NORTHWEST EMC

Sunlight Supply, Inc.

902215 400/600 Galaxy Grow Amp #2

Report # SNSY0041

NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: March 30, 2015
Sunlight Supply, Inc.
Model: 902215 400/600 Galaxy Grow Amp #2

Emissions

Standards

Specification	Method
FCC 18.305:2015 Consumer equipment	MP-5:1986
FCC 18.307:2015 Consumer equipment	MP-5:1986

Results

Test Description	Applied	Results	Comments
Radiated Emissions	Yes	Pass	
Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2015.2.19

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

EMISSIONS MEASUREMENTS

NORTHWEST EMC
REV 2014.10.08

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

Sample Calculations

Radiated Emissions:

Field Strength		Measured Level		Antenna Factor		Cable Factor		Amplifier Gain		Distance Adjustment Factor		External Attenuation
33.5	=	42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0

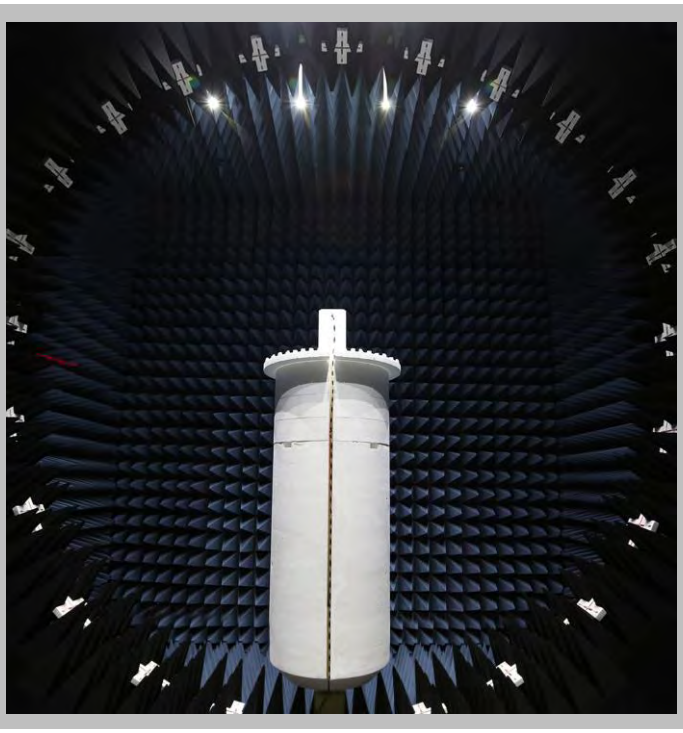
Conducted Emissions:

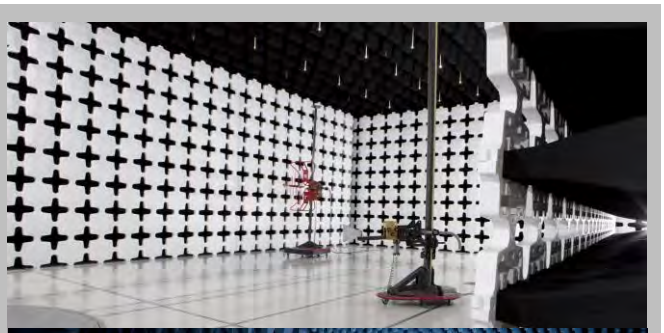
Adjusted Level		Measured Level		Transducer Factor		Cable Factor		External Attenuation
47.1	=	26.7	+	0.3	+	0.1	+	20.0

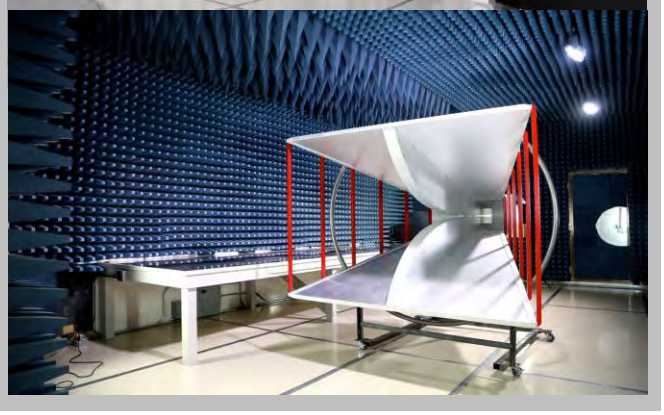
FACILITIES

NORTHWEST EMC
REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Sunlight Supply, Inc.
Address:	5408 NE 88th Street Bldg A101
City, State, Zip:	Vancouver, WA 98665
Test Requested By:	Ken Garver
Model:	902215 400/600 Galaxy Grow Amp #2
First Date of Test:	March 27, 2015
Last Date of Test:	March 30, 2015
Receipt Date of Samples:	March 27, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Digital Ballast

Highest frequency generated or used in the device:
None Provided- Assumes < 108 MHz

Testing Objective:
Provide the specific EMC testing requested by the customer.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration SNSY0041- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Digital Ballast	Sunlight Supply, Inc.	902215 400/600 Galaxy Grow Amp #2	Sample #2

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
HPS Lamp	Sunlight Supply, Inc.	Ultra Sun 600W 901526	None
Air Cooled Reflector	Sunlight Supply, Inc.	Magnum XXXL 6 Inch 904520	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	2.0m	Yes	AC Mains	Digital Ballast
AC Power	No	4.5m	Yes	Digital Ballast	Air Cooled Reflector

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	3/27/2015	Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	3/30/2015	Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

RADIATED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level was detected. This required the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search was utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT. Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance was 3 meters or 10 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna was increased so that the lowest point of the bottom of the antenna cleared the ground surface by at least 25 cm.

The EUT arrangement is configured as equivalent to that occurring in normal use. Tabletop equipment is placed on a 0.8 meter high non-conductive table & for Floor-standing equipment, it is placed on, but insulated from a ground reference plane by the use of its own rollers or stand-off supports. If measurements above 1 GHz were required, the test setup was modified to meet the regulatory requirements for higher frequency measurements. If required, RF absorber was placed on the floor between the measurement antenna and EUT.

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Spectrum Analyzer	Agilent	E4443A	AFB	3/17/2015	03/17/2016
Pre-Amplifier	Miteq	AM-1551	AOY	8/14/2014	08/14/2015
Antenna, Biconilog	Teseq	CBL 6141B	AXR	7/7/2014	07/07/2016
EV11 Cables	N/A	10m Test Distance Cables	EVL	8/14/2014	08/14/2015

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.8 dB	-3.8 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 1000 MHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

SNSY0041-1

MODES INVESTIGATED

On, set to 600W

RADIATED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	902215 400/600 Galaxy Grow Amp #2	Work Order:	SNSY0041
Serial Number:	Sample #2	Date:	03/30/2015
Customer:	Sunlight Supply, Inc.	Temperature:	23.1°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1020.1 mb
Tested By:	Cole Ghizzone	Job Site:	EV11
Power:	110VAC/60Hz	Configuration:	SNSY0041-1

TEST SPECIFICATIONS

Specification: RF lighting: consumer equipment	Method:
FCC 18.305:2015	MP-5:1986

TEST PARAMETERS

Run #:	1	Test Distance (m):	10	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

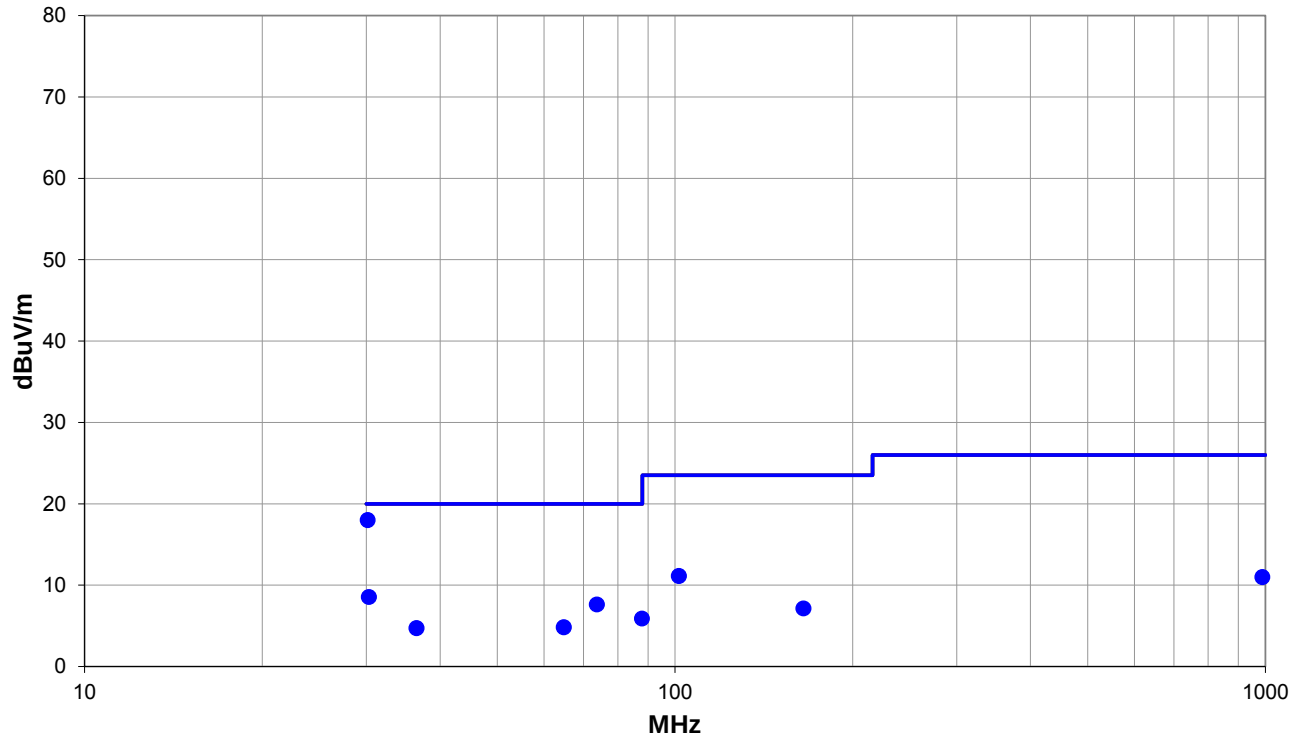
Using 120V power cord. Allowed 20 minutes to warm up.

EUT OPERATING MODES

On, set to 600W

DEVIATIONS FROM TEST STANDARD

None



Run #: 1 ■ PK ◆ AV ● QP

RADIATED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #1

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Ant. Height (m)	Azimuth (deg.)	Test Dist. (m)	Ext. Atten. (dB)	Polar. Trans. Type	Detect.	Dist. Adjust. (dB)	Adj. (dBuV/m)	Spec. Limit (dBuV/m)	Margin. (dB)
30.152	42.7	-15.2	1.0	14.0	10.0	0.0	Vert	QP	-9.5	18.0	20.0	-2.0
30.297	33.3	-15.2	1.1	40.0	10.0	0.0	Horz	QP	-9.5	8.6	20.0	-11.4
73.698	47.2	-30.0	3.8	184.0	10.0	0.0	Horz	QP	-9.5	7.6	20.0	-12.4
101.490	47.8	-27.1	4.0	161.0	10.0	0.0	Horz	QP	-9.5	11.1	23.5	-12.4
87.873	44.5	-29.1	4.0	75.0	10.0	0.0	Horz	QP	-9.5	5.9	20.0	-14.1
988.147	30.0	-9.5	3.8	117.0	10.0	0.0	Vert	QP	-9.5	11.0	26.0	-15.0
64.782	43.7	-29.3	4.0	197.0	10.0	0.0	Horz	QP	-9.5	4.8	20.0	-15.2
36.482	32.5	-18.2	2.8	36.0	10.0	0.0	Horz	QP	-9.5	4.7	20.0	-15.3
165.024	42.0	-25.3	3.8	360.0	10.0	0.0	Horz	QP	-9.5	7.1	23.5	-16.4

CONCLUSION

Pass

Tested By

CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARH	03/11/2015	03/11/2016
High Pass Filter	TTE	H97-100K-50-720B	HHD	01/05/2015	01/05/2016
Attenuator, BNC 10 Watt	Fairview Microwave	SA6B10W-20	TQQ	11/20/2014	11/20/2015
EV07 Cables	N/A	Conducted Cables	EVG	02/03/2015	02/03/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	10/07/2014	10/07/2015

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

SNSY0041-1

MODES INVESTIGATED

On, set to 600W

CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

EUT:	902215 400/600 Galaxy Grow Amp #2	Work Order:	SNSY0041
Serial Number:	Sample #2	Date:	03/27/2015
Customer:	Sunlight Supply, Inc.	Temperature:	22.6°C
Attendees:	None	Relative Humidity:	37.1%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	SNSY0041-1

TEST SPECIFICATIONS

Specification: RF lighting: consumer equipment	Method:
FCC 18.307:2015	MP-5:1986

TEST PARAMETERS

Run #:	1	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

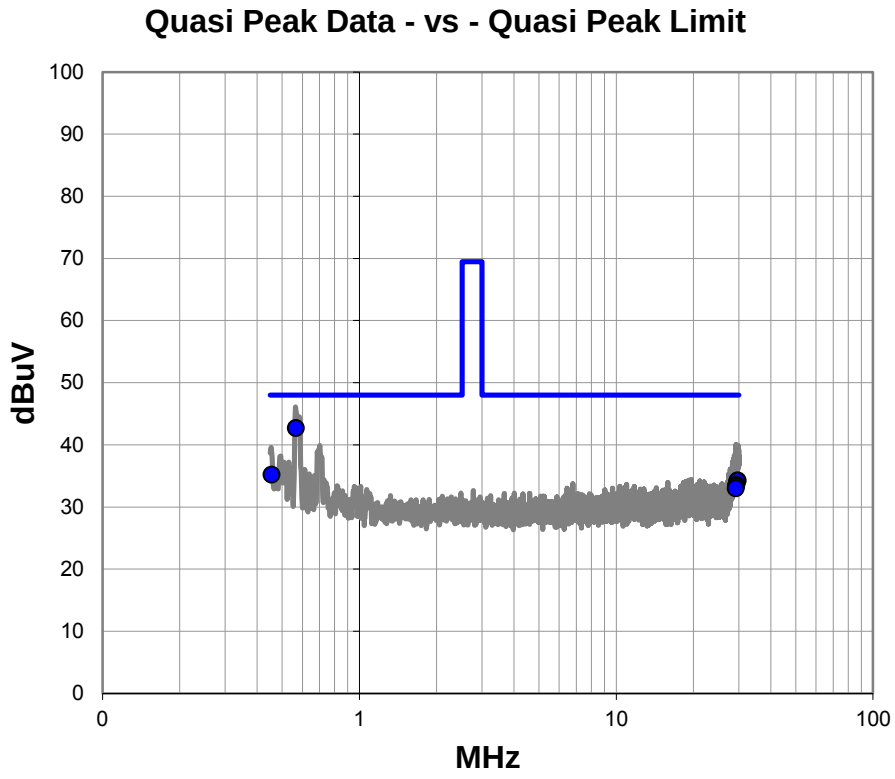
Using 120V power cord. Allowed 20 minutes to warm up.

EUT OPERATING MODES

On, set to 600W

DEVIATIONS FROM TEST STANDARD

None



CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

RESULTS - Run #1

Peak Data – vs – Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.567	22.3	20.4	42.7	48.0	-5.3
0.456	14.8	20.4	35.2	48.0	-12.8
29.758	12.2	22.1	34.3	48.0	-13.7
29.644	12.1	22.1	34.2	48.0	-13.8
29.406	11.5	22.1	33.6	48.0	-14.4
29.282	11.3	22.1	33.4	48.0	-14.6
29.182	10.9	22.1	33.0	48.0	-15.0

CONCLUSION

Pass

Tested By

CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

EUT:	902215 400/600 Galaxy Grow Amp #2	Work Order:	SNSY0041
Serial Number:	Sample #2	Date:	03/27/2015
Customer:	Sunlight Supply, Inc.	Temperature:	22.6°C
Attendees:	None	Relative Humidity:	37.1%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	SNSY0041-1

TEST SPECIFICATIONS

Specification: RF lighting: consumer equipment	Method:
FCC 18.307:2015	MP-5:1986

TEST PARAMETERS

Run #:	2	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

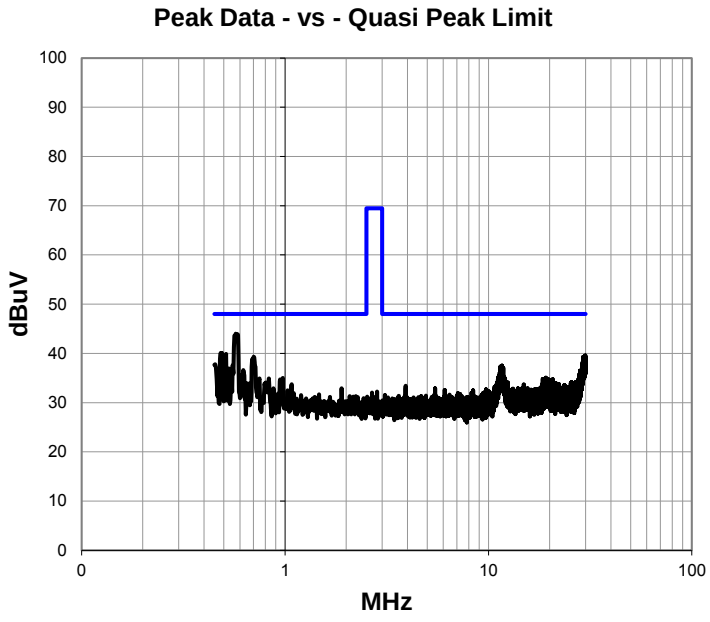
Using 120V power cord. Allowed 20 minutes to warm up.

EUT OPERATING MODES

On, set to 600W

DEVIATIONS FROM TEST STANDARD

None



CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

RESULTS - Run #2

Peak Data – vs – Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.572	23.6	20.4	44.0	48.0	-4.0
0.483	19.7	20.4	40.1	48.0	-7.9
0.491	19.7	20.4	40.1	48.0	-7.9
0.513	19.5	20.4	39.9	48.0	-8.1
29.937	17.5	22.1	39.6	48.0	-8.4
29.623	17.3	22.1	39.4	48.0	-8.6
0.701	18.8	20.5	39.3	48.0	-8.7
29.801	17.2	22.1	39.3	48.0	-8.7
29.162	17.2	22.1	39.3	48.0	-8.7
29.538	17.1	22.1	39.2	48.0	-8.8
29.476	16.9	22.1	39.0	48.0	-9.0
29.368	16.9	22.1	39.0	48.0	-9.0
29.021	16.1	22.1	38.2	48.0	-9.8
29.091	15.8	22.1	37.9	48.0	-10.1
0.454	17.4	20.4	37.8	48.0	-10.2
11.644	16.5	21.0	37.5	48.0	-10.5
28.955	15.4	22.0	37.4	48.0	-10.6
11.456	16.3	21.0	37.3	48.0	-10.7
28.818	15.2	22.0	37.2	48.0	-10.8
11.814	16.1	21.0	37.1	48.0	-10.9
11.729	16.1	21.0	37.1	48.0	-10.9
11.519	16.1	21.0	37.1	48.0	-10.9
11.781	15.9	21.0	36.9	48.0	-11.1
0.528	16.5	20.4	36.9	48.0	-11.1
28.874	14.7	22.0	36.7	48.0	-11.3
0.624	16.2	20.4	36.6	48.0	-11.4

CONCLUSION

Pass

Tested By