



**Test Report issued under the responsibility of:**  
**ITC ENGINEERING SERVICES, INC.**

**IEC 61000-6-4: 2011, Electromagnetic Compatibility (EMI)**

– Generic Standards –

Emission Standard for Industrial Environments

**IEC 61000-6-2: 2016, Electromagnetic Compatibility (EMC)**

– Generic Standards –

Immunity Standard for Industrial Environments

<b>Report Reference No.....</b>	20170501-02_CE
Date of Issue .....	6/05/17
Total Number of Pages .....	38
<b>Testing Laboratory .....</b>	ITC Engineering Services, Inc.
Address .....	9959 Calaveras Road, Box 543, Sunol CA 94586
<b>Applicant's Name.....</b>	<b>Techniquip</b>
Address .....	530 Boulder Ct. # 103 Place Pleasanton, CA 94588
Contact.....	Mr. David Wensley
Phone .....	925-251-9036
<b>Test Specification Standard .....</b>	See Report for Details
Test Procedure.....	Emissions & Immunity
Judgment.....	Complies as Tested
Manufacturer Logo .....	 <b>TECHNIQUIP</b> <b>Techniquip</b>
Manufacturer .....	
Model/Type Reference .....	PROLUX
Input Voltage Rating .....	100-240V, 50/60Hz



ISO/IEC 17025: 2005 Accredited Laboratory

## TABLE OF CONTENTS

<b>TABLE OF CONTENTS.....</b>	<b>2</b>
1.1 TESTING LOCATION .....	4
1.2 REVISION HISTORY .....	4
1.3 SUMMARY OF TESTS.....	5
1.4 DECLARATION/DISCLAIMER.....	5
1.5 CONDITION OF EUT .....	5
1.6 GENERAL DESCRIPTION OF EUT.....	5
1.7 EUT PORTS AND CONNECTORS.....	5
1.8 LIST OF PERIPHERALS USED DURING TEST .....	6
1.9 GENERAL TEST REMARKS.....	6
<b>2 EMISSIONS TESTS.....</b>	<b>7</b>
2.1 RADIATED EMISSIONS PER CISPR11:2015 + AMD1: 2016 CLASS A.....	7
2.1.1 <i>Administrative and Environmental Details</i> .....	7
2.1.2 <i>Test Equipment</i> .....	7
2.1.3 <i>Test Results</i> .....	7
2.1.4 <i>Measurement Uncertainty</i> .....	7
2.1.5 <i>Test Data</i> .....	8
2.1.6 <i>Test Setup Photo</i> .....	9
2.2 CONDUCTED EMISSIONS PER CISPR11:2015 + AMD1: 2016 CLASS A.....	10
2.2.1 <i>Administrative and Environmental Details</i> .....	10
2.2.2 <i>Test Equipment</i> .....	10
2.2.3 <i>Test Results</i> .....	10
2.2.4 <i>Test Data</i> .....	11
2.2.5 <i>Measurement Uncertainty</i> .....	12
2.2.6 <i>CONDUCTED TEST Setup</i> .....	12
2.3 POWER LINE HARMONICS PER IEC 61000-3-2: 2014 .....	13
2.3.1 <i>Administrative and Environmental Details</i> .....	13
2.3.2 <i>Test Equipment</i> .....	13
2.3.3 <i>Software used</i> .....	13
2.3.4 <i>Test Results</i> .....	13
2.3.5 <i>Test Data</i> .....	14
2.3.6 <i>Test SetupPhoto</i> .....	15
2.4 POWER LINE FLICKER PER IEC 61000-3-3:2013 + AMD1 :2017 .....	16
2.4.1 <i>Administrative and Environmental Details</i> .....	16
2.4.2 <i>Test Equipment</i> .....	16
2.4.3 <i>Software Used</i> .....	16
2.4.4 <i>TEST RESULTS</i> .....	16
2.4.5 <i>Test DATA</i> .....	16
2.4.6 <i>Test set-up photo</i> .....	17
<b>3 IMMUNITY TESTS PER IEC 61000-6-2:2016.....</b>	<b>18</b>
3.1 ELECTROSTATIC DISCHARGE PER IEC 61000-4-2:2008.....	18
3.1.1 <i>Administrative and Environmental Details</i> .....	18
3.1.2 <i>Test Equipment</i> .....	18
3.1.3 <i>Test Specification</i> .....	18
3.1.4 <i>Test Results</i> .....	18

3.1.5 <i>Test Data</i> .....	19
3.1.6 <i>ESD Test discharge points</i> .....	19
3.1.7 <i>Test Setup Photo</i> .....	22
<b>3.2 RADIATED RF ELECTROMAGNETIC FIELDS PER IEC 61000-4-3: 2010</b> .....	<b>23</b>
3.2.1 <i>Administrative and Environmental Details</i> .....	23
3.2.2 <i>Test Equipment</i> .....	23
3.2.3 <i>Test Specification</i> .....	23
3.2.4 <i>Test Results</i> .....	23
3.2.5 <i>Measurement Uncertainty</i> .....	24
3.2.6 <i>Test Setup Photo</i> .....	24
<b>3.3 ELECTRICAL FAST TRANSIENT PER IEC 61000-4-4: 2012</b> .....	<b>25</b>
3.3.1 <i>Administrative and Environmental Details</i> .....	25
3.3.2 <i>Test Equipment</i> .....	25
3.3.3 <i>Test Specification</i> .....	25
3.3.4 <i>Coupled Lines</i> .....	25
3.3.5 <i>Test Results</i> .....	25
3.3.6 <i>Test Setup Photos</i> .....	26
<b>3.4 VOLTAGE SURGE IMMUNITY PER IEC 61000-4-5:2014</b> .....	<b>27</b>
3.4.1 <i>Administrative and Environmental Details</i> .....	27
3.4.2 <i>Test Equipment</i> .....	27
3.4.3 <i>Test Specification</i> .....	27
3.4.4 <i>Measurement &amp; Control Port Specifications</i> .....	27
3.4.5 <i>Coupled Lines</i> .....	27
3.4.6 <i>Test Results</i> .....	27
3.4.7 <i>Test Setup Photo</i> .....	28
<b>3.5 CONDUCTED IMMUNITY PER IEC 61000-4-6:2013 Cor.1 2015</b> .....	<b>30</b>
3.5.1 <i>Administrative and Environmental Details</i> .....	30
3.5.2 <i>Test Equipment</i> .....	30
3.5.3 <i>Test Specification</i> .....	30
3.5.4 <i>Test Results</i> .....	30
3.5.5 <i>Measurement Uncertainty</i> .....	31
3.5.6 <i>Test Setup Photo</i> .....	31
<b>3.6 MAGNETIC FIELD IMMUNITY PER IEC 61000-4-8:2009</b> .....	<b>32</b>
3.6.1 <i>Administrative and Environmental Details</i> .....	32
3.6.2 <i>Test Equipment</i> .....	32
<i>*Verified Before Use</i> .....	32
3.6.3 <i>Test Specification</i> .....	32
3.6.4 <i>Test Results</i> .....	32
3.6.5 <i>Test Setup Photos</i> .....	33
<b>3.7 POWER LINE DIPS AND BROWN OUTS PER IEC 61000-4-11:2004 AMD1:2017</b> .....	<b>35</b>
3.7.1 <i>Administrative and Environmental Details</i> .....	35
3.7.2 <i>Test Equipment</i> .....	35
3.7.3 <i>Test Specification</i> .....	35
3.7.4 <i>Test Results</i> .....	35
3.7.5 <i>Test Setup Photo</i> .....	36
<b>4 APPENDIX</b> .....	<b>37</b>
4.1 EUT TECHNICAL SPECIFICATIONS .....	37
4.2 MODIFICATION LETTER.....	38

## 1.1 TESTING LOCATION

<input checked="" type="checkbox"/> ITC Testing Laboratory:	:	ITC Engineering Services, Inc.
Testing Location/Address	:	9959 Calaveras Road, PO Box 543, Sunol, CA 94586, USA
Prepared By (Name + Signature)	:	Sharmistha Modak 
Tested By (Name + Signature)	:	Sharmistha Modak 
Approved By (Name + Signature)	:	Michael Gbadebo, PE 
<input type="checkbox"/> Manufacturer Facility	:	
Testing Location/Address	:	
Tested By (Name + Signature)	:	
Approved By (+ Signature)	:	
<input type="checkbox"/> 3 <sup>rd</sup> Party Test Facility	:	
Testing Location/Address	:	
Tested By (Name + Signature)	:	
Approved By (+ Signature)	:	

## 1.2 REVISION HISTORY

#	Revision Date	Old Report Number	New Report Number	Revision
N/A	N/A	N/A	20170501-01	N/A

### 1.3 SUMMARY OF TESTS

ITC Engineering Services, Inc. as an independent testing laboratory, declares that the equipment specified above was tested to the requirements of:

1. **EMISSIONS REGULATIONS:** including
  1. CISPR11:2015 + AMD1: 2016 Class A
  2. IEC 61000-3-2: 2014
  3. IEC 61000-3-3:2013 + AMD1 :2017
2. **IMMUNITY REGULATIONS:** IEC 61000-6-2: 2016 including
  1. IEC 61000-4-2:2008
  2. IEC 61000-4-3: 2010
  3. IEC 61000-4-4: 2012
  4. IEC 61000-4-5:2014
  5. IEC 61000-4-6:2013 Cor 1:2015
  6. IEC 61000-4-8:2009
  7. IEC 61000-4-11:2004 + AMD1: 2017

### 1.4 DECLARATION/DISCLAIMER

It is the manufacturer's responsibility to assure that additional production units of these models are manufactured with identical electrical and mechanical characteristics. This report is the confidential property of the applicant. As a mutual protection to our applicants, the public, and ourselves, extracts from the test report shall not be reproduced except in full without ITC Engineering Service's written approval. The applicant/manufacturer shall not use this report to claim product endorsement by any US Government agency.

### 1.5 CONDITION OF EUT

Equipment Under Test (EUT) was tested as it was received.

### 1.6 GENERAL DESCRIPTION OF EUT

ProLux is a source of continuous high intensity illumination intended to deliver illumination only through non-electrical light cables made with optical fibers or optical cavities for use providing illumination for optical fibers in a variety of industries.

### 1.7 EUT PORTS AND CONNECTORS

#### Ports and connectors:

1. AC Power Outlet
2. Light Cable port

## 1.8 LIST OF PERIPHERALS USED DURING TEST

Description	Manufacturer	Model Name	Serial Number
N\A	N\A	N\A	

## 1.9 GENERAL TEST REMARKS

The EUT was operated under the following conditions during the testing:

<input type="checkbox"/>	Standby	<input type="checkbox"/>	Test Program (H - Pattern)
<input type="checkbox"/>	Test Program (Color Bar)	<input type="checkbox"/>	Test Program (Applicant Specific)
<input type="checkbox"/>	TV/VCR Signal Input	<input type="checkbox"/>	Signal Generator Input
<input type="checkbox"/>	Continuous Audio Tone (1kHz)	<input type="checkbox"/>	Cycled Audio Tone (1kHz)
<input type="checkbox"/>	Printer/Parallel Function	<input type="checkbox"/>	Modem/Serial Function
<input type="checkbox"/>	Serpentine Program with I/O	<input type="checkbox"/>	Serpentine Program without I/O
<input type="checkbox"/>	Practice Operation	<input checked="" type="checkbox"/>	Normal Operating Mode
<input type="checkbox"/>	Essential Operation (Functional Safety)	<input type="checkbox"/>	Continuous Unmonitored Operation
<input checked="" type="checkbox"/>	Continuous Monitored Operation	<input type="checkbox"/>	Non-Continuous Operation

Does the EUT Meet the Requirements in Accordance with Technical Regulations?

<input checked="" type="checkbox"/> Meets Regulation Requirements	<input type="checkbox"/> Does Not Meet Regulation Requirements
---	--

Does the EUT Fulfill the Customer's Requirements?

<input checked="" type="checkbox"/> Fulfills the customer's requirements	<input type="checkbox"/> Does Not fulfill the customer's requirements
--	---

## 2 EMISSIONS TESTS

### 2.1 RADIATED EMISSIONS PER CISPR11:2015 + AMD1: 2016 CLASS A

The EUT was placed on a wooden turntable 80 cm above a ground reference plane in the Semi-Anechoic Chamber. The EUT was then powered on and placed in an operational mode. Radiated emissions were monitored from 30MHz to 1GHz using antennas placed ten meters from the EUT. The antennas were oriented in both horizontal and vertical polarizations and were elevated from one to four meters while the unit was rotated and monitored. The results were recorded.

#### 2.1.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	Semi-Anechoic Chamber
<b>Test Date:</b>	5/23/17
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43 %

#### 2.1.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Biconical Antenna	EMCO	3104	3459	1/09/2018
L. P. Antenna	EMCO	3146	1596/1001	5/23/2018
Horn Antenna	EMCO	3115	11966E	2/03/2018
EMC Analyzer	Agilent	E7405A	US40240257	7/16/17

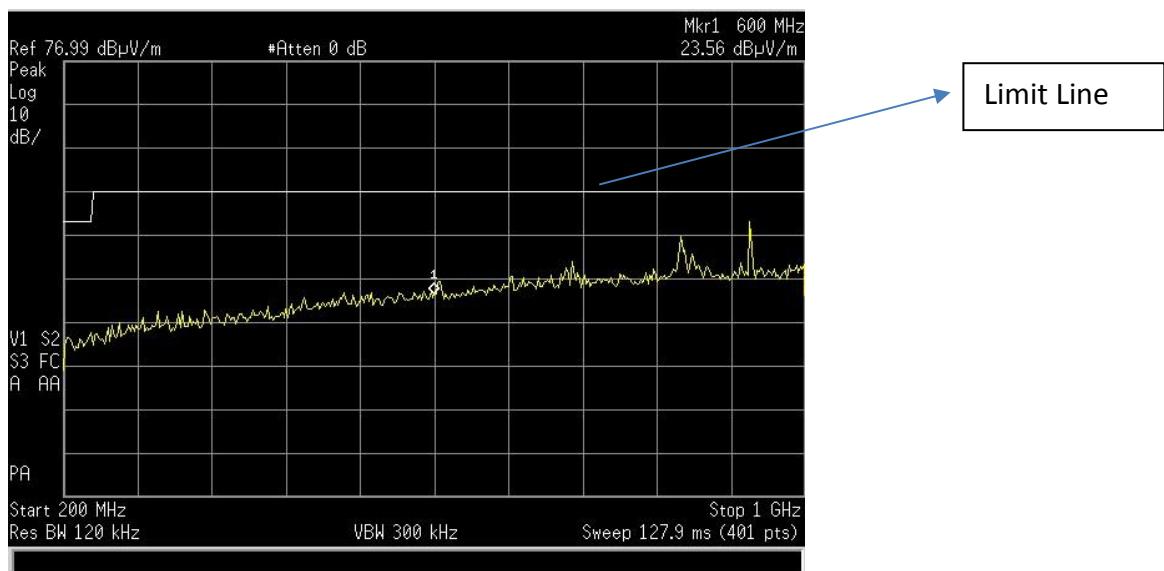
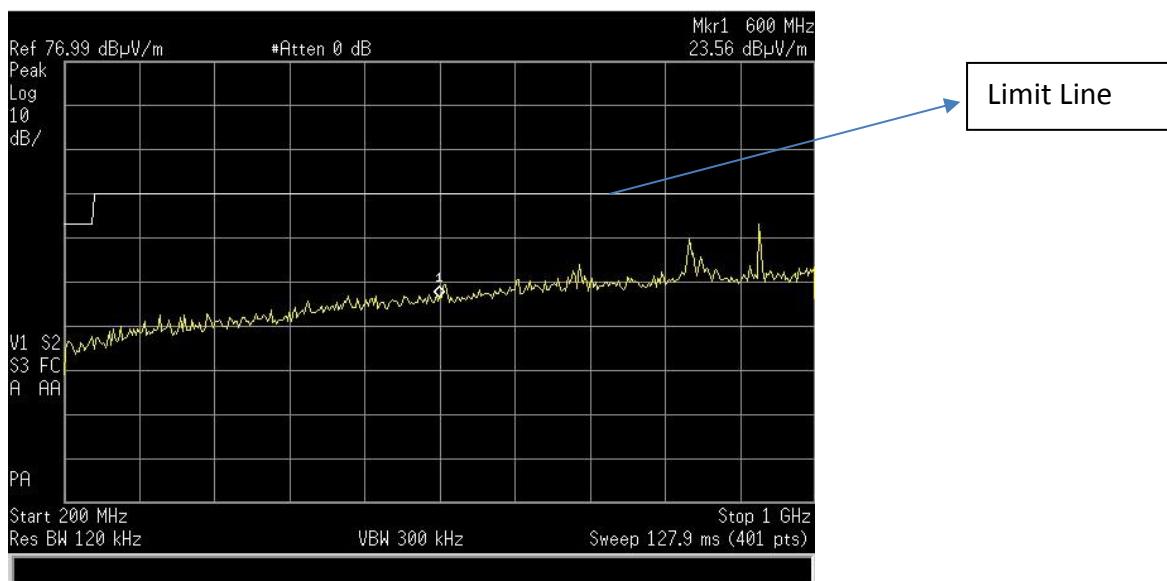
\*CNR – Calibration Not Required

#### 2.1.3 TEST RESULTS

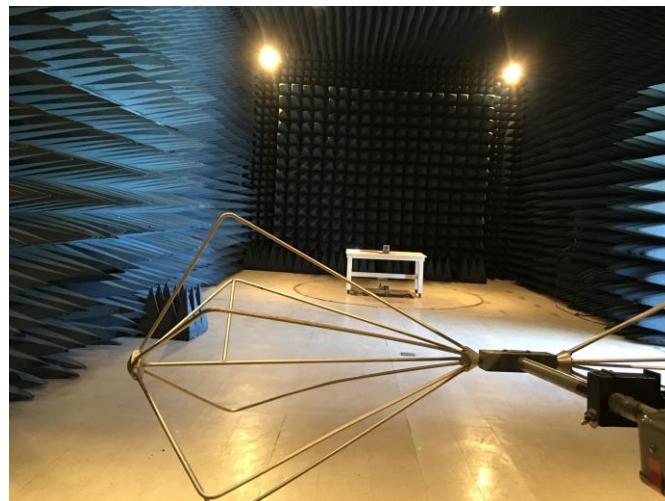
The EUT meets the requirements of the test for Radiated Emissions per CISPR11:2015 + AMD1: 2016 Class A.

#### 2.1.4 MEASUREMENT UNCERTAINTY

UNCERTAINTY OF RADIATED EMISSIONSMEASUREMENT – 30MHz THROUGH 1 GHz					
	Uncertainty Contribution	Value	Data Source	Prob. Dist.	Divisor
1	Antenna (Bi-conical / Log Periodic)	± .82	Cal. Lab	Normal	$k = 2$
2	Cable loss /Attenuator	± 0.5	Historical record	Normal	$k = 1$
3	Receiver/SA Specification	± 2.3	Mfg. Spec.	Rectangular	1.73
4	Mismatch	± 0.5	Historical record	"U"	1.41
5	Site Corrections: Site Imperfections:	± 4.0	Site Atten. Data	Triangular	2.45
6	Separation Distance: at 3m	± 0.2	Site Atten. Data	Rectangular	1.73
7	Combined Standard Uncertainty $u_c(y)$	±2.62		Normal	
8	Expanded Uncertainty $U$	±4.47		Normal	$k = 2$
<b>Combined Standard Uncertainty Calculation(<math>y</math>) = <math>[(.82/2)^2 + (0.5/1)^2 + (2.3/1.73)^2 + (0.5/1.41)^2 + (4.0/2.45)^2 + (0.2/1.73)^2]^{1/2} = (0.168 + 0.25 + 1.77 + 0.126 + 2.65 + 0.013)^{1/2} = 2.622 (u_c(y)) = U_{lab} = \pm 5.24</math></b>					

**2.1.5 TEST DATA****RADIATED EMISSION PLOT (WORST CASE) 30MHz – 200MHz****RADIATED EMISSION PLOT (WORST CASE) 200MHz – 1GHz**

## 2.1.6 TEST SETUP PHOTO



**Radiated Emission Set-up for 30 – 200 MHz**



**Radiated Emission Set-up for 0.02 – 1 GHz**

## 2.2 CONDUCTED EMISSIONS PER CISPR11:2015 + AMD1: 2016 CLASS A

The EUT was placed in a shielded room 80 cm above the horizontal ground reference plane and 40 cm away from the vertical ground reference plane. Power input to the EUT was supplied through a LISN (Line Impedance Stabilization Network) and the excess power cord was looped into figure "8" above the LISN. The EUT was powered on and placed in an operational mode. The line conducted tests were performed on hot and neutral lines.

### 2.2.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

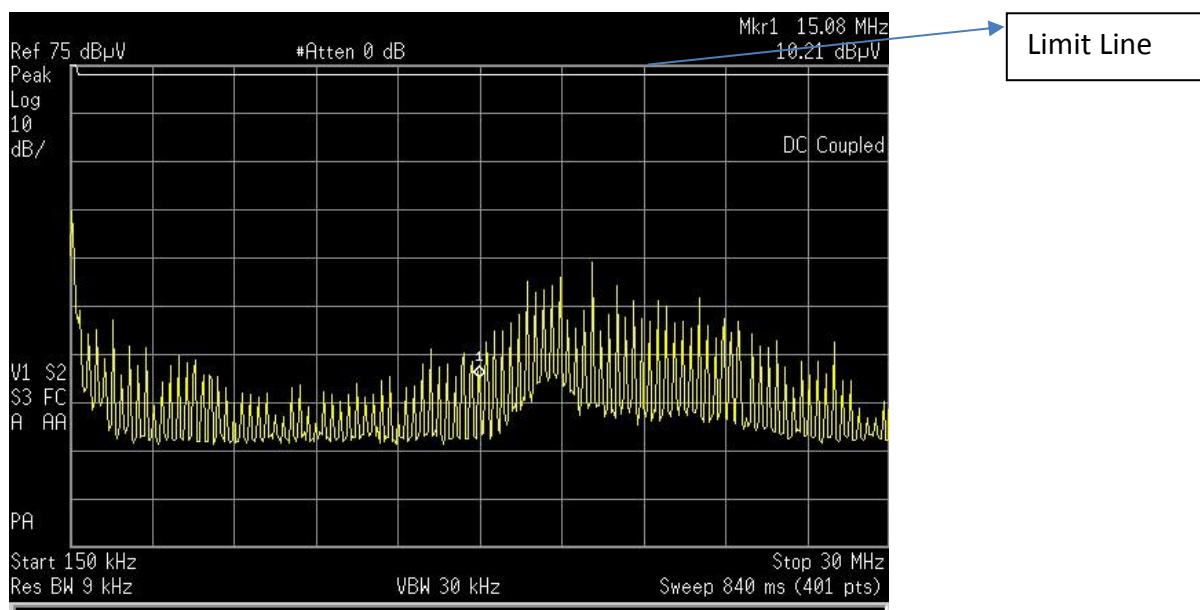
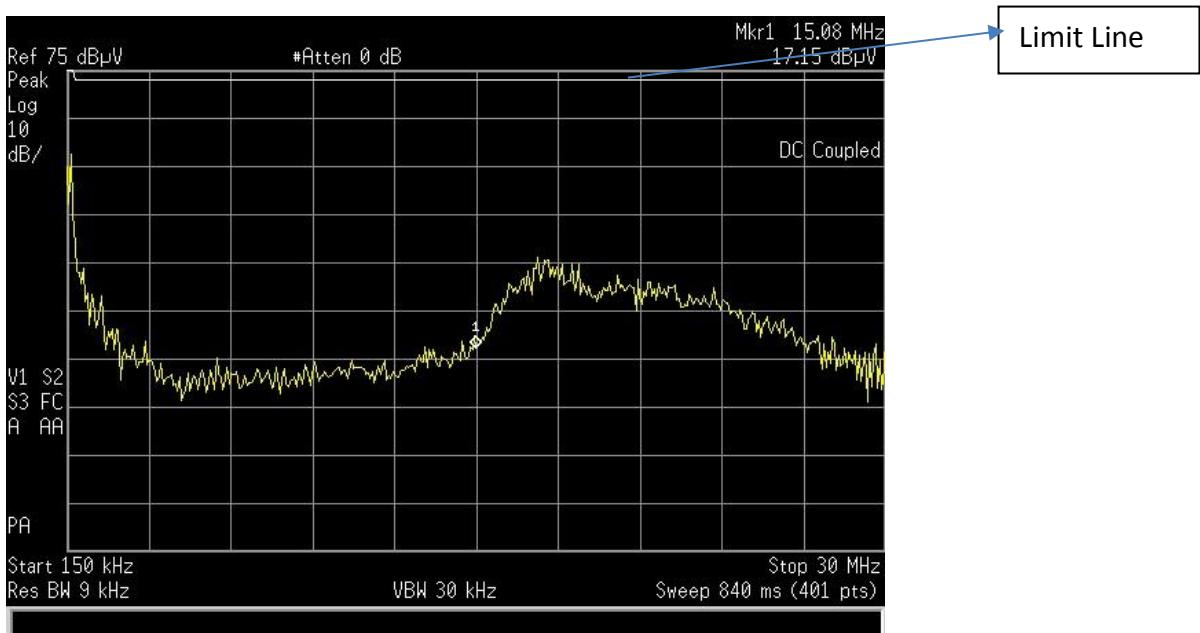
<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/23/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43 %
<b>Test Voltage 2:</b>	230 V~, 50 Hz

### 2.2.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
EMC Analyzer	Agilent	E7405A	US40240257	1/09/2018
Power Source	California Instruments	1251R	L05211	VBU*
LISN (25 Amp)	EMCO	3825/2	8901-1447	7/21/2017

### 2.2.3 TEST RESULTS

The EUT meets the requirements of the test for Conducted Emissions per CISPR11:2015 + AMD1: 2016 Class A..

**2.2.4 TEST DATA****HOT LINE CONDUCTED EMISSIONS ( 230V 50HZ )****NEUTRAL LINE CONDUCTED EMISSIONS (230V 50HZ)**

## 2.2.5 MEASUREMENT UNCERTAINTY

UNCERTAINTY OF CONDUCTED EMISSIONS MEASUREMENT – 150KHZ THROUGH 30MHZ					
	Uncertainty Contribution	Value	Data Source	Prob. Dist.	Divisor
1	Cable and Attenuator Calibration	± 0.5	Historical Data	Normal	$k = 1$
2	Receiver/SA specification	± 2.0	Mfg. Spec.	Rectangular	1.73
3	Receiver Corrections: Sine Wave Voltage Pulse Amplitude Response Pulse Repetition Rate Response	±0.55 ± 1.5 ± 0.75	Mfg. Spec.	Normal Rectangular Rectangular	$k = 2$ 1.73 1.73
4	LISN coupling specification	± 2.0	Cal. Lab.	Normal	$k = 2$
5	Mismatch	± 0.26	Estimation	"U"	1.41
6	Combined Standard Uncertainty $u_c(y)$	± 1.91		Normal	
7	Expanded Uncertainty $U$	± 3.82		Normal	$k = 2$
<b>Combined Standard Uncertainty Calculation:</b>					
$u_c(y) = [(0.5/1)^2 + (2.0/1.73)^2 + (0.55/2)^2 + (1.5/1.73)^2 + (0.75/1.73)^2 + (2.0/2)^2 + (0.26/1.41)^2]^{1/2}$ $= (0.25 + 1.34 + .076 + .75 + .19 + 1 + .034)^{1/2} = 1.91$ $2(u_c(y)) = U_{lab} = \pm 3.82$					

## 2.2.6 CONDUCTED TEST SETUP



AC Line Conducted Emission Test Set-up

## 2.3 POWER LINE HARMONICS PER IEC 61000-3-2: 2014

The EUT was placed in a shielded room supplied with filtered power. The line power input to the EUT was supplied through a reference impedance network. The unit was powered on and placed into an operational mode. A power analyzer and associated software were used to collect the data.

### 2.3.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/26/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	20°C
<b>Humidity:</b>	45%

### 2.3.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model	Serial Number	Calibration Due Date
Universal Power Analyzer	Voltech	PM3000A	AL32/2834	7/13/2018
Reference Impedance Network	Voltech	IEC Standard 555	1B07/9032	7/13/2018
Computer	e-machines	T1095	QCG1BK1000432	N/A
Keyboard	HP	KB-9970	9L21203044B	N/A
Mouse	Dell	851841-1000	LZF35011718	N/A
Monitor	View Sonic	VA702b	PSX053011858	N/A

### 2.3.3 SOFTWARE USED

Description	Manufacturer	Model Name	Version Number
Test Software	Voltech	IEC1000-3/IEC555	3.13.08

### 2.3.4 TEST RESULTS

The EUT meets the requirements of the Power Line Harmonics test per IEC 61000-3-2: 2014.

**2.3.5 TEST DATA**

<b>Product:</b>	TECNIQUIP	
Serial no:		
Description:		
Test Date:	May 26 2017 11:38am	
Result Name:	TECHNIQUIP	
<b>Type of Test:</b>	EN61000:2001 Harmonics	
Limits:	Class A	
Power Analyzer:	Voltech PM3000A v2.22 s/n 2834	
AC Source:	Mains / Manual Source	
<b>Harmonic Results Against Chosen Limits:</b>	<b>Notes:</b>	
<b>PASS</b>		
<b>Test Parameter Details</b>	<b>User Entered</b>	<b>Measured</b>
Operating Frequency:	50	49.9873
Operating Voltage:	230	231.3330
Specified Power:	0.0000	55.3164
Fundamental Current:	0.0000	0.2491
Power Factor:	0.0000	0.9587
Average Input Current:		0.2515
Maximum POHC:		0.0055
POHC Limit:		0.2514
Maximum THC:		0.0399
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	02:00:00	

Harmonic	Limit 1	Limit 2	Average Reading	<L1	<L2	Max Reading	<L2	Pass/FAIL
2	1.0800A	1.6200A	1.930mA	✓	✓	2.145mA	✓	N/A
3	2.3000A	3.4500A	29.75mA	✓	✓	30.69mA	✓	Pass
4	430.0mA	645.0mA	0.790mA	✓	✓	1.192mA	✓	N/A
5	1.1400A	1.7100A	20.68mA	✓	✓	20.74mA	✓	Pass
6	300.0mA	450.0mA	1.003mA	✓	✓	1.237mA	✓	N/A
7	770.0mA	1.1550A	11.46mA	✓	✓	12.63mA	✓	Pass
8	230.0mA	345.0mA	1.183mA	✓	✓	1.531mA	✓	N/A
9	400.0mA	600.0mA	4.201mA	✓	✓	5.483mA	✓	N/A
10	184.0mA	276.0mA	1.026mA	✓	✓	1.272mA	✓	N/A
11	330.0mA	495.0mA	1.192mA	✓	✓	1.392mA	✓	N/A
12	153.3mA	230.0mA	0.803mA	✓	✓	1.192mA	✓	N/A
13	210.0mA	315.0mA	1.124mA	✓	✓	1.192mA	✓	N/A
14	131.4mA	197.1mA	0.763mA	✓	✓	1.192mA	✓	N/A
15	150.0mA	225.0mA	3.087mA	✓	✓	3.167mA	✓	N/A
16	115.0mA	172.5mA	0.740mA	✓	✓	1.192mA	✓	N/A
17	132.3mA	198.5mA	3.576mA	✓	✓	3.623mA	✓	N/A
18	102.2mA	153.3mA	0.679mA	✓	✓	1.187mA	✓	N/A
19	118.4mA	177.6mA	2.809mA	✓	✓	3.083mA	✓	N/A
20	92.00mA	138.0mA	0.325mA	✓	✓	0.740mA	✓	N/A
21	107.1mA	160.7mA	2.145mA	✓	✓	2.145mA	✓	N/A
22	83.63mA	125.4mA	0.256mA	✓	✓	0.715mA	✓	N/A
23	97.82mA	146.7mA	2.203mA	✓	✓	2.500mA	✓	N/A
24	76.66mA	115.0mA	0.245mA	✓	✓	0.715mA	✓	N/A
25	90.00mA	135.0mA	2.445mA	✓	✓	2.622mA	✓	N/A
26	70.76mA	106.1mA	0.238mA	✓	✓	0.238mA	✓	N/A
27	83.33mA	125.0mA	2.144mA	✓	✓	2.145mA	✓	N/A
28	65.71mA	98.57mA	0.247mA	✓	✓	0.326mA	✓	N/A

**POWER LINE HARMONICS TEST DATA (230V, 50HZ)**

## 2.3.6 TEST SETUP PHOTO



**POWERLINE HARMONICS TEST SETUP**

## 2.4 POWER LINE FLICKER PER IEC 61000-3-3:2013 + AMD1 :2017

The EUT was placed on the test surface in a shielded room supplied with filtered power. The input power of the EUT was passed through a Reference Impedance Network. The EUT was powered on and placed in an operational mode. A power analyzer and associated software was used to collect the data.

### 2.4.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/26/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	20 C
<b>Humidity:</b>	45 %

### 2.4.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Universal Power Analyzer	Voltech	PM3000A	AL32/2834	7/13/2017
Reference Impedance Network	Voltech	IEC Standard 555	1B07/9032	7/13/2017
Computer	e-machines	T1095	QCG1BK1000432	N/A
Keyboard	HP	KB-9970	9L21203044B	N/A
Mouse	Dell	851841-1000	LZF35011718	N/A
Monitor	View Sonic	VA702b	PSX053011858	N/A

### 2.4.3 SOFTWARE USED

Description	Manufacturer	Model Name	Version Number
Test Software	Voltech	IEC1000-3/IEC555	3.13.08

### 2.4.4 TEST RESULTS

The EUT meets the requirements for the Power Line Flicker test per IEC 61000-3-3:2013 + AMD1 :2017.

### 2.4.5 TEST DATA

PASS				
	Pst	dc (%)	dmax (%)	d(t) > 3.3% (ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.121	0.023	0.287	0

Flicker Emissions Data Result at 230Vac 50 Hz

#### 2.4.6 TEST SET-UP PHOTO



Power line Flicker Test Setup

### 3 IMMUNITY TESTS PER IEC 61000-6-2:2016

#### 3.1 ELECTROSTATIC DISCHARGE PER IEC 61000-4-2:2008

The EUT, positioned on the test surface, was powered on and placed in an operational mode. The EUT was subjected to  $\pm 2\text{kV}$ ,  $\pm 4\text{kV}$  and  $\pm 8\text{kV}$  air discharge and  $\pm 2\text{kV}$  and  $\pm 4\text{kV}$  contact discharge. The locations of the discharges can be seen in the Test Setup Photos.

##### 3.1.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/24/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%

##### 3.1.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
ESD Simulator	Noiseken	ESS-2002	ESS0746805	11/05/2017
ESD Gun	Noiseken	TC-815R	ESS0736746	11/05/2017

##### 3.1.3 TEST SPECIFICATION

<b>Discharge Voltage (Air)</b>	<input checked="" type="checkbox"/> 2 kV <input type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV <input type="checkbox"/> kV
<b>Discharge Voltage (Contact)</b>	<input checked="" type="checkbox"/> 2kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> kV <input type="checkbox"/> kV
<b>Discharge Impedance</b>	<input checked="" type="checkbox"/> 330 $\Omega$ / 150 pF <input type="checkbox"/> 150 $\Omega$ / 150 pF
<b>Discharge Repetition Rate</b>	<input checked="" type="checkbox"/> $\geq$ 1 second
<b>Number of Discharges</b>	<input checked="" type="checkbox"/> $\geq$ 10 at all locations
<b>Kind of Discharges</b>	<input checked="" type="checkbox"/> Air Discharge <input checked="" type="checkbox"/> Contact Discharge
<b>Type of Contacts</b>	<input checked="" type="checkbox"/> Direct Contact <input checked="" type="checkbox"/> Indirect Contact
<b>Polarity</b>	<input checked="" type="checkbox"/> Positive <input checked="" type="checkbox"/> Negative
<b>Location of Discharge</b>	<input checked="" type="checkbox"/> Each location on the surface touchable by hand (see photos)
<b>Ground Cable Resistance (HCP)</b>	Total (tip-to-tip): 940k $\Omega$ Resistance (top): 470k $\Omega$ Resistance (bottom): 470k $\Omega$
<b>Ground Cable Resistance (VCP)</b>	Total (tip-to-tip): 940k $\Omega$ Resistance (top): 470k $\Omega$ Resistance (bottom): 470k $\Omega$

##### 3.1.4 TEST RESULTS

The EUT meets the requirements of Electrostatic Discharge test per IEC 61000-4-2:2008.

<input checked="" type="checkbox"/> <b>Met Criterion A</b>	No Degradation of Function (No effect due to ESD on the EUT)
<input type="checkbox"/> <b>Met Criterion B</b>	Distortion of Function observed, but self recovers after removal of ESD effect.
<input type="checkbox"/> <b>Met Criterion C</b>	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> <b>Met Criterion D</b>	Complete Loss of Function & not recoverable.

**3.1.5 TEST DATA**

ESD TEST DATA SHEET Electrostatic Discharge 61000-4-2								
Indirect (To coupling planes)	Positive Polarity				Negative Polarity			
	(kV)				(kV)			
	2	4	6	8	2	4	6	8
Horizontal Coupling Plane	10	10			10	10		
Vertical Coupling Plane	10	10			10	10		
Positive Polarity				Negative Polarity				
(kV)				(kV)				
Direct Air	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
(To EUT)	<b>2</b>	<b>4</b>	<b>8</b>	<b>15</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>15</b>
Light Cable	0	0	0		0	0	0	
Fan Vent	10	10	10		10	10	10	
Front Knobs	0	0	0		0	0	0	
Positive Polarity				Negative Polarity				
(kV)				(kV)				
Direct Contact	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3	Level 4
(To EUT)	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>
All Screws	10	10			10	10		
AC Port	10	10			10	10		
Chassis	10	10			10	10		
<b>Test Result:</b>	PASS							

**3.1.6 ESD TEST DISCHARGE POINTS**

EUT Front ESD



EUT Back ESD



EUT Right Side ESD



EUT LeftSide ESD

**ESD DISCHARGE POINTS ( CONTACT POINT ● ; AIR POINT ○ )**

### 3.1.7 TEST SETUP PHOTO



**ESD Test Set-up**

### 3.2 RADIATED RF ELECTROMAGNETIC FIELDS PER IEC 61000-4-3: 2010

The EUT was placed on a test surface 80 cm above the ground plane in the Semi-Anechoic Chamber. The EUT was powered on and placed in an operational mode. It was then monitored while being subjected to RF radiation on all sides from 80 MHz to 2.7GHz at 3 V/m in horizontal and vertical polarization.

#### 3.2.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	Semi-Anechoic Chamber
<b>Test Date:</b>	5/30/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%

#### 3.2.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Power Amplifier	OphirRF	5163F	1030	CNR**
Power Amplifier	Amplifier Research	250A250A	29034	CNR**
Power Amplifier	IFI	SMX200	L387-0407	CNR**
L. P. Antenna (80-1000 MHz)	Amplifier Research	AT 1100	10537	10/14/2017
DRGH Antenna (1000-2500 MHz)	AH Systems	SAS-571	587	10/14/2017
Signal Generator	Giga-tronics	2550B	919003	11/25/2017
Isotropic Field Probe	ETS LINDGREN	HI-4455	60849	10/15/2017

\*N/A – Not Applicable; \*\*CNR – Calibration Not Required

#### 3.2.3 TEST SPECIFICATION

<b>Frequency Range</b>	<input type="checkbox"/> 27 MHz – 500 MHz	<input type="checkbox"/> 26MHz – 1000MHz	
	<input type="checkbox"/> 9 kHz – 27 MHz	<input checked="" type="checkbox"/> 80MHz – 2.7GHz	
<b>Field Strength</b>	<input type="checkbox"/> 1 V/m	<input checked="" type="checkbox"/> 3 V/m	<input type="checkbox"/> 10 V/m
<b>Distance Antenna – EUT</b>	<input type="checkbox"/> 1 m	<input checked="" type="checkbox"/> 3 m	<input type="checkbox"/> _m
<b>Modulation</b>	<input checked="" type="checkbox"/> AM	80 %	1 kHz
	<input type="checkbox"/> FM	%	_ kHz
	<input type="checkbox"/> Sine Wave	<input type="checkbox"/> Square	<input type="checkbox"/> Pulsed
<b>Step</b>	<input type="checkbox"/> 1%	<input type="checkbox"/> Custom	<input type="checkbox"/> < 0.015 decades/sec
<b>Polarization of Antenna</b>	<input checked="" type="checkbox"/> Horizontal	<input checked="" type="checkbox"/> Vertical	

#### 3.2.4 TEST RESULTS

The EUT meets the requirements for the Radiated Immunity test per IEC 61000-4-3: 2006 +A1: 2007 +A2: 2010.

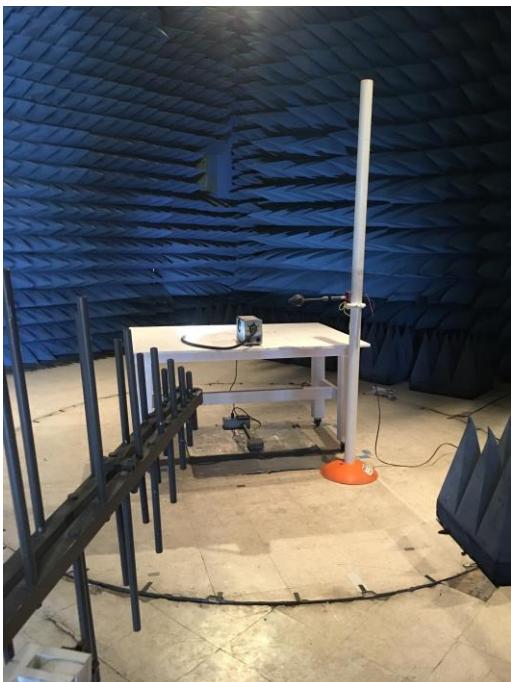
<input checked="" type="checkbox"/> <b>Met Criterion A</b>	No Degradation of Function (No effect due to RF on the EUT)
<input type="checkbox"/> <b>Met Criterion B</b>	Distortion of Function observed, but self recovers.
<input type="checkbox"/> <b>Met Criterion C</b>	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> <b>Met Criterion D</b>	Complete Loss of Function & not recoverable.

### 3.2.5 MEASUREMENT UNCERTAINTY

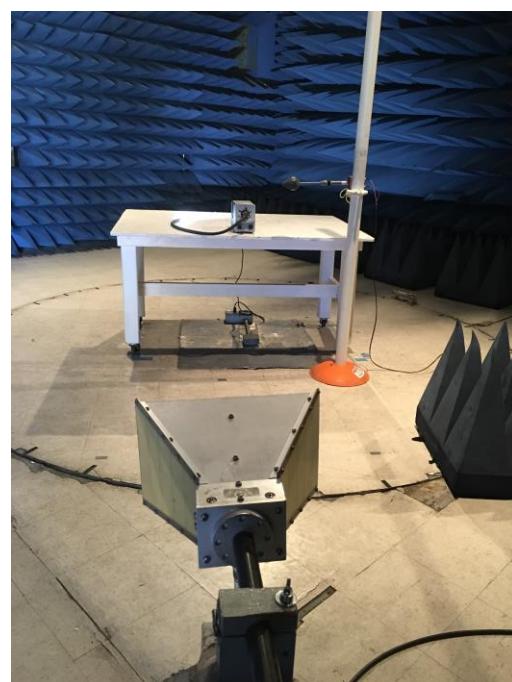
UNCERTAINTY OF RADIATED IMMUNITY MEASUREMENT – 80MHz TO 1GHz					
	Uncertainty Contribution	Value	Data Source	Probability Dist.	Divisor
<b>1</b>	Power Amplifier Harmonics	± 0.75	Mfg. Spec	Rectangular	1.73
<b>3</b>	Forward Power Measurement Drift	± 0.5	Historical Rec.	Rectangular	1.73
<b>4</b>	F/S Monitor	± 0.7	Cal-Lab	Normal	2.00
<b>5</b>	F/S Accept. Window	± 0.5	Historical Rec.	Rectangular	1.73
<b>6</b>	Effect of Field Disturbance	± 0.0		Rectangular	1.73
<b>7</b>	Measurement System Repeatability	± 0.5	Historical Rec.	Normal	1.00
<b>8</b>	Combined Standard Uncertainty $u_c(y)$	± 0.85			
<b>9</b>	Expanded Uncertainty $U$	± 1.71			$k = 2.00$

**Combined Standard Uncertainty Calculation:**  $u_c(y) = [(0.75/1.73)^2 + (0.5/1.73)^2 + (0.7/2)^2 + (0.5/1.73)^2 + (0.0/1.73)^2 + (0.5/1)^2]^{1/2} = [0.19 + 0.084 + 0.12 + 0.084 + 0 + 0.25]^{1/2} = 0.852$  ( $u_c(y)$ ) =  $U_{lab} = \pm 1.71$

### 3.2.6 TEST SETUP PHOTO



radiated immunity test setup (0.08GHz – 1 GHz)



radiated immunity test setup (1GHz – 2.7 GHz)

### 3.3 ELECTRICAL FAST TRANSIENT PER IEC 61000-4-4: 2012

The EUT was placed on the test surface in a shielded room. The power input of the unit was routed through the Burst-Tester Mainframe. The EUT was powered on and placed in an operational mode. The unit was monitored during the test.

#### 3.3.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/30/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%
<b>Test Voltage 2:</b>	230V, 50Hz

#### 3.3.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Burst-Tester	Haefely	PEFT.1	081 979-03	VBU*
Coupling Clamp	Haefely	093 506.1	083 839 -11	VBU*

\*Verified Before Use

#### 3.3.3 TEST SPECIFICATION

<b>Pulse Amplitude - AC Power Port</b>	<input type="checkbox"/> 0.5 KV	<input type="checkbox"/> 1.0 KV	<input checked="" type="checkbox"/> 2.0 KV	<input type="checkbox"/> 4.0 KV
<b>Pulse Amplitude - DC Power Port</b>	<input type="checkbox"/> 0.5 KV	<input type="checkbox"/> 1.0 KV	<input type="checkbox"/> 2.0 KV	<input type="checkbox"/> 4.0 KV
<b>Pulse Amplitude - Signal/Data</b>	<input type="checkbox"/> 0.5 KV	<input type="checkbox"/> 1.0 KV	<input type="checkbox"/> 2.0 KV	<input type="checkbox"/> ___ KV
<b>N. C. Port Pulse Amplitude - Proc.</b>	<input type="checkbox"/> 0.5 KV	<input type="checkbox"/> 1.0 KV	<input type="checkbox"/> 2.0 KV	<input type="checkbox"/> ___ KV
<b>Meas. &amp; C. Port Burst Freq.</b>	<input type="checkbox"/> 2.5 kHz	<input checked="" type="checkbox"/> 5.0 kHz	<input type="checkbox"/> ___ kHz	
<b>Burst Duration</b>	<input type="checkbox"/> 5/50 ns		<input type="checkbox"/> ___ ns	
<b>Time of Coupling</b>	<input type="checkbox"/> 60 seconds		<input type="checkbox"/> ___ seconds	
<b>Coupling Method</b>	<input type="checkbox"/> Coupling Clamp		<input checked="" type="checkbox"/> Coupling. /Decoupling. Network	
<b>Polarity</b>	<input checked="" type="checkbox"/> Positive		<input checked="" type="checkbox"/> Negative	

#### 3.3.4 COUPLED LINES

<b>Name of Lines</b>	AC Power Cord
<b>Type of Lines</b>	<input type="checkbox"/> Shielded <input checked="" type="checkbox"/> Unshielded
<b>Status of Lines</b>	<input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive

#### 3.3.5 TEST RESULTS

The EUT meets the requirements for Electrical Fast Transients per IEC 61000-4-4: 2012.

<input checked="" type="checkbox"/> <b>Met Criterion A</b>	No Degradation of Function (No effect due to EFT on the EUT)
<input type="checkbox"/> <b>Met Criterion B</b>	Distortion of Function observed, but self recovers.*
<input type="checkbox"/> <b>Met Criterion</b>	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> <b>Met Criterion D</b>	Complete Loss of Function & not recoverable.

\*Power line applied burst causes optical USB mouse LED to flicker, cursor freezes, disappears and reappears. Normal function returns without user intervention when upset is removed.

### 3.3.6 TEST SETUP PHOTOS



EFT Test Set-up at Power Line

### 3.4 VOLTAGE SURGE IMMUNITY PER IEC 61000-4-5:2014

The EUT, positioned on the test surface in a shielded room above the horizontal ground reference plane, was powered on through a coupling filter and placed in an operational mode. The unit was monitored during the test. Five surges for each phase angle (0°, 90°, 270°) at 1 kV were applied on the power cable of the EUT with a repetition rate of 60 seconds in differential mode (Line to Neutral) at both positive and negative polarities. The test was repeated at 2kV in common mode (Line to Ground and Neutral to Ground) at both positive and negative polarities.

#### 3.4.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/30/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%
<b>Test Voltage 1:</b>	230V, 50Hz

#### 3.4.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Pulse Generator	Schaffner Instrument.	NSG651	143 9303	VBU*
Coupling Filter	Haefely	FP20	081 774-05	CNR**

\*Verified Before Use; \*\* Calibration Not Required

#### 3.4.3 TEST SPECIFICATION

<b>Pulse Amplitude: AC Power Port - Common Mode (Line-Ground)</b>	<input type="checkbox"/> 0.5kV	<input type="checkbox"/> 1.0kV	<input checked="" type="checkbox"/> 2.0 kV	<input type="checkbox"/> 4.0kV
<b>Pulse Amplitude: AC Power Port - Differential Mode (Line-Line)</b>	<input type="checkbox"/> 0.5kV	<input checked="" type="checkbox"/> 1.0kV	<input type="checkbox"/> 2.0 kV	<input type="checkbox"/> 4.0kV
<b>Pulse Amplitude: DC Power Port</b>	<input type="checkbox"/> 0.5kV	<input type="checkbox"/> 1.0kV	<input type="checkbox"/> 2.0 kV	<input type="checkbox"/> 4.0kV
<b>Pulse Amplitude: Signal/Data</b>	<input type="checkbox"/> 0.5kV	<input type="checkbox"/> 1.0kV	<input type="checkbox"/> 2.0 kV	<input type="checkbox"/> 4.0kV
<b>Pulse Amplitude: Process</b>	<input type="checkbox"/> 0.5kV	<input type="checkbox"/> 1.0kV	<input type="checkbox"/> 2.0 kV	<input type="checkbox"/> 4.0kV

#### 3.4.4 MEASUREMENT & CONTROL PORT SPECIFICATIONS

<b>Source Impedance</b>	<input checked="" type="checkbox"/> 0 Ω + 18μF	<input checked="" type="checkbox"/> 10 Ω + 9μF	<input type="checkbox"/> 42 Ω + 0.1μF	<input type="checkbox"/> 42 Ω + 0.5μF
<b>Number of Surges</b>	<input type="checkbox"/> 2 Surges/Angle		<input checked="" type="checkbox"/> 5 Surges/Angle	
<b>Angles</b>	<input checked="" type="checkbox"/> 0°	<input checked="" type="checkbox"/> 90°	<input type="checkbox"/> 180°	<input checked="" type="checkbox"/> 270°
<b>Repetition Rate</b>	<input checked="" type="checkbox"/> 60 sec		<input type="checkbox"/> Sec.	
<b>Polarity</b>	<input checked="" type="checkbox"/> Positive		<input checked="" type="checkbox"/> Negative	

#### 3.4.5 COUPLED LINES

<b>Name of Lines</b>	AC Power Cord
<b>Type of Lines:</b>	<input type="checkbox"/> Shielded <input checked="" type="checkbox"/> Unshielded
<b>Status of Lines:</b>	<input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive

#### 3.4.6 TEST RESULTS

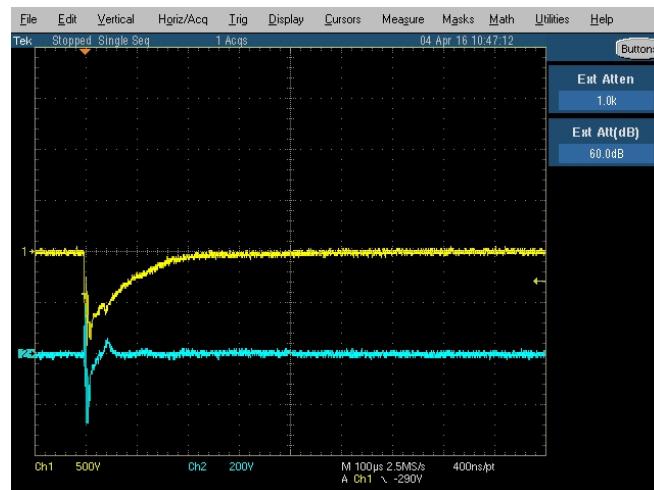
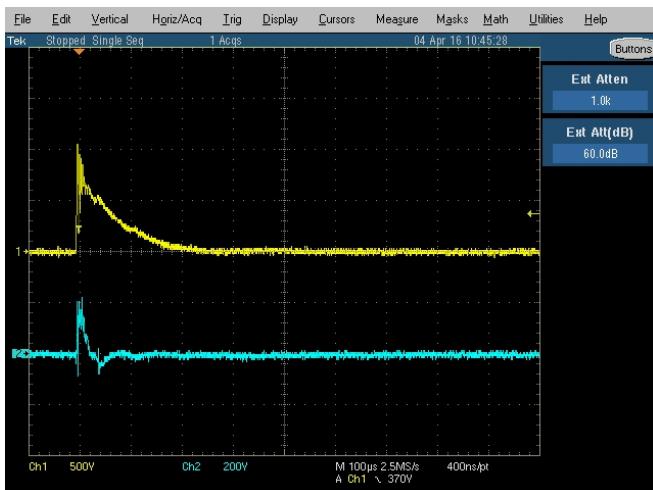
The EUT meets the requirements of the Voltage Surge Immunity test per IEC 61000-4-5:2014.

<input checked="" type="checkbox"/> <b>Met Criterion A</b>	No Degradation of Function (No effect due to VS on the EUT)
<input type="checkbox"/> <b>Met Criterion B</b>	Distortion of Function observed, but self recovers.
<input type="checkbox"/> <b>Met Criterion C</b>	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> <b>Met Criterion D</b>	Complete Loss of Function & not recoverable.

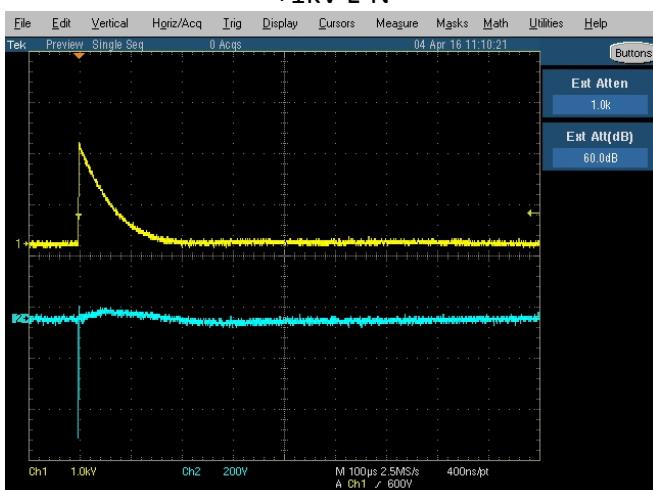
### 3.4.7 TEST SETUP PHOTO



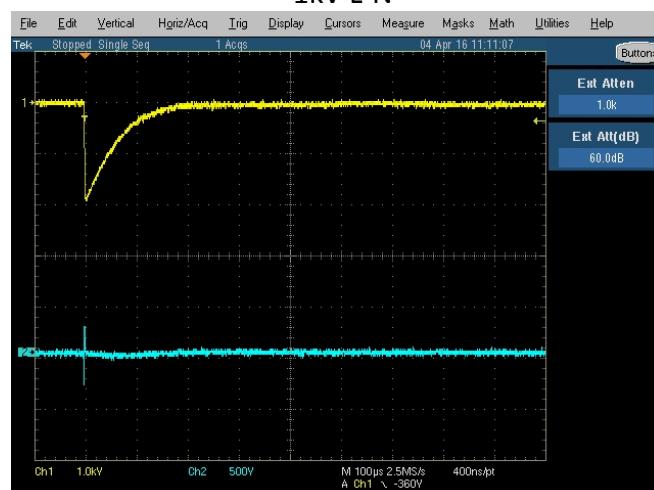
**VOLTAGE SURGE TEST SETUP**



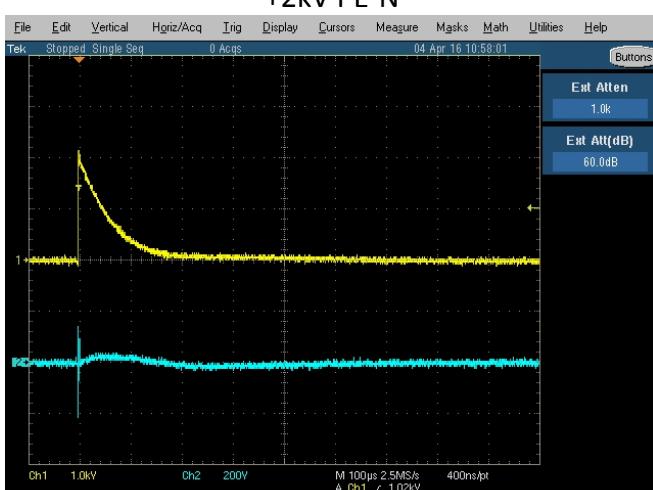
+1kV L-N



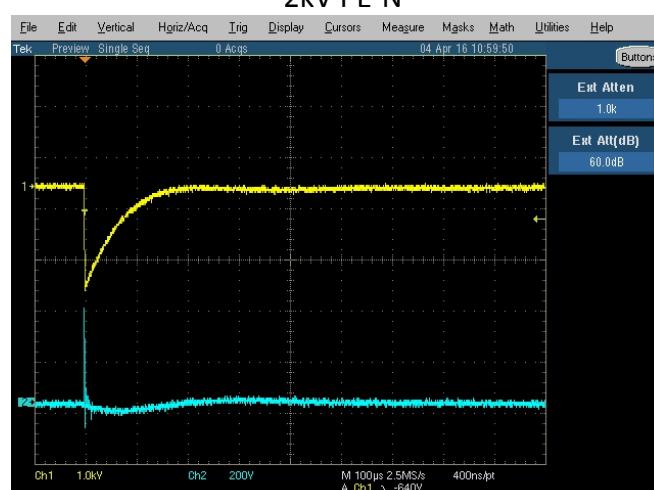
-1kV L-N



+2kV PE-N



-2kV PE-N



+2kV PE-L

-2kV PE-L

### 3.5 CONDUCTED IMMUNITY PER IEC 61000-4-6:2013 COR.1 2015

The EUT, positioned on the test surface in the shielded room, was powered on and placed in an operational mode. The line power for the EUT was passed through a Coupling/ Decoupling Network (CDN) and injected with 3Vrms at carrier frequencies from 150 KHz to 80 MHz, with 80% amplitude modulation @ 1 KHz, while the EUT was monitored for errors.

#### 3.5.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/31/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%
<b>Test Voltage</b>	230V~, 50 Hz

#### 3.5.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Signal Generator	Agilent	8648C	3847A05285	3/31/2018
RF Power Amplifier	ENI	310L	115-220	CNR*
Oscilloscope	Tektronix	TDS7104	B020599	1/09/2018
Passive Impedance Adapter	Fisher Custom Communications	FCC-801-150-50-CDN	2014	CNR**
Passive Impedance Adapter	Fisher Custom Communications, Inc.	FCC-801-150-50-CDN	2013	CNR**
Power line Coupling/ Decoupling Network	Fisher Custom Communication, Inc.	FCC-801-M3-25A	2002	CNR*

\* Calibration Not Required; \*\*Verified Before Use

#### 3.5.3 TEST SPECIFICATION

<b>Frequency Range</b>	<input checked="" type="checkbox"/> 150 kHz - 80 MHz	<input type="checkbox"/> 26 MHz – 80 MHz
<b>Field Strength</b>	<input type="checkbox"/> 1 Vrms	<input checked="" type="checkbox"/> 3 Vrms
	<input type="checkbox"/> 10 Vrms	<input type="checkbox"/> _ Vrms
<b>Modulation</b>	<input checked="" type="checkbox"/> AM <input type="checkbox"/> FM	80 % 1kHz Rate
<b>Step</b>	<input type="checkbox"/> < 0.015 decades / sec	<input checked="" type="checkbox"/> 1% <input type="checkbox"/> Custom
	<input checked="" type="checkbox"/> Sine Wave	<input type="checkbox"/> Unmodulated

#### 3.5.4 TEST RESULTS

The EUT meets the requirements for Conducted Immunity per IEC 61000-4-6:2013 COR1 :2015

<input checked="" type="checkbox"/> <b>Met Criterion A</b>	No Degradation of Function (No effect due to CI on the EUT)
<input type="checkbox"/> <b>Met Criterion B</b>	Distortion of Function observed, but self recovers.
<input type="checkbox"/> <b>Met Criterion C</b>	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> <b>Met Criterion D</b>	Complete Loss of Function & not recoverable.

**3.5.5 MEASUREMENT UNCERTAINTY**

UNCERTAINTY OF CONDUCTED IMMUNITY MEASUREMENTS – 150KHz TO 80MHz					
	Uncertainty Contribution	3m Value	Data Source	Probability Dist.	Divisor
1	RMS Voltmeter	± 0.3	Mfg. Spec.	Rectangular	1.73
2	Volt. Level Accept. Window	± 0.5	Mfg. Spec.	Rectangular	1.73
3	Power Amp. Harmonics	± 0.75	Mfg. Spec.	Rectangular	1.73
4	Signal Generator Drift	± 0.5	Mfg. Spec.	Rectangular	1.73
5	Mismatch rms Voltmeter CDN	± 0.5	Historical Record	"U"	1.41
6	Mismatch Amplifier CDN + 6dB Attenuator	± 0.5	Historical Record	"U"	1.41
7	Meas. System Repeatability	± 0.5	Historical Record	Normal	1.00
8	Combined Standard Uncertainty $u_c(y)$	± 1.73			
9	Expanded Uncertainty $U$	± 3.46			$k = 2$
<b>Combined Standard Uncertainty Calculation(y) = </b> [(0.3/1.73) <sup>2</sup> + (0.5/1.73) <sup>2</sup> + (0.75/1.73) <sup>2</sup> + (0.5/1.73) <sup>2</sup> + (0.5/1.41) <sup>2</sup> + (0.5/1.41) <sup>2</sup> + (0.5/1) <sup>2</sup> ] <sup>1/2</sup> = [0.18 + 1.34 + 1.34 + 0.125] <sup>1/2</sup> = 1.732 ( $u_c(y)$ ) = $U_{lab}$ = ± 3.46					

**3.5.6 TEST SETUP PHOTO****CONDUCTED IMMUNITY TEST SETUP**

### 3.6 MAGNETIC FIELD IMMUNITY PER IEC 61000-4-8:2009

The EUT was placed in a shielded room, powered on and placed into an operational mode. While being monitored the unit was subjected to horizontal or vertical magnetic field at the applied power line frequency.

#### 3.6.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	EMC Lab 2A
<b>Test Engineer:</b>	5/31/2017
<b>Temperature:</b>	Sharmistha Modak
<b>Humidity:</b>	25°C
<b>Test Voltage 2:</b>	230V, 50Hz

#### 3.6.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
3-Turn Magnetic Test Loop	ITC	N/A	N/A	VBU*
2000A AC/DC Clamp Meter	Extech	380926	H180407	10/29/2017
Variable Transformer	Superior Electric	9T92A0087	N/A	VBU*
2:1 Step down Transformer	Franzus	TS-501TR	N/A	VBU*

\*VERIFIED BEFORE USE

#### 3.6.3 TEST SPECIFICATION

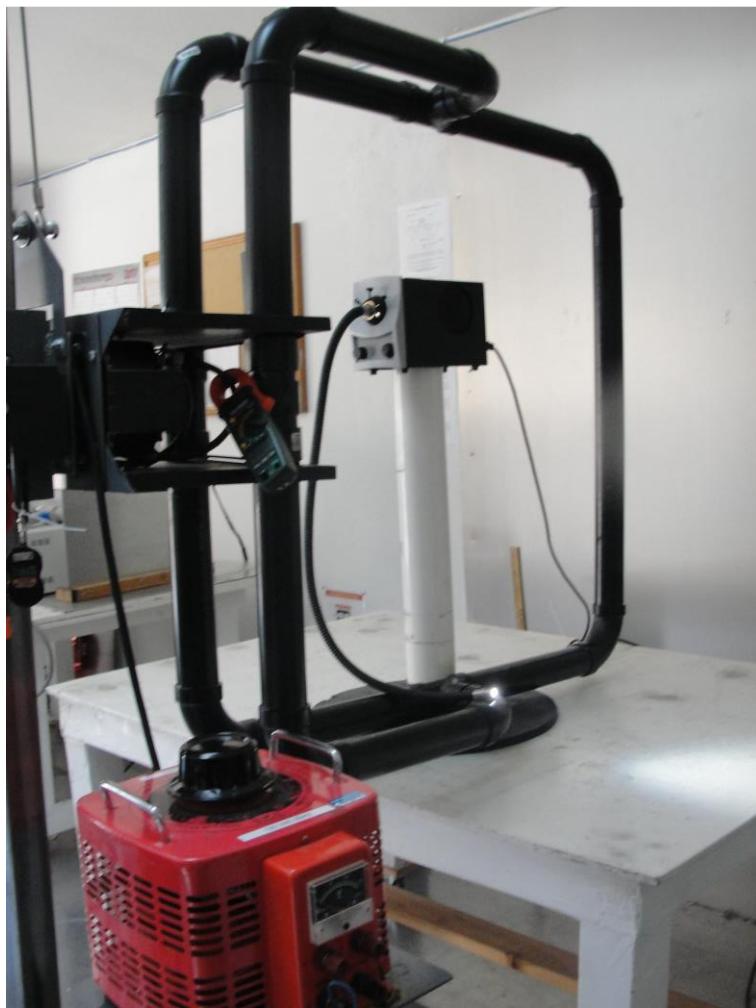
<b>Frequency</b>	<input checked="" type="checkbox"/> 50Hz	<input checked="" type="checkbox"/> 60Hz
<b>Field Strength</b>	<input checked="" type="checkbox"/> 3 A/m	<input type="checkbox"/> 30A/m
<b>Modulation</b>	<input type="checkbox"/> Modulated	<input checked="" type="checkbox"/> Unmodulated
<b>Polarization of Antenna</b>	<input type="checkbox"/> Circular	<input checked="" type="checkbox"/> Horizontal <input checked="" type="checkbox"/> Vertical

#### 3.6.4 TEST RESULTS

The EUT meets the requirements for Magnetic Field Immunity per IEC 61000-4-8:2009.

<input checked="" type="checkbox"/> Met Criterion A	No Degradation of Function (No effect due to MF on the EUT)
<input type="checkbox"/> Met Criterion B	Distortion of Function observed, but self recovers.
<input type="checkbox"/> Met Criterion C	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> Met Criterion D	Complete Loss of Function & not recoverable.

### 3.6.5 TEST SETUP PHOTOS



Magnetic immunity test setup – Vertical Field



**Magnetic immunity test setup – Horizontal Field**

### 3.7 POWER LINE DIPS AND BROWN OUTS PER IEC 61000-4-11:2004 AMD1:2017

The EUT, positioned on the test surface in a shielded room above the horizontal reference plane, was powered on and placed in an operational mode. The Line Voltage Simulator was placed in series with the power input of the EUT. The voltage interruptions and brownouts were conducted on the power line of the EUT while it was observed for errors.

#### 3.7.1 ADMINISTRATIVE AND ENVIRONMENTAL DETAILS

<b>Site Used:</b>	EMC Lab 2A
<b>Test Date:</b>	5/31/2017
<b>Test Engineer:</b>	Sharmistha Modak
<b>Temperature:</b>	25°C
<b>Humidity:</b>	43%
<b>Test Voltage 1:</b>	230 V , 50 Hz

#### 3.7.2 TEST EQUIPMENT

Equipment Description	Manufacturer	Model Name	Serial Number	Calibration Due Date
Voltage Dip and Up Simulator	Noiseken	VDS-2002	VDS0720190	VBU*

\*VBU – Verified Before Use

#### 3.7.3 TEST SPECIFICATION

Test Level %U <sub>T</sub>	Voltage Dips and Short Interruptions %U <sub>T</sub>	Duration (In period)
0	>95 (Dip)	.5/1 cycle
70	30 (Dip)	25/30 cycles
0	>95 (Interruption)	250/300 cycles

#### 3.7.4 TEST RESULTS

The EUT meets the Power Line Dips and Brown-out requirements per IEC 61000-4-11:2004. AMD1:2017

Unit lost power during 0% Test level with 250/300 cycle duration and recovered power after few seconds.

<input type="checkbox"/> Met Criterion A	No Degradation of Function (No effect due to Dips & Brown Outs on the EUT)
<input checked="" type="checkbox"/> Met Criterion B	Distortion of Function observed, but self recovers.
<input type="checkbox"/> Met Criterion C	Error of Function (Required operator intervention to continue operation)
<input type="checkbox"/> Met Criterion D	Complete Loss of Function & not recoverable.

**3.7.5 TEST SETUP PHOTO****POWER LINE DIPS AND BROWNOUT TEST SETUP**

## 4 APPENDIX

### 4.1 EUT TECHNICAL SPECIFICATIONS

<b>Manufacturer:</b>	Techniquip		
<b>General Description:</b>	ProLux is a source of continuous high intensity illumination intended to deliver illumination only through non-electrical light cables made with optical fibers or optical cavities (liquid light guides) for use providing illumination for optical fibers in a variety of industries.		
<b>Product</b>	PROLUX LED ILLUMONATOR	<b>Model:</b>	
<b>Dimensions:</b>	HXWXL 6" X 4.5"X 8.5"	<b>Serial Number:</b>	N\A
<b>Host Rated Voltage:</b>	100-240V~, 50-60Hz	<b>Power Cord Type:</b>	<input checked="" type="checkbox"/> Shielded <input type="checkbox"/> Un-Shielded

## **4.2 MODIFICATION LETTER**

No modifications were done to the EUT during testing.

To Whom It May Concern:

The EUT, ProLux LED Illuminator described in this report, was tested to the requirements of the standards below:

- **EMISSIONS REGULATIONS:**
  - CISPR11:2015 + AMD1: 2016 Class A
  - IEC 61000-3-2: 2014
  - IEC 61000-3-3:2013 + AMD1 :2017
- **IMMUNITY REGULATIONS:** IEC 61000-6-2: 2016 including
  - IEC 61000-4-2:2008
  - IEC 61000-4-3: 2010
  - IEC 61000-4-4: 2012
  - IEC 61000-4-5:2014
  - IEC 61000-4-6:2013 Cor 1:2015
  - IEC 61000-4-8:2009
  - IEC 61000-4-11:2004 + AMD1: 2017

For further information, please contact the manufacturer at:

**Mr. David Wensley**

530 Boulder Ct. # 103 Place Pleasanton, CA 94588

Phone: 925-251-9036

Email: dw@bioluxsystems.com