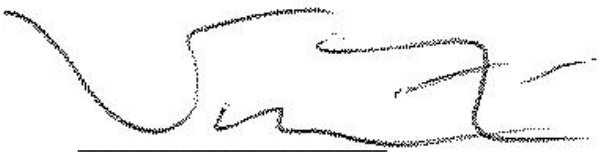
Test Certificate

A sample of the following product received on May 11, 2011 and tested on May 11, 12, 13, 15 and 16, 2011 complied with the requirements of,

- **RRA Notices 2010-5, 2011-5, 2010-6 and 2011-6 (KN22"Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class A) and KN24 "Information technology equipment – Immunity characteristics, Limits and method of measurement.")**

given the measurement uncertainties detailed in Elliott report R83304.

Ubiquiti Networks
Model AirCam



Wayne Fisher
Engineering Team Lead

_____
Ubiquiti Networks

_____
Printed Name

A2LA ACCREDITED
Testing Cert #2016.01

Elliott Laboratories 41039 Boyce Road 510-578-3500 Phone
www.elliottlabs.com Fremont, CA. 94538 510-440-9525 Fax

EMC Test Report

Class A Information Technology Equipment

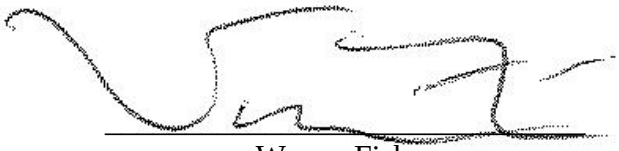
RRA Notices 2010-5, 2011-5, 2010-6 and 2011-6 (KN22 and KN24)

Product Name: Security Camera

Model: AirCam

COMPANY:	Ubiquiti Networks 91 E. Tasman Drive San Jose, CA 95134
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road Fremont, CA. 94538-2435
TEST LABORATORY ID #:	US0027
REPORT DATE:	May 26, 2011
FINAL TEST DATES:	May 11, 12, 13, 15 and 16, 2011

AUTHORIZED SIGNATORY:



Wayne Fisher
Engineering Team Lead
Elliott Laboratories, An NTS Company

A2LA ACCREDITED
Testing Cert #2016.01

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	05-26-2011	First release	

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SCOPE

Governments and standards organizations around the world have published requirements regarding the electromagnetic compatibility (EMC) of electronic equipment. Testing has been performed on the Ubiquiti Networks model AirCam, pursuant to the following standards.

Standard	Title	Standard Date
KN22/KN24	RRA Notice 2010-5	2010
	RRA Notice 2011-5	2011
	RRA Notice 2010-6	2010
	RRA Notice 2011-6	2011

All measurements and evaluations have been in accordance with these specifications, test procedures, and measurement guidelines as outlined in Elliott Laboratories test procedures, and in accordance with the standards referenced therein

OBJECTIVE

The objective of Ubiquiti Networks is to:declare conformity with the requirements of the RRA for EMC of ITE equipment;

STATEMENT OF COMPLIANCE

The tested sample of Ubiquiti Networks model AirCam complied with the requirements of:

Standard/Regulation	Equipment Type/Class	Standard Date
KN22 and KN24	Class A	RRA Notices 2010-5, 2011-5, 2010-6, and 2011-6

The test results recorded herein are based on a single type test of the Ubiquiti Networks model AirCam and therefore apply only to the tested sample(s). The sample was selected and prepared by Jennifer Sanchez of Ubiquiti Networks.

Maintenance of compliance is the responsibility of the company. Any modification of the product that could result in increased emissions or susceptibility should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the Ubiquiti Networks model AirCam. The measurements were extracted from the data recorded during testing and represent the highest amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

CONDUCTED EMISSIONS (MAINS PORT)

Frequency Range Operating Voltage	Standard/Section	Requirement	Measurement	Margin	Status
0.15-30 MHz, 110V, 50Hz	KN22 (Class A)	0.15-0.5 MHz: 79 dBµV QP 66 dBµV Av 0.5-30 MHz: 73 dBµV QP 60 dBµV Av	37.0dBµV @ 19.709MHz	-23.0dB	Complied
0.15-30 MHz, 220V, 60Hz			54.1dBµV @ 0.169MHz	-24.9dB	Complied

Conducted Emissions 220V/60Hz

	Frequency	Level	AC	KN22 Class A		Detector
	MHz	dBµV	Line	Limit	Margin	QP/Ave
1	19.709	37.0	Neutral	60.0	-23.0	AVG
2	0.167	55.7	Neutral	79.0	-23.3	QP
3	19.710	36.5	Line 1	60.0	-23.5	AVG
4	0.174	55.0	Line 1	79.0	-24.0	QP
5	0.151	54.0	Line 1	79.0	-25.0	QP
6	0.159	52.8	Neutral	79.0	-26.2	QP
7	0.167	33.0	Neutral	66.0	-33.0	AVG
8	19.709	39.7	Neutral	73.0	-33.3	QP
9	0.174	32.6	Line 1	66.0	-33.4	AVG
10	19.710	39.2	Line 1	73.0	-33.8	QP
11	0.151	31.1	Line 1	66.0	-34.9	AVG
12	0.159	29.4	Neutral	66.0	-36.6	AVG

RADIATED EMISSIONS

Frequency Range	Standard/Section	Requirement	Measurement	Margin	Status
30-1000 MHz	KN22 Class A	30 – 230, 40 dBµV/m 230 – 1000, 47 dBµV/m (10m limit)	37.0dBµV/m @189.01 MHz	-3.0dB	Complied

Highest emissions – KN 22 (30-1000 MHz)

	Frequency MHz	Level dBuV/m	Pol v/h	KN22 Class A Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters
1	189.006	37.0	V	40.0	-3.0	QP	60	1.0
2	500.003	37.2	H	47.0	-9.8	QP	104	1.5
3	141.758	28.8	V	40.0	-11.2	QP	119	1.5
4	65.749	28.6	V	40.0	-11.4	QP	174	1.5
5	472.516	35.5	H	47.0	-11.5	QP	72	2.0
6	625.873	22.7	H	47.0	-24.3	QP	70	1.5

Highest emissions – KN 22 (1-6GHz)

	Frequency MHz	Level dBuV/m	Pol v/h	KN22 Class A Limit	Margin	Detector Pk/QP/Avg	Azimuth degrees	Height meters
1	1600.040	43.0	V	56.0	-13.0	AVG	168	1.0
2	2400.040	35.4	V	56.0	-20.6	AVG	9	1.0
3	1600.130	46.3	V	76.0	-29.7	PK	168	1.0
4	2400.030	42.7	V	76.0	-33.3	PK	9	1.0

INFORMATION TECHNOLOGY EQUIPMENT IMMUNITY TEST RESULTS

The following tests were performed on the Ubiquiti Networks model AirCam. The results are based upon performance criteria defined by the company and as detailed in this test report.

Test	Basic Standard	Level Tested	Criterion Required	Criterion Met	Status
ESD	KN 61000-4-2	4 kV CD 8 kV AD	B	A	Complied
RF EM Field AM 80% AM 1kHz	KN 61000-4-3	80-1000 MHz 3 V/m	A	A	Complied
EFT, AC Power Port	KN 61000-4-4	1 kV	B	A	Complied
EFT, DC Power Port		N/A – Note 1			
EFT, Signal Ports		N/A – Note 2			
Surge, AC Power Port	KN 61000-4-5	1 kV DM, 2 kV CM 1.2/50 µs	B	A	Complied
Surge, DC Power Port		N/A – Note 1			
Surge, Signal Ports		N/A – Note 2			
RF, conducted continuous, Signal Ports	KN 61000-4-6	N/A – Note 2			
RF, conducted continuous, AC Power Port		0.15-80 MHz, xx Vrms 80% AM 1kHz	A	A	Complied
RF, conducted continuous, DC Power Port		N/A – Note 1			
Power Frequency Magnetic Field	KN 61000-4-8	N/A – Note 3			
Voltage Dips and Interrupts (50/60Hz)	KN 61000-4-11	>95%, 0.5 cycles 30%, 30 cycles >95%, 300 cycles	B C C	A A C	Complied Note 4

Note 1 The EUT does not have any DC power ports
Note 2 Ubiquiti Networks stated that the EUT's interface ports are not intended to connect to longer than 3m.
Note 3 Ubiquiti Networks stated that the EUT does not contain any components susceptible to 50Hz magnetic fields.

MEASUREMENT UNCERTAINTIES

ISO/IEC 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 were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of *U*cispr and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV or dBuA	150kHz – 30MHz	± 2.2 dB
Radiated Electric Field	dBuV/m	30 – 1000 MHz	± 3.6 dB
		1000 – 40,000 MHz	± 6.0 dB
Radiated Immunity	V/m	80 – 2700 MHz	- 26.3%, + 29.97%
ESD	KV	N/A	± 8.6%
Fast Transients	Voltage	N/A	± 5.98 %
	Timing	N/A	± 8.60 %
Surge	Voltage	N/A	± 4.92 %
RF Common Mode (CDN method)	Vrms	N/A	-12.64 %, +13.33 %
RF Common Mode (BCI method)	Vrms	N/A	-13.45 %, +15.32 %
Voltage Dips	Voltage	N/A	± 2.32 %
Voltage Dips	Timing	N/A	± 0.08mS

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Ubiquiti Networks model AirCam is a Security camera that is designed to stream live video. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the AirCam is 24 Vdc, 1 Amp. The electrical rating of the POE Adapter is 100-240V, 50-60Hz, 0.5A.

The sample was received on May 11, 2011 and tested on May 11, 12, 13, 15 and 16, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Ubiquiti Networks	AirCam	Security Camera	4	N/A
Ubiquiti Networks	UBI-POE-24-1	POE Adapter	1010-0001765	N/A

OTHER EUT DETAILS

The following EUT details should be noted: EUT is a POE device.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 6 cm wide by 16 cm deep by 6 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

No local support equipment was used during emissions testing.

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

Company	Model	Description	Serial Number	FCC ID
Dell	Vostro	PC Laptop	32709455821	-

EUT INTERFACE PORTS

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

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length (m)
POE(EUT)	POE Injector	Cat. 5	Unshielded	0.5
AC Power(POE Injector)	AC Mains	3 Wire	Unshielded	1
LAN(POE Injector)	PC Laptop	Cat. 5	Unshielded	2

EUT OPERATION

During emissions testing the EUT was streaming live video.

During immunity testing the EUT was steaming live video. Normal operation is indicated by the EUT continuously streaming live video displayed on the PC Laptop and shall be monitored by the PC Laptop.

The performance criteria applied during immunity testing were:
Criterion A: During and after testing the EUT shall continue to show the video stream on the PC Laptop.
Criterion B: During application of the transient test, degradation of performance including loss of signal is allowed provided that the EUT self-recovers to normal operation after testing without any operator intervention.
Criterion C: Loss of function is allowed provided that normal operation can be restored by operator intervention.

EMISSIONS TESTING

RADIATED AND CONDUCTED EMISSIONS

Final test measurements were taken at the Elliott Laboratories Anechoic Chambers listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of ANSI C63.4: 2003 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and Industry Canada.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
Chamber 3	R-1683 G-58 C-1795 T-1639	769238	IC 2845B-3	41039 Boyce Road Fremont, CA 94538-2435

RADIATED EMISSIONS CONSIDERATIONS

Radiated emissions measurements were made with the EUT powered from a supply voltage within the expected tolerances of each nominal operating voltage/frequency for each geographical regions covered by the scope of the standards referenced in this report.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4 and CISPR 22 (KN 22).

Mains port measurements are made with the EUT connected to the public power network through 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.

Telecommunication port measurements are made with the unshielded network cable connected through an impedance stabilization network (ISN) appropriate to the type of cable employed. Where no suitable ISN is available measurements are made using a capacitive voltage probe (CVP) and a current probe. If shielded cables are specified for the port under test the measurement is made of the noise voltage on the shield of the cable via a 100 ohm resistor.

EMISSIONS MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1:2006 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. 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 1000 MHz 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

Measurements are converted to the field strength at an antenna or voltage developed at the LISN (or ISN) measurement port, which is then compared directly with the appropriate specification limit under software control of the test receivers and spectrum analyzers. 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 emission measurements utilize a fifty micro-Henry 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.

IMPEDANCE STABILIZATION NETWORK (ISN)

Telecommunication port conducted emission measurements utilize an Impedance Stabilization Network with a 150-ohm termination impedance and specific longitudinal conversion loss as the voltage monitoring point. This network provides for calibrated radio-frequency noise measurements by the design of the internal circuitry on the EUT and measurement ports, respectively. For current measurements, a current probe with a uniform frequency response and less than 1-ohm insertion impedance is used.

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 bilog antenna or combination of biconical and log periodic antennas are used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas may be used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, horn antennas are used. The antenna calibration factors are included in site factors that are programmed into the test receivers or data collection software.

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, CISPR 22 and KN22 specify 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 up to 12-mm thick 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 company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

EMISSIONS TEST PROCEDURES

EUT AND CABLE PLACEMENT

The standards require 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, CISPR 22 and KN22, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS (MAINS)

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. Emissions that have peak values close to the specification limit are also measured in the quasi-peak and average detection modes to determine compliance except when the amplitude of the emission when measured with the quasi-peak detector is more than 10 dB below the specification limit for average measurements. In this case only quasi-peak measurements are performed.

CONDUCTED EMISSIONS (TELECOMMUNICATION PORTS)

Conducted emissions voltages are measured at a point 80 cm from the EUT. If conducted emission currents are measured, the current probe is located 70 cm from the EUT. 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. Emissions that have peak values close to the specification limit are also measured in the quasi-peak and average detection modes to determine compliance except when the amplitude of the emission when measured with the quasi-peak detector is more than 10 dB below the specification limit for average measurements. In this case only quasi-peak measurements are performed.

RADIATED EMISSIONS (SEMI-ANECHOIC and/or OATS TEST ENVIRONMENT)

Radiated emissions measurements in a semi-anechoic environment are performed in two phases (preliminary scan and final maximization). Final maximization may be performed on an OATS.

Preliminary Scan

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 regulations specified on page 1. One or more of these are performed with the antenna polarized vertically and one or more of these are performed 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 if required. 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

During final maximization, 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 that 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 that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

For measurements above 1GHz every effort is made to ensure the EUT remains within the cone of radiation of the measurement antenna (i.e. 3dB beam-width of the antenna). This may include rotating the product and/or angling the measurement antenna.

When Testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5m. Maximum emissions are found within this restricted range because emission levels decrease over distance and as the antenna is raised above 2.5m, the distance from the EUT increases. As a result of the increased measurement distance, at antenna heights above 2.5m, lower emission levels are measured as compared to emissions levels measured at antenna heights at 2.5m and below.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form). The calculation is 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, 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

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

IMMUNITY TESTING

GENERAL INFORMATION

Final tests were performed at the Elliott Laboratories Test Sites located at 41039 Boyce Road, Fremont, CA 94538-2435. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent CENELEC and IEC standards.

IMMUNITY MEASUREMENT INSTRUMENTATION

ELECTROSTATIC DISCHARGE TEST SYSTEM

An ESD generator is used for all testing. It is capable of applying electrostatic discharges in both contact discharge mode to 8 kV and air discharge mode to 16.5 kV in both positive and negative polarities in accordance with the IEC/EN/KN 61000-4-2 basic EMC publication.

ELECTROMAGNETIC FIELD TEST SYSTEM

A signal generator and power amplifiers are used to provide a signal at the appropriate power and frequency to an antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the IEC/EN/KN 61000-4-3 basic EMC publication.

ELECTRICAL FAST TRANSIENT/BURST TEST SYSTEM

An electrical fast transient/burst generator is used for all testing. It is capable of applying the required fast transient immunity test levels to the mains at any phase angle with respect to the mains voltage waveform and to attached cables via a capacitive coupling clamp in accordance with the IEC/EN/KN 61000-4-4 basic EMC publication.

SURGE TEST SYSTEM

A surge generator is used for all testing. It is capable of providing the required surge immunity test levels to the mains port at any phase angle with respect to the mains line voltage waveform or to the signal port in accordance with the IEC/EN/KN 61000-4-5 basic EMC publication.

For I/O line surges a surge coupling network is used to couple the output from the generator to the I/O lines. The generator can generate the CWG (1.2/50µS) and CCITT (70/100µS) waveforms as required by the IEC/EN/KN 61000-4-5 basic standard.

CONDUCTED INTERFERENCE TEST SYSTEM

A signal generator and power amplifier are used to provide a signal at the appropriate power and frequency through a coupling network to obtain the required electromagnetic signal on the power cord and attached cables of the EUT in accordance with the IEC/EN/KN 61000-4-6 basic immunity standard.

VOLTAGE VARIATION TEST SYSTEM

A power-line disturbance simulator and variable transformer are used for all testing. These two units are, when used together, capable of simulating mains voltage variations between 0 and 100% for periods up to 100 seconds in duration in accordance with the IEC/EN/KN 61000-4-11 basic EMC standard.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

IMMUNITY TEST PROCEDURES

EQUIPMENT PLACEMENT

The basic standards for evaluating immunity to electrostatic discharges specify that a tabletop EUT shall be placed on a non-conducting table 80 centimeters above a ground reference plane and that floor-mounted equipment shall be placed on an insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement. For tabletop equipment, a 1.6 by 0.8 meter metal sheet is placed on the table and connected to the ground plane via a metal strap with two 470-kOhm resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material.

The basic standards for evaluating immunity to radiated electric fields specify that a tabletop EUT be placed on a non-conducting table 80 centimeters high and that floor-mounted equipment may be mounted on non-conductive supports 0.05 to 0.15m high. During the IEC 61000-4-3 tests, the EUT is positioned in a shielded anechoic test chamber to reduce reflections from the internal surfaces of the chamber.

The basic standards for evaluating immunity electrically fast transient bursts specify that the EUT and attached cables be placed on an insulating support 10 centimeters above a ground reference plane. During the tests, the EUT was positioned on a table with a ground reference plane or on the floor in conformance with this requirement.

The basic standards for evaluating immunity to surge transients do not specify positioning of the EUT. The EUT was therefore placed on a table or on the floor.

The basic standards for evaluating immunity to conducted rf disturbances specify that the EUT be placed on an insulating support 10 centimeters above a ground reference plane and that the attached cables be maintained between 30 and 50 millimeters above this plane where possible. During the tests, the EUT was positioned on a table with a ground reference plane or on the floor in conformance with this requirement.

The basic standards for evaluating immunity to voltage dips and interruptions do not specify positioning of the EUT. The EUT was therefore placed on a table or on the floor.

APPLICATION OF ELECTROSTATIC DISCHARGES

The points of application of the test discharges directly to the EUT are determined after consideration of the parts of the EUT that are accessible to the operator during normal operation. Contact and air discharges are applied to the EUT, contact discharges to conducting surfaces and air-gap discharges to insulating surfaces. Contact discharges are also applied to the coupling planes to simulate nearby ESD events.

APPLICATION OF ELECTROMAGNETIC FIELD

The electromagnetic field is established at the front edge of the EUT.

The frequency range is swept through the frequency range of the test using a power level necessary to obtain the required field strength at the EUT. The field is amplitude modulated using a 1-kHz sine wave to a depth of 80% for the swept frequency test in accordance with the applicable basic standard(s).

The test is repeated with each of the four sides of the EUT facing the field-generating antenna. For small, portable products the test is also performed with the top and bottom sides of the EUT facing the antenna.

APPLICATION OF ELECTRICAL FAST TRANSIENTS

The application of the test voltage to the EUT is made to the cable connected to the power port under test via discrete capacitors and through a capacitive coupling clamp in the case of cables connected to signal ports.

APPLICATION OF SURGES

The application of the surge to the EUT's AC or DC power port is made to the power cable attached to the unit via the coupling/decoupling network within the surge generator.

For coupling to unshielded signal lines a coupling network is used to give the correct coupling path (resistor and capacitor/spark gap) to the line under test. Coupling to shielded signal lines is made directly to the shield at the far end of the cable, with the cable length set to the shorter of 20m or the maximum specified cable length. Whenever possible a decoupling network is placed in series with the I/O line under test and the support equipment to ensure that any susceptibility observed is due to the EUT and not the support equipment. Decoupling networks are not available for high-speed signal lines.

APPLICATION OF CONDUCTED INTERFERENCE

The application of the test voltage to the EUT is made through either a coupling-decoupling network (CDN), by direct injection, or through an inductive coupling clamp as appropriate to the cable being tested. The frequency range is swept from 0.15 to 80 MHz using a power level necessary to obtain the specified interference voltage.

APPLICATION OF VOLTAGE VARIATIONS

The applications of the variations in mains voltage to the EUT are made through the AC power cable attached to the unit.

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Cal Due
Conducted Emissions - AC Power Ports, 12-May-11				
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	4/21/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	4/13/2012
Fischer Custom Comm	LISN, 25A, 150kHz to 30MHz, 25 Amp,	FCC-LISN-50-25-2-09	2001	9/16/2011
Radiated Emissions, 30 - 6,000 MHz, 12-May-11				
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/26/2011
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/14/2011
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	6/4/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	4/13/2012
Com-Power Corp.	Preamplifier, 30-1000 MHz	PAM-103	2380	4/13/2012
Radiated Immunity, 80 - 1,000 MHz, 13-May-11				
EMCO	Antenna, Biconilog Transmitting	3143	180	N/A
Werlatone	Directional Coupler, 80-1000 MHz, 40dB, 200W	C3910	917	N/A
Rohde & Schwarz	Power Sensor, 1uW-100mW, DC-18 GHz, 50ohms	NRV-Z51	1069	7/19/2011
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	9/13/2011
Anritsu	Signal Generator, 10MHz-20GHz	68347C	1785	11/22/2011
Amplifier Research	Amplifier, 250W, 80-1000 MHz	250A1000	1809	N/A
Conducted Immunity (IEC/EN 61000-4-6), 15-May-11				
Rohde & Schwarz	Signal Generator, 9 kHz-1.04 GHz	SMY01	168	11/11/2011
Fischer Custom Comm.	Decoupling Network,.15 - 230 MHz	F-203I-DCN	605	N/A
Instruments For Industry	Power Supply Control Module	P.S. 5000 / 28 / 40	639	N/A
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	11/29/2011
Fischer Custom Comm.	M3 Network, 150 kHz-230 MHz	FCC-801-M3-25A	1581	5/19/2011
Bird Electronics Corp.	6 dB, 100 W Attenuator	100-A-FFN-06	1596	6/28/2011
Fischer Custom Comm.	150-50 ohm adapter, 1/2, 0.15 to 80 MHz	FCC-801-150-50	1600	5/11/2012
Fischer Custom Comm.	150-50 ohm adapter, 1/2, 0.15 to 80 MHz	FCC-801-150-50	1601	5/11/2012
Rohde & Schwarz	Pwr Sensor 300 uW - 30 Watts (+ 25dB pad)	NRV-Z54	1788	7/19/2011
Hevi-Duty	Transformer 208V-220V 60Hz only “SV KN Kit 12”	HS5F3AS	2209	N/A
EFT, 15-May-11				
Fischer Custom Comm.	Decoupling Network,.15 - 230 MHz	F-203I-DCN	605	N/A
EM Test AG	EFT Generator	UCS 500 M6	1585	N/A
Hevi-Duty	Transformer 208V-220V 60Hz only “SV KN Kit 12”	HS5F3AS	2209	N/A

Manufacturer	Description	Model	Asset #	Cal Due
VDI, 15-May-11				
Fischer Custom Comm.	Decoupling Network,.15 - 230 MHz	F-203I-DCN	605	N/A
EM Test AG	VDI Generator	UCS 500 M6	1585	N/A
Hevi-Duty	Transformer 208V-220V 60Hz only “SV KN Kit 12”	HS5F3AS	2209	N/A
ESD, 15-May-11				
Schaffner	ESD Gun	NSG-435	1491	2/7/2012
Elliott Laboratories	ESD, Vertical Plane, 19-3/4 x 19-3/4	ESD, VP, 19-3/4 x 19-3/4	1664	N/A
Hevi-Duty	Transformer 208V-220V 60Hz only “SV KN Kit 12”	HS5F3AS	2209	N/A
Surge, 16-May-11				
EMC Partner	Surge	Transient 2000 IN6	2203	8/3/2011

Appendix B Test Data

T83139 Pages 24 - 55

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Emissions Standard(s):	KN22	Class:	A
Immunity Standard(s):	KN24	Environment:	Radio

EMC Test Data

For The

Ubiquiti Networks

Model

AirCam

Date of Last Test: 5/15/2011

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Conducted Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

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: 5/11/2011
Test Engineer: Peter Sales
Test Location: Fremont Chamber #3

Config. Used: 1
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 21 °C
Rel. Humidity: 34 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	CE, AC Power,220V/60Hz	Class A	Pass	54.1dBµV @ 0.169MHz (-24.9dB)

Modifications Made During Testing

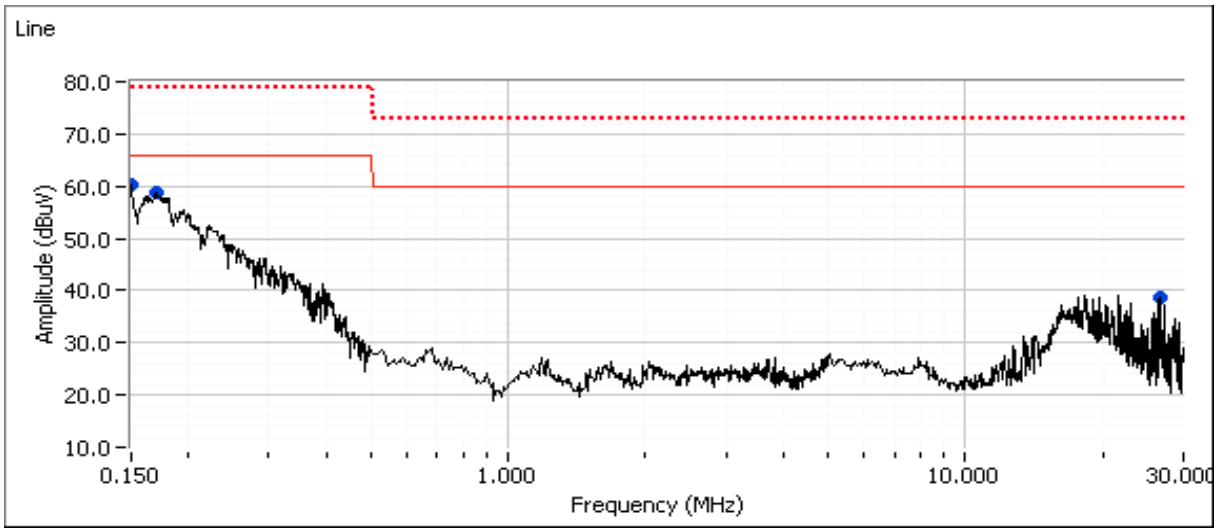
No modifications were made to the EUT during testing

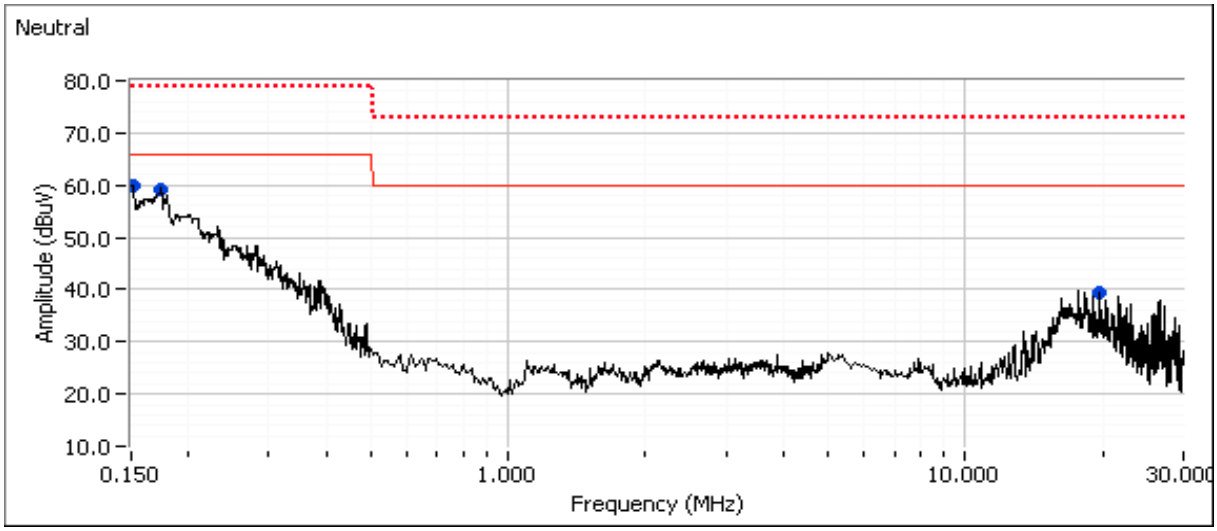
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz





Continue Run #2 next page...

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 220V/60Hz

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

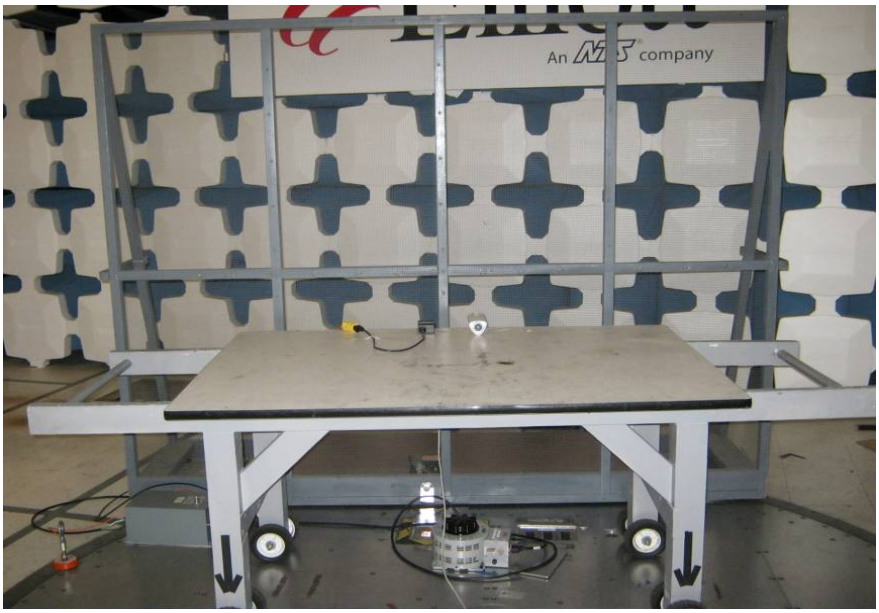
Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.152	60.2	Line 1	66.0	-5.8	Peak	
0.153	59.9	Neutral	66.0	-6.1	Peak	
0.176	59.3	Neutral	66.0	-6.7	Peak	
0.169	58.7	Line 1	66.0	-7.3	Peak	
19.710	39.6	Neutral	60.0	-20.4	Peak	
26.610	38.8	Line 1	60.0	-21.2	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.169	54.1	Line 1	79.0	-24.9	QP	QP (1.00s)
26.610	34.3	Line 1	60.0	-25.7	AVG	AVG (0.10s)
19.710	33.4	Neutral	60.0	-26.6	AVG	AVG (0.10s)
0.176	52.1	Neutral	79.0	-26.9	QP	QP (1.00s)
0.152	52.0	Line 1	79.0	-27.0	QP	QP (1.00s)
0.153	51.3	Neutral	79.0	-27.7	QP	QP (1.00s)
26.610	37.8	Line 1	73.0	-35.2	QP	QP (1.00s)
19.710	37.2	Neutral	73.0	-35.8	QP	QP (1.00s)
0.169	29.0	Line 1	66.0	-37.0	AVG	AVG (0.10s)
0.152	27.0	Line 1	66.0	-39.0	AVG	AVG (0.10s)
0.176	26.6	Neutral	66.0	-39.4	AVG	AVG (0.10s)
0.153	26.2	Neutral	66.0	-39.8	AVG	AVG (0.10s)

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

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: 5/11/2011
Test Engineer: Peter Sales
Test Location: Fremont Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

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: 21 °C
Rel. Humidity: 34 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class A	Pass	37.0dBµV/m @ 189.01MHz (-3.0dB)
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class A	Pass	37.0dBµV/m @ 189.01MHz (-3.0dB)

Modifications Made During Testing

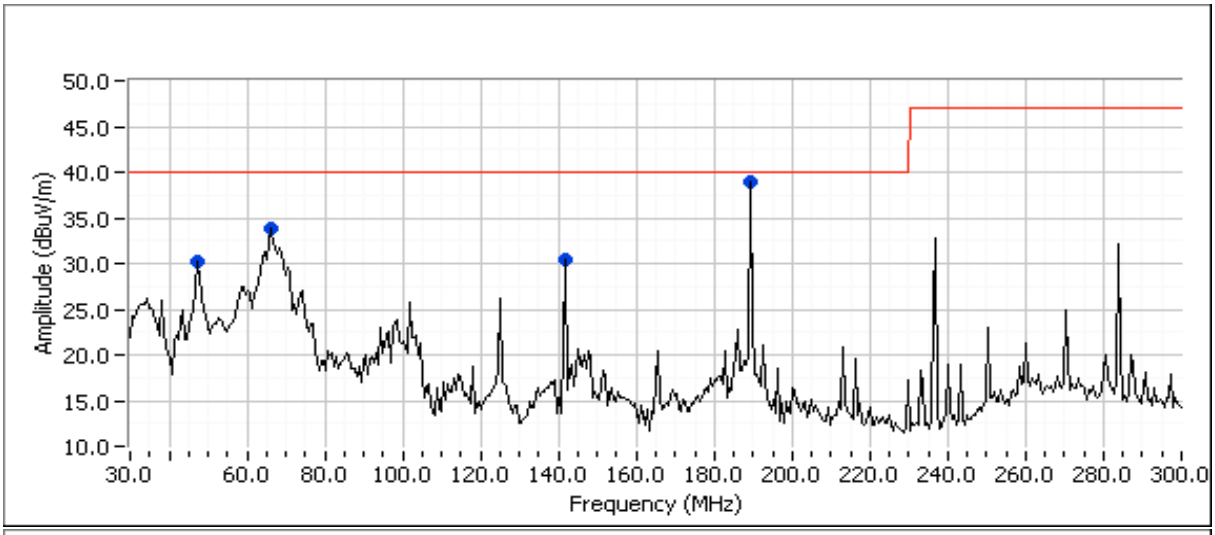
No modifications were made to the EUT during testing

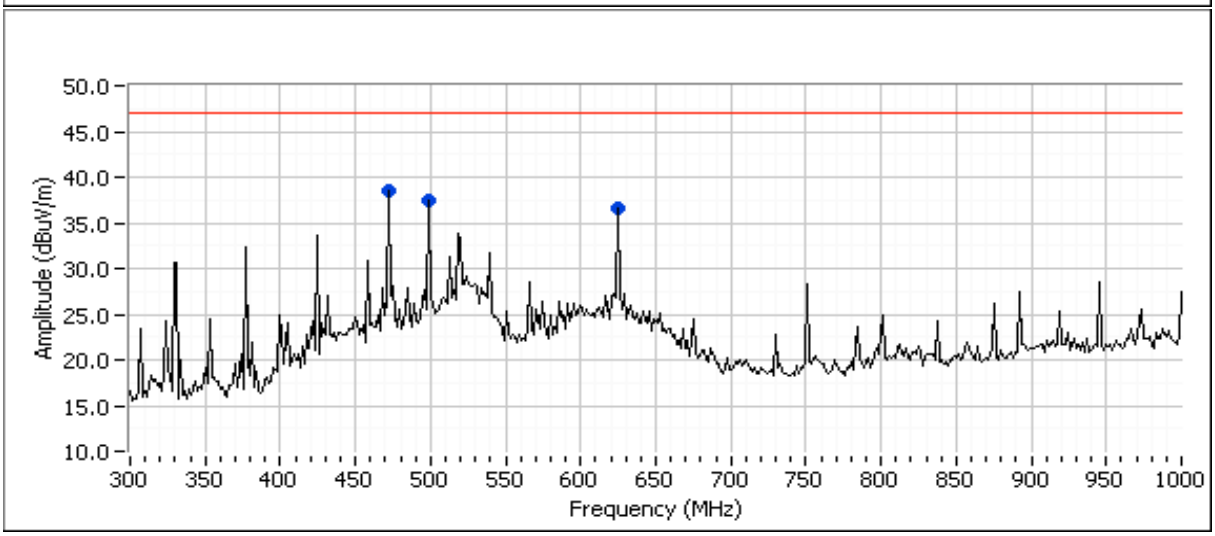
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz
Shielded Ethernet cable on LAN and Ferrite on POE port of Camera





Continue Run #1 next page...

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz (continue)

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	10	10	0.0

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	EN 55022 A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
189.006	38.9	V	40.0	-1.1	Peak	61	1.0	
65.749	33.9	V	40.0	-6.1	Peak	174	1.5	
472.516	38.5	H	47.0	-8.5	Peak	72	2.0	
141.758	30.5	V	40.0	-9.5	Peak	120	1.5	
500.003	37.5	H	47.0	-9.5	Peak	104	1.5	
45.554	30.3	V	40.0	-9.7	Peak	11	2.5	
625.873	36.7	H	47.0	-10.3	Peak	70	1.5	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	EN 55022 A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
189.006	37.0	V	40.0	-3.0	QP	60	1.0	QP (1.00s)
500.003	37.2	H	47.0	-9.8	QP	104	1.5	QP (1.00s)
141.758	28.8	V	40.0	-11.2	QP	119	1.5	QP (1.00s)
65.749	28.6	V	40.0	-11.4	QP	174	1.5	QP (1.00s)
472.516	35.5	H	47.0	-11.5	QP	72	2.0	QP (1.00s)
625.873	22.7	H	47.0	-24.3	QP	70	1.5	QP (1.00s)

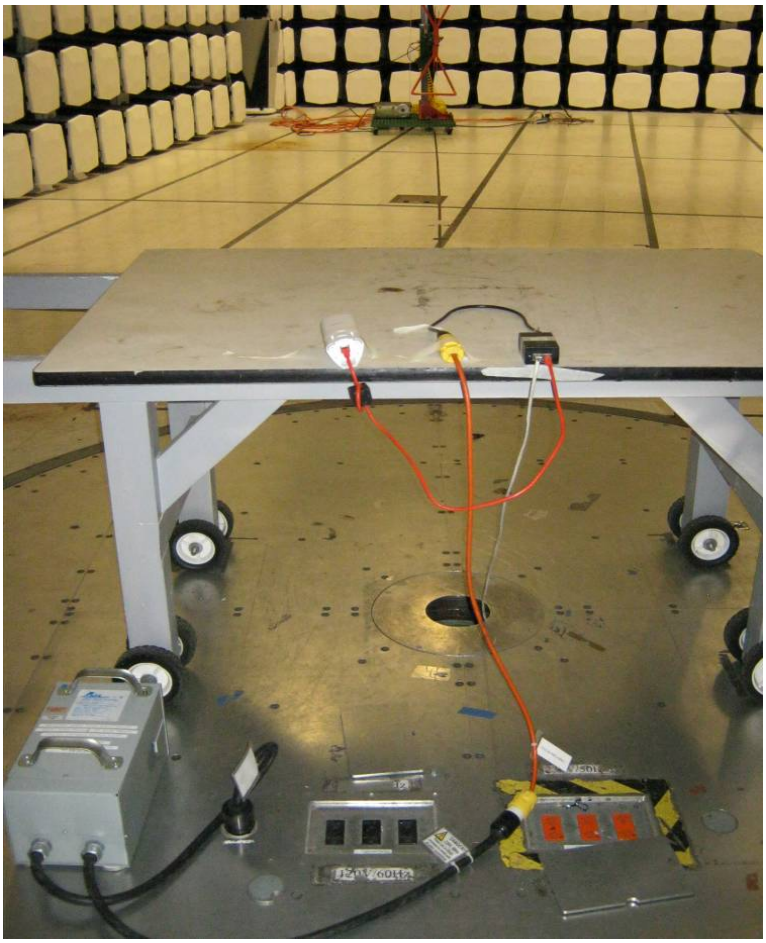
Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	10	10	0.0

Frequency	Level	Pol	EN 55022 A		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
189.006	37.0	V	40.0	-3.0	QP	60	1.0	QP (1.00s)
500.003	37.2	H	47.0	-9.8	QP	104	1.5	QP (1.00s)
141.758	28.8	V	40.0	-11.2	QP	119	1.5	QP (1.00s)
65.749	28.6	V	40.0	-11.4	QP	174	1.5	QP (1.00s)
472.516	35.5	H	47.0	-11.5	QP	72	2.0	QP (1.00s)
625.873	22.7	H	47.0	-24.3	QP	70	1.5	QP (1.00s)

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Standard:	KN22	Class:	A

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Electrostatic Discharge (KN 61000-4-2)

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: 5/15/2011 10:13 Config. Used: 1
Test Engineer: Chris Groat Config Change: none
Test Location: Fremont EMC Lab #1 EUT Voltage: 220V/60Hz

General Test Configuration

For table-top equipment, the EUT and all local support equipment were located on a 0.5-mm thick insulating layer above a horizontal coupling plane, 80 cm above a ground reference plane.

Unless otherwise stated, ten discharges at each voltage, and polarity, were applied to each test point listed. Contact discharges were applied to coupling planes and conductive surfaces of the EUT. Air discharges were applied to any non-conductive surfaces of the EUT. The VCP was located on the table top for table top devices and 80cm above the ground plane for floor standing equipment.

The determination as to the test point being a part of a conductive or non-conductive surface was based on the manufacturer's declaration.

Ambient Conditions:

Temperature: 21 °C
Relative Humidity: 33 %
Pressure: 1016 mb

Summary of Results - Electrostatic Discharges

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	4kV CD 8kV AD	4kV CD 8kV AD	B	A / Pass	Refer to Individual Run

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:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: Electrostatic Discharge

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		

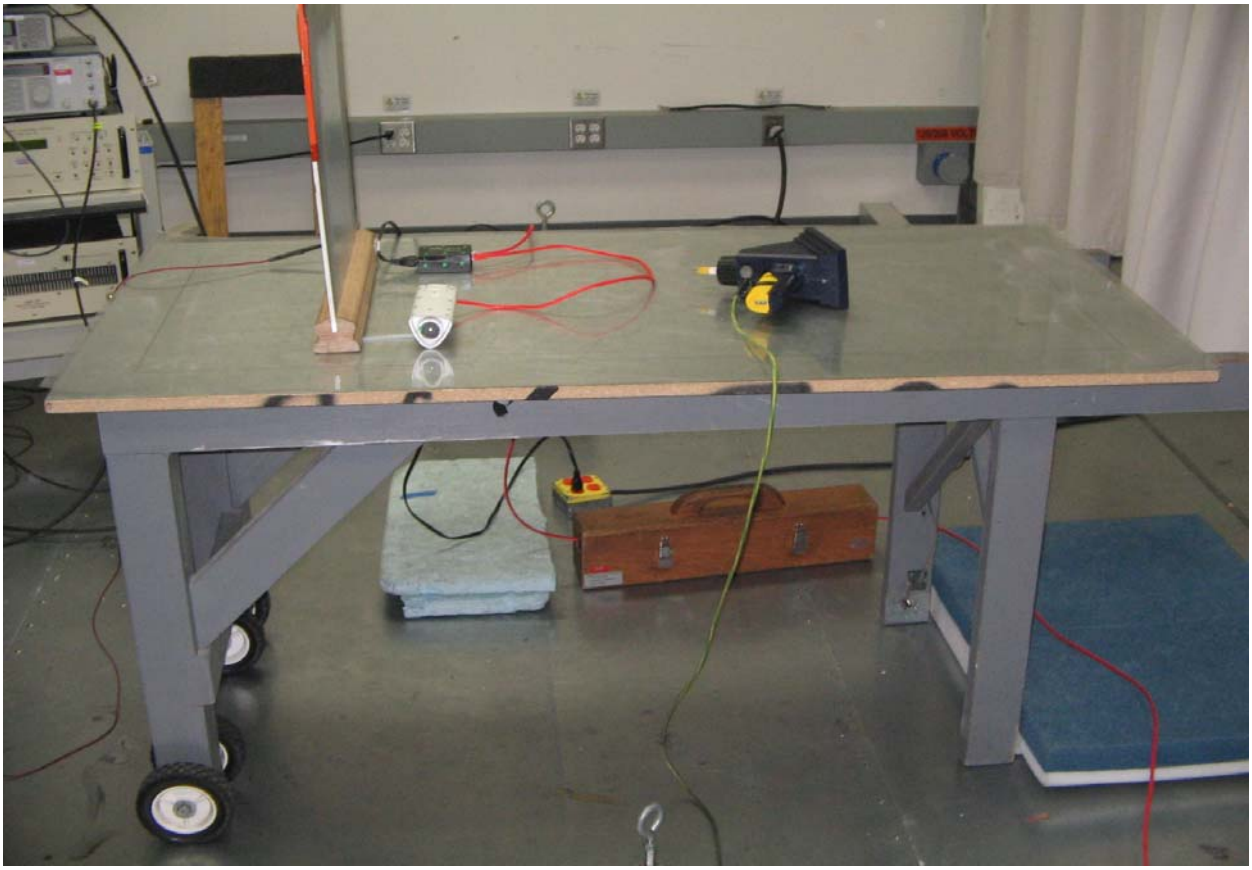
Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Air Cam	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
POE Injector								
POE Port	X	X			X	X		
LAN Port	X	X			X	X		

Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Air Cam								
Top Side	ND	ND	ND		ND	ND	ND	
Left Side	ND	ND	ND		ND	ND	ND	
Right Side	ND	ND	ND		ND	ND	ND	
Back Side	ND	ND	ND		ND	ND	ND	
Front Side	ND	ND	ND		ND	ND	ND	
POE Injector								
AC Power Input	ND	ND	ND		ND	ND	ND	
Top Side	ND	ND	ND		ND	ND	ND	
Left Side	ND	ND	ND		ND	ND	ND	
Right Side	ND	ND	ND		ND	ND	ND	
Back Side	ND	ND	ND		ND	ND	ND	
Front Side	ND	ND	ND		ND	ND	ND	

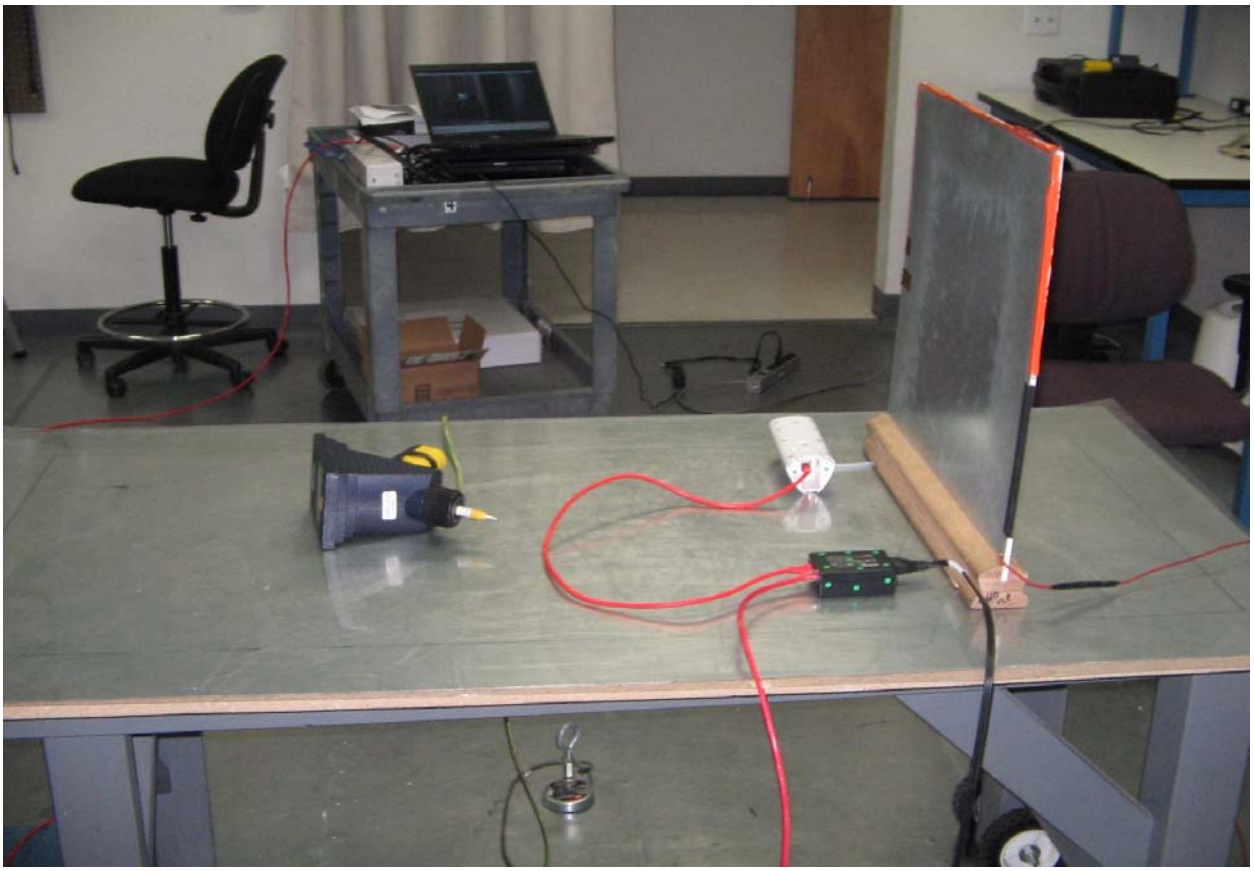
Note: An "X" indicates that the unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Radiated Immunity (KN 61000-4-3)

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: 5/13/2011 16:03 Config. Used: 1
Test Engineer: Hong Stenerson Config Change: None
Test Location: Fremont Chamber #1 EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 33 %

Summary of Results-Radiated Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	

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:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: Radiated Immunity, 80-1000 MHz (KN61000-4-3)

Frequency:	80-1000 MHz
Step Size:	1 %
Dwell time:	2874 ms
Field Uniformity:	1.5m x 1.5m
Test Distance:	2.5

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%

Frequency	Level	Front		Left Side		Rear		Right		Top		Bottom	
Range (MHz)	V/m	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

Test files used for this run:
The following calibration files from U:\EMC Stuff\RI Playback Files FT\CH1\80-1000 MHz\80-1000 MHz (Oct 2010)\ were used:
2.5m tip of Antenna to the field 1.55m High 80 MHz - 1000 MHz H 3Vm.crf
2.5m tip of Antenna to the field 1.55m High 80 MHz - 1000 MHz V 3Vm.crf

Note:	An "X" indicates that the unit continued to operate as intended. The video stream was display on the laptop screen continuously during the entire test session

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Electrical Fast Transient/Burst (EFT/B) (KN 61000-4-4)

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: 5/15/2011 10:13 Config. Used: 1
Test Engineer: Chris Groat Config Change: none
Test Location: Fremont EMC Lab #1 EUT Voltage: 220V/60Hz

General Test Configuration

The EUT system was located 10 cm above a ground reference plane. A 0.5m long power cord was used between the EUT's power port and the coupling/decoupling network. Interference was coupled onto the cables connected to the ports identified in the test data tables using the capacitive trench, with a maximum length of 0.5m of cable between the interface port and the trench.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 33 %

Summary of Results

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	AC Power	± 1 kV	± 1 kV	B	A / Pass	Refer to Individual Run

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:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: EFT/B Testing

Test Parameters	
Waveform: 5 ns / 50 ns	Burst Period: 300 ms
Repetition Frequency: 5 kHz (2.5 kHz @ 4 kV)	Burst Width: 15 ms

Applied Location	Positive Polarity (kV)				Negative Polarity (kV)			
Power Line	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
AC Power Port(s)	0.5	1.0	2.0	4.0	0.5	1.0	2.0	4.0
Line + Neutral + Protective Earth *(3-Wire AC Power Port)*	X	X			X	X		

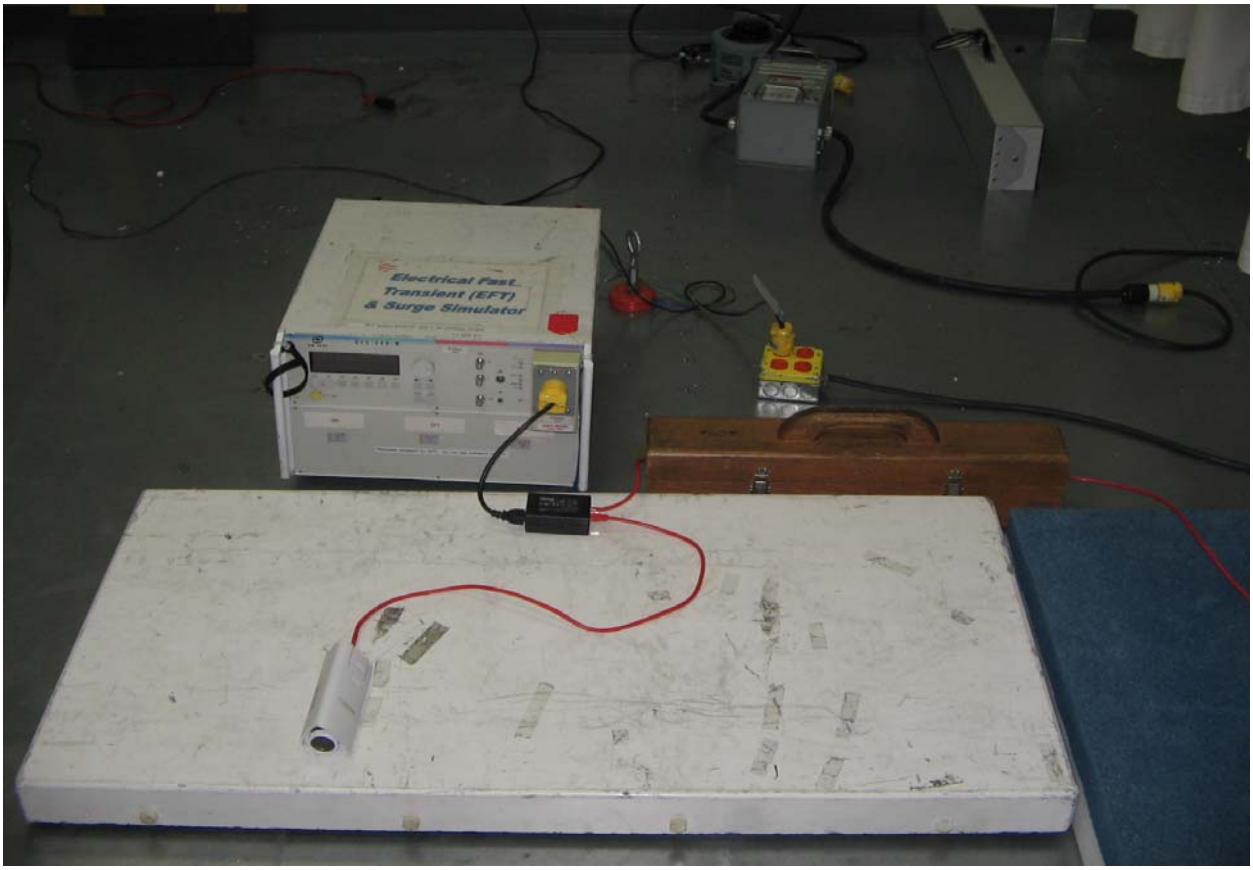
I/O Port	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
	0.25	0.5	1.0	2.0	0.25	0.5	1.0	2.0
none								

Note:	An "X" indicates that the unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.
Note:	The ports are intended to connect to cables less than 3m in length and the product standard only requires the test to be performed on cables exceeding 3m in length. Manufacvturer states that these cables are to be less than 3 meters.
Note 1:	The interface cables for the I/O ports tested were routed through the capacitive trench and tested simultaneously.

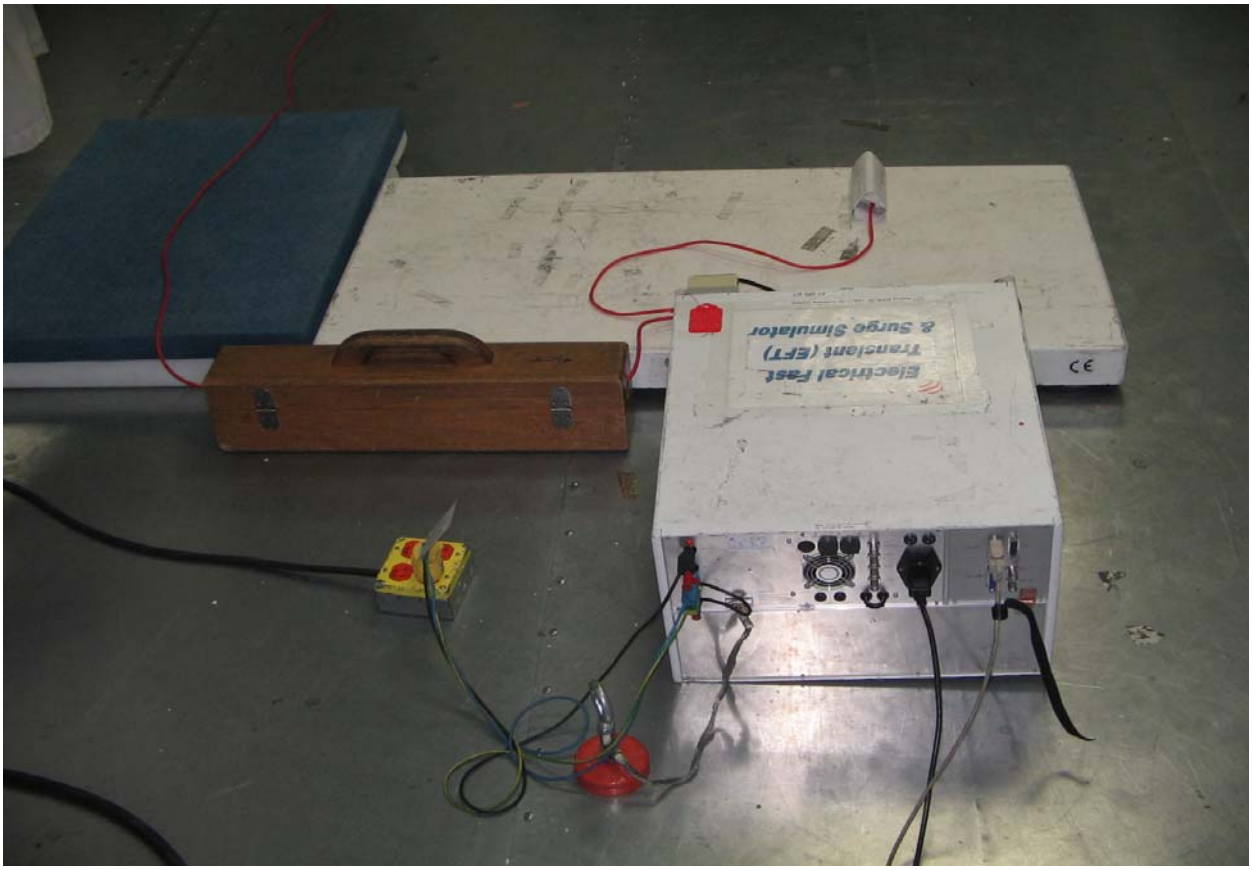
The following interface ports were not tested:

Port(s)	Reason
LAN, POE	The ports are intended to connect to cables less than 3m in length and the product standard only requires the test to be performed on cables exceeding 3m in length.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Surge (KN 61000-4-5)

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: 5/16/2011 13:13 Config. Used: 1
Test Engineer: David Bare Config Change: None
Test Location: Fremont EMC Lab #1 EUT Voltage: 220V, 60Hz

General Test Configuration

The EUT and all local support equipment were located on a bench.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 34 %

Summary of Results

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	AC Power	± 2 kV CM ± 1 kV DM	± 2 kV CM ± 1 kV DM	B	A / Pass	

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:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: Surge Immunity, Power Line

AC Power Port

Test Parameters
Waveform: 1.2/50µS
Impedance: 12 Ohms (Common Mode), 2 Ohms (Differential Mode)

Applied Location	Positive Polarity (kV)				Negative Polarity (kV)			
Power Line	Level 1 0.5	Level 2 1.0	Level 3 2.0	Level 4 4.0	Level 1 0.5	Level 2 1.0	Level 3 2.0	Level 4 4.0
Line to Line (Differential Mode)								
0°	x	x			x	x		
90°	x	x			x	x		
180°	x	x			x	x		
270°	x	x			x	x		
Line to PE (Common Mode)								
0°	x	x	x		x	x	x	
90°	x	x	x		x	x	x	
180°	x	x	x		x	x	x	
270°	x	x	x		x	x	x	
Neutral to PE (Common Mode)								
0°	x	x	x		x	x	x	
90°	x	x	x		x	x	x	
180°	x	x	x		x	x	x	
270°	x	x	x		x	x	x	

Note: An "X" indicates that the unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Conducted Immunity (KN 61000-4-6)

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: 5/15/2011 10:13 Config. Used: 1
Test Engineer: Chris Groat Config Change: none
Test Location: Fremont EMC Lab #1 EUT Voltage: 220V/60Hz

General Test Configuration

The EUT and all local support equipment were placed on an insulating support 10 cm above a ground reference plane. All interface cables between parts of the EUT (for equipment comprising several units) and to local support equipment were also placed on the insulating support. All interface cabling between the EUT and the coupling and decoupling network(s) were located 3 to 5 cm above the ground reference plane.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 34 %

Summary of Results - Conducted Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	AC power	0.15-80MHz 1kHz 80% AM 3 Vrms	0.15-80MHz 1kHz 80% AM 3 Vrms	A	A / Pass	Refer to Individual Run

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:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: Conducted Susceptibility (KN61000-4-6)

Test Level:	3 Vrms
Step Size:	1 %
Dwell time:	2874 ms

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%

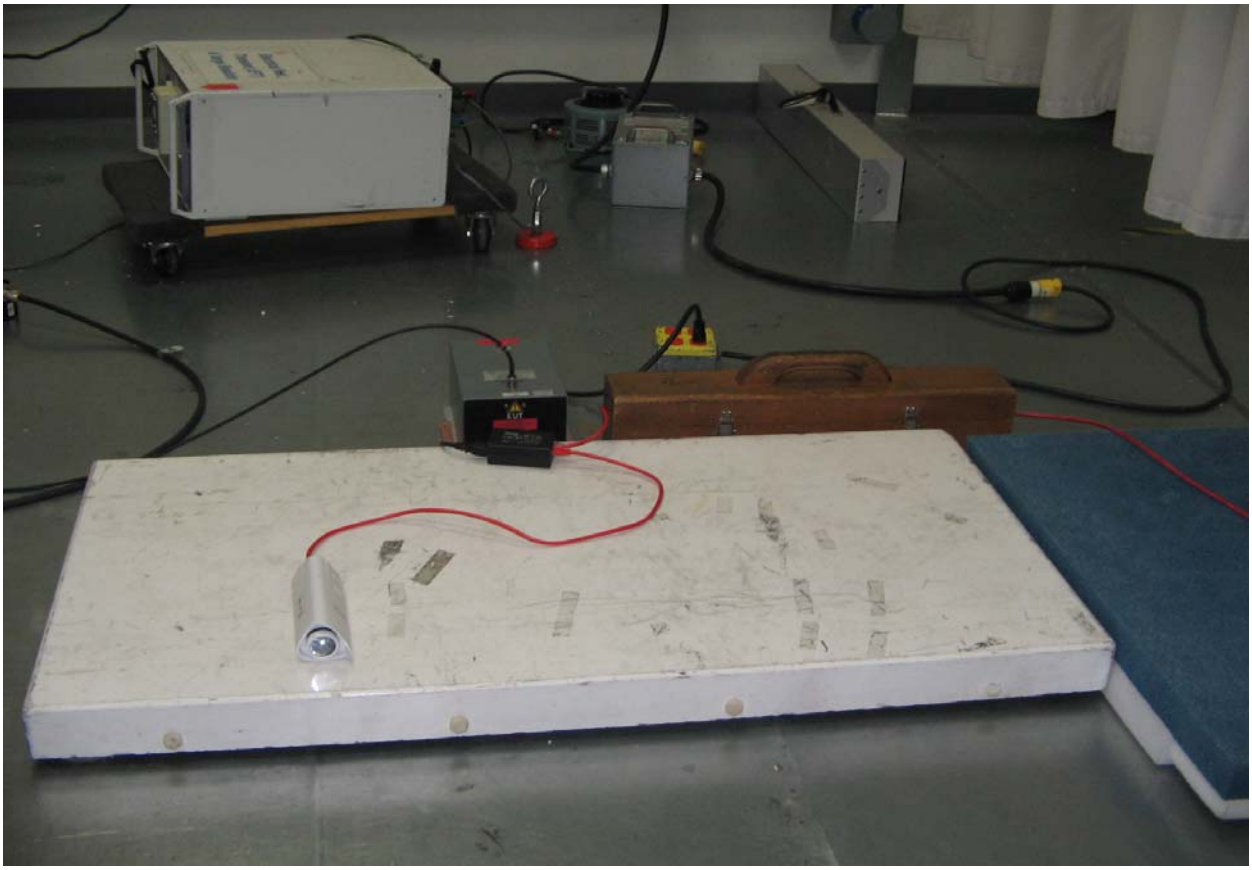
Frequency Range MHz	Port Under Test	Injection Method	Comments
0.15 - 80	AC Power	M3 CDN	The unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.

Note:	
Note 1:	As the EUT was telecommunications terminal equipment, functional checks of the system were made at the spot frequencies detailed in KN24 in accordance with Annex A of the standard.

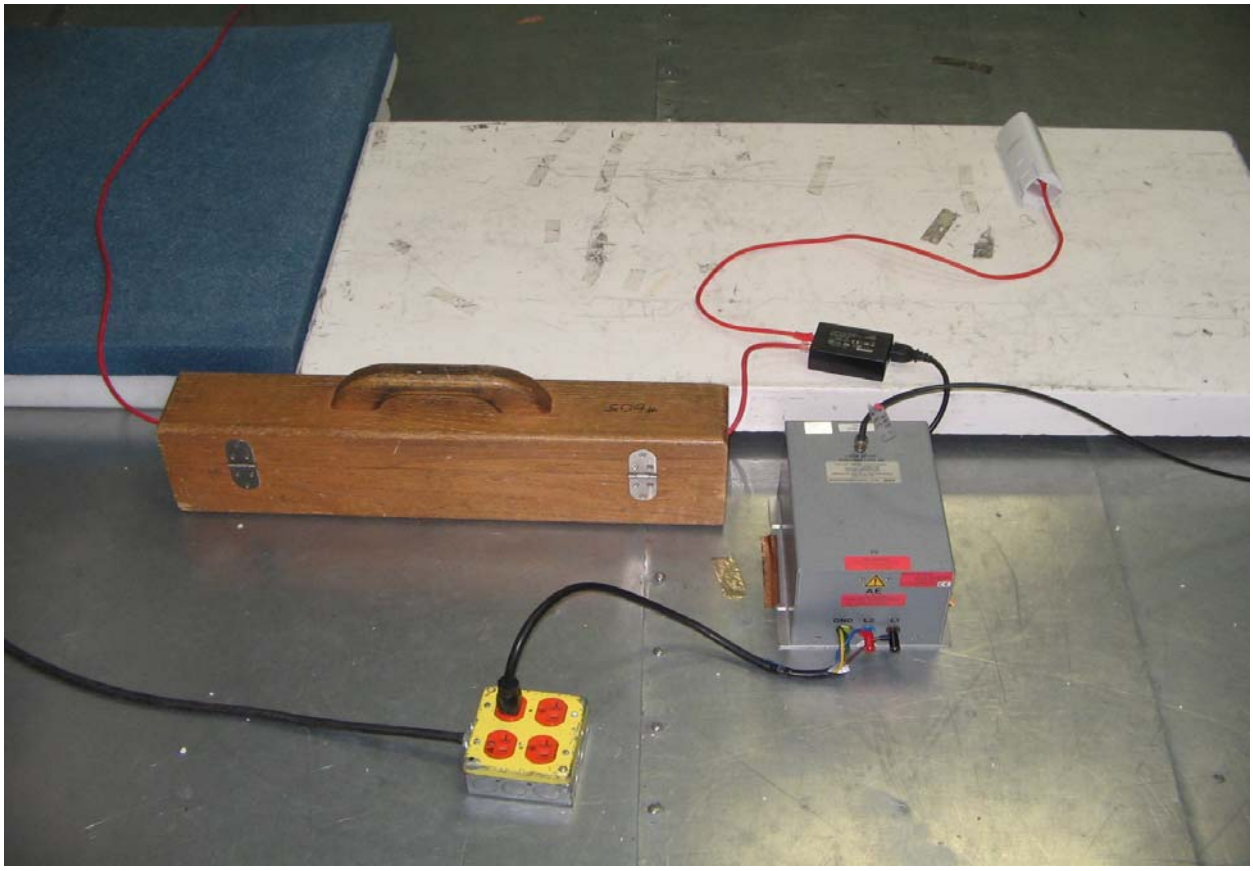
The following interface ports were not tested:

Port(s)	Reason
LAN, POE	The ports are intended to connect to cables less than 3m in length and the product standard only requires the test to be performed on cables exceeding 3m in length. Manufacvturer states that these cables are to be less than 3 meters.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio



Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Voltage Dips and Interrupts (KN 61000-4-11)

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: 5/15/2011 10:13 Config. Used: 1
Test Engineer: Chris Groat Config Change: none
Test Location: Fremont EMC Lab #1 EUT Voltage: 220V/60Hz & 230V/50Hz

General Test Configuration

The EUT and all local support equipment were located on a non-conductive bench.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 34 %

Summary of Results

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	AC power	>95% ½ period	>95% ½ period	B	A / Pass	220V/60Hz nominal (½ period at 60Hz = 8.33 ms)
1	AC power	30% 30 periods	30% 30 periods	C	A / Pass	220V/60Hz nominal (30 periods at 60 Hz = 500 ms)
1	AC power	>95% 300 periods	>95% 300 periods	C	C / Pass	220V/60Hz nominal (300 periods at 60 Hz = 5 sec)

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.

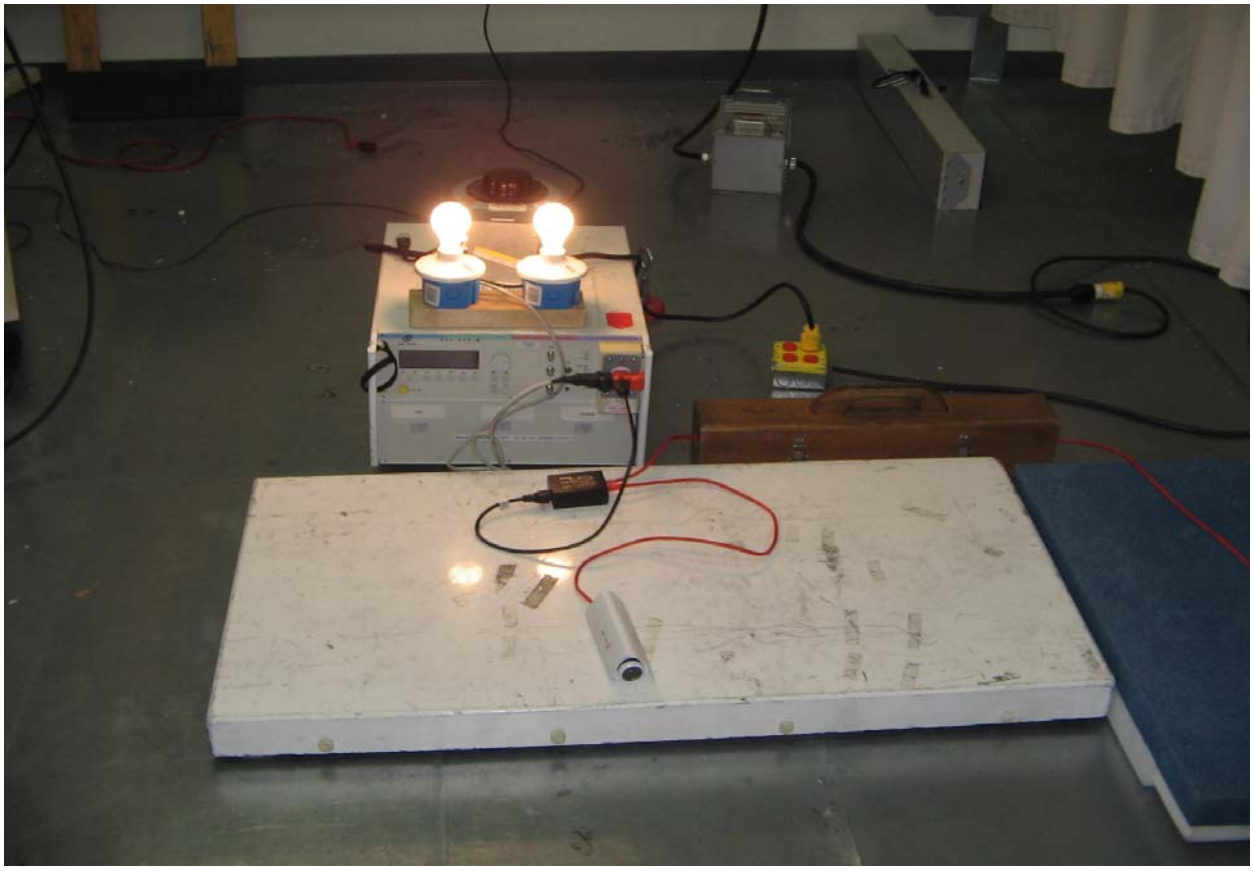
Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

Run #1: Voltage Dips and Interrupts

Nominal Operating Voltage of EUT:	220 Volts	60 Hz

Voltage Dips/Time % / ms or % / periods	Port Under Test	Interrupt Voltage	Comments
>95% ½ period	AC Power	0	The unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.
30% 30 periods	AC Power	154	The unit continued to operate as intended.. The video stream was continuously displayed on the PC laptop. There was no loss of video stream reported by the monitoring software.
>95% 300 periods	AC Power	0	The unit stopped and rebooted. The video stream stopped(froze) being displayed on the PC laptop. Operator intervention was needed to restart the PC Laptop video stream There was a loss of video stream reported by the monitoring software.

Client:	Ubiquiti Networks	Job Number:	J83025
Model:	AirCam	T-Log Number:	T83139
		Account Manager:	Susan Pelzl
Contact:	Jennifer Sanchez		
Immunity Standard(s):	KN24	Environment:	Radio

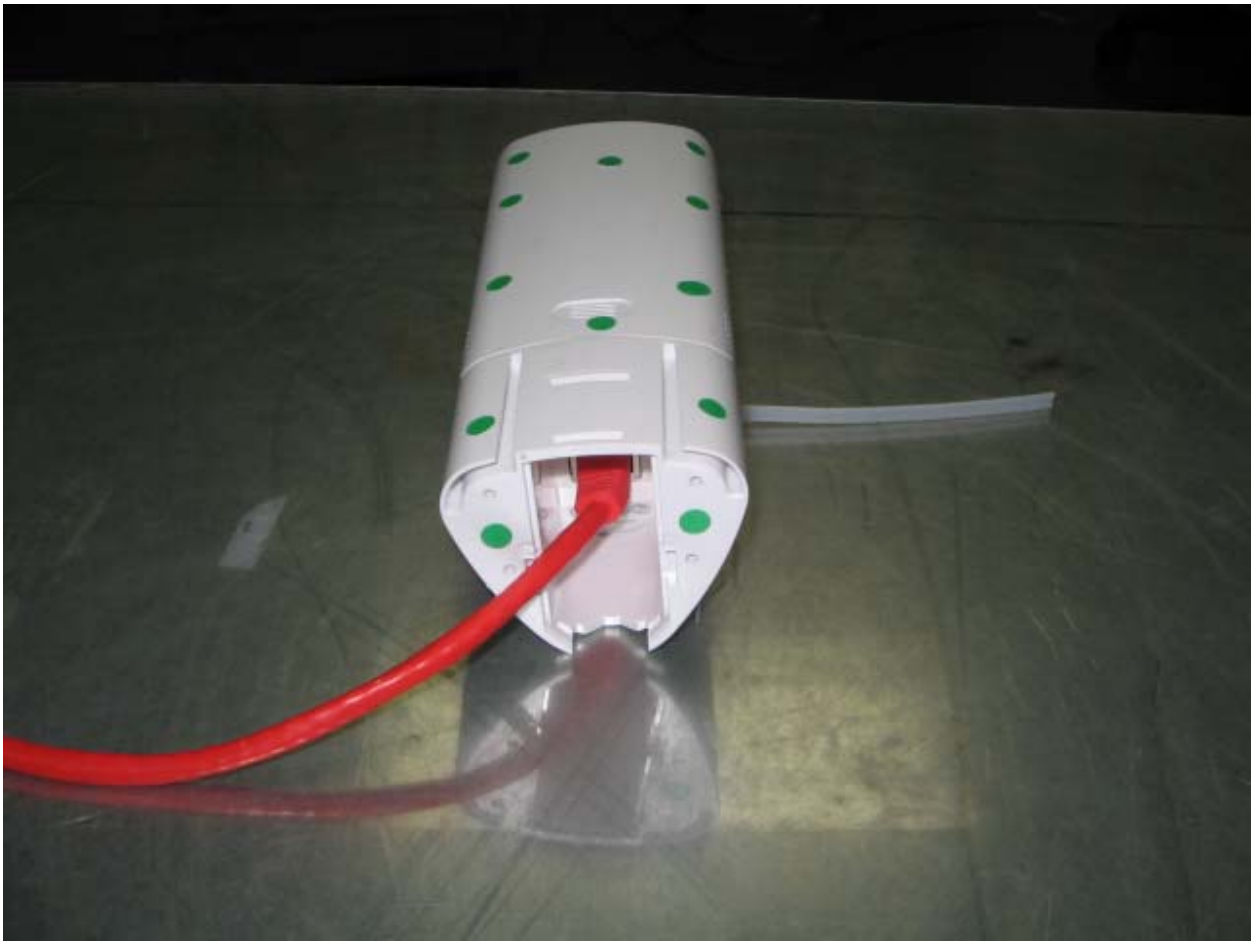


Appendix C ESD Test Points Photographs

ESD Test Points Photographs – Front of AirCam Unit

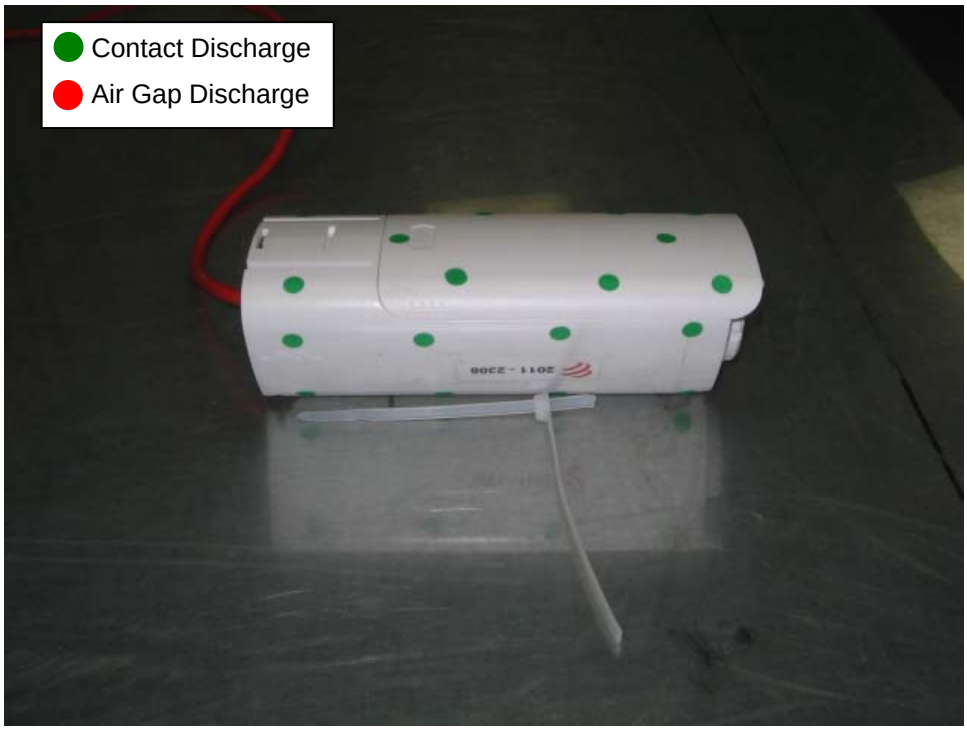
Contact Discharge
Air Gap Discharge

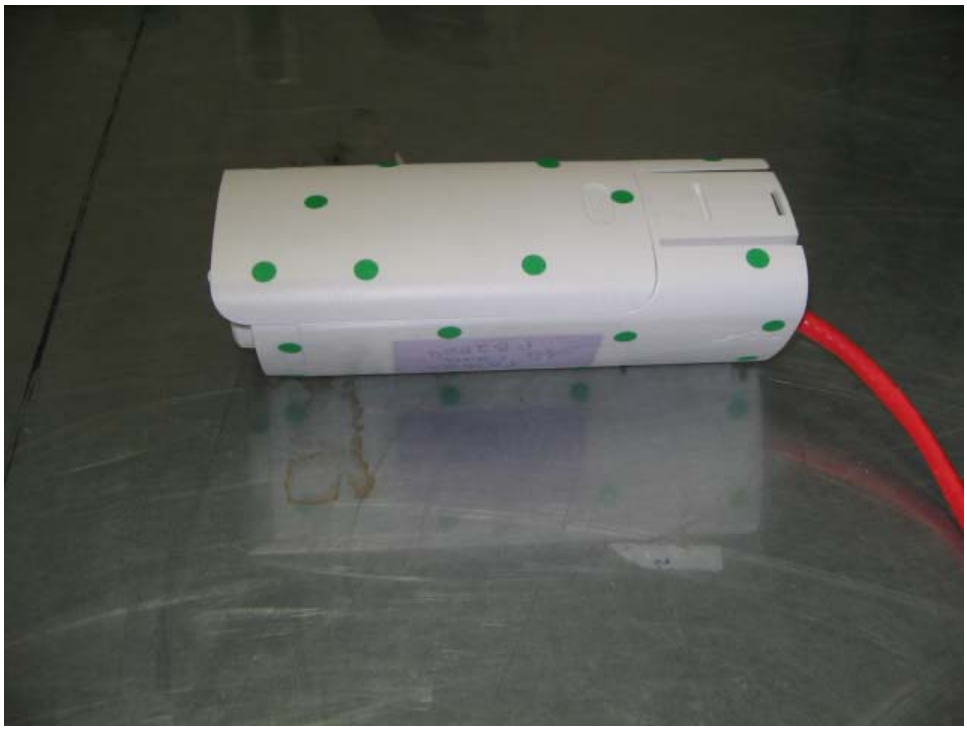
ESD Test Points Photographs – Rear of AirCam Unit



Contact Discharge
Air Gap Discharge

ESD Test Points Photographs – Sides of AirCam Unit





Contact Discharge
Air Gap Discharge

ESD Test Points Photographs – Front of POE Unit

Contact Discharge
Air Gap Discharge

ESD Test Points Photographs – Rear of POE Unit

Contact Discharge
Air Gap Discharge

ESD Test Points Photographs – Sides of POE Unit

End of Report

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