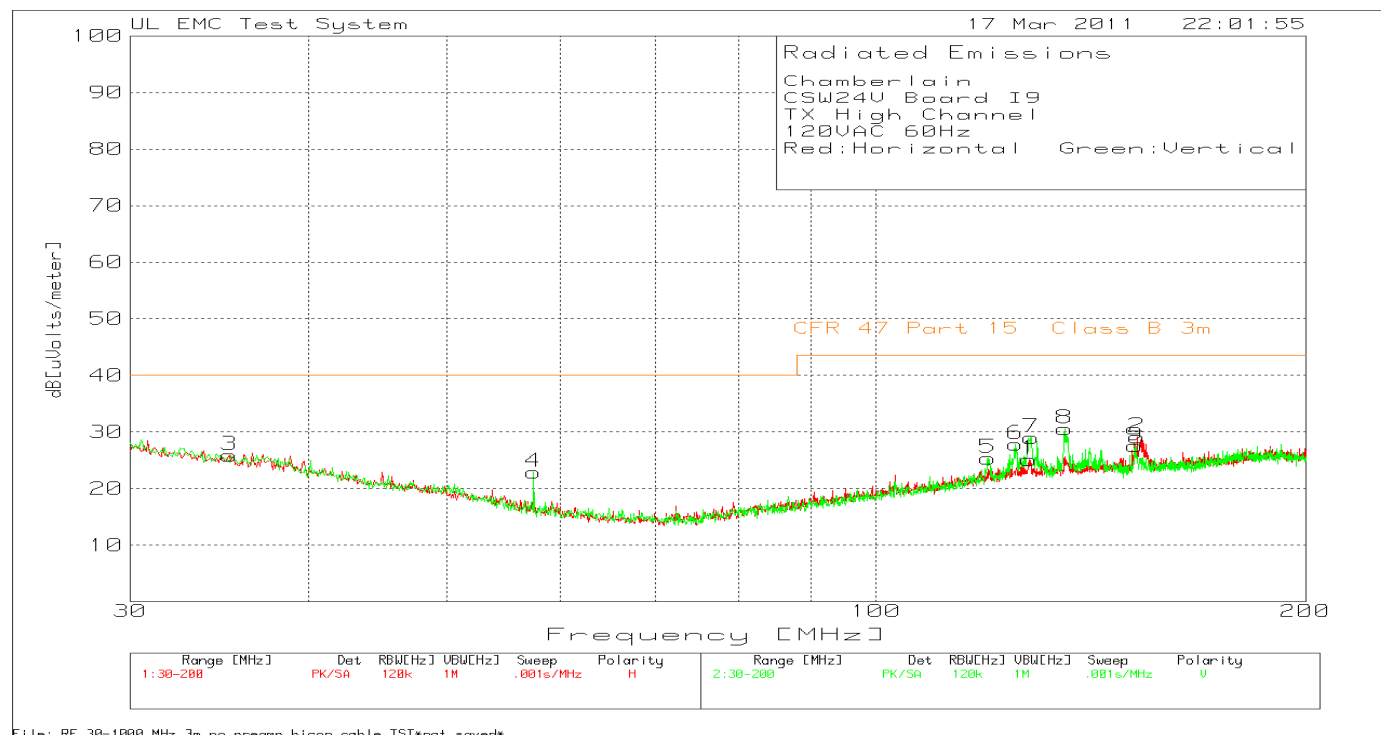
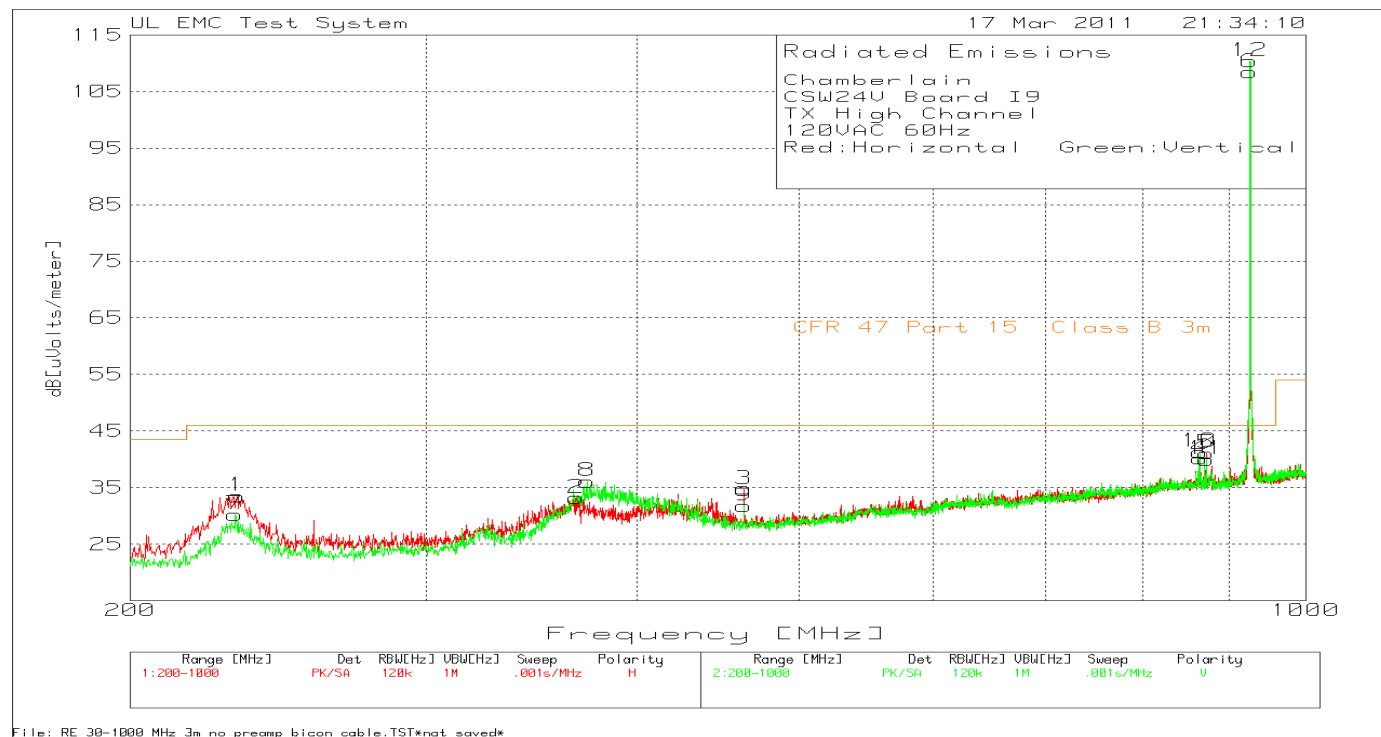
Figure 10 Radiated Spurious Emissions below 30-200MHz, High Channel, CSW24V**Figure 11 Radiated Spurious Emissions below 200-1000MHz, High Channel, CSW24V**

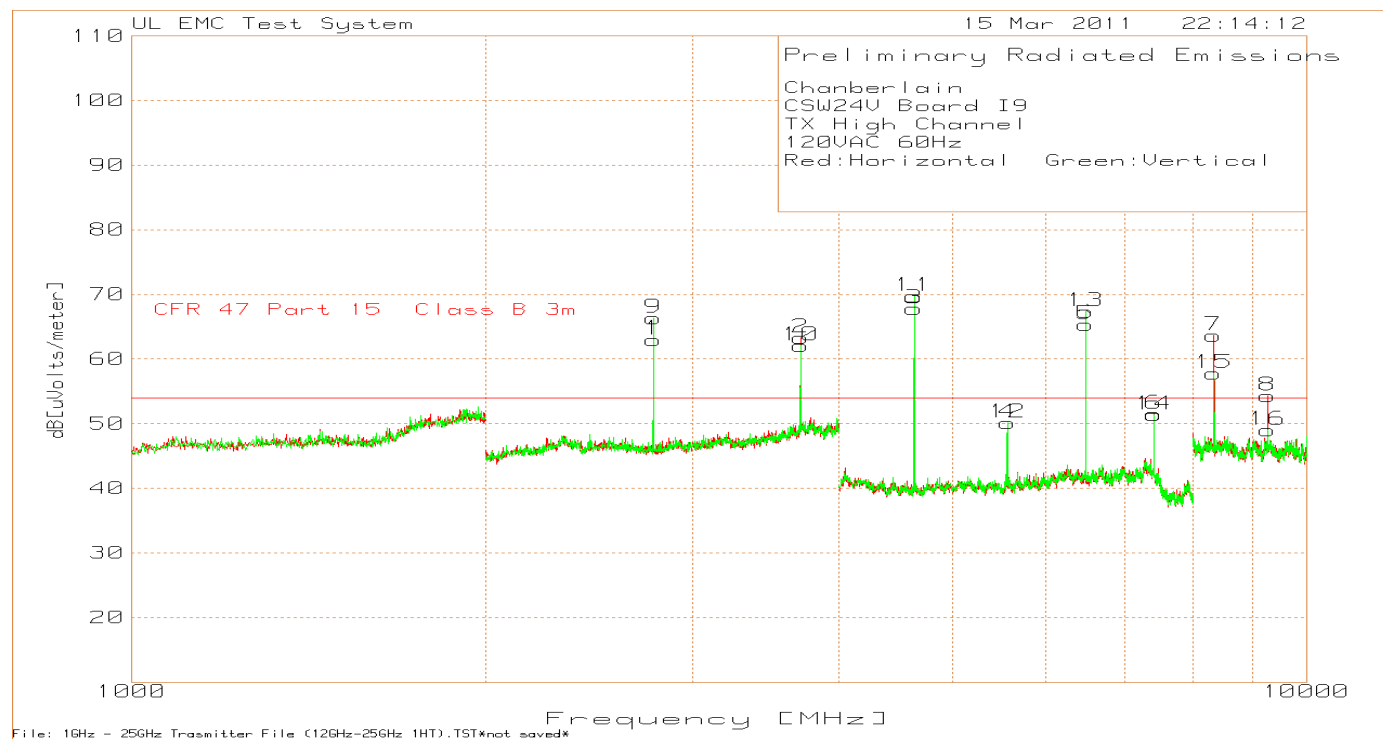
Figure 12 Radiated Spurious Emissions above 1GHz, High Channel, CSW24V

Table 10 Radiated Spurious Emissions below 30-200MHz, High Channel, CSW24V

Chamberlain										
CSW24V Board I9										
TX High Channel										
120VAC 60Hz										
Red:Horizontal Green:Vertical										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Bicon Horizontal 30 - 200MHz										
1	128.041	10.15	PK	1.3	13.7	25.15	43.5	-18.35	201	Horz
2	152.4238	13.15	PK	1.4	14.6	29.15	43.5	-14.35	201	Horz
3	35.1824	8.72	PK	0.7	16.5	25.92	40	-14.08	100	Horz
Bicon Vertical 30 - 200MHz										
4	57.5262	14.28	PK	0.9	7.7	22.88	40	-17.12	100	Vert
5	119.8851	11.24	PK	1.2	12.9	25.34	43.5	-18.16	100	Vert
6	125.2374	13.08	PK	1.3	13.5	27.88	43.5	-15.62	100	Vert
7	128.3808	13.95	PK	1.3	13.8	29.05	43.5	-14.45	100	Vert
8	135.6872	15.05	PK	1.3	14.2	30.55	43.5	-12.95	100	Vert
9	151.8291	11.53	PK	1.4	14.6	27.53	43.5	-15.97	100	Vert
LIMIT 1: NONE										
LIMIT 2: CFR 47 Part 15 Class B 3m										
PK - Peak detector										

Table 11 Radiated Spurious Emissions below 200-1000MHz, High Channel, CSW24V

Chamberlain												
CSW24V Board I9												
TX High Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	231.4457	19.96	PK	1.8	11.7	33.46	-	-	46	-12.54	100	Horz
2	368.4211	15.36	PK	2.3	15.5	33.16	-	-	46	-12.84	200	Horz
3	463.2911	14.41	PK	2.6	17.6	34.61	-	-	46	-11.39	100	Horz
4	865.6895	13.37	PK	3.8	23	40.17	-	-	46	-5.83	400	Horz
5	872.6183	14.28	PK	3.8	23	41.08	-	-	46	-4.92	301	Horz
6	926.7155	81.01	PK	3.9	23.5	108.41	-31.55	76.86	94	-17.14	200	Horz
LogP Vertical 200 - 1000MHz												
7	230.9127	16.97	PK	1.8	11.5	30.27	-	-	46	-15.73	301	Vert
8	373.7508	18.11	PK	2.3	15.7	36.11	-	-	46	-9.89	100	Vert
9	463.2911	11.8	PK	2.6	17.4	31.8	-	-	46	-14.2	100	Vert
10	864.6236	14.47	PK	3.8	23	41.27	-	-	46	-4.73	201	Vert
11	872.6183	13.28	PK	3.8	22.9	39.98	-	-	46	-6.02	401	Vert
12	926.7155	83.16	PK	3.9	23.3	110.36	-31.55	78.81	94	-15.19	201	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 12 Radiated Spurious Emissions above 1GHz, High Channel, CSW24V

Chanberlain												
CSW24V Board I9												
TX High Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]				
2 - 4GHz 2000 - 4000MHz												
1	2780.781	36.63	PK	4.19	22.2	63.02	-31.61	31.41	54	-22.59	150	Horz
2	3707.708	34.05	PK	5.77	23.5	63.32	-31.61	31.71	54	-22.29	100	Horz
4 - 8GHz 4000 - 8000MHz												
3	4632.422	91.64	PK	-51.58	27.7	67.76	-31.61	36.15	54	-17.85	100	Horz
4	5561.041	71.41	PK	-49.58	28.3	50.13	Limit not applicable, not in restricted band.				100	Horz
5	6486.991	83.78	PK	-47.59	29.1	65.29	Limit not applicable, not in restricted band.				100	Horz
6	7415.61	67.23	PK	-46.79	31	51.44	-31.61	19.83	54	-34.17	100	Horz
8 - 12GHz 8000 - 10000MHz												
7	8340.34	76.38	PK	-49.27	36.5	63.61	-31.61	32	54	-22	150	Horz
8	9267.267	66.74	PK	-48.81	36.4	54.33	Limit not applicable, not in restricted band.				100	Horz
2 - 4GHz 2000 - 4000MHz												
9	2780.781	39.98	PK	4.19	22.2	66.37	-31.61	34.76	54	-19.24	200	Vert
10	3707.708	32.79	PK	5.77	23.5	62.06	-31.61	30.45	54	-23.55	150	Vert
4 - 8GHz 4000 - 8000MHz												
11	4632.422	93.6	PK	-51.58	27.7	69.72	-31.61	38.11	54	-15.89	100	Vert
12	5561.041	71.41	PK	-49.58	28.3	50.13	Limit not applicable, not in restricted band.				150	Vert
13	6486.991	85.88	PK	-47.59	29.1	67.39	Limit not applicable, not in restricted band.				100	Vert
14	7412.942	67.11	PK	-46.78	31	51.33	-31.61	19.72	54	-34.28	100	Vert
8 - 12GHz 8000 - 10000MHz												
15	8340.34	70.59	PK	-49.27	36.5	57.82	-31.61	26.21	54	-27.79	150	Vert
16	9267.267	61.41	PK	-48.81	36.4	49	Limit not applicable, not in restricted band.				150	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m												
PK - Peak detector												
File: 1GHz - 25GHz Trasmmitter File (12GHz-25GHz 1HT).TST*not saved*												

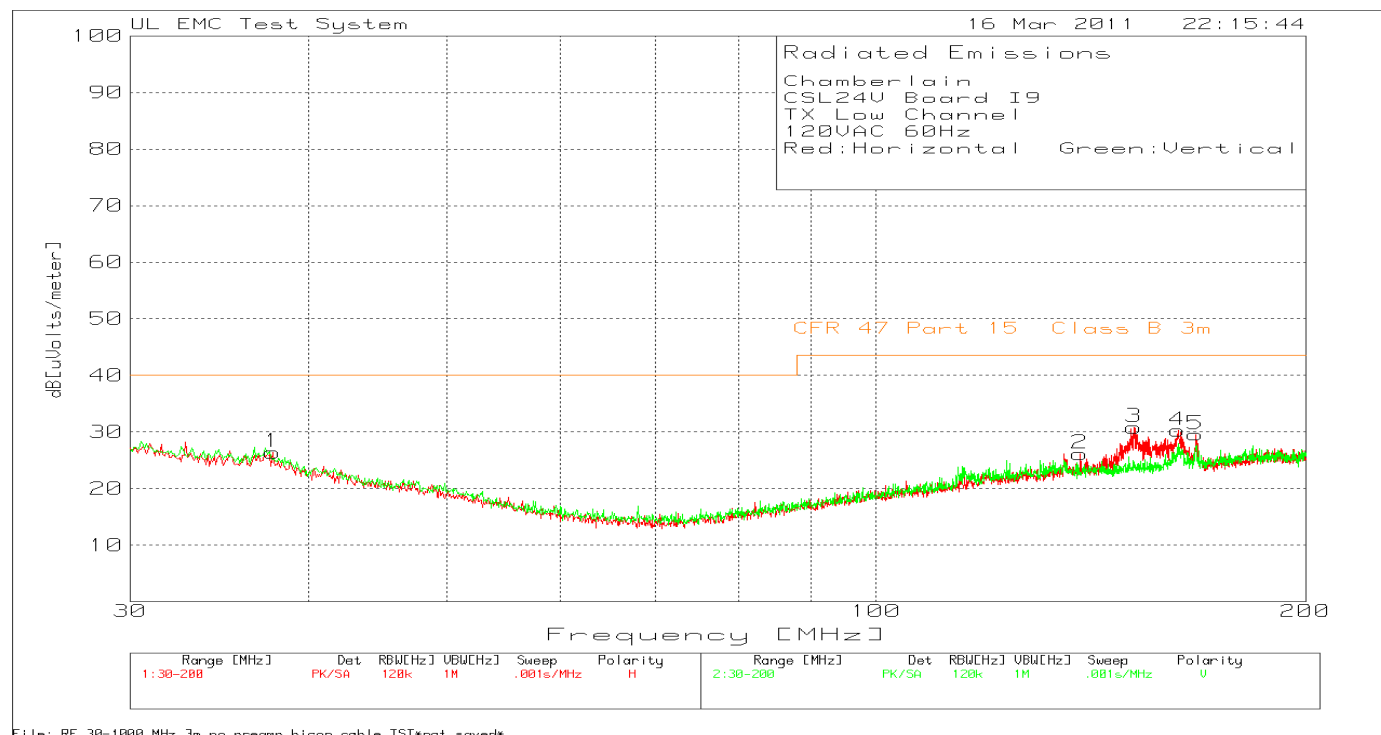
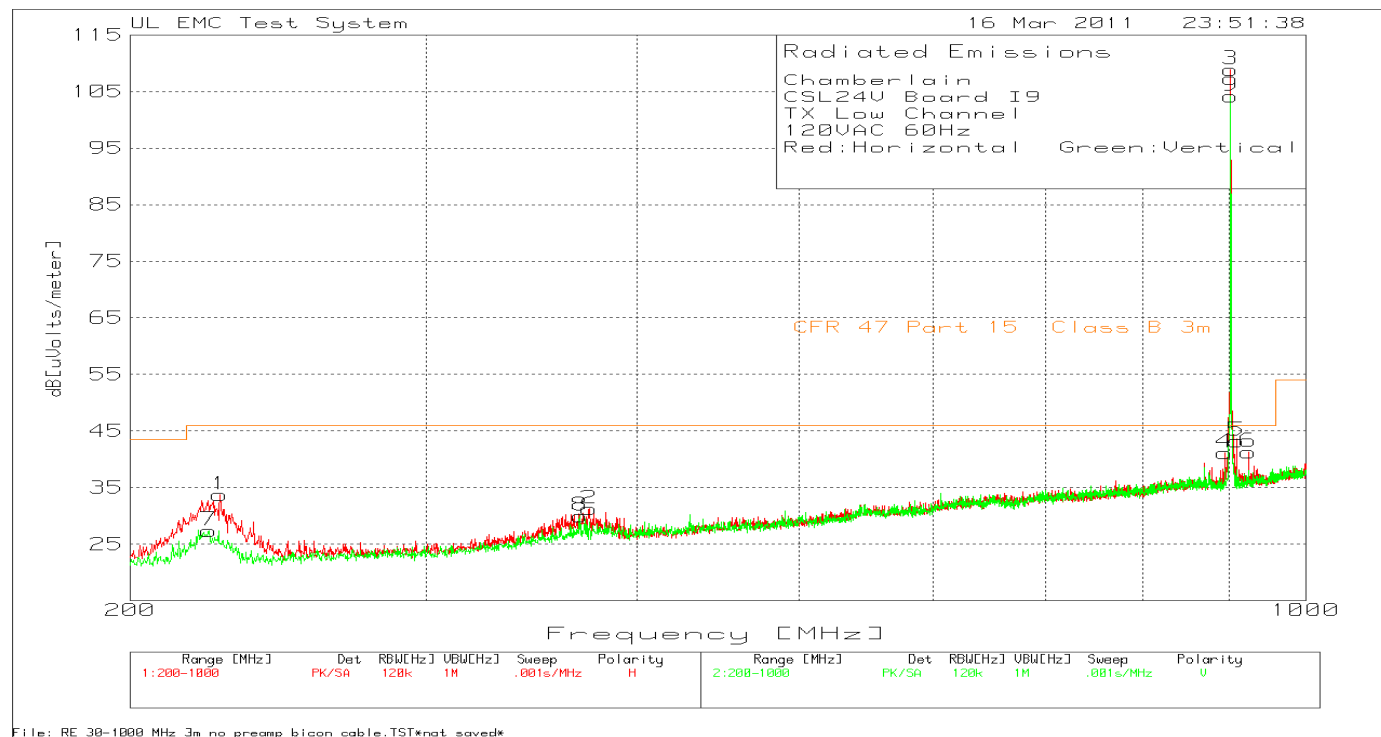
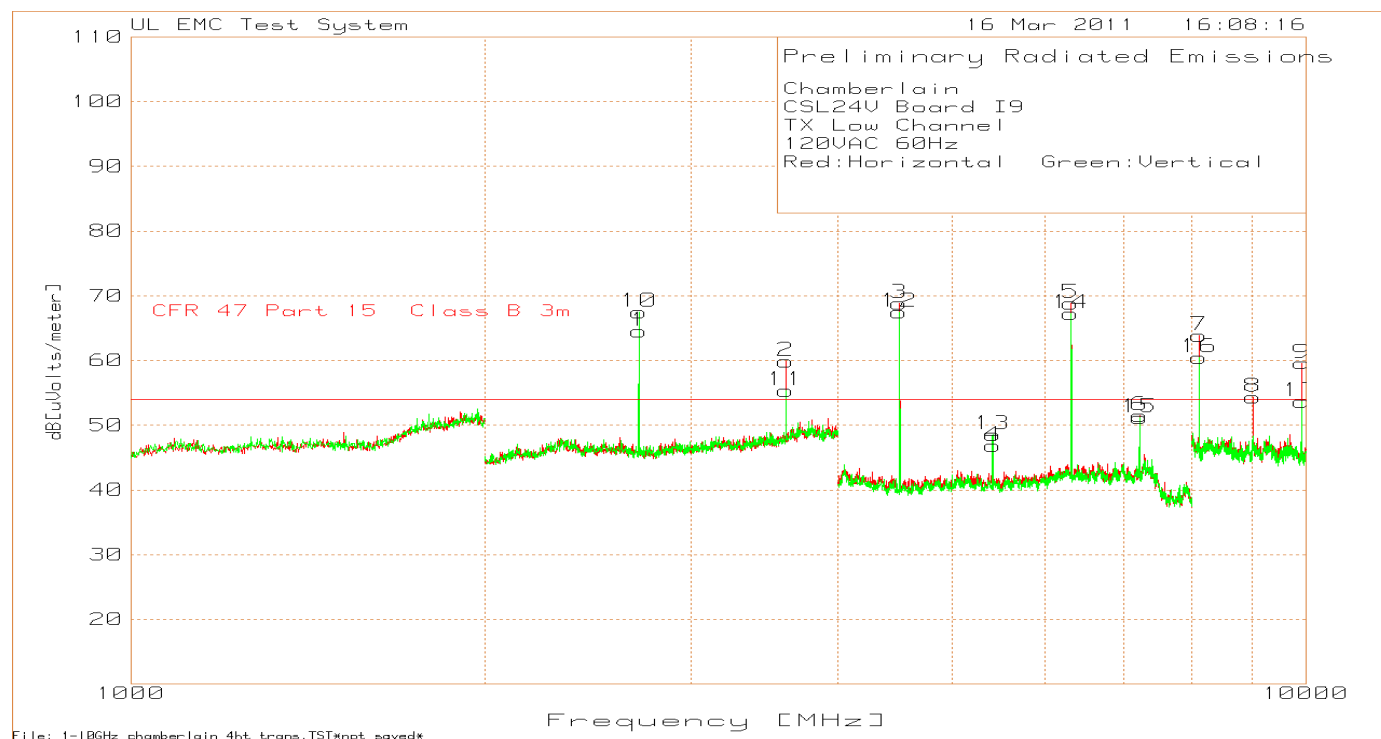
Figure 13 Radiated Spurious Emissions below 30-200MHz, Low Channel, CSL24V**Figure 14 Radiated Spurious Emissions below 200-1000MHz, Low Channel, CSL24V**

Figure 15 Radiated Spurious Emissions above 1GHz, Low Channel, CSL24V**Table 13 Radiated Spurious Emissions below 30-200MHz, Low Channel, CSL24V**

Chamberlain										
CSL24V Board I9										
TX Low Channel										
120VAC 60Hz										
Red:Horizontal Green:Vertical										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Bicon Horizontal 30 - 200MHz										
1	37.7311	10.37	PK	0.7	15.3	26.37	40	-13.63	201	Horz
2	138.9155	10.5	PK	1.4	14.3	26.2	43.5	-17.3	201	Horz
3	151.5742	14.88	PK	1.4	14.6	30.88	43.5	-12.62	201	Horz
4	162.7036	13.75	PK	1.5	15	30.25	43.5	-13.25	201	Horz
5	167.5462	12.99	PK	1.5	15.1	29.59	43.5	-13.91	100	Horz
LIMIT 2: CFR 47 Part 15 Class B 3m										
PK - Peak detector										

Job #: 1001351660

File #: MC15343

Project #: 11CA11377

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Model Number:

CSW24V, CSL24V

Client Name:

Chamberlain Group Inc.

14 Radiated Spurious Emissions below 200-1000MHz, Low Channel, CSL24V

Chamberlain												
CSL24V Board I9												
TX Low Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	226.1159	20.29	PK	1.8	11.6	33.69	-	-	46	-12.31	101	Horz
2	374.8168	13.32	PK	2.3	15.6	31.22	-	-	46	-14.78	201	Horz
3	902.465	81.99	PK	3.8	23.1	108.89	-31.55	77.34	94	-16.66	101	Horz
4	895.0033	14.24	PK	3.8	23.1	41.14	-	-	46	-4.86	101	Horz
5	909.9267	16.11	PK	3.8	23.3	43.21	-	-	46	-2.79	201	Horz
6	924.8501	13.96	PK	3.8	23.5	41.26	-	-	46	-4.74	101	Horz
LogP Vertical 200 - 1000MHz												
7	222.6516	14.21	PK	1.8	11.4	27.41	-	-	46	-18.59	201	Vert
8	370.2865	12.1	PK	2.3	15.6	30	-	-	46	-16	100	Vert
9	902.465	77.42	PK	3.8	23	104.22	-31.55	72.67	94	-21.33	201	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 15 Radiated Spurious Emissions above 1GHz, Low Channel, CSL24V

Chamberlain												
CSL24V Board I9												
TX Low Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]				
2 - 4GHz 2000 - 4000MHz												
1	2706.707	38.29	PK	4.16	22.1	64.55	-31.55	33	54	-21	100	Horz
2	3609.61	31.52	PK	5.22	23.2	59.94	-31.55	28.39	54	-25.61	100	Horz
4 - 8GHz 4000 - 8000MHz												
3	4509.673	93.18	PK	-52.16	27.8	68.82	-31.55	37.27	54	-16.73	99	Horz
4	5414.276	68.9	PK	-49.98	27.9	46.82	-31.55	15.27	54	-38.73	99	Horz
5	6316.211	87.49	PK	-47.84	29.2	68.85	Limit not applicable, not in restricted band.				99	Horz
6	7218.145	68.36	PK	-46.62	29.8	51.54	Limit not applicable, not in restricted band.				99	Horz
8 - 12GHz 8000 - 10000MHz												
7	8118.118	76.73	PK	-49.04	36.2	63.89	-31.55	32.34	54	-21.66	150	Horz
8	9023.023	66.81	PK	-48.52	36.1	54.39	-31.55	22.84	54	-31.16	100	Horz
9	9925.926	72.38	PK	-49.17	36.4	59.61	Limit not applicable, not in restricted band.				100	Horz
2 - 4GHz 2000 - 4000MHz												
10	2706.707	41.23	PK	4.16	22.1	67.49	-31.55	35.94	54	-18.06	100	Vert
11	3609.61	26.9	PK	5.22	23.2	55.32	-31.55	23.77	54	-30.23	150	Vert
4 - 8GHz 4000 - 8000MHz												
12	4509.673	91.86	PK	-52.16	27.8	67.5	-31.55	35.95	54	-18.05	100	Vert
13	5414.276	70.65	PK	-49.98	27.9	48.57	-31.55	17.02	54	-36.98	100	Vert
14	6316.211	85.9	PK	-47.84	29.2	67.26	Limit not applicable, not in restricted band.				100	Vert
15	7218.145	67.98	PK	-46.62	29.8	51.16	Limit not applicable, not in restricted band.				100	Vert
8 - 12GHz 8000 - 10000MHz												
16	8120.12	73.33	PK	-49.11	36.2	60.42	-31.55	28.87	54	-25.13	150	Vert
17	9925.926	66.45	PK	-49.17	36.4	53.68	Limit not applicable, not in restricted band.				150	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m												
PK - Peak detector												
File: 1-10GHz chamberlain 4ht trans.TST*not saved*												

Figure 16 Radiated Spurious Emissions below 30-200MHz, Middle Channel, CSL24V

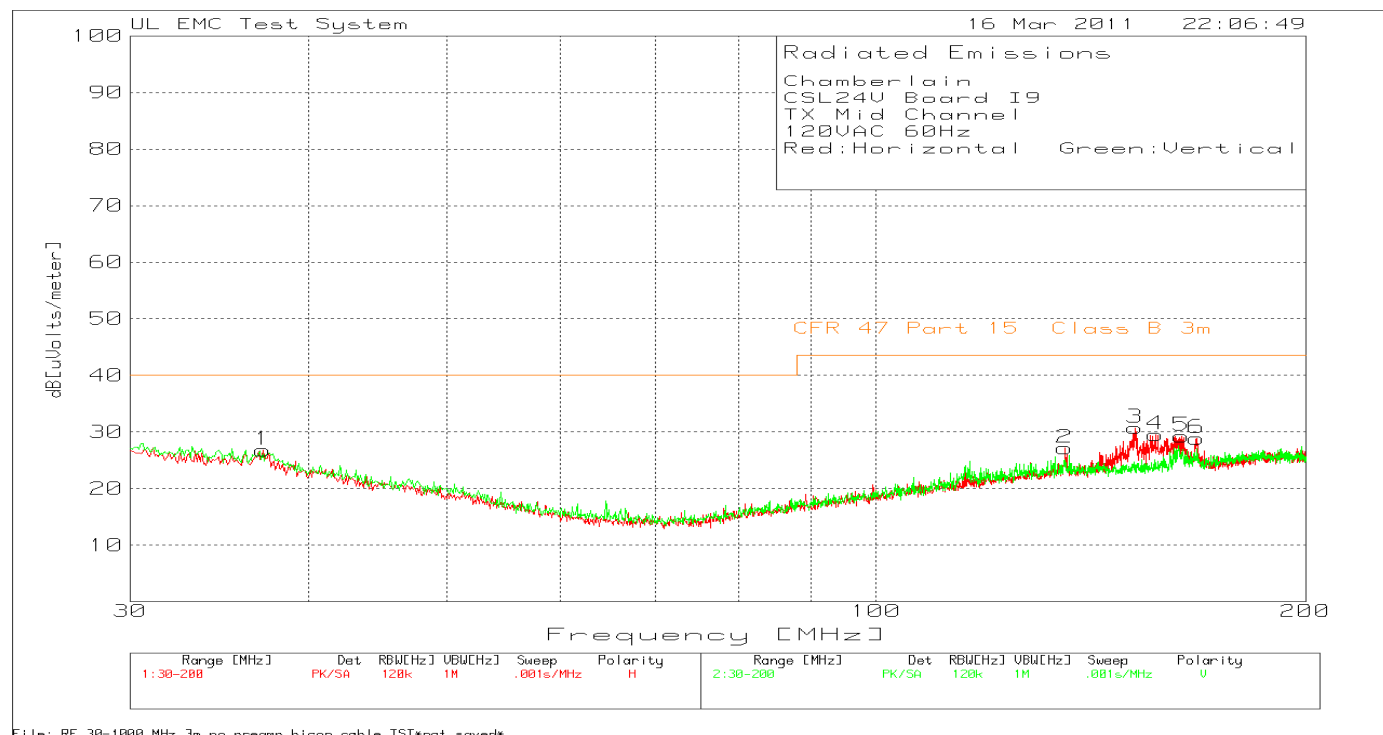


Figure 17 Radiated Spurious Emissions below 200-1000MHz, Middle Channel, CSL24V

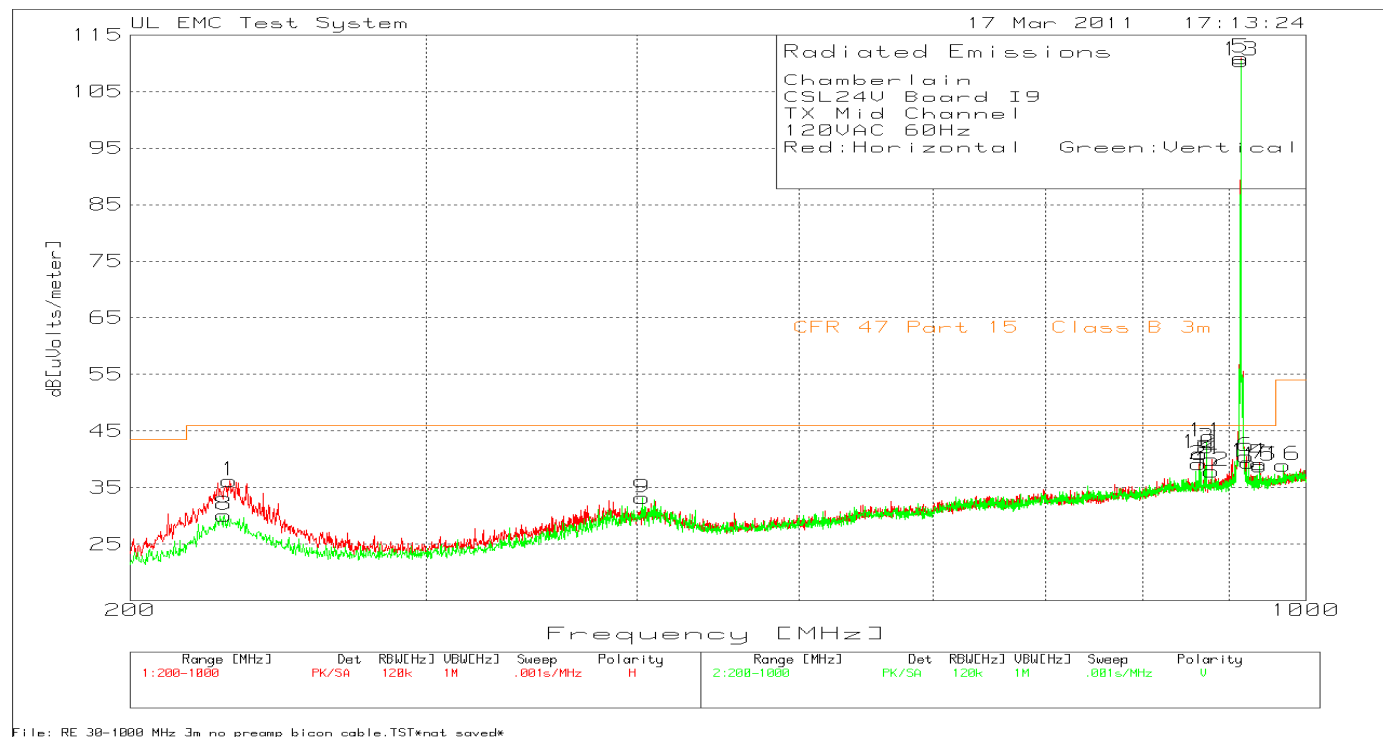
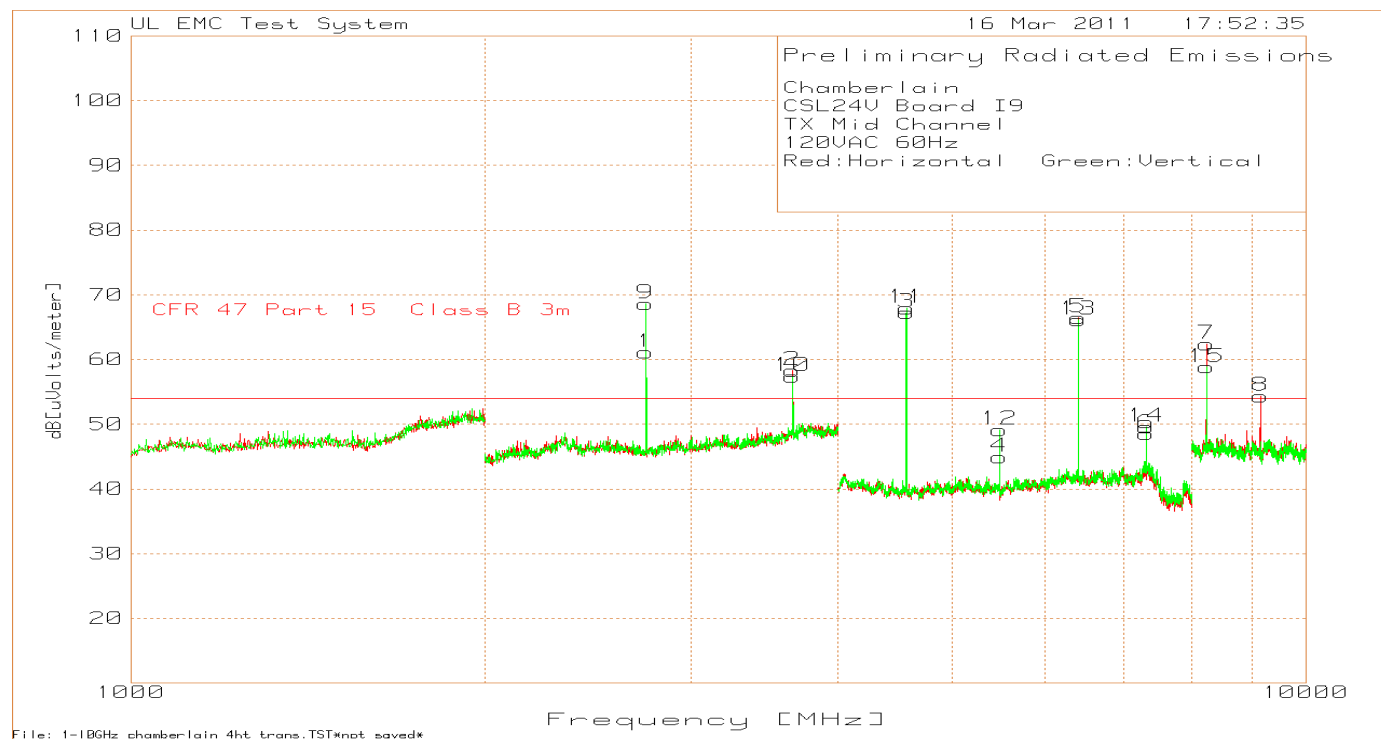


Figure 18 Radiated Spurious Emissions above 1GHz, Middle Channel, CSL24V**Table 16 Radiated Spurious Emissions below 30-200MHz, Middle Channel, CSL24V**

Chamberlain										
CSL24V Board I9										
TX Mid Channel										
120VAC 60Hz										
Red:Horizontal Green:Vertical										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Bicon Horizontal 30 - 200MHz										
1	37.1364	10.38	PK	0.7	15.7	26.78	40	-13.22	100	Horz
2	135.6022	11.64	PK	1.3	14.2	27.14	43.5	-16.36	100	Horz
3	151.7441	14.76	PK	1.4	14.6	30.76	43.5	-12.74	100	Horz
4	156.9265	13.47	PK	1.4	14.7	29.57	43.5	-13.93	100	Horz
5	163.6382	12.82	PK	1.5	15	29.32	43.5	-14.18	201	Horz
6	167.8011	12.31	PK	1.5	15.1	28.91	43.5	-14.59	100	Horz
LIMIT 2: CFR 47 Part 15 Class B 3m										
PK - Peak detector										

Table 17 Radiated Spurious Emissions below 200-1000MHz, Middle Channel, CSL24V

Chamberlain												
CSL24V Board I9												
TX Mid Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	229.0473	22.68	PK	1.8	11.7	36.18	-	-	46	-9.82	100	Horz
2	864.3571	12.44	PK	3.7	23	39.14	-	-	46	-6.86	201	Horz
3	872.6183	15.32	PK	3.8	23	42.12	-	-	46	-3.88	301	Horz
4	879.547	13.02	PK	3.9	23.1	40.02	-	-	46	-5.98	301	Horz
5	914.7235	83.77	PK	3.9	23.3	110.97	-31.55	79.42	94	-14.58	100	Horz
6	922.4517	13.29	PK	3.8	23.4	40.49	-	-	46	-5.51	201	Horz
7	938.974	11.69	PK	3.9	23.6	39.19	-	-	46	-6.81	201	Horz
LogP Vertical 200 - 1000MHz												
8	227.4484	16.88	PK	1.8	11.4	30.08	-	-	46	-15.92	201	Vert
9	403.0646	14.47	PK	2.4	16.3	33.17	-	-	46	-12.83	201	Vert
10	865.6895	14.22	PK	3.8	23	41.02	-	-	46	-4.98	201	Vert
11	872.6183	16.36	PK	3.8	22.9	43.06	-	-	46	-2.94	301	Vert
12	879.547	11.14	PK	3.9	22.9	37.94	-	-	46	-8.06	100	Vert
13	914.7235	83.4	PK	3.9	23.1	110.4	-31.55	78.85	94	-15.15	201	Vert
14	924.8501	12.33	PK	3.8	23.3	39.43	-	-	46	-6.57	201	Vert
15	939.2405	11.56	PK	3.9	23.4	38.86	-	-	46	-7.14	401	Vert
16	969.3538	10.87	PK	3.9	24.2	38.97	-	-	54	-15.03	100	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 18 Radiated Spurious Emissions above 1GHz, Middle Channel, CSL24V

Chamberlain												
CSL24V Board I9												
TX Mid Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]				
2 - 4GHz 2000 - 4000MHz												
1	2744.745	34.86	PK	4.13	22.1	61.09	-31.57	29.52	54	-24.48	99	Horz
2	3659.66	29.24	PK	5.64	23.4	58.28	-31.57	26.71	54	-27.29	99	Horz
4 - 8GHz 4000 - 8000MHz												
3	4573.716	91.21	PK	-51.68	27.7	67.23	-31.57	35.66	54	-18.34	99	Horz
4	5488.993	66.77	PK	-49.9	28.1	44.97	Limit not applicable, not in restricted band.				99	Horz
5	6404.27	84.53	PK	-47.26	29.2	66.47	Limit not applicable, not in restricted band.				99	Horz
6	7319.546	63.7	PK	-45.74	30.6	48.56	-31.57	16.99	54	-37.01	99	Horz
8 - 12GHz 8000 - 10000MHz												
7	8232.232	73.93	PK	-47.98	36.4	62.35	-31.57	30.78	54	-23.22	150	Horz
8	9147.147	68.34	PK	-50.25	36.3	54.39	-31.57	22.82	54	-31.18	100	Horz
2 - 4GHz 2000 - 4000MHz												
9	2744.745	42.4	PK	4.13	22.1	68.63	-31.57	37.06	54	-16.94	150	Vert
10	3659.66	28.32	PK	5.64	23.4	57.36	-31.57	25.79	54	-28.21	150	Vert
4 - 8GHz 4000 - 8000MHz												
11	4573.716	91.9	PK	-51.68	27.7	67.92	-31.57	36.35	54	-17.65	100	Vert
12	5488.993	70.97	PK	-49.9	28.1	49.17	Limit not applicable, not in restricted band.				150	Vert
13	6404.27	84.2	PK	-47.26	29.2	66.14	Limit not applicable, not in restricted band.				100	Vert
14	7319.546	64.73	PK	-45.74	30.6	49.59	-31.57	18.02	54	-35.98	100	Vert
8 - 12GHz 8000 - 10000MHz												
15	8232.232	70.4	PK	-47.98	36.4	58.82	-31.57	27.25	54	-26.75	150	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m												
PK - Peak detector												
File: 1-10GHz chamberlain 4ht trans.TST*not saved*												

Figure 19 Radiated Spurious Emissions below 30-200MHz, High Channel, CSL24V

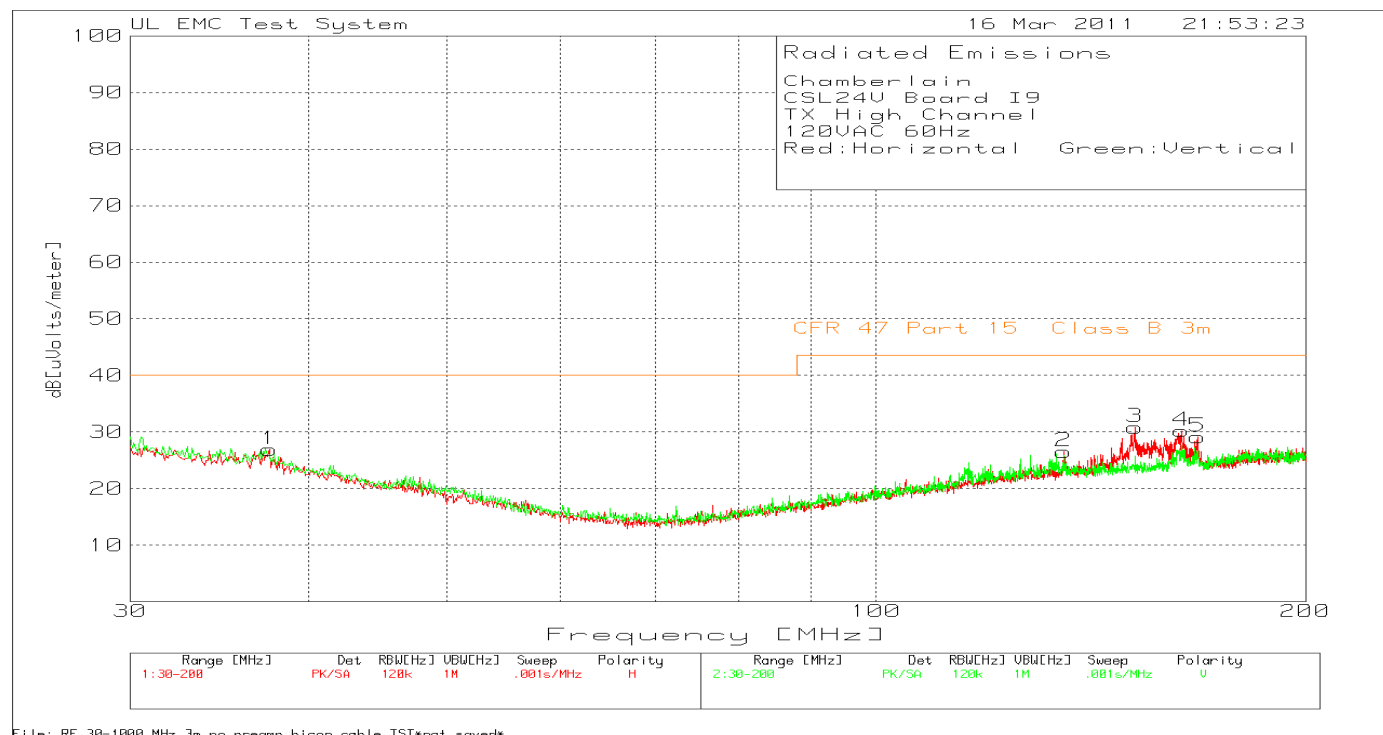


Figure 20 Radiated Spurious Emissions below 200-1000MHz, High Channel, CSL24V

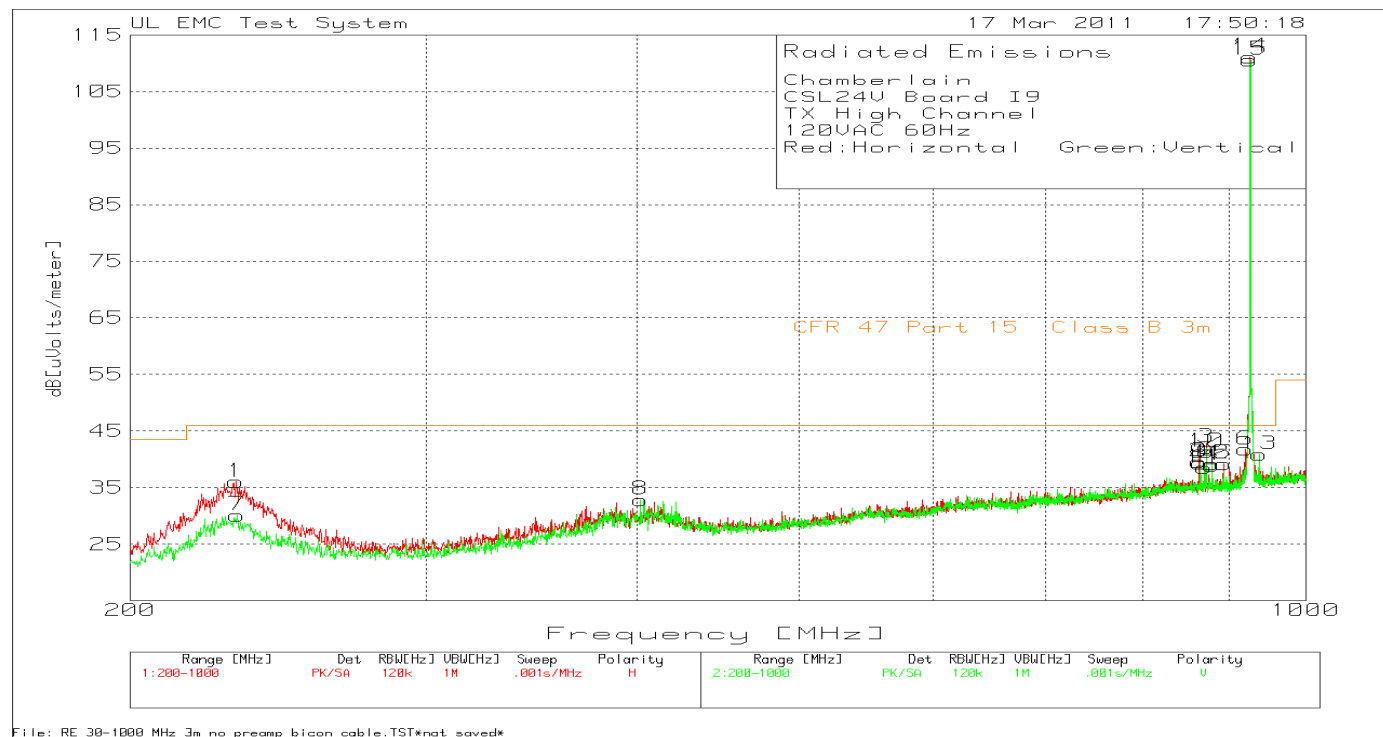
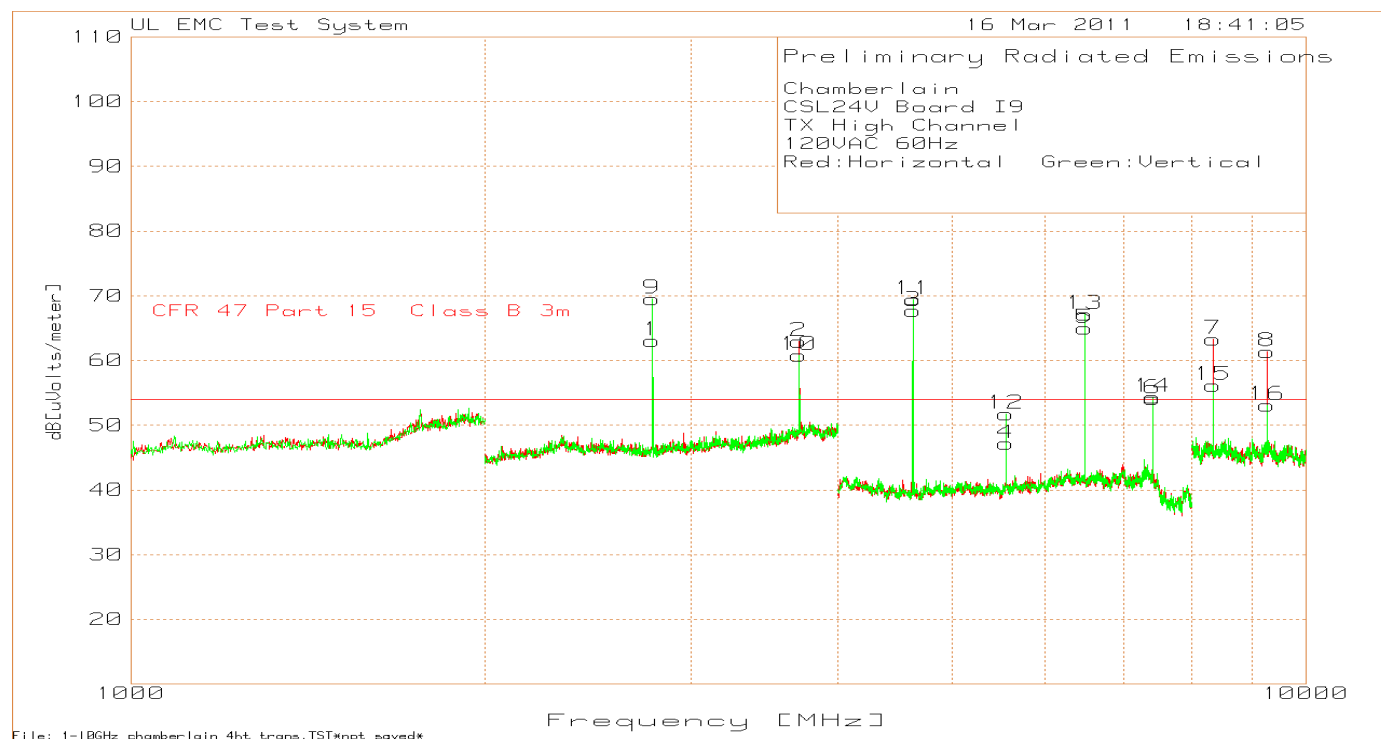


Figure 21 Radiated Spurious Emissions above 1GHz, High Channel, CSL24V**Table 19 Radiated Spurious Emissions below 30-200MHz, High Channel, CSL24V**

Chamberlain										
CSL24V Board I9										
TX High Channel										
120VAC 60Hz										
Red:Horizontal Green:Vertical										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Bicon Horizontal 30 - 200MHz										
1	37.5612	10.78	PK	0.7	15.4	26.88	40	-13.12	100	Horz
2	135.2624	11.02	PK	1.3	14.2	26.52	43.5	-16.98	100	Horz
3	151.8291	14.81	PK	1.4	14.6	30.81	43.5	-12.69	100	Horz
4	163.6382	13.74	PK	1.5	15	30.24	43.5	-13.26	201	Horz
5	167.971	12.51	PK	1.5	15.1	29.11	43.5	-14.39	100	Horz
LIMIT 2: CFR 47 Part 15 Class B 3m										
PK - Peak detector										

Table 20 Radiated Spurious Emissions below 200-1000MHz, High Channel, CSL24V

Chamberlain												
CSL24V Board I9												
TX High Channel												
120VAC 60Hz												
Red:Horizontal Green:Vertical												
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 2	Margin 2[dB]	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/meter]	Correction	Correction				
	[MHz]	[dB(uV)]		[dB]	[dB]		dB	dB[uVolts/meter]				
LogP Horizontal 200 - 1000MHz												
1	231.1792	22.52	PK	1.8	11.7	36.02	-	-	46	-9.98	100	Horz
2	864.3571	12.88	PK	3.7	23	39.58	-	-	46	-6.42	100	Horz
3	872.3518	15.32	PK	3.7	23	42.02	-	-	46	-3.98	201	Horz
4	879.547	11.9	PK	3.9	23.1	38.9	-	-	46	-7.1	100	Horz
5	893.4044	12.27	PK	3.8	23.1	39.17	-	-	46	-6.83	201	Horz
6	920.3198	14.54	PK	3.8	23.4	41.74	-	-	46	-4.26	100	Horz
14	926.7155	83.67	PK	3.9	23.5	111.07	-31.55	79.52	94	-14.48	100	Horz
LogP Vertical 200 - 1000MHz												
7	231.4457	16.83	PK	1.8	11.5	30.13	-	-	46	-15.87	201	Vert
8	402.2652	14.24	PK	2.4	16.2	32.84	-	-	46	-13.16	201	Vert
9	865.6895	12.57	PK	3.8	23	39.37	-	-	46	-6.63	401	Vert
10	872.6183	14.65	PK	3.8	22.9	41.35	-	-	46	-4.65	100	Vert
11	870.2199	11.79	PK	3.7	23	38.49	-	-	46	-7.51	301	Vert
12	879.547	12.43	PK	3.9	22.9	39.23	-	-	46	-6.77	301	Vert
13	938.974	13.54	PK	3.9	23.4	40.84	-	-	46	-5.16	201	Vert
15	926.7155	83.32	PK	3.9	23.3	110.52	-31.55	78.97	94	-15.03	201	Vert
LIMIT 2: CFR 47 Part 15 Class B 3m												
PK - Peak detector												

Table 21 Radiated Spurious Emissions above 1GHz, High Channel, CSL24V

Chamberlain													
CSL24V Board I9													
TX High Channel													
120VAC 60Hz													
Red:Horizontal Green:Vertical													
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Duty Cycle	Level with	Limit 1	Margin 1[dB]	Height [cm]	Polarity	
Number	Frequency	Reading	Type	Factor	Factor	dB	Correction	Correction					
	[MHz]	[dB(uV)]		[dB]	[dB]	[uVolts/meter]	dB	dB[uVolts/meter]					
2 - 4GHz 2000 - 4000MHz													
1	2780.781	36.66	PK	4.19	22.2	63.05	-31.61	31.44	54	-22.56	100	Horz	
2	3707.708	33.66	PK	5.77	23.5	62.93	-31.61	31.32	54	-22.68	100	Horz	
4 - 8GHz 4000 - 8000MHz													
3	4632.422	91.55	PK	-51.58	27.7	67.67	-31.61	36.06	54	-17.94	100	Horz	
4	5561.041	68.43	PK	-49.58	28.3	47.15	Limit not applicable, not in restricted band.					100	Horz
5	6486.991	83.52	PK	-47.59	29.1	65.03	Limit not applicable, not in restricted band.					100	Horz
6	7415.61	69.94	PK	-46.79	31	54.15	-31.61	22.54	54	-31.46	100	Horz	
8 - 12GHz 8000 - 10000MHz													
7	8340.34	76.11	PK	-49.27	36.5	63.34	-31.61	31.73	54	-22.27	150	Horz	
8	9267.267	73.82	PK	-48.81	36.4	61.41	Limit not applicable, not in restricted band.					150	Horz
2 - 4GHz 2000 - 4000MHz													
9	2780.781	43.09	PK	4.19	22.2	69.48	-31.61	37.87	54	-16.13	150	Vert	
10	3707.708	31.56	PK	5.77	23.5	60.83	-31.61	29.22	54	-24.78	150	Vert	
4 - 8GHz 4000 - 8000MHz													
11	4632.422	93.31	PK	-51.58	27.7	69.43	-31.61	37.82	54	-16.18	100	Vert	
12	5561.041	72.97	PK	-49.58	28.3	51.69	Limit not applicable, not in restricted band.					100	Vert
13	6486.991	85.68	PK	-47.59	29.1	67.19	Limit not applicable, not in restricted band.					100	Vert
14	7415.61	70.18	PK	-46.79	31	54.39	-31.61	22.78	54	-31.22	100	Vert	
8 - 12GHz 8000 - 10000MHz													
15	8340.34	68.89	PK	-49.27	36.5	56.12	-31.61	24.51	54	-29.49	150	Vert	
16	9267.267	65.55	PK	-48.81	36.4	53.14	Limit not applicable, not in restricted band.					100	Vert
LIMIT 1: CFR 47 Part 15 Class B 3m													
PK - Peak detector													
File: 1-10GHz chamberlain 4ht trans.TST*not saved*													

4.1 Test Conditions and Results – BAND-EDGE COMPLIANCE

Test Description	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 emission limits specified in Section 15.209(a) (see Section15.205(c)).	
Basic Standard	47 CFR Part 15.247(d) RSS-210, A8.5	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	902MHz – 928MHz	Antenna Conducted
Limits		
Measurement Type		
Conducted	Antenna Conducted – 20dB below the fundamental	
Supplementary information: Only Antenna Conducted Measurements required. No restricted bands close to the allocated frequency band.		

Table 22 Band Edge Compliance EUT Configuration Settings

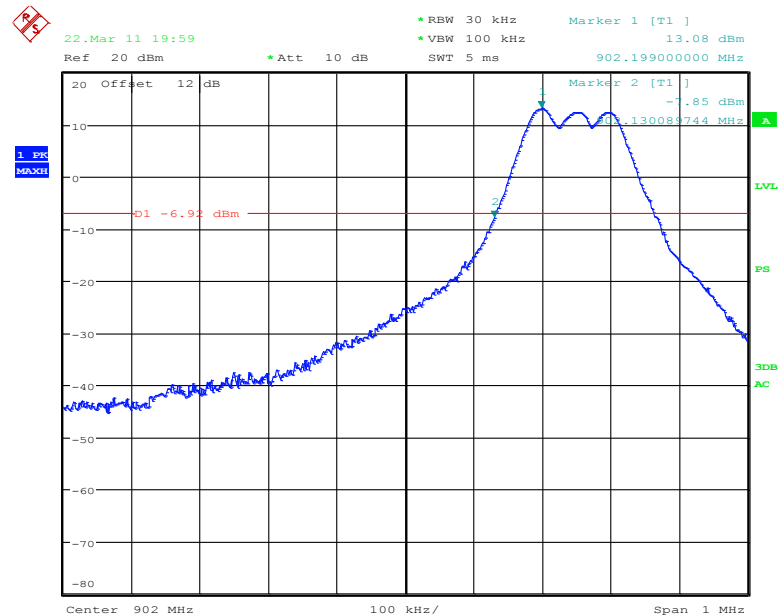
Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	1 and 2
Supplementary information: None		

Table 23 Band Edge Compliance Test Equipment

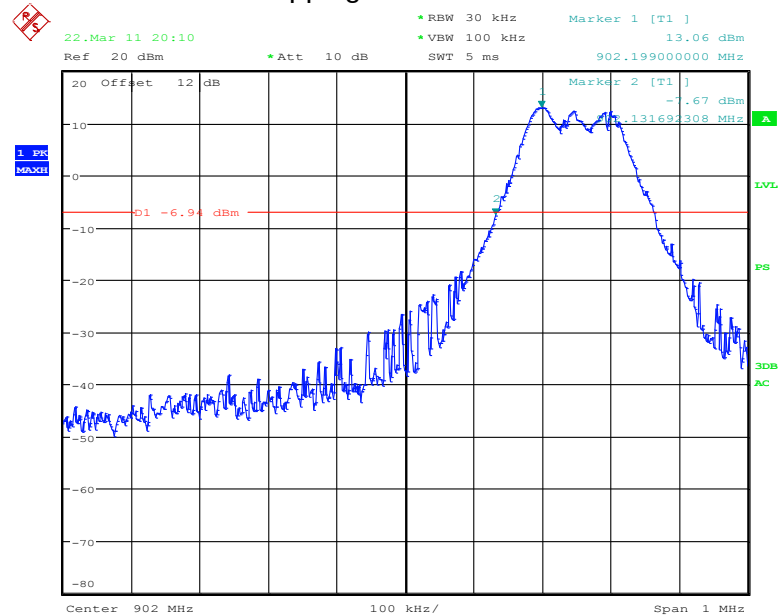
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

Test setup for Band Edge Compliance – Conducted

See Appendix B, Figure 34 for test setup photo

Figure 22 Conducted Band Edge Compliance Graph**Low Channel**

Date: 22.MAR.2011 19:59:44

Low Channel with Hopping

Date: 22.MAR.2011 20:10:22

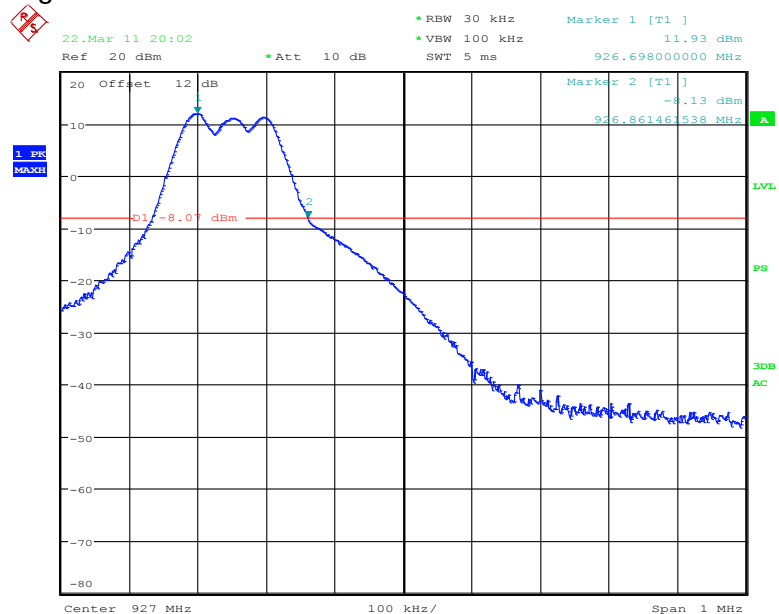
Job #: 1001351660
Model Number:
Client Name:

File #: MC15343
CSW24V, CSL24V
Chamberlain Group Inc.

Project #: 11CA11377

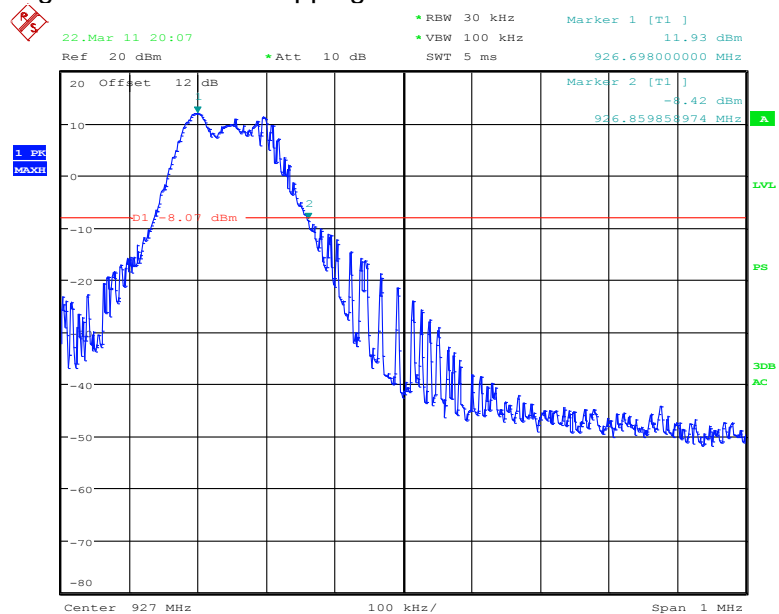
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High Channel



Date: 22.MAR.2011 20:02:12

High Channel with Hopping



Date: 22.MAR.2011 20:07:05

Table 24 Band Edge Compliance Data Points

Low Channel

Peak Frequency	Peak Level	20db Down Frequency	20dB Down Level
902.199 MHz	13.08 dBm	902.130 MHz	-7.85 dBm

Low Channel with Hopping

Peak Frequency	Peak Level	20db Down Frequency	20dB Down Level
902.199 MHz	13.06 dBm	902.131 MHz	-7.67 dBm

High Channel

Peak Frequency	Peak Level	20db Down Frequency	20dB Down Level
926.698 MHz	11.93 dBm	926.861 MHz	-8.13 dBm

High Channel with Hopping

Peak Frequency	Peak Level	20db Down Frequency	20dB Down Level
926.698 MHz	11.93 dBm	926.859 MHz	-8.42 dBm

4.2 Test Conditions and Results – MAXIMUM PEAK OUTPUT POWER

Test Description	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.	
Basic Standard	47 CFR Part 15.247(b)(2) RSS-210 A8.4(1)	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	902MHz – 928MHz	Antenna Conducted
Limits		
Frequency (MHz)	Limit mW	
	Peak	
902 - 928	1000 (30dBm – gain of Antenna over 6dBi)	
Supplementary information: None		

Table 25 Maximum Peak Output Power EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	1
Supplementary information: None		

Table 26 Maximum Peak Output Power Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

Table 27 Maximum Peak Output Power Results

Channel	Limit (dBm)	Power dBm	Power W
Low Channel	30	13.13	0.0206
Middle Channel	30	12.59	0.0182
High Channel	30	12.03	0.0160

Test setup for Maximum Peak Output Power

See Appendix B, Figure 34 for test setup photo

Job #: 1001351660
Model Number:
Client Name:

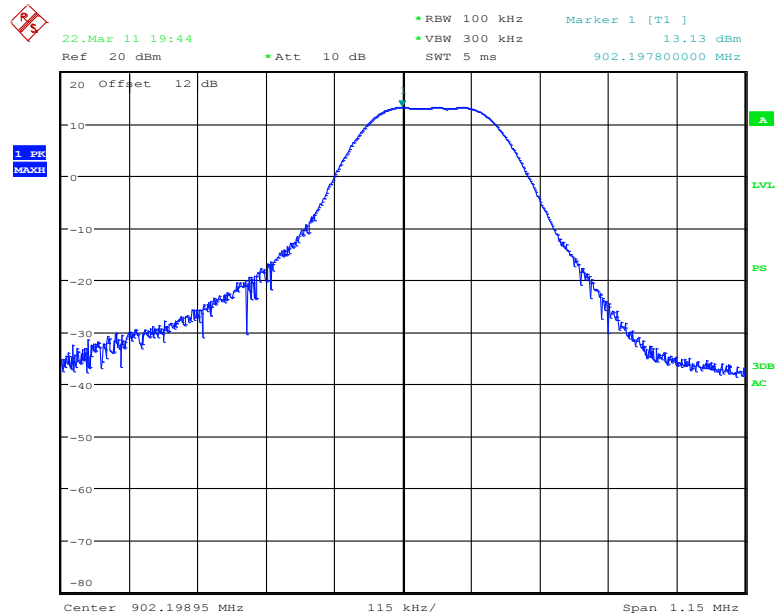
File #: MC15343
CSW24V, CSL24V
Chamberlain Group Inc.

Project #: 11CA11377

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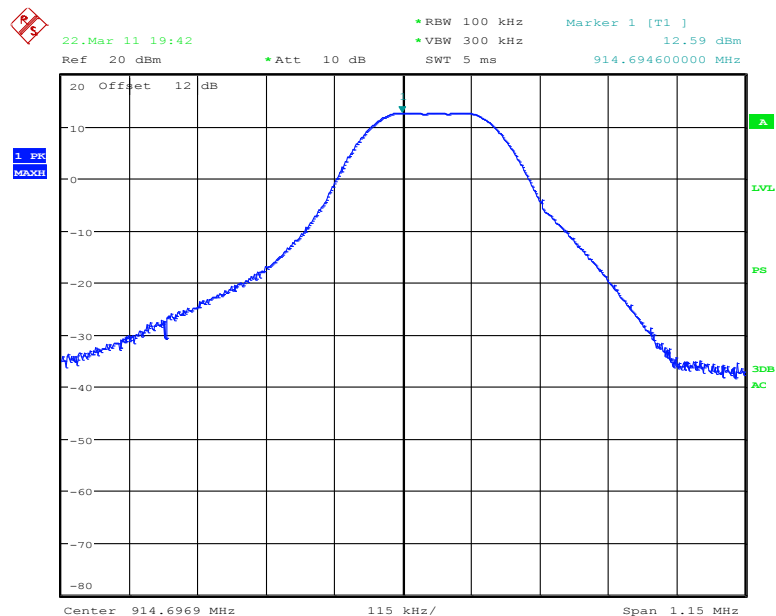
Figure 23 Maximum Peak Output Power Graph

Low Channel



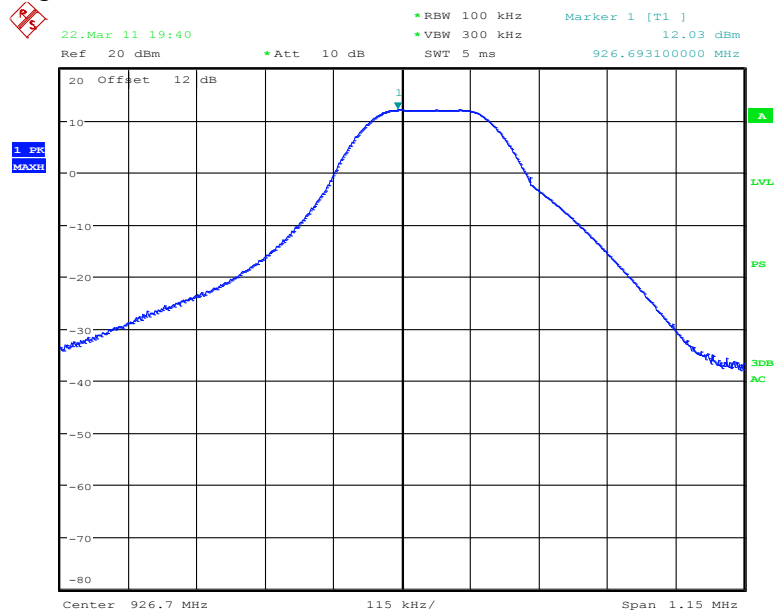
Date: 22.MAR.2011 19:44:05

Middle Channel



Date: 22.MAR.2011 19:42:41

High Channel



Date: 22.MAR.2011 19:40:49

4.3 Test Conditions and Results – Dwell Time and Duty Cycle Correction

Test Description	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210 A8.1(C)

Table 28 Dwell Time Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	2
Supplementary information: Duty cycle also measured/calculated for use in radiated spurious measurements		

Table 29 Dwell Time Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

Table 30 Dwell Time Results

Mode	Number of Channels	Maximum Time Allowed in 20s.	Measured Dwell Time in 20s.
TX Hopping Low Channel	50	400mS	167.9
TX Hopping Middle Channel	50	400mS	167.5
TX Hopping High Channel	50	400mS	166.8

Table 31 Duty Cycle Correction Factor

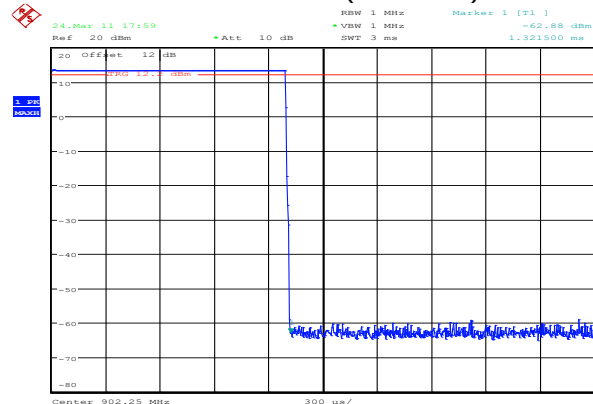
Mode	Number of TX in 100mS	TX Duration in 100mS	Duty Cycle Correction (dB) $20 \times \log\left(\frac{TX (ms)}{100ms}\right)$
TX Hopping Low Channel	2	2.644	-31.55dB
TX Hopping Middle Channel	2	2.638	-31.57dB
TX Hopping High Channel	2	2.626	-31.61dB

Test Setup for Dwell Time

See Appendix B, Figure 34 for test setup photo

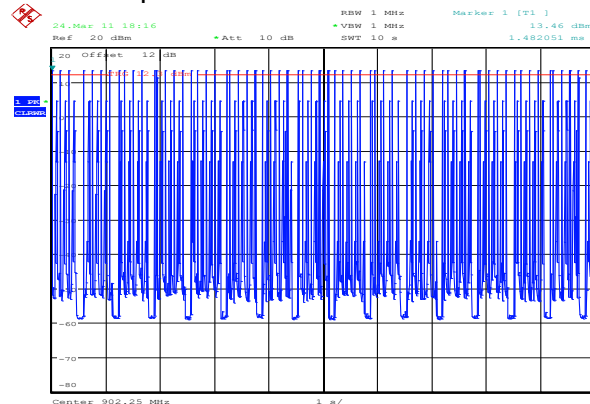
Figure 24 Dwell Time Graphs

Low Channel Dwell Time (1.322ms)



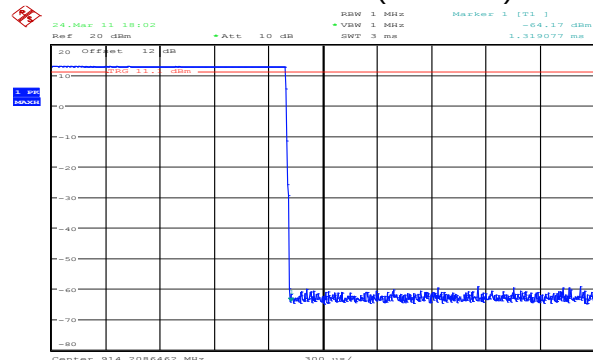
Date: 24.MAR.2011 17:59:21

10s Sweep 1



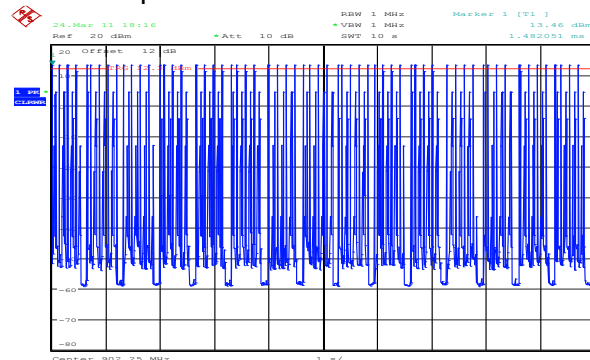
Date: 24.MAR.2011 18:16:05

Middle Channel Dwell Time (1.319ms)



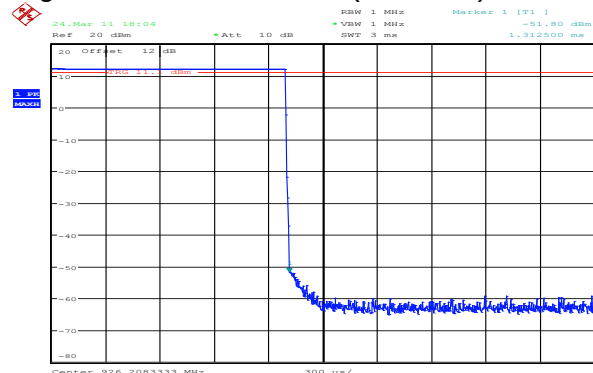
Date: 24.MAR.2011 18:02:35

10s Sweep 2



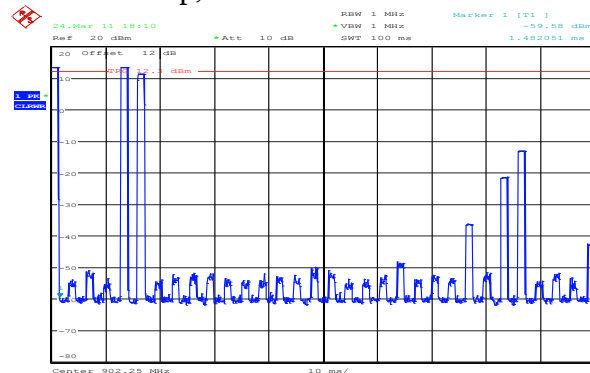
Date: 24.MAR.2011 18:16:38

High Channel Dwell Time (1.313ms)



Date: 24.MAR.2011 18:04:28

100mS Sweep, number of TX



Date: 24.MAR.2011 18:10:59

Job #: 1001351660

File #: MC15343

Project #: 11CA11377

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Model Number:

CSW24V, CSL24V

Client Name:

Chamberlain Group Inc.

The number of transitions plots show only the single channel. It was checked that the number of transitions was the same on other channels do to equal channel use. The total number of transitions counted in 20s is: 127. Total maximum transmit time: 167.9mS within 20s.

4.4 Test Conditions and Results – NUMBER OF HOPPING FREQUENCIES

Test Description	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210 A8.1(C)

Table 32 Number of Hopping Frequencies Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	2
Supplementary information: None		

Table 33 Number of Hopping Frequencies Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

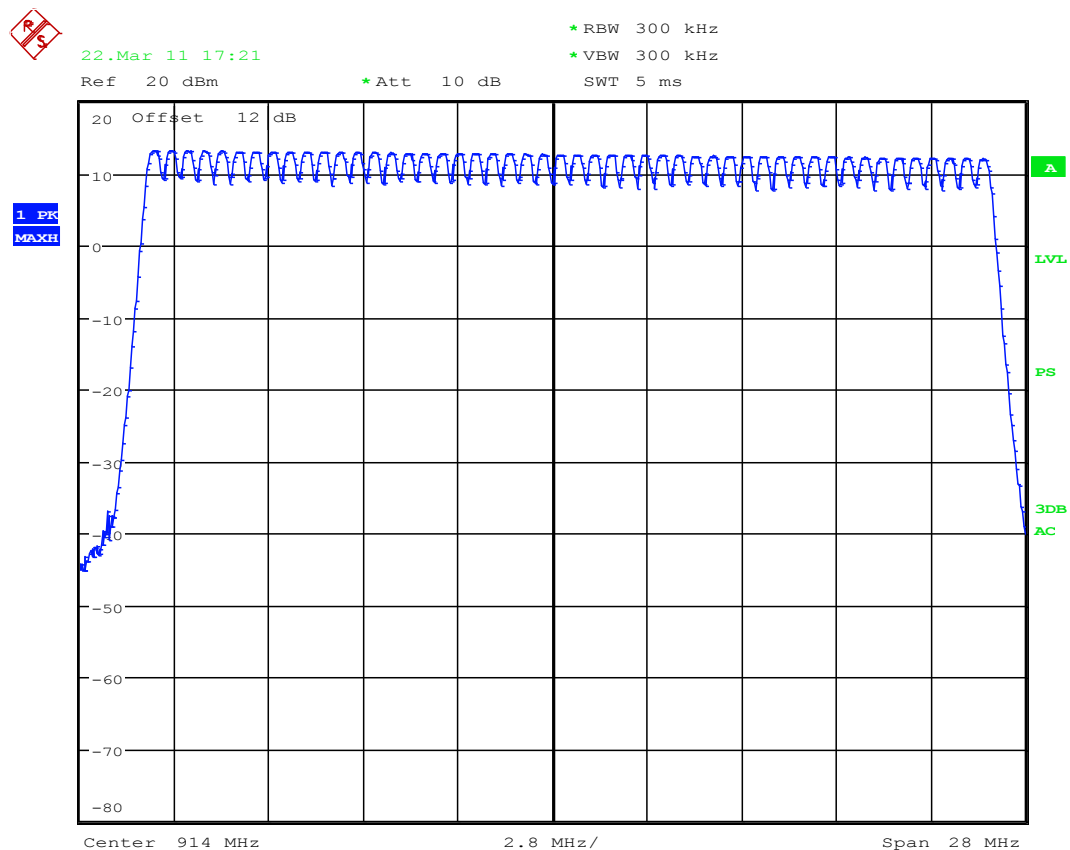
Table 34 Number of Hopping Frequencies Results

Mode	Number of Channels	Minimum Number Required
TX, Hopping	50	50

Test Setup for Number of Hopping Frequencies

See Appendix B, Figure 34 for test setup photo

Figure 25 Number of Hopping Frequencies Graphs



Date: 22.MAR.2011 17:21:58

4.5 Test Conditions and Results – 20DB BANDWIDTH

Test Description	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210 A8.1(C)

Table 35 20dB Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	1
Supplementary information: None		

Table 36 20dB Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

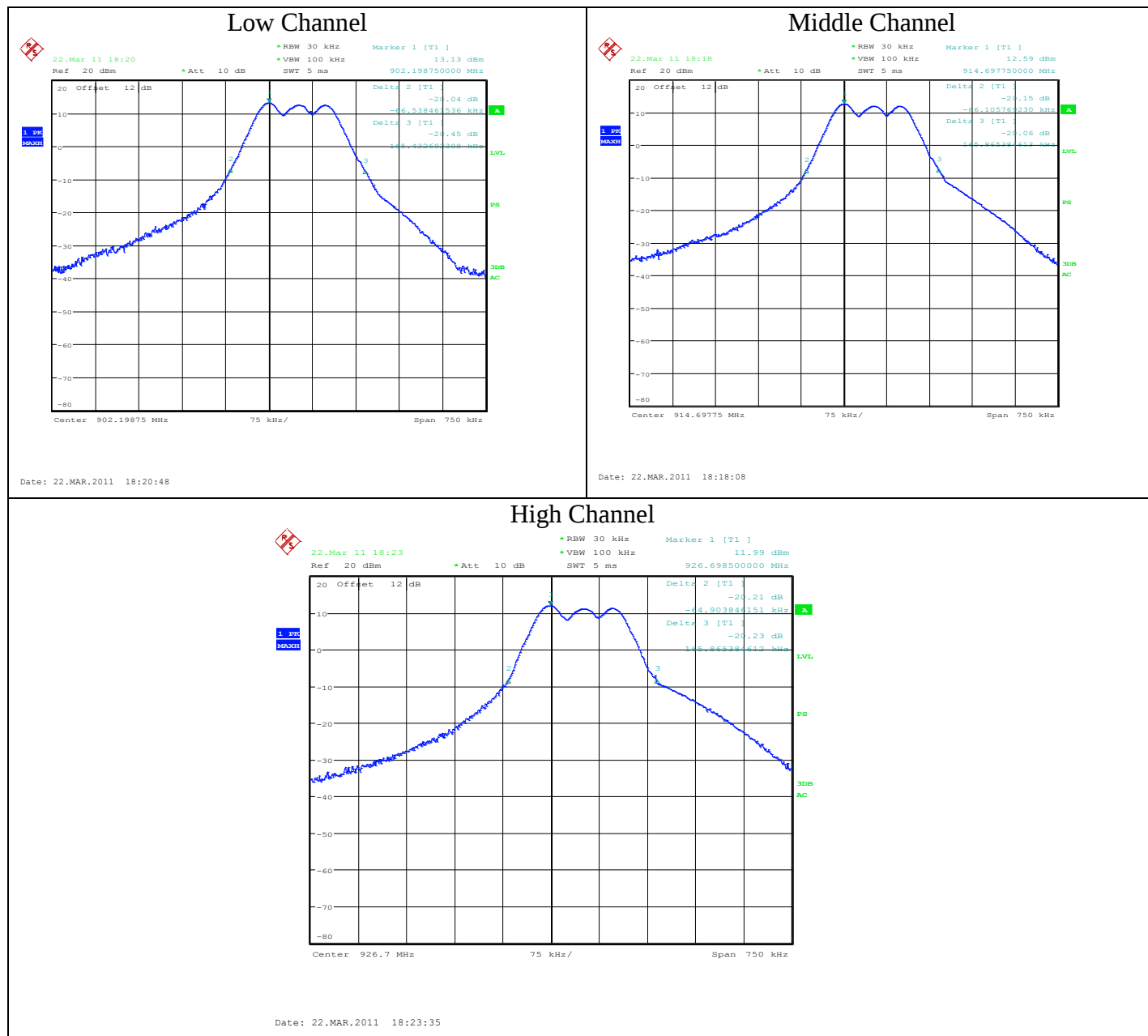
Table 37 20dB Bandwidth Results

Mode	Channel	20dB Bandwidth
TX	Low	232kHz
	Middle	232kHz
	High	231kHz

Test Setup for 20dB Bandwidth

See Appendix B, Figure 34 for test setup photo

Figure 26 20dB Bandwidth Graphs



4.6 Test Conditions and Results – Carrier Frequency Separation

Test Description	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.
Basic Standard	47 CFR Part 15.247(a)(1) RSS-210 A8.1(B)

Table 38 Carrier Frequency Separation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	2	2
Supplementary information: Separation frequencies were measured for each channel and then averaged.		

Table 39 Carrier Frequency Separation Test Equipment

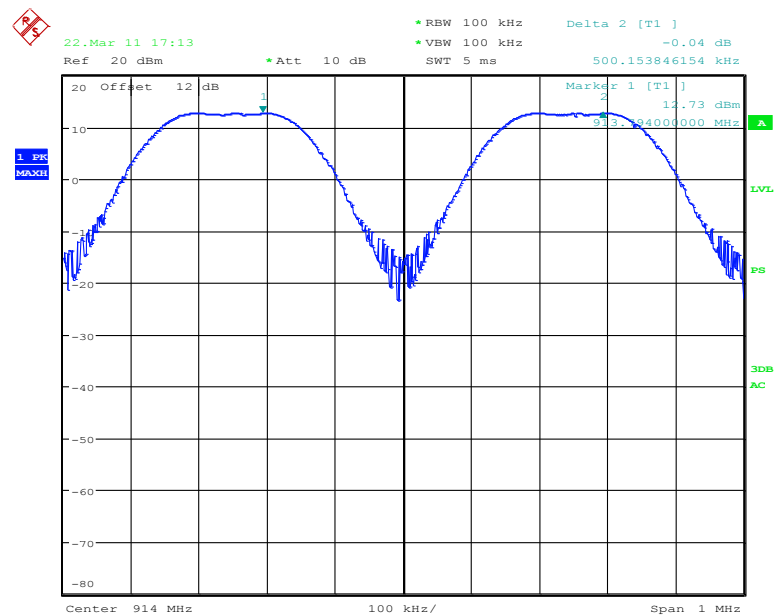
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	Rhode & Schwartz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Attenuator w/ Cable	Mini Circuits	BW-N10W5	None	N/A	N/A
50-Ohm to 75-Ohm Transformer	Hewlett-Packard	11694 A	SN: 08857	N/A	N/A

Table 40 Carrier Frequency Separation Results

Mode	Channel	Carrier Frequency Separation Limit	Channel Separation
TX Hopping	Middle	> 20dB Bandwidth (aprx. 160kHz)	500kHz

Test Setup for Carrier Frequency Separation

See Appendix B, Figure 34 for test setup photo

Figure 27 Carrier Frequency Separation Graphs

Date: 22.MAR.2011 17:13:34

4.7 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	
Basic Standard	47 CFR Part 15.207 RSS-Gen 7.2.4	
UL LPG	80-EM-S0026	
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains
Limits - Class B		
Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Supplementary information: None		

Table 41 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	3	1
Supplementary information: None		

Table 42 Conducted Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	Dec 29 2010	Dec 29 2011
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	885551	N/A	N/A
Attenuator	HP	8494B	2831A00 838	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	Jan 6 2011	Jan 6 2012
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	Jan 6 2011	Jan 6 2012
FILE USED FOR TESTING					
CISPR 22_11 w_ Dongle Line 1and2.TST					

Figure 28 Test Setup for Conducted Emissions

See Appendix B, Figure 34 for test setup photo

Figure 29 Conducted Emissions Graph

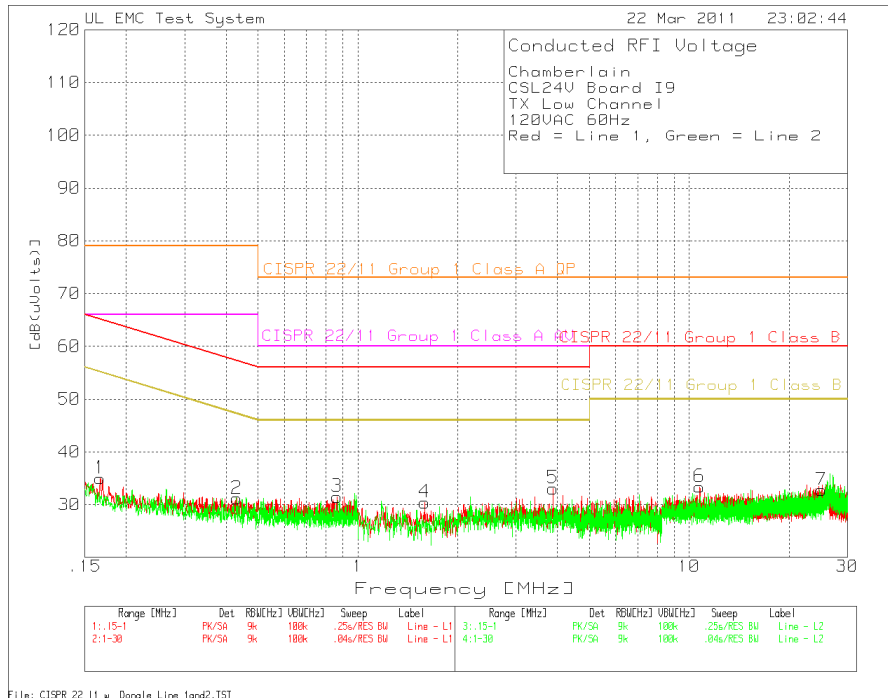
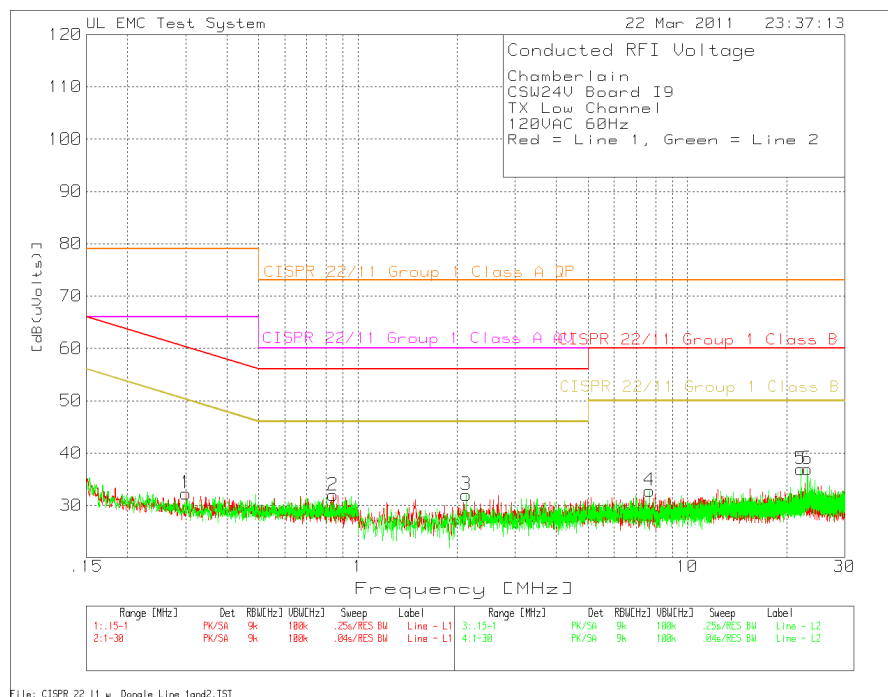


Table 43 Conducted Emissions Data Points

Chamberlain															
CSW24V Board I9															
TX Low Channel															
120VAC 60Hz															
Red = Line 1, Green = Line 2															
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]	Limit 3	Margin 3[dB]	Limit 4	Margin 4[dB]	
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]									
	[MHz]	[dB(uV)]		[dB]	[dB]										
Line - L1 .15 - 1MHz															
1	0.30076	20.65	PK	10.9	0.7	32.25	79	-46.75	66	-33.75	60.2	-27.95	50.2	-17.95	
2	0.84223	21.14	PK	10.6	0.2	31.94	73	-41.06	60	-28.06	56	-24.06	46	-14.06	
Line - L2 1 - 30MHz															
3	2.12639	21.25	PK	10.7	0.1	32.05	73	-40.95	60	-27.95	56	-23.95	46	-13.95	
4	7.67866	21.49	PK	11	0.3	32.79	73	-40.21	60	-27.21	60	-27.21	50	-17.21	
5	22.1189	24.77	PK	11.7	0.4	36.87	73	-36.13	60	-23.13	60	-23.13	50	-13.13	
6	23.13301	24.8	PK	11.7	0.4	36.9	73	-36.1	60	-23.1	60	-23.1	50	-13.1	
LIMIT 1: CISPR 22/11 Group 1 Class A QP															
LIMIT 2: CISPR 22/11 Group 1 Class A AV															
LIMIT 3: CISPR 22/11 Group 1 Class B QP															
LIMIT 4: CISPR 22/11 Group 1 Class B AV															
PK - Peak detector															

□

Chamberlain															
CSL24V Board I9															
TX Low Channel															
120VAC 60Hz															
Red = Line 1, Green = Line 2															
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]	Limit 3	Margin 3[dB]	Limit 4	Margin 4[dB]	
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]									
	[MHz]	[dB(uV)]		[dB]	[dB]										
Line - L1 .15 - 1MHz															
1	0.16699	21.19	PK	12.2	1.6	34.99	79	-44.01	66	-31.01	65.1	-30.11	55.1	-20.11	
2	0.43071	20.04	PK	10.7	0.4	31.14	79	-47.86	66	-34.86	57.2	-26.06	47.2	-16.06	
3	0.86389	20.64	PK	10.6	0.2	31.44	73	-41.56	60	-28.56	56	-24.56	46	-14.56	
Line - L1 1 - 30MHz															
4	1.59398	19.57	PK	10.6	0.2	30.37	73	-42.63	60	-29.63	56	-25.63	46	-15.63	
5	3.87936	22.18	PK	10.7	0.2	33.08	73	-39.92	60	-26.92	56	-22.92	46	-12.92	
6	10.76446	21.99	PK	11	0.4	33.39	73	-39.61	60	-26.61	60	-26.61	50	-16.61	
7	25.07793	20.35	PK	11.7	0.7	32.75	73	-40.25	60	-27.25	60	-27.25	50	-17.25	
LIMIT 1: CISPR 22/11 Group 1 Class A QP															
LIMIT 2: CISPR 22/11 Group 1 Class A AV															
LIMIT 3: CISPR 22/11 Group 1 Class B QP															
LIMIT 4: CISPR 22/11 Group 1 Class B AV															
PK - Peak detector															

4.8 Test Conditions and Results – RADIATED EMISSIONS

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter or 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	47 CFR Part 15.207 RSS-Gen 7.2.5	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	10 meter distance
	1GHz – 5GHz	3 meter distance
Limits - Class B		
Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak	Average
30 to 88	29.54	NA
88 to 216	33.06	NA
216 to 960	35.56	NA
960 to 1,000	43.52	NA
Above 1GHz	NA	54
Supplementary information: None		

Table 44 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	3
Supplementary information: None		

Table 45 Radiated Emissions Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	Dec. 30, 2010	Dec. 31, 2011
Bicon Antenna	Chase	VBA6106A	EMC4078	Dec. 2, 2010	Dec. 31, 2010
Log-P Antenna	Chase	UPA6109	EMC4313	June 1, 2010	June 30, 2011
Spectrum Analyzer	Rhode & Schwarz	FSEK	EMC4182	Dec. 28, 2010	Dec. 30, 2011
Antenna Array	UL	BOMS	EMC4276	Oct. 21, 2010	Oct. 21, 2011

Test setup for Radiated EmissionsSee Appendix B, **Figure 35** for test setup photo.

Figure 30 Radiated Emissions below 1GHz, RX Mode, CSW24V

Note: RX Hopping mode was the only RX mode tested due to the measured emissions being very low levels.

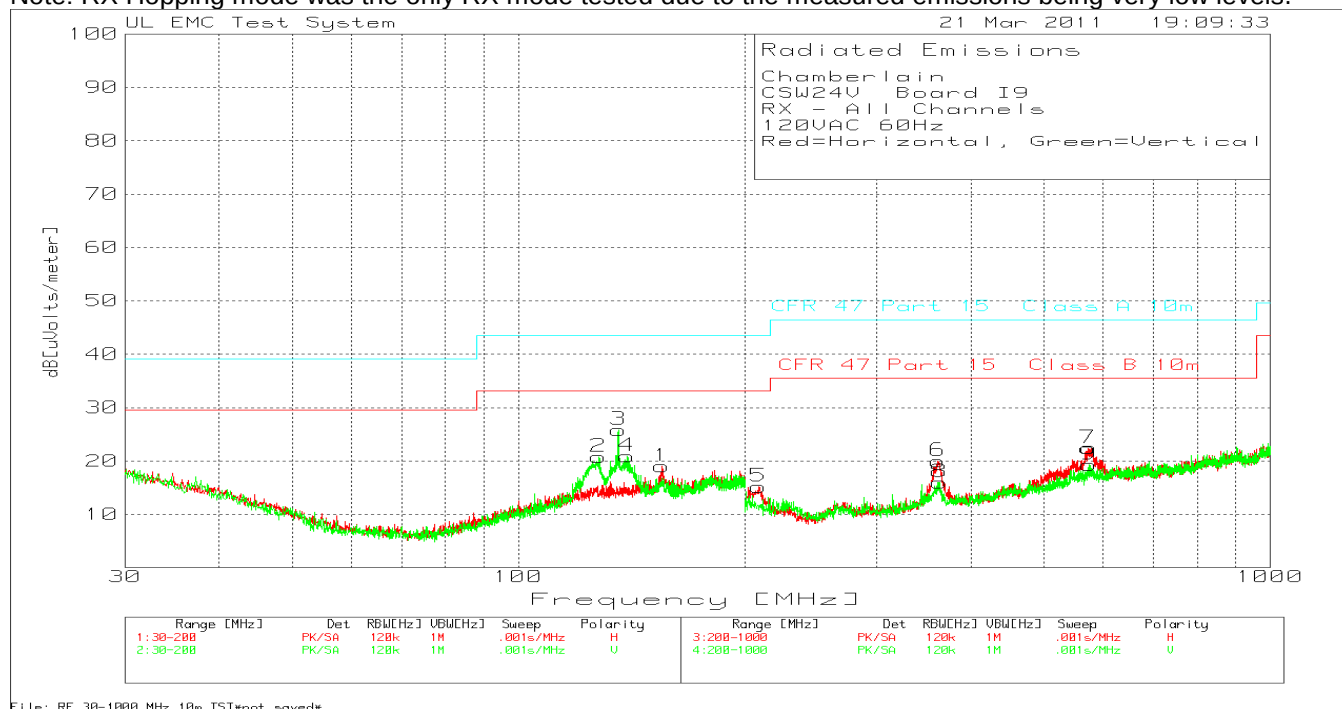


Figure 31 Radiated Emissions above 1GHz, RX Mode, CSW24V

Note: RX Hopping mode was the only RX mode tested due to the measured emissions being very low levels.



Table 46 Radiated Emissions below 1GHz, RX Mode, CSW24V

Chamberlain
CSW24V Board I9

RX - All Channels

120VAC 60Hz

Red=Horizontal, Green=Vertical

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6	
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]						
	[MHz]	[dB (uV)]	[dB]	[dB]							
=====											
1	155.3973	34 PK	-30	15	19	-	-	43.5	33.1	-	-
		Height:399	Horz	Margin	[dB]	-	-	-24.5	-14.1	-	-
2	127.956	36.95 PK	-30	13.8	20.75	-	-	43.5	33.1	-	-
		Height:100	Vert	Margin	[dB]	-	-	-22.75	-12.35	-	-
3	136.027	41.61 PK	-30	14.2	25.81	-	-	43.5	33.1	-	-
		Height:100	Vert	Margin	[dB]	-	-	-17.69	-7.29	-	-
4	139.4253	36.54 PK	-30	14.4	20.94	-	-	43.5	33.1	-	-
		Height:100	Vert	Margin	[dB]	-	-	-22.56	-12.16	-	-
5	209.0606	37.51 PK	-33.3	11	15.21	-	-	43.5	33.1	-	-
		Height:300	Horz	Margin	[dB]	-	-	-28.29	-17.89	-	-
6	361.7588	37.67 PK	-32.4	14.7	19.97	-	-	46.4	35.6	-	-
		Height:202	Horz	Margin	[dB]	-	-	-26.43	-15.63	-	-
7	572.0187	34.93 PK	-31.5	19	22.43	-	-	46.4	35.6	-	-
		Height:100	Horz	Margin	[dB]	-	-	-23.97	-13.17	-	-
8	363.0913	33.73 PK	-32.3	14.6	16.03	-	-	46.4	35.6	-	-
		Height:100	Vert	Margin	[dB]	-	-	-30.37	-19.57	-	-
9	573.8841	31.64 PK	-31.4	19.1	19.34	-	-	46.4	35.6	-	-
		Height:202	Vert	Margin	[dB]	-	-	-27.06	-16.26	-	-

LIMIT 1: NONE

LIMIT 2: NONE

LIMIT 3: CFR 47 Part 15 Class A 10m

LIMIT 4: CFR 47 Part 15 Class B 10m

Table 47 Radiated Emissions above 1GHz, RX Mode, CSW24V

Chamberlain
CSW24V Board I9

RX All Channels

120VAC 60Hz

Red=Horizontal, Green=Vertical

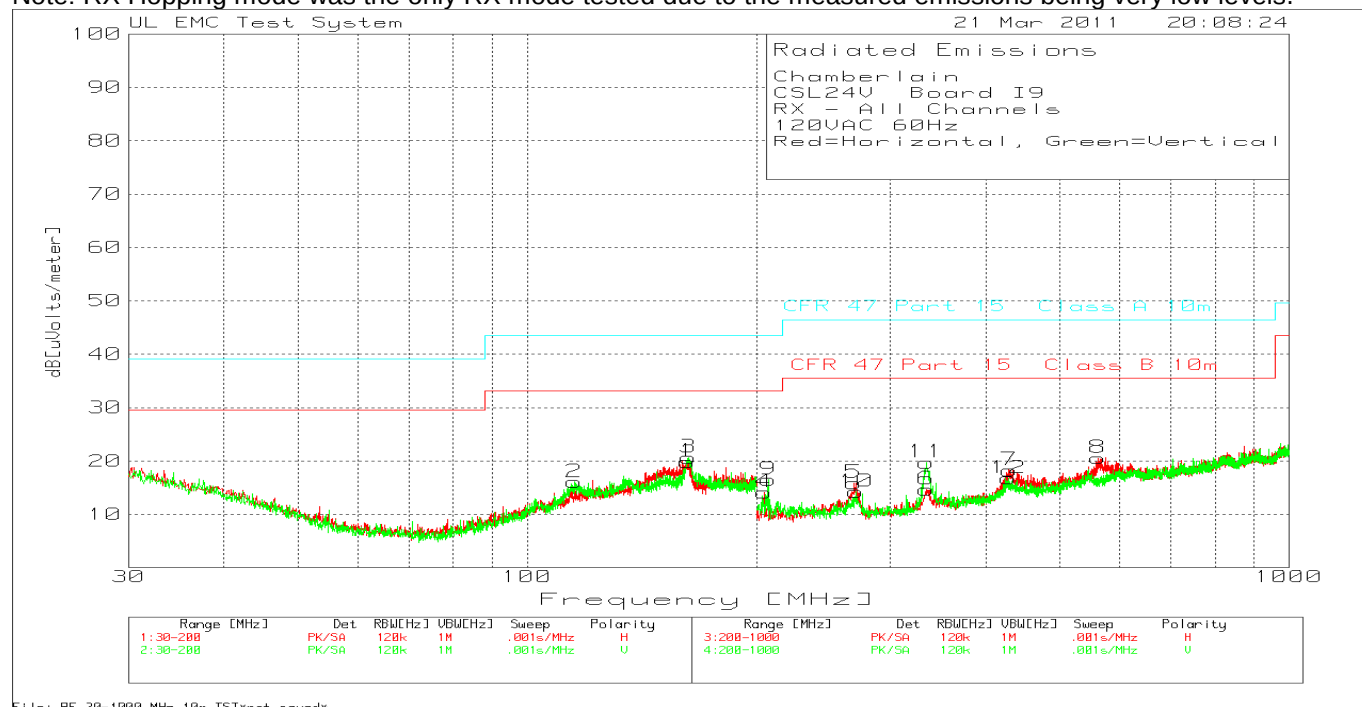
Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
No. Frequency	Reading	Factor	Factor	dB[uVolts/meter]						
[MHz]	[dB(uV)]	[dB]	[dB]							
1	1064.128	71.33 PK	-56.34	24	38.99	-	54	-	-	-
		Height:150 Horz		Margin [dB]	-	-15.01	-	-	-	-
2	1841.683	67.27 PK	-53.74	27.3	40.83	-	54	-	-	-
		Height:99 Horz		Margin [dB]	-	-13.17	-	-	-	-
3	3735.736	64.64 PK	-49.44	23.7	38.9	-	54	-	-	-
		Height:100 Horz		Margin [dB]	-	-15.1	-	-	-	-
4	4018.036	65.12 PK	-50.92	28.5	42.7	-	54	-	-	-
		Height:200 Horz		Margin [dB]	-	-11.3	-	-	-	-
5	1062.124	72.56 PK	-56.37	24	40.19	-	54	-	-	-
		Height:200 Vert		Margin [dB]	-	-13.81	-	-	-	-
6	1911.824	65.82 PK	-52.99	27.6	40.43	-	54	-	-	-
		Height:100 Vert		Margin [dB]	-	-13.57	-	-	-	-
7	3953.954	64.58 PK	-50.01	24.1	38.67	-	54	-	-	-
		Height:100 Vert		Margin [dB]	-	-15.33	-	-	-	-
8	4050.1	64.91 PK	-50.38	28.4	42.93	-	54	-	-	-
		Height:200 Vert		Margin [dB]	-	-11.07	-	-	-	-

LIMIT 1: NONE

LIMIT 2: 47 CFR Part 15, Class B

Figure 32 Radiated Emissions below 1GHz, RX Mode, CSL24V

Note: RX Hopping mode was the only RX mode tested due to the measured emissions being very low levels.

**Figure 33 Radiated Emissions above 1GHz, RX Mode, CSL24V**

Note: RX Hopping mode was the only RX mode tested due to the measured emissions being very low levels.

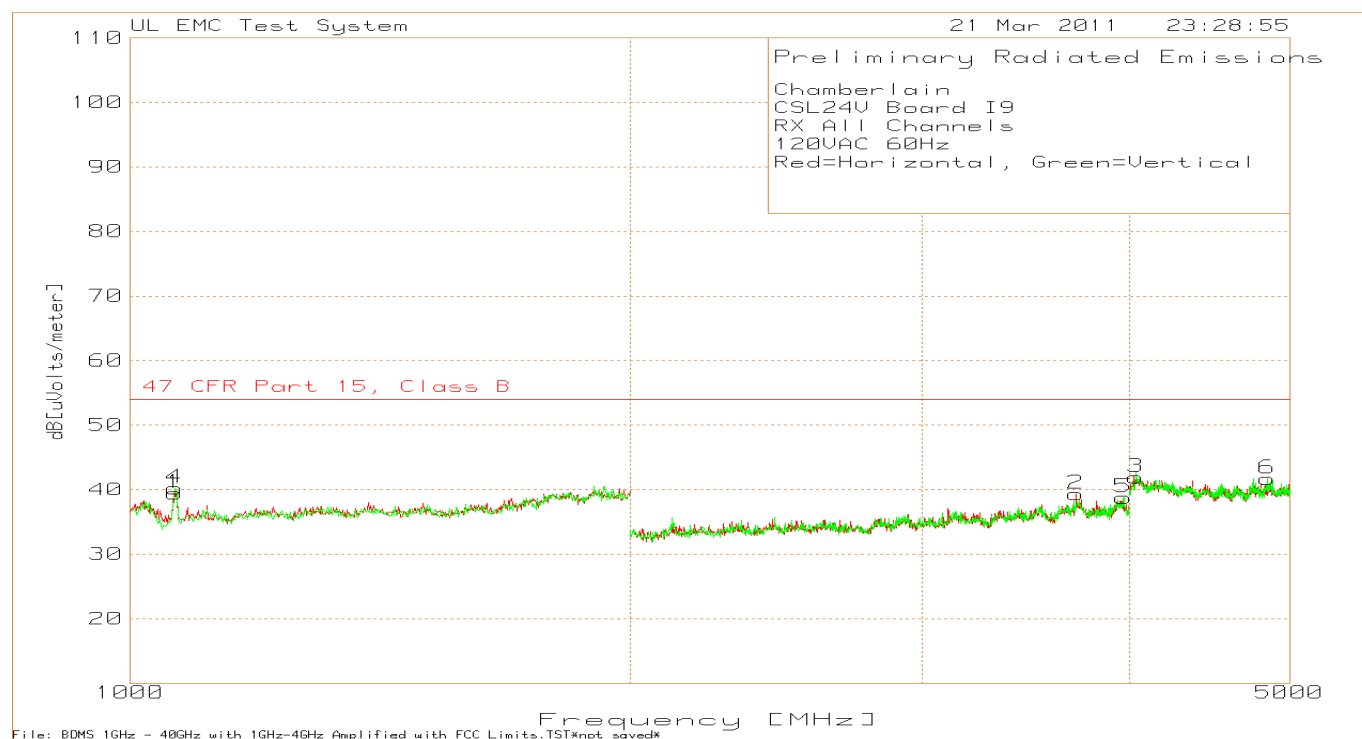


Table 48 Radiated Emissions below 1GHz, RX Mode, CSL24V

Chamberlain
CSL24V Board I9

RX - All Channels

120VAC 60Hz

Red=Horizontal, Green=Vertical

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]					
	[MHz]	[dB(uV)]	[dB]	[dB]						
1	162.4488	34.79 PK	-30	15.1	19.89	-	-	43.5	33.1	-
		Height:400	Horz	Margin	[dB]	-	-	-23.61	-13.21	-
2	115.2124	33.36 PK	-30	12.7	16.06	-	-	43.5	33.1	-
		Height:100	Vert	Margin	[dB]	-	-	-27.44	-17.04	-
3	162.9585	35.5 PK	-30	15.1	20.6	-	-	43.5	33.1	-
		Height:100	Vert	Margin	[dB]	-	-	-22.9	-12.5	-
4	204.5303	36.26 PK	-33.3	11.2	14.16	-	-	43.5	33.1	-
		Height:303	Horz	Margin	[dB]	-	-	-29.34	-18.94	-
5	268.4877	36.15 PK	-33	12.7	15.85	-	-	46.4	35.6	-
		Height:303	Horz	Margin	[dB]	-	-	-30.55	-19.75	-
6	334.044	33.05 PK	-32.6	14.2	14.65	-	-	46.4	35.6	-
		Height:201	Horz	Margin	[dB]	-	-	-31.75	-20.95	-
7	429.7135	34.17 PK	-32.1	16.2	18.27	-	-	46.4	35.6	-
		Height:201	Horz	Margin	[dB]	-	-	-28.13	-17.33	-
8	561.0926	33.17 PK	-31.4	18.8	20.57	-	-	46.4	35.6	-
		Height:101	Horz	Margin	[dB]	-	-	-25.83	-15.03	-
9	207.1952	38.67 PK	-33.3	11.1	16.47	-	-	43.5	33.1	-
		Height:100	Vert	Margin	[dB]	-	-	-27.03	-16.63	-
10	270.6196	34.51 PK	-33	12.7	14.21	-	-	46.4	35.6	-
		Height:100	Vert	Margin	[dB]	-	-	-32.19	-21.39	-
11	334.5769	37.99 PK	-32.6	14.3	19.69	-	-	46.4	35.6	-
		Height:100	Vert	Margin	[dB]	-	-	-26.71	-15.91	-
12	428.6476	32.73 PK	-32.1	16.1	16.73	-	-	46.4	35.6	-
		Height:401	Vert	Margin	[dB]	-	-	-29.67	-18.87	-

Job #: 1001351660
Model Number:
Client Name:

File #: MC15343
CSW24V, CSL24V
Chamberlain Group Inc.

Project #: 11CA11377

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LIMIT 1: NONE

LIMIT 2: NONE

LIMIT 3: CFR 47 Part 15 Class A 10m

LIMIT 4: CFR 47 Part 15 Class B 10m

Table 49 Radiated Emissions above 1GHz, RX Mode, CSL24V

Chamberlain
CSL24V Board I9

RX All Channels

120VAC 60Hz

Red=Horizontal, Green=Vertical

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
No. Frequency	Reading	Factor	Factor	dB[uVolts/meter]						
[MHz]	[dB(uV)]	[dB]	[dB]							
1	1064.128	71.83 PK	-56.34	24	39.49	-	54	-	-	-
		Height:150 Horz		Margin [dB]		-	-14.51	-	-	-
2	3715.716	64.95 PK	-49.19	23.6	39.36	-	54	-	-	-
		Height:200 Horz		Margin [dB]		-	-14.64	-	-	-
3	4040.08	63.87 PK	-50.45	28.5	41.92	-	54	-	-	-
		Height:200 Horz		Margin [dB]		-	-12.08	-	-	-
4	1064.128	72.58 PK	-56.34	24	40.24	-	54	-	-	-
		Height:200 Vert		Margin [dB]		-	-13.76	-	-	-
5	3969.97	64.83 PK	-50.24	24.2	38.79	-	54	-	-	-
		Height:100 Vert		Margin [dB]		-	-15.21	-	-	-
6	4845.691	64.12 PK	-50.15	27.7	41.67	-	54	-	-	-
		Height:100 Vert		Margin [dB]		-	-12.33	-	-	-

LIMIT 1: NONE

LIMIT 2: 47 CFR Part 15, Class B

5.0 IMMUNITY TEST RESULTS

Immunity testing was not performed nor required by the standard.

Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100414-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see <http://ts.nist.gov/ts/htdocs/210/214/scopes/1004140.htm>



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91044).



Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2180



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: Radiated Emissions R-621, Conducted Emissions C-642.



ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6