INSTRUCTION MANUAL
For

LINE IMPEDANCE STABILIZATION NETWORK

Model LI-215A
9 kHz to 30 MHz

Table of Contents

1.0 Introduction

This manual includes product specifications, safety precautions, product maintenance and warranty information. It also includes some basic guidance on properly configuring calibration , test setup, running test level calibrations and performing conducted emissions testing.

2.0 Product Description

Overview

The LI-215A Line Impedance Stabilization Network was specifically designed for providing standardized line impedance during Electromagnetic Compatibility (EMC) testing in accordance with FCC, CISPR and CE requirements.

In addition, it minimizes the noise generated by equipment other than the EUT to be included in the measurement.

Standard items included:

Equipment, accessories, and documents supplied with the model LI-215A LISN are as follows:

- User's guide.
- AC Power cord.
- Calibration data and Certificate traceable to NIST.

Optional items

- ISO-17025 calibration data and certificate.
- External transient limiter model LIT-930

3. 0 Product Specifications

Model:	**LI-215A**
Electrical	
Frequency Range:	9 kHz to 30 MHz
Compliant Standards:	CISPR 16-1-2 Edition 1.2: 2006-08, ANSI C63.4: 2003 & 2009
Number of lines:	Two lines
Max current rating:	15 Amp AC, 10 Amp DC
Max Voltage Rating:	270 VAC, 50/60 Hz (Line to Ground)/ 380 VDC
Inductor type:	250 µH and 50 µH
Internal line termination:	Yes, 50 Ω
EUT Power Connector:	NEMA 5-15R receptacle
Power input connector:	IEC 60320 Inlet
RF measurement connector:	50Ω, N type (female)
Operating Temperature:	5° C to 40° C / 40° F to 104° F
Mechanical	
Dimensions (L x W x H):	17.5 x 13 x 7.5 inches/ 44 x 33 x 19 cm
Weight:	28 lb. / 12.5 kg

This equipment is designed for indoor use only.

3.1 Other equipment available from Com-Power

- SPA-3000 Spectrum Analyzer
- PS-400 Near Field Probe kit
- PS-500 Near Field Probe kit
- LIN-115A, LISN 150 kHz – 30 MHz, 15 A
- LI-125A, LISN 150 kHz – 30 MHz, 25 A
- LI-150A, LISN 150 kHz – 30 MHz, 50 A
- Special order LISNs with higher voltage and / or current
- LIT-930 Transient Limiter
- LIT-153 Transient Limiter

4. 0 Important Safety Precautions

The LISN must be securely fastened to the earth ground before making any connections to external power**.** Proper grounding of the LISN not only ensures correct conducted emissions measurements and also prevents potential high leakage current from presenting a hazard test personnel. To help establish proper grounding the bottom surface of the LISN is unpainted. In addition, the bottom plate has holes for securely bolting the LISN to the ground plane.

Only connect EUTs with power plug with a protective earth contact should be inserted into LISN power input port. The protective action must not be negated by the use of a cheater plug or an extension cord without a protective conductor.

Maintenance

There are no user serviceable parts inside the unit. User modifications to the LISNs will void warranty and may also invalidate the calibration. Send the LISN to authorized Com-Power service center if needs repair. Please visit our website at www.com-power.com to request a return merchandise authorization number (RMA) before you send the unit in for service.

Environmental conditions

This equipment is designed for indoor use to be safe under the following environmental Conditions:

- Temperature: 5° C to 40° C
- Maximum relative humidity: 80%

5.0 Warranty

Com-Power warrants to its Customers that the products it manufactures will be free from defects in materials and workmanship for a ***period of 3 years***. This warranty shall not apply to:

- Transport damages during shipment from your plant.
- Damages due to poor packaging.
- Products operated outside their specifications.
- Products Improperly maintained or modified.
- Consumable items such as fuses, power cords, cables, etc.
- Normal wear
- Calibration
- Products shipped outside the United States without the prior knowlege of Com-Power.

In addition, Com-Power shall not be obliged to provide service under this warranty to repair damage resulting from attempts to install, repair, service or modify the instrument by personnel other than Com-Power service representatives.

Under no circumstances does Com-Power recognize or assume liability for any loss, damage or expense arising, either directly or indirectly, from the use or handling of this product, or any inability to use this product seperately or in combination with any other equipment.

When requesting warranty services, it is recommended that the original packaging material be used for shipping. Damage due to improper packaging will void warranty.

In the case of repair or complaint, a label should be attached to the housing of the instrument which describes briefly the faults observed. Please include the name, telephone number and email address of the contact person. Please visit our website www.com-power.com and obtain an RMA number by selecting service and completing the online form.

5.1 Maintenance

This product contain no user serviceable parts inside. If the unit does not operate or needs calibration, please contact Com-Power Corporation. Do not instrument cover. Any modifications or repairs performed on the unit by someone other than an authorized factory trained technician will void warranty.

The exterior surface may be cleaned with mild detergent and then be wiped with a dry, clean, lint-free cloth. Use care to avoid liquids or other foreign objects entering the chassis.

6.0 Front and rear panel marking

6.1 Power input port

The Model LI-215A has a standard IEC inlet located on the back panel for connection to external DC or AC power source. It can handle 270 VAC or 380 VDC input. See specification table on page 3 of this manual.

6.2 EUT power port

The LI-215A uses a NEMA 5-15R (standard US wall socket) socket to power the equipment under test.

6.3 EMI measurement Port

The 50 Ω Type 'N' connector located to the right of the EUT Power Port is for connecting the Spectrum analyzer or EMI receiver for making conducted noise measurements.

6.4 Test lead selection switch (Line / LI or Neutral / L2)

This switch allows measurement of noise from each line. The line that is not being measured is automatically terminated internally by a 50 Ω terminator. However, the power to EUT is uninterrupted.

6.5 Grounding bolt (GND)

The bolt marked 'GND' on back panel of the LISN is used for extra grounding with a braid or short wire. This is in addition to mounting the LISN on the RF ground plane using conductive bottom surface.

7.0 LISN Theory

7.1 Overview

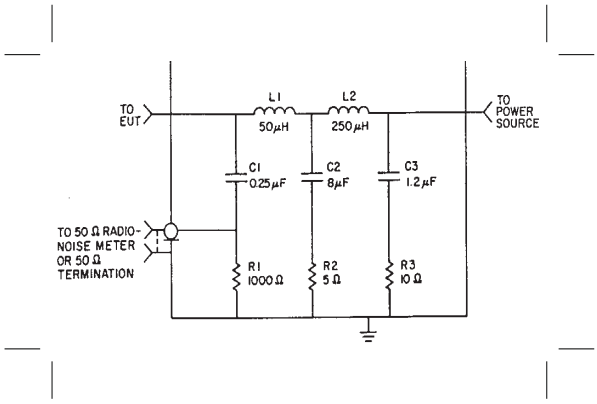
Line Impedance Stabilization Networks used supply standardized line impedance to the EUT during conducted emissions testing which is independent of the external power line impedance. The standardized impedance enables consistent readings for RF noise measurements on the power line. The model LI-215A consists of two separate LISN networks housed in a single enclosure for testing EUTs with single phase power requirements down to 9 kHz.

In addition to providing standardized impedance, the LISN also acts as a low pass filter for the power to equipment under test. The LISN blocks RF noise from the power line from reaching the equipment under test, however, the power to the equipment passes through the LISN with minimal effect. This filter comprises of two stage low pass LC filters. Therefore, there are two capacitors and two inductors for the filters. The two inductors used in the LI-215A are air core type to eliminate the possibility of saturation and to provide stability.

The LISN also provides a low impedance path for the RF noise from the EUT to the measuring equipment, thereby facilitating the measurement of the RF noise. The insertion loss of the measured noise may be significant at low frequency. Therefore, at frequencies below 400 kHz, the insertion loss correction factor must be compensated for highest accuracy noise measurement.

The schematic of the LISN as well as line impedance is specified in the ANSI C63.4 as CISPR-16-1-2 standards. A typical circuit diagram of an LISN is given in Figure 1 below.

Figure 1 – Example of an equivalent LISN circuit



8.0 Typical Performance Data

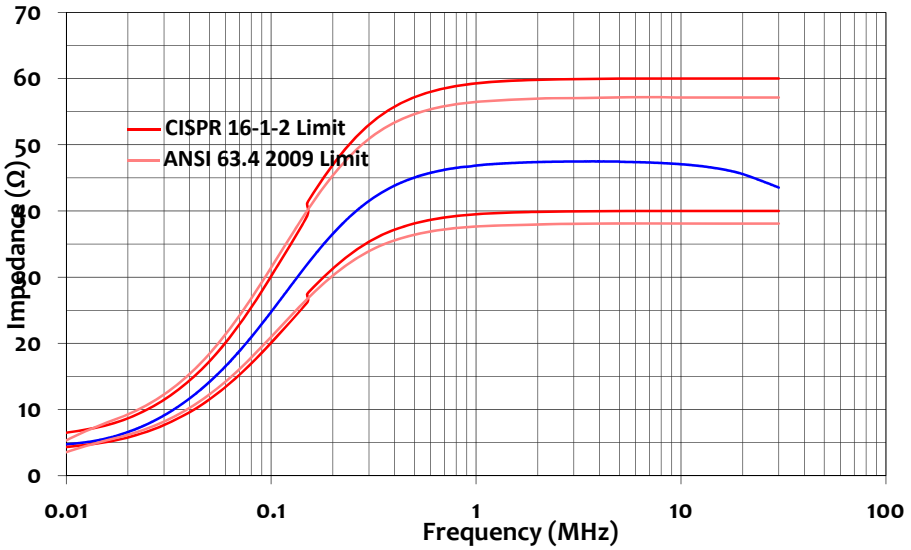


Figure 2 - Impedance compared to CISPR 16-1-2 and ANSI 63.4 requirements.

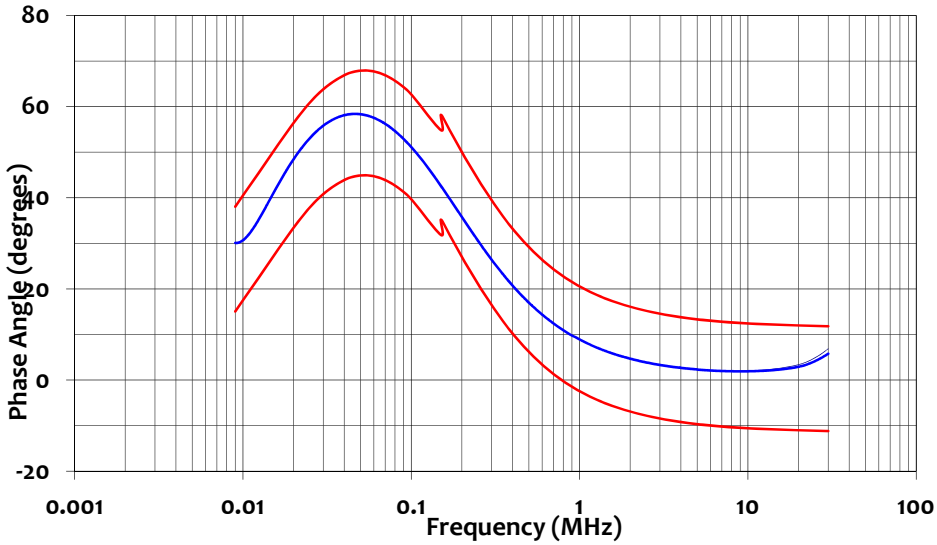


Figure 3 - Phase compared to CISPR 16-1-2 requirements.