ARRL The national association for AMATEUR RADIO™
ADMINISTRATIVE HEADQUARTERS
225 Main Street, Newington, Connecticut, USA 06111-1494
Telephone: 860-594-0200 ■ FAX: 860-594-0259
www.arrl.org

04/10/2014

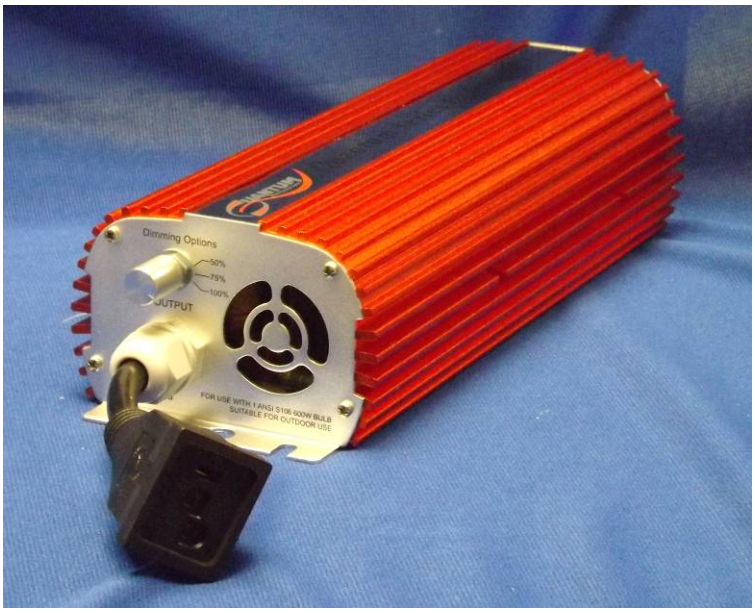
Conducted Emissions Test Report

STANDARD	TITLE
IEEE C63.4 - 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

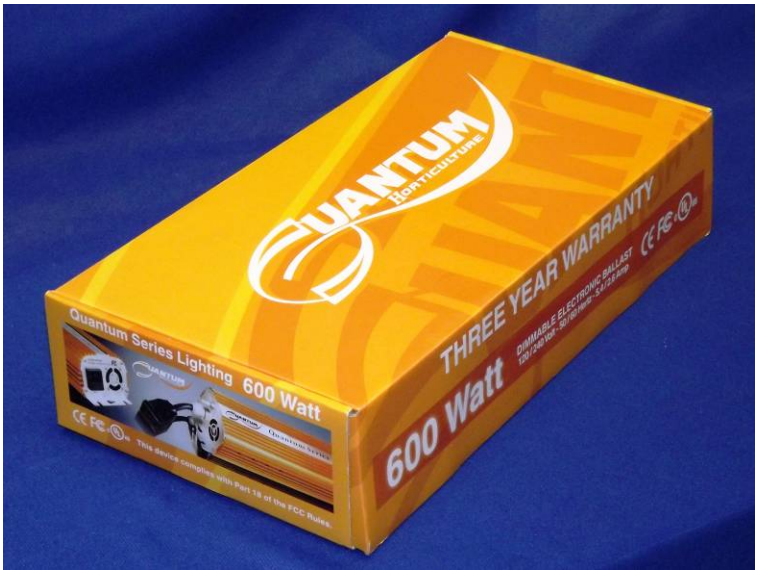
REVIEW	SIGNATURE	DATE
Performed By:	Mike Gruber – W1MG Pete Turbide – W1PT	4/9/14
Results Reviewed By:	Edward Hare – W1RFI	4/10/14

Summary of Test Results: **Fail**

EUT CONFIGURATION	
Manufacturer	Quantum Horticulture
Model Number	N/A
Model	HPS/MH—600W
Serial Number	N/A
Importer	**Hydrofarm Horticultural Products** 2249 S. McDowell Ext. Petaluma CA 94954 Tel: (800) 634-9990 Web: www.hydrofarm.com **Formerly:** R & M Supply, Inc. 420 Harley Knox Blvd Perris CA 92571
Retailers	**Aquarius Hydroponics** (purchased here) 138 Memorial Ave West Springfield, MA 01089 Tel: (413) 732-3300 Web: http://aquariushydro.com See Appendix A for additional details. Other sources include but not necessarily limited to Hydrofarm Product distributors of record. This list is too extensive for inclusion in this report. The complete list is available at: www.hydrofarm.com/where-to-buy/index.php.


Dimming Options
50%
75%
100%
OUTPUT
FOR USE WITH 1 ANSI S106 600W BULB
SUITABLE FOR OUTDOOR USE


Quantum Series Lighting


QUANTUM
HORTICULTURE
THREE YEAR WARRANTY
600 Watt
Quantum Series Lighting 600 Watt

GENERAL INFORMATION

OBJECT

This document outlines the conducted emissions requirements applicable to lighting equipment covered under **47CFR18**. This procedure will be used for the testing of lighting products in the ARRL EMC laboratory.

EUT PASS CRITERIA (Consumer)

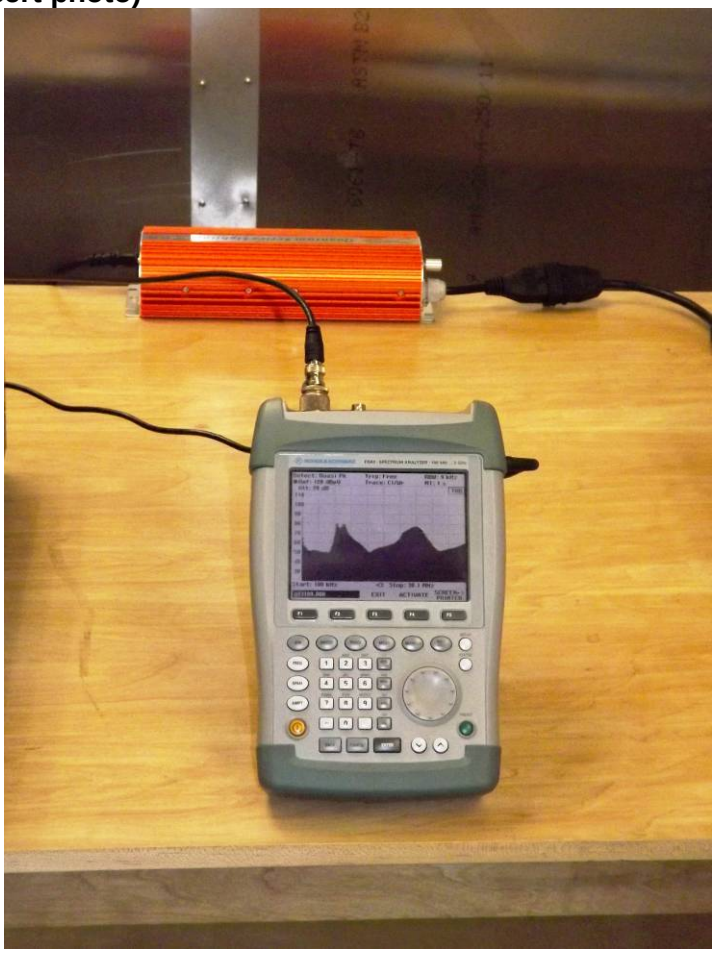
Table 1

Test Location	Test	Frequency Range	Limits
Power Supply	**Conducted Emissions**	0.45 MHz - 2.51 MHz	250 µV / 48 dB(µV) quasi peak
		2.51 MHz - 3 MHz	3,000 µV / 70 dB(µV) quasi peak
		3 MHz - 30 MHz	250 µV / 48 dB(µV) quasi peak

SETUP CHECKLIST

Initials	Setup
MG	The EUT should be in new condition, built to production specifications, using production parts and using production processes. (commercially available)
MG	Schedule EMC facility time with the ARRL Laboratory. (This test is performed by formally trained users of the EMC facility)
MG	Complete Equipment List Table.
MG	Connect output of LISN to input of EMC Receiver.
MG	Apply rated voltage to input of LISN.
MG	Connect the EUT to the LISN using a standard power cord supplied with the product. (approx. 1.2m in length)
MG	The Reference Ground Plane on the floor should be at least 2m x 2m in size and shall extend 0.5m beyond the footprint of the EUT.
MG	For measuring table-top devices, mount onto a table 0.8m high and use a vertical conducting plane at least 2m x 2m in size located 40cm to the rear of the EUT and bonded to the reference ground plane with 3cm-wide straps at intervals less than 1m.
MG	Test each EUT model number at its nominal (rated) voltage.
MG	Photograph the test setup and include in this test report.

TEST SETUP (insert photo)



EQUIPMENT LIST

Use the following equipment (or equivalent) in executing this procedure. If an equivalent piece of test equipment is used, then a note with the make, model, serial number, and calibration due date of the equipment must be made in the table.

Manufacturer	Description	Model Number	Serial Number	Cal Due
N/A	Conducted Emissions test area	N/A	N/A	N/A
R&S	EMC Spectrum Analyzer/EMI Receiver	FSH3	102393	06-21-14
N/A	Measurement Cable	N/A	N/A	N/A
R&S	Line Impedance Stabilization Network (LISN)	ENV216	100057	Self

CONDUCTED EMISSIONS TEST

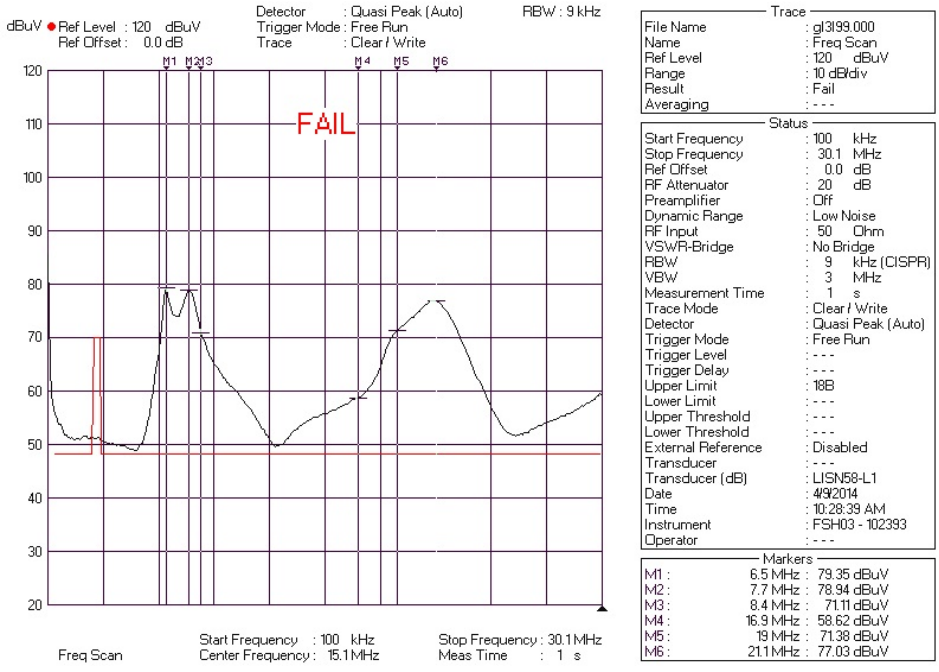
1. Bond the LISN to the ground plane of the test area using a grounding cable that is as short as possible.
2. Connect the EUT power cable to the Line Impedance Stabilization Network (LISN).
3. Measure the conducted emissions from the EUT using the LISN and a quasi-peak detector.
4. Record the six highest emissions from the EUT and compare the voltage to the limits specified in Table 1.
5. Attach emissions plots to this procedure.

Six Highest Emissions	Nominal Line Voltage	Interference Voltage (Quasi Peak)	Limit (Quasi Peak)	PASS / FAIL
6.5 MHz	120VAC	79 dBµV	48 dB(µV)	FAIL
7.7 MHz	120VAC	79 dBµV	48 dB(µV)	FAIL
8.4 MHz	120VAC	71 dBµV	48 dB(µV)	FAIL
16.9 MHz	120VAC	59 dBµV	48 dB(µV)	FAIL
19.0 MHz	120VAC	71 dBµV	48 dB(µV)	FAIL
21.1 MHz	120VAC	77 dBµV	48 dB(µV)	FAIL

(See Appendix B for additional comments on required FCC product labeling.)

PLOT OF CONDUCTED EMISSIONS (PHASE TO GROUND)

NOTE: The Neutral conductor to ground spectra was very similar.



Quantum 600 Watt Dimmable Ballast at 600 Watt Setting

All Power Settings Are Similar. See Appendix C for supplemental data.

Appendix A

Quantum 600 Watt Dimmable Ballast Purchasing Info

On April 8, 2014, an ARRL Laboratory Engineer used a personal credit card to purchase a Quantum 600 Watt Dimmable Ballast for grow lights. This purchase was made at the following nearby retail store:

Aquarius Hydroponics
138 Memorial Ave
West Springfield, MA 01089
Tel: (413) 732-3300
Web: http://aquariushydro.com

See the following sales receipt on next page for supplemental and supporting documentation.

Aquarius Hydroponics

SOLD TO:
Retail Customer

Date: 2014-04-07 17:33:52
Payment Method: Credit Card

1 x Quantum 600w Dimmable Ballast	QT600	6.25%	**$189.00**	**$189.00**	**$189.00**	**$189.00**

Sub-Total:	$189.00
Tax:	$11.81
Discount:	$18.90(-10%)
Total:	$181.91

APPENDIX B

Product Meets FCC Labeling Requirements

As the photos in this report show, this product has the required FCC RFI warning and labeling. **This device, however, does not meet the emissions limits.** We also note the following:

1) **On box**: FCC logo and statement, "This device complies with Part 18 of the FCC Rules." **Device however, clearly does not meet Part 18 emissions limits.** CE and UL logos also noted.
2) **In documentation**: FCC logo and statement, "This device complies with section 18 of the FCC rules and regulations. This product may cause interference to radio equipment and should not be installed near maritime safety communications equipment or other critical navigation or communication equipment operating between 0.45-30 MHz. Move your ballast should any interference occur." **Device however, clearly does not meet Part 18 emissions limits.** CE and UL logos also noted.
3) **On unit**: FCC logo. CE and UL logos also noted.

Some of the more important rules that apply in this case are as follows. Please note that paragraph § 18.213 (d) specifically applies to RF Lighting Devices. In addition, some rules regarding equipment authorization under § 18.203 are included for reference purposes:

§ 18.203 Equipment authorization.

(a) Consumer ISM equipment, unless otherwise specified, must be authorized under either the Declaration of Conformity or certification procedure prior to use or marketing. An application for certification shall be filed with the Commission on an FCC Form 731, pursuant to the relevant sections in part 2, subpart J of this chapter and shall also be accompanied by:

(1) A description of measurement facilities pursuant to § 2.948, or reference to such information already on file with the Commission.

(2) A technical report pursuant to §§ 18.207 and 18.311.

§ 18.213 Information to the user.

Information on the following matters shall be provided to the user in the instruction manual or on the packaging if an instruction manual is not provided for any type of ISM equipment:

(a) The interference potential of the device or system
(b) Maintenance of the system
(c) Simple measures that can be taken by the user to correct interference.
(d) Manufacturers of RF lighting devices must provide an advisory statement, either on the product packaging or with other user documentation, similar to the following: This product may cause interference to radio equipment and should not be installed near maritime safety communications equipment or other critical navigation or communication equipment operating between 0.45–30 MHz. Variations of this language are permitted provided all the points of the statement are addressed and may be presented in any legible font or text style.

APPENDIX C

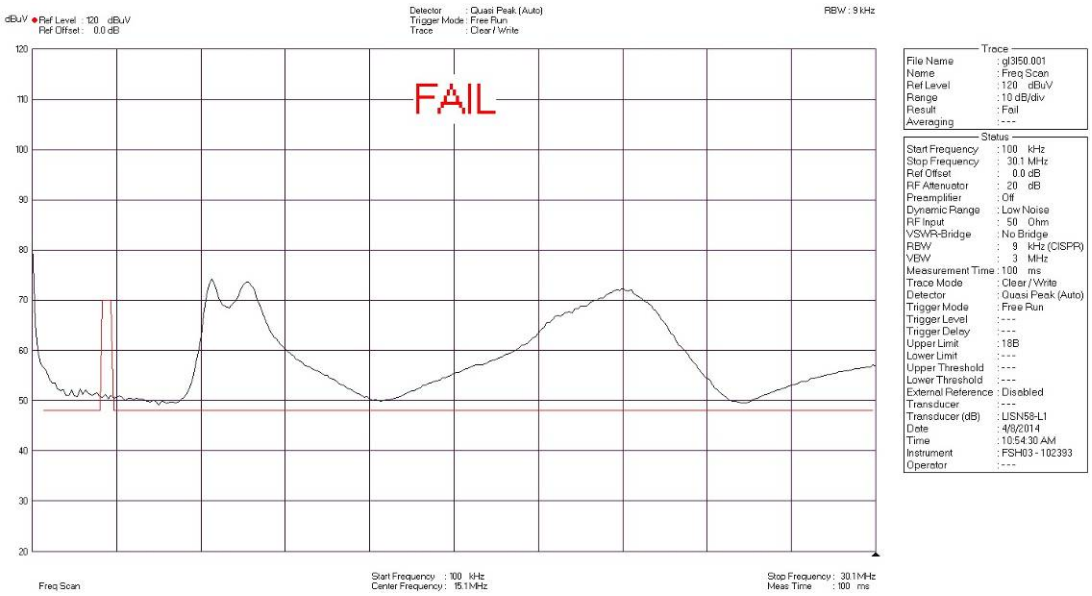
Quantum 600 Dimmable Ballast Conducted Emissions Testing
Supplemental Data

The Quasi Peak graphs in this Appendix show that the Quantum 600 Dimmable ballast significantly exceeds all FCC Part 18 limits under all operating conditions.

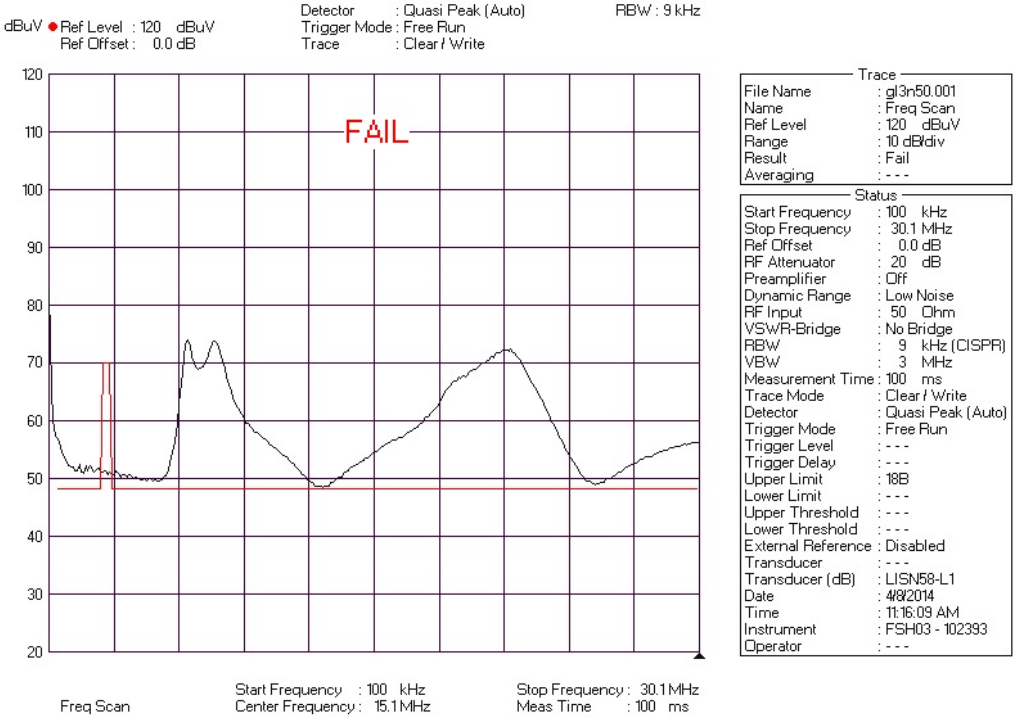
Quantum Horticulture 600W Dimmable Ballast

50% Setting

0.10 to 30.1 MHz



Phase to Ground

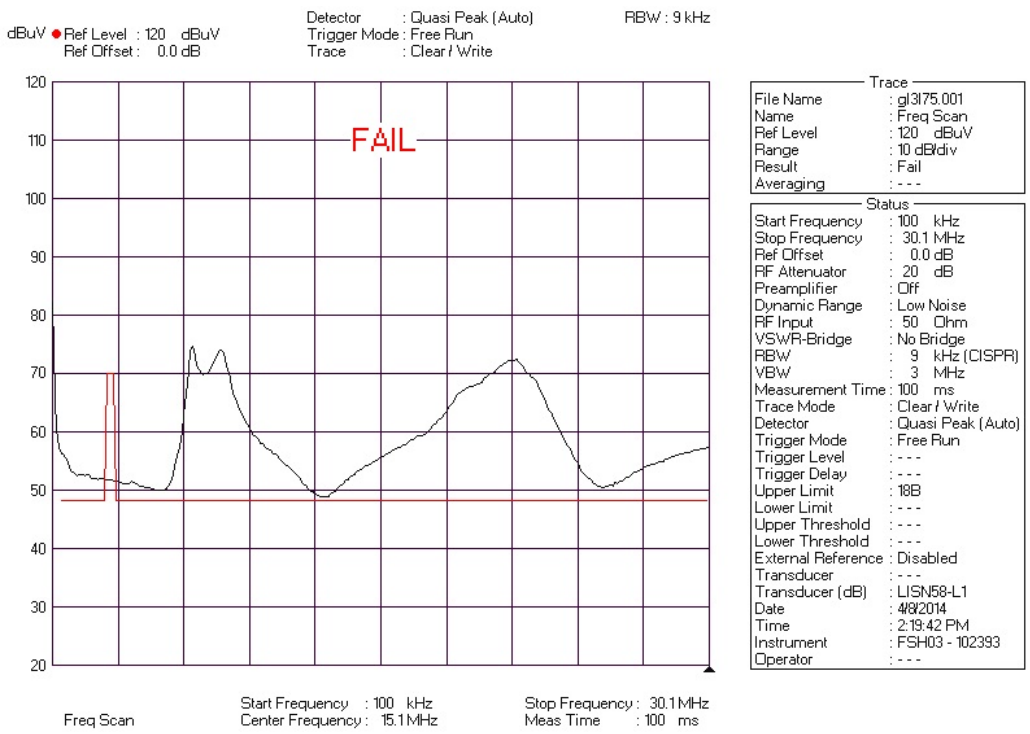


Neutral to Ground

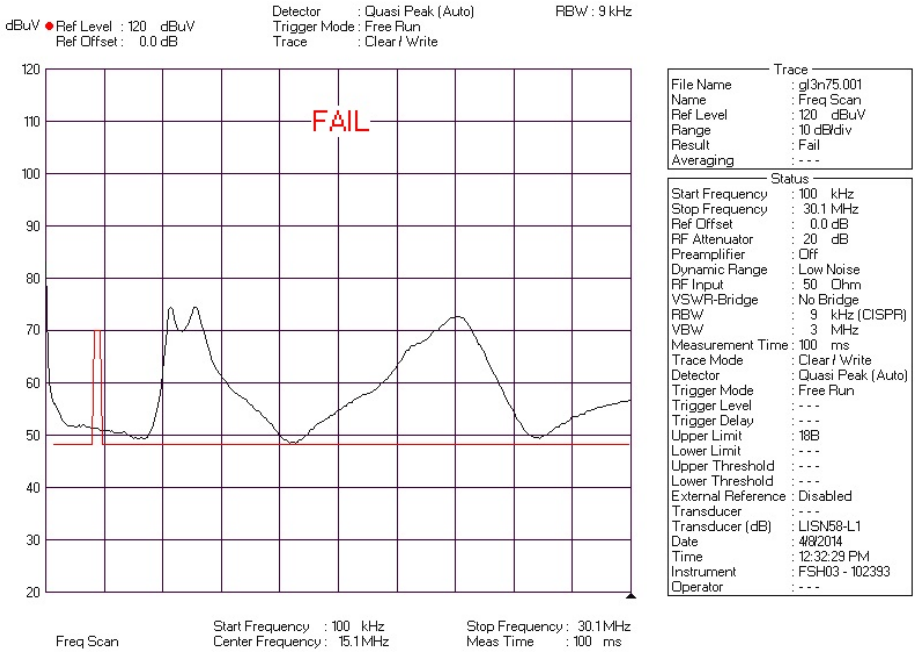
Quantum Horticulture 600W Dimmable Ballast

75% Setting

0.10 to 30.1 MHz



Phase to Ground

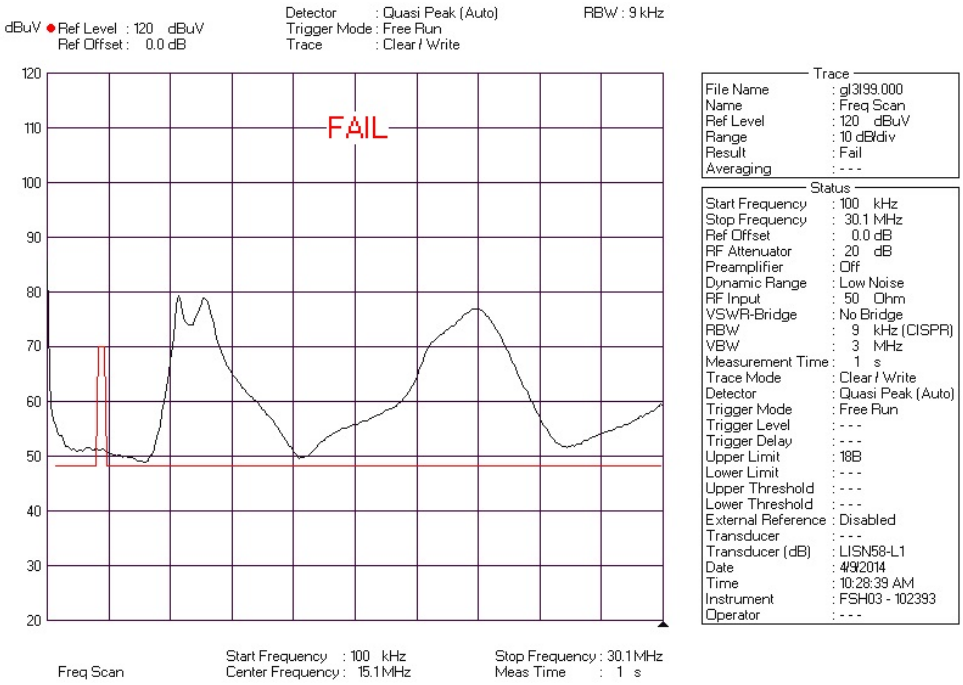


Neutral to Ground

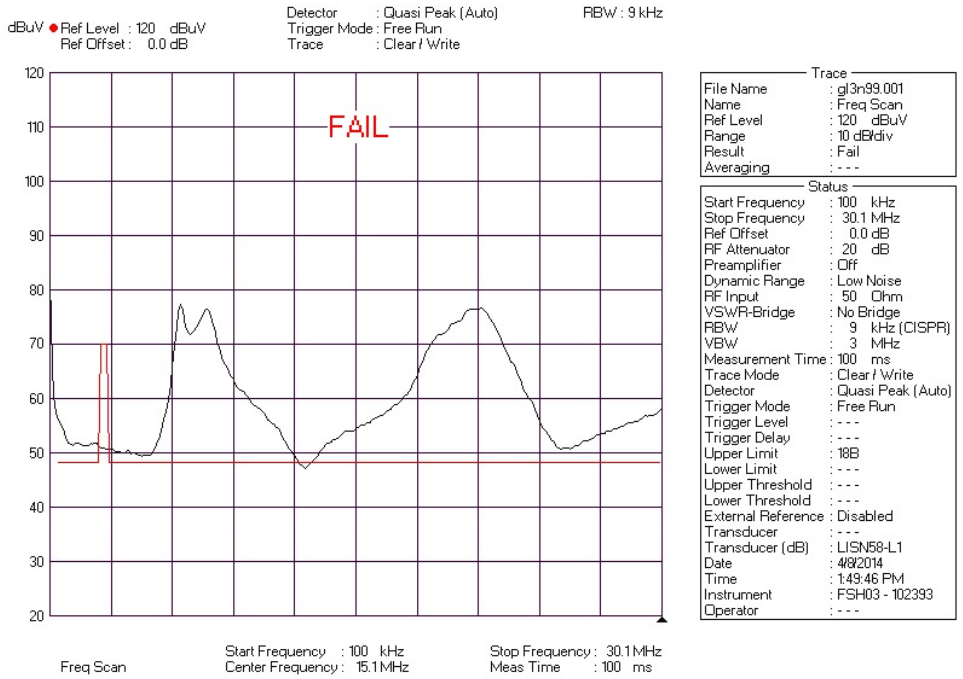
Quantum Horticulture 600W Dimmable Ballast

100% Setting

0.10 to 30.1 MHz



Phase to Ground



Neutral to Ground