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Electromagnetic Emissions Test Report In Accordance With Industry Canada Radio Standards Specification 210 And FCC Part 15 Sections 15.209, 15.231 on the iControl Networks Transmitter Model: Gateway 2

UPN:	5747A-GATEWAY2
FCC ID:	S23-GATEWAY2
GRANTEE:	iControl Networks 502 Waverly St. Suite 302 Palo Alto, CA 94301
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Ave Sunnyvale, CA 94086
REPORT DATE:	January 2, 2007
FINAL TEST DATES:	October 4 and 11, 2006

AUTHORIZED SIGNATORY: David W Bare

David W. Bare
Principal Engineer

ACCREDITED
2016-01

Equipment Name and Model:

Transceiver, Gateway 2

Manufacturer:

iControl Networks
502 Waverly St. Suite 302
Palo Alto, CA 94301

Tested to applicable standard:
RSS210, Issue 6, Septemeber 2005
RSS GEN, Issue 1, Septemeber 2005
Low Power License-Exempt Radio Communication Devices

Test Report Prepared For:
Marc Baum
iControl Networks
502 Waverly St. Suite 302
Palo Alto, CA 94301

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 1

Declaration of Compliance

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards; and that the equipment performed in accordance with the data submitted in this report.

Signature	_____
Name	David W. Bare
Title	Principal Engineer Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	January 2, 2007

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SCOPE

An electromagnetic emissions test has been performed on the iControl Networks model Gateway 2 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and Industry Canada Radio Standards Specification RSS-210 for Low Power, License-Exempt Radio Communication Devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4 2003 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the iControl Networks model Gateway 2 and therefore apply only to the tested sample. The sample was selected and prepared by Marc Baum of iControl Networks.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and Industry Canada RSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and Industry Canada Radio Standards Procedure RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of iControl Networks model Gateway 2 complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators and Industry Canada specification RSS 210 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands).

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

15.231 / RSS 210 Section A1.1

FCC Part 15 Section	RSS 210/RSS GEN Section	Description	Comments	Result
15.207 / 15.107	7.2.2	AC Conducted Emissions, 0.15 – 30 MHz	33.5dBµV @ 0.443MHz (-23.5 dB)	Complies
15.231 (a) (1)	A1.1.1(1)	Duration of manually activated transmission	Each transmission lasts for 26ms – Refer to operational description	Complies
15.231 (a) (2)	A1.1.1(2)	Duration of automatically activated transmission		Complies
15.231 (a) (3)	A1.1.1(3)	Transmissions at predetermined / regular intervals are not permitted	Transmissions are limited to those instigated by the end user. There are security polling transmissions that may occur at predetermined intervals such that the total number of packets never exceeds 18 packets (468ms) per hour.	Complies
15.231 (a) (4)	A1.1.1(4)	Pendency of transmissions used during emergencies involving fire, security, and safety of life	The device does not have these types of transmissions	N/A
15.231 (b)	A1.1.2(1) / Table 4	Transmitter Radiated Emissions, 319 MHz	58.5dBµV/m (841.4µV/m) @ 319.500MHz (-21.0dB)	Complies
15.231 (b)	A1.1.2(1) / Table 4	Transmitter Radiated Spurious Emissions, 30-4180 MHz	51.4dBµV/m (371.5µV/m) @ 213.0MHz (-4.5dB)	Complies
15.231 (c)	-	20dB Bandwidth	447 kHz	Complies
-	A1.1.3	99% Bandwidth	73.9kHz	Complies
15.231 (d)	A1.1.4	Frequency Stability	Not applicable	
15.231 (e)	A1.1.5	Transmission of data signals	Device does not operate under this section	NA
15.109	6 Table 1	Receiver Spurious Emissions	40.2dBµV/m (102.3µV/m) @ 2999.06MHz (-13.8dB)	Complies

Note 1 – Refer to the operational description included with this application for detailed description and timing diagrams for transmission duration.

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.207 / 15.107	7.2.2	AC Conducted Emissions, 0.15 – 30 MHz	33.5dBµV @ 0.443MHz (-23.5 dB)	Complies
15.249 (a)	A2.9 (1)	Transmitter Radiated Emissions, 902-928 MHz	78.7dBµV/m (8609.9µV/m) @ 908.39MHz (-15.3dB)	Complies
15.249 (a) and (d)	A2.9 (1) and (2)	Transmitter Radiated Spurious Emissions, 30-9080 MHz	44.5dBµV/m (167.9µV/m) @ 4542.97MHz (-9.5dB)	Complies
15.109	6 Table 1	Receiver Spurious Emissions	40.2dBµV/m (102.3µV/m) @ 2999.06MHz (-13.8dB)	Complies

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The iControl Networks model Gateway 2 is a home network controller that is designed to support remote home monitoring. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120 Volts, 60 Hz, and 0.1 Amps.

The sample was received on October 4, 2006 and tested on October 11, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
iControl Networks	Gateway 2	To support remote home monitoring	ALPHA7	
CUI Inc	41-12-300	AC/DC Adaptor	n/a	

OTHER EUT DETAILS

The following EUT details should be noted: EUT rated at 120VAC/60Hz.
CUI Inc. AC/DC Adaptor rated DC Output: 12Volts 300mA.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 16 cm wide by 24 cm deep by 5 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for testing:

Manufacturer	Model	Description	Serial Number
None	-	-	-

The following equipment was used as remote support equipment for testing:

Manufacturer	Model	Description	Serial Number
DELL	PP11L	Dell Latitude D610 Laptop	-

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RJ-45	Laptop	CAT-5	Unshielded	5.0
RJ-11	Unterminated	RJ-11	Unshielded	2.0
DC Power	AC to DC Adaptor	2 Wire DC	Unshielded	2.0

EUT OPERATION

During emissions testing the EUT is running software that exercised all communications ports verified through green status of the LEDS.

ANTENNA SYSTEM

The 319.5 MHz transmitter uses one of two attached omni antennas. The 908.42MHz transmitter uses a PCB trace antenna.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on October 4 and 11, 2006 at the Elliott Laboratories Open Area Test Site #1 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4 2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4 2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions, which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS, SECTION 15.207 & 15.107(a)

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

CONDUCTED EMISSIONS SPECIFICATION LIMITS, RSS 210

Frequency Range (MHz)	Class B Limit (uV)	Class B Limit (dBuV)
0.450 to 30.000	250	48

FUNDAMENTAL AND HARMONIC LIMITS 15.231 (b) / RSS 210 Table 1

The table below shows the limits for both the Fundamental and Harmonic emissions for each frequency band of operation detailed in Section 15.231 (b) for control signals.

Operating Frequency (MHz)	Field strength (microvolts/m)	Harmonics (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

FUNDAMENTAL AND HARMONIC LIMITS 15.231 (e)/RSS 210 Table 4

The table below shows the limits for both the Fundamental and Harmonic emissions (that do not fall in restricted bands) for each frequency band of operation detailed in Section 15.231 (e) for data signals.

Operating Frequency (MHz)	Field strength (microvolts/m)	Harmonics (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 – 260	1500	150
260 – 470	1500 – 5000	150 - 500
Above 470	5000	500

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209 / RSS 210 Table 3

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands and the limits for all emissions for a low power device operating under the general rules of RSS 210 and FCC Part 15 Subpart C.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.109 / RSS 210 Table 3 (RECEIVER)

The table below shows the limits for emissions from the receiver.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 1,000 MHz, 03-Oct-06
Engineer: Riaz Momand

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	55	28-Dec-06
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - `6.5 GHz	8595EM	780	05-Sep-07
EMCO	Biconical Antenna, 30-300 MHz	3110B	1497	26-Jun-07
Hewlett Packard	Preamplifier	8447D OPT 010	1826	02-May-07

Radiated Emissions, 30 - 3000 MHz, 04-Oct-06
Engineer: Chris Groat

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	07-Mar-07
Rohde & Schwarz	Test Receiver, 20-1300 MHz	ESVP	273	31-Jan-07
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	10-Jan-07
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-07
EMCO	Antenna, Horn, 1-18 GHz (SA40, 30 Hz)	3115	1142	07-Jun-08
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1595	26-Jun-07

Conducted Emissions - AC Power Ports, 04-Oct-06
Engineer: Chris Groat

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	LISN, FCC / CISPR	LISN-4, OATS	362	30-Jun-07
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	28-Aug-07
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	10-Jan-07
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	04-Apr-07

Radiated Emissions, 30 - 6,500 MHz, 11-Oct-06
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	07-Mar-07
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	297	31-Jan-07
EMCO	Antenna, Horn, 1-18 GHz	3115	487	24-May-08
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	10-Jan-07
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-07
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	957	24-Apr-07
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	25-Jul-07

EXHIBIT 2: Test Measurement Data

15 Pages

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	Test-Log Number:	T65565
		Project Manager:	Esther Zhu
Contact:	Wes Worth		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

iControl Networks

Model

Gateway 2

Date of Last Test: 10/11/2006

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	Test-Log Number:	T65565
		Project Manager:	Esther Zhu
Contact:	Wes Worth		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

EUT INFORMATION

The client agreed provide the following information after the test session(s).

General Description

The EUT is a home network controller that is designed to support remote home monitoring. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120 Volts, 60 Hz, 0.1 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
iControl Networks	Gateway 2	Home monitoring controller	ALPHA7	-
CUI Inc	41-12-300	AC/DC Adaptor	n/a	-

Other EUT Details

The following EUT details should be noted: EUT rated at 120VAC/60Hz.
CUI Inc. AC/DC Adaptor rated DC Output: 12Volts 300mA.

EUT Antenna (Intentional Radiators Only)

The EUT antenna has two omni directional antennas.
The antennas are integral to the device.

EUT Enclosure

The EUT enclosure is primarily constructed of Plastic. It measures approximately 16 cm wide by 24 cm deep by 5 cm high.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Project Manager:	Esther Zhu
Contact:	Wes Worth		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration # 1

The client agreed provide the following information after the test session(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
DELL	PP11L	Dell Latitude D610 Laptop	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RJ-45	Laptop	CAT-5	Unshielded	5.0
RJ-11	Unterminated	RJ-11	Unshielded	2.0
DC Power	AC to DC Adaptor	2 Wire DC	Unshielded	2.0

Note: All ports on EUT were connected.

EUT Operation During Emissions Tests

During emissions testing the EUT is running a software that exercise all communications ports verified through Green status of the LEDS.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Radiated Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/4/2006 8:03
Test Engineer: Chris Groat
Test Location: SVOATS #2

Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 42 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000MHz, Maximized Emissions	FCC B	Pass	30.0dBµV/m @ 501.250MHz (-16.0dB)
3	RE, 1000 - 3000 MHz, Maximized Emissions	FCC B	Pass	40.2dBuV/m @ 2999.12MHz (-13.8dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Run #1: Preliminary Radiated Emissions, 30-1000 MHz
Z-Wave and GE radios in receive mode

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
501.250	30.0	H	46.0	-16.0	QP	41	3.0	
375.250	27.9	H	46.0	-18.1	QP	48	3.0	
125.000	23.5	V	43.5	-20.0	QP	181	1.1	
872.250	23.5	V	46.0	-22.5	QP	161	1.1	
250.725	17.6	V	46.0	-28.4	QP	0	1.1	
30.675	10.4	H	40.0	-29.6	QP	179	3.0	
436.500	15.3	H	46.0	-30.7	QP	180	3.0	
Note 1:	Z-Wave OFF, GE OFF							

Run #2: Maximized Readings From Run #1

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
501.250	30.0	H	46.0	-16.0	QP	41	3.0	
375.250	27.9	H	46.0	-18.1	QP	48	3.0	
125.000	23.5	V	43.5	-20.0	QP	181	1.1	
872.250	23.5	V	46.0	-22.5	QP	161	1.1	
250.725	17.6	V	46.0	-28.4	QP	0	1.1	
30.675	10.4	H	40.0	-29.6	QP	179	3.0	
436.500	15.3	H	46.0	-30.7	QP	180	3.0	

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Run #3: Maximized readings, 1000 - 3000 MHz
Z-Wave and GE radios in receive mode

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 3000 MHz	3	3	0.0

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2999.060	40.2	V	54.0	-13.8	AVG	0	1.0	
2463.800	39.6	V	54.0	-14.4	AVG	0	1.0	
1999.440	35.2	V	54.0	-18.8	AVG	0	1.0	
2999.060	52.0	V	74.0	-22.0	PK	0	1.0	
1498.720	31.4	V	54.0	-22.6	AVG	0	1.0	
1199.320	30.9	V	54.0	-23.1	AVG	0	1.0	
2463.800	50.1	V	74.0	-23.9	PK	0	1.0	
1125.460	28.0	V	54.0	-26.0	AVG	0	1.0	
1999.440	47.1	V	74.0	-26.9	PK	0	1.0	
1498.720	43.9	V	74.0	-30.1	PK	0	1.0	
1199.320	41.9	V	74.0	-32.1	PK	0	1.0	
1125.460	38.7	V	74.0	-35.3	PK	0	1.0	

Note 1:	Above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/4/2006 8:03
Test Engineer: Chris Groat
Test Location: SVOATS #2
Config. Used: 1
Config Change: none
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 46 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	EN55022 B	Pass	33.5dBµV @ 0.443MHz (-23.5dB)

Modifications Made During Testing:

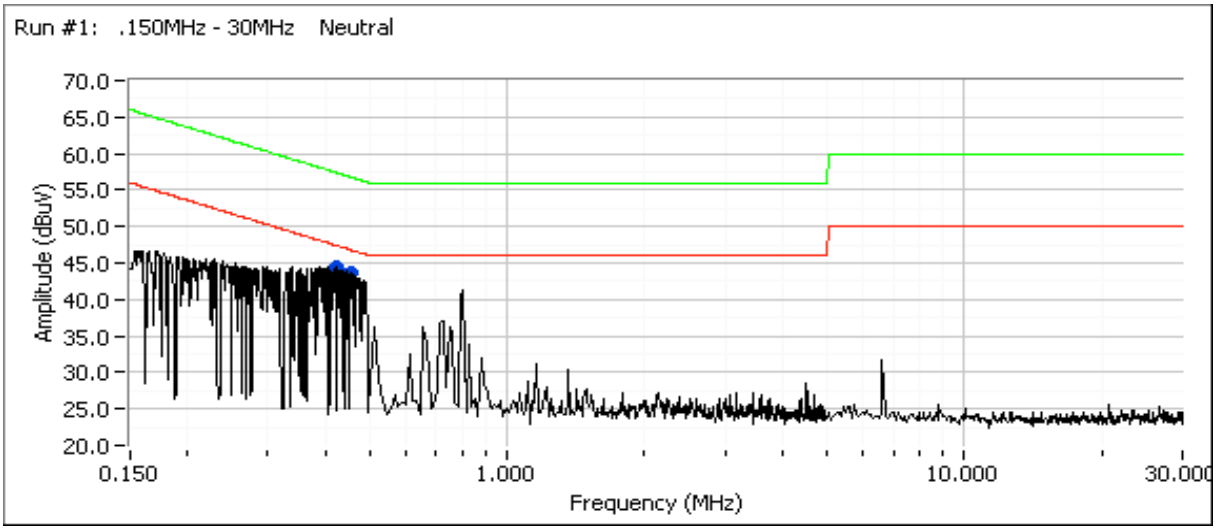
No modifications were made to the EUT during testing

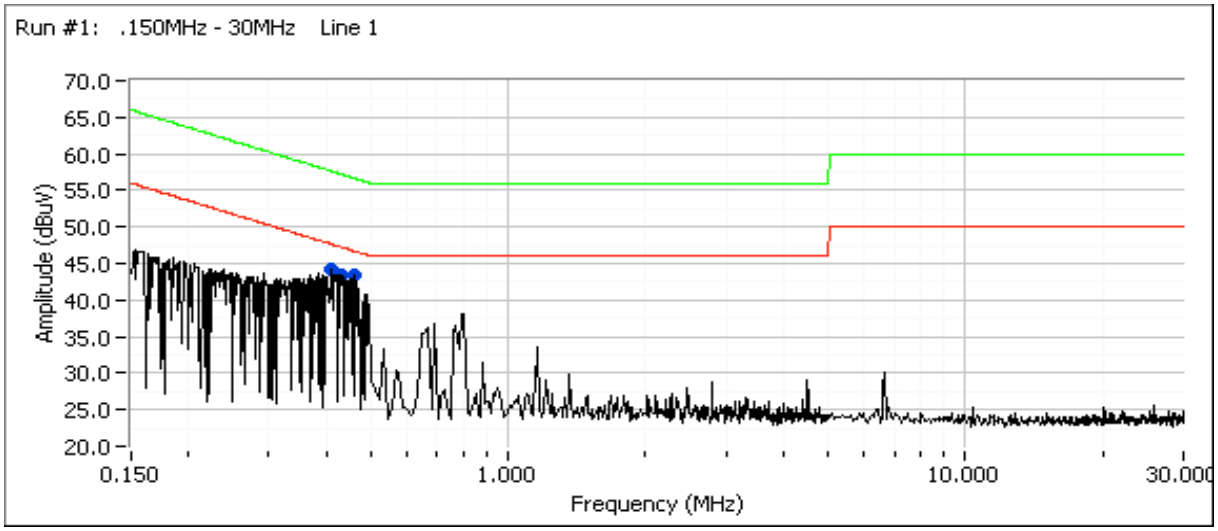
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
AC/DC Adaptor CUI Inc. M/N: 41-12-300





Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	B

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
AC/DC Adaptor CUI Inc. M/N: 41-12-300

Frequency	Level	AC	EN55022 B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.443	33.5	Neutral	57.0	-23.5	QP	
0.452	33.2	Neutral	56.8	-23.6	QP	
0.424	33.6	Neutral	57.4	-23.8	QP	
0.429	33.3	Line 1	57.3	-24.0	QP	
0.409	33.5	Line 1	57.7	-24.2	QP	
0.459	32.3	Line 1	56.7	-24.4	QP	
0.459	5.7	Line 1	46.7	-41.0	Ave	
0.452	5.8	Neutral	46.8	-41.0	Ave	
0.443	5.7	Neutral	47.0	-41.3	Ave	
0.429	5.8	Line 1	47.3	-41.5	Ave	
0.424	5.8	Neutral	47.4	-41.6	Ave	
0.409	6.0	Line 1	47.7	-41.7	Ave	

Note 1:	Z-Wave OFF, GE OFF

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

RSS 210 and FCC 15.321 Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/11/2006
Test Engineer: Juan Martinez
Test Location: SVOATS #1
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 15 °C
Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 3195.08 MHz - Spurious Emissions	FCC Part 15.209 / 15.231(a)	Pass	71.4dBuV/m (3715.4uV/m) @ 213.00MHz (-4.5dB)
2	20dB Bandwidth	FCC Part 15.231(c)	Pass	447 kHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 3195.08 MHz.

Other Spurious Emissions

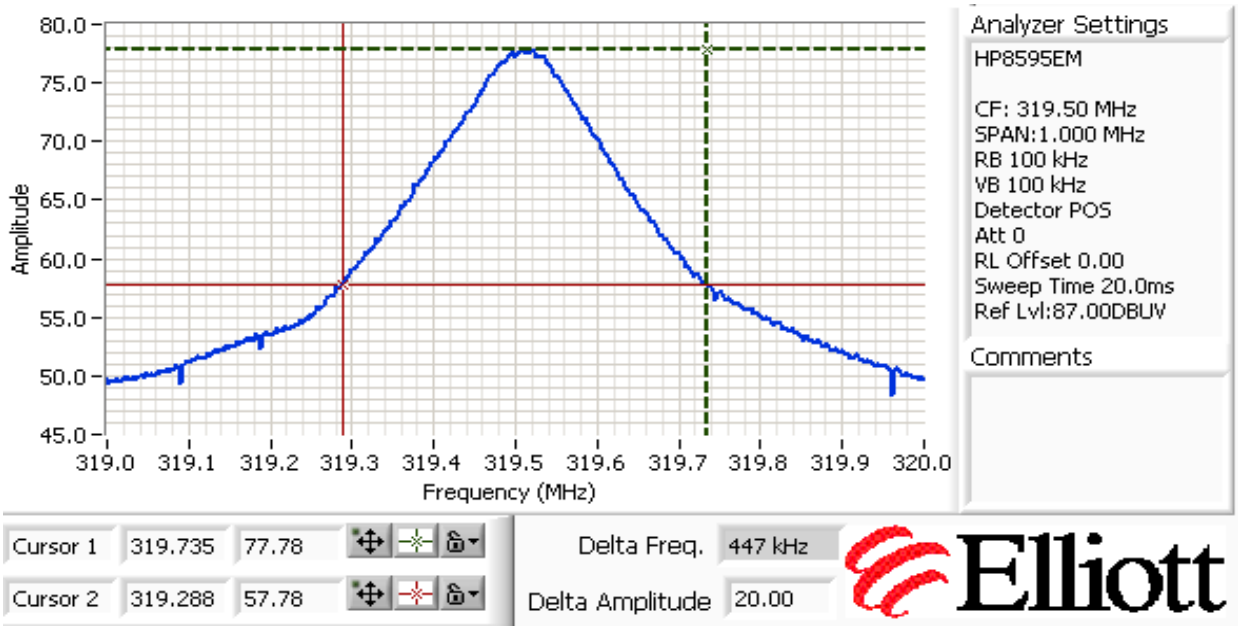
Frequency	Level	Pol	15.321 (b)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
213.000	42.6	v	75.9	-33.3	Pk	51	1.0	
213.000	42.6	v	55.9	-13.3	Avg	51	1.0	Note 1
213.000	71.4	h	75.9	-4.5	Pk	54	1.5	
213.000	51.4	h	55.9	-4.5	Avg	54	1.5	Note 1
319.508	68.7	v	99.5	-30.8	Pk	403	1.1	
319.508	48.7	v	79.5	-30.8	Avg	403	1.1	Note 1
319.508	78.5	h	99.5	-21.0	Pk	330	1.0	
319.508	58.5	h	79.5	-21.0	Avg	330	1.0	Note 1
426.000	64.0	h	75.9	-11.9	Pk	199	1.0	
426.000	44.0	h	55.9	-11.9	Avg	199	1.0	Note 1
532.492	44.0	h	55.9	-11.9	Pk	178	1.0	Peak reading, average limit
639.037	43.4	h	55.9	-12.5	Pk	14	1.0	Peak reading, average limit
958.525	45.6	h	55.9	-10.3	Pk	360	1.0	Peak reading, average limit
958.520	47.0	v	55.9	-8.9	Pk	0	1.3	Peak reading, average limit
639.037	47.0	v	55.9	-8.9	Pk	339	1.0	Peak reading, average limit

Note 1:	Duty cycle included. Peak readings were taken and duty cycle was implemented to get the average reading. Client will provide the duty cycle plot.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

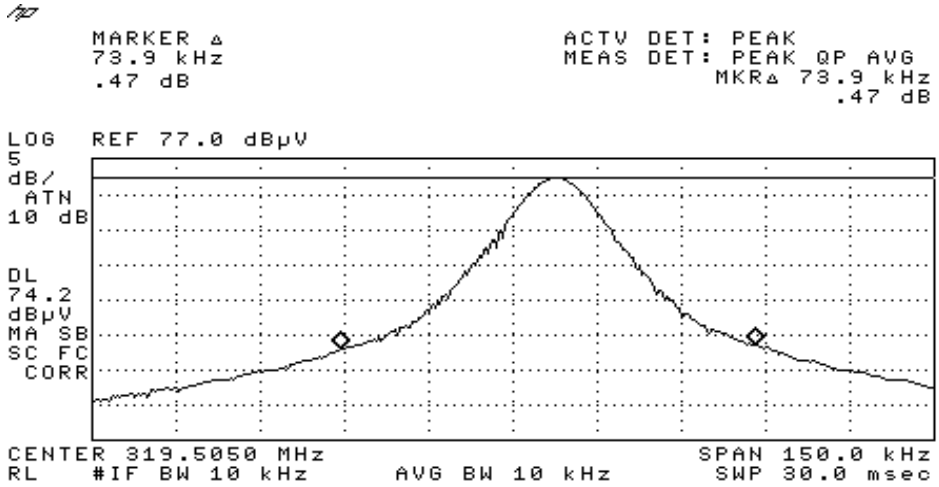
Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

Run #2: 20dB Bandwidth

Required bandwidth < 798.75kHz



99% Bandwidth



Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

RSS 210 and FCC 15.249 Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 10/11/2006
Test Engineer: Juan Martinez
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 15 °C
Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 9080 MHz - Spurious Emissions	FCC Part 15.209 / 15.249	Pass	44.5dBuV/m (167.9uV/m) @ 4543.0 MHz (-9.5dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

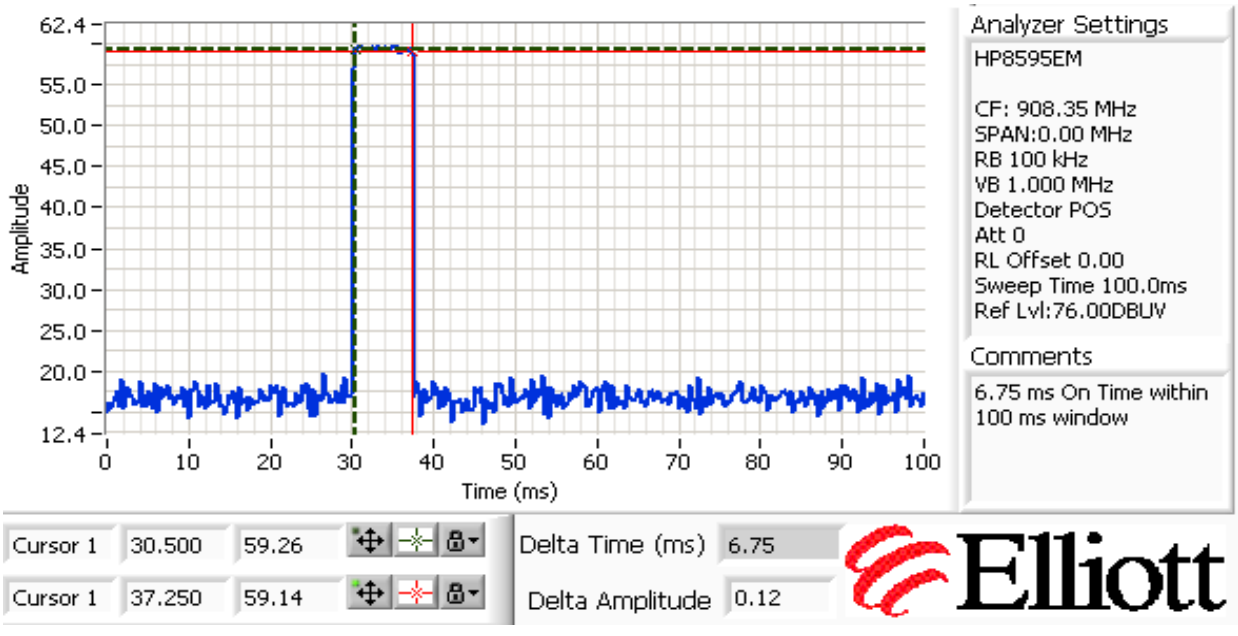
Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 9080 MHz.

Other Spurious Emissions

Frequency	Level	Pol	15.249 & RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
908.390	68.2	v	94.0	-25.8	Pk	300	1.0	
908.390	78.7	h	94.0	-15.3	Pk	244	1.0	
1817.180	33.3	H	54.0	-20.7	AVG	1	1.0	
1817.180	44.6	H	74.0	-29.4	PK	1	1.0	
2724.760	38.5	H	54.0	-15.5	AVG	1	1.0	
2724.760	50.1	H	74.0	-23.9	PK	1	1.0	
3633.670	42.7	H	54.0	-11.3	AVG	1	1.0	
3633.670	53.3	H	74.0	-20.7	PK	1	1.0	
4542.970	44.5	H	54.0	-9.5	AVG	1	1.0	
4542.970	55.5	H	74.0	-18.5	PK	1	1.0	
1817.210	33.4	V	54.0	-20.6	AVG	1	1.0	
1817.210	44.6	V	74.0	-29.4	PK	1	1.0	
2726.290	38.4	V	54.0	-15.6	AVG	1	1.0	
2726.290	49.3	V	74.0	-24.7	PK	1	1.0	
3632.420	42.8	V	54.0	-11.2	AVG	360	2.5	
3632.420	52.9	V	74.0	-21.1	PK	360	2.5	

Note 1:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Duty Cycle correction factor = -23

Client:	iControl Networks	Job Number:	J65176
Model:	Gateway 2	T-Log Number:	T65565
		Account Manager:	Esther Zhu
Contact:	Wes Worth		
Standard:	FCC	Class:	N/A

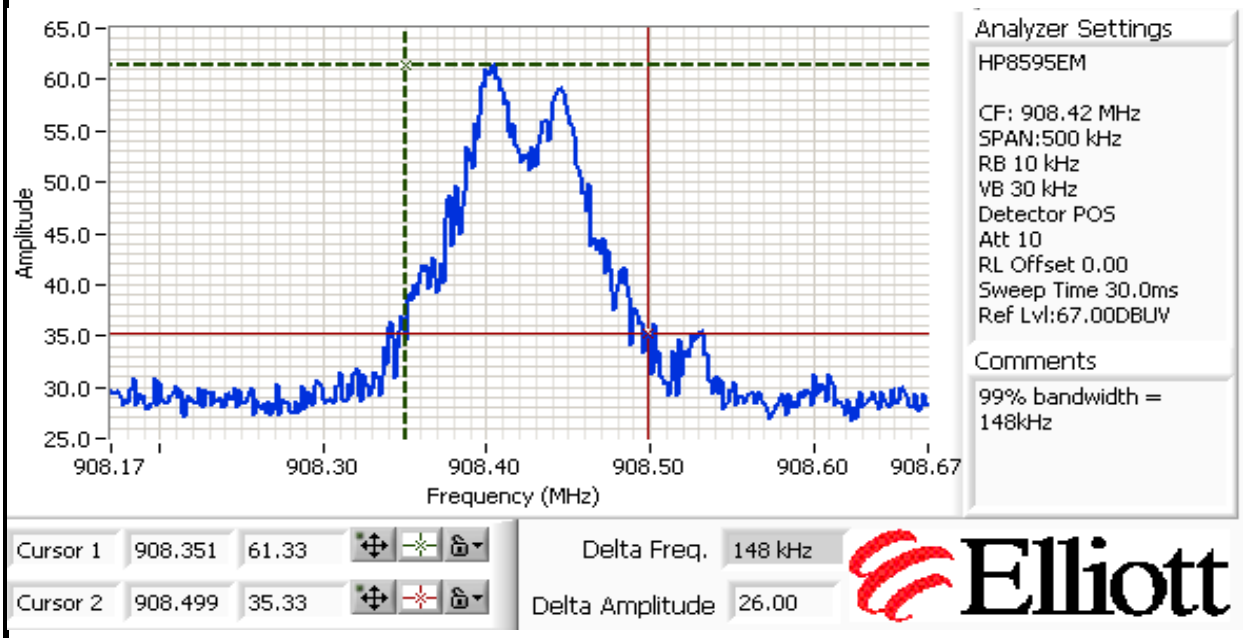


EXHIBIT 3: Photographs of Test Configurations

Uploaded as separate exhibit

EXHIBIT 4: Detailed Photographs of iControl Networks Model Gateway2

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EXHIBIT 5: Block Diagram of iControl Networks Model Gateway 2

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EXHIBIT 6: Schematic Diagrams of iControl Networks Model Gateway 2

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EXHIBIT 7: Theory of Operation for iControl Networks Model Gateway 2

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EXHIBIT 8: Operator's Manual

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EXHIBIT 9: Label and Label Location

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