MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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August 10, 2011

Ubiquiti Networks, Inc.
91 E. Tasman
San Jose, CA 95134

Dear Jennifer Sanchez,

Enclosed is the EMC test report for compliance testing of the Ubiquiti Networks, Inc., NanoBridgeM2, tested to the requirements of ETSI EN 301 489-1 with ETSI EN 301 489-17 (Article 3.1(b) of R&TTE Directive).

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\ Ubiquiti Networks, Inc. \ EMCS31986A-ETS489)

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Electromagnetic Compatibility
Test Report

For the

Ubiquiti Networks, Inc.
NanoBridgeM2

Tested for Compliance with

ETSI EN 301 489-1
With ETSI EN 301 489-17 (Article 3.1(b) of R&TTE Directive)

MET Report: EMCS31986A-ETS489

August 10, 2011

Prepared For:

Ubiquiti Networks, Inc.
91 E. Tasman
San Jose, CA 95134

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230

Electromagnetic Compatibility
Test Report

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Ubiquiti Networks, Inc.
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Tested for Compliance with

ETSI EN 301 489-1
With ETSI EN 301 489-17 (Article 3.1(b) of R&TTE Directive)

MET Report: EMCS31986A-ETS489

Ram Shrestha
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of ETSI EN 301 489-1 with ETSI EN 301 489-17 under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 10, 2011	Initial Issue.

Table of Contents

List of Tables

List of Figures

List of Photographs

List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
CISPR	**C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques (International Special Committee on Radio Interference)
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**H**ert**z**
kPa	**k**ilo**Pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**H**ertz
µH	**micro**H**enry**
µF	**micro**F**arad**
µs	**micros**econds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

1.0 Introduction

1.1 Overview

MET Laboratories, Inc. was contracted by Ubiquiti Networks, Inc. to perform testing on the NanoBridgeM2, under Ubiquiti Networks, Inc. purchase order number US100185.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the NanoBridgeM2.

1.2 Test Site

All testing was performed at MET Laboratories, Inc., 3162 Belick Street, Santa Clara, CA 95054 and 13301 McCallen Pass, Austin, Texas 78754. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

1.3 General Performance Criteria

The performance criteria cited in EN 301 489-17:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

Note: For specific details on performance criteria, see sub-clause 6.2 of EN 301 489-17.

1.4 Testing Summary

Emissions

Descriptive Name	Requirement	Test Method	Result
Enclosure of Ancillary Equipment Measured on a Stand Alone Basis	ETSI EN 301 489-1, Section 8.2	EN 55016-2-3 (2006)	Not Applicable - 8.2 is for computer peripherals and all the digital emissions for intentional radiators are covered under the appropriate EN standard for the radio.
DC Power Input/Output Ports	ETSI EN 301 489-1, Section 8.3	EN 55022 (2006)	Not Applicable - Unit does not have DC Power.
AC Mains Power Input/Output Ports	ETSI EN 301 489-1, Section 8.4	EN 55022 (2006)	Compliant
Harmonic Current Emissions (AC Mains Input Port)	ETSI EN 301 489-1, Section 8.5	EN 61000-3-2 +A1 (2006)	Compliant
Voltage Fluctuations and Flicker (AC Mains Input Port)	ETSI EN 301 489-1, Section 8.6	EN 61000-3-3 (1995)	Compliant
Telecommunication Ports	ETSI EN 301 489-1, Section 8.7	EN 55022 (2006)	Compliant

Immunity

Descriptive Name	Requirement	Test Method	Result
Radio Frequency Electromagnetic Field (80 MHz – 1000 MHz and 1400 MHz to 2700 MHz)	ETSI EN 301 489-1, Section 9.2	EN 61000-4-3 (2006)	Compliant
Electrostatic Discharge (ESD)	ETSI EN 301 489-1, Section 9.3	EN 61000-4-2 (2001)	Compliant
Fast Transient, Common Mode	ETSI EN 301 489-1, Section 9.4	EN 61000-4-4 (2004)	Compliant
Radio Frequency, Common Mode	ETSI EN 301 489-1, Section 9.5	EN 61000-4-6 (2005)	Compliant
Transient & Surges in the Vehicular Environment	ETSI EN 301 489-1, Section 9.6	ISO 7637-2 (2004) (12/24 VDC)	Not Applicable - EUT is not intended to be used in vehicular environment.
Voltage Dips and Interruptions	ETSI EN 301 489-1, Section 9.7	EN 61000-4-11 (2004)	Compliant
Surges	ETSI EN 301 489-1, Section 9.8	EN 61000-4-5 (2006)	Compliant

Table 1. Summary of Compliance Testing

1.5 Modifications to the Test Standard

No modifications were made to the test standard.

1.6 References

ETSI EN 301 489-1 V1.8.1 (2008-04)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN301 489-17 V2.1.1(2009-05)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Wideband data and HIPERLAN equipment
EN 55022	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement, 2006
EN 61000-3-3	Electromagnetic Compatibility (EMC) Part 3-3: Limits – Limitation of Voltage Changes, Voltage Fluctuations and Flicker in Public Low-Voltage Supply Systems, for Equipment with Rated Current ≤ 16 A per Phase and Not Subject to Conditional Connection, 1995
EN 61000-4-2	Electromagnetic Compatibility (EMC) Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test, 2001
EN 61000-4-3	Electromagnetic compatibility (EMC) Part 4-3: Testing and Measurement Techniques – Radiated, Radio-Frequency, Electromagnetic Field Immunity Test, 2006
EN 55016-2-3	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods – Part 2-3: Methods of Measurement of Disturbances and Immunity – Radiated Disturbance Measurements, 2006
EN 61000-4-4	Electromagnetic Compatibility (EMC) Part 4-4: Testing and Measurement Techniques – Electrical Fast Transient/Burst Immunity Test, 2004
EN 61000-4-5	Electromagnetic Compatibility (EMC) Part 4-5: Testing and Measurement Techniques – Surge Immunity Test, 2006
EN 61000-4-6	Electromagnetic Compatibility - Part 4-6: Testing and Measurement Techniques Section – Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields, 2005
EN 61000-4-11	Electromagnetic Compatibility - Part 4-11: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, 2004
ISO 7637-2	Road Vehicles – Electrical Disturbances from Conduction and Coupling – Part 2: Electrical Transient Conduction Along Supply Lines Only, 2004
EN 61000-3-2/Amendment 1	Electromagnetic Compatibility (EMC) – Part 3-2: Limits – Limits for Harmonic Current Emissions (Equipment Input Current Up to and Including 16 A per Phase, 2006

Table 2. Test References

2.0 Equipment Under Test

2.1 Description of Test Sample

The results obtained relate only to the item(s) tested.

Model(s) Tested:	NanoBridgeM2	
Model(s) Covered:	NanoBridgeM2	
EUT Specifications:	Primary Power:	DC POE: 15V, 0.5 A
	Secondary Power:	230VAC, 50 Hz
	Equipment Emissions Class: The radio equipment and/or associated ancillary equipment under test are classified as equipment for fixed use.	
Lab Ambient Test Conditions:	Temperature:	15-35º C
	Relative Humidity:	30-60%
	Atmospheric Pressure:	860-1060 mbar
Evaluated by:	Ram Shrestha	
Report Date(s):	August 10, 2011	

The NanoBridgeM2, Equipment Under Test (EUT) for the remainder of this document, is a 802.11b/g/n high-performance, long range completely integrated CPE in the feed of a 18dBi dish antenna.

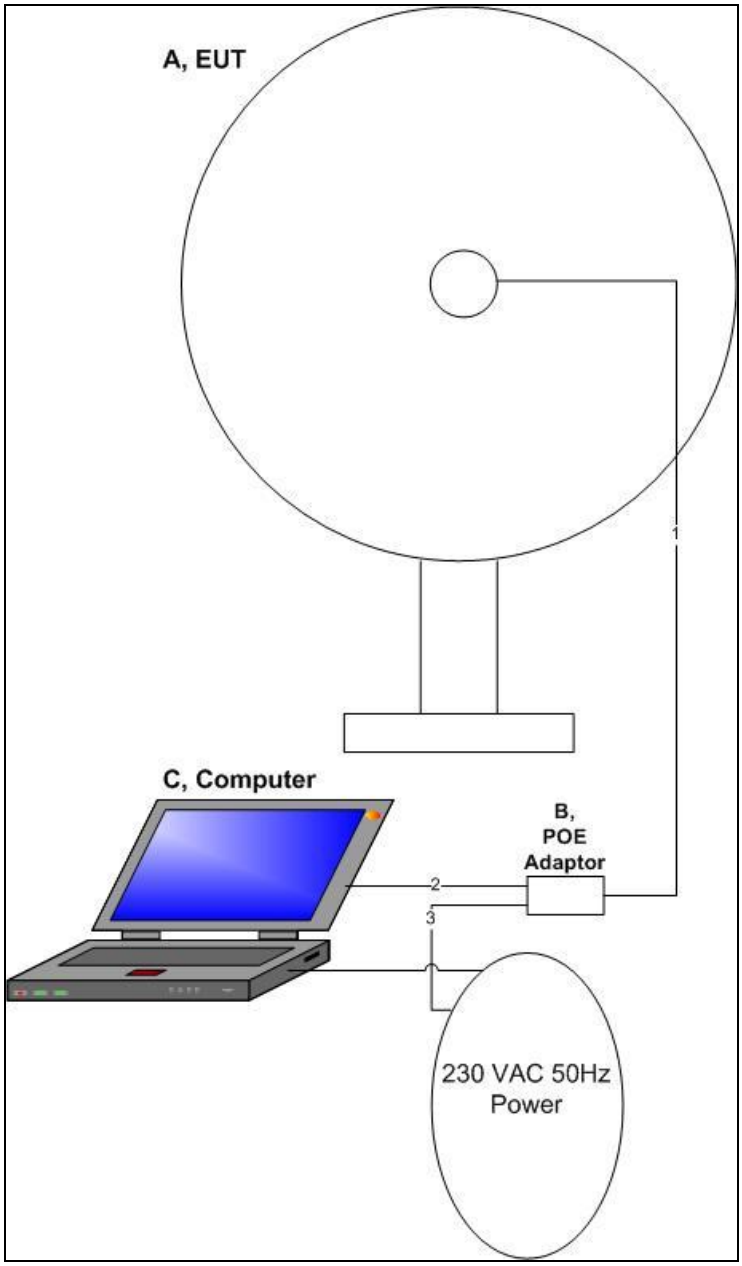


Figure 1. Block Diagram of Test Configuration

Equipment Configuration

The EUT was set up as outlined in Figure 1. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Part Number	Serial Number
A	NanoBridgeM2	NanoBridgeM2	N/A	00272230AFFF
N/A	Dish antenna	N/A	N/A	N/A
B	Power Supply (POE)	UBI-POE-24-5	N/A	1104-0072896

Table 3. Equipment Configuration

2.2 Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
N/A	Laptop (used for wireless communication)	Dell	Inspiron 1501	NA
C	Desktop	Dell	Optiplex 745	N/A

Table 4. Support Equipment

2.3 Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded (Y/N)	Termination Box ID & Port Name
1	A,EUT	CAT 5E	1	8	Y	B, POE
2	B, LAN	CAT 5E	1	8	Y	C, Desktop
3	B, Power	Power Cable	1	.5	N	230VAC Power Supply

Table 5. Ports and Cabling Information

2.4 Mode of Operation

Using Atheros Radio Test Software.

2.5 Method of Monitoring EUT Operation

If Ping Times out and doesn't return in wireless and Ethernet communication, that'd be a failure. If Unit locks up and requires power down is a failure as well.

2.6 Modifications to the EUT

No modifications were made to the EUT.

2.7 Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Ubiquiti Networks, Inc. upon completion of testing.

3.0 Electromagnetic Compatibility Emission Criteria

3.1 AC Mains Power Input/Output Ports: Limits for Conducted Emissions

Test Requirement(s): ETSI EN 301 489-1, Clause 8.4:

In accordance with *EN 55022 Clause 5.1*, the EUT shall meet the Class B limits shown in Table 6:

Limits for Conducted Emissions of Equipment				
Frequency Range (MHz)	**intended for use in telecommunication centres only [EN 55022Class A Limits] (dB□V)**		**[EN 55022 Class B Limits] (dB□V)**	
	Quasi-Peak	**Average**	**Quasi- Peak**	**Average**
0.15 - 0.5	79	66	66 to 56	56 to 46
0.5 - 5	73	60	56	46
5 - 30	73	60	60	50

Table 6. Limits of Conducted Disturbance at AC Mains Power Input/Output Ports

Note: The lower limit shall apply at the transition frequencies. The limits decrease linearly with the logarithm of the frequency in the range of 0.15 MHz to 0.5 MHz.

Test Procedure: The EUT was placed on a non-metallic table located in a shielded enclosure (See Photograph 1). The measurement was performed using normal operation of the equipment. The method of testing, test conditions, and test procedures of *Clause 9* of *EN 55022* were used. The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω / 50 µH as the input transducer to an EMC field intensity meter. The tests were conducted in a RF-shielded enclosure.

Test Results: The EUT was compliant with the specified requirements of Clause 8.4.

Test Engineer(s): Jonathon Chao

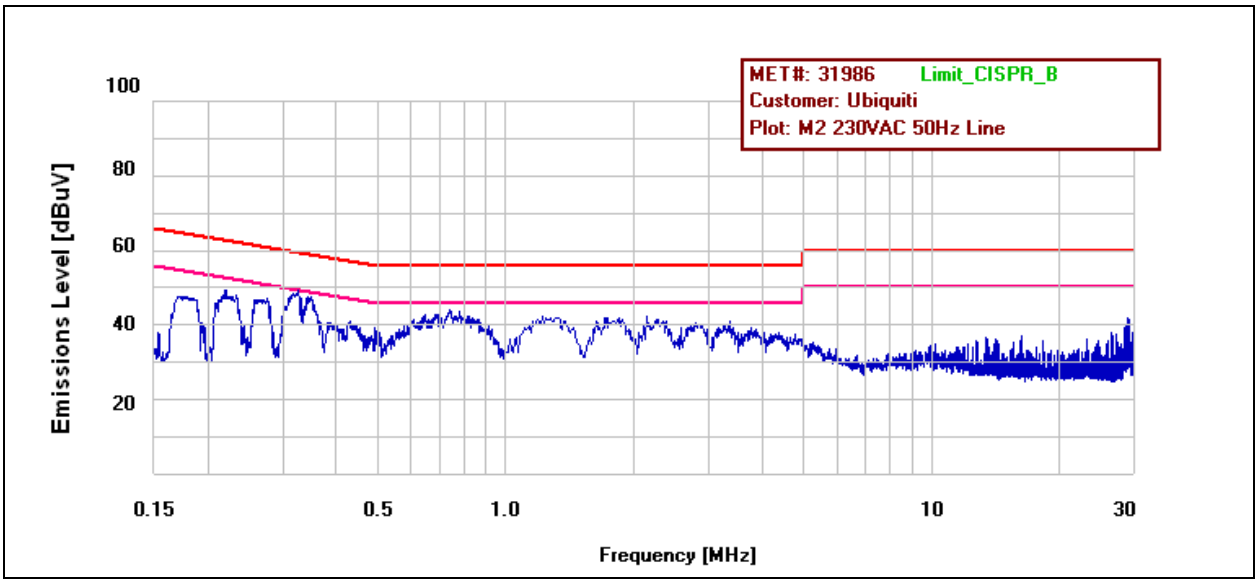
Test Date(s): 06/17/11

Electromagnetic Compatibility Emission

AC Mains Power Input/Output Ports: Limits for Conducted Emissions

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
M2 230 VAC 50Hz Line	.321	44.4	59.698	-15.298	Pass	29.8	49.698	-19.898	Pass
M2 230 VAC 50Hz Line	.697	37.5	56	-18.5	Pass	25.6	46	-20.4	Pass
M2 230 VAC 50Hz Line	1.7	35.6	56	-20.4	Pass	25.1	46	-20.9	Pass

Table 7. Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Phase Line, 230 MHz, 50 Hz



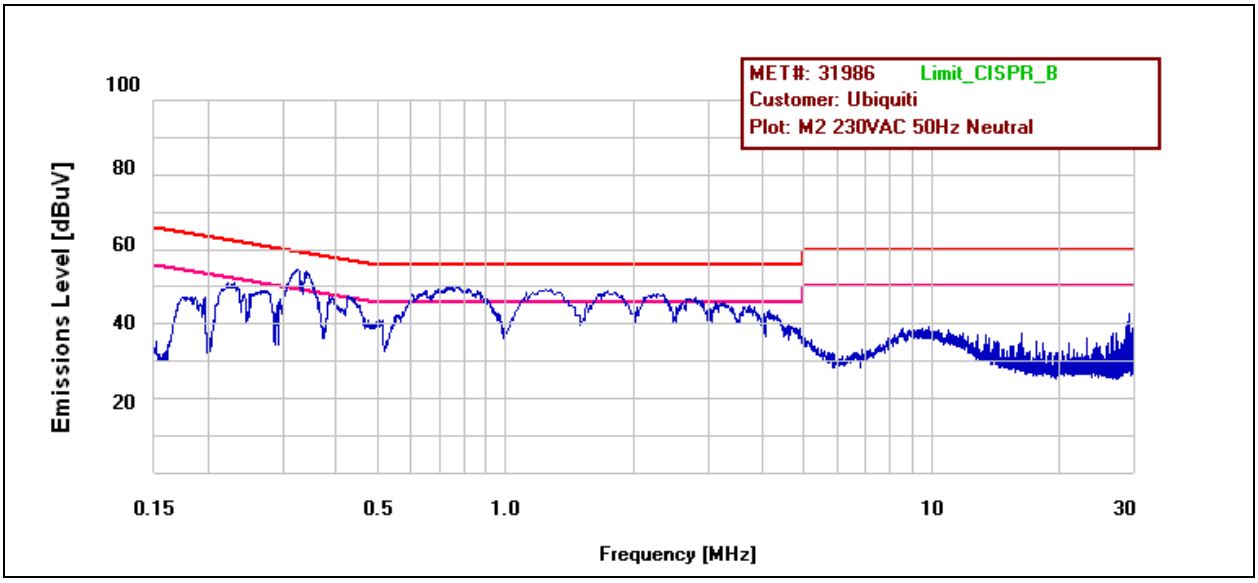
Plot 1. Conducted Emission Limits, Phase Line Plot, 230 MHz, 50 Hz

Electromagnetic Compatibility Emission

AC Mains Power Input/Output Ports: Limits for Conducted Emissions

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
M2 230 VAC 50Hz Neutral	.325	51.7	59.596	-7.896	Pass	36.1	49.596	-13.496	Pass
M2 230 VAC 50 Hz Neutral	.774	46.7	56	-9.3	Pass	37.54	46	-8.46	Pass
M2 230 VAC 50Hz Neutral	1.245	46.2	56	-9.8	Pass	35.67	46	-10.33	Pass

Table 8. Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Neutral Line, 230 MHz, 50 Hz



Plot 2. Conducted Emission Limits, Neutral Line Plot, 230 MHz, 50 Hz

Electromagnetic Compatibility Emission

AC Mains Power Input/Output Ports: Limits for Conducted Emissions

Photograph 1. AC Mains Power Input/Output Ports, Conducted Disturbance, Test Setup

Electromagnetic Compatibility Emission

3.2 Harmonic Current Emissions

Test Requirement(s): **ETSI EN 301 489-1, Clause 8.5:**

Per *EN 61000-3-2+A1, Clause 7,* the EUT must not produce harmonic currents, which exceed the limits expressed in Table 9.

Harmonic Order	Maximum Permissible Harmonic Current (in Amperes)
Odd Harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15 < n < 39	0.15 - 15/n
Harmonic Order	**Maximum Permissible Harmonic Current (in Amperes)**
Even Harmonics	
2	1.08
4	0.43
6	0.30
8< n <40	0.23 - 8/n

Table 9. Harmonic Current Emission Limits from Section 7 of EN 61000-3-2

Test Procedure: The EUT was placed on a non-metallic table located in a shielded enclosure (See Photograph 2). The measurement was performed using normal operation of the equipment. The method of testing, test conditions, and test procedures of *EN 61000-3-2+A1*.

Electromagnetic Compatibility Emission

Harmonic Current Emissions

Test Procedure (Con't): ITE is tested with the equipment configured to its rated current. In this case, the equipment, if necessary, may be configured with its power supplies loaded with additional load (resistive) boards to simulate rated current conditions. For ITE systems designed for use with a manufacturer-supplied power distribution system, e.g. transformers, UPS, power conditioner, etc., compliance with the limits of this standard shall be met at the input to the power distribution system.

Test Results: The EUT was found compliant with the specified requirements of Clause 8.5.

Test Engineer(s): Jonathon Chao

Test Date(s): 06/20/11

Class (A, B, C, D)	Voltage (V)	Current (A)	Frequency (Hz)	Total Harmonic Distortion (%)
A	236.42V	66.8 mA	50.009 Hz	227.44%
Harmonic #	**Measured (A)**	**Limit(A)✧**	**Results**	**Notes**
3	.0259	2.300	Pass	No anomalies
5	.0249	1.140	Pass	No anomalies
7	.0235	0.770	Pass	No anomalies
9	.0218	0.400	Pass	No anomalies
11	.0197	0.330	Pass	No anomalies
13	.0174	0.21	Pass	No anomalies
15-39	.0018-.0151	0.150- 0.058	Pass	No anomalies
2	.0014	1.080	Pass	No anomalies
4	.0014	0.430	Pass	No anomalies
6	.0013	0.300	Pass	No anomalies
8-40	.0003-.0012	0.230- 0.046	Pass	No anomalies

Table 10. Harmonics, Test Results

Electromagnetic Compatibility Emission

Harmonic Current Emissions

Photograph 2. Harmonic Current Emissions, Test Setup

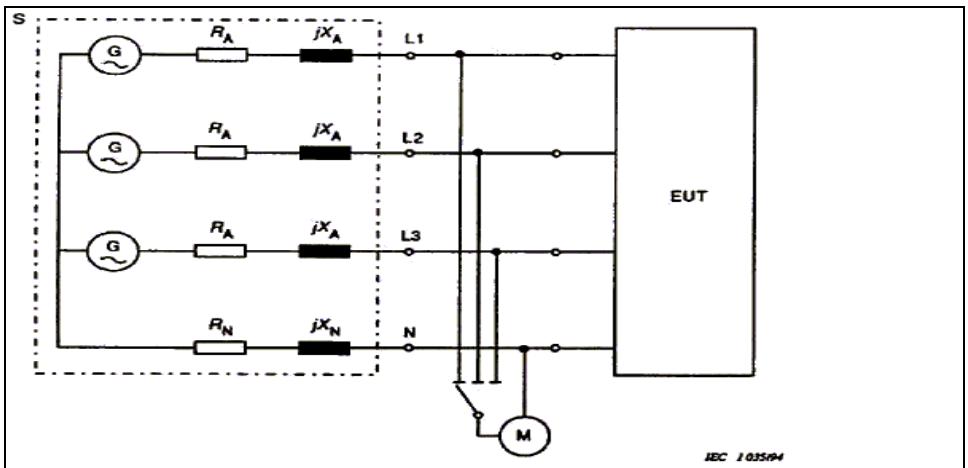
Electromagnetic Compatibility Emission

3.3 Voltage Fluctuations (Flicker)

Test Requirement(s): **ETSI EN 301 489-1, Clause 8.6:**

The EUT must not produce voltage fluctuations and/or flicker at the supply terminals as measured or calculated according to clause 4, according to limits expressed in *Clause 5*, under test conditions described in *Clause 6* and *Annex A* of *EN 61000-3-3*.

Test Procedure: The EUT was placed on a non-metallic table inside a shielded enclosure (See Photograph 3). The EUT was situated such that the sides of the EUT were no closer than 2.0 m from the walls of the shielded enclosure. The EUT was operated with an AC main source at 220 V. Tests to prove the compliance of the EUT with the limits of *EN 61000-3-3, Section 5* were made using the test circuit provided in Figure 2 of *EN 61000-3-3*. The test circuit consisted of the test power supply, the reference impedance, the EUT, and a flickermeter. The test supply voltage (open-circuit voltage) was the rated voltage of the equipment. The test voltage was maintained within 2% of the nominal value. The frequency was 50 Hz 0.5%. The total harmonic distortion of the supply voltage was less than 3%. The limits applicable to voltage fluctuations and flicker at the supply terminals of the EUT were automatically measured with the analyzer.



EUT equipment under test

M measuring equipment

S supply source consisting of the supply voltage generator G and reference impedance Z with the elements:

R_A = 0,24 Ω; jX_A = 0,15 Ω at 50 Hz;

R_N = 0,16 Ω; jX_N = 0,10 Ω at 50 Hz.

The elements include the actual generator impedance.

When the source impedance is not well defined, see 6.2.

G voltage source in accordance with 6.3.

NOTE – In general, three-phase loads are balanced, and R_N and X_N can be neglected, as there is no current in the neutral wire.

Figure 2. Test Circuit for EN 61000-3-3

Electromagnetic Compatibility Emission

Voltage Fluctuations (Flicker)

Test Results: The EUT was found compliant with the specified requirements of Clause 8.6.

Test Engineer(s): Jonathan Chao

Test Date(s): 06/20/11

Voltage (V)	Current (A)	Frequency (Hz)	Power Factor
263.3 V	67.2 mA	49.990 Hz	.396

Average (Is) relative voltage Drop		**d(t)**		.004%
Relative voltage fluctuation (3s)		**Dpp**		.002
d(t) at steady - state level		**YES /NO**		Yes
Last relative steady - state level change		**Dc**		0%
Last transition swing		**Dmax**		--
Normalized peak flicker (3s)		**Pp**		0%
Parameter		**Observation Period**		Limit
		Short	**Long**	
Observation Time	**Tp**	10 min	120 min	
Maximum relative voltage change	**dmax**	0%	0%	4
Max rel. steady-state voltage change	**dc**	0%	0%	3
Duration of d(t) > 3 %	**t**	0s	0s	0.2
Short term flicker severity	**Pst**	0	0	1.0
Long term flicker severity	**Plt**	NA	0	0.65

Table 11. Flicker, Test Results

Electromagnetic Compatibility Emission

Voltage Fluctuations (Flicker)

Photograph 3. Voltage Fluctuations (Flicker), Test Setup

Electromagnetic Compatibility Emission

3.4 Telecommunications Ports

Test Requirement(s): **ETSI EN 301 489-1, Clause 8.7:**

The EUT must be in accordance with EN 55022 (2006), Section 5.2.

The EUT shall meet the Conducted Common Mode limits shown in Table 12:

Frequency Range (MHz)	Voltage Limits (dBµV)		Current Limits (dBµA)	
	Quasi-Peak	Average	Quasi- Peak	Average
0.15 - 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 - 30	74	64	30	20
Note 1: The limits decrease linearly with the logarithm of the frequency in the range of 0.15 MHz to 0.5 MHz..				
Note 2: The current and voltage disturbnace limits are derived for use with an ISN which presents a common mode (asymetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 Log_{10} 150/1 = 44 dB).				

Table 12. Limits of Conducted Common Mode (Asymmetric Mode) Disturbance at Telecommunication Ports from Clause 5.2 of EN 55022 Class B

Test Procedure: The EUT was placed on a non-metallic table located in a shielded enclosure (See Photograph 4). The measurements were performed using normal operation of the equipment. The method of testing, test conditions, and test procedures of *Clause 9* of *EN 55022* were used. The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a Current Probe as the input transducer to an EMC field intensity meter.

Environmental Conditions for Conducted Emission	
Ambient Temperature:	23°C
Relative Humidity:	35%

Test Results: The EUT was found compliant with the requirement(s) of this section.

Test Engineer(s): Jonathan Chao

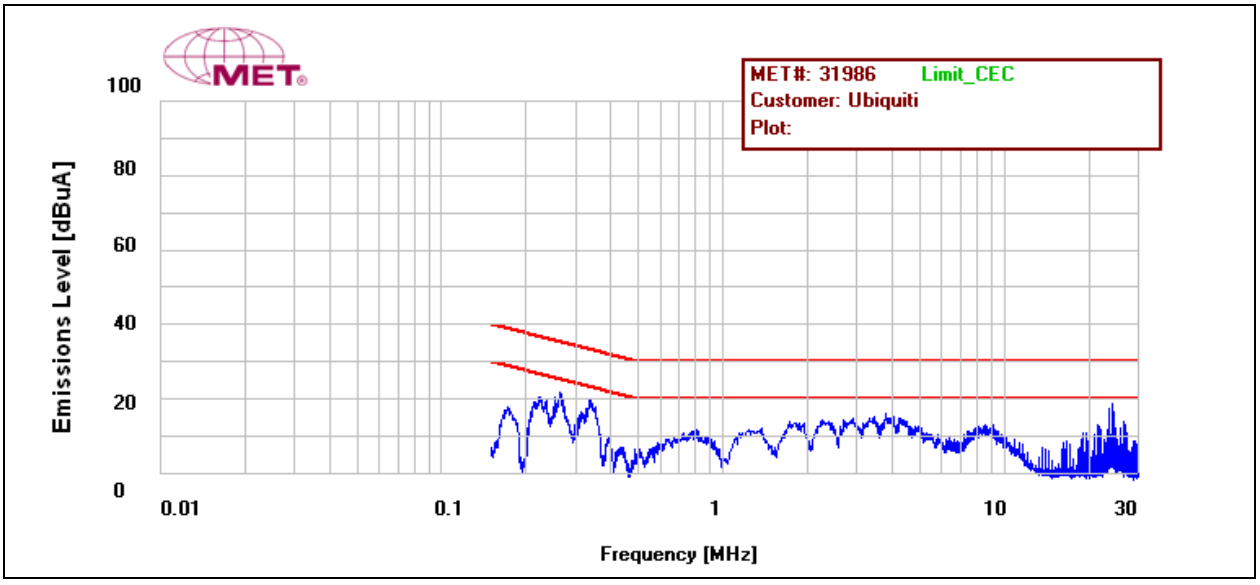
Test Date(s): 06/17/11

Limits for Conducted Disturbance at Telecommunication Ports

Conducted Emissions - Voltage for Telecommunication Ports, Worst Case Emissions, M2 Telecom Shielded Line

Line	Frequency (MHz)	Raw	QP Amplitude	QP Limit	Delta	Pass / Fail	Raw	Average Amplitude	Average Limit	Delta	Pass / Fail
M2 Telecom Shielded	.260	45.54	13.54	35.431	-21.891	Pass	37.41	5.41	25.431	-20.021	Pass
M2 Telecom Shielded	.765	35.41	3.41	30	-26.59	Pass	26.92	-5.08	20	-25.08	Pass
M2 Telecom Shielded	3.368	39.7	7.7	30	-22.3	Pass	31.86	-0.14	20	-20.14	Pass
M2 Telecom Shielded	5.104	35.15	3.15	30	-26.85	Pass	26.22	-5.78	20	-25.78	Pass
M2 Telecom Shielded	9.234	34.87	2.87	30	-27.13	Pass	27.8	-4.2	20	-24.2	Pass
M2 Telecom Shielded	24.14	44.1	12.1	30	-17.9	Pass	43.22	11.22	20	-8.78	Pass

Table 13. Limits for Conducted Disturbance at Telecommunication Ports Test Results, M2 Telecom Shielded



Plot 3. Conducted Emission Limits for Telecommunications Ports, M2 Telecom Shielded Plot

Limits for Conducted Disturbance at Telecommunication Ports

Photograph 4. Limits for Conducted Disturbance at Telecommunication Ports

4.0 Electromagnetic Compatibility Immunity Criteria

4.1 Radio Frequency Electromagnetic Field

Test Requirement(s): **ETSI EN 301 489-1, Clause 9.2:**

Per *EN 61000-4-3*, the EUT must not be susceptible to a radiated electromagnetic field of 3 V/m, 80% amplitude modulated, in the frequency range 80 MHz to 1000 MHz and 1400 MHz to 2700 MHz(EN 61000-4-3). Performance criterion A applies.

The EUT was placed on a non-metallic table located inside the semi-anechoic chamber and the radiating antenna for 80MHz to 1GHz range was placed 2.5 m and for 1.4 to 2.7 GHz, Horn antenna was placed at 1m in front of the EUT (See Photograph 5). Support equipment, other than laptop being used to monitor wireless communication, for the EUT was located outside of the test room. The EUT was exposed to the required immunity fields. The amplitude and frequency of the radiated interference was set by an automated, computer-controlled system.

The chamber and signal generation/amplification system is calibrated to insure a uniform RF field with no EUT present. The recorded signal is played back by the controlling computer with the EUT placed in the area of uniform field. The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental, as recommended in EN 61000- 4-3. The signal was amplitude modulated 80% over the frequency range 80 MHz to 1000 MHz and 1400 MHz to 2700 MHz at a level of 3 V/m. Field presence was monitored during testing via a field probe placed in close proximity to the EUT. Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization. Testing was performed in a semi-anechoic chamber.

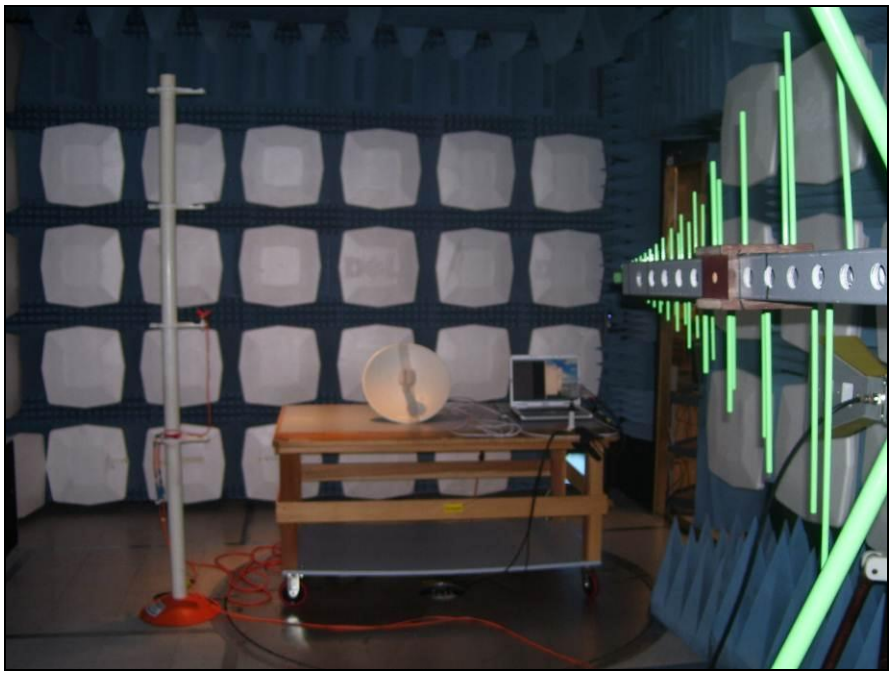
Test Results: The EUT as tested was compliant with the requirements of Clause 9.2.

Test Technician(s): Roel Garcia

Test Date(s): 06/22/11

Frequency Range (MHz)	Step Size (%)	Dwell Time (s)	Voltage Level (V/m)	Antenna Polarity	Modulation	Front	Back	Left	Right
80-1000	1	1	3	V	80% AM, 1kHz	Pass	Pass	Pass	Pass
80-1000	1	1	3	H	80% AM, 1kHz	Pass	Pass	Pass	Pass
1400-2700	1	1	3	V	80% AM, 1kHz	Pass	Pass	Pass	Pass
1400-2700	1	1	3	H	80% AM, 1kHz	Pass	Pass	Pass	Pass

Table 14. Radiated Immunity, Test Results



Photograph 5. Radio Frequency Electromagnetic Field, Test Setup, 80 MHz – 1 GHz

Photograph 6. Radio Frequency Electromagnetic Field, Test Setup, 1.4 GHz – 2.7 GHz

Electromagnetic Compatibility Immunity

4.2 Electrostatic Discharge

Test Requirement(s): **ETSI EN 300 489-1 Clause 9.3:**

Per *EN 61000-4-2*, the EUT was tested with air discharges of up to ± 8 kV, applied to non-conductive surfaces, and to contact discharges of up to ± 4 kV, applied to conductive surfaces of the EUT and the HCP/VCP. Performance Criterion B applies.

The EUT was placed on a non-metallic table located above a ground reference plane (GRP) (See Photograph 16), with a thickness of at least 0.25 mm, thus satisfying the requirements of *IEC 61000-4-2*:

> It [the GRP] shall be a metallic sheet (copper or aluminum) of 0.25 mm minimum thickness.... The minimum size of the reference plane is 1 m2, the exact size depending on the dimensions of the EUT. It shall project beyond the EUT or coupling plane by at least 0.5 m on all sides....

A horizontal coupling plane (HCP), 1.6 m x 0.8 m, shall be placed on the table. The EUT and cables shall be isolated from the coupling plane by an insulating support 0.5 mm thick.

A copper vertical coupling plane (VCP) measuring 0.5 m X 0.5 m was placed 0.1 m from the EUT. The VCP was connected to the GRP through two series 470 k Ω resistors. The GRP was connected to safety ground. The EUT was connected to the grounding system through its power cable only, in accordance with *EN 61000-4-2, Section 7.1, paragraph 4*:

> The EUT shall be connected to the grounding system in accordance with its installation specifications. No additional grounding connections are allowed.

Ambient Temperature:	22°C
Relative Humidity:	49%
Atmospheric Pressure:	98 kPa

Environmental Conditions during EN 61000-4-2 Testing

Electromagnetic Compatibility Immunity

Electrostatic Discharge

Test Procedure: Air discharges of up to ± 8kV were applied to non-conductive surfaces. Contact discharges of up to ± 4 kV were applied to conductive surfaces of the EUT. Contact discharges of ± 4 kV were applied to the HCP/VCP. Negative and positive discharges were applied at least ten times to each selected discharge point. The functionality of the EUT was determined during and after each discharge in accordance with Performance Criterion B.

There was Ground continuity on Ethernet ports of POE. Hence, tested as grounded equipment. But there was no ground continuity on antenna and screws on it. Hence tested as ungrounded equipment.

Test Results: The EUT as tested was compliant with the requirements of Clause 9.3.

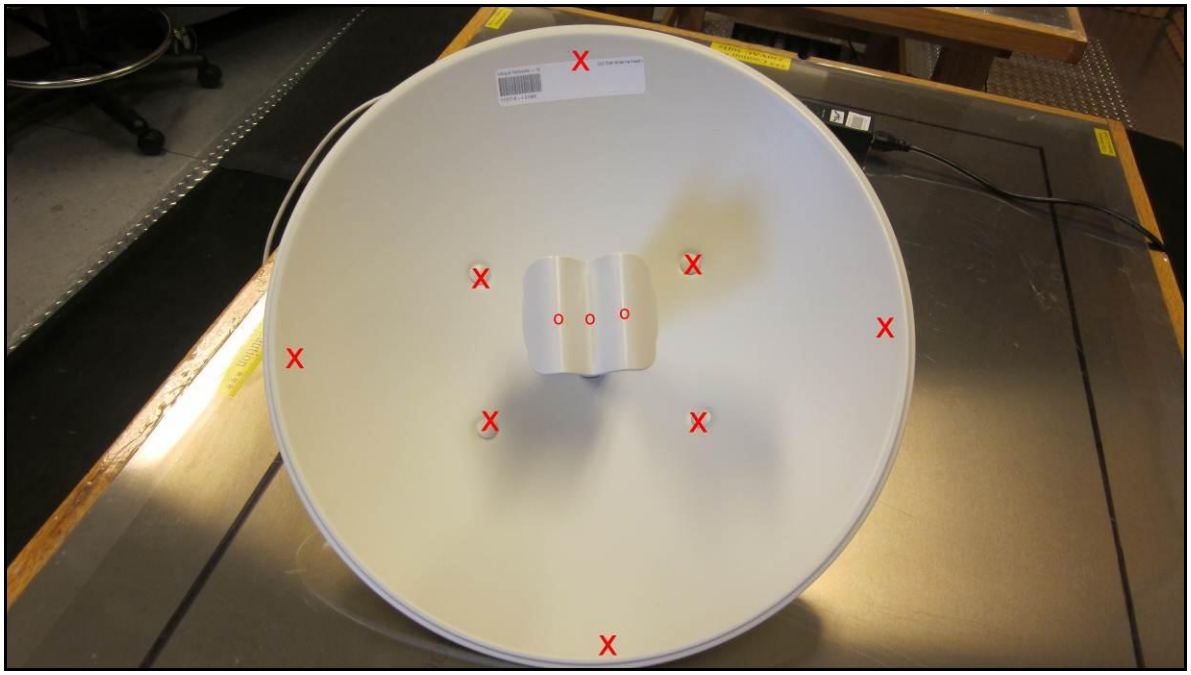
Test Technician(s): Roel Garcia

Test Date(s): 06/23/11

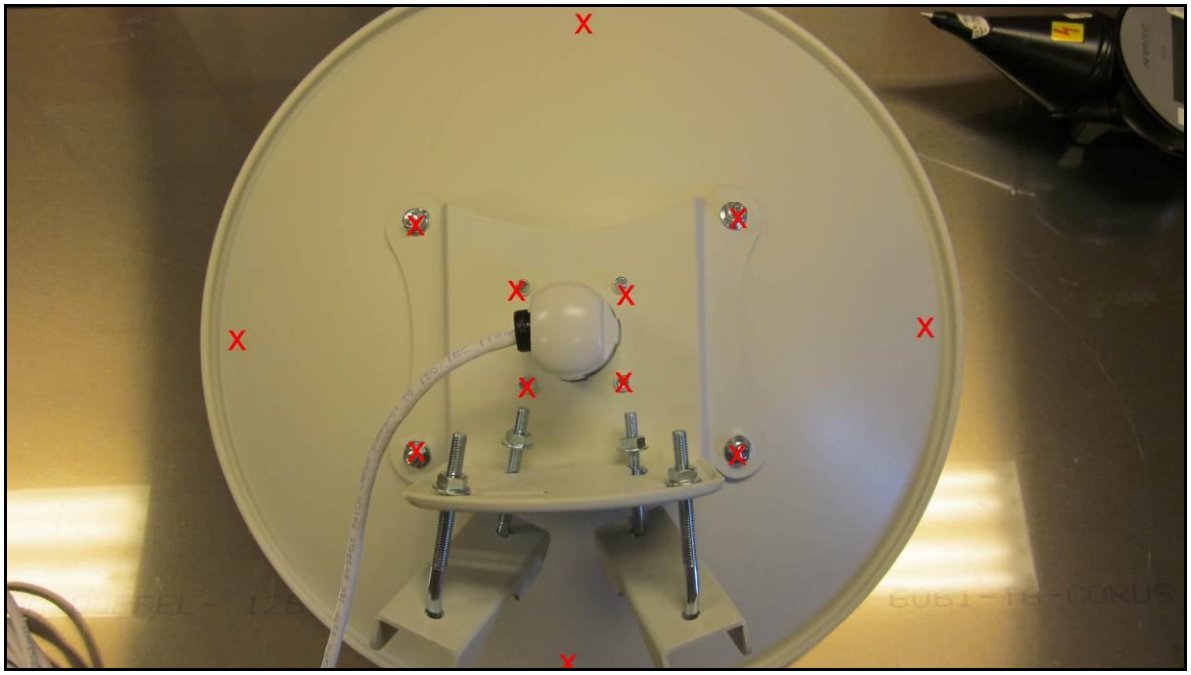
Discharge Type	Test Voltage (+/- kV)	Results				Anomalies
		Front	Back	Left	Right	
HCP (POE + M2D)	2	Pass	Pass	Pass	Pass	No anomalies
	4	Pass	Pass	Pass	Pass	No anomalies
VCP (POE + M2D)	2	Pass	Pass	Pass	Pass	No anomalies
	4	Pass	Pass	Pass	Pass	No anomalies
POE						
Contact Discharge	2	N/A	Pass	N/A	N/A	No anomalies
	4	N/A	Pass	N/A	N/A	No anomalies
Air Discharge	2	Pass	Pass	Pass	Pass	No anomalies
	4	Pass	Pass	Pass	Pass	No anomalies
	8	Pass	Pass	Pass	Pass	No anomalies
M2D						
Contact Discharge	2	Pass	Pass	N/A	N/A	No anomalies
	4	Pass	Pass	N/A	N/A	See Note.
Air Discharge	2	Pass	Pass	Pass	Pass	No anomalies
	4	Pass	Pass	Pass	Pass	No anomalies
	8	Pass	Pass	Pass	Pass	No anomalies
Note: Network connections timed out for 6 seconds when applying conact discharge to the M2D at -4Kv. Connection was re-established without operator intervention.						

Table 15. Electrostatic Discharge, Test Results

Electrostatic Discharge, Test Points

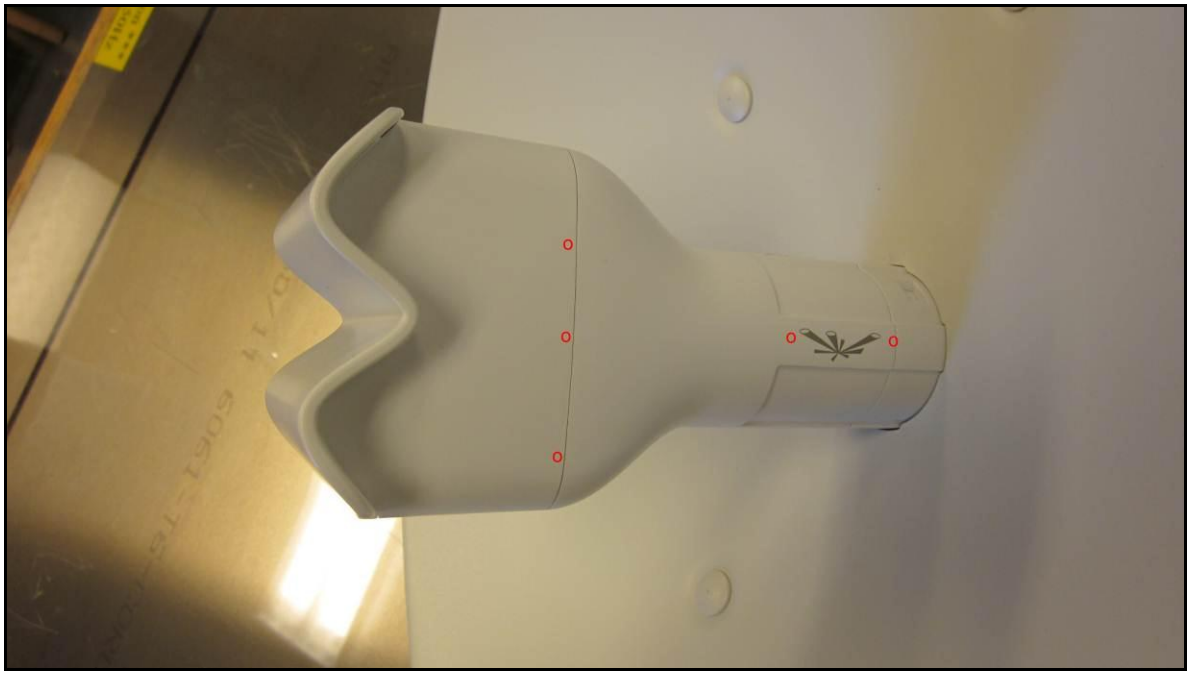


Photograph 7. ESD, Test Points, Dish Front View

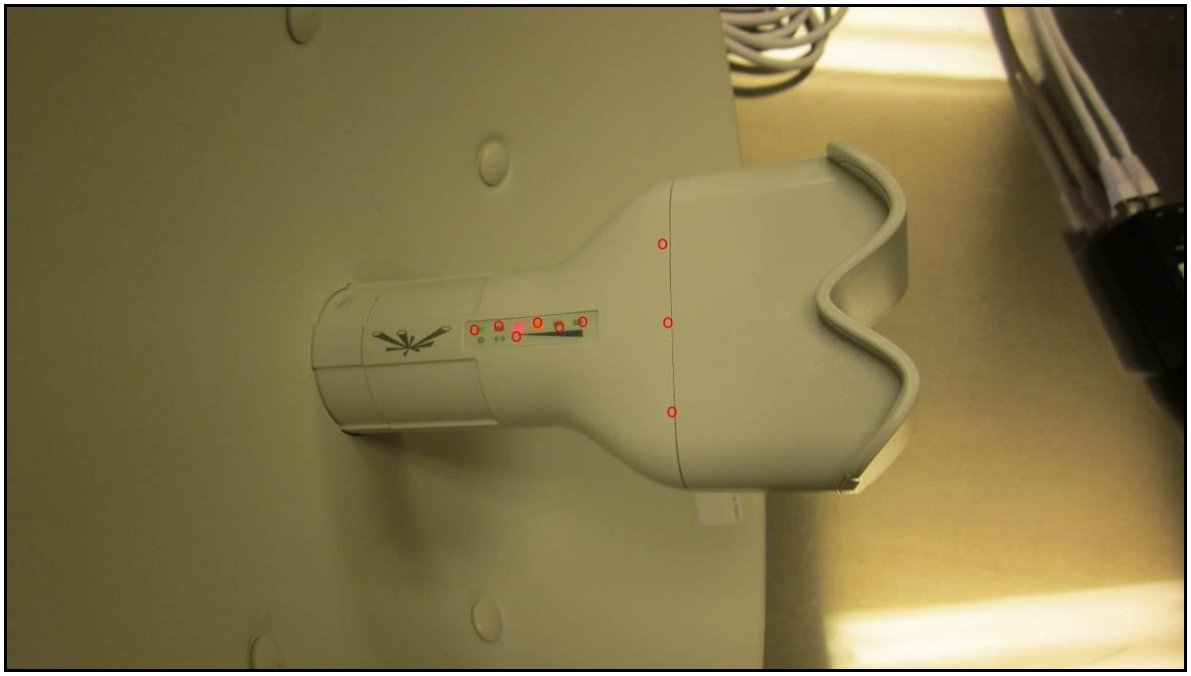


Photograph 8. ESD, Test Points, Dish Rear View

X = Contact Discharge
O = Air Discharge



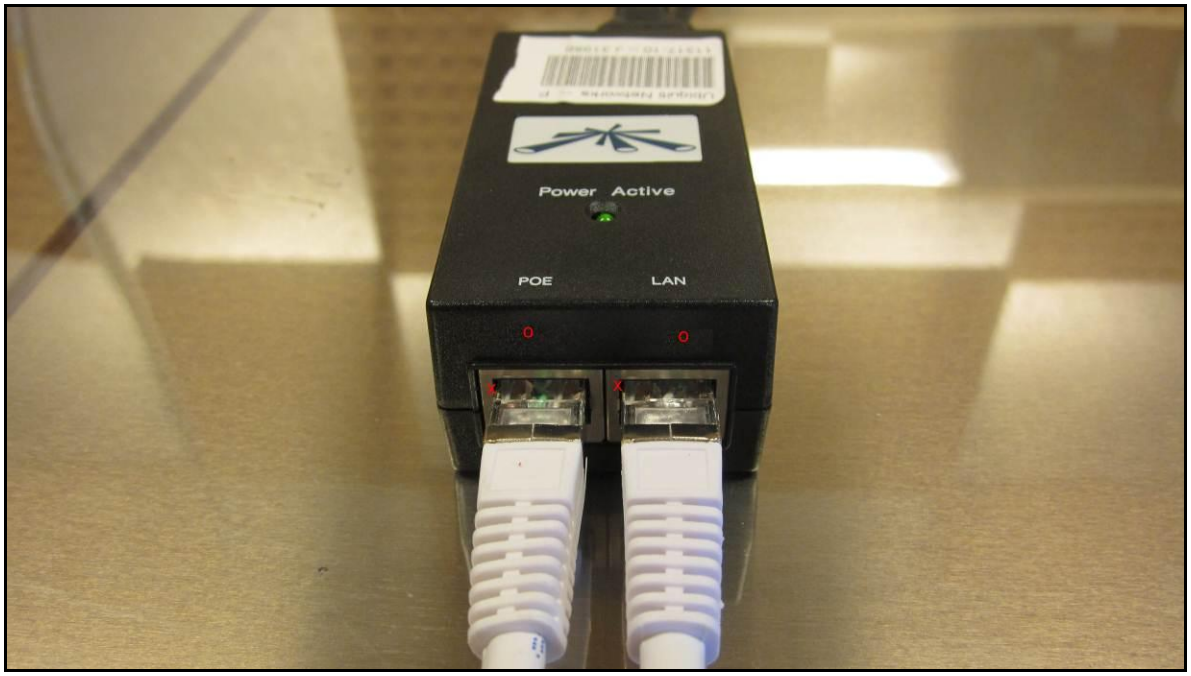
Photograph 9. ESD, Test Points, Left View



Photograph 10. ESD, Test Points, Right View

X = Contact Discharge
O = Air Discharge

Photograph 11. ESD, Test Points, POE Left Top View



Photograph 12. ESD, Test Points, POE Front View

X = Contact Discharge
O = Air Discharge

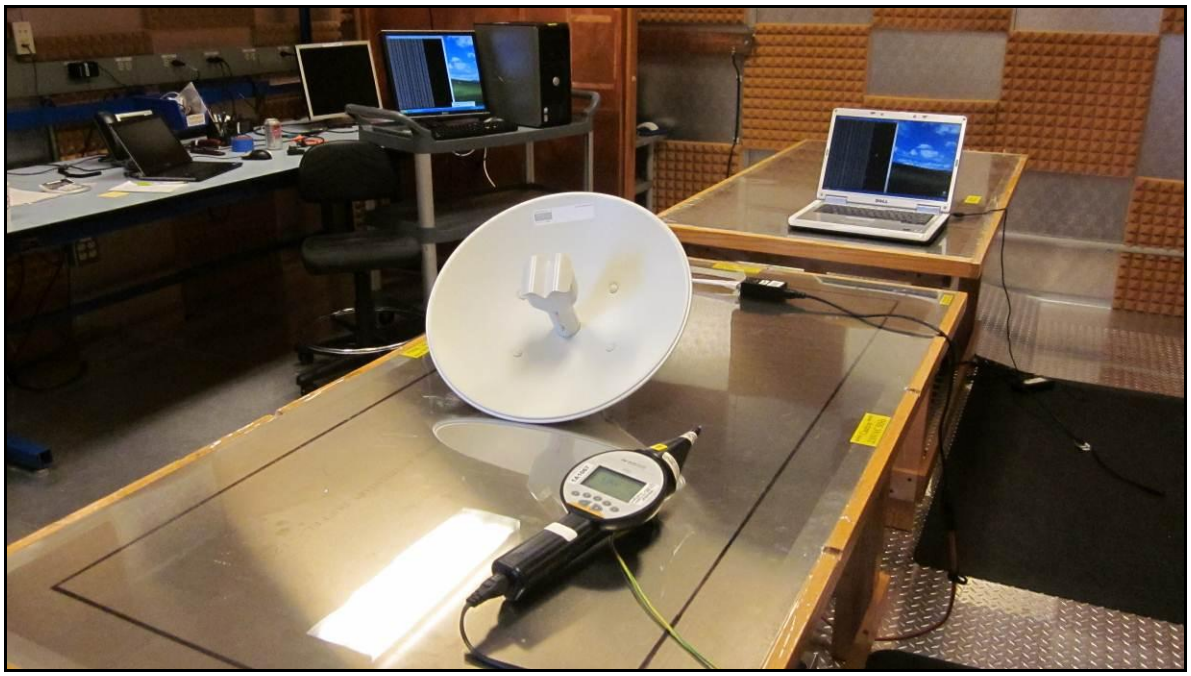
Photograph 13. ESD, Test Points, POE Left View

Photograph 14. ESD, Test Points, POE Rear View

X = Contact Discharge
O = Air Discharge

Photograph 15. ESD, Test Points, POE Right View

X = Contact Discharge
O = Air Discharge



Photograph 16. Electrostatic Discharge, Test Setup

Electromagnetic Compatibility Immunity

4.3 Fast Transient, Common Mode

Test Requirement(s): **ETSI EN 300 489-1, Clause 9.4:**

Per *EN 61000-4-4*, The EUT was tested with the electrical fast transients shown in Figure 3, having an amplitude of ± 1 kV applied to the AC power cables (plug type); ± 0.5 kV applied to the DC power cables; ± 1 kV applied to I/O and data lines. Only cables that could potentially exceed 3 m in length in real-world application of the EUT need be tested. Performance criterion B applies for all tests.

Test Procedure: The EUT was placed on a non-metallic table 10cm above a GRP extending at least 0.1 m beyond all sides of the EUT (See Photograph 17). The Electrical Fast Transient/Burst (EFT/B) generator and the coupling clamp were mounted to the ground plane. For application of the fast transients to the power lines, power was supplied to the EUT through the EFT/B generator. For application of the fast transients to I/O, data and control lines, the cables were individually placed in the coupling clamp, which was also connected to the EFT/B generator.

The EFT/B generator was operated to couple the required transient bursts to each line of the power input in common mode. Transient bursts were applied for a period not less than one minute with both positive transients and negative transients.

The EUT was then powered from an isolated circuit, and selected I/O, data and control cables were placed one at a time in the capacitive coupling clamp. The EFT/B generator was operated to inject the required bursts onto each selected cable via the coupling clamp.

Throughout testing, the EUT was monitored closely for signs of susceptibility.

Electromagnetic Compatibility Immunity

Fast Transient, Common Mode

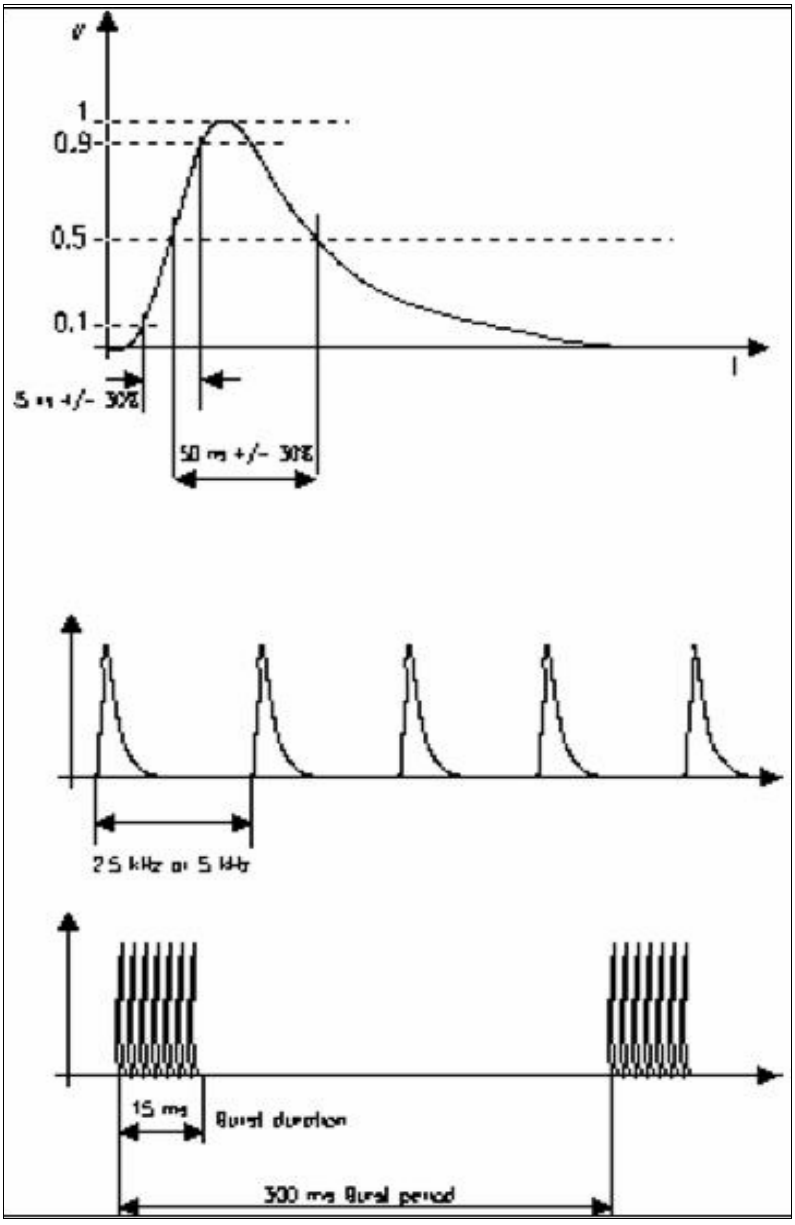


Figure 3. EN 61000-4-4 Test Waveform

Electromagnetic Compatibility Immunity

Fast Transient, Common Mode

Test Results: The EUT as tested was found compliant with the requirements of Clause 9.4.

Test Technician(s): Roel Garcia

Test Date(s): 06/27/11

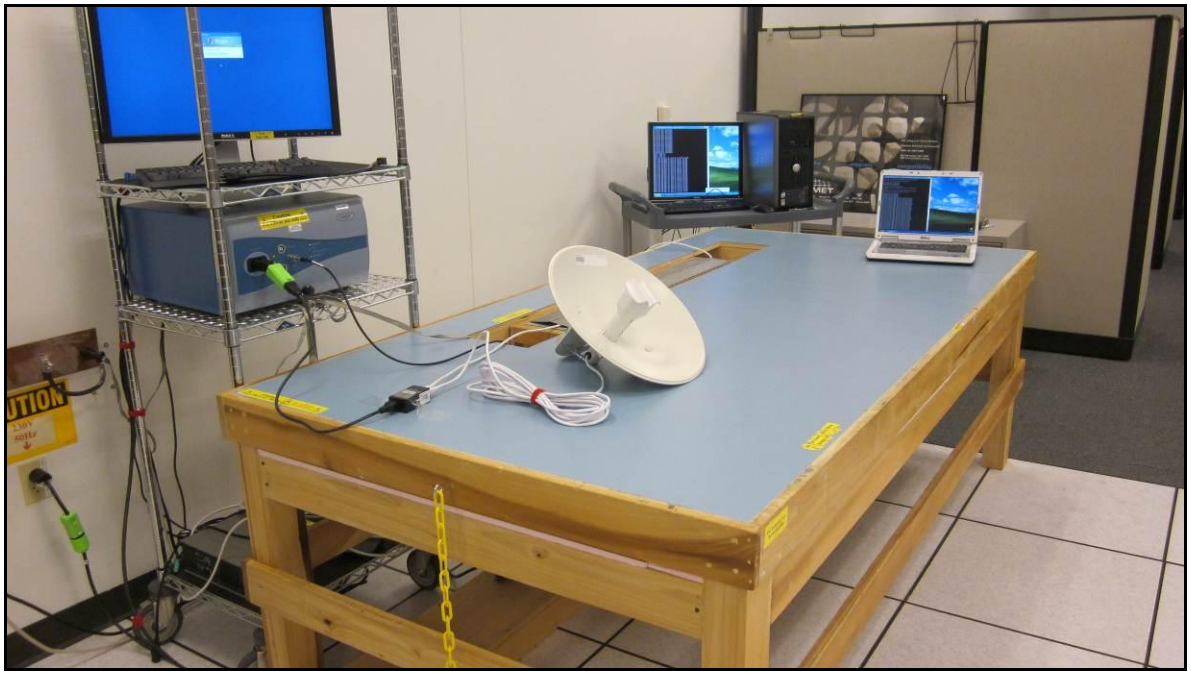
Line Under Test	Voltage Level	Pulse Polarity	Burst Repetition	Test Duration	Pass/Fail	Anomalies
AC Power	500V	+	300ms/5.0kHz	1 Min	Pass	See Note
AC Power	500V	-	300ms/5.0kHz	1 Min	Pass	See Note
AC Power	1.0kV	+	300ms/5.0kHz	1 Min	Pass	See Note
AC Power	1.0kV	-	300ms/5.0kHz	1 Min	Pass	See Note
LAN cable	500V	+	300ms/5.0kHz	1 Min	Pass	See Note
LAN cable	500V	-	300ms/5.0kHz	1 Min	Pass	See Note

Table 16. Fast Transient, Test Results

Note: During 500V and 1.0kV AC Line tests, as well as 500V LAN cable testing, Network cable and wireless communications lost. Communications was automatically restored upon completion of test. Operator intervention not required.

Fast Transient, Common Mode

Photograph 17. Fast Transient, Common Mode, Test Setup



Photograph 18. Fast Transient, Common Mode, Test Setup, Clamp

Electromagnetic Compatibility Immunity

4.4 Radio Frequency, Common Mode

Test Requirement(s): **ETSI EN 300 489-1, Clause 9.5:**

Per *EN 61000-4-6*, all interconnecting cables on the EUT including AC power lines, data and control lines shall be tested for immunity to conducted radio frequencies in the range 0.15 MHz - 80 MHz. Using the EMI Clamp method, I/O and data cables must be tested to a level of 3 Vrms. The injection voltage shall be amplitude modulated at 80% by a 1 kHz tone. Performance Criterion A applies for all tests.

Test Procedure: The EUT was placed on a non-metallic table 10cm above a GRP (See Photograph 19). For power line cables, a Coupling Decoupling Network (CDN) was used. The CDN was initially calibrated in a calibration jig with a 50 Ω RF load and a 100 Ω matching resistor on one side, and a 100 Ω matching resistor and the receiver (spectrum analyzer) on the other. The injection voltage level was adjusted to maintain a monitored voltage of 3 Vrms across the frequency range (0.15 MHz to 80 MHz).

For cables other than the power line in the frequency range 0.15 MHz - 80 MHz, the EM Clamp was initially calibrated in a calibration jig with a 50 Ω RF load and a 100 Ω matching resistor on one side, and a 100 Ω matching resistor and the receiver (spectrum analyzer) on the other. The injection voltage level was adjusted to maintain a monitored voltage of 3 Vrms across the frequency range (0.15 MHz to 80 MHz). The EM Clamp was clamped around the cable under test at a distance of 0.1 to 0.3 m from the EUT.

Electromagnetic Compatibility Immunity

Radio Frequency, Common Mode

Test Results: The EUT as tested was found compliant with the requirements of Clause 9.5.

Test Technician(s): Roel Garcia

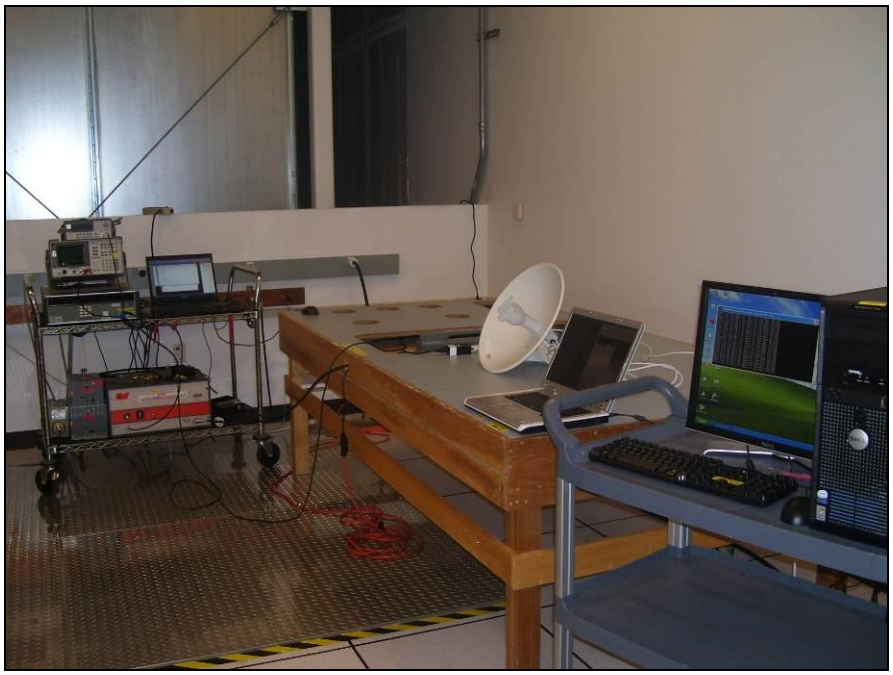
Test Date(s): 06/22/11

Line Under test	Dwell Time (s)	Frequency Steps %	Frequency Start (MHz)	Frequency Stop (MHz)	Voltage Level (Vrms)	Pass/Fail	Comments
Power	1	1	0.15	80	3	**Pass**	**None**
LAN	1	1	0.15	80	3	Pass	**None**

Table 17. Conducted Immunity, Test Results

Radio Frequency, Common Mode

Photograph 19. Radio Frequency, Common Mode, Test Setup



Photograph 20. Radio Frequency, Common Mode, Test Setup, Clamp

Electromagnetic Compatibility Immunity

4.5 Voltage Dips and Short Interruptions

Test Requirement(s): **ETSI EN 300 489-1, Clause 9.7:**

Per *EN 61000-4-11*, the EUT shall be tested for the following voltage dips, interruptions and variations:

5.2.4.4 Voltage Dips and Short Interruptions		
Unit	**Test level and Characteristic**	**Performance Criterion**
Voltage reduction % Duration ms	100 10	B
Voltage reduction % Duration ms	100 20	B
Voltage reduction % Duration ms	30 500	C
Voltage reduction % Duration ms	100 5000	C

Table 18. Voltage Dips and Short Interruptions Limits

Test Procedure: The EUT was placed on a non-metallic table and situated in the center of a GRP. The EUT was provided with AC power via the programmable power supply (See Photograph 21). The power supply was programmed to perform the applicable set of voltage dips, interruptions and variations. Each sequence was repeated three times to verify the results.

Results: The EUT as tested was found compliant with the requirements of Clause 9.7.

Test Technician(s): Roel Garcia

Test Date: 06/27/11

Test Type	Residual Voltage	Duration (mS)	Interruption Cycle(s)	# of Test Repitions	Repetition Interval	Pass/Fail	Anomalies
Voltage Dips	0%	10	0.5	3.0	20 Seconds	Pass	None
Voltage Dips	0%	20	1.0	3.0	20 Seconds	Pass	None
Voltage Dips	70%	500	25	3.0	20 Seconds	Pass	None
Short Interruptions	0%	5000	250	3.0	20 Seconds	Pass	See Note

Table 19. Voltage Dips and Interruptions, Test Results

Note: Communications with Network lost for approximately 6 seconds. Network comunications recovered without operator inteverntion.

Electromagnetic Compatibility Immunity

Voltage Dips and Short Interruptions

Photograph 21. Voltage Dips and Interruptions, Test Setup

Electromagnetic Compatibility Immunity

4.6 Surges

Test Requirement(s): **ETSI EN 301 489-1, Clause 9.8:**

The EUT was tested with the surge waveforms shown on the following page, having an open circuit amplitude of ± 1.0 kV applied to the I/O interconnection cables. Performance criterion B applies for I/O cables.

The EUT was tested with the surge waveforms shown on the following page, having an open circuit amplitude of ± 1 kV (differential mode), and ±2 kV (common mode) applied to the AC power cables. Performance Criterion B applies for AC power cables.

Test Procedure: AC power [where applicable] was supplied to the EUT through the Combination Wave Generator. The combination wave generator was configured to produce the following output:

Open Circuit Voltage:	Front Time = 1.2 □s Time to Half = 50 □s
Short Circuit Current:	Front Time = 8 □s Time to Half = 20 □s
Telecom wave parameters:	Front Time = 10 □s Time to Half = 700 □s

Table 20. Combination Wave Generator Test Parameters for EN 61000-4-5

Electromagnetic Compatibility Immunity

Surges

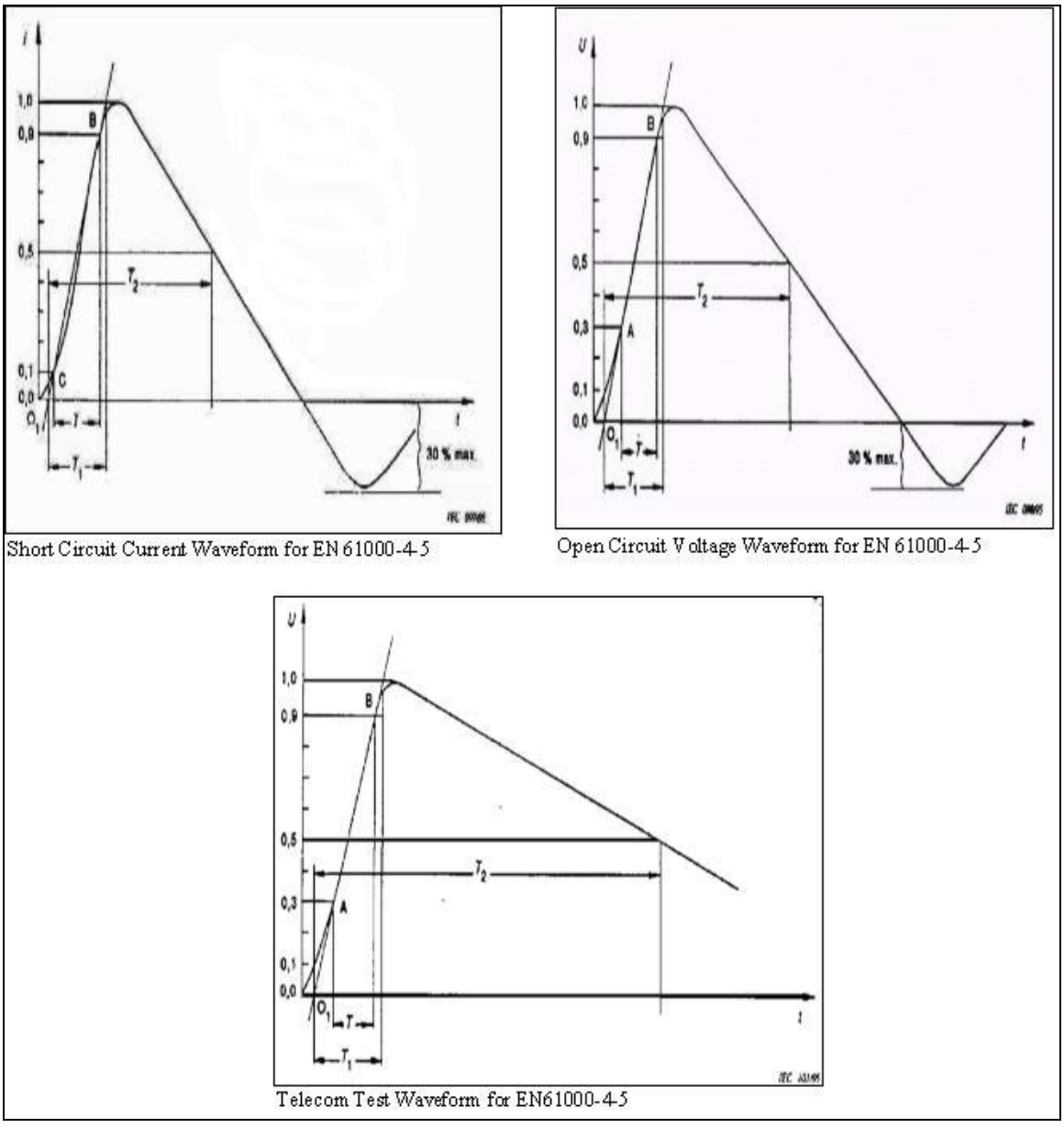


Figure 4. EN 61000-4-5 Surge Test Waveforms

Electromagnetic Compatibility Immunity

Surges

Test Procedure (Continued):

For AC power lines, the Combination Wave Generator was operated to couple the required surges between each EUT input power phase and ground, and from line to line. These three tests were performed with positive surges and negative surges, synchronized with the power input phase at 0°, 90°, 180°, and 270°. Throughout testing, the EUT was monitored closely for signs of susceptibility. For I/O port surges, surge waveforms were applied via a CDN, in accordance with *Section 7 of EN 61000-4-5*. The CDN coupled the required surges between each EUT input line and ground. These three tests were performed with positive surges and negative surges.

Test Results: The EUT as tested was found compliant with the requirements of Clause 9.8.

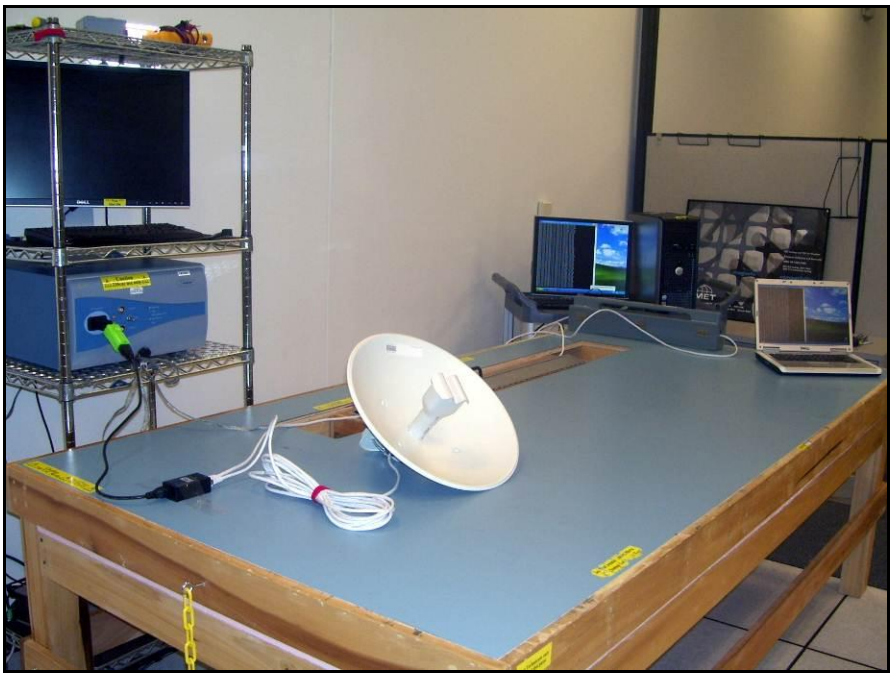
Test Engineer(s): Ram Shrestha

Test Date(s): 06/27/11 – 06/28/11

Port Name	Coupling Type	Surge Rep. Rate	Events per Phase Angle	Voltage Level (+/-)	Phase Angle (degree)	Pass/Fail	Anomalies
AC Differential Mode (Line to Neutral)							
Power	**L-N**	1/min	5	+500	0, 90, 180, 270	Pass	None
Power	**L-N**	1/min	5	-500	0, 90, 180, 270	Pass	None
Power	**L-N**	1/min	5	+1000	0, 90, 180, 270	Pass	None
Power	**L-N**	1/min	5	-1000	0, 90, 180, 270	Pass	None
AC Common Mode (Line to Ground)							
Power	**L-G**	1/min	5	+500	0, 90, 180, 270	Pass	None
Power	**L-G**	1/min	5	-500	0, 90, 180, 270	Pass	None
Power	**L-G**	1/min	5	+1000	0, 90, 180, 270	Pass	None
Power	**L-G**	1/min	5	-1000	0, 90, 180, 270	Pass	None
Power	**L-G**	1/min	5	+2000	0, 90, 180, 270	Pass	None
Power	**L-G**	1/min	5	-2000	0, 90, 180, 270	Pass	None
AC Common Mode (Neutral to Ground)							
Power	**N-G**	1/min	5	+500	0, 90, 180, 270	Pass	None
Power	**N-G**	1/min	5	-500	0, 90, 180, 270	Pass	None
Power	**N-G**	1/min	5	+1000	0, 90, 180, 270	Pass	None
Power	**N-G**	1/min	5	-1000	0, 90, 180, 270	Pass	None
Power	**N-G**	1/min	5	+2000	0, 90, 180, 270	Pass	None
Power	**N-G**	1/min	5	-2000	0, 90, 180, 270	Pass	None
LAN	**L-G**	1/min	5	+1000	N/A	Pass	None
LAN	**L-G**	1/min	5	-1000	N/A	Pass	None
Notes: During testing at all voltage levels, pinging through Ethernet line was interrupted for about 1 second at intermittent times. Network connection was restored without operator intervention.							

Table 21. Surges, Test Results

Surges



Photograph 22. Surges, AC power Test Setup

Photograph 23. Surges, I/O Setup

5.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

Test Name: AC Conducted Emissions Voltage Clause 8.4					**Test Date(s): 06/17/11**
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2460	1-26GHZ SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	7/13/2010	7/13/2011
1S2677	LISN	TESEQ	NNB 51	12/1/2010	12/1/2011
Test Name: Harmonic Current Emissions Clause 8.5					**Test Date(s): 06/20/11**
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2398	POWER MEASUREMENT SYSTEMS	COMBINOVA	ANALYZER 300	04/19/2011	04/19/2012
Test Name: Voltage Fluctuations (Flicker) Clause 8.6					**Test Date(s): 06/20/11**
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2398	POWER MEASUREMENT SYSTEMS	COMBINOVA	ANALYZER 300	04/19/2011	04/19/2012
Test Name: Telecom Line Conducted Emissions Clause 8.7					**Test Date(s): 06/17/11**
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2460	1-26GHZ SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	7/13/2010	7/13/2011
1S2677	LISN	TESEQ	NNB 51	12/1/2010	12/1/2011
1S2487	CURRENT PROBE	SOLAR ELECTRONICS	6741-1	2/21/2011	8/21/2012
1S2668	PER-AMPLIFIER	SONOMA INSTRUMENTS	310 N	SEE NOTE	
Test Name: Radiated Electromagnetic Field Clause 9.2					**Test Date(s): 06/22/11**
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1085	AMPLIFIER	AMPLIFIER RESEARCH	250W1000A	SEE NOTE	
1A1063	SIGNAL GENERATOR	MARCONI INSTRUMENTS	2032	7/29/2010	7/29/2012
1A1115	STARPROBE	AMPLIFIER RESEARCH	FL7004	10/18/2010	10/18/2011
1A1061	FIELD MONITOR	AMPLIFIER RESEARCH	FM7004	10/18/2010	10/18/2011
1A1062	LASER PROBE INTERFACE	AMPLIFIER RESEARCH	FI7000	10/18/2010	10/18/2011
1A1059	BI-LOG ANTENNA	SCHAFFNER	CBL6112B	SEE NOTE	
1A10081	AMPLIFIER	AMPLIFIER RESEARCH	5081G4A	SEE NOTE	
1A1046	RI 3M CHAMBER	ETS	N/A	1/27/2011	1/27/2012
1A1109	HORN ANTENNA	SOUND SCIENCES CORP.	DRH-118	SEE NOTE	

Test Name: Electrostatic Discharge Immunity Clause 9.3					Test Date(s): 06/23/11
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1067	MODULE	NEMTEST	DITO	07/16/2010	07/16/2011
1A1060	ESD CHAMBER	ETS	TEMP & HUMIDITY CHAMBER	02/21/2011	02/21/2012
1A1048	TEMP & HUMIDITY METER	EXTECH	4465CF	04/27/2011	04/27/2012
Test Name: Fast Transients Clause 9.4					**Test Date(s): 06/27/11**
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1057	SURGE/EFT GENERATOR	SCHAFFNER	MODULA	7/13/2010	7/13/2011
1A1012	EM CURRENT CLAMP	FISCHER	F-203I-23MM	SEE NOTE	
Test Name: Radio Frequency, Conducted Continuous Clause 9.5					**Test Date(s): 06/22/11**
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1016	SPECTRUM ANALYZER	HEWLETT PACKARD	8594F	12/20/2010	12/20/2011
1A1071	AMPLIFIER	AMPLIFIER RESEARCH	100A250	SEE NOTE	
1A1107	ATTENUATOR	HEWLETT PACKARD	10DB	SEE NOTE	
1A1022	RF PROBE	SOLAR ELECTRONICS	9118-1	6/2/2010	7/2/2011
1A1012	EM INJECTION CLAMP	FISCHER CUSTOM COMMUNICATIONS	F-2031-23MM	SEE NOTE	
1A1037	CDN	FISCHER CUSTOM COMMUNICATIONS	FCC-801-M3-16A	SEE NOTE	
1A1064	CDN	FISCHER CUSTOM COMMUNICATIONS	FCC-801-M3-32A	SEE NOTE	
1A1034	ATTENUATOR	BIRD	10DB	SEE NOTE	
1A1111	TEST TABLE	CUSTOM MADE	N/A	3/28/2011	3/28/2012
Test Name: Voltage Dips and Short Interruptions Clause 9.7					**Test Date(s): 06/27/11**
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1052	PC INTERFACE	CALIFORNIA INSTRUMENTS	PACS-1	12/20/2010	12/20/2011
1A1053	POWER SOURCE	CALIFORNIA INSTRUMENTS	5000-IX	12/20/2010	12/20/2011
Test Name: Surges Clause 9.8					**Test Date(s): 06/27/11 – 06/28/11**
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1057	SURGE/EFT GENERATOR	SCHAFFNER	MODULA	7/13/2010	7/13/2011
2A1005	TEMPERATURE CONTROL	OMEGA	PRHTEMP 2000	12/9/2010	12/9/2011
1A1104	SURGE GENERATOR	THERMO SCIENTIFIC	EMCPROPLUS	SEE NOTE	

Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.