

Description Report



CERTIFICATE: NA201810930
PROJECT: 383555-1.1

Issued to: Linea Research Ltd.
Customer Number: 253375

Issued By: Nemko Canada, Inc., 303 River Road, Ottawa, Ontario, K1V 1H2, Canada
Date: September 30, 2019
Report Prepared by: John Mason
Report Approved by: Stuart Beck

PRODUCTS

AUDIO, VIDEO, and SIMILAR ELECTRONIC EQUIPMENT - Safety Requirements - Certified to US and Canada Standards

Product: Amplifier

Model: 44M20; 44C20; 44M10; 44C10; 44M06; 44C06; 48M10; 44M03; 48M06; 48M03; 88C10; 88C06; 88C03; 48M20; 48C20; 88C20

Ratings: 20kW Max, 100-230V~50-60Hz, Class I

APPLICABLE REQUIREMENTS

UL Std. No. 60065 8th Edition - Standard for Audio, Video and Similar Electronic Apparatus – Safety Requirements

CAN/CSA-C22.2 No. 60065.16 - Audio, Video and Similar Electronic Apparatus – Safety Requirements

COMPLIANCE DECLARATION

An engineering evaluation of the application submitted determined that the products documented within this report are compliant with the applicable requirements for certification. Complete details of updates, tests results, construction and design of the equipment as well as supporting documents are on file with the certification body.

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1. **FACTORIES**

Factory Name	Factory Number	Location
Linea Research Ltd.	253375	1 & 2 Aylesford Court, Works Road, Letchworth Garden City, Herts, SG6 1LP United Kingdom

2. **MULTIPLE LISTEE**

Multiple Listee	Model	Status (Active / Withdrawn)	Certificate Number
N/A			

3. **PROJECT HISTORY**

Project No.	Modification
351526-1.1	- Main Report
383555-1.1	- Addition of models 48M20, 48C20, 88C20 - Change of address for applicant, manufacturer and factory from 1 Marquis Business Centre, Royston Road Baldock, Herts, SG7 6XL United Kingdom to 1 & 2 Aylesford Court, Works Road, Letchworth Garden City, Herts, SG6 1LP United Kingdom - Correction of F2 & F3 data - Addition of alternative fuses for F1, F2 & F3

4. **MARKINGS**

A. Minimum Markings:


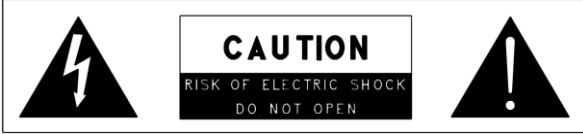



1. Marking Method: (For Minimum Markings)

- The mark shall only be applied to the products as detailed above.
- The mark shall only be affixed at the factory locations listed above.
- Recognized Adhesive Nameplate
 - Nameplate shall be suitable for the surface to which it is applied.
 - All information is printed by the nameplate manufacturer. Any markings which are added (e.g. amp rating, serial number, etc.) at the product manufacturer facility are done legibly in a permanent manner (e.g. using permanent ink/typing ribbon meeting the requirements of ANSI/UL 969 or CAN/CSA No. 0.15).
- Silkscreened

2. Required Information: (For Minimum Markings)

- Complete electrical rating:
 - Voltage (V): Rated voltage(s) or rated voltage range(s), in Volts.
 - Frequency (Hertz): Rated frequency or rated frequency range in hertz.
 - Power (W): Rated power, in watts or current (mA or A): Rated current, in amperes or milliamperes
- The applicants name and/or Nemko customer number (253375)
- Model or identifying designation;
- Date of manufacture, serial number or date code traceable to month and year of manufacture;
- The Nemko North America mark with "C" and/or "US" qualifiers.
 - For Use in the U.S.: "NRTL" indicator is optional.
 - For Use in Canada: The words "Electrical Safety" and/or the applicable product "Standard".
- Reference to the applicable product "Standard".

B. Additional Markings and Documentation (Due mainly to safety issues):

Mark	Symbol	Reference	Title
X		IEC 60417-5032	Alternating current
X	 and "ATTENTION - RISQUE DE CHOC ÉLECTRIQUE NE PAS OUVRIR".	Figure 15 DU	Shock hazard marking and associated graphical symbols
X		IEC 60417-5019	Protective earth (ground)
X		IEC 60417-5036	Dangerous voltage
X		ISO 7000-0434	Caution

1. Accessible Terminals: Cl. 5.1.I
 Indicate with an "X"

(X) Speaker TERMINALS: Speaker TERMINALS, other than PORTABLE APPARATUS, that is not provided with speakers and associated wiring shall be provided with a marking adjacent to the TERMINALS as identified below:

(X) "Class 2 Wiring" for all other TERMINALS provided the audio output power exceeds 1W per channel under normal operating conditions or the apparatus is intended to be installed or interconnected in the field by a SKILLED PERSON.

2. Class I Grounding: Cl. 5.5.2.d

The following text, "THIS PRODUCT MUST BE EARTHED and CET APPAREIL NÉCESSITE UN RACCORDEMENT ÉLECTRIQUE À LA TERRE" must be on the equipment to inform user the equipment must have connection to earth ground

5. FACTORY TESTS

Factory Tests Required: Yes No

As per Annex N

The following tests are conducted on 100% of production.

Applicable Factory Test (Indicated by X)	Type of Factory Test
X	<p><u>Dielectric Voltage-Withstand Test:</u></p> <p>The insulation of the apparatus should be checked by the following tests. In general, these tests are considered to be sufficient. A 1500Vac or 2121Vdc (for equipment rated greater than 150Vac) test voltage of substantially sine-wave form, having MAINS frequency, or a combination of both with a peak value specified in table N.1, is applied between the MAINS supply TERMINALS connected in parallel and:</p> <ul style="list-style-type: none"> – TERMINALS regarded as ACCESSIBLE (see 8.4), and – ACCESSIBLE conductive parts respectively, which may become HAZARDOUS LIVE in the event of an insulation fault as a result of incorrect assembly. <p style="text-align: center;">NOTE 1: TERMINALS regarded as ACCESSIBLE and ACCESSIBLE conductive parts may be connected together during the dielectric strength test.</p> <p>NOTE 2: For complete details of test procedures, please refer to Annex N of this standard</p>
X	<p><u>Earthing-Continuity Test:</u></p> <p>Protective earthing connection of screens and metal barriers For CLASS I apparatus with a screen or metal barrier (see 8.5) between HAZARDOUS LIVE parts and TERMINALS regarded as ACCESSIBLE (see 8.4) or ACCESSIBLE conductive parts respectively, the continuity of the protective earthing connection should be checked as late as possible during the production process between the screen or metal barrier and</p> <p style="text-align: center;">or</p> <ul style="list-style-type: none"> – the protective earthing contact of the MAINS plug or appliance inlet, – the PROTECTIVE EARTHING TERMINAL in case of a PERMANENTLY CONNECTED APPARATUS. <p>The test current applied for 1s to 4s should be in the order of no less than 10A, derived from a source having a no-load voltage not exceeding 12 V. The measured resistance should not exceed</p> <ul style="list-style-type: none"> – 0,1 Ω for apparatus with a detachable power supply cord, – 0,2 Ω for apparatus with a non-detachable power supply cord. <p>NOTE Care should be taken that the contact resistance between the tip of the measuring probe and the metal parts under test does not influence the test results.</p>

6. PRINTED MATERIAL

Documents Revision	Description of Documents
Version 7	User's Guide

7. DESCRIPTION

Model: 44M20; 44C20; 44M10; 44C10; 44M06; 44C06; 48M10; 44M03; 48M06; 48M03; 88C10; 88C06; 88C03; 48M20; 48C20; 88C20

Ratings: 20kW Max, 100-230V~50-60Hz, Class I

General: The Linea Research 44M series, 48M series, 44C series and 88C series models are high-power amplifiers for professional use. The model 44M20 has an audio output rating of 5kW per channel in to a 2Ω load in normal mode or 10kW for a pair of channels in to a 4Ω load when in bridge mode. The only differences between the models are external presentation not affecting safety.

Models 48M20, 48C20 & 88C20 have been added to the existing range. These new models are electrically and physically identical to models already tested and have been created to fill a gap in the market by altering the system firmware, not affecting the safety of the products.

- 1) Classification of Installation and Use: Professional
- 2) Supply Connection: Detachable power cord (not supplied) via Neutrik connector.
- 3) Class of Equipment: Class I
- 4) Overall Size of Equipment (W x H x D): 483mm x 93mm x 357mm
- 5) Mass of Equipment: 12.5kg
- 6) Conditions of Acceptability:
 - a) The main supply cord set provided with the equipment must be an approved type acceptable to the authorities in the US and Canada where the equipment is sold.

Appendix A - LIST OF CRITICAL COMPONENTS

Object / Part No.	Manufacturer / Trademark	Type / Model	Technical Data	Standard (Edition / Year)	Mark(s) of Conformity ¹⁾
(INT) Mains inlet	Neutrik	NAC3MP-HC	250Vac 32A	IEC/EN61984 UL1977	 40022413  E135070
(INT) Mains connector	Neutrik	NAC3FC-HC	250Vac 32A	IEC/EN61984 UL1977	 40022413  E135070
(INT) Mains switch	Arcoelectric	8550	10(6)A 250Vac	IEC/EN61058 UL61058-1	 15  E45221
(INT) Relay RLY1 – RLY5	Schrack	RT314012	16A 250Vac	IEC/EN60947 UL508	 40007571  E214025
(INT) X caps, C7, C8, C9, C11, C12	Kemet/Arcotronics	R46 X2 class	150nF and 3x 1uF 275Vac	IEC/EN60384-14 UL1414	 03  E97797
(INT) Y2 caps, C1, C2, C3, C4, C5, C6, C10, C24, C34	Kemet/Arcotronics	R41 series	1nF to 10nF 275Vac	IEC/EN60384-14 UL1414	 03  US E85238
(INT) Y2 caps, C1, C2, C3, C4, C5, C6, C10, C24, C34 (alt)	Kemet/Arcotronics	F881 series	1nF to 10nF 300Vac	IEC/EN60384-14 UL1414	 16  E97797
(INT) Y2 caps, C1, C2, C3, C4, C5, C6, C10, C24, C34 (alt)	Vishay	MKP3386 series	1nF to 10nF 300Vac	IEC/EN60384-14 UL60384-14	 6  US E354331
Bleed resistors R7 - -10	-	-	75kΩ	IEC/EN60065	Tested in appliance
(INT) Fuse F1	Littelfuse	215 series	T8AH 250V	IEC/EN60127 UL248-14	 40013521  E10480
Fuse F1 (Alt)	Cooper/Bussmann	S505-8	T8AH 250V	IEC/EN60127 UL248-14	 40014091  E19180
Fuse F1 (Alt)	Interchangeable	Interchangeable	T8AH 250V	IEC/EN60127 UL248-14	Marks of conformity
(INT) Fuse F2, F3	Littelfuse	215 series	T8AH 250V	IEC/EN60127 UL248-14	 40013521  E10480
Fuse F2, F3 (Alt)	Interchangeable	Interchangeable	T20A 250V	UL248-14	Marks of conformity
(INT) Opto Isolator Opt 1, Opt 2	Broadcom/ Avago	HCNW137	5000V	IEC/EN60747-5-5 UL1577	 40009376  E55361
(INT) Opto Isolator Opt 3, Opt 4, Opt 5	Isocom	ISP627	5,300V	IEC/EN60747-5-5 UL1577	 40028086  E91231
(INT) Opto Isolator Opt 6	Isocom	TLP621	5,300V	IEC/EN60747-5-5 UL1577	 40028086  E91231

Object / Part No.	Manufacturer / Trademark	Type / Model	Technical Data	Standard (Edition / Year)	Mark(s) of Conformity ¹⁾
(CT) TX2	Art Electric	KB1030	Isolation transformer	IEC/EN60065 UL60065	Tested in appliance
(CT) TX3	Art Electric	KB1031	Isolation transformer	IEC/EN60065 UL60065	Tested in appliance
L1	Art Electric	KA1028	Differential choke T157-52 18µH	IEC/EN60065 UL60065	Tested in appliance
L2, L3	Art Electric	KA1027	Common mode choke TX36/23/15- 3E6. 2 x 1.96 mH	IEC/EN60065 UL60065	Tested in appliance

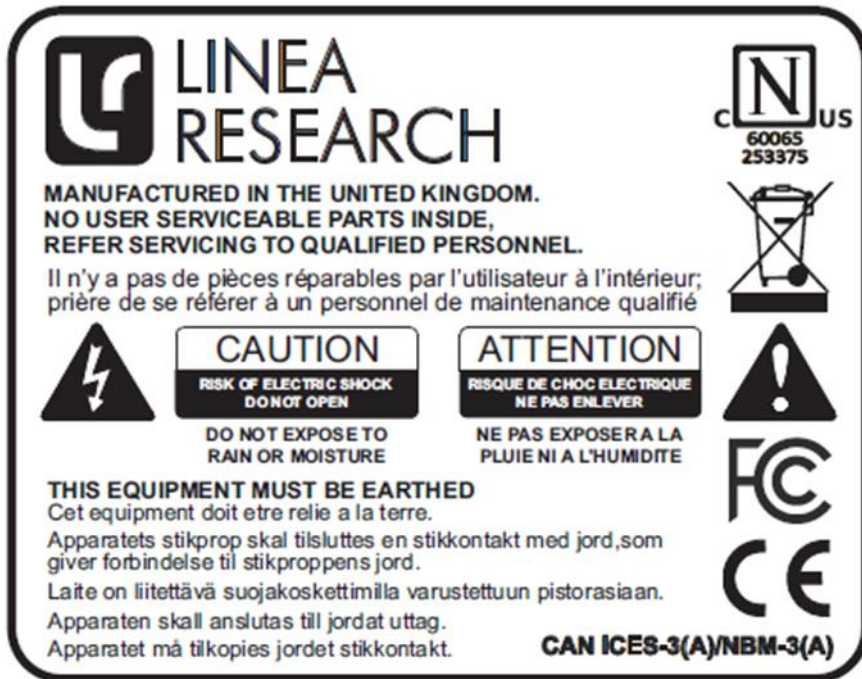
Supplementary information:

Notes:

- 1) Component descriptions marked with “(INT)” identifier may be substituted with other components providing all of the following conditions are met:
 - Original "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application;
 - Applicable country identifiers are included;
 - Components substituted must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.

- 2) The term “(CT)”, following the component name, denotes a “Non-Certified” component that is subject to periodic re-testing.

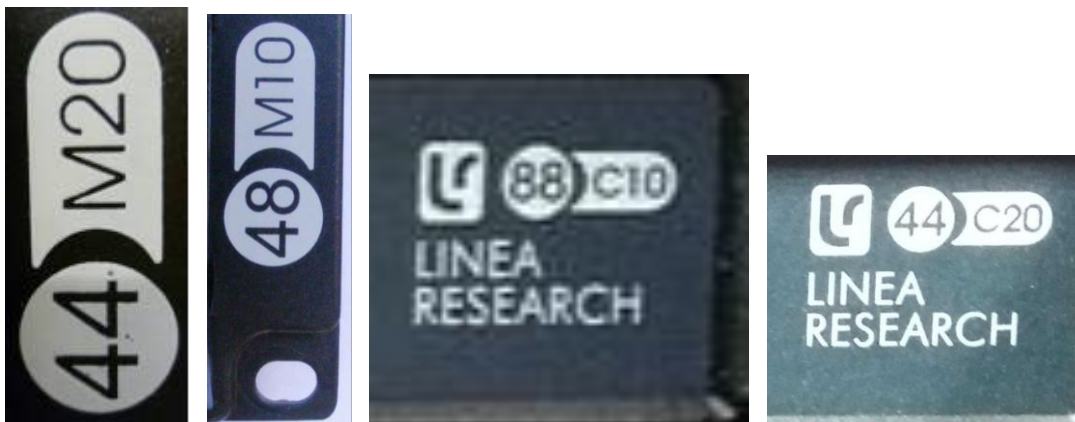
Appendix B - MARKINGS & LABELS



Logo (left side front M series)



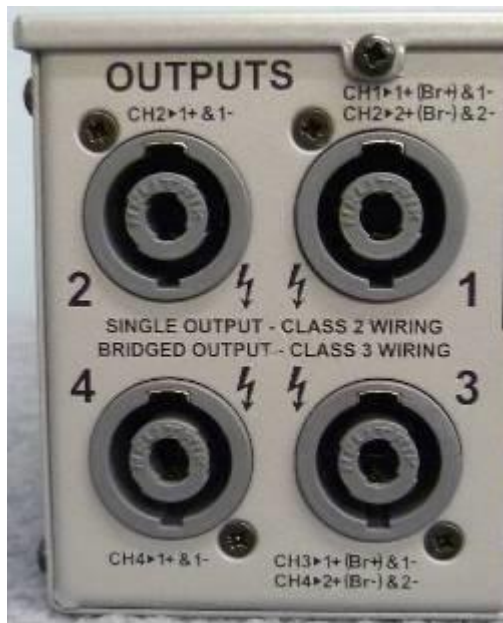
Logos/Models (44M series, 48M Series, 44C Series, 88C Series)



Mains inlet markings M and C series



Speaker output markings model dependent



Appendix C - PHOTOGRAPHS

General appearance of amplifier



Front & rear views of representative **M** variant

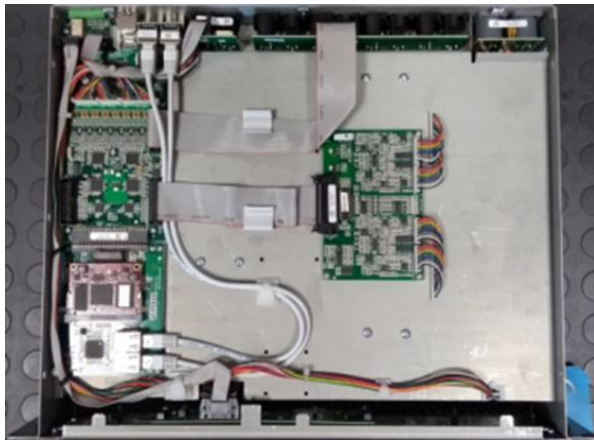


Front & rear views of representative **C** variant



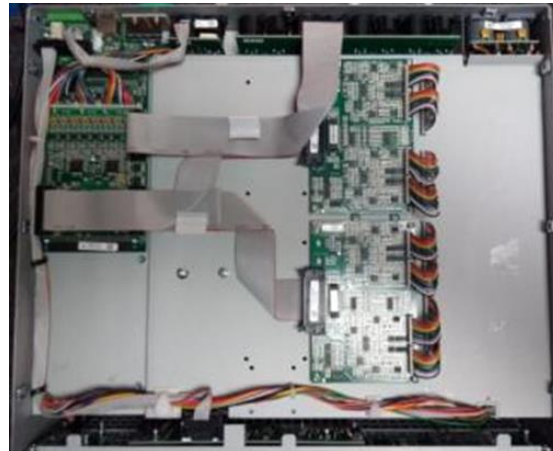
4 channel with Dante card fitted

4 channel without Dante card fitted



8 channel with Dante card fitted

8 channel without Dante card fitted



Internal view with top plate removed



Mains input filter chokes



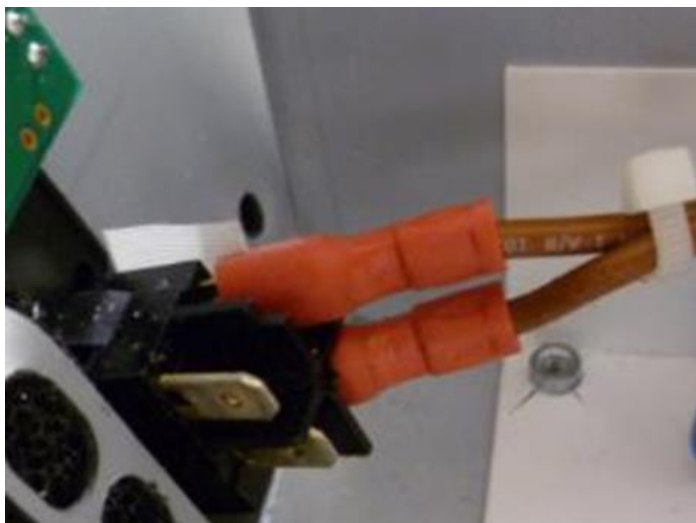
Mains inlet and earth wiring



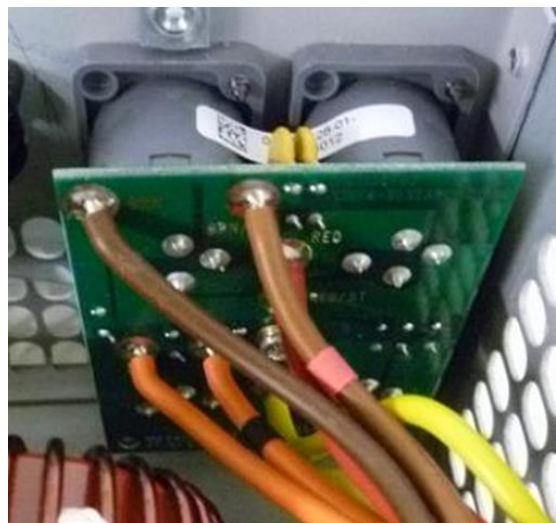
Mains inlet and earth wiring



Wiring to mains switch



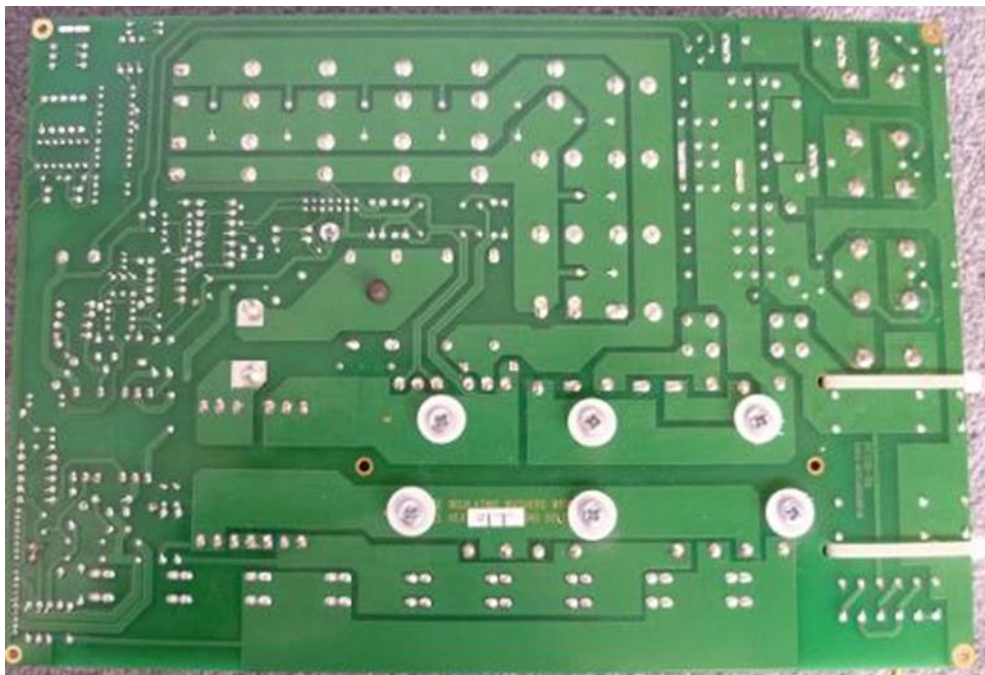
Wiring at rear of speaker connectors



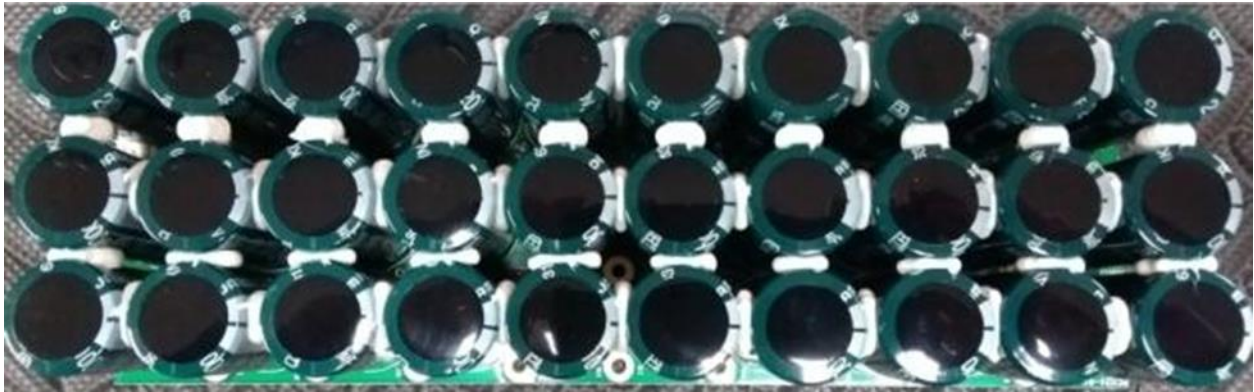
Power supply PCB component side



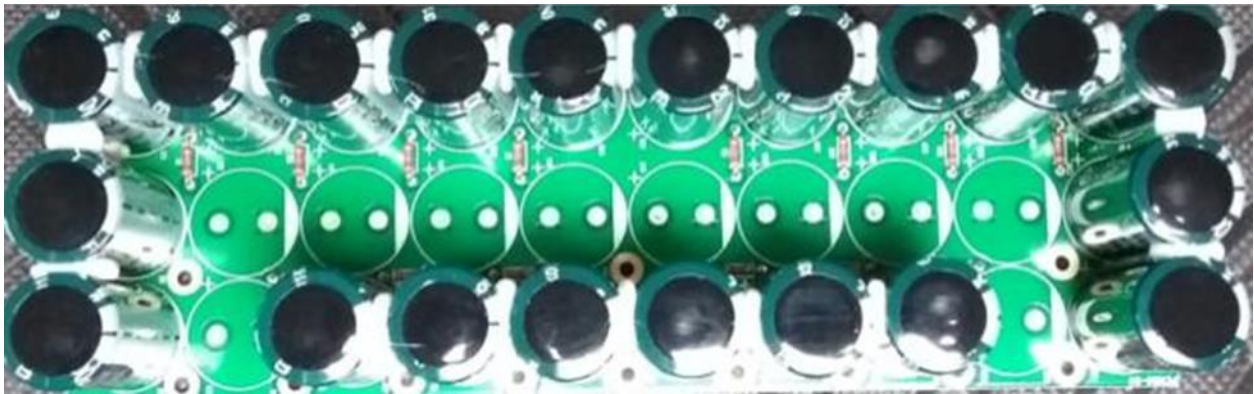
Power supply PCB print side



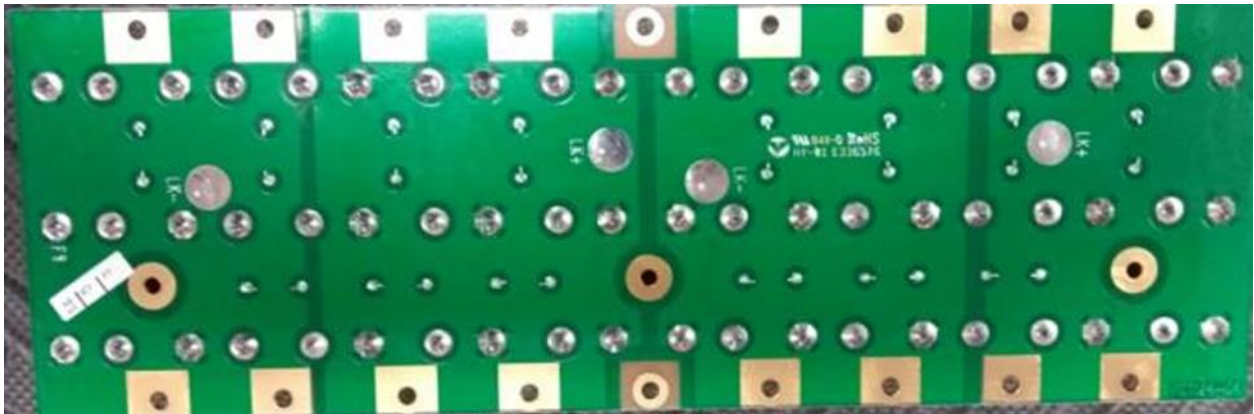
Capacitor block top side (full)



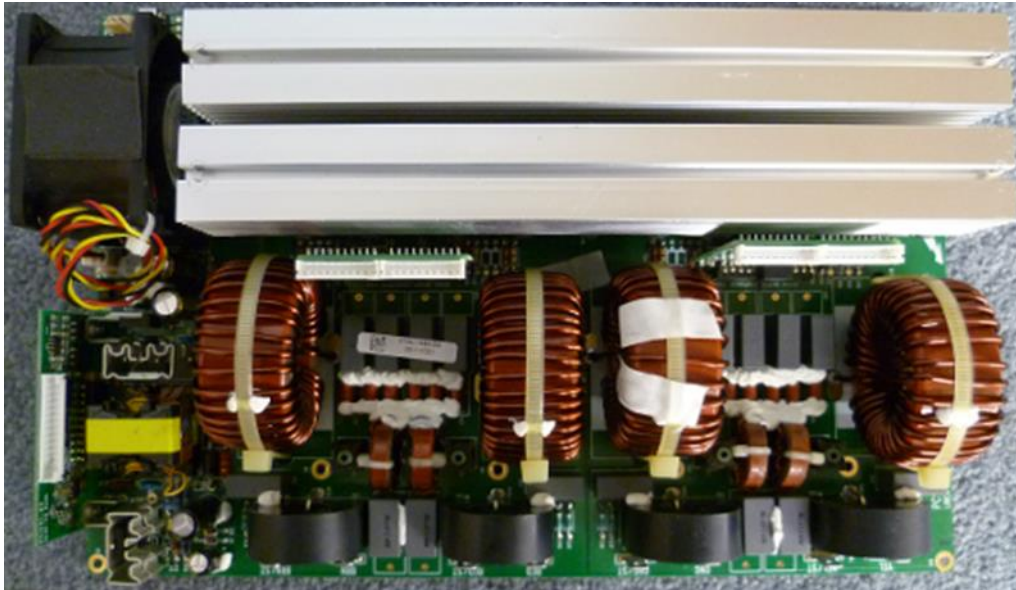
Capacitor block top side (partial)



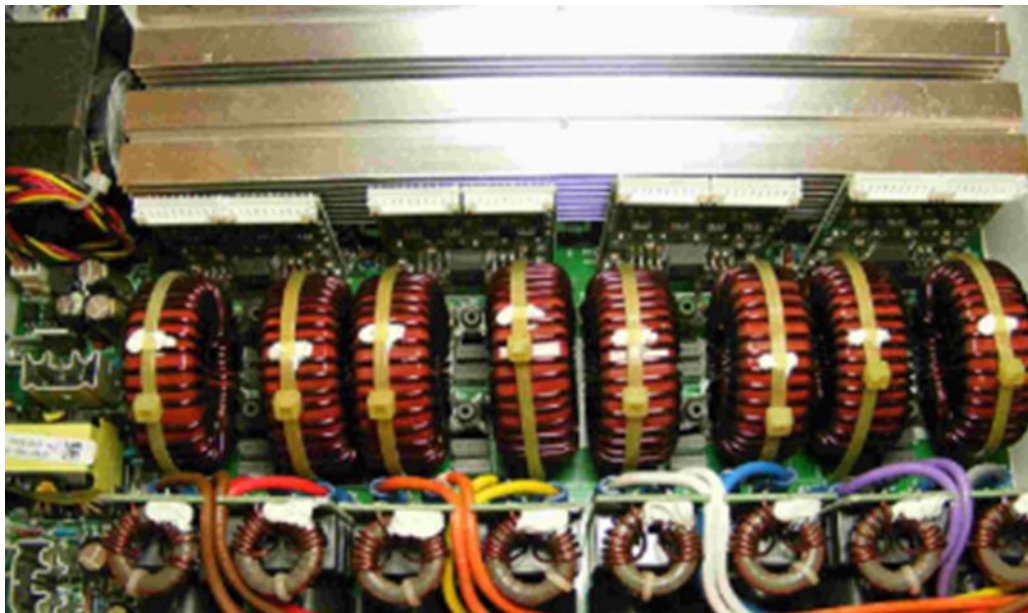
Capacitor block PCB print side



4 channel amplifier PCB

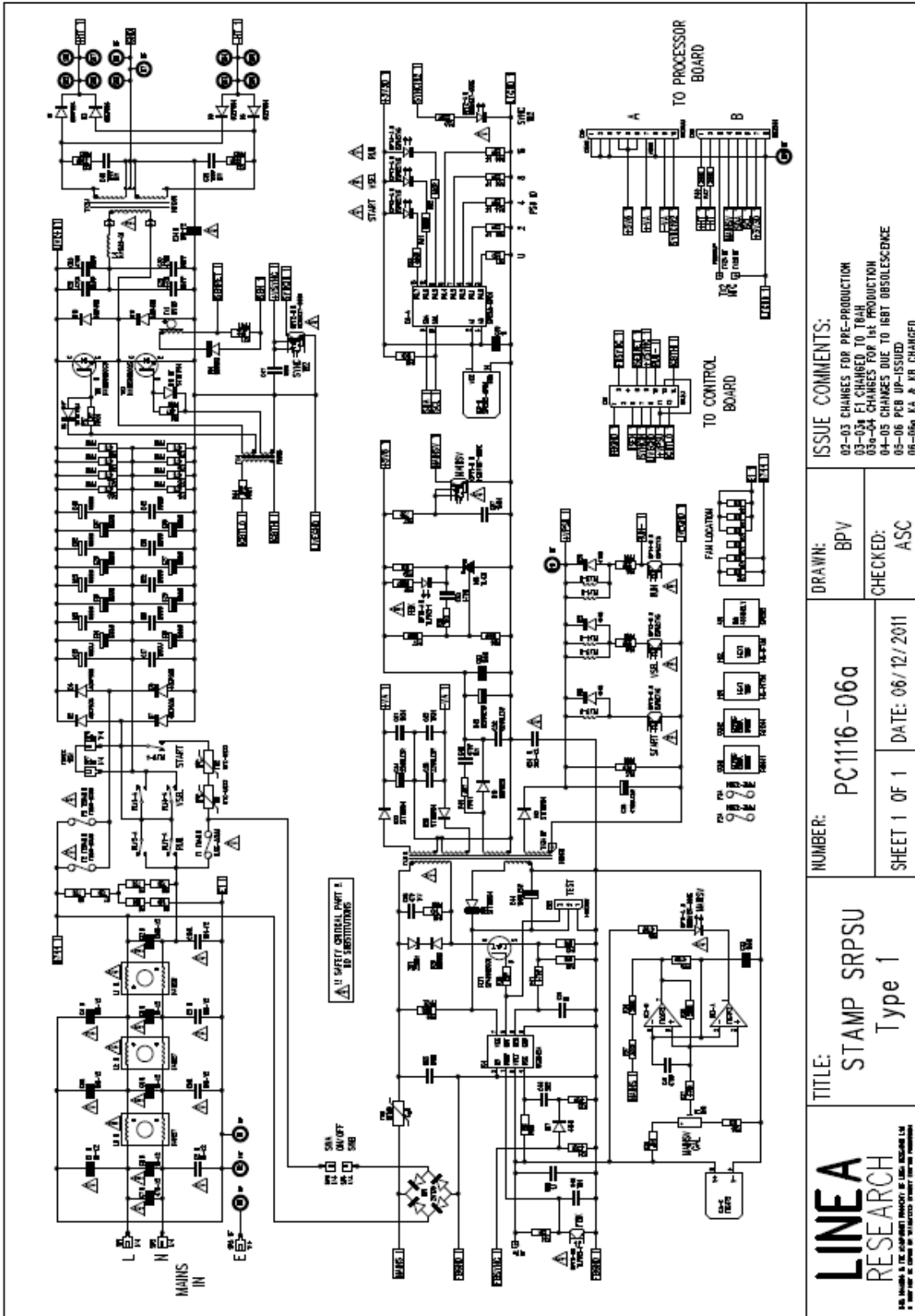


8 channel amplifier PCB



Appendix C – ILLUSTRATIONS

PSU Main PCB



LINEA RESEARCH <small>140 N. MAIN ST. & 17th AVENUE, PHOENIX, AZ 85004-1104 USA TEL: 602-998-0000 FAX: 602-998-0001</small>	TITLE: STAMP SRPSU Type 1		NUMBER: PC1116-06a	DRAWN: BPV	ISSUE COMMENTS: 02-03 CHANGES FOR PRE-PRODUCTION 03-04 E1 CHANGED TO TR4H 03-04 CHANGES FOR 1st PRODUCTION 04-05 CHANGES DUE TO 18BT OBSOLESCE 05-06 PCB UP-ISSUED 06-06a I.A. & Y.B. CHANGED
	SHEET 1 OF 1	DATE: 06/12/2011	CHECKED: ASC	FIN LOGIC	