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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: iControl Gateway

UPN:	5747A-GATEWAY1
FCC ID:	S23-GATEWAY1
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:	March 2, 2005
FINAL TEST DATE:	February 16 and February 17, 2005

AUTHORIZED SIGNATORY: Mark Briggs

Mark Briggs
Principal Engineer

ACCREDITED
2016-01

Equipment Name and Model:

Transceiver , iControl Gateway

Manufacturer:

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

Tested to applicable standard:
RSS210, Issue 5, February 1996
Low Power License-Exempt Radio Communication Devices

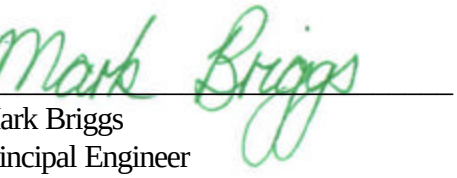
Test Report Prepared For:
Wes Worth
iControl Networks
502 Waverly St. Suite 302
Palo Alto, CA 94301

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC4549 3, Dated July 3, 1997

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 (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.



Signature
Name Mark Briggs
Title Principal Engineer
Elliott Laboratories Inc.
Address 684 W. Maude Ave
Sunnyvale, CA 94086
USA

Date: March 2, 2005

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SCOPE

An electromagnetic emissions test has been performed on the iControl Networks model iControl Gateway 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 iControl Gateway and therefore apply only to the tested sample. The sample was selected and prepared by Wes Worth 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 iControl Gateway 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 6.1

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.207 / 15.107		AC Conducted Emissions, 0.15 – 30 MHz	61.4dBµV @ 0.169MHz (-3.6dB)	Complies
	6.6 / 7.4	AC Conducted emissions 0.45 – 30 MHz	43.2dBµV (145.0µV) @ 0.921MHz (-4.8dB)	Complies
15.231 (a) (1)	6.1.1(a) (1)	Duration of manually activated transmission	Each transmission lasts for 26ms – Refer to operational description	Complies
15.231 (a) (2)	6.1.1(a) (2)	Duration of automatically activated transmission		Complies
15.231 (a) (3)	6.1.1(a) (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)	6.1.1(a) (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)	6.1.1(b) / Table 1	Transmitter Radiated Emissions, 319 MHz	91.4dBµV/m (37153.5µV/m) @ 319.500MHz (-4.5dB)	Complies
15.231 (b)	6.1.1(b) / Table 1	Transmitter Radiated Spurious Emissions, 30-4180 MHz	53.1dBµV/m (451.9µV/m) @ 1597.5MHz (-0.9dB)	Complies
15.231 (c)	6.1.1 (c)	Bandwidth	48.8 kHz	
15.231 (d)	6.1.1 (d)	Frequency Stability	Not applicable	
15.231 (e)	6.1.1 (e)	Transmission of data signals	Device does not operate under this section	NA
15.109	7.3	Receiver Spurious Emissions	41.3dBµV/m (116.1µV/m) @ 303.745MHz (-4.7dB)	Complies

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

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 iControl Gateway is a wireless device controller which is designed to control home and small business products. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120/240 V, 50/60 Hz, 0.5 Amps.

The sample was received on February 15, 2005 and tested on February 16 and February 17, 2005. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
iControl	iControl Gateway	Home Monitoring Controller	-	
Tamura	425A12400P	Power adapter	-	

OTHER EUT DETAILS

The EUT is comprised of two PCBs. The main PCB acts as the device(s) controller and performs the power line RF transmission interface to send and receive control commands to the household devices/appliances which can be tuned on and off. The main PCB also performs IP communication with cameras, and communicates with the iControl server mostly through Ethernet but also via the analog modem. The second PCB is a 319.5 MHz transceiver which can wirelessly control household devices such as motion sensors, door sensors and thermometers. In normal operation, the power line transmit duration for a single packet is less than 300 mS.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 5.38 in (13.67 cm) wide, by 7.25 in (18.42 cm) deep, by 1.63 in (4.14 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
Rolm	CBX	Phone	None

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

Manufacturer	Model	Description	Serial Number
Netgear	EN 104	Hub	ENT4B11520314

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)
Ethernet RJ-45	hub	Cat5	unshielded	2
phone phone RJ-11	unterminated	RJ-11	unshielded	2
DC power	Adapter	two wire	unshielded	2

EUT OPERATION

The EUT was placed in a RF test mode for testing of the transmitter and in normal mode of operation for testing the digital circuitry and receiver. In both modes the carrier current device within the EUT was operational. For conducted emissions against the RSS 210 limit the carrier current output was decoupled from the AC line.

ANTENNA SYSTEM

The EUT antenna has two omni directional antennas. One is used for transmit, either can be used for receive.

The antennas are integral to the device.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on February 16 and February 17, 2005at the Elliott Laboratories Open Area Test Site #2 & 3 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

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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, 15-Feb-05
Engineer: Adam LaCourse

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	09-Jul-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06
EMCO (ETS-Lindgren)	Log Periodic Antenna, 0.2-2 GHz	3148	1595	01-Jun-05

Conducted Emissions - AC Power Ports, 15-Feb-05
Engineer: Adam LaCourse

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	FCC / CISPR LISN	LISN-4, OATS	362	01-Jul-05
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	01-Sep-05
Rohde & Schwarz	Test Receiver, 9kHz-2750MHz	ESCS 30	1337	12-Jan-06

Conducted Emissions - AC Power Ports, 16-Feb-05
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	FCC / CISPR LISN	LISN-3, OATS	304	01-Jul-05
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	12-May-05
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1398	11-Feb-06
Fischer Custom Comm.	LISN, Freq. 0.9 -30 MHz,16 Amp	FCC-LISN-50/250-16-2	1079	01-Jul-05

Conducted Emissions - AC Power Ports, 16-Feb-05
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	01-Sep-05
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	31-Jan-06
Elliott Laboratories	FCC / CISPR LISN	LISN-4, OATS	362	01-Jul-05
Fischer Custom Comm.	LISN, Freq. 0.9 -30 MHz,16 Amp	FCC-LISN-50/250-16-2	1079	01-Jul-05

Radiated Emissions, 0.009 - 30 MHz, 16-Feb-05
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	12-May-05
EMCO	Magnetic Loop Antenna, 10kHz-30MHz	6502	1299	20-Dec-06

Radiated Emissions, 30 -3,200MHz, 17-Feb-05
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	31-Jan-07
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	08-Nov-05
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	787	17-Dec-05
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	25-Mar-05

Radiated Emissions, 0.009 - 30 MHz, 11-Mar-05
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer 9KHz-26.5GHz, non programmable	8563E	284	15-Mar-05
EMCO	Magnetic Loop Antenna, 10kHz-30MHz	6502	1299	20-Dec-06

EXHIBIT 2: Test Measurement Data

12 Pages

Elliott

EMC Test Data

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	
Contact:	Wes Worth		
Emissions Spec:	FCC 15 B, 15.231	Class:	B
Immunity Spec:	EN55024	Environment:	-

EMC Test Data

For The

iControl Network

Model

iControl Gateway

Date of Last Test: 3/15/2005

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	
Contact:	Wes Worth		
Emissions Spec:	FCC 15 B, 15.231	Class:	B
Immunity Spec:	EN55024	Environment:	-

EUT INFORMATION

General Description

The EUT is a wireless device controller which is designed to control home and small business products. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120/240 V, 50/60 Hz, 0.5 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
iControl	iControl Gateway	Home Monitoring Controller	-	-
Tamura	425A12400P	Power adapter	-	-

Other EUT Details

The EUT is comprised of two PCBs. The main PCB acts as the device(s) controller and performs the power line RF transmission interface to send and receive control commands to the household devices/appliances which can be tuned on and off. The main PCB also performs IP communication with cameras, and communicates with the iControl server mostly through Ethernet but also via the analog modem. The second PCB is a 319.5 MHz transceiver which can wirelessly control household devices such as motion sensors, door sensors and thermometers. In normal operation, the power line transmit duration for a single packet is less than 300 mS.

EUT Antenna

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 5.38 in (13.67 cm) wide, by 7.25 in (18.42 cm) deep, by 1.63 in (4.14 cm) high.

Modification History

Mod. #	Test	Date	Modification
1			

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

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	
Contact:	Wes Worth		
Emissions Spec:	FCC 15 B, 15.231	Class:	B
Immunity Spec:	EN55024	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Rolm	CBX	Phone	None	

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Netgear	EN 104	Hub	ENT4B11520314	

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet RJ-45	hub	Cat5	unshielded	2
phone phone RJ-11	unterminated	RJ-11	unshielded	2
DC power	Adapter	two wire	unshielded	2

EUT Operation During Emissions

The EUT was placed in a RF test mode for testing of the transmitter and in normal mode of operation for testing the digital circuitry.

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Conducted Emissions - Power Ports

Test Specifics

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: 2/16/2005
Test Engineer: David Bare
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. A second LISN was used for all local support equipment.

Ambient Conditions:

Temperature: 16.5 °C
Rel. Humidity: 67 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
3	CE, AC Power,120V/60Hz	FCC 15.107(a)	Pass	61.4dBµV @ 0.169MHz (-3.6dB)
4	CE, AC Power,120V/60Hz	RSS 210		43.2dBµV (145.0µV) @ 0.921MHz (-4.8dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

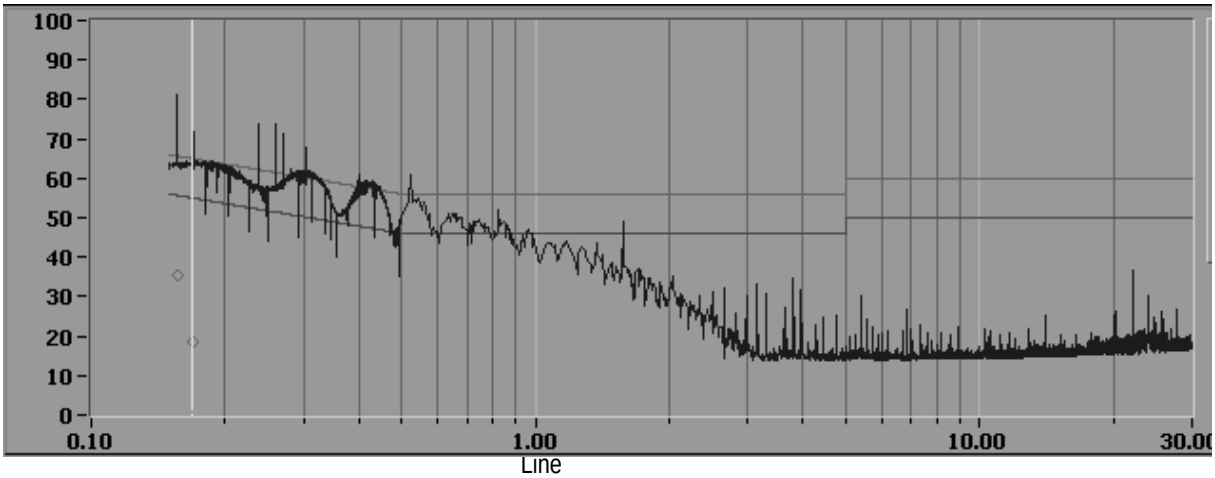
Deviations From The Standard

No deviations were made from the requirements of the standard.

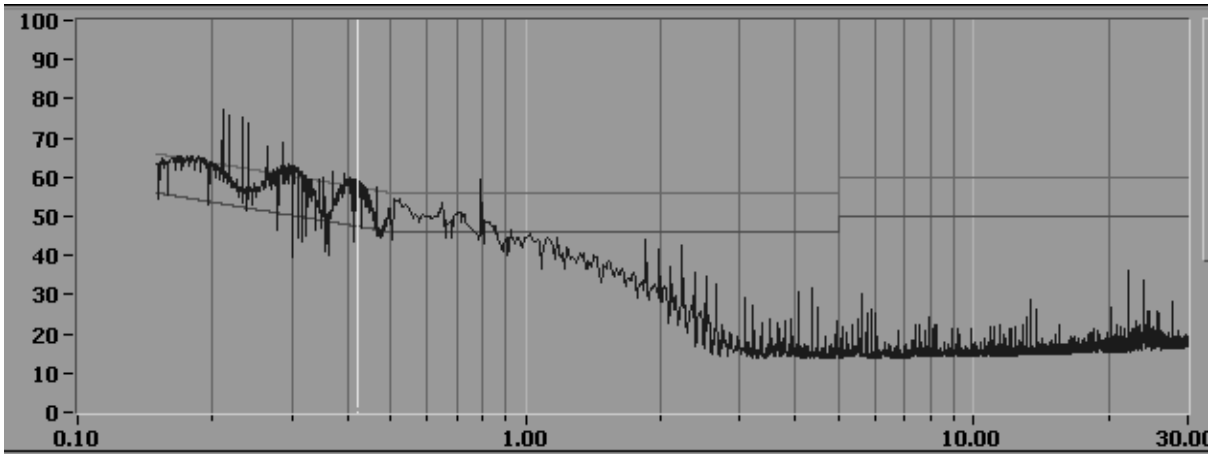
Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Run #3: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

New sample of the power adapter - carrier current transmissions enabled and 319 MHz transmitter enabled.



Line



Neutral

Elliott

EMC Test Data

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

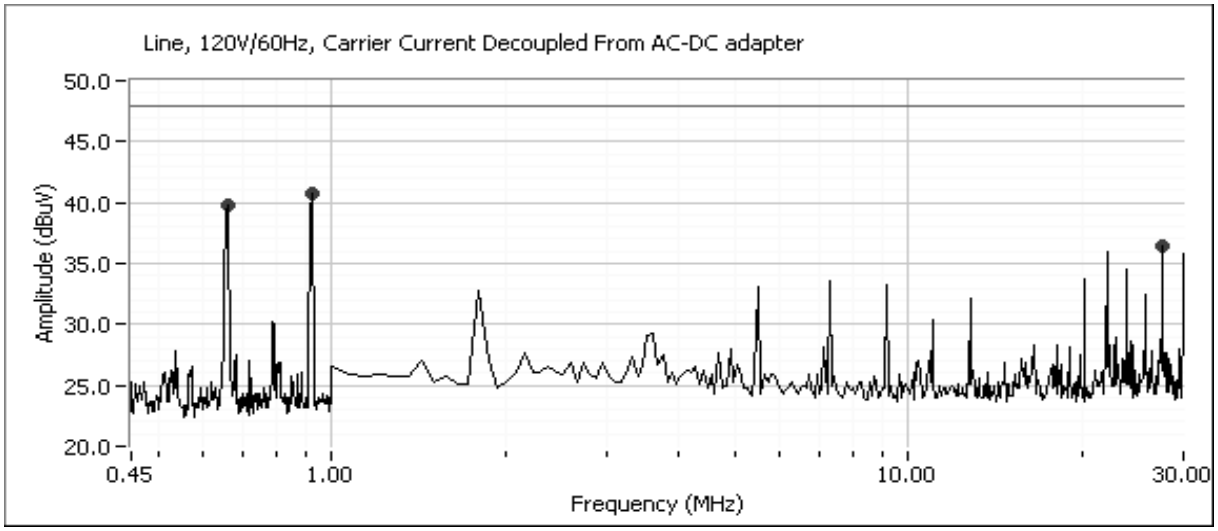
Run #3: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

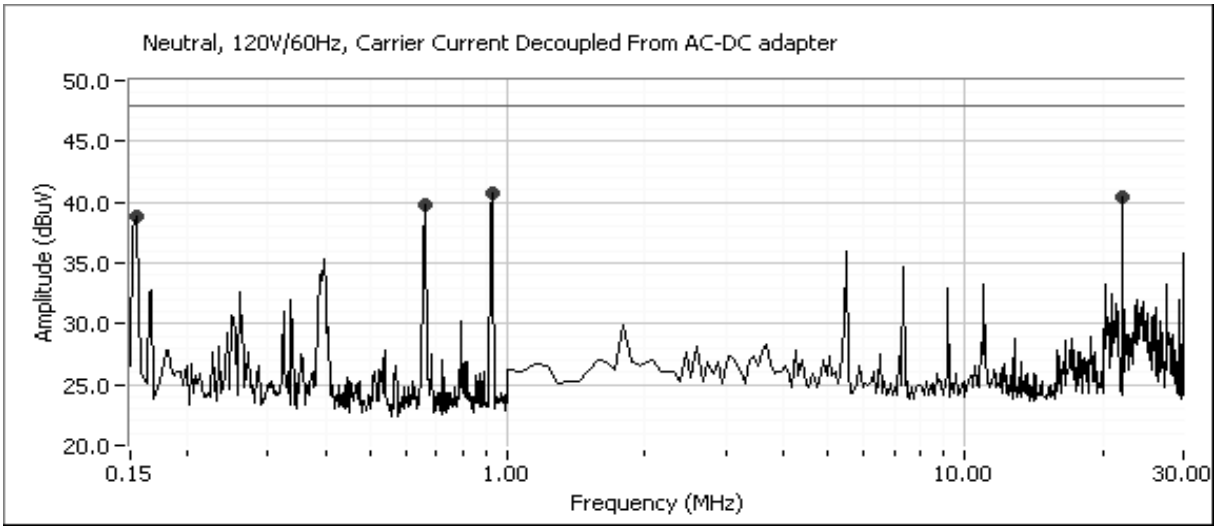
Frequency	Level	AC	FCC 15.107(a)		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.169	61.4	Neutral	65.0	-3.6	QP	
0.304	56.5	Line	60.1	-3.6	QP	
0.304	56.3	Neutral	60.1	-3.8	QP	
0.156	61.7	Neutral	65.7	-4.0	QP	
0.169	61.0	Line	65.0	-4.0	QP	
0.156	61.5	Line	65.7	-4.2	QP	
0.421	52.9	Line	57.4	-4.5	QP	
0.421	52.5	Neutral	57.4	-4.9	QP	
0.156	43.4	Neutral	55.7	-12.3	Average	
0.169	39.4	Neutral	55.0	-15.6	Average	
0.421	28.2	Line	47.4	-19.2	Average	
0.421	28.0	Neutral	47.4	-19.4	Average	
0.304	30.7	Line	50.1	-19.4	Average	
0.169	34.8	Line	55.0	-20.2	Average	
0.304	29.9	Neutral	50.1	-20.2	Average	
0.156	35.4	Line	55.7	-20.3	Average	

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Run #4: AC Power Port Conducted Emissions, 0.45 - 30MHz, 120V/60Hz

New sample of the power adapter - carrier current transmissions disabled and 319 MHz transmitter enabled.





Elliott

EMC Test Data

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Frequency	Level	AC	RSS 210		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.921	43.2	Neutral	48.0	-4.8	Peak	Peak readings, QP limit
22.119	40.7	Neutral	48.0	-7.3	Peak	Peak readings, QP limit
0.658	40.7	Line 1	48.0	-7.3	Peak	Peak readings, QP limit
0.923	40.7	Line 1	48.0	-7.3	Peak	Peak readings, QP limit
0.153	39.7	Line 1	48.0	-8.3	Peak	Peak readings, QP limit
0.159	38.4	Neutral	48.0	-9.6	Peak	Peak readings, QP limit
27.648	37.9	Line 1	48.0	-10.1	Peak	Peak readings, QP limit

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Radiated Emissions

Test Specifics

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: 2/17/2005
Test Engineer: David Bare
Test Location: SVOATS #3
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 used) are detailed under each run description.

Note, for testing 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.

Ambient Conditions:

Temperature: 15 °C
Rel. Humidity: 77 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Receive Mode Radiated Emissions, 30 - 3200MHz	15.109(a)	Pass	41.3dBµV/m (116.1µV/m) @ 303.745MHz (-4.7dB)
2	Transmitter field strengthTransmit	15.231(a), 15.209	Pass	91.4dBµV/m (37153.5µV/m) @ 319.500MHz (-4.5dB)
2	Transmitter spurious emissions: 30 MHz - 4 GHz	15.231(a), 15.209	Pass	53.1dBµV/m (451.9µV/m) @ 1597.5MHz (-0.9dB)
3	20dB Bandwidth	15.231(a) and (c)	Pass	48.8kHz
3	Timing	15.231(a) and (c)	Complies	Refer to operational description

Modifications Made During Testing:

No modifications were made to the EUT during testing

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Deviations From The Standard

No deviations were made from the requirements of the standard.

Run #1: Maximized Radiated Emissions, Receive mode

Frequency	Level	Pol	FCC 15.109(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
303.745	41.3	h	46.0	-4.7	QP	85	1.0	
303.745	37.7	v	46.0	-8.3	QP	20	1.6	
607.490	25.2	v	46.0	-20.8	QP	0	1.0	Noise floor
607.490	25.0	h	46.0	-21.0	QP	0	1.0	Noise floor
911.235	33.7	v	46.0	-12.3	QP	280	1.0	
911.235	24.6	h	46.0	-21.4	QP	85	1.0	
1214.980	31.7	h	54.0	-22.3	AVG	219	1.1	
1214.980	42.6	h	74.0	-31.5	PK	219	1.1	
1518.725	33.1	h	54.0	-20.9	AVG	135	1.2	
1518.725	42.6	h	74.0	-31.4	PK	135	1.2	

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Run #2: Maximized Radiated Emissions, Transmit mode

Stated duty cycle in any 100 msec was 9.76% giving a correction factor of 12.8dB

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
319.500	91.4	h	95.9	-4.5	Peak	250	1.0	
319.500	71.4	h	75.9	-4.5	Average			
319.500	90.7	v	95.9	-5.2	Peak	330	1.0	
319.500	70.7	v	75.9	-5.2	Average	330	1.0	Calculated from peak and duty cycle

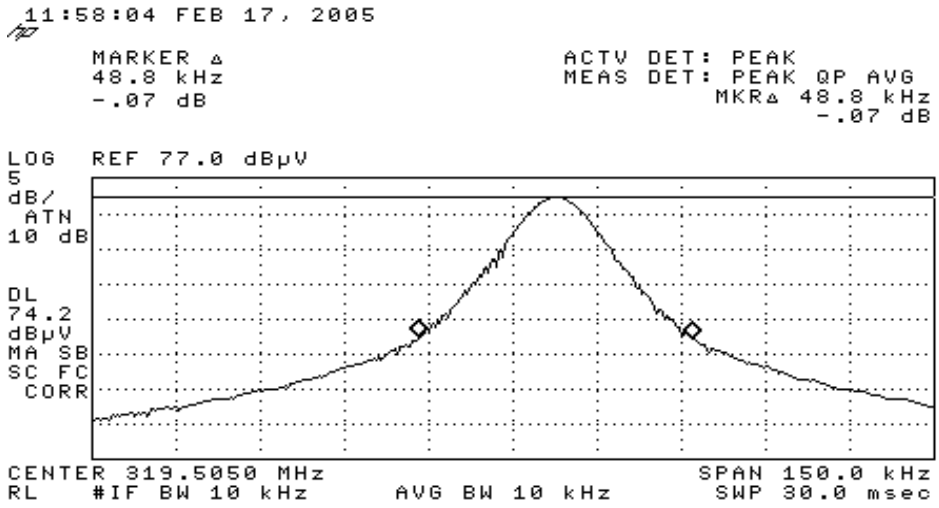
Stated duty cycle in any 100 msec was 9.76% giving a correction factor of 12.8dB

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1597.500	53.1	v	54.0	-0.9	Average	210	1.0	Restricted band limit applies
1597.500	73.1	v	74.0	-0.9	Peak	210	1.0	Restricted band limit applies
639.000	54.2	v	55.9	-1.7	Average	20	1.0	Calculated from peak and duty cycle
639.000	74.2	v	75.9	-1.7	Peak	20	1.0	
639.000	67.7	v	-	-	QP	30	1.0	Note 1
639.000	61.4	h	-	-	QP	85	1.0	Note 1
958.500	71.9	v	75.9	-4.0	Peak	210	1.0	
958.500	51.9	v	55.9	-4.0	Average	210	1.0	Calculated from peak and duty cycle
639.000	49.2	h	55.9	-6.7	Average	100	1.2	Calculated from peak and duty cycle
639.000	69.2	h	75.9	-6.7	Peak	100	1.2	
1597.500	61.7	h	74.0	-12.3	Peak	240	1.0	Restricted band limit applies
1597.500	41.7	h	54.0	-12.3	Average	240	1.0	Restricted band limit applies
958.500	43.5	h	55.9	-12.4	Average	30	1.2	Calculated from peak and duty cycle
958.500	63.5	h	75.9	-12.4	Peak	30	1.2	
1278.000	41.1	v	55.9	-14.8	Average	60	1.0	Calculated from peak and duty cycle
1278.000	61.1	v	75.9	-14.8	Peak	60	1.0	
1278.000	36.0	h	55.9	-19.9	Average	240	1.0	Calculated from peak and duty cycle
1278.000	56.0	h	75.9	-19.9	Peak	240	1.0	
3195.000	34.1	h	55.9	-21.8	Average	240	1.0	
3195.000	54.1	h	75.9	-21.8	Peak	240	1.0	

Note 1:	Quasi Peak measurements for reference only
Note 2:	The device was in a test mode, available only for FCC testing, that caused the device to transmit once every 1 - 2 seconds. Care was taken to ensure the EUT azimuth and receive antenna height were adjusted to obtain the maximum field strength from the device under test.

Client:	iControl Network	Job Number:	J56794
Model:	iControl Gateway	T-Log Number:	T56905
		Account Manager:	-
Contact:	Wes Worth		
Spec:	FCC 15 B, 15.231	Class:	B

Run #3: Timing and Bandwidth



20dB Bandwidth

EXHIBIT 3: Photographs of Test Configurations

3 Pages

EXHIBIT 4: Detailed Photographs of iControl Networks Model iControl Gateway

External Photographs: 2 Pages
Internal Photographs: 3 Pages

EXHIBIT 5: Block Diagram of iControl Networks Model iControl Gateway

2 Pages

EXHIBIT 6: Schematic Diagrams of iControl Networks Model iControl Gateway

2 Pages

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

5 Pages

EXHIBIT 8: Advertising Literature

Not available at this time

EXHIBIT 9: Operator's Manual

45 Pages

EXHIBIT 10: Label and Label Location

2 Pages