ARRL The national association for AMATEUR RADIO™
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04/25/2014

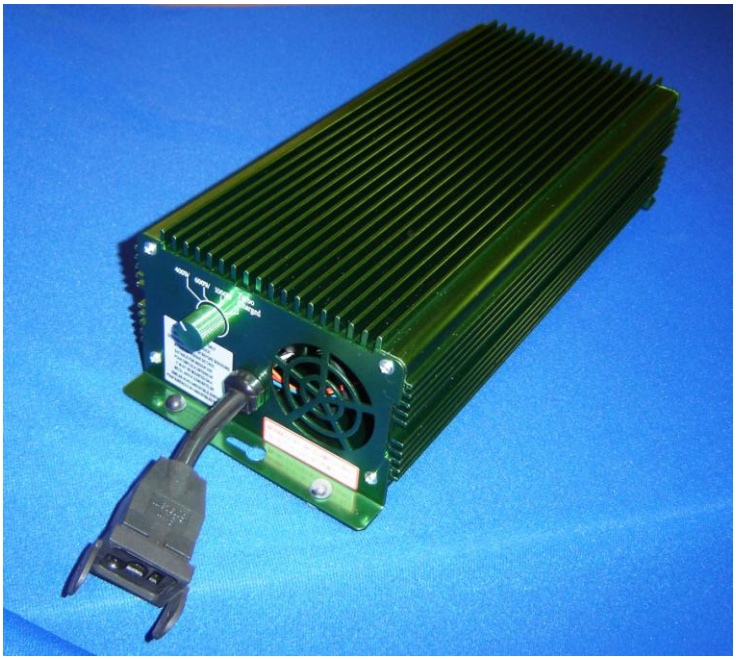
Conducted Emissions Test Report

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	4/25/14
Results Reviewed By:	Edward Hare – W1RFI	4/25/14

Summary of Test Results: **Fail**

EUT CONFIGURATION	
Manufacturer	Galaxy
Model Number	N/A
Model	Legacy Selectable Wattage Ballast
Serial Number	N/A
Importer (Note: This company also describes itself as a manufacturer, distributor and a wholesaler.)	**Sunlight Supply®, Inc.** 5408 NE 88th St. Vancouver, WA 98665 Tel: (360) 883-8846 Web: www.sunlightsupply.com Sunlight Supply® also has a close business association with: **National Garden Wholesale®** Web: www.n-g-w.com
Retailers	**Liquid Sun – Massachusetts** (purchased here) 8 Lynwood Avenue Suite 105 Holyoke, MA 1040 Tel: (413) 732-3300 Web: http://liquidsun.bz See Appendix A for additional details. Other sources include but not necessarily limited to Sunlight Supply® product distributors of record. This list is too extensive for inclusion in this report. The complete list is available at: www.sunlightsupply.com/page/findretailer.




GALAXY
ELECTRONIC BALLAST
1000 WATT
GALAXY
ELECTRONIC BALLAST

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)

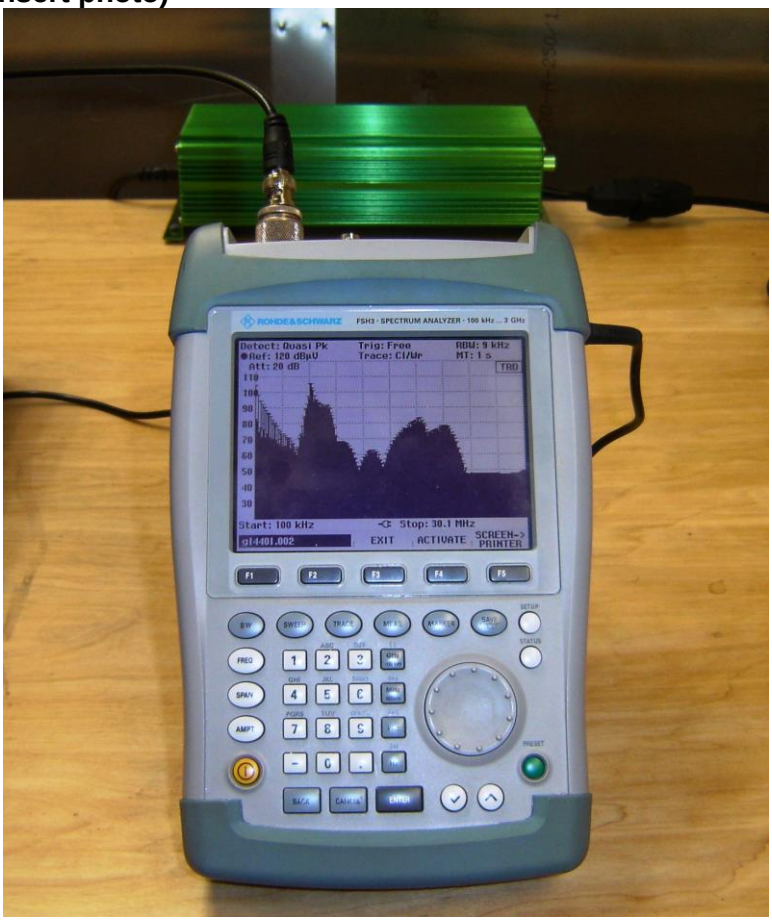
Table 1

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

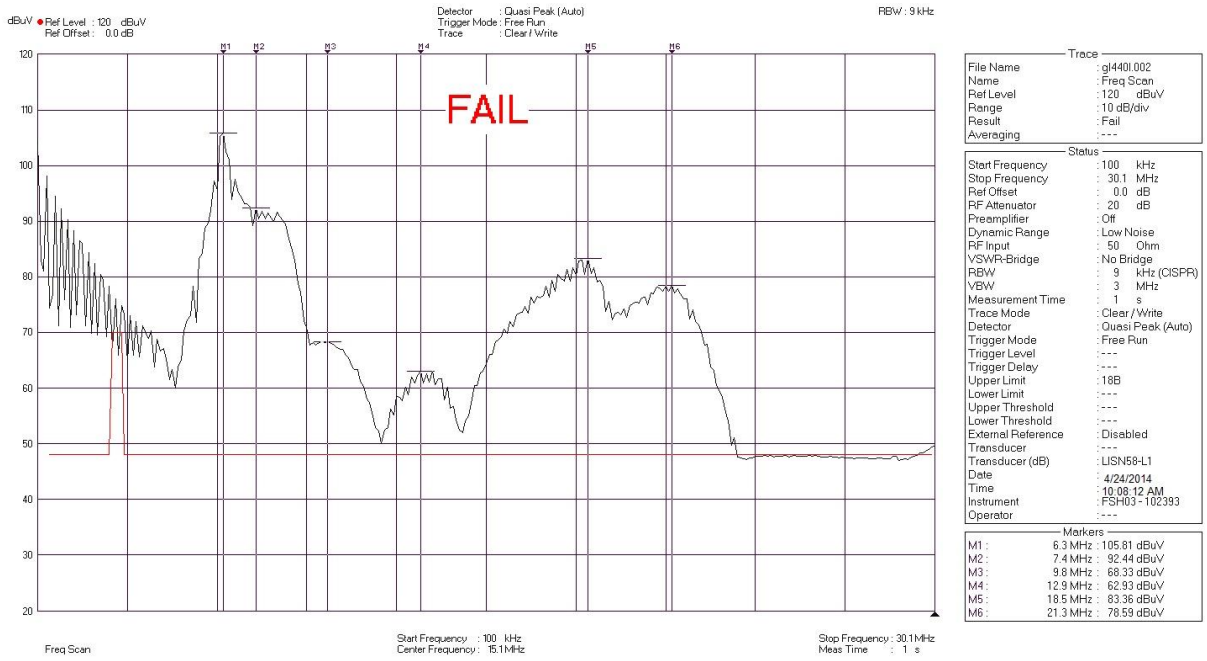
1. Bond the LISN to the ground plane of the test area using a grounding cable that is as short as possible.
2. Connect the EUT power cable to the Line Impedance Stabilization Network (LISN).
3. Measure the conducted emissions from the EUT using the LISN and a quasi-peak detector.
4. Record the six highest 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
6.3 MHz	120VAC	106 dBµV	48 dB(µV)	FAIL
7.4 MHz	120VAC	92 dBµV	48 dB(µV)	FAIL
9.8 MHz	120VAC	68 dBµV	48 dB(µV)	FAIL
12.9 MHz	120VAC	63 dBµV	48 dB(µV)	FAIL
18.5 MHz	120VAC	83 dBµV	48 dB(µV)	FAIL
21.3 MHz	120VAC	79 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.



Galaxy Legacy 1000 Watt Dimmable Ballast at 400 Watt Setting

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

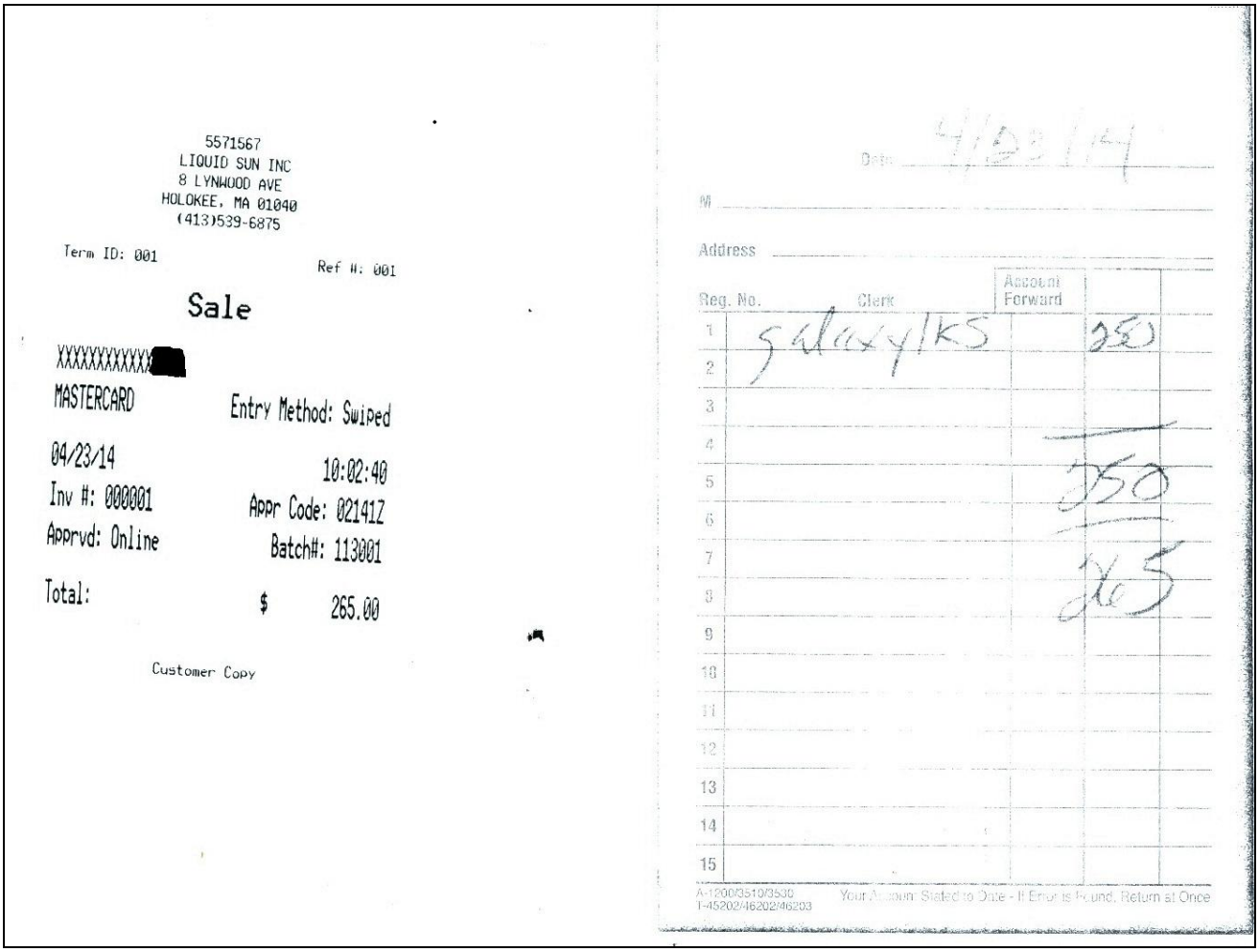
Appendix A

Galaxy 1000 Watt Dimmable Ballast Purchasing Info

On April 23, 2014, an ARRL Laboratory Engineer used a personal credit card to purchase a Galaxy 1000 Watt Dimmable Ballast for grow lights. This purchase was made at the following nearby retail store:

Liquid Sun – Massachusetts
8 Lynwood Avenue Suite 105
Holyoke, MA 1040
Tel: (413) 732-3300
Web: http://liquidsun.bz

See the following sales receipt for supplemental and supporting documentation.



5571567
LIQUID SUN INC
8 LYNWOOD AVE
HOLOKEE, MA 01040
(413)539-6875

Term ID: 001 Ref #: 001

Sale

XXXXXXXXXXXX[redacted]
MASTERCARD Entry Method: Swiped

04/23/14 10:02:40
Inv #: 000001 Appr Code: 021417
Apprvd: Online Batch#: 113001

Total: $ 265.00

Customer Copy

Date 4/23/14

M

Address

Reg. No.	Clerk	Account Forward	
1	galaxy1k5		250
2			
3			
4			
5			250
6			
7			265
8			
9			
10			
11			
12			
13			
14			
15			

A-1200/3510/3530 Your Account Stated to Date - If Error is Found, Return at Once
1-45202/46202/46203

APPENDIX B

Galaxy 1000 Watt Dimmable Ballast
Fails to Meet FCC Labeling Requirements

As the photos in this report show, there is no FCC label or sticker on this device. Furthermore, there is no FCC information included anywhere on the device, box or documentation. There is no reference to either Part 18 or Part 15 of the FCC rules.[1] This lack of proper labeling and documentation is an additional Part 18 rules violation.

Specifically, 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.

[1] While not necessarily an FCC matter, we also note that the device does not have a UL logo, although there is a label on the device with a UL reference.

APPENDIX C

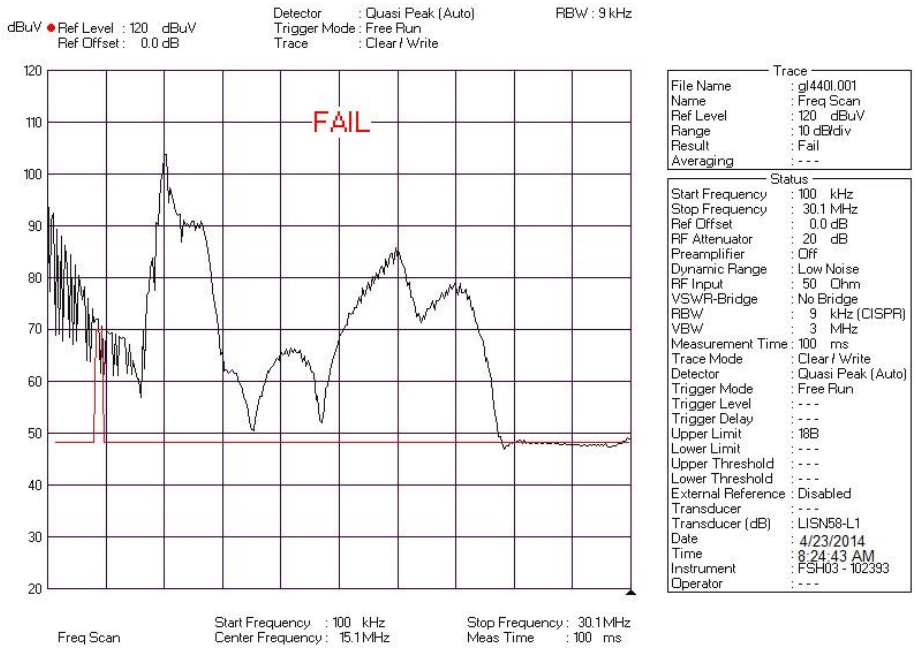
Galaxy Legacy 1000 Watt Dimmable Ballast Conducted Emissions Testing
Supplemental Data

The Quasi Peak graphs in this Appendix show that the Galaxy Legacy 1000 Dimmable ballast significantly exceeds all FCC Part 18 limits under all operating conditions.

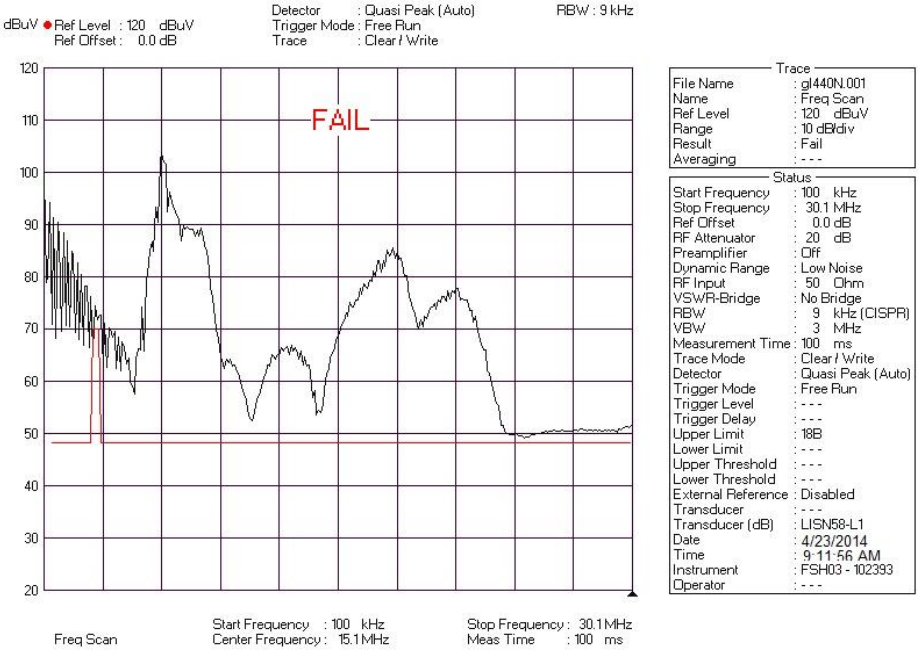
Galaxy Legacy 1000W Dimmable Ballast

400 Watt Setting

0.10 to 30.1 MHz



Phase to Ground

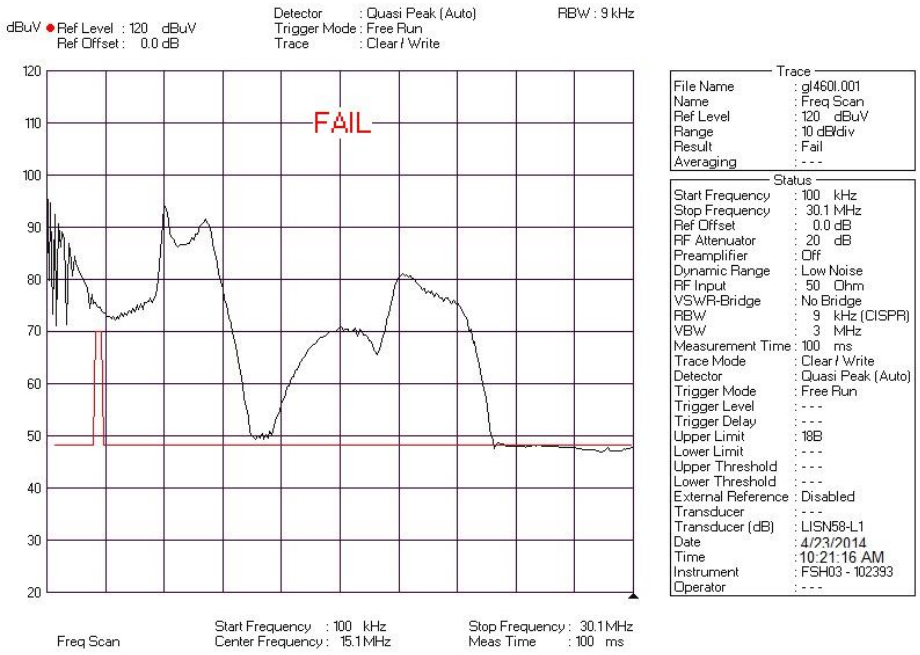


Neutral to Ground

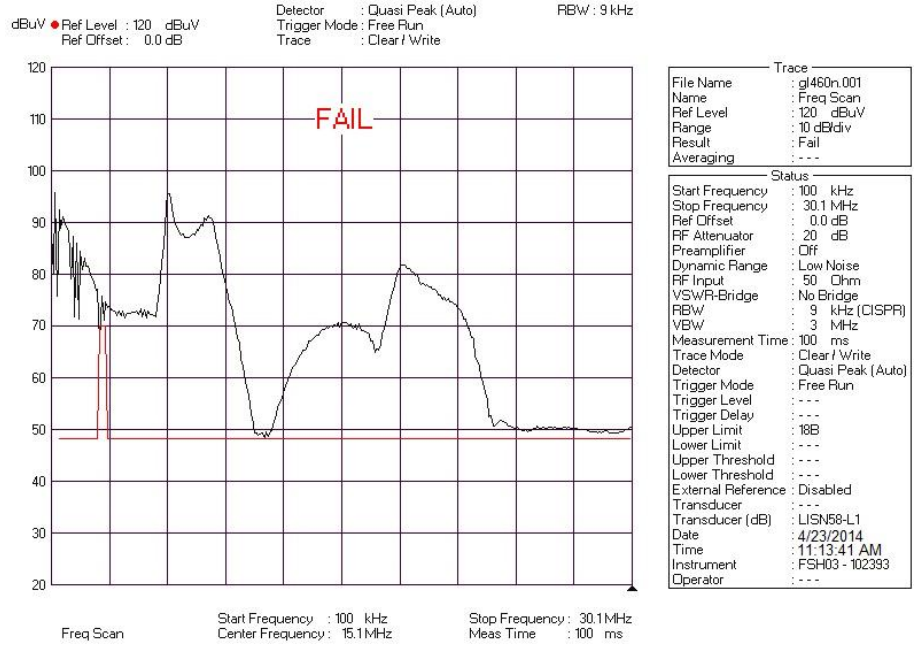
Galaxy Legacy 1000W Dimmable Ballast

600 Watt Setting

0.10 to 30.1 MHz



Phase to Ground

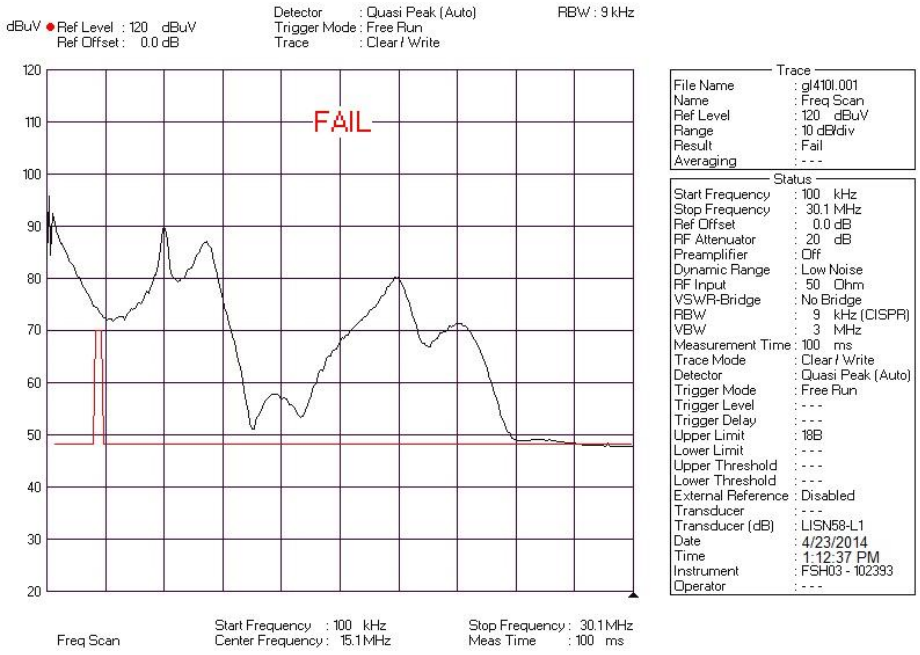


Neutral to Ground

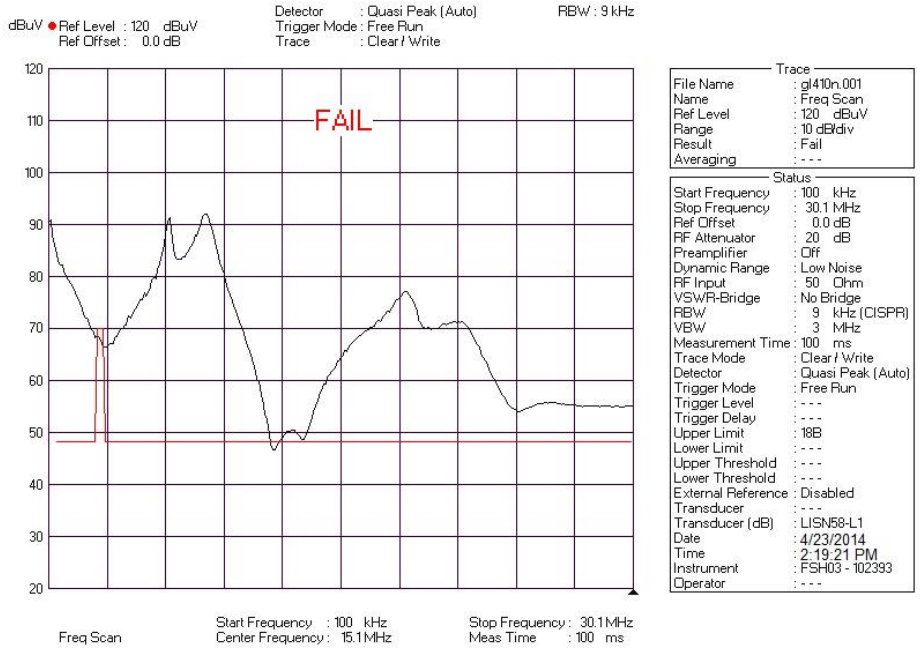
Galaxy Legacy 1000W Dimmable Ballast

1000 Watt Setting

0.10 to 30.1 MHz



Phase to Ground

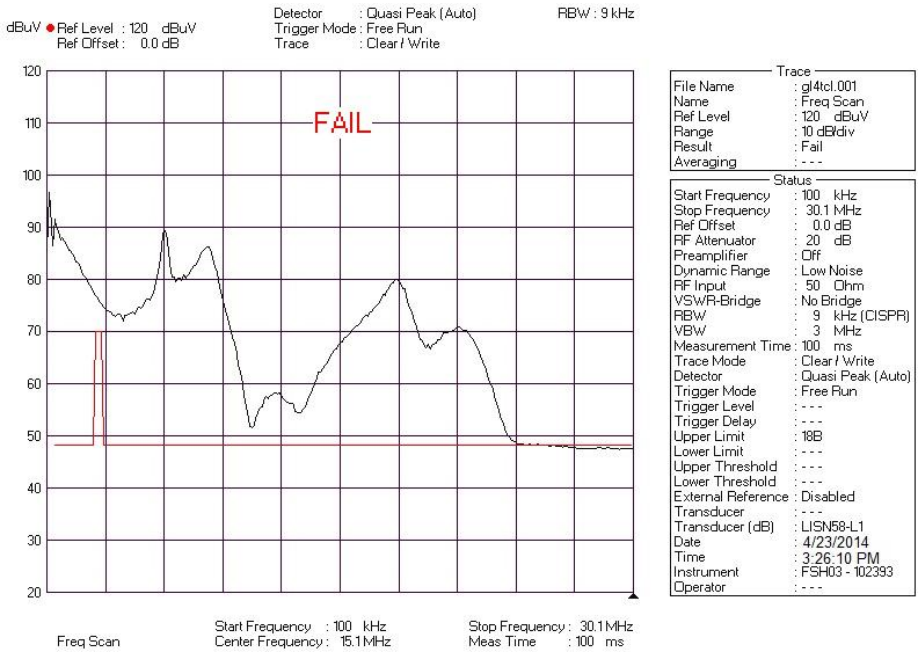


Neutral to Ground

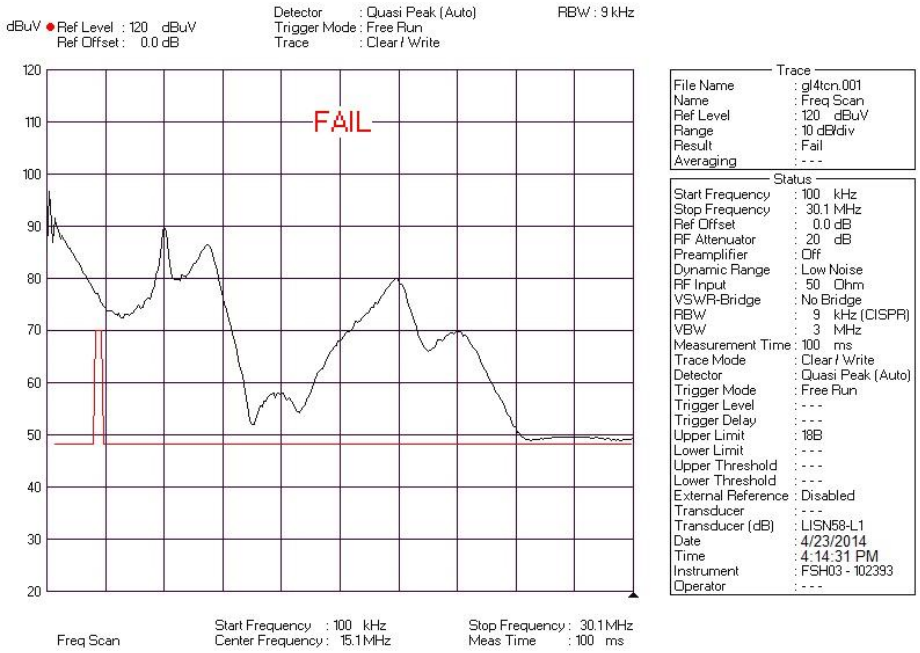
Galaxy Legacy 1000W Dimmable Ballast

Turbo Charged Setting

0.10 to 30.1 MHz



Phase to Ground



Neutral to Ground