



**EN 301 489-17 v2.1.1  
EN 55022:2006 + A1:2007**

**TEST REPORT**

**FOR**

**802.11b/g/n 1x2 SISO NETWORKING DEVICE**

**MODEL NUMBER: UNIFI AP MINI**

**REPORT NUMBER: 11U14006-4**

**ISSUE DATE: FEBRUARY 8, 2012**

*Prepared for*  
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*Prepared by*  
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**NVLAP LAB CODE 200065-0**

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02-08-12	Initial Issue	S. Leitner

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** UBIQUITI NETWORKS  
91 E. TASMAN DRIVE,  
SAN JOSE, CA 95134, USA

**EUT DESCRIPTION:** 802.11 b/g/n 1X2 SISO NETWORKING DEVICE

**MODEL:** UniFi AP Mini and UBI-POE-24-1

**SERIAL NUMBER:** 1145T002722A41C52 and 1101-0009610

**DATE TESTED:** NOVEMBER 11, 2011 - JANUARY 30, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
EN 55022:2006 + A1:2007	Pass
EN 301 489-17 v2.1.1	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Tested By:



STEVE LEITNER  
EMC SUPERVISOR  
UL CCS

STEVE AGUILAR  
EMC TECHNCIAN  
UL CCS

## 2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented in EN 301 489-1 v1.8.1 as referenced by EN 301 489-17 v2.1.1, as well as EN 55022:2006 + A1:2007.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is a Wi-Fi access point with an 802.11b/g/n SISO transceiver. The EUT includes Ubiquiti Networks Model UBI-POE-24-1 POE Adapter.

### **5.2. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes an internal antenna, with a maximum gain of 3 dBi.

### **5.3. SOFTWARE AND FIRMWARE**

The EUT firmware was AirOS v5.5.

### **5.4. WORST-CASE MODE FOR EMISSIONS TESTS**

The worst-case channel is determined as the channel with the highest output power. Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power.

All emissions tests were made in the 802.11g mode, HT40.

The EUT had to two mounting positions: installation on a wall and ceiling. These two positions were investigated and it was found that ceiling-mounted orientation was worst-case. Final testing was performed with the EUT orientated as ceiling-mounted (flat on the table). All emission tests were performed with the manufacturer-supplied Cat 6 shielded cables.

### **5.5. WORST-CASE MODE FOR IMMUNITY TESTS**

The EUT was tested in the mode set by default when linked with a laptop PC by wire and wirelessly. All immunity tests were performed with manufacturer-supplied shielded Cat 6 cables.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Laptop	Dell	Vostro 1520	365517273309.00
AC/DC Adapter	Dell	N6M8J	CN-0N6M8J-48661-07Q-23SY-A00
Laptop	Dell	Vostro 1510	36517273309
AC/DC Adapter	Dell	YD637	CN-0YD637-71616-9AC-069D

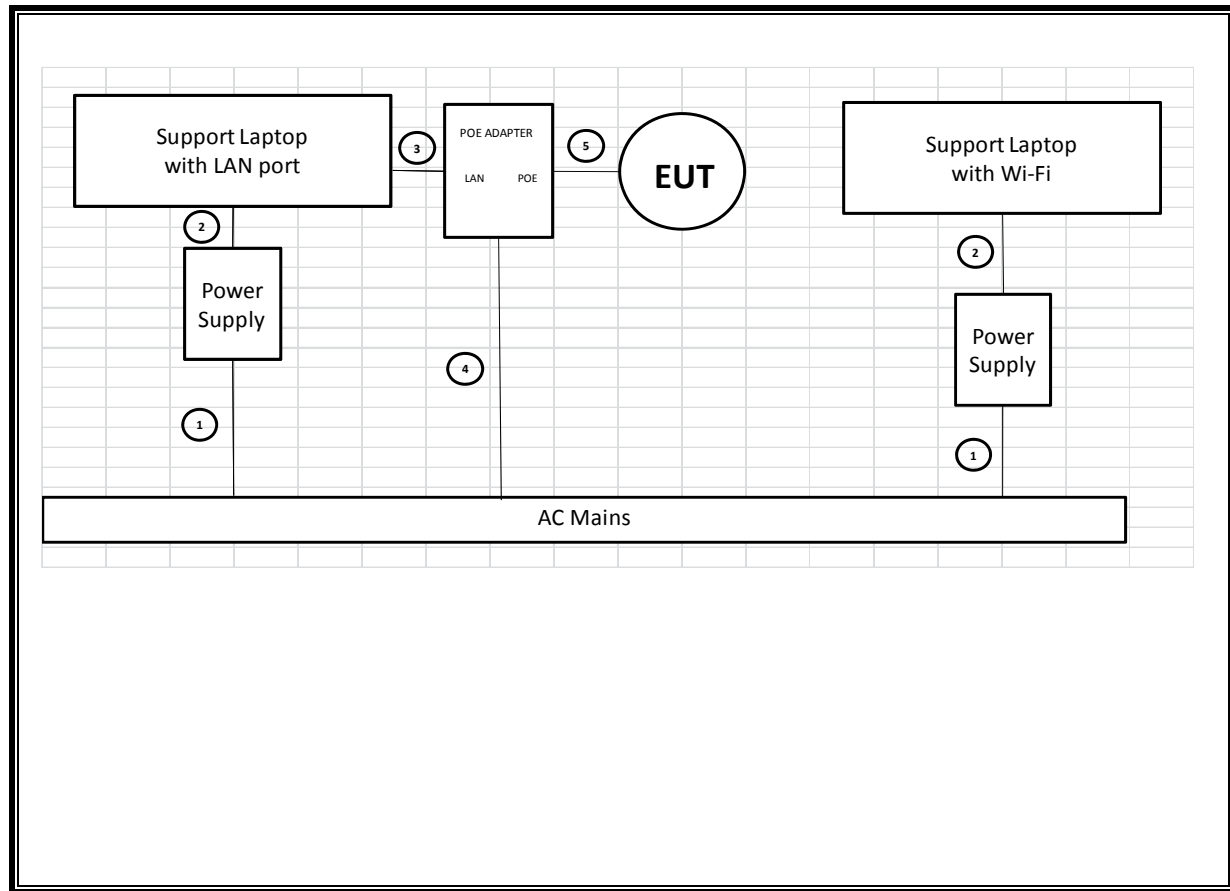
### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	Parallel blade	Unshielded	0.8 m	N/A
2	DC	2	Barrel	Unshielded	1 m	Ferrite at Laptop
3	WLAN	1	RJ45	Shielded	4 m	CAT 6
4	AC	1	USA115VAC	Unshielded	0.5 m	N/A
5	PoE	1	RJ45	Shielded	2 m	CAT 6

### TEST SETUP

The EUT was connected to a support laptop PC and powered by the PoE adapter during the tests. Pinging was used to monitor the wireless link between the support laptop PC wired to the EUT and a remotely located support laptop PC. In this way, data was transmitted wirelessly through the EUT.

## SETUP DIAGRAM





## 6. EMISSIONS LIMITS AND RESULTS

### 6.1. RADIATED EMISSIONS

#### LIMITS

EN 55022

**Table 5 – Limits for radiated disturbance of class A ITE  
at a measuring distance of 10 m**

Frequency range MHz	Quasi-peak limits dB( $\mu$ V/m)
30 to 230	40
230 to 1 000	47
NOTE 1 The lower limit shall apply at the transition frequency.	
NOTE 2 Additional provisions may be required for cases where interference occurs.	

#### TEST PROCEDURE

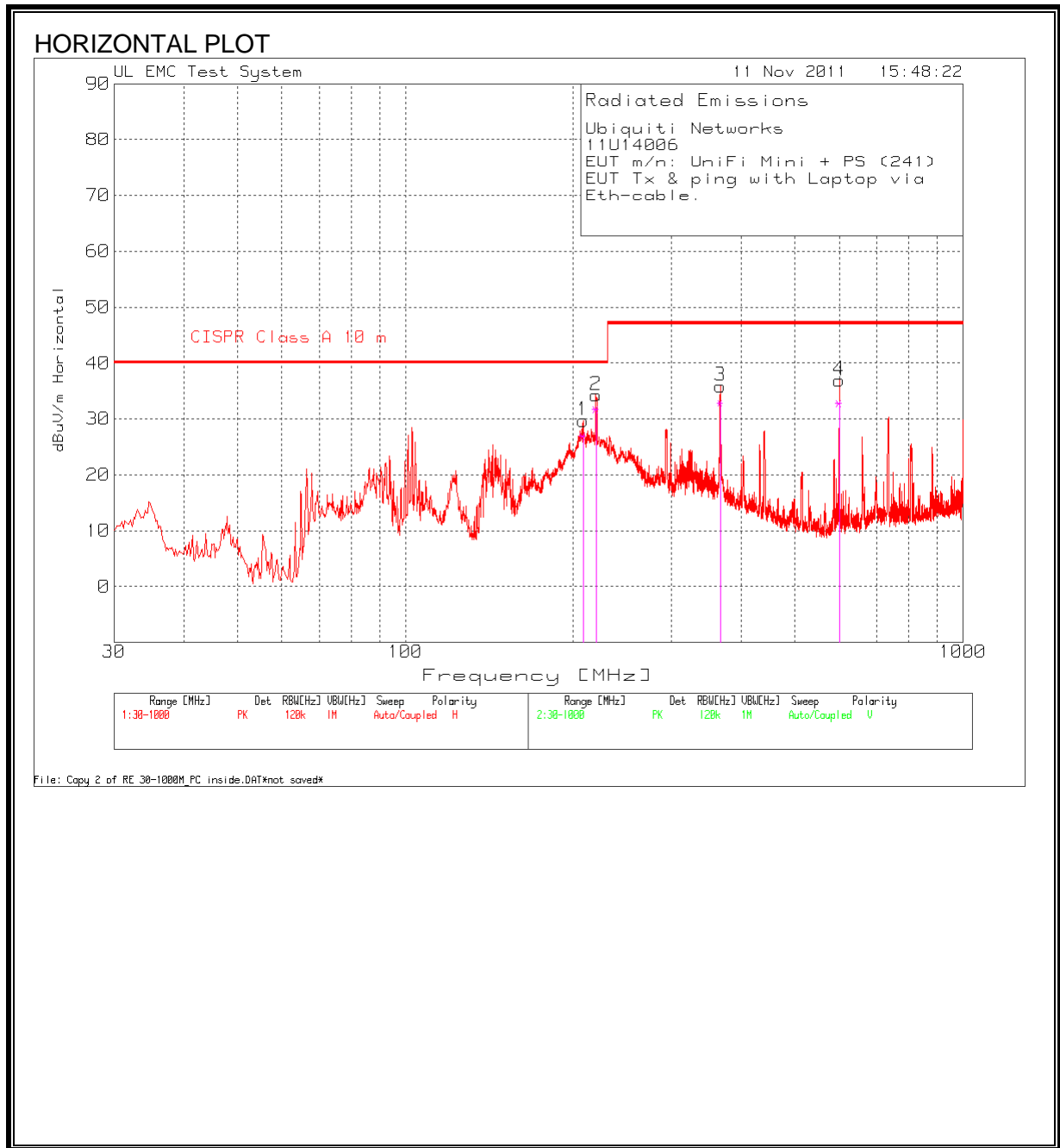
EN 55022

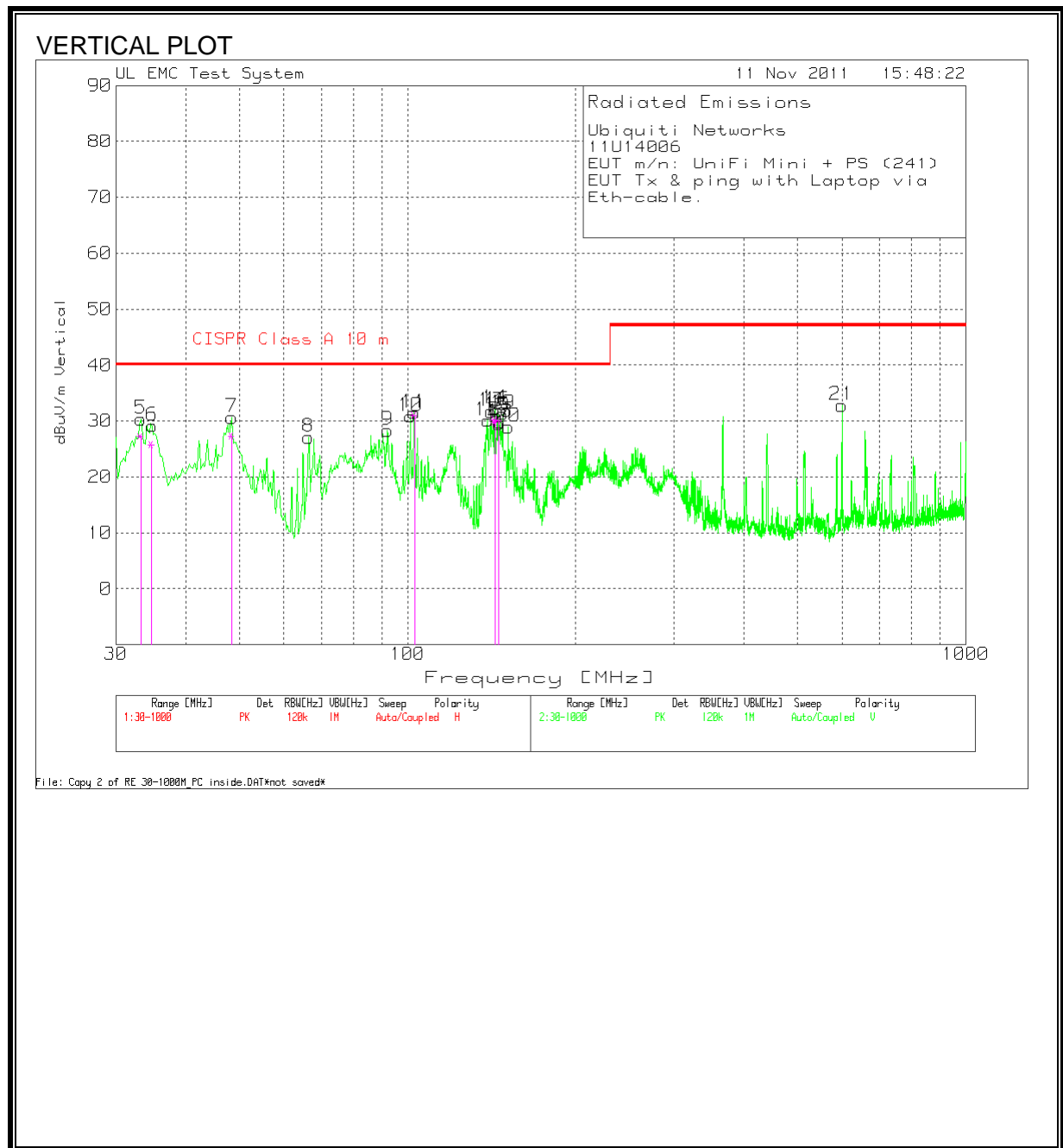
The highest clock frequency generated or used in the EUT is 40 MHz, therefore the frequency range was investigated from 30 MHz to 1000 MHz.

#### TEST AND MEASUREMENT EQUIPMENT

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	4/28/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00945	10/6/2012
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	7/12/2012
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	1/27/2012
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	7/16/2012

**RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)**





# HORIZONTAL AND VERTICAL SUMMARY DATA

Ubiquiti Networks											
11U14006											
EUT m/n: UniFi Mini + PS (241)											
EUT Tx & ping with Laptop via STP Eth cable											
O. Su											
Test Frequency	Meter Reading	Detector	5m Cable [dB]	5m T64 PreAmp [dB]	5m T122 Bilog [dB]	10m to 3m Conversion [dB]	dBuV/m	CISPR Class A 10 m limit	QP Margin	Height [cm]	Polarity
208.3373	54.68	PK	1.6	-28.1	12	-10.5	29.68	40	-10.32	100	Horz
219.5803	59.36	PK	1.6	-28.1	11.9	-10.5	34.26	40	-5.74	100	Horz
367.484	57.75	PK	2.1	-27.9	14.4	-10.5	35.85	47	-11.15	100	Horz
599.9041	53.6	PK	2.7	-27.3	18.4	-10.5	36.9	47	-10.1	200	Horz
102.6918	58.68	PK	1.1	-28.2	10.4	-10.5	31.48	40	-8.52	100	Vert
141.0731	55.92	PK	1.2	-28.1	13.2	-10.5	31.72	40	-8.28	100	Vert
143.2054	56.63	PK	1.2	-28.1	13	-10.5	32.23	40	-7.77	100	Vert
145.1439	56.24	PK	1.3	-28.1	12.9	-10.5	31.84	40	-8.16	100	Vert
PK - Peak detector											
QP - Quasi-Peak detector											

## 6.2. AC MAINS LINE CONDUCTED EMISSIONS

### LIMIT

EN 301 489-1 Clause 8.4.3

The equipment shall meet the class B limits given in EN 55022.

**Table 2 – Limits for conducted disturbance at the mains ports  
of class B ITE**

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

### TEST PROCEDURE

EN 55022

### TEST AND MEASUREMENT EQUIPMENT

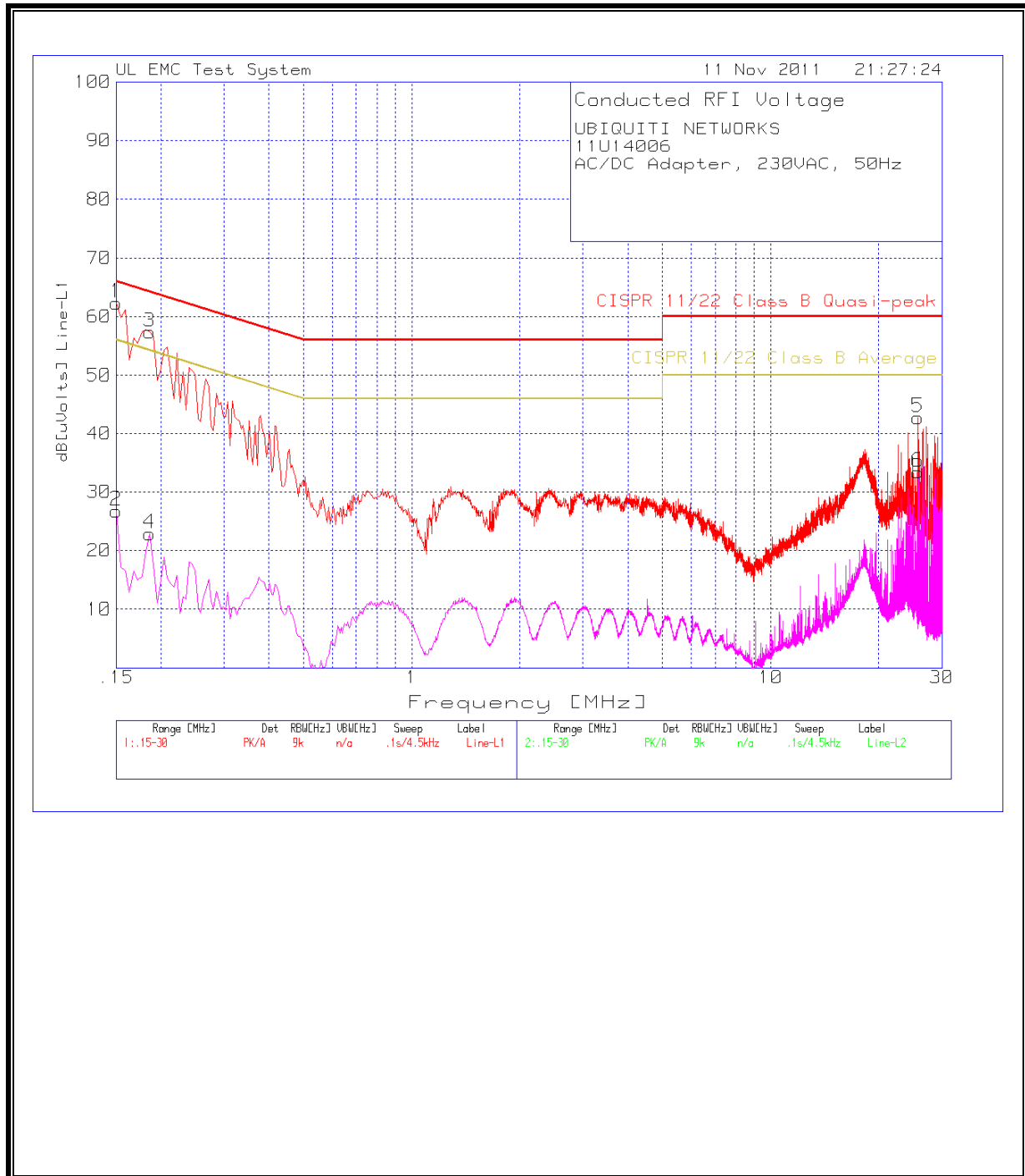
TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> EMI Test Receiver	R & S	ESHS 20	827129/006	06/05/2012
<input checked="" type="checkbox"/> LISN, 10 kHz - 30 MHz	FCC	LISN50/250-25-2	2023	12/13/2012

## RESULTS

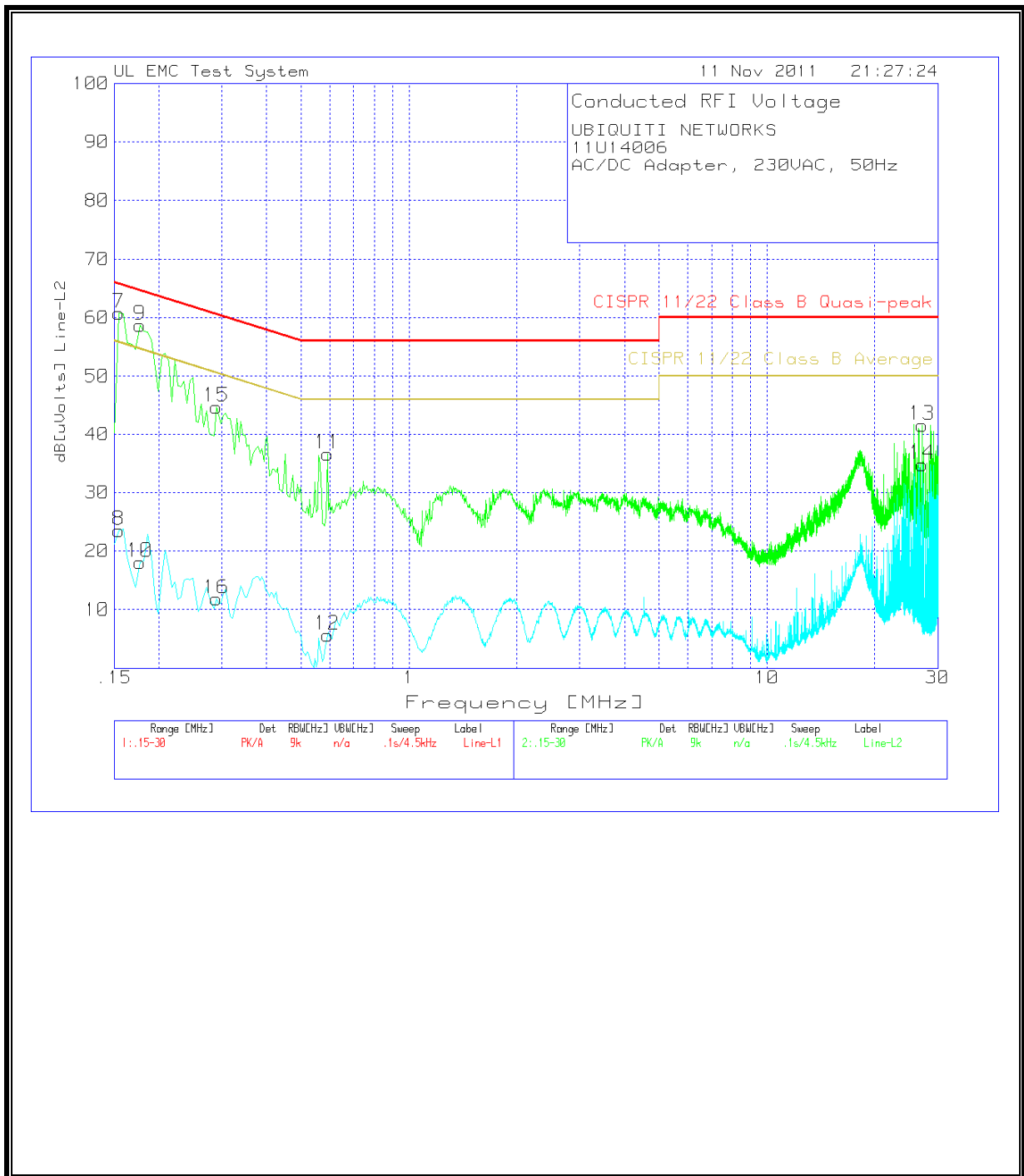
### 6 WORST EMISSIONS

Ubiquity Networks						
11U14006. M/n: UniFi Mini						
EUT + AC/POE 24V/1A, ping with Laptop						
via Ethernet cable. Tested: AC						
Port of AC/POE. AC 230V 50Hz						
T. Nguyen						
Line-L1 .15 - 30MHz						
Test Frequency	Meter Reading	Detector	CISPR Class B QP Limit	QP Margin	CISPR Class B Av Limit	Av Margin
0.15	62.28	PK	66	-3.72	-	-
0.15	26.69	Av	-	-	56	-29.31
0.186	57.35	PK	64.2	-6.85	-	-
0.186	22.85	Av	-	-	54.2	-31.35
25.692	42.77	PK	60	-17.23	-	-
25.692	33.4	Av	-	-	50	-16.6
Line-L2 .15 - 30MHz						
0.1545	60.83	PK	65.8	-4.97	-	-
0.1545	23.54	Av	-	-	55.8	-32.26
0.177	58.68	PK	64.6	-5.92	-	-
0.177	18.02	Av	-	-	54.6	-36.58
0.591	36.58	PK	56	-19.42	-	-
0.591	5.7	Av	-	-	46	-40.3
27.159	41.65	PK	60	-18.35	-	-
27.159	34.79	Av	-	-	50	-15.21
0.2895	44.72	PK	60.5	-15.78	-	-
0.2895	11.8	Av	-	-	50.5	-38.7
PK - Peak detector						
QP - Quasi-Peak detector						
Av - Average detector						

**LINE 1 RESULTS**



**LINE 2 RESULTS**





### 6.3. TELECOM PORT LINE CONDUCTED EMISSIONS

#### LIMIT

EN 301 489-1 Clause 8.7.3

The equipment shall meet the class B limits given in Table 4 of EN 55022.

**Table 4 – Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0,15 MHz to 30 MHz for class B equipment**

Frequency range MHz	Voltage limits dB(μV)		Current limits dB(μA)	
	Quasi-peak	Average	Quasi-peak	Average
0,15 to 0,5	84 to 74	74 to 64	40 to 30	30 to 20
0,5 to 30	74	64	30	20
NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz. NOTE 2 The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150 / I = 44$ dB).				

#### TEST METHOD

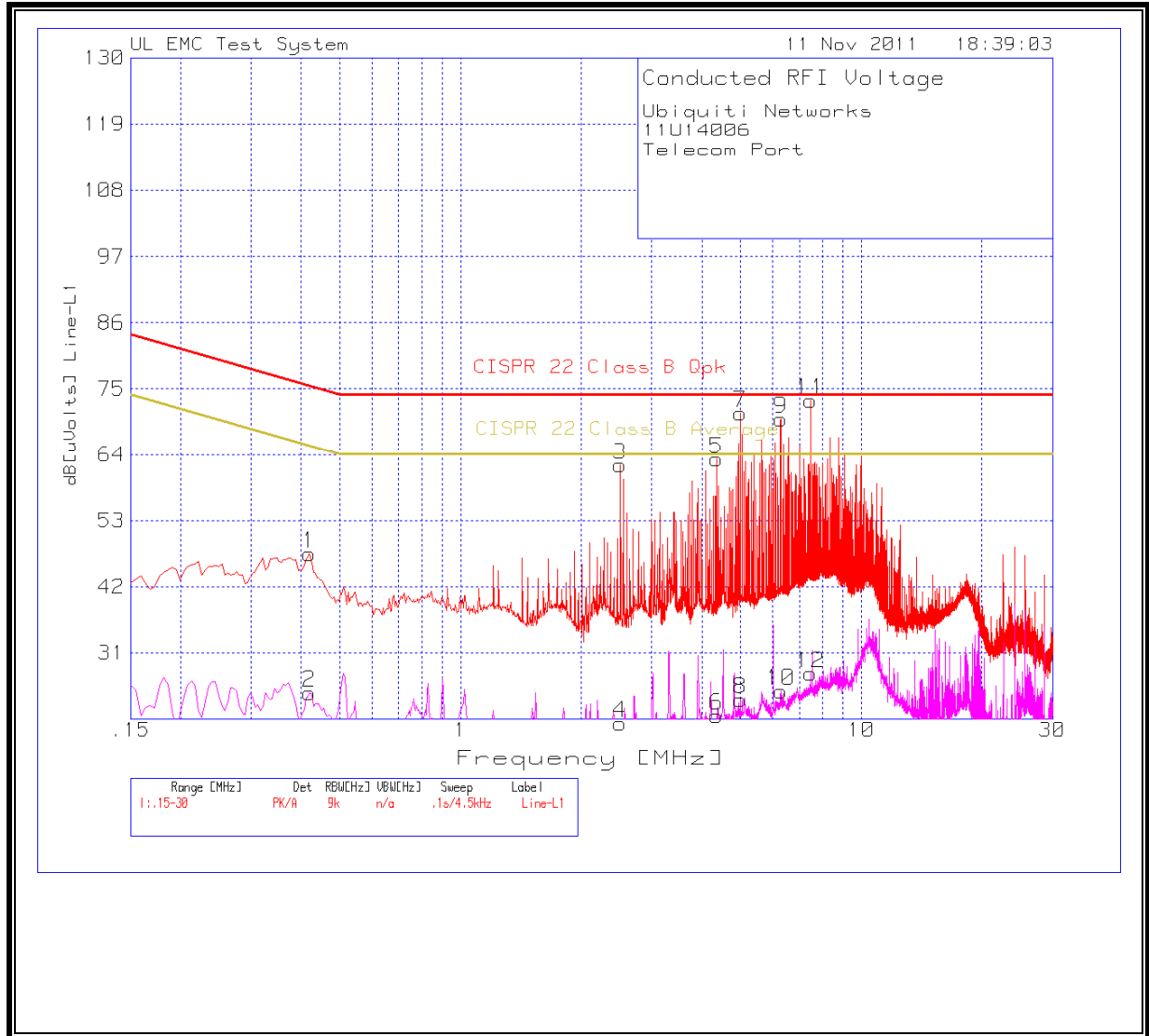
EN 55022

## RESULTS

### 6 WORST EMISSIONS

Ubiquiti Networks								
11U14006								
Telecom Port								
Test Operator: Thanh Nguyen								
Test Date: 11/11/11								
Telecom Port .15 - 30MHz								
Test Frequency	Meter Reading	Detector	ISN ST-08 Factor	Corrected dB[uVolts]	CISPR Class B QP Limit	QP Margin	CISPR Class B Av Limit	Av Margin
0.42	37.43	PK	10	47.43	75.4	-27.97		
0.42	14.32	Av	10	24.32	-	-	65.4	-41.08
2.5035	52.42	PK	9.9	62.32	74	-11.68		
2.5035	9.45	Av	9.9	19.35	-	-	64	-44.65
4.362	53.38	PK	9.9	63.28	74	-10.72		
4.362	10.63	Av	9.9	20.53	-	-	64	-43.47
4.9965	61.12	PK	9.9	71.02	74	-2.98		
4.9965	13.39	Av	9.9	23.29	-	-	64	-40.71
6.3105	60.24	PK	9.8	70.04	74	-3.96		
6.3105	14.8	Av	9.8	24.6	-	-	64	-39.4
7.485	63.28	PK	9.8	73.08	74	-0.92		
7.485	17.75	Av	9.8	27.55	-	-	64	-36.45
PK - Peak detector								
QP - Quasi-Peak detector								
Av - Average detector								

**TELECOM PORT PLOTS**



## **6.4. HARMONIC CURRENT EMISSIONS**

### **LIMIT**

EN 301 489-1, Clause 8.5  
EN 61000-3-2

### **TEST PROCEDURE**

EN 61000-3-2

Harmonic current emissions were not measured. The POE adapter is rated 5 W and, in accordance with Clause 7 of EN 61000-3-2, limits are not specified for equipment with a rated power of 75 W or less.

## 6.5. AC MAINS VOLTAGE FLUCTUATIONS AND FLICKER

### LIMIT

EN 301 489-1, Clause 8.6  
EN 61000-3-3

### TEST PROCEDURE

EN 61000-3-3

### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> AC Power Source	Schaffner	NSG 1007	55768	08/25/2013
<input checked="" type="checkbox"/> Signal Conditioning Unit	Schaffner	CCN 1000-1	72260	08/25/2013

### TEST INFORMATION

**Date:** 01/25/2012  
**Project No:** 11U14006  
**Tester:** Oliver Su  
**Mode of Operation:** Ping wireless and wired with laptop.

### RESULTS

Test Results	
Pass	Fail
<input checked="" type="checkbox"/>	<input type="checkbox"/>

**NOTE:** In accordance with Clause 6.5 of EN 61000-3-3, the observation period shall include that part of the whole operation cycle in which the equipment under test produces the most unfavorable sequence of voltage changes. With the access point EUT, cycles occur within seconds or parts of a second. Therefore, 10 minutes was considered sufficient to capture the most unfavorable voltage changes. The Clause also states that for  $P_{lt}$  assessment, the cycle of operation shall not be repeated when testing equipment with a cycle of operation of less than 2 hours.

**VOLTAGE FLUCTUATIONS AND FLICKER RESULTS**

**SUMMARY**

**Flicker Test Summary per EN/IEC61000-3-3 (Run time)**

EUT: 802.11 b/g/n 1x2 MIMO Networking Device      Tested by: Oliver Su  
Test category: All parameters (European limits)      Test Margin: 100  
Test date: 1/25/2012      Start time: 10:48:43 AM      End time: 10:59:10 AM  
Test duration (min): 10      Data file name: F-000220.cts\_data  
Comment: 11U14006, ping wireless and wired with laptop  
Customer: Ubiquiti

**Test Result: Pass**

**Status: Test Completed**

**PARAMETER VALUES**

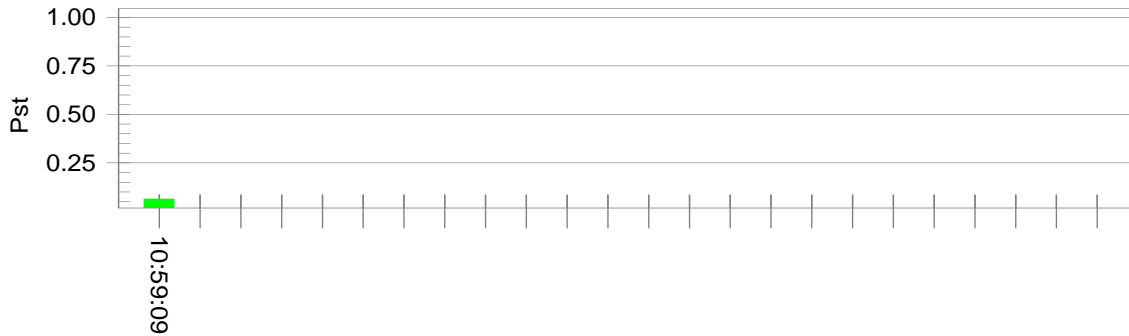
**Parameter values recorded during the test:**

Vrms at the end of test (Volt):	229.96		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

### SHORT TERM CHART

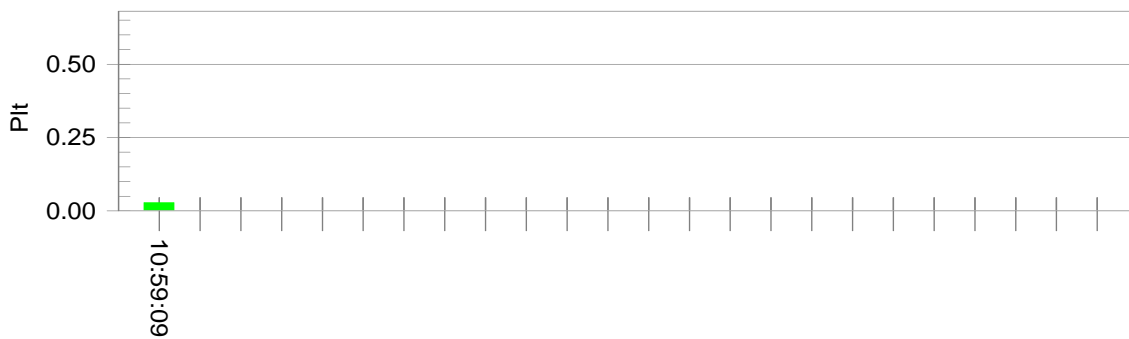
Pst<sub>i</sub> and limit line

European Limits



### LONG TERM CHART

Plt and limit line



## 7. IMMUNITY LIMITS AND RESULTS

### 7.1. ELECTROSTATIC DISCHARGE

#### TEST LEVEL

EN 301 489-1 Clause 9.3.2

Contact Discharge:  $\pm 2$  kV to  $\pm 4$  kV

Air Discharge:  $\pm 2$  kV to  $\pm 8$  kV

#### TEST PROCEDURE

EN 61000-4-2

#### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.4 and 6.6

Performance criteria for Transient phenomena applied to Transmitters (TT) and Receivers (RT)

#### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> ESD Simulator	Schaffner	NSG-435	5980	11/28/2012
<input checked="" type="checkbox"/> Static Charge Monitor	Wescorp	W210A	CCS 01658	C.N.R.

#### ENVIRONMENTAL CONDITIONS

Parameter	Value	Limits
Temperature	21.5 °C	15 °C to 35 °C
Humidity	38 %	30 % to 60 %
Pressure	1015 mbar	860 mbar to 1060 mbar

#### TEST INFORMATION

**Date:** 01/30/2012

**Project No:** 11U14006

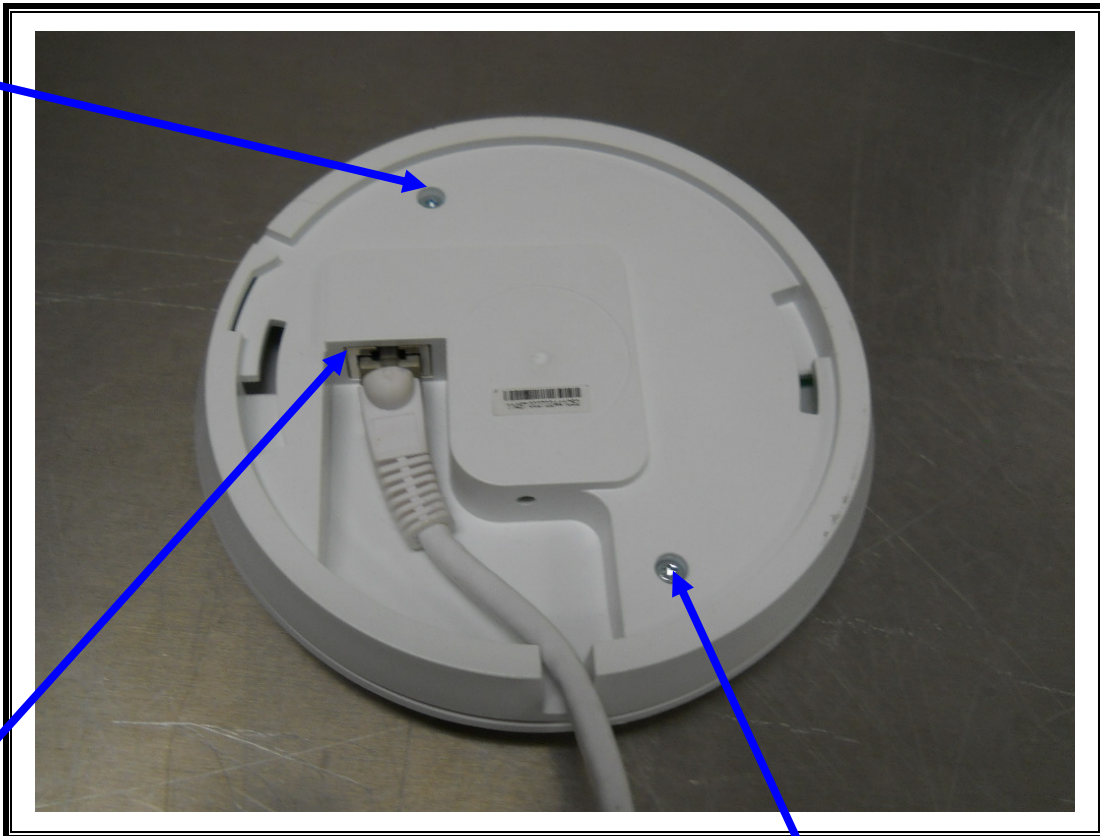
**Tester:** Steve Aguilar

**EUT Mode of Operation:** Ping support laptop through EUT.



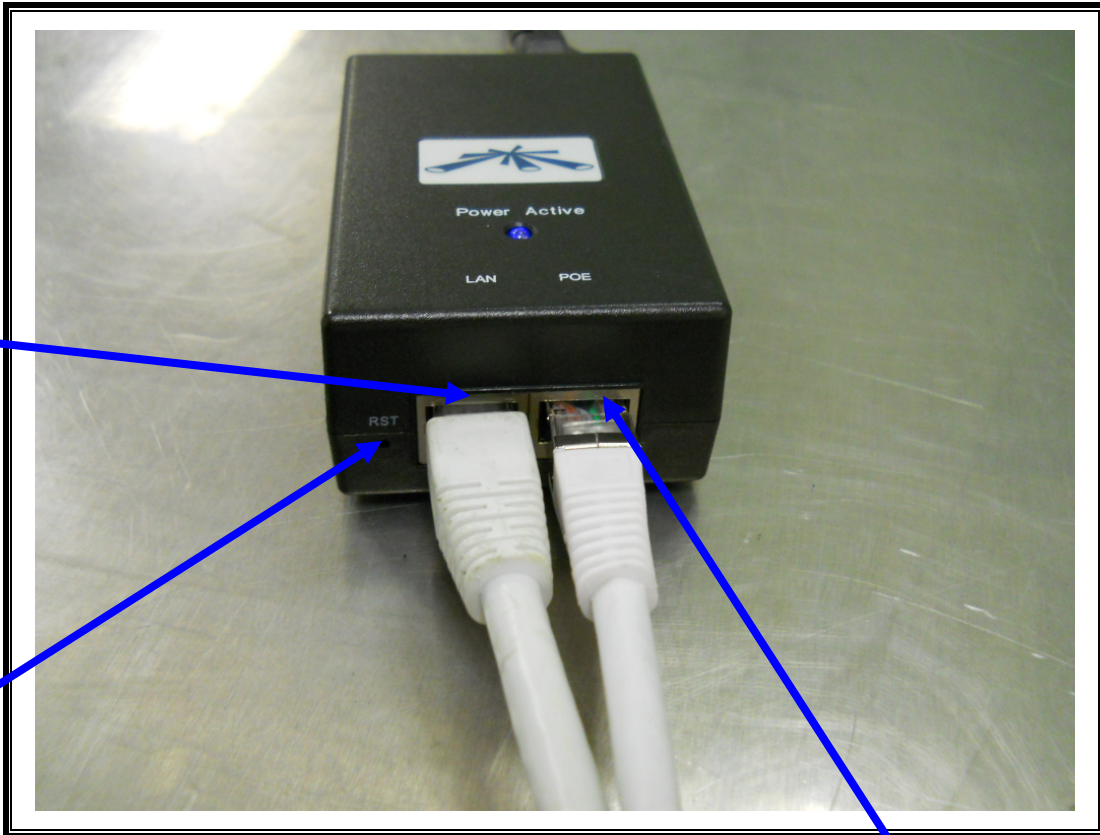
**PHOTOGRAPHS OF DIRECT CONTACT DISCHARGE POINTS**

**DIRECT CONTACT DISCHARGE**



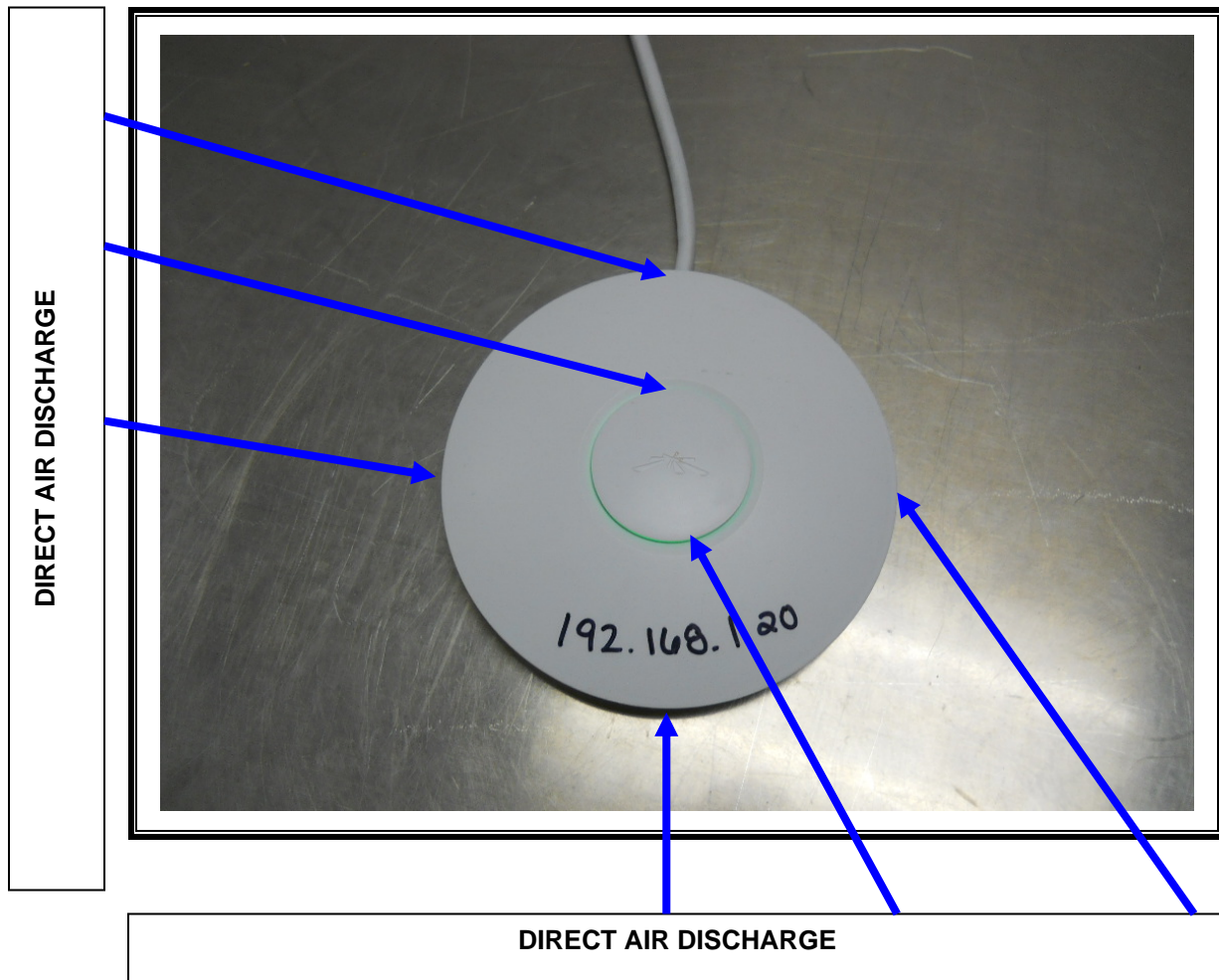
**DIRECT CONTACT DISCHARGE**

DIRECT CONTACT DISCHARGE



DIRECT CONTACT DISCHARGE

**PHOTOGRAPHS OF DIRECT AIR DISCHARGE POINTS**

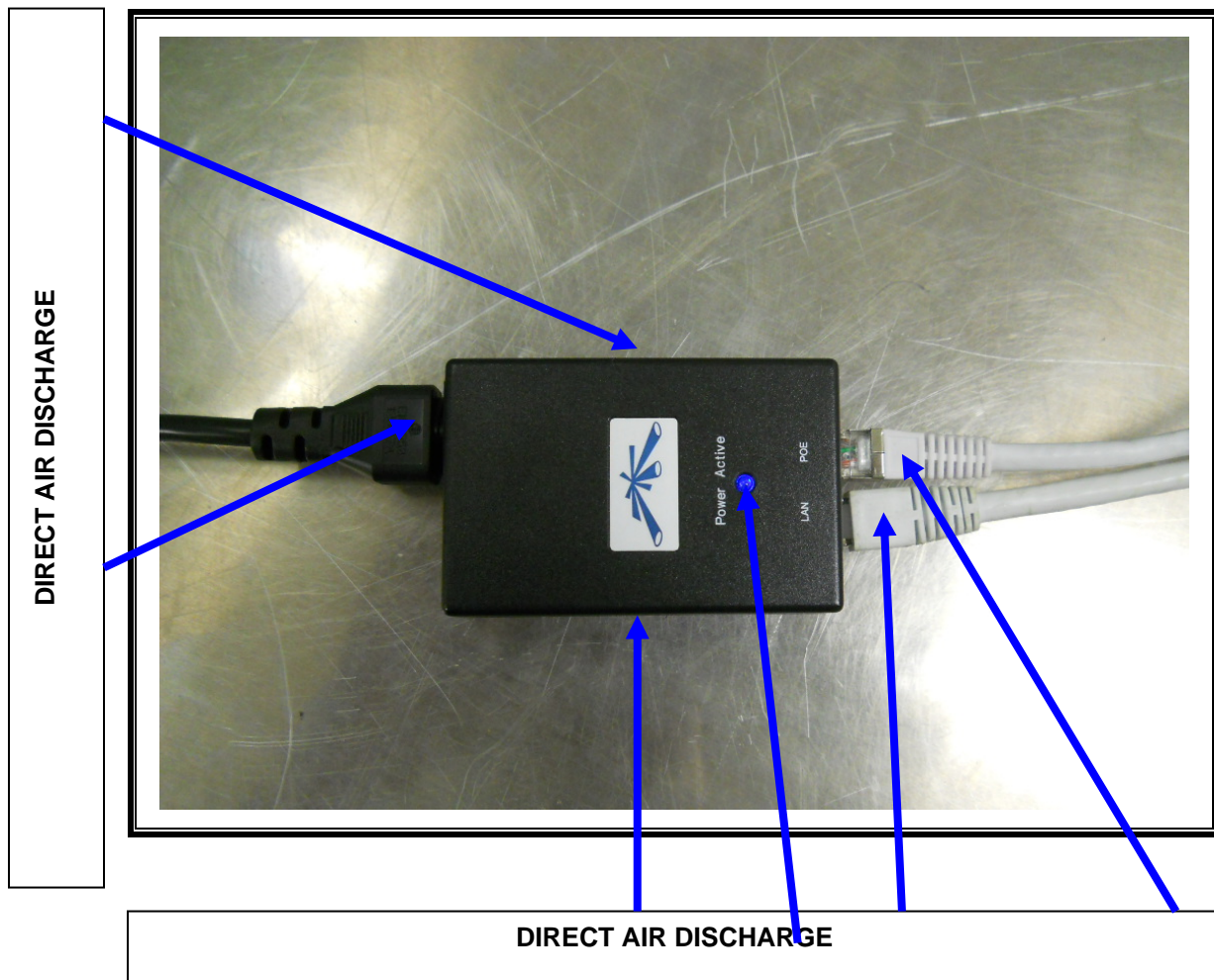


DIRECT AIR DISCHARGE

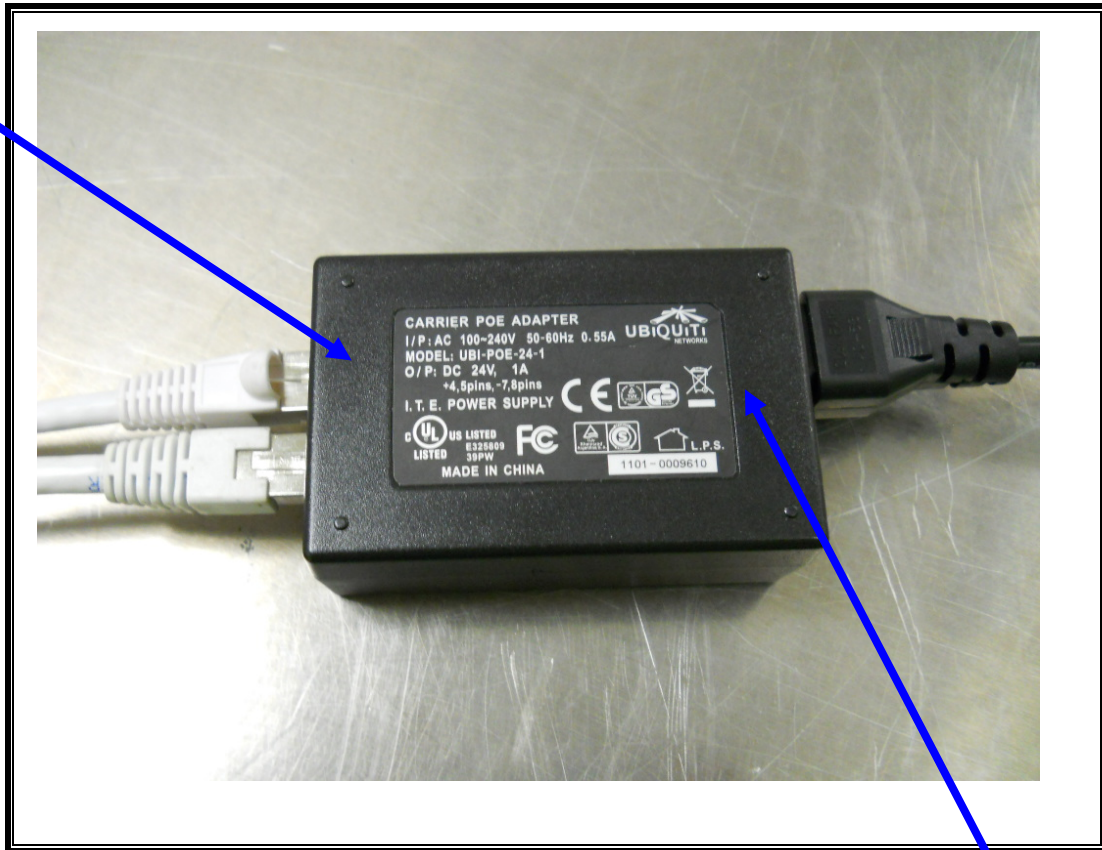


DIRECT AIR DISCHARGE



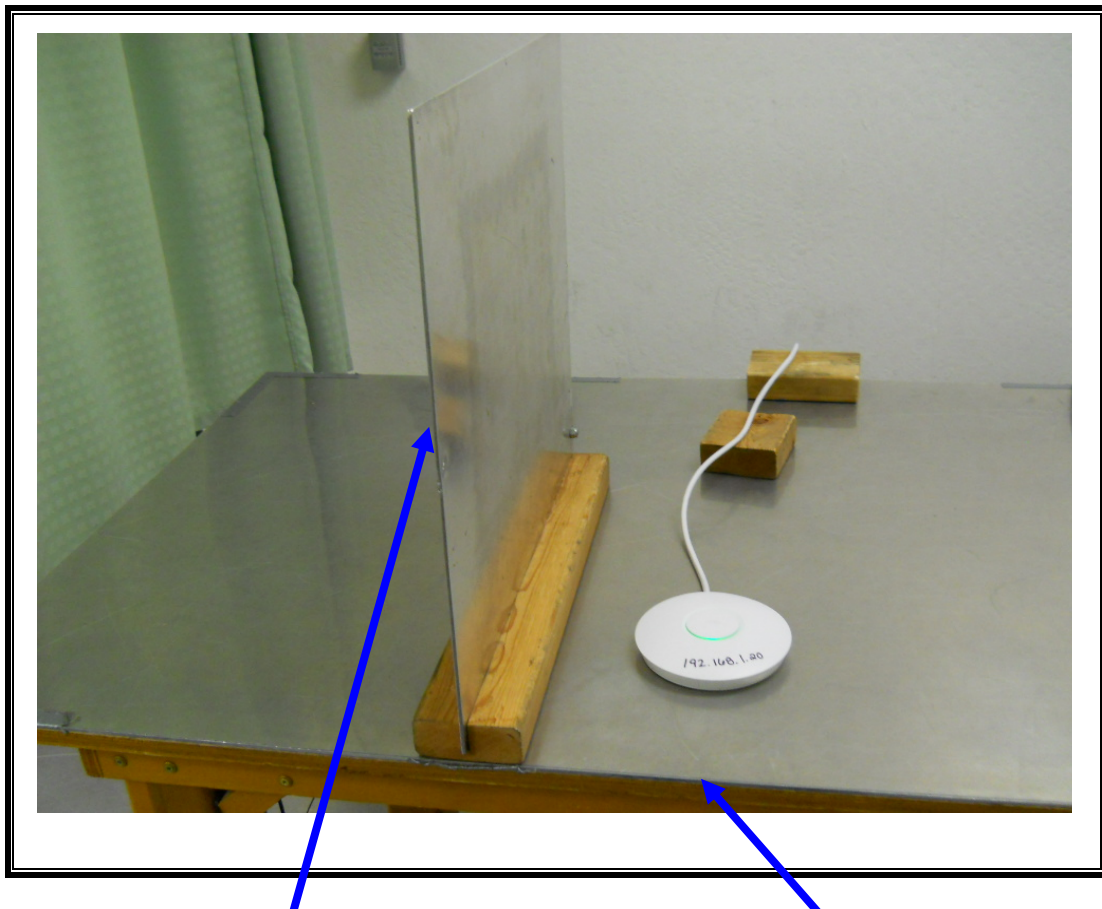


DIRECT AIR DISCHARGE



DIRECT AIR DISCHARGE

**PHOTOGRAPH OF HCP AND VCP FOR INDIRECT CONTACT DISCHARGE TESTS**



**INDIRECT CONTACT DISCHARGE**

## RESULTS

Direct Contact Discharge				
Test Points	Test Levels		Results	
	$\pm 2$ kV	$\pm 4$ kV	Pass	Fail
POE/LAN connectors on POE Adapter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom of UniFi AP mini	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Direct Air Discharge					
Test Points – UniFi AP mini	Test Levels			Results	
	$\pm 2$ kV	$\pm 4$ kV	$\pm 8$ kV	Pass	Fail
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Direct Air Discharge					
Test Points – POE Adapter	Test Levels			Results	
	$\pm 2$ kV	$\pm 4$ kV	$\pm 8$ kV	Pass	Fail
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Indirect Contact Discharge From Horizontal Coupling Plane				
Side - UniFi AP mini	Test Levels		Results	
	$\pm 2$ kV	$\pm 4$ kV	Pass	Fail
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Indirect Contact Discharge From Vertical Coupling Plane				
Side - POE Adapter	Test Levels		Results	
	$\pm 2$ kV	$\pm 4$ kV	Pass	Fail
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Required Passing Criterion:**  
**Actual Performance:**

A ☐ B ☒ C ☐  
A ☐ B ☒ C ☐

**Note:** Temporary interruptions of pinging that automatically corrected were observed on  $\pm 2$  and  $\pm 4$  kV direct contact discharge to metal surface of POE connector at EUT and at the POE adapter.



## 7.2. RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY

### TEST LEVEL

EN 301 489-1 Clause 9.2.2

3 V/m with 1000 Hz Sinusoidal AM at 80 % depth  
80 to 1000 MHz in 1 % increments, and  
1400 to 2700 MHz in 1 % increments

### TEST PROCEDURE

EN 301 489-1 Clause 9.2.2

EN 61000-4-3

### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.3 and 6.5  
Performance criteria for Continuous phenomena applied to Transmitters (TT) and  
Receivers (RT)

### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> Signal Generator	Agilent	MXG N5183A	MY50140493	04/26/2012
<input checked="" type="checkbox"/> RF Amplifier	Amplifier Research	150W1000M2	303370	C.N.R.
<input checked="" type="checkbox"/> RF Amplifier	Amplifier Research	30S1G3	303877	C.N.R.
<input checked="" type="checkbox"/> Directional Coupler	Werlatone	C6021	8576	C.N.R.
<input checked="" type="checkbox"/> Directional Coupler	Amplifier Research	DC7144A	305089	C.N.R.
<input checked="" type="checkbox"/> Power Meter	Agilent	N1914A	MY50000606	06/24/2012
<input checked="" type="checkbox"/> Power Sensor	Agilent	E93044A H18	2349A08568	07/07/2012
<input checked="" type="checkbox"/> Log Periodic Antenna	Rohde & Schwarz	HL 046	358714/003	C.N.R.
<input checked="" type="checkbox"/> Horn Antenna	EMCO	3115	C01218/100 0614	9/1/2012
<input checked="" type="checkbox"/> Field Probe	Holaday	HI 6105	62873	10/17/2012

**ENVIRONMENTAL CONDITIONS**

Parameter	Value	Limits
Humidity	34 %	< 95 %

**TEST INFORMATION**

**Date:** 1-24-2012

**Project No:** 11U14006

**Tester:** Steve Aguilar

**EUT Mode of Operation:** Ping support laptop through EUT.

**RESULTS**

Enclosure Port									
Frequency Range (MHz)	Antenna Polarization	Front Side		Back Side		Left Side		Right Side	
		Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
80 to 1000	Horizontal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
80 to 1000	Vertical	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1400 to 2700	Horizontal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1400 to 2700	Vertical	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Required Passing Criterion:**

A ☒

B ☐

C ☐

**Actual Performance:**

A ☒

B ☐

C ☐

**Notes:** POE powered by 230 V, 50 Hz. Exclusion Band: 2280 – 2607.675 MHz.

### 7.3. FAST TRANSIENTS, COMMON MODE IMMUNITY

#### TEST LEVEL

EN 301 489-1 Clause 9.4.2

1 kV open circuit voltage for AC Mains power input port

0.5 kV open circuit voltage for signal, telecommunication, and control ports

#### TEST PROCEDURE

EN 61000-4-4

#### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.4 and 6.6

Performance criteria for Transient phenomena applied to Transmitters (TT) and Receivers (RT)

#### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> EFT Generator	Haefely-Trench	PEFT Junior	083762-05	8/16/2012
<input checked="" type="checkbox"/> Capacitive Clamp	Haefely-Trench	093 506.1	083 661-25	C.N.R

#### ENVIRONMENTAL CONDITIONS

Parameter	Value	Limits
Humidity	39 %	< 95 %

#### TEST INFORMATION

**Date:** 1/24/2012

**Project No:** 11U14006

**Tester:** Steve Aguilar

**EUT Mode of Operation:** Ping support laptop through EUT.

## RESULTS

AC Mains Power Port				
Test Level	Test Voltage	Test Voltage Polarity	Results	
			Pass	Fail
2	0.5 kV	Positive / Negative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	1 kV	Positive / Negative	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Signal, Telecommunication, Control, and DC Power Ports				
Test Level	Test Voltage	Test Voltage Polarity	Results	
			Pass	Fail
1	0.25 kV	Positive / Negative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	0.5 kV	Positive / Negative	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Signal, Telecommunication, Control, and DC Power Ports under test	
Port Number	Port Description
1	LAN port on POE Adapter

**Required Passing Criterion:**

A ☐

B ☒

C ☐

**Actual Performance:**

A ☐

B ☒

C ☐

**Notes:** -0.5 kV on POE adapter LAN port caused intermittent interruption in pinging but immediately recovered and Ethernet link was maintained. The manufacturer specified that the POE cable does not exceed 3 m in length.

## 7.4. SURGES

### TEST LEVEL

EN 301 489-1 Clause 9.8.2

1 kV line to line for the AC mains power input port  
2 kV line to ground for the AC mains power input port

### TEST PROCEDURE

EN 61000-4-5

### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.4 and 6.6  
Performance criteria for Transient phenomena applied to Transmitters (TT) and Receivers (RT)

### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Cal Due
<input checked="" type="checkbox"/> Surge Generator	Haefely	Psurge 4.1 093 203.1	083762-05	2/1/2012
<input type="checkbox"/> Coupling Network	Haefely	IP 6.2 093 001.1	083 661-25	C.N.R
<input type="checkbox"/> Decoupling Unit	Haefely	DEC1A 093 012.1	083 599-10	C.N.R
<input type="checkbox"/> High Voltage Probe	Haefely	093 296.1	N/A	C.N.R

### **ENVIRONMENTAL CONDITIONS**

Parameter	Value	Limits
Humidity	31 %	< 95 %

### **TEST INFORMATION**

**Date:** 1-27-2012

**Project No:** 11U14006

**Tester:** Steve Aguilar

**EUT Mode of Operation:** Ping support laptop through EUT.

### **RESULTS**

AC Mains Port					
Test Level	Surge Voltage	Phase Angles	Path	Results	
				Pass	Fail
1	± 0.5 kV	0°, 90°, 180°, 270°	LINE-LINE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	± 1 kV	0°, 90°, 180°, 270°	LINE-LINE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1	± 0.5 kV	0°, 90°, 180°, 270°	LINE-GND	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	± 1 kV	0°, 90°, 180°, 270°	LINE-GND	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	± 2 kV	0°, 90°, 180°, 270°	LINE-GND	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Required Passing Criterion:**

A ☐

B ☒

C ☐

**Actual Performance:**

A ☒

B ☐

C ☐

Note: The manufacturer states that the LAN port does not connect to cables longer than 10 m and is not connected to outdoor cables.

## 7.5. RADIO FREQUENCY, COMMON MODE IMMUNITY

### TEST LEVEL

EN 301 489-1 Clause 9.5.2

3 Volts RMS with 1000 Hz Sinusoidal AM at 80 % depth  
150 kHz to 80 MHz in 1 % increments

### TEST PROCEDURE

EN 301 489-1 Clause 9.5.2

EN 61000-4-6

### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.3 and 6.5  
Performance criterion for Continuous phenomena applied to Transmitters (TT) and  
Receivers (RT)

### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> Signal Generator	Rohde & Schwarz	SMY01	842045 / 030	10/27/2012
<input checked="" type="checkbox"/> RF Amplifier	Amplifier Research	75A250	303332	C.N.R
<input checked="" type="checkbox"/> Attenuator	Bird	300-A-FFN-06	603	C.N.R
<input checked="" type="checkbox"/> Bulk Injection Probe	FCC	F-120-9B	17	C.N.R
<input checked="" type="checkbox"/> CDN	FCC	FCC-801-M3-25A	153	02/28/2012

## ENVIRONMENTAL CONDITIONS

Parameter	Value	Limits
Humidity	31 %	< 95 %

## TEST INFORMATION

**Date:** 01/27/2012

**Project No:** 11U14006

**Tester:** Steve Aguilar

**EUT Mode of Operation:** Ping support laptop through EUT.

## RESULTS

AC Mains Port				
Frequency Range	Coupling Type		Results	
	CDN	Current Clamp	Pass	Fail
150 kHz to 80 MHz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Signal, Telecommunication, and Control Ports				
Frequency Range	Coupling Type		Results	
	CDN	Current Clamp	Pass	Fail
150 kHz to 80 MHz	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Signal, Telecommunication, and Control Ports under test	
Port Number	Port Description
1	LAN port of POE Adapter

**Required Passing Criterion:**

A ☒

B ☐

C ☐

**Actual Performance:**

A ☒

B ☐

C ☐

**Notes:** POE input voltage: 230 V, 50Hz.



## 7.6. AC MAINS VOLTAGE DIPS AND INTERRUPTIONS

### TEST LEVEL

EN 301 489-1 Clause 9.7.2

Level	Periods	For Reference	
		Reduction	Time
0 % residual	0.5 cycle	100 % Dip	10 ms
0 % residual	1 cycle	100 % Dip	20 ms
70 % residual	25 cycles	30 % Dip	500 ms
0 % residual	250 cycles	100 % Interruption	5000 ms

### TEST PROCEDURE

EN 61000-4-11

The power supply voltage range is 100-240 VAC, therefore, tests were performed at the lowest and highest voltages of the declared range.

### PERFORMANCE CRITERIA

EN 301 489-17 Clause 6.1, 6.2, 6.4 and 6.6

Performance criteria for Transient phenomena applied to Transmitters (TT) and Receivers (RT)

### TEST AND MEASUREMENT EQUIPMENT

Test Equipment List				
Description	Manufacturer	Model	Serial Number	Calibration Due
<input checked="" type="checkbox"/> AC Power Source	Schaffner	NSG-1007	55768	08/25/2013
<input checked="" type="checkbox"/> Signal Conditioning Unit	Schaffner	CCN-1000-1	72260	08/25/2013

### ENVIRONMENTAL CONDITIONS

Parameter	Value	Limits
Humidity	31%	< 95 %

### TEST INFORMATION

Date: 1-27-2012

Project No: 11U14006

Tester: Steve Aguilar

EUT Mode of Operation: Ping support laptop through EUT.

## RESULTS

At nominal voltage, 100 VAC

Level	Period	Results	
		Pass	Fail
100 % Dip 0 % residual	0.5 cycle 10 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
100 % Dip 0 % residual	1 cycle 20 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30 % Dip 70 % residual	25 cycles 500 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
100 % Interruption 0 % residual	250 cycles 5000 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>

At nominal voltage, 240 VAC

Level	Period	Results	
		Pass	Fail
100 % Dip 0 % residual	0.5 cycle 10 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
100 % Dip 0 % residual	1 cycle 20 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30 % Dip 70 % residual	25 cycles 500 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
100 % Interruption 0 % residual	250 cycles 5000 ms	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Required Passing Criterion (0 %, 0.5 cycle):

A ☐

B ☒

C ☐

Required Passing Criterion (0 %, 1 cycle):

A ☐

B ☒

C ☐

Required Passing Criterion (30 %, 25 cycles):

A ☐

B ☒

C ☐

Required Passing Criterion (0%, 250 cycles):

A ☐

B ☐

C ☒

Actual Performance (0 %, 0.5 cycle):

A ☒

B ☐

C ☐

Actual Performance (0 %, 1 cycle):

A ☒

B ☐

C ☐

Actual Performance (30 %, 25 cycles):

A ☒

B ☐

C ☐

Actual Performance (0%, 250 cycles):

A ☐

B ☐

C ☒

**Notes:** For both 100% interruptions, the EUT rebooted and a manual software restart was required.

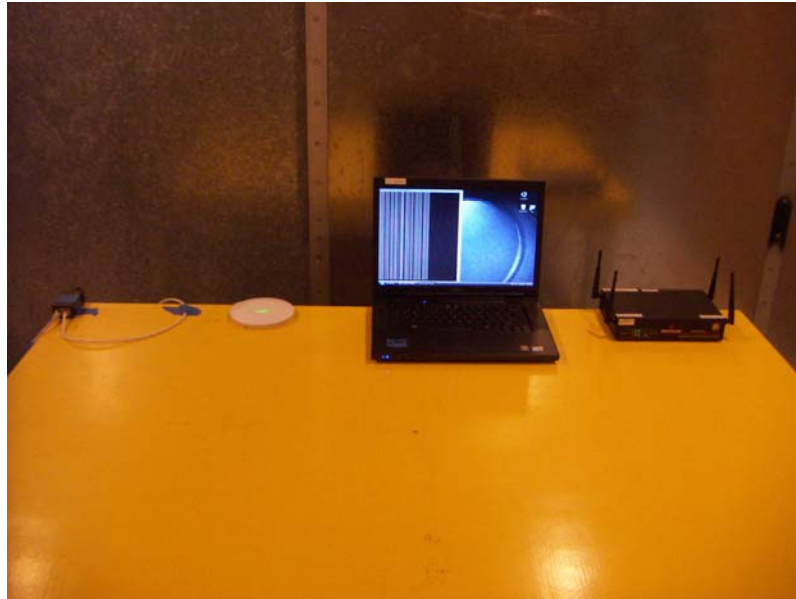
## 8. SETUP PHOTOS

### RADIATED EMISSIONS

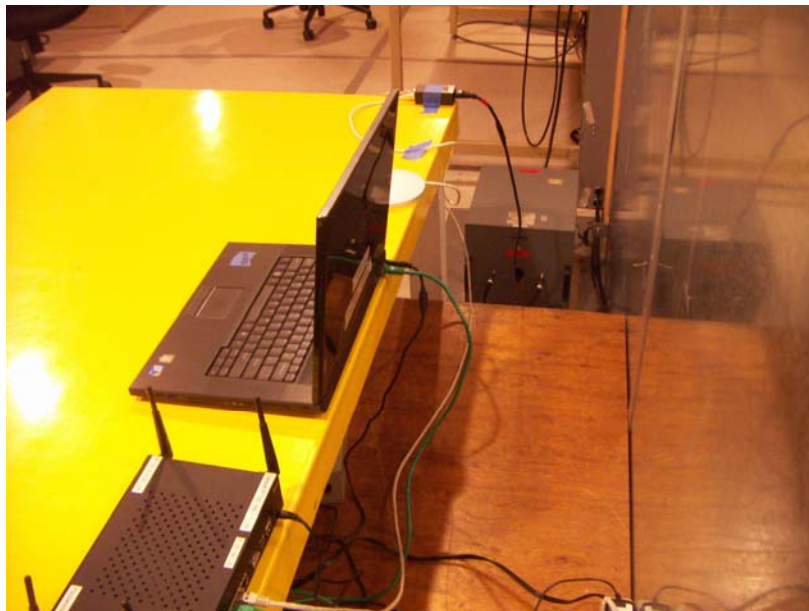


**AC MAINS LINE CONDUCTED EMISSIONS**

FRONT

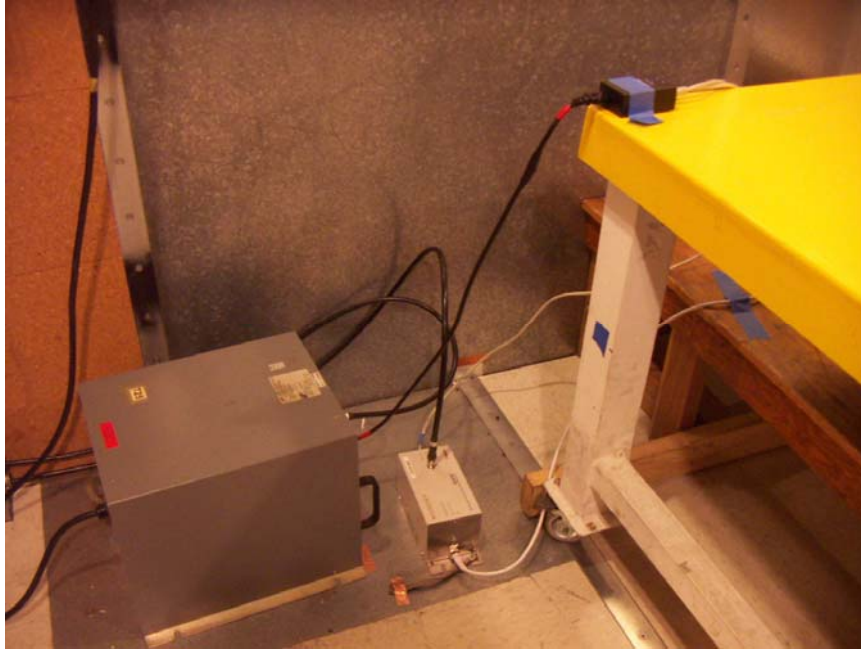


BACK

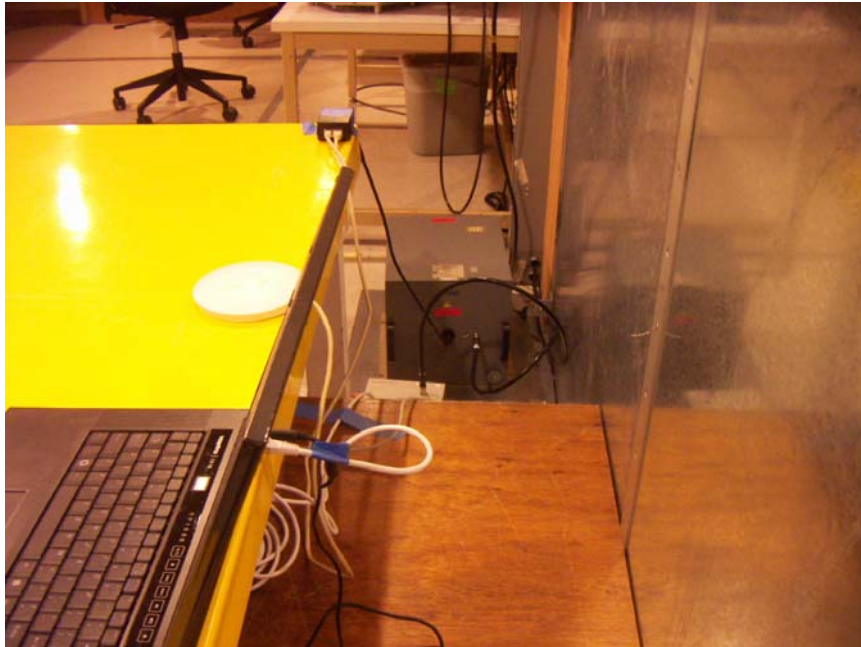


**TELECOM PORT LINE CONDUCTED EMISSIONS**

FRONT



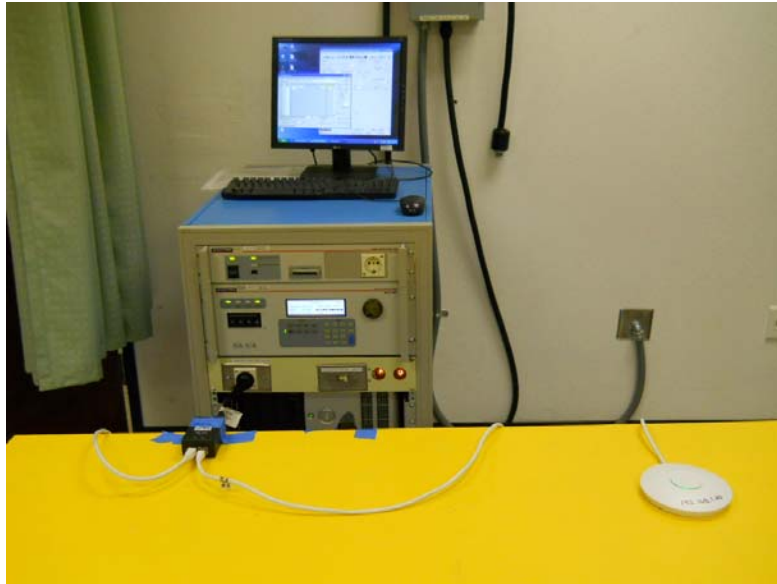
BACK





**AC MAINS LINE VOLTAGE FLUCTUATIONS AND FLICKER**

FLICKER PHOTO

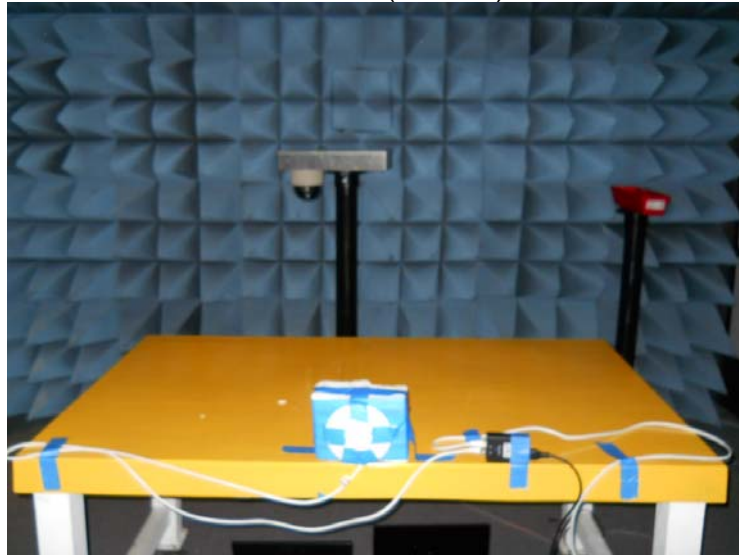


**ELECTROSTATIC DISCHARGE IMMUNITY**

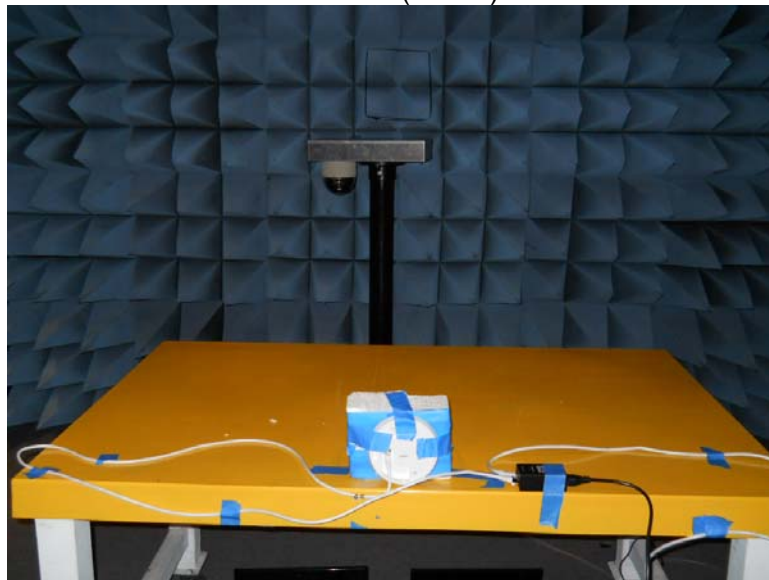


**RADIATED IMMUNITY**

RF ELECTROMAGNETIC FIELD (FRONT)



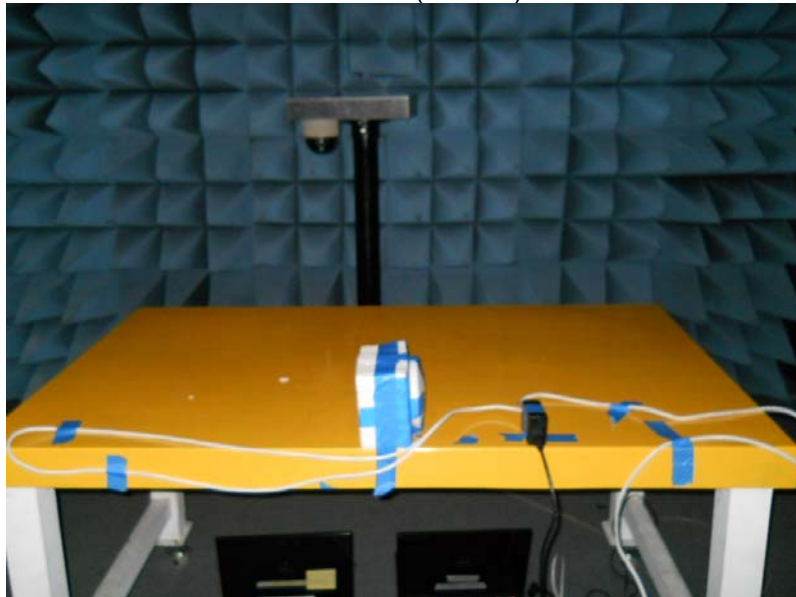
RF ELECTROMAGNETIC FIELD (BACK)



RF ELECTROMAGNETIC FIELD (LEFT)



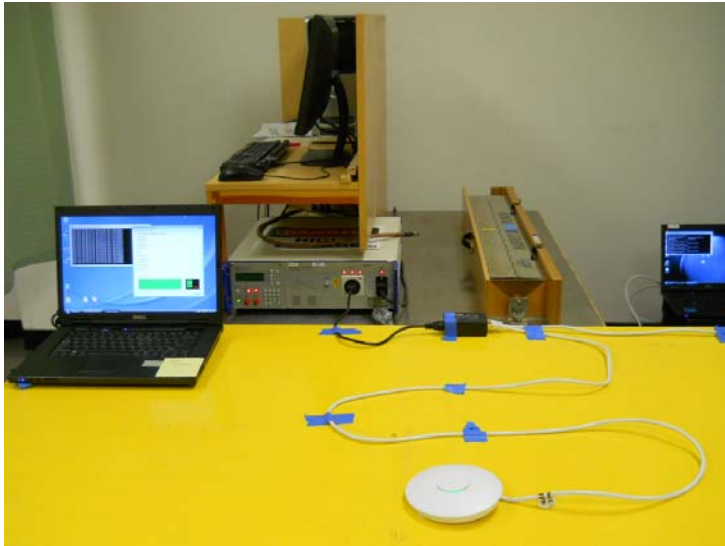
RF ELECTROMAGNETIC FIELD (RIGHT)





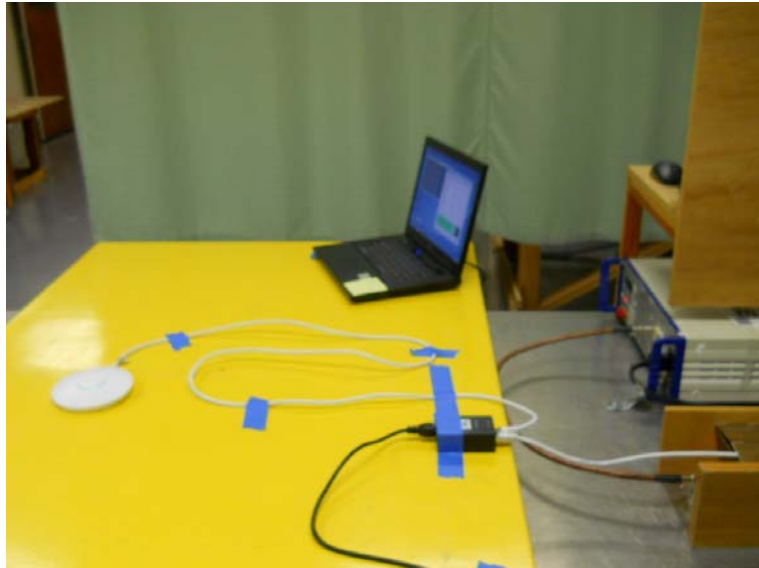
**ELECTRICAL FAST TRANSIENT (AC MAINS) IMMUNITY**

AC MAINS EFT BURST PHOTO



**ELECTRICAL FAST TRANSIENT (I/O LINES) IMMUNITY**

I/O LINES EFT BURST PHOTO



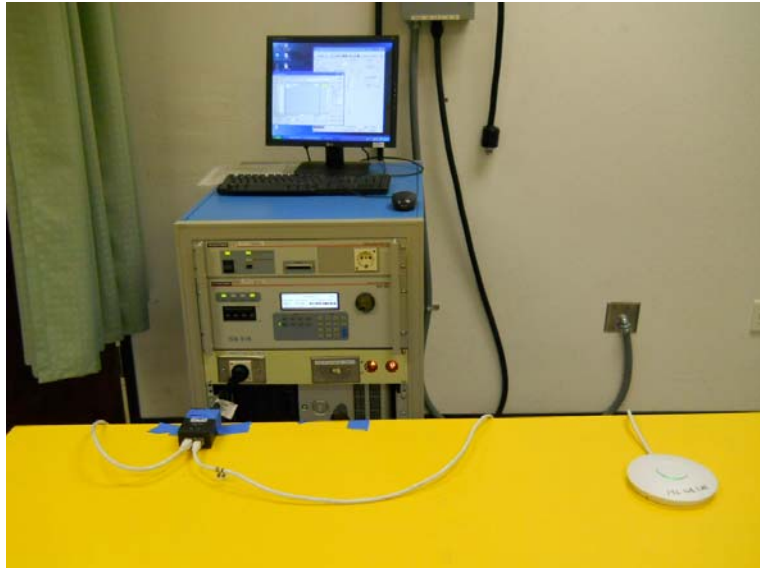
**SURGE (AC MAINS) IMMUNITY**

AC MAINS SURGE PHOTO



**POWERLINE VOLTAGE DIPS AND INTERRUPTIONS**

DIPS AND INTERRUPTIONS PHOTO



**RF CONDUCTED IMMUNITY (AC MAINS)**

AC MAINS CONDUCTED IMMUNITY PHOTO



**RF CONDUCTED IMMUNITY (I/O LINES)**

LAN LINE CONDUCTED IMMUNITY PHOTO



**END OF REPORT**