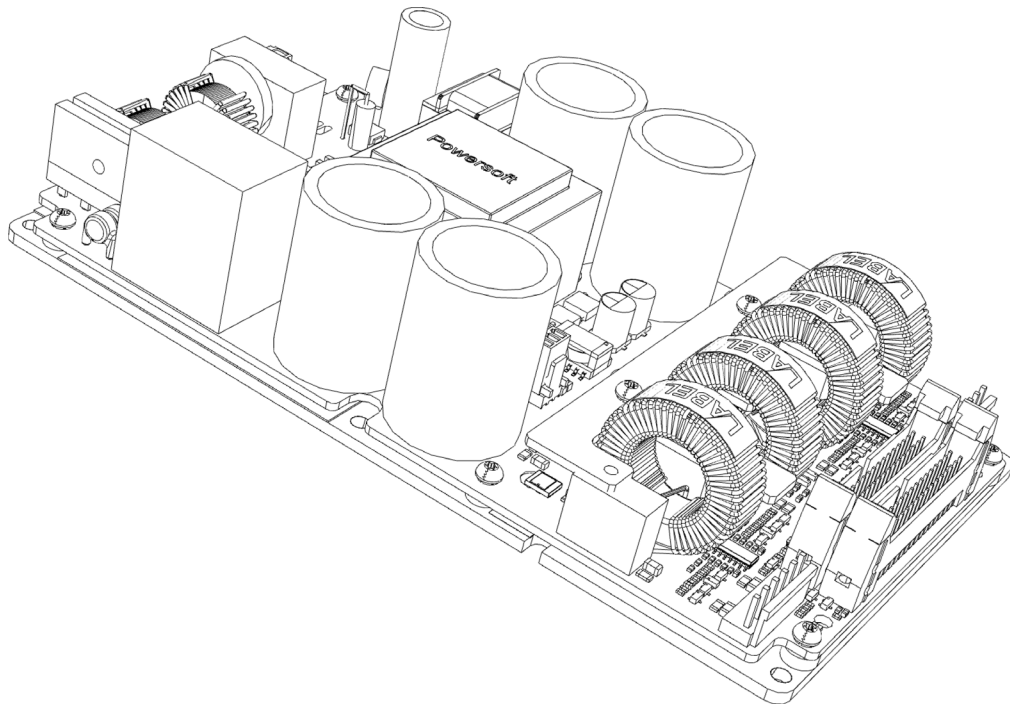




LiteMod 4HC



USER GUIDE

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Data are subject to change without notice.
For latest update please refer to the
online version available on www.powersoft-audio.com.

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Important safety instructions


This amplifier module is intended to be installed inside other devices and must be checked in the final product.


EXPLANATIONS OF GRAPHICAL SYMBOLS


-  The triangle with the lightning bolt is used to alert the user to the risk of electric shock.
-  The triangle with the exclamation point is used to alert the user to important operating or maintenance instructions.
-  The CE-mark indicates the compliance with the low voltage and electromagnetic compatibility.
-  Symbol for earth/ground connection.
-  Symbol for conformity with Directive 2002/96/EC and Directive 2003/108/EC of the European Parliament on waste electrical and electronic equipment (WEEE).
-  Symbol for electrostatic discharge sensitive devices.




1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this equipment near water.
6. Do not block any ventilation openings. Install in accordance with Powersoft's instructions.
7. Do not install near any heat sources such as radiators, heat registers, stover or other apparatus that produce heat.
8. Do not defeat the safety purpose of the polarized or grounding-type plug.
9. Only use attachments/accessories specified by Powersoft.
10. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

 TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT ATTEMPT TO OPEN ANY PART OF THE UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

 DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE, DRIPPING OR SPLASHING LIQUIDS. OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHOULD NOT BE PLACED ON THIS APPARATUS.

 SPEAKER TERMINALS COULD BE HAZARDOUS LIVE IF SPEAKER BRIDGE MODE CONNECTION IS USED.

 PROPER CONNECTIONS AND INSULATIONS TECHNIQUES MUST BE ADOPTED WHEN SPEAKER BRIDGE MODE CONNECTION IS USED.

Importantes instructions de sécurité

Ce module d'amplification est destiné à être installé à l'intérieur d'autres dispositifs et doit donc être contrôlé sur le produit fini.

EXPLICATION DES SYMBOLES GRAPHIQUES



La triangle avec le symbol du foudre est employée pour alerter l'utilisateur au risque de décharge électrique.



Le triangle avec un point d'exclamation est employée pour alerter l'utilisateur d'instruction importantes pour lors opérations de maintenance.



Le marquage CE indique la conformité à la directive de basse tension et la compatibilité électromagnétique.



Symbole pour la connexion à la terre.



Symbole pour la conformité al la Directive 2002/96/EC et la Directive 2003/108/EC du Parlement Européen sur les équipements électriques et électroniques (WEEE).



Symbole pour les appareils sensibles aux décharges électrostatiques.



AVIS

**RISQUES D'ÉLECTROCUTION
NE PAS OUVRIR**



1. Lisez ces instructions.
2. Gardez ces instructions.
3. Tenez compte de toutes les mises en garde.
4. Suivez toutes les instructions.
5. N'utilisez pas cet amplificateur à proximité de l'eau.
6. Assurez-vous d'une bonne ventilation de l'appareil. Installez en accord avec les instructions préconisées par Powersoft.
7. N'installez pas l'appareil à proximité de sources de chaleur ou d'autres appareils produisant de la chaleur.
8. Respectez le dispositif de mise à la terre de la prise secteur.
9. Utilisez uniquement les accroches et accessoires spécifiés par Powersoft.
10. Confiez toute réparation à un technicien qualifié. L'intervention d'un technicien est nécessaire dans les cas suivants : le cordon d'alimentation ou la prise secteur sont endommagés, des corps étrangers ou du liquide se sont introduits dans l'appareil, l'appareil a été exposé à la pluie ou à l'humidité, l'appareil montre des signes de dysfonctionnement ou est tombé.



MISE EN GARDE : AFIN DE RÉDUIRE LES RISQUES DE CHOC ÉLECTRIQUE, N'ESSAYEZ PAS D'OUVRIR L'UNITÉ, MEME EN PARTIE. AUCUNE PIÈCE A L'INTERIEUR NE PEUT ETRE CHANGÉE PAR L'UTILISATEUR. LAISSEZ L'ENTRETIEN A UN PERSONNEL QUALIFIÉ.



NE PAS EXPOSER CET APPAREIL A LA PLUIE OU A L'HUMIDITÉ, AUX GOUTTES OU AUX ÉCLABOUSSURES. LES OBJETS REMPLIS DE LIQUIDE, TELS QUE LES VASES, NE DOIVENT PAS ETRE PLACÉS SUR CET APPAREIL.



LES BORNES D'ENCEINTES POURRAIENT ÊTRE DANGEREUX SI LA CONNEXION DE MODE PONT DU HAUT-PARLEUR EST UTILISÉ.



ADOPTER DES TECHNIQUES CORRECTES DE CONNEXION ET D'ISOLEMENT LORSQUE LA CONNEXION EN MODE BRIDGE HAUT-PARLEUR EST UTILISÉ.

Instrucciones de seguridad importantes

Este módulo amplificador está diseñado para ser instalado dentro de otros dispositivos y debe verificarse en el producto final.

EXPLICACIÓN DE LOS SÍMBOLOS GRÁFICOS



El triángulo con el símbolo de rayo eléctrico es usado para alertar al usuario de el riesgo de un choque eléctrico.



El triángulo con el signo de admiración es usado para alertar al usuario de instrucciones importantes de operación o mantenimiento.



La marca CE indica el cumplimiento de la directiva de bajo voltaje y de compatibilidad electromagnética.



Símbolo de la conexión a tierra.



Símbolo de conformidad con la Directiva 2002/96/EC y Directiva 2003/108/EC del Parlamento Europeo sobre los aparatos eléctricos y electrónicos (WEEE).



Símbolo para los dispositivos sensibles a descargas electrostáticas.



PRECAUCIÓN

RIESGO DE CHOQUE ELÉCTRICO
NO ABRA LA UNIDAD



1. Lea estas instrucciones.
2. Guarde estas instrucciones.
3. Preste atención a todas las advertencias.
4. Siga todas las instrucciones.
5. No use este aparato cerca del agua.
6. No bloquee las aberturas de ventilación. Realice la instalación de acuerdo con las indicaciones de Powersoft.
7. No instale cerca ninguna fuente de calor como, por ejemplo, radiadores, rejillas de calefacción, hornos u otros aparatos que produzcan calor.
8. No elimine el diseño de seguridad del enchufe, ya sea del tipo polarizado o con conexión a tierra.
9. Use exclusivamente los dispositivos/accesorios indicados por Powersoft.
10. El servicio técnico debe realizarlo siempre personal cualificado. Se requerirá servicio de asistencia técnica cuando el aparato sufra algún tipo de daño como, por ejemplo, que el cable de alimentación o el enchufe estén dañados, que se haya derramado líquido o hayan caído objetos dentro del aparato, que éste se haya expuesto a la lluvia o humedad, que no funcione normalmente o que se haya caído.



PRECAUCIÓN: PARA REDUCIR EL RIESGO DE DESCARGA ELÉCTRICA, NO DESMONTE LA TAPA (NI EL PANEL TRASERO). NO HAY PIEZAS REPARABLES POR EL USUARIO EN EL INTERIOR. LLÉVELO A REPARAR A PERSONAL DE SERVICIO CUALIFICADO.



NO EXPONGA ESTE UNIDAD A LA LLUVIA O LA HUMEDAD, GOTEO O SALPICADURAS. NO COLOQUE OBJETOS LLENOS DE LÍQUIDOS, TALES COMO VASIJAS, SOBRE EL APARATO.



TERMINALES DE LOS ALTAVOCES PODRÍA SER PELIGROSO, SI SU CONEXIÓN SE UTILIZA EL ALTAVOZ MODO PUENTE.



ADOPTAR TÉCNICAS CORRECTAS DE CONEXIÓN Y AISLAMIENTO CUANDO SE USA CONEXIÓN DE ALTAVOZ MODO PUENTE.

Importanti istruzioni di sicurezza


Questo modulo amplificatore è destinato ad essere installato dentro altri dispositivi e deve quindi essere controllato nel prodotto finito.


SPIEGAZIONE DEI SIMBOLI GRAFICI


-  Il triangolo con il lampo è utilizzato per avvisare l'utente del rischio di scossa elettrica.
-  Il triangolo con il punto esclamativo è utilizzato per avvisare l'utente di importanti istruzioni d'uso e manutenzione.
-  Il marchio CE indica la conformità del prodotto a tutte le direttive europee applicabili
-  Simbolo della connessione di terra.
-  Simbolo di conformità alla Direttiva 2002/96/CE e alla Direttiva 2003/108/CE del Parlamento Europeo sulle apparecchiature elettriche ed elettroniche (RAEE).
-  Simbolo per le apparecchiature sensibili alle scariche elettrostatiche




1. Leggere queste istruzioni.
2. Conservare le istruzioni.
3. Tenere conto di tutti gli avvisi.
4. Seguire tutte le istruzioni.
5. Non usare l'apparecchio in prossimità di acqua.
6. Non ostruire le prese di ventilazione. Installare secondo le indicazioni del produttore.
7. Non installare vicino a fonti di calore quali radiatori, bocchette dell'aria calda, stufe o altri apparecchi (compresi gli amplificatori) che producono calore.
8. Non compromettere la sicurezza delle spine polarizzate o con messa a terra.
9. Usare solo accessori specificati dal produttore.
10. Ricorrere a personale qualificato per qualsiasi intervento. Tali interventi sono necessari in caso di guasti dell'apparecchio quali danneggiamento del cavo di alimentazione o della spina, versamento di liquidi o caduta di oggetti nell'apparecchio, esposizione a pioggia o umidità o se l'apparecchio non funziona normalmente o è caduto.

 **ATTENZIONE: PER RIDURRE IL RISCHIO DI SCOSSE ELETTRICHE, NON TENTARE DI APRIRE ALCUNA PARTE DELL'UNITÀ. NON CI SONO PARTI INTERNE AD USO DELL'UTENTE. RIVOLGERSI A PERSONALE QUALIFICATO PER L'ASSISTENZA.**

 **NON ESPORRE QUESTO APPARECCHIO ALLA PIOGGIA, UMIDITÀ O SOSTANZE LIQUIDE. OGGETTI PIENI DI LIQUIDI, COME VASI, NON DEVONO ESSERE COLLOCATI SU QUESTO APPARATO.**

 **I TERMINALI DEI DIFFUSORI POTREBBERO ESSERE PERICOLOSI, SE VIENE UTILIZZATA LA CONNESSIONE IN MODALITÀ BRIDGE DEGLI ALTOPARLANTI.**

 **ADOTTARE LE CORRETTE TECNICHE DI CONNESSIONE E ISOLAMENTO QUANDO VIENE UTILIZZATA LA CONNESSIONE IN MODALITÀ BRIDGE DEGLI ALTOPARLANTI.**

Regulatory information

FCC COMPLIANCE NOTICE

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ▶ Reorient or relocate the receiving antenna.
- ▶ Increase the separation between the equipment and receiver.
- ▶ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ▶ Consult the dealer or an experienced radio/TV technician for help.

WEEE DIRECTIVE

If the time arises to throw away your product, please recycle all the possible components.



This symbol indicates that when the end-user wishes to discard this product, it must be sent to separate collection facilities for recovery and recycling. By separating this product from other household-type waste, the volume of waste sent to incinerators or land-fills will be reduced and natural resources will thus be conserved.

The Waste Electrical and Electronic Equipment Directive (WEEE Directive) aims to minimise the impact of electrical and electronic goods on the environment. Powersoft S.p.A. comply with the Directive 2002/96/EC and 2003/108/EC of the European Parliament on waste electrical finance the cost of treatment and recovery of electronic equipment (WEEE) in order to reduce the amount of WEEE that is being disposed of in land-fill site. All of our products are marked with the WEEE symbol; this indicates that this product must NOT be disposed of with other waste. Instead it is the user's responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved reprocessor, or by returning it to Powersoft S.p.A. for reprocessing. For more information about where you can send your waste equipment for recycling, please contact Powersoft S.p.A. or one of your local distributors.

EC DECLARATION OF CONFORMITY

Manufacturer:
Powersoft S.p.A.
via E. Conti 5
50018 Scandicci (Fi)
Italy



We declare that under our sole responsibility the products:

Model Name: LiteMod 4HC

Intended use: Professional Audio Amplifier Module

Are in conformity with the provisions of the following EC Directives, including all amendments, and with national legislation implementing these directives:

2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility Directive
2011/65/EU	RoHs Directive

The following harmonized standards are applied:

EN 55103-2: 2009 /IS: 2012
EN 55032: 2012
EN 55035: 2017
EN 60065: 2014 /AC: 2016
EN 61000-3-3: 2013
EN 61000-3-2: 2014

Scandicci,
July 2019

Luca Lastrucci
Managing Director

For compliance questions only: compliance@powersoft.it

Electrostatic Discharge (ESD)

Electrostatic discharge (ESD) is one of the most significant factors leading to damage and failure of a wide variety of electronic components.

Poor handling can cause internal damage, which is invisible. This internal damage can then cause electrical failure or reliability problems.



It is recommended that all workstations where Electrostatic Discharge Sensitive devices (ESDS) and assemblies are handled outside of full static protection packaging (i.e. within static control areas) should be provided with some form of ground conductive or dissipative flooring.

7:1.Welcome

Congratulations on your purchase of the Powersoft LiteMod 4HC module.

We know you are eager to use the LiteMod module, but please take a moment to read this user's manual and safety instructions. In case you have any questions, please do not hesitate to contact your dealer or Powersoft.

The LiteMod 4HC is a four channel amplifier modules specifically designed to drive high power loudspeakers.

The LiteMod 4HC represents an important evolution in power amplifier modules: extremely compact and light-weight LiteMod 4HC can be easily integrated into any appliance such as active loudspeakers and stand alone rack amplifiers.

The new design of the power supply equipped with PFC, reduces power consumption (less than 0.9 W in standby) while enhancing reliability and consistency in all operating conditions. The high efficiency of the output stage improves overall performance delivering pristine power and clean output signal. A dedicated optional DSP board can be easily plugged to the module providing a complete solution in a compact package.

Powersoft LiteMod 4HC is the ultimate flexible platform suiting your application design.

7:2.Unpacking & checking for shipping damage

Your Powersoft product has been completely tested and inspected before leaving the factory. Carefully inspect the shipping package before opening it, and then immediately inspect your new product. If you find any damage notify the shipping company immediately.

7:3.Disposal of the packing material

The transport and protective packing has been selected from materials which are environmentally friendly for disposal and can normally be recycled.

Rather than just throwing these materials away, please ensure they are offered for recycling.

Thermal constraints

This device must be correctly heatsinked for proper and reliable operation: an appropriate external passive heat sink guarantees by design thermal efficiency and reliability.

Proper heatsink planarity is strongly suggested to allow thermal transfer from the module's bottom plate to the heatsink; a thermal compound may be used, but it is not strictly necessary.

In order to ensure proper ventilation of the module, reasonable spacing of at least 100 mm must be left between the frame of the unit and any side component or surface of the enclosure.

The module has been designed to fit into a loudspeaker cabinet: please refer to [FIGURE 1](#) for proper module placing.

IN [FIGURE 1](#) HEATSINK FINS ARE SET HORIZONTALLY (WRONG!) ONLY FOR DESCRIPTIVE PURPOSE.

All configuration showed in [FIGURE 1](#) are viable for proper module placing and cooling. We suggest to position the module vertically with respect the ground in order to take advantage of the chimney effect for ventilation and heat dissipation.

In [FIGURE 1.a](#) the module and the loudspeakers share the same room into the cabinet. This is the default placement solution: it allows good ventilation because of woofer diaphragm movement and high air volume; be aware of magnetic field interaction: place the module far enough from loudspeakers magnet in order to prevent fans blockage.

[FIGURE 1.b](#) shows the more efficient cooling configuration, even if it is less effective against dust and moisture that can get into the module. By allowing external air flow, it is possible to reduce the fins width on the heatsink by maintaining good cooling performances.

8:1.Heatsink performance

Here we suggest a rule of thumb to calculate the thermal resistance of the heatsink.

The absolute thermal resistance of the heatsink is the temperature difference (kelvin or celsius) across it structure when a unit of heat energy flows through it in unit time (watt). For seek of simplicity: a heatsink with low thermal resistance offers high heat dissipation, as well as a low electric resistance allows high current flowing through a conductive wire.

In order to define the maximum allowed thermal resistance for the heatsink let assume the following:

- ▶ e as the amp module efficiency
- ▶ cf as the crest factor of the audio signal
- ▶ W_{max} as the peak power delivered by the module
- ▶ T_{amb} as the highest ambient temperature
- ▶ T_{mod} as the highest operating temperature

The thermal resistance of the heatsink derives from the fol-

lowing formula:

The maximum dissipated power can be calculated as:

$$R_{th} = \frac{T_{mod} - T_{amb}}{\text{Dissipated power}}$$

For example, stating an efficiency of 80%, 6 dB crest factor

$$\text{Dissipated power} = \frac{W_{max} (1 - e)}{cf}$$

and 3400 W peak power, the dissipated heat is:

Supposing that the thermal protection of the module (T_{mod}) is

$$\frac{3400 (1 - 0.8)}{4} = 170 \text{ W}$$

set at 75°C (167°F) on the bottom plate and stating an ambient temperature of 45 °C (113°F), the previous example gives: meaning that the temperature of the bottom plate is always

$$\frac{75 - 45}{170} = 0.14^{\circ}\text{C/W}$$

lower than 75°C if the heatsink has a thermal resistance better than 0.14°C/W (or 0.14 K/W) with ambient temperature up to 45 °C.

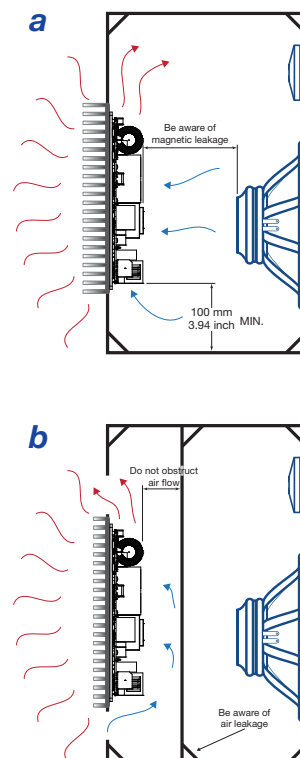



FIGURE 1: Cooling solutions (for descriptive purpose the heatsink fins are set in wrong direction);
 a) Module and loudspeaker into the same chamber;
 b) Module in a separate vented chamber.

Electromagnetic Compatibility (EMC) & Safety

9:1.AC MAINS filter

 In order to improve the electromagnetic compatibility an EMC filter must be inserted before the AC MAINS plugs on the power supply. Powersoft suggests:

- YanBixinKeji YB12E3-6A-W(R)
- YanBixinKeji YB12E4-10-Q
- Delta 05DBAW5

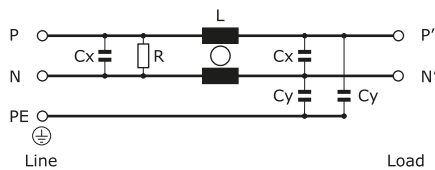


FIGURE 2: Typical electrical schematic of the EMI Filter.

9:2.Cabling

Wiring between the amp module and the load may lead to radio frequency noise. The following guide lines should be observed:

- ▶ reduced cabling length is advisable;
- ▶ keep cable pairs as close as possible to each other in order to minimize the antenna effect;
- ▶ design the cabling path far from RF noise source;
- ▶ set the cabling for RF noise rejection: shielded or twisted cables are advisable configuration (ref. FIGURE 4);
- ▶ place ferrites as close to the module as possible

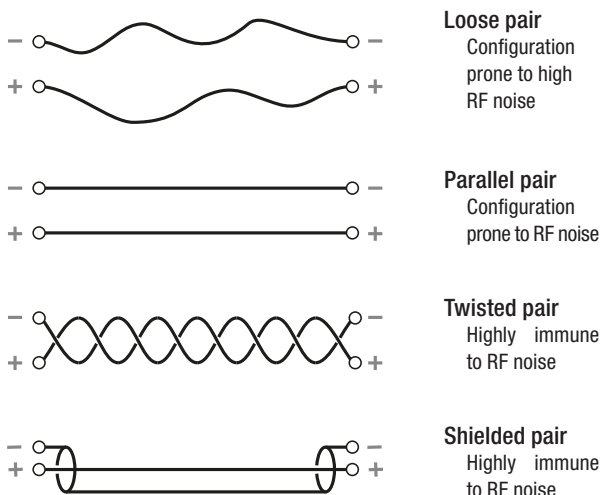


FIGURE 4: Cabling configuration.

9:3.Ferrite cores

Reject RF noise from input and output cabling by installing ferrite shields. Powersoft suggests the FAIR RITE 0431164181, or equivalent.

Wrap both cables around one side of each ferrite so that it pass through each ferrite twice (ref. FIGURE 3). Install the ferrite shield as close as possible to where the cable plugs into the amplifier. Placing the ferrite elsewhere on the cable noticeably reduces its effectiveness.

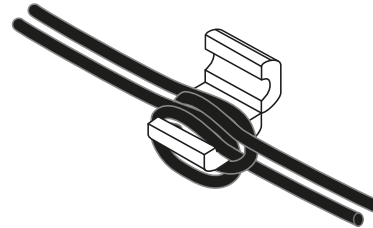


FIGURE 3: Ferrite core installation on I/O wirings.

9:4.Chassis shielding

If not already present on the product, a full body metal chassis or a shielding cage will provide best shielding of RF emission. In order to achieve the highest shielding, minimize the amount and size of holes or opening in the chassis.

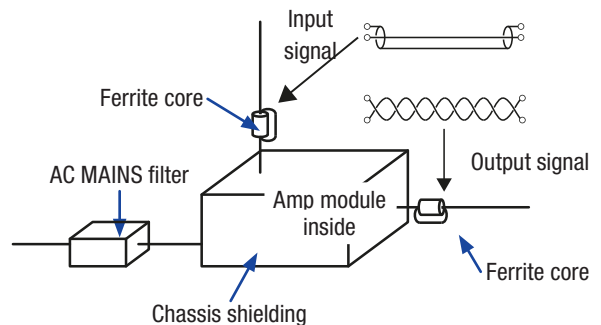



FIGURE 5: Tools and best practice for improving the electromagnetic compatibility.

9:5.Mains Fuse

Mains voltage cable must be protected by an external Time delay fuse of 15A rating (Littlefuse Series 326). Replace the fuse with the same type and rating.

9:6.Earth connection

 This device must be powered exclusively by earth connected mains sockets in electrical networks compliant to the IEC 364 or similar rules. Is absolutely necessary to verify this fundamental requirement of safety and, in case of doubt, require an accurate check by a qualified personal.

Is absolutely necessary to ground this device using the proper earth connection on the metal frame of the chassis; use M4 nut and bolt with proper split washer – grover washer – to secure the earth terminal lug.

Mechanical drawings

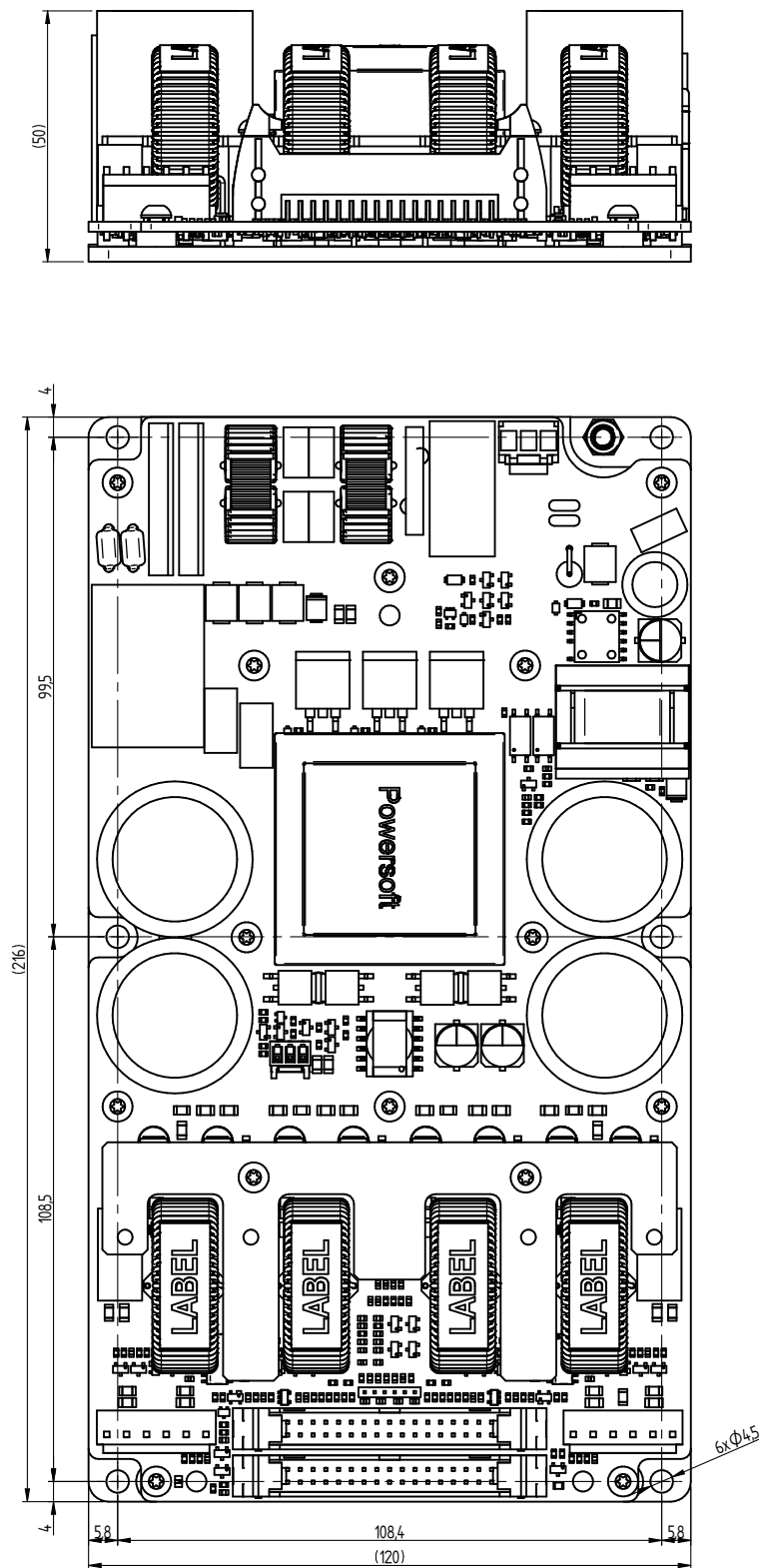
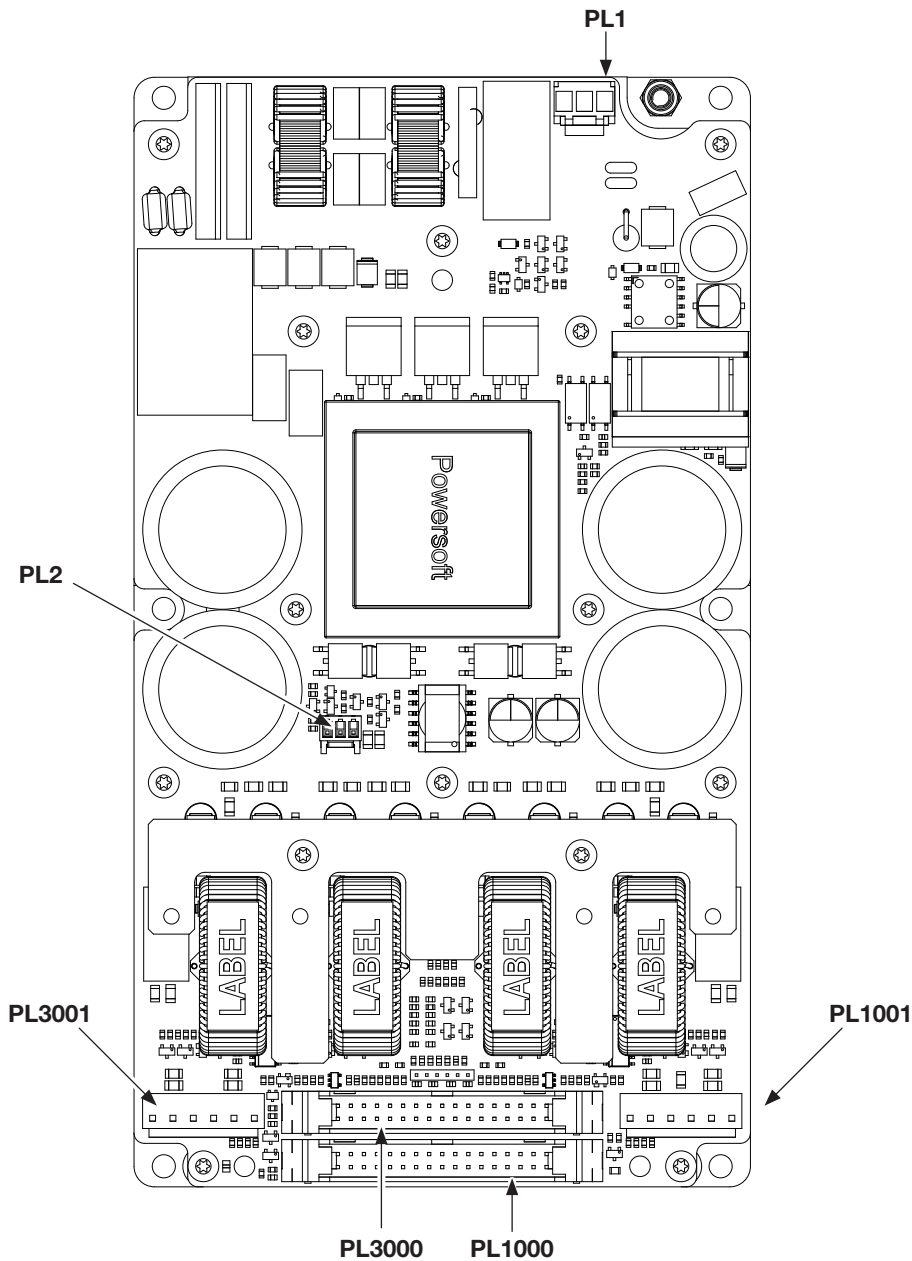


FIGURE 6: LiteMod4HC side and back plate (all dimensions in millimeters).

Connections



11:1. Grounding

The amplifier module is intended to be assembled in an End Product.

In the End Product, the metal plate of the amplifier module shall be mechanically fixed and electrically connected to conductive parts connected to protective earth – PE.

The main PE connector of the End Product shall be connected to the chassis, or to the accessible conductive enclosure parts, with suitable measures according the standard and applicable national deviations.

Any EMI filter added into the mains cable must be screwed to grounded metal parts of the chassis and its PE cable must be connected to grounding point of end product.

11:2. Bill of connectors

CODE	NAME	TYPE
PL1000 PL3000	Input connector	IDC socket 34 pin
PL1001 PL3001	Output connector	JST B6P-VH
PL1	AC Mains	JST B3P-VH
PL2	FAN	Molex 22-27-2031

Mating connectors (not provided)

Loudspeaker wires housing: JST VHR-6N

Mains connector housing: JST VHR-3N

Terminals: SVH-41T_P1-1

Fan connector: Molex 22-01-2035

Terminals: KK 254 4809 series

11:2.1.PL1 pinout

Pin#	Symbol	Description
1	L	AC Mains: Line input
2	n/c	not connected
3	N	AC Mains: neutral input

11:2.2.PL2 pinout

Pin#	Symbol	Description
1	GND	Ground connection
2	HOT	+12 V, 150 mA max current draw
3	GND	Ground connection

The PL2 molex plug is intended for connecting a fan whose activation is driven in relation to the temperature.

11:2.3.PL1000, PL3000 pinout

LiteMod4HC - PL1000 (IDC34p)

Pin#	Name	Type	Description	Range	Scale Factor	Impedance		
1	SDPWS	IN	Power supply shut down. Active High. Enable energy save mode (consumption <1W). Same as pin 34. Same as pin 1 and 34 on PL3000	3,3VDC < VIH < 12VDC	\	4,7KΩ		
2	READY 1	OUT	Channel 1 PWM state. High when output 1 PWM generation is enabled	VOH= 5VDC / VOL= 1VDC	\	100KΩ		
3	RESERVED	\	\	\	\	\		
4	+5VDC OUT	POWER	Regulated +5VDC supply output (+/-5%). Same as pin 31. Same as pin 4 and 31 on PL3000	Max current available= 100mA	\	\		
5	GND	POWER						
6	IN 1+	IN	Channel 1 balanced input (non-inverting)	3VRMS input for full output Absolute MAX input= 8VRMS	\	Differential= 3KΩ Common mode= 3,5KΩ (bal)		
			Channel 1 unbalanced input (non-inverting, when shorting pin 7 to GND)			3,5KΩ (unbal)		
7	IN 1-	IN	Channel 1 balanced input (inverting)			3VRMS input for full output Absolute MAX input= 8VRMS	\	Differential= 3KΩ Common mode= 0,95KΩ (bal)
			Channel 1 unbalanced input (inverting, when shorting pin 6 to GND)					1,5KΩ (unbal)
8	GND	POWER						
9	VOUT1MON	OUT	Channel 1 output voltage monitor	0-4,5VDC	20V/V			4,5KΩ
10	PROTECT 1	OUT	Channel 1 output stage protection monitor. Low when output is in protect state	11VDC < VOH < 13VDC 0VDC < VOL < 1VDC	\	Open Collector - 100KΩ Pullup		
11	IOUT1MON	OUT	Channel 1 output current monitor	0-4VDC	8,35A/V	2,7KΩ		
12	TEMPMON 12	OUT	Output stages 1&2 temperature monitor. Highest temperature between channel 1 and 2 is considered. Same as pin 23	0-5VDC	See Table	10KΩ		
13	+12VDC OUT	POWER	Regulated +12VDC (+/-10%) supply output (for audio circuits). Same as pin 22. Same as pin 13 and 22 on PL3000	Max current available= 1A	\	\		
14	-12VDC OUT	POWER	Regulated -12VDC (+/-10%) supply output (for audio circuits). Same as pin 21. Same as pin 14 and 21 on PL3000.	Max current available= 0,3A	\	\		
15	MUTE 1	IN	Channel 1 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=0,2VDC	\	47KΩ Internal pull-up to +5VDC		
16	+VCCMON	OUT	Positive rail bus monitor	+4,5VDC MAX	20V/V	4,5KΩ		
17	-VCCMON	OUT	Negative rail bus monitor	-4,5VDC MAX	20V/V	4,5KΩ		
18	-VCCMON	OUT	Negative rail bus monitor	-4,5VDC MAX	20V/V	4,5KΩ		
19	+VCCMON	OUT	Positive rail bus monitor	+4,5VDC MAX	20V/V	4,5KΩ		
20	MUTE 2	IN	Channel 2 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=0,2VDC	\	47KΩ Internal pull-up to +5VDC		
21	-12VDC OUT	POWER	Regulated -12VDC (+/-10%) supply output (for audio circuits) Same as pin 14. Same as pin 14 and 21 on PL3000	Max current available= 0,3A	\	\		

Pin#	Name	Type	Description	Range	Scale Factor	Impedance
22	+12VDC OUT	POWER	Regulated +12VDC (+/-10%) supply output (for audio circuits) Same as pin 13. Same as pin 13 and 22 on PL3000	Max current available= 1A	\	\
23	TEMPMON 12	OUT	Output stages 1&2 temperature monitor. Highest temperature between channel 1 and 2 is considered. Same as pin 12	0-5VDC	See Table	10K Ω
24	IOUT2MON	OUT	Channel 2 output current monitor	0-4VDC	8,35A/V	2,7K Ω
25	PROTECT 2	OUT	Channel 2 output stage protection monitor. Low when output is in protect state	11VDC < VOH < 13VDC / 0VDC < VOL < 1VDC	\	Open Collector - 100K Ω Pullup
26	VOUT2MON	OUT	Channel 2 output voltage monitor	0-4,5VDC	20V/V	4,5K Ω
27	GND	POWER				
28	IN 2-	IN	Channel 2 balanced input (inverting)	3VRMS input for full output Absolute MAX input= 8VRMS	\	Differential= 3K Ω / Common mode= 3.5K Ω (bal)
			Channel 2 unbalanced input (inverting, when shorting pin 29 to GND)			\
29	IN 2+	IN	Channel 2 balanced input (non-inverting)		\	Differential= 3K Ω / Common mode= 0.95K Ω (bal)
			Channel 2 unbalanced input (non-inverting, when shorting pin 28 to GND)		\	1,5K Ω (unbal)
30	GND	POWER				
31	+5VDC OUT	POWER	Regulated +5VDC (+/-5%) supply output. Same as pin 31. Same as pin 4 and 31 on PL3000	Max current available= 100mA	\	\
32	RESERVED	\	\	\	\	\
33	READY 2	OUT	Channel 2 PWM state. High when output 2 PWM generation is enabled	VOH= 5VDC / VOL= 1VDC	\	100K Ω
34	SDPWS	IN	Power supply shut down. Active High. Enable enegy save mode (consumption <1W). Same as pin 1. Same as pin 1 and 34 on PL3000	3,3VDC < VIH < 12VDC	\	4,7K Ω

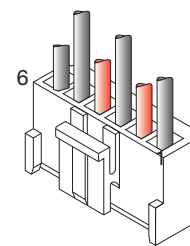
LiteMod4HC - PL3000 (IDC34p)

Pin#	Name	Type	Description	Range	Scale Factor	Impedance
1	SDPWS	IN	Power supply shut down. Active High. Enable energy save mode (consumption <1W). Same as pin 34. Same as pin 1 and 34 on PL1000	3,3VDC < VIH < 12VDC	\	4,7KΩ
2	READY 3	OUT	Channel 3 PWM state. High when output 3 PWM generation is enabled	VOH= 5VDC / VOL= 1VDC	\	100KΩ
3	RESERVED	\	\	\	\	\
4	+5VDC OUT	POWER	Regulated +5VDC (+/-5%) supply output. Same as pin 31. Same as pin 4 and 31 on PL1000	Max current available= 100mA	\	\
5	GND	POWER				
6	IN 3+	IN	Channel 3 balanced input (non-inverting)	3VRMS input for full output Absolute MAX input= 8VRMS	\	Differential= 3KΩ / Common mode= 3,5KΩ (bal)
			Channel 3 unbalanced input (non-inverting, when shorting pin 7 to GND)			3,5KΩ (unbal)
7	IN 3-	IN	Channel 3 balanced input (inverting)		\	Differential= 3KΩ / Common mode= 0,95KΩ (bal)
			Channel 3 unbalanced input (inverting, when shorting pin 6 to GND)			1,5KΩ (unbal)
8	GND	POWER				
9	VOUT3MON	OUT	Channel 3 output voltage monitor	0-4,5VDC	20V/V	4,5KΩ
10	PROTECT 3	OUT	Channel 3 output stage protection monitor. Low when output is in protect state.	11VDC < VOH < 13VDC / 0VDC < VOL < 1VDC	\	Open Collector - 100KΩ Pullup
11	IOUT3MON	OUT	Channel 3 output current monitor	0-4VDC	8,35A/V	2,7KΩ
12	TEMPMON 34	OUT	Output stages 3&4 temperature monitor. Highest temperature between channel 3 and 4 is considered. Same as pin 23	0-5VDC	See table	10KΩ
13	+12VDC OUT	POWER	Regulated +12VDC (+/-10%) supply output (for audio circuits). Same as pin 22. Same as pin 13 and 22 on PL1000	Max current available= 1A	\	\
14	-12VDC OUT	POWER	Regulated -12VDC (+/-10%) supply output (for audio circuits). Same as pin 21. Same as pin 14 and 21 on PL1000.	Max current available= 0,3A	\	\
15	MUTE 3	IN	Channel 3 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=0,2VDC	\	47KΩ Internal pull-up to +5VDC
16	+VCCMON	OUT	Positive rail bus monitor	+4,5VDC MAX	20V/V	4,5KΩ
17	-VCCMON	OUT	Negative rail bus monitor	-4,5VDC MAX	20V/V	4,5KΩ
18	-VCCMON	OUT	Negative rail bus monitor	-4,5VDC MAX	20V/V	4,5KΩ
19	+VCCMON	OUT	Positive rail bus monitor	+4,5VDC MAX	20V/V	4,5KΩ
20	MUTE 4	IN	Channel 4 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=0,2VDC	\	47KΩ Internal pull-up to +5VDC
21	-12VDC OUT	POWER	Regulated -12VDC (+/-10%) supply output (for audio circuits) Same as pin 14. Same as pin 14 and 21 on PL1000	Max current available= 0,3A	\	\
22	+12VDC OUT	POWER	Regulated +12VDC (+/-10%) supply output (for audio circuits) Same as pin 13. Same as pin 13 and 22 on PL1000	Max current available= 1A	\	\
23	TEMPMON 34	OUT	Output stages 3&4 temperature monitor. Highest temperature between channel 3 and 4 is considered. Same as pin 12	0-5VDC	See table	10KΩ
24	IOUT4MON	OUT	Channel 4 output current monitor	0-4VDC	8,35A/V	2,7KΩ
25	PROTECT 4	OUT	Channel 4 output stage protection monitor. Low when output is in protect state	11VDC < VOH < 13VDC / 0VDC < VOL < 1VDC	\	Open Collector - 100KΩ Pullup
26	VOUT4MON	OUT	Channel 4 output voltage monitor	0-4,5VDC	20V/V	4,5KΩ
27	GND	POWER				

Pin#	Name	Type	Description	Range	Scale Factor	Impedance
28	IN 4-	IN	Channel 4 balanced input (inverting)	3VRMS input for full output Absolute MAX input= 8VRMS	\	Differential= 3KΩ / Common mode= 3.5KΩ (bal)
			Channel 4 unbalanced input (inverting, when shorting pin 29 to GND)			3,5KΩ (unbal)
29	IN 4+	IN	Channel 4 balanced input (non-inverting)		\	Differential= 3KΩ / Common mode= 0,95KΩ (bal)
			Channel 4 unbalanced input (non-inverting, when shorting pin 28 to GND)			1,5KΩ (unbal)
30	GND	POWER				
31	+5VDC OUT	POWER	Regulated +5VDC (+/-5%) supply output. Same as pin 4. Same as pin 4 and 31 on PL1000	Max current available= 100mA	\	\
32	RESERVED	\	\	\	\	\
33	READY 4	OUT	Channel 4 PWM state. High when output 1&2 PWM generation is enabled	VOH= 5VDC / VOL= 1VDC	\	100KΩ
34	SDPWS	IN	Power supply shut down. Active High. Enable energy save mode (consumption <1W). Same as pin 1. Same as pin 1 and 34 on PL1000	3,3VDC < VIH < 12VDC	\	4,7KΩ

11:2.4.PL1001, PL3001 pinout

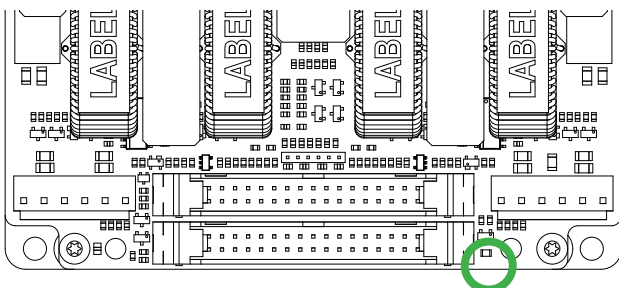
Pin#	PL1001 Polarity	PL3001 Polarity
1	CH1 (-)	CH2 (+)
2	CH1 (+)	CH2(-)
3	CH3 (-)	CH4 (+)
4	CH3 (+)	CH 4 (-)
5	GND	GND
6	PARALLEL	PARALLEL



Loudspeaker wires housing: JST VHR-6N

11:3.LED encoding

A single LED is located on the point indicated in the picture.



Color	Status	Description
	solid off	OFF - amp is off
Green	solid on	READY - amp is ready to be used

11:4. Internal Signal Path Polarity

In order to increase the power's supply energy storage efficiency, signals coming from channel pairs 1-2 are reversed in polarity.

This ensures a symmetrical use of the voltage rails: if, for example, both channels 1 and 2 input signals are going through a peak at the same time, channel 1's energy will come from the positive voltage rails while channel 2, whose polarity is reversed with respect to channel 1, will be fed energy from the negative voltage rails. In this manner, the power supply will work symmetrically, with one channel driven by the positive rails and the other by the symmetrical negative rails. Channel 2's signal will be polarity reversed once more to ensure that both channels output with the same polarity as their corresponding input signals.

For this reason it is very important not to invert the polarity of either channels before feeding them to the module. A double polarity inversion (the first by the user inserting the input signal and the other by the amplifier's internal circuitry) results in no inversion at all. If this were the case, both channels would be weighting on only one side (positive or negative) of the power supply's voltage rails. This would result in an inefficient use of the power supply's energy.

Please pay special attention in using balanced inputs on all measurement equipment (such as oscilloscope probes) when you are bench testing.

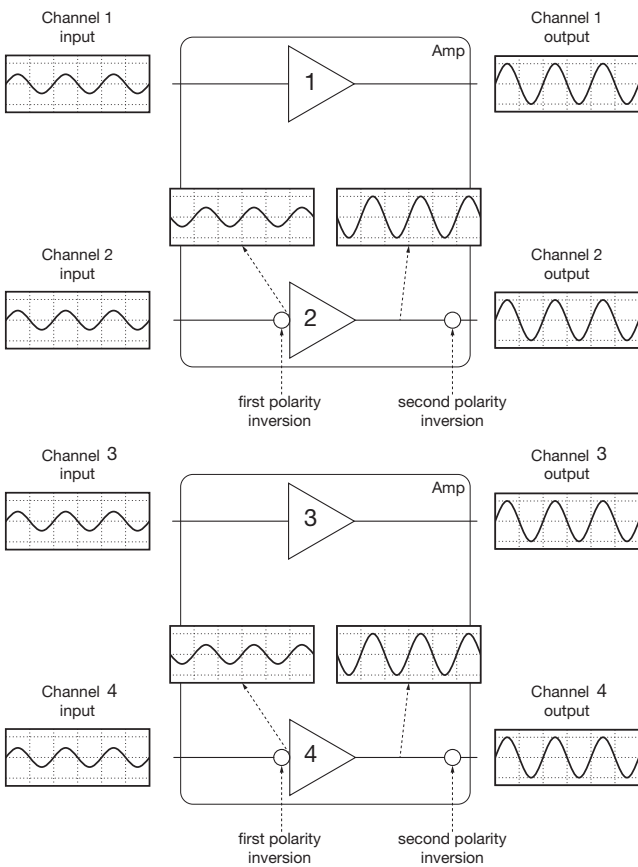


FIGURE 7: Internal signal path polarity with example input signals. All channels are fed with the same sine signal.

11:5. Output Configuration

LiteMod 4HC can be configured in 5 different output type of connections:

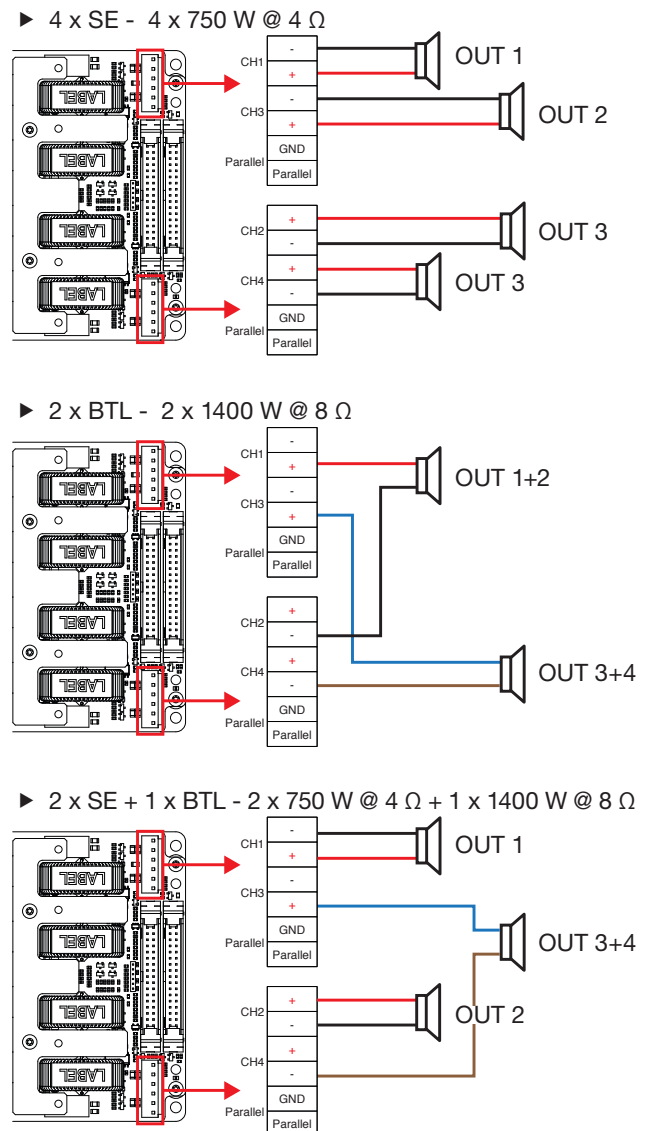
4 x SE (Single Ended): 4 independent channels.

2 x BTL (Bridge Tied Load): Two couples of channels bridged.

2 x SE + 1 x BTL: A couple of channel bridged while the remaining two channels kept single ended.

2 x PTL (Parallel Tied Load); Two couple of channels obtained by paralleling two channels of the module. This configuration can be activated by short circuiting two pins of output connector indicated on [FIGURE 8](#), it must be done before switching on the module. Activating the parallel mode on one of the output connectors, implies setting up parallel mode on both channel pairs. For safety reasons we suggest to apply the parallel mode on both connectors.

1 x PBTL (Parallel Bridge Tied Load): A single channel can be obtained by bridging the PTL configuration.



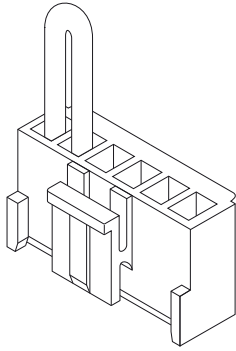
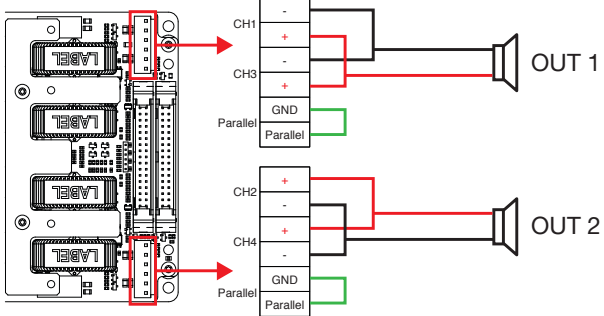
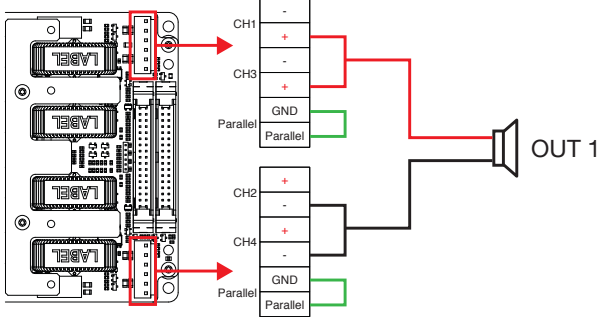


FIGURE 8: Short-circuited pins on the output connector.

► 2 x PTL - 2 x 1400 W @ 2 Ω



► 1 x PBTL - 1 x 2400 W @ 4 Ω



Protections

Fault protections are systems designed to protect people from severe or fatal electric shocks and avoid severe damages on the amplifier or the loudspeakers in case of electrical parameters out of scaling or critical changes in environmental conditions.

The architecture of Powersoft's amplifiers includes several protection mechanisms triggered by harmful signal and temperature. Protection systems and triggers are independently implemented in the power supply section (power supply protection) and the amplifier section (amplifier protections) in order to minimize system damages and maximize efficiency.

In case any limiter requires >17dB of gain reduction, each channel's relative PROTECT pin (PL1000 - #10=ch1 #25=ch2, PL3000 - #10=ch3 #25=ch4) will become active.

If any limiter requires a >20 dB reduction, the module will shut off.

12:1.Fan Control

Fan starts to run as soon as the amp module measures a temperature greater than 60°, the fan control keeps fan at maximum speed for the first 2s, then its speed will be controlled according to operating temperature. When the amp module reaches 75°, the fan starts to run at maximum speed.

The fan is not included in the package, Powersoft recommends the following (or equivalent):

- ▷ 40x40= SUNON series MB60151Vx, or series MF60151Vx
- ▷ 80x80= SUNON, series ME80151Vx

T (°C)	TempMon
25	2.59
30	2.53
35	2.45
40	2.31
45	2.16
50	2.00
55	1.83
60*	1.64
65	1.43
70	1.22
75**	0.98
80	0.74
85	0.45
90	0.11

*FAN ACTIVATION THRESHOLD
**MAX SPEED

TABLE 1: TempMon

12:2.Power supply protections

Power supply protections aim to avoid damages due to stress of the Power supply or to isolate a faulty section in the electrical power system from the rest of the device in order to prevent the propagation of the fault and limit damages.

12:2.1.Primary AC mains overcurrent protection

A 15A time-delay fuse (Littelfuse series 326) prevents against dangerous mains overcurrents in case of a internal failure. The fuse holder is placed on the L wire on the mains cable assembly provided as optional cable kit. In case Powersoft cable would not be used, a similar cable is mandatory, please follow assembly instructions described in Cable Kit paragraph.

12:2.2.Primary AC mains overvoltage protection

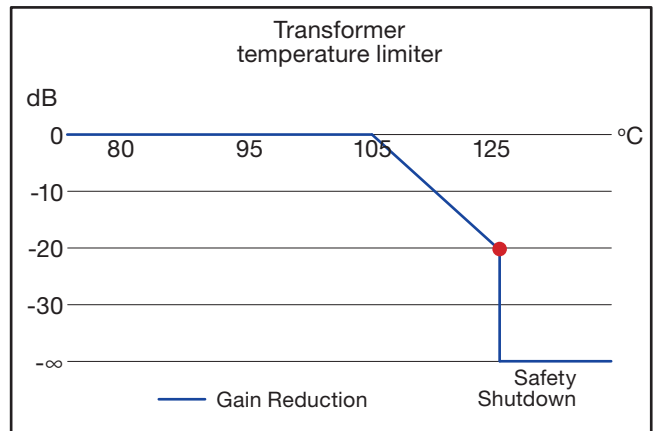
AC mains overvoltage threshold is set to 280 V_{RMS}. If the AC mains voltage exceeds 280 V_{RMS} the primary power supply stops working, but the auxiliary remain active.

The power supply turns on again when the AC mains voltage drops under 275 V_{RMS}.

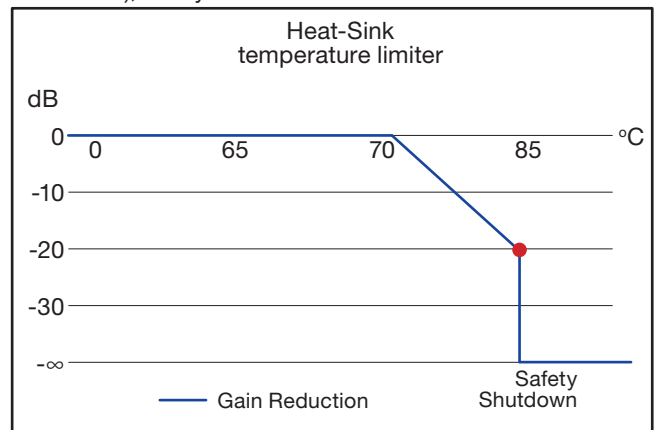
12:2.3.Primary thermal protection

The temperature is detected at the power supply's MOSFETs located on the Main Board's bottom side and inside the power transformer.

The limiting factor is set as follows: 0dB @ 105°C, and -20dB @ 125°C. When the temperature exceeds the safety threshold of 125°C, the system switches off.



Another sensor is located on the heatsink, when the temperature exceed the safety threshold (0 dB @70 °C, -20 dB @85° C), the system switch off.



12:2.4.Total power limiter

When the module detects a long term output current of >11 A, and an output power grater than 700 W, it will limit the output power accordingly.

12:3.Amplifier protections

Amplifier protections are triggered by the audio signals, output currents and voltages, and by the temperature of the output stage's devices. Temperature is read by NTC (Negative Temperature Coefficient) thermistors. NTCs provide a voltage proportional to temperature read, which decreases with an increasing temperature.

The average of the temperatures read by all NTCs triggers a secondary thermal limiter which acts as follow: 0dB @ 70°C, and -20dB @ 85°C. When temperature exceeds the safety threshold of 85°C the system switches off.

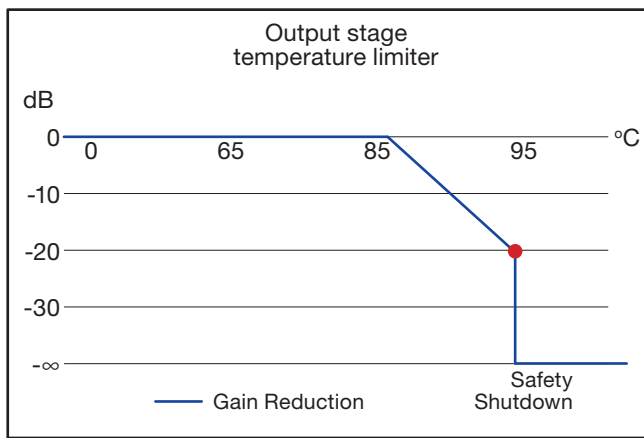


TABLE 1 displays the relationship between temperature and voltage drop across NTC thermistors. NTC's voltage drop for each channel are routed to the respective TEMPMON contacts (pin #12 and #23) on PL1001.

The limiting factor is 0dB @ 85° C, and -20dB @ 95° C.

Since the temperature is detected on the PCB surface it does not represent the actual temperature of the plate: be aware that some parts of the amplifier may be at higher temperature, but not at risk of failure.

12:3.1.Harmful signal protections

Bad signals can cause amplifier and loudspeakers damages. In order to limit such failures, harmful signal triggers specific protections.

12:3.1.1.Output short circuit

If the load impedance is too low or the loudspeaker cable is short circuited (because of voice coil damages, wires short circuit, improper wiring, etc), the amplifier output current could rise to harmful values.

When the output current reaches 31 A_{peak} the amplifier section switches off (in less than 5us), while the power supply is still working.

The module will then start a series of checks at different intervals, in which it will try to switch itself on again, as described in the table below, and will then cycle the entire process indefinitely.

Time	Cycle #
2 s	30 times
10 s	90 times
5 min	6 times
30 min	1 time

12:3.1.2.RMS output current protection

Two RMS output current protections are available: short-term current limiter and long-term current limiter.

A short term limiter (60ms) will be engaged as soon as an output current > 15Arms is detected.

A long term limiter (800ms) will be engaged as soon as an output current > 8Arms is detected.

- ▶ Short-term current limiter
THR= 15A, ATK= 60ms
- ▶ Long-term current limiter
THR= 8A, ATK= 800ms

12:3.1.3.High frequency stationary loud signals

High frequency stationary signals, such as sine waves with high amplitude, tend to stress the amplifier section of the module as well as the loudspeakers voice coils.

If the output signal is above 20 kHz the protection will activate in 0.5 s when the output amplitude exceeds 20 V_{RMS}.

- ▶ High Freq. limiter
THR= 20Vrms @20kHz, ATK= 0.5s

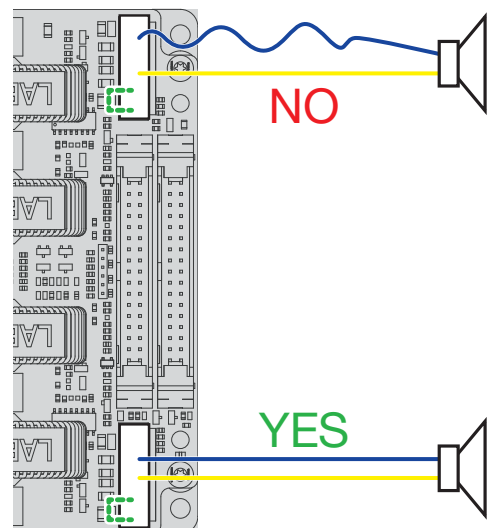
12:3.1.4.Soft Clip Limiter

Clipping signals will be smoothed out with an attack time of 2 ms and a release time of 20ms.

12:3.1.5.Output Current Mismatch Protection

When using the module in PTL mode, there is a risk of encountering current mismatch between the paralleled channels. A protection will intervene and mute the outputs for 60 seconds. The module then restarts normally unless the protection intervenes again.

In order to avoid this protection verify that the PTL output cable is made of short cables that are also the same lenght between each other.



Cable Kit - KT000349

For module evaluation only.

13:1.Mains Cable – CB000727



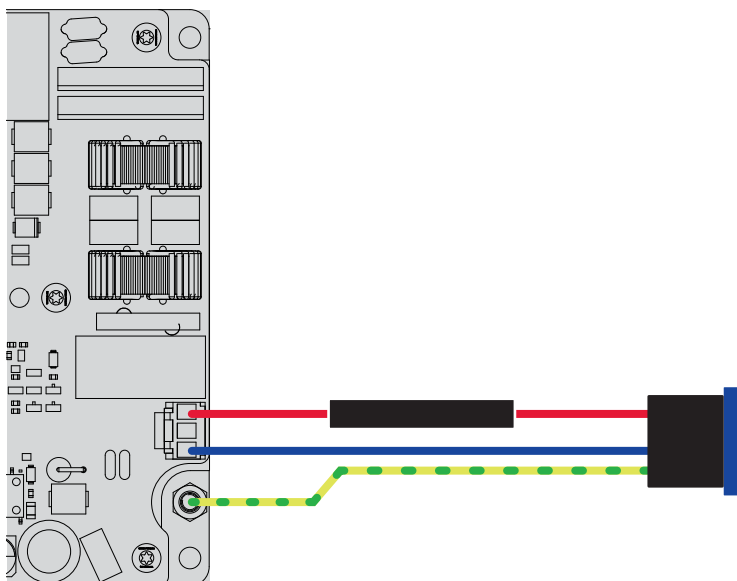
Bill of Materials

Q	Part Description	MPN / Specs
1	PowerCon	NAC3MPA-1
1	JST connector	VHR-3N
2	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
1	Fuse Holder	SCI R3-32B2
1	Fuse	LITTLE FUSE 326 15AT
1	Red cable	14 AWG
1	Blu cable	14 AWG
1	Yellow/Green cable	14 AWG

JST Housing pin-out

Powercon pin-out

PIN 1	AC Mains L (red wire)	PIN L	AC Mains L (red wire)
PIN 2	Not connected	PIN N	AC Mains N (blue wire)
PIN 3	AC Mains N (blue wire)	PIN GND	Ground
AMP GND	Ground (yellow-green wire)		



13:2.Output cable, 4 x SE configuration – CB000731



Bill of Materials

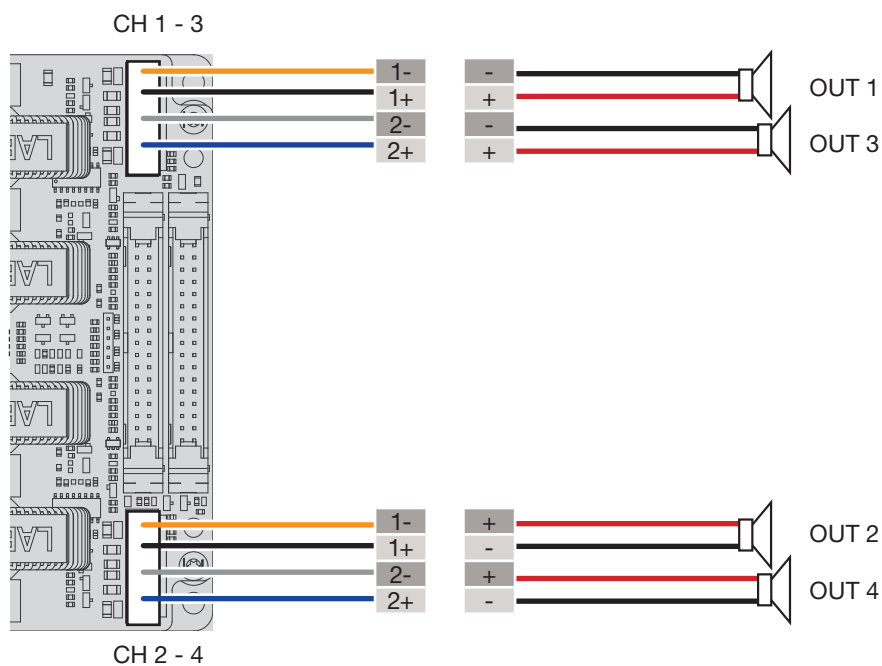
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
1	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
1	White Cable	16 AWG
1	Blue Cable	16 AWG
1	Orange Cable	16 AWG
1	Grey Cable	16 AWG

Pin Out CH 1-3

JST Pin	Cable	Speakon Pin	Speaker Pin
1	ORANGE	1-	-
2	WHITE	1+	+
3	GREY	2-	-
4	BLUE	2+	+
5	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.

Pin Out CH 2-4

JST Pin	Cable	Speakon Pin	Speaker Pin
1	ORANGE	1-	+
2	WHITE	1+	-
3	GREY	2-	+
4	BLUE	2+	-
5	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.



13:3.Output cable, 2 x BTL configuration – CB000730



Bill of Materials

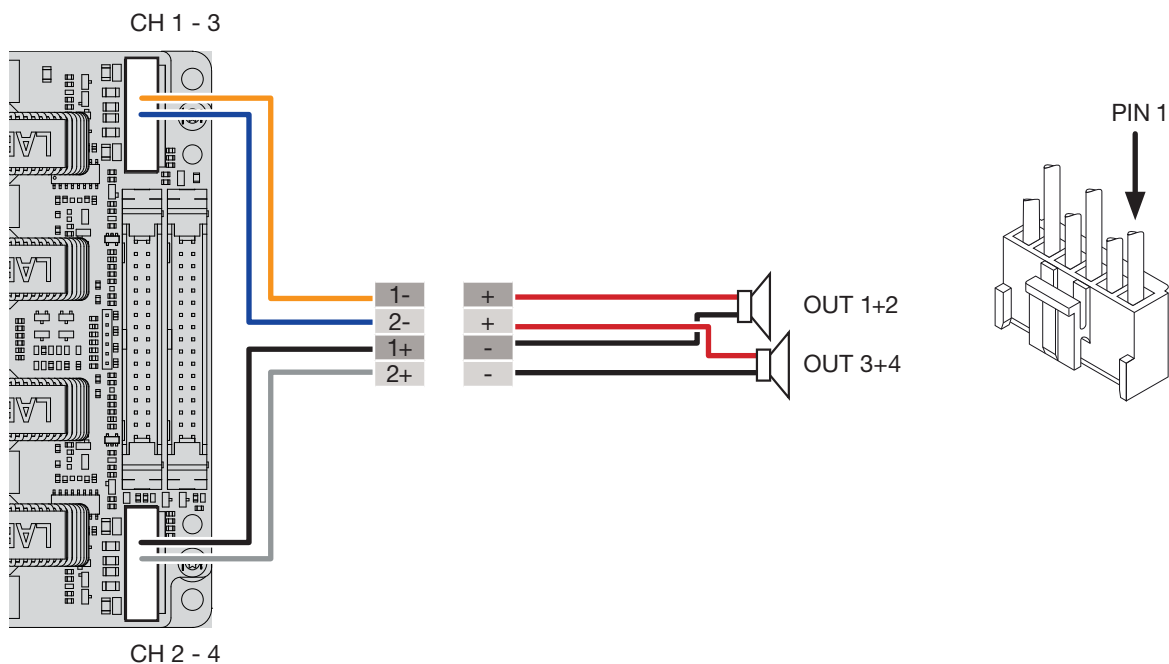
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
1	White Cable	16 AWG
1	Blue Cable	16 AWG
1	Orange Cable	16 AWG
1	Grey Cable	16 AWG

Pin Out CH 1-3

JST Pin	Cable	Speakon Pin	Speaker Pin
1	N.C.	N.C.	N.C.
2	ORANGE	1-	+
3	N.C.	N.C.	N.C.
4	BLUE	2-	+
5	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.

Pin Out CH 2-4

JST Pin	Cable	Speakon Pin	Speaker Pin
1	N.C.	N.C.	N.C.
2	WHITE	1+	-
3	N.C.	N.C.	N.C.
4	GREY	2+	-
5	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.



13:4.Output cable, 2 x PTL configuration – CB000733



Bill of Materials

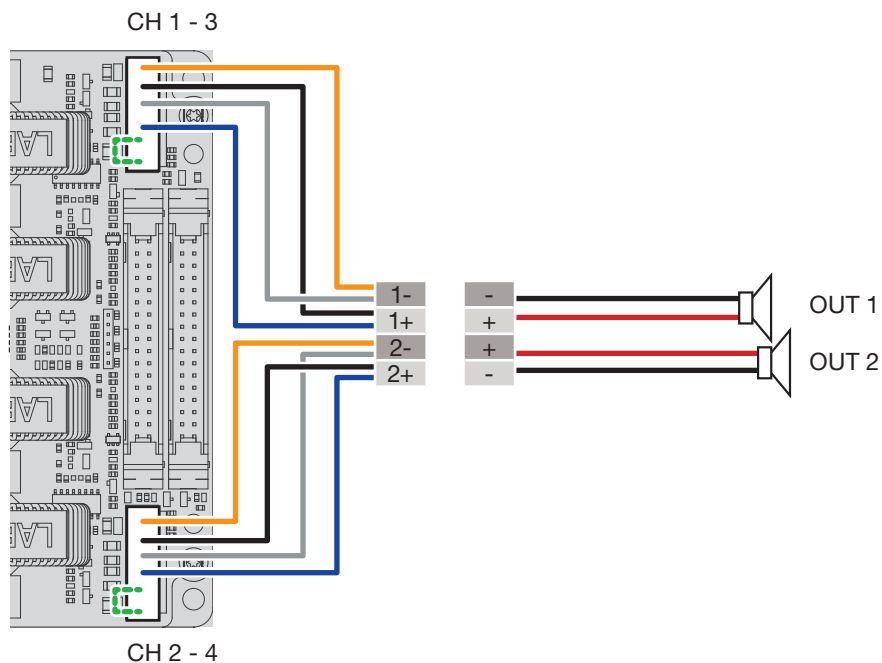
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
8	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
2	White Cable	16 AWG
2	Blue Cable	16 AWG
2	Orange Cable	16 AWG
2	Grey Cable	16 AWG
2	Loop Cable	16 AWG

Pin Out CH 1-3

JST Pin	Cable	Speakon Pin	Speaker Pin
1	ORANGE	1-	-
2	WHITE	1+	+
3	GREY	1-	-
4	BLUE	1+	+
5	LOOP	N.C.	N.C.
6	LOOP	N.C.	N.C.

Pin Out CH 2-4

JST Pin	Cable	Speakon Pin	Speaker Pin
1	ORANGE	2-	+
2	WHITE	2+	-
3	GREY	2-	+
4	BLUE	2+	-
5	LOOP	N.C.	N.C.
6	LOOP	N.C.	N.C.



13:5.Output cable, 1 x PBTL configuration – CB000732



Bill of Materials

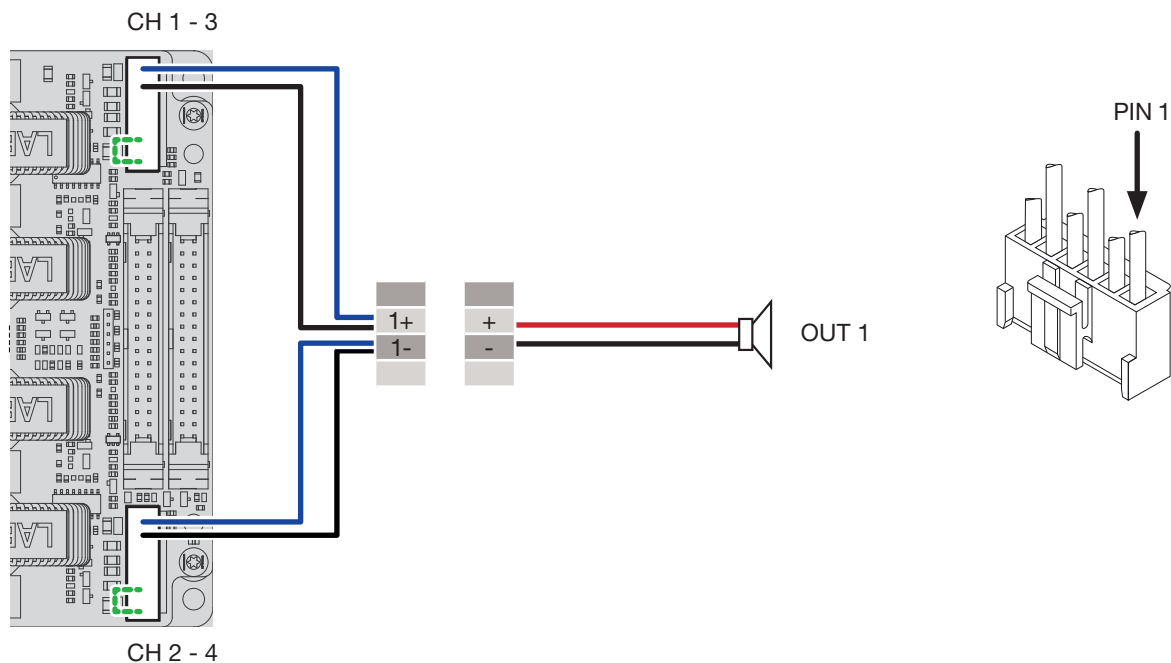
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
2	White Cable	16 AWG
2	Blue Cable	16 AWG
2	Loop Cable	16 AWG

Pin Out CH 1-3

JST Pin	Cable	Speakon Pin	Speaker Pin
1	N.C.	N.C.	N.C.
2	WHITE	1+	+
3	N.C.	N.C.	N.C.
4	BLUE	1+	+
5	LOOP	N.C.	N.C.
6	LOOP	N.C.	N.C.

Pin Out CH 2-4

JST Pin	Cable	Speakon Pin	Speaker Pin
1	N.C.	N.C.	N.C.
2	WHITE	1-	-
3	N.C.	N.C.	N.C.
4	BLUE	1-	-
5	LOOP	N.C.	N.C.
6	LOOP	N.C.	N.C.

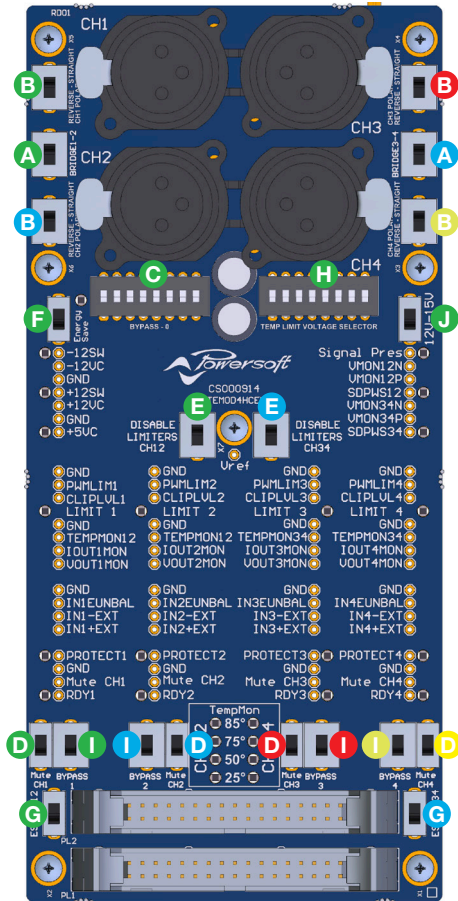


Evaluation Board - KTP00477

14

14:1.Switch functions

The EVB is an analog audio interface that includes a thermal limiter, a clip limiter, and other functions (mute, energy save enable) in order to evaluate the module without using a DSP. When using amp modules that feature on board clip and thermal limiters (such as the 4HC), the limiters on the EVB can be bypassed.



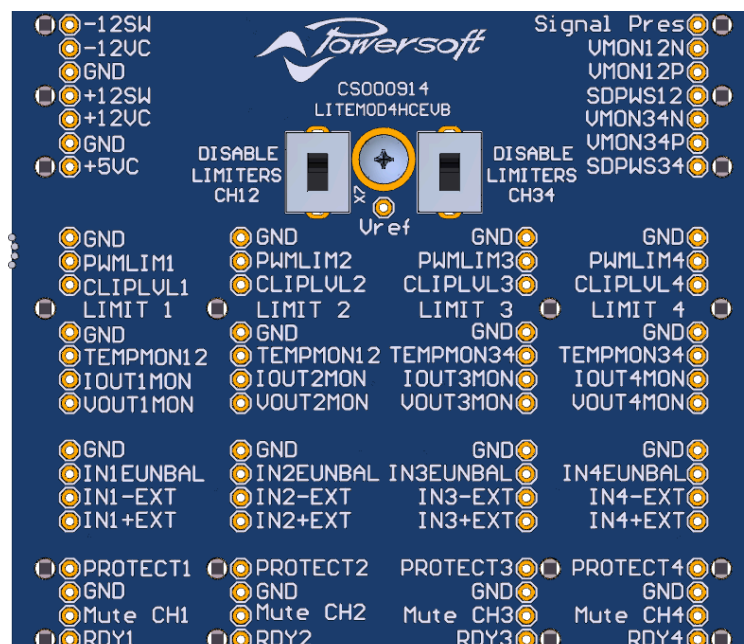
Description		Status	
A	CH1-CH2 Bridge Mode	<input type="checkbox"/>	OFF
A	CH3-CH4 Bridge Mode	<input type="checkbox"/>	OFF
B	CH1 Polarity Reverse	<input type="checkbox"/>	ON
B	CH2 Polarity Reverse	<input type="checkbox"/>	ON
B	CH3 Polarity Reverse	<input type="checkbox"/>	ON
B	CH4 Polarity Reverse	<input type="checkbox"/>	ON
C	Bypass 1/2/3/4	<input checked="" type="checkbox"/>	ON
D	CH1 Mute	<input type="checkbox"/>	OFF
D	CH2 Mute	<input type="checkbox"/>	OFF
D	CH3 Mute	<input type="checkbox"/>	OFF
D	CH4 Mute	<input type="checkbox"/>	OFF
E	Voltage Limiter Disable CH 1-2	<input type="checkbox"/>	ON
E	Voltage Limiter Disable CH 3-4	<input type="checkbox"/>	ON
F	Energy Save	<input type="checkbox"/>	ON
G	ESMODE CH1-2	<input type="checkbox"/>	OFF
G	ESMODE CH2-3	<input type="checkbox"/>	OFF
H	Thermal Limiter Threshold Setup	<input checked="" type="checkbox"/>	ON
I	CH1 Bypass	<input type="checkbox"/>	OFF
I	CH2 Bypass	<input type="checkbox"/>	OFF
I	CH3 Bypass	<input type="checkbox"/>	OFF
I	CH4 Bypass	<input type="checkbox"/>	OFF
J	Auxilliary Voltage Selector	<input type="checkbox"/>	OFF

Switch	Status ON	Status OFF
A	Bridge Mode Ch1 routed to both Ch1, Ch2 Ch3 routed to both Ch3, Ch4	Each input connector is routed on its related channel
B	Polarty Reverse Reverse polarity for each input XLR (see block diagram for better comprehension of Polarty Reverse insertion point)	Standard polarity
C	Bypass 1/2/3/4 Output sourced directly from input XLRs. When ON, all EVB limiting circuitry is bypassed (use in conjunction with Bypass – 0 dip switch)	Input signal pass through internal limiters.
D	Mute Mute related channel (disable output stage PWM generator)	Related channel unmuted
E	Limiters Disable thermal and voltage limiters disabled. Signal pass through internal preamplifier stage anyway.	Thermal and voltage limiters engaged.
F	Energy Save Energy save Active: after 10sec that input signal is not detected, it goes into “shut down / auto mute” state depending on the status of ESMODE switch; it wakes up if signal is detected (wake up threshold -59dBV).	Energy save disabled.
G	ESMODE When Energy Save Mode is enabled this status shuts down the Power Supply of the module (connected to the related output connector)	When Energy Save Mode is enabled this status mutes all channels of related connector (disable output stage PWM generator power supply is not shut down).

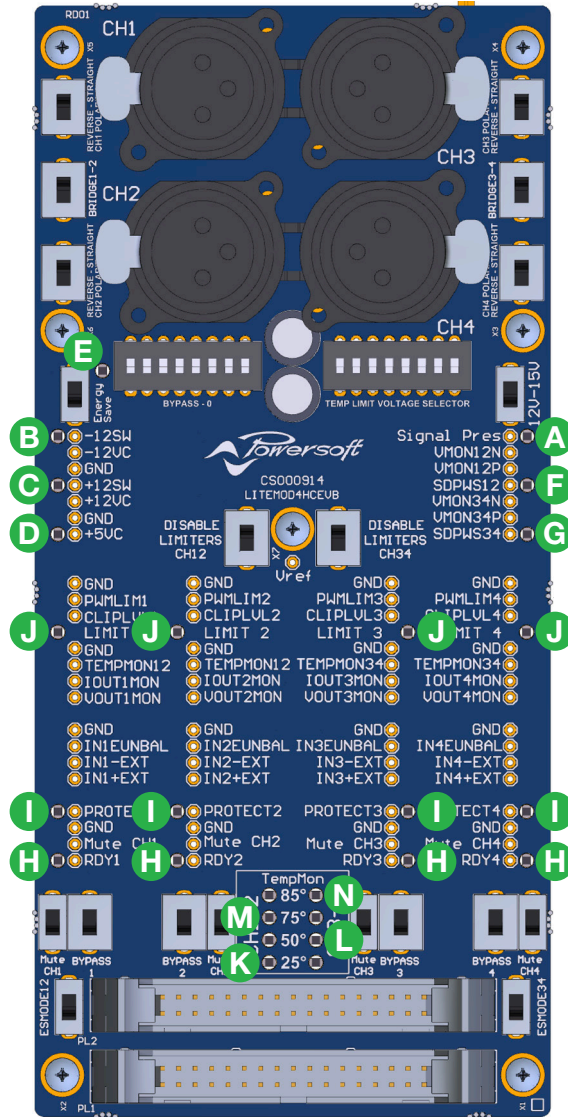
Switch	Status ON	Status OFF
H Thermal Limiter Threshold Setup	Set threshold according to the attached table amplifier dependant too.	
I Bypass 1-4	Signal goes to inner limiter circuitry.	Signal disconnected from internal limiters. In order to completely bypass inner circuitry, Input bypass should be OFF and Limiter Bypass ON
J Auxilliary Voltage Selector	Sets module having auxiliary voltage of +/-15V. Not applicable fot Litemod 4HC	Module has a default auxiliary voltage of +/-12Vdc - Not applicable fot Litemod 4HC

14:2. Test points

Test Point	Description	Scale/Full Scale (For Minimod4)
GND	Ground	
PWMLIM1 (2,3,4)	Thermal Limiter Status (active high)	
CLIPVL1 (2,3,4)	Voltage Limiter Threshold dependent from rail voltage	
TEMPMON12 (34)	Signal monitoring the thermal status of amplifier stages.	See table below
IOUT1MON (2,3,4)	Output Current monitor (scale dependent from connected module)	8A/V
VOU1MON (2,3,4)	Output Voltage monitor (scale dependent from connected module)	20V/V
IN1EUNBAL (2,3,4)	Unbalanced Input Signal (in phase and compared to IN-)	1V/V
IN1-EXT (2,3,4)	Balanced Negative Input Signal (at IDC output connector)	1V/V (±1%)
IN1+EXT (2,3,4)	Balanced Positive Input Signal (at IDC output connector)	1V/V (±1%)
PROTECT1 (2,3,4)	Protection Circuit Detection (active low)	4.6V
Mute CH1 (2,3,4)	Channel Mute (active low)	8V
RDY1 (2,3,4)	Channel Ready to play (signal dependent from connected module)	2V
VMON12N	Negative rail Monitor Channels 1,2	20V/V
VMON12P	Positive rail Monitor Channels 1,2	20V/V
VMON34N	Negative rail Monitor Channels 3,4	20V/V
VMON34P	Positive rail Monitor Channels 3,4	20V/V
SDPWS12	Shut Down Power Supply Signal (active high) engaged by Energy safe mode.	4.5V
SDPWS34	Shut Down Power Supply Signal (active high) engaged by Energy safe mode.	4.5V
-12SW	Auxiliary Negative Supply Voltage (switched when engaging energy safe mode)	1V/V
-12VC	Auxiliary Negative Supply Voltage (as supplied by module)	1V/V
+12SW	Switched Auxiliary Positive Supply Voltage (switched when engaging energy safe mode)	1V/V
+12VC	Auxiliary Positive Supply Voltage (as supplied by module)	1V/V
+5VC	Auxiliary Positive +5V Supply Voltage (as supplied by module)	1V/V



14:3.LED Description



	LED	Color	ON	OFF
A	SIGNAL PRES	GREEN	Signal presence on input connectors	Absence of signal at input connectors
B	12SW -12VC	GREEN	Presence of -12V auxiliary voltage	Absence of -12V auxiliary voltage. Switched off in case Energy Save status engaged
C	+12SW +12VC	GREEN	Presence of +12V auxiliary voltage	Absence of +12V auxiliary voltage. Switched off in case Energy Save status engaged
D	+5VC	GREEN	Presence of +5VC auxiliary voltage	absence of +5VC auxiliary voltage
E	Energy Save	GREEN	When Energy save engaged	When energy save OFF
F	SDPWS12	GREEN	When SDPWS enabled by Energy save status	When SDPWS disabled
G	SDPWS34	GREEN	When SDPWS enabled by Energy save status	When SDPWS disabled
H	RDY1,2,3,4	GREEN	When related channel in Ready Status	When related channel not in Ready Status
I	PROTECT1,2,3,4	RED	When related channel in Protect Status	When related channel not in Protect Status
J	LIMIT1,2,3,4	AMBER	When limiter of related channel is engaged	When limiter of related channel is not engaged
K	TEMPMON12, 34 - 25°C	GREEN	When TEMPMON of related channel pair is < 2.56V	When TEMPMON of related channel pair is > 2.56V
L	TEMPMON12, 34 - 50°C	AMBER	When TEMPMON of related channel pair is < 1.65V	When TEMPMON of related channel pair is > 1.65V
M	TEMPMON12, 34 - 75°C	AMBER	When TEMPMON of related channel pair is < 0.93V	When TEMPMON of related channel pair is > 0.93V
N	TEMPMON12, 34 - 85°C	RED	When TEMPMON of related channel pair is < 0.826V	When TEMPMON of related channel pair is > 0.826V

14:4. Voltage and Thermal Limiter

The EVB is provided with a Clip and Thermal Limiter that protects the connected amplifier. Since LiteMod 4HC is protected by its own limiters, we suggest to disable the EVB internal limiter by using the “Voltage Limiter Disable Switch” (E) (see picture at paragraph 14:3).

The EVB’s Thermal Limiter can be used with LiteMod 4HC by setting lower thresholds in order to change the amp thermal behavior, but additional precautions must be taken in order to avoid a thermal shut-down of the module.

Plate Temperature	Temp Mon 12-34	Threshold ID
25	2,59	
30	2,53	
35	2,45	
40	2,31	
45	2,16	a
50	2	
55	1,83	
60	1,64	b
65	1,43	
70	1,22	
75	0,98	c
80	0,74	
85	0,45	
90	0,11	

TEMP LIMIT VOLTAGE SELECTOR

	1	2	3	4	5	6	7	8	Threshold ID
	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	g
	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	f
	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	e
	OFF	ON	ON	ON	ON	OFF	OFF	OFF	d
	OFF	ON	ON	ON	ON	ON	OFF	OFF	c
	OFF	ON	ON	ON	ON	ON	ON	OFF	b
	OFF	ON	ON	ON	ON	ON	ON	ON	a



Warning: when enabling Thermal Limiter inside EVB, a Clip Limiter will be also enabled. Clip Limiter limits a max THD of output signal of about 3%, this limiter cannot be adjusted by the user.

14:5. Mute/Unmute

Couples of channels CH1-CH3 and CH2-CH4 can be muted or unmuted by acting on the switch “MUTE” of related channels. When muting a channel, PWM generator stage is disabled.

MUTE CH1	MUTE CH2	MUTE CH3	MUTE CH4	CH1	CH2	CH3	CH4
ON				MUTED		MUTED	
	ON				MUTED		MUTED
		ON		MUTED		MUTED	
			ON		MUTED		MUTED

14:6. AUX Voltage selector

By default most of Powersoft modules provide an auxiliary supply voltage of +/-12V. By activating (ON status) this switch, the module provides an auxiliary volt of +/-15V - not applicable on Litemod 4HC.

14:7.Energy Save

Evaluation board is provided of a signal detection circuit having a wake up threshold of about -59dBV. If Energy save Active, after 10sec of a lack of signal detection, it goes into “shut down / auto mute” state. Depending on the status of ESMODE switch Its behavior may change as follow:

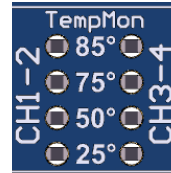
If ESMODE ON: When Energy Save Mode is enabled a Shut down of Power Supply of the module (connected to the related output connector).

If ESMODE OFF: Energy Save status leads to a mute of channels of related connector (disable output stage PWM generator power supply is not shut down).

14:8.TempMon LED bar

A LEDs light bar indicates 4 different thresholds as listed in the table below. Temperatures indicated on the scale must be considered only as an indication and are strongly dependent from the module used along with evaluation board.

LED	Turn on/off Threshold (V)
25°	2.5
50°	1.65
75°	0.93
85°	0.826



14:9.Bypass entire EVB

When bypassing a channel of evaluation board, the signal goes directly from XLR input connectors to DIL 34 poles output connectors. In this way, evaluation board can be transformed in a passive XLR input board, routing audio signals straight from the input XLRs to the amplifier’s input terminals (polarity reverse and bridge switches are disabled too).

The following position of switches “Bypass_0” “Bypass_01” “Bypass_2” “Bypass_3” “Bypass_4” should be set:

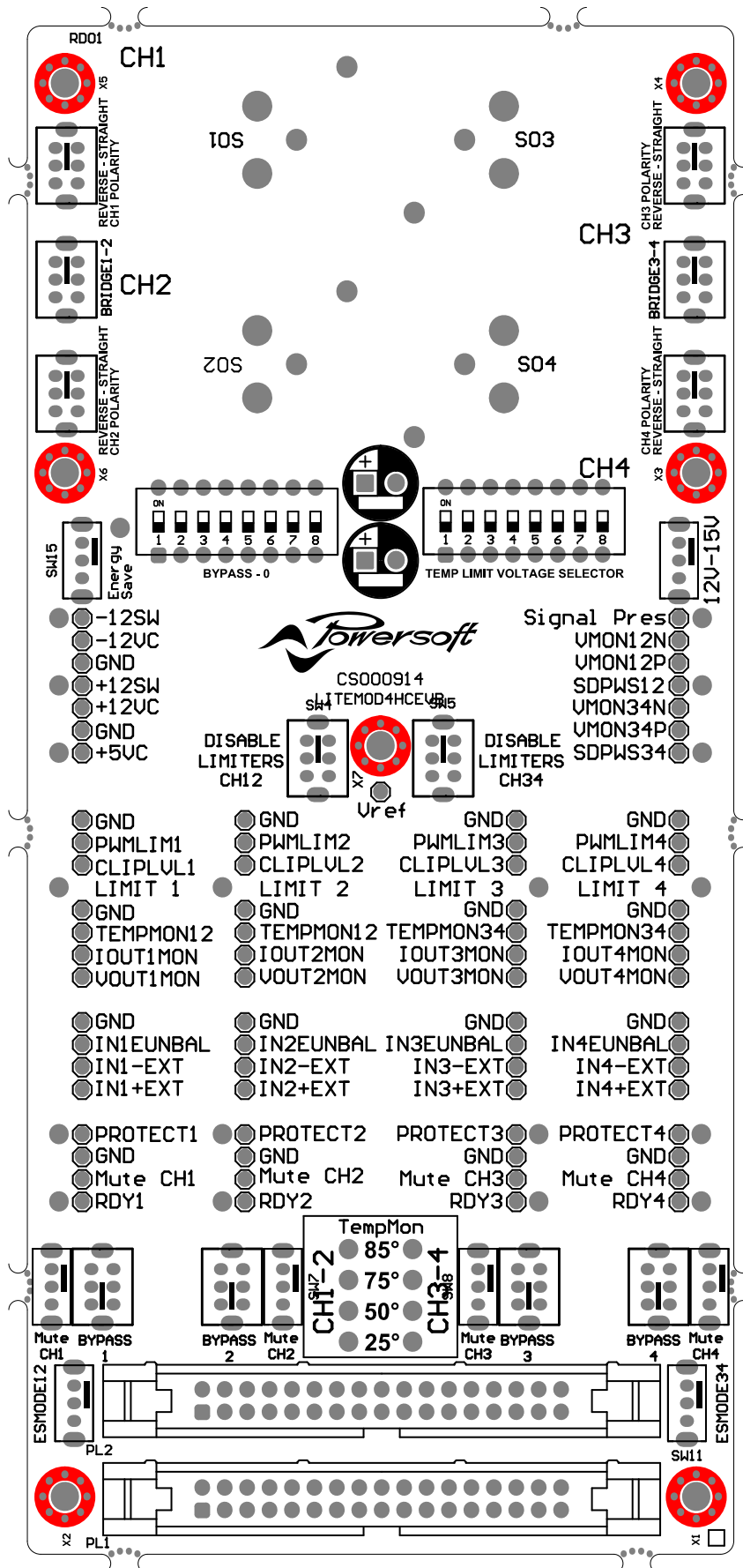
Channel to be bypassed	BYPASS_0								BYPASS_1-4			
	1	2	3	4	5	6	7	8	1	2	3	4
CH1	OFF	OFF	-	-	-	-	-	-	ON	-	-	-
CH2	-	-	OFF	OFF	-	-	-	-	-	ON	-	-
CH3	-	-	-	-	OFF	OFF	-	-	-	-	ON	-
CH4	-	-	-	-	-	-	OFF	OFF	-	-	-	ON

In order to activate the internal limiters of demo board, the above described switches must be set in the opposite position as follow.

Channel to be activated	BYPASS_0								BYPASS_1-4			
	1	2	3	4	5	6	7	8	1	2	3	4
CH1	ON	ON	-	-	-	-	-	-	OFF	-	-	-
CH2	-	-	ON	ON	-	-	-	-	-	OFF	-	-
CH3	-	-	-	-	ON	ON	-	-	-	-	OFF	-
CH4	-	-	-	-	-	-	ON	ON	-	-	-	OFF

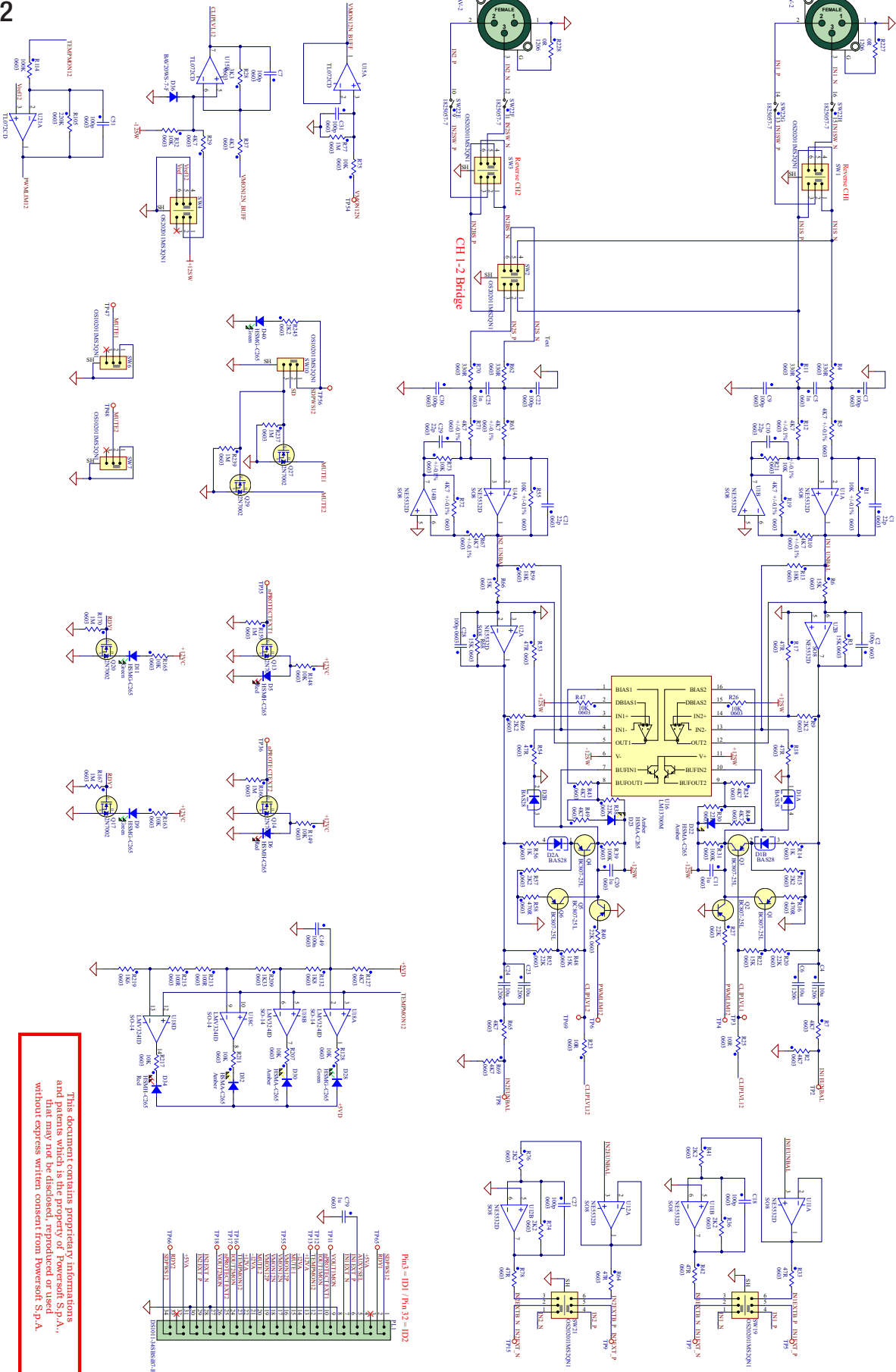
When EVB bypass is active, the following features are still available: TEMP LED BAR, MUTE, energy save (+ energy save mode selection).

14:11.Silkscreen



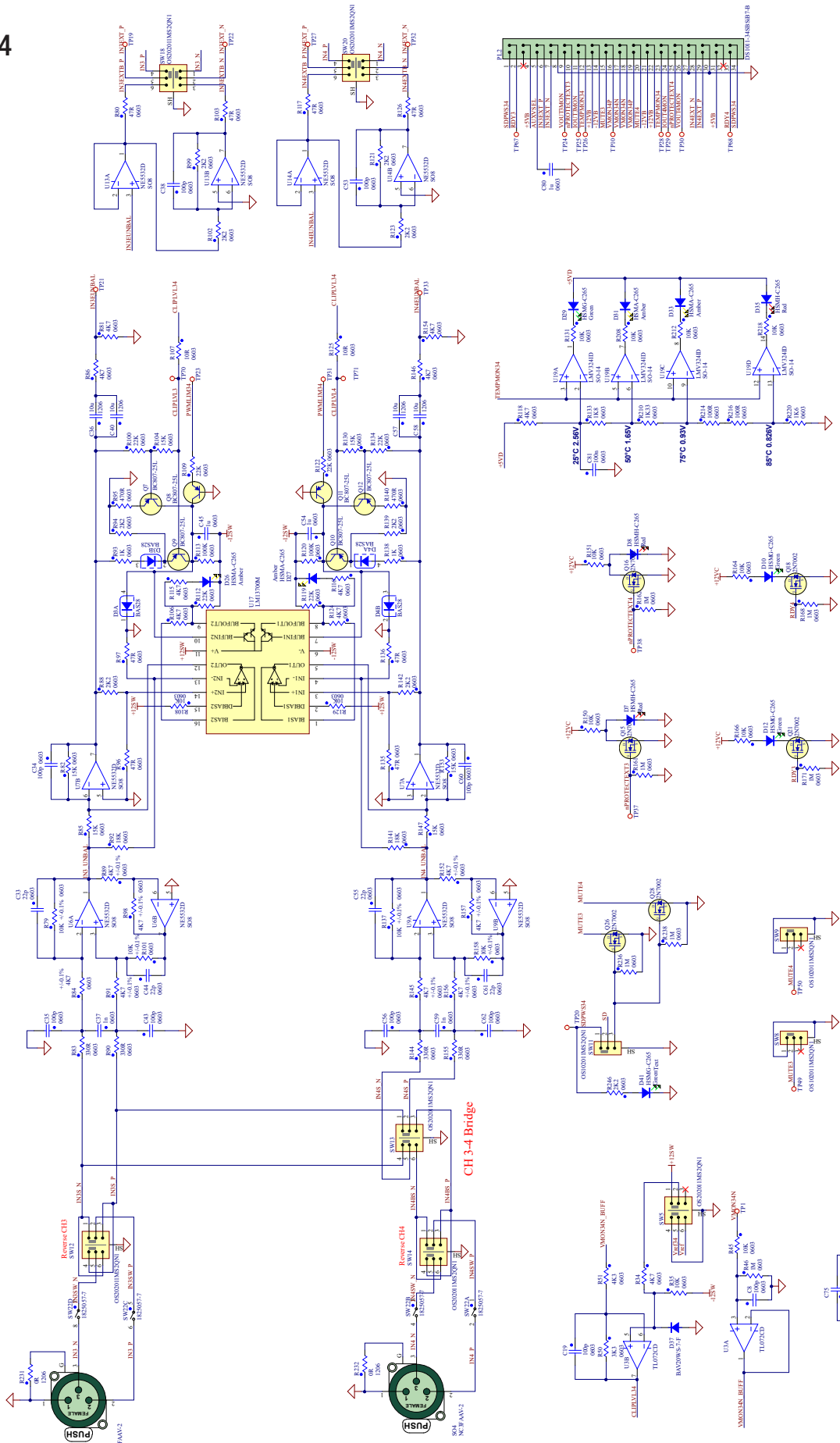
14:12.Schematic

CH1-2



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CH3-4



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Support and warranty

15:1.Service

There are no user-serviceable parts in your amplifier. Refer servicing to qualified technical personnel. In addition to having an in-house service department, Powersoft supports a network of authorized service centers. If your amplifier needs repair contact your Powersoft dealer (or distributor). You can also contact the Powersoft Technical Service department to obtain the location of the nearest authorized service center.

15:2.Warranty

Powersoft guarantees its manufactured products to be free from defective components and factory workmanship for a period of 12 (twelve) months, starting from the date printed in the invoice of purchase.

All warranty repairs and retrofits must be performed at Powersoft facilities or at an Authorized Service Center at no cost for the purchaser. Warranty exclusion: Powersoft's warranty does not cover product malfunctioning or failure caused by: misuse, abuse, repair work or alterations performed by non-authorized personnel, incorrect connections, exposure to harsh weather conditions, mechanical damages (including shipping accidents), and normal wear and tear.

Powersoft will perform warranty services provided that the product is not damaged during transportation.

15:2.1.Return of Goods

Goods can be returned to Powersoft only after they have been granted a Return Merchandise Authorization – RMA – number to be attached to the external packaging. Powersoft (or its Authorized Service Center) has the right to refuse any returned good without a RMA number.

15:2.2.Repair or replacement

Powersoft reserves the right to repair or replace any defective goods covered by product warranty at its sole discretion and as it deems best.

15:2.3.Cost and responsibility of transport

The purchaser (or end user/customer) is solely responsible for all transportation costs and risks associated with sending warranty covered goods to Powersoft or its Authorized Service Center. Powersoft will assume full responsibility and cover all costs incurred to send the goods back to the purchaser (or end user/customer).

15:3.Assistance

Even though most product malfunctioning can be solved at your premises through Powersoft Customer Care or your direct knowledge, occasionally, due the nature of the failure, it might be necessary to return defective products to Powersoft for repair. In the latter case, before shipping, you are kindly asked to follow step by step the procedure described below:

- ▶ Obtain the “Defect Report Form” by contacting our Customer Care Department via email: service@powersoft.it or download the “Defect Report Form”.
- ▶ Fill out one “Defect Report form” for each returned item (the form is an editable tab guided document) and save as your name, amp model and serial number (for example: distributorname-MDRIVE-17345.doc) providing all required information except the RMA code/s and send it to service@powersoft.it for Powersoft approval.
- ▶ In case of defect reports approved by the Powersoft Customer Service Representative you will receive an RMA authorization code (one RMA code for each returning device). Upon receiving the RMA code you must package the unit and attach the RMA code outside the pack, protected in a waterproof transparent envelope so it is clearly visible.

All returning items must be shipped to the following address:

Powersoft S.p.A.
Via Cadolingi, 13
50018 Scandicci (FI) Italy

In case of shipment from countries NOT belonging to the European Community make sure you have also followed the instructions described in the document available for download at the TEMPORARY EXPORTATION / IMPORTATION PROCEDURE link at <http://www.powersoft-audio.com/en/support/service>.

Thank you for your understanding and cooperation and continued support as we work to improve our partnership.

Specifications

General	
Maximum output power per channel @ 4Ω	750 W
Maximum output power per channel @ 8Ω	400 W
Maximum output power @ 8Ω bridge mode	1400 W
Maximum output power @ 2Ω parallel mode	1400 W
Maximum output power @ 4Ω parallel bridge mode	2400 W
Maximum total power all channels driven	2400 W
Max Output Voltage and Current	
Single Ended	78 V _{peak} / 30 A _{peak}
BTL	156 V _{peak} / 30 A _{peak}
PBTL	156 V _{peak} / 60 A _{peak}

Audio	
Gain	26 dB
Frequency Response (±1 dB, 1 W @ 8 Ω)	10 Hz - 30 kHz
S/N (20 Hz - 20 kHz A-Weighted @ 8 Ω)	Typical > 115 dB
Noise Floor	Typical -80 dBV (A)
Crosstalk Separation (1 kHz)	Typical > 80 dB
Input sensitivity	11 dBu
Input impedance	4.5 kΩ balanced
THD+N (from 0.1 W to 1/2 Power)	< 0.08% (typical < 0.05%)
DIM (from 0.1 W to 1/2 Power)	< 0.2% (typical < 0.05%)
Damping Factor	> 500 @ 1 kHz

Aux Supplies	
Max aux supply current draw @ +12 V	1000 mA
Max aux supply current draw @ -12 V	300 mA
Max aux supply current draw @ +5V	50 mA
Fan plug - 12V Fan	200 mA

AC Mains Power	
Power supply	Universal input, regulated Switch Mode with PFC
Nominal voltage	100-240 V AC @ 50-60Hz
Operating Voltage	85-264 V AC
Power Factor	cosφ > 0.9 @ 4 Ω full power
Consumption	
Standby	< 1 W (with an aux load < 100 mW)
Idle	≤ 10.2 W @ 100-240 V AC
Rated Load (1/4 Max Power)	700 W
AC Current	Nominal 7 A Max 25 A
Inrush Current (230 V AC)	41 A _{peak}

Thermal & Environment		
Operating temperature & Humidity	-20° to 65° C, 0 to 90% Non condensing	
Thermal Dissipation	Cooling Plate + Optional Variable Speed Fan	
1/8 Max Output Power @ 4Ω	Current Draw @ 230 V	2.2 A _{rms}
	Thermal Loss @ 230 V	241 BTU/h
	Current Draw @ 115 V	4.0 A _{rms}
	Thermal Loss @ 115 V	251 BTU/h
Vibration	EN 60068-2-64: 2008 (Random Test) EN 60068-2-27:2009 (Shock Test)	
EMC immunity	EN 55103-2: 2009 EN 55035: 2017	
EMC emissions	EN 55032: 2015	
EMC other	EN 61000-3-2: 2014 EN 61000-3-3: 2013	
Safety standards	IEC 60065:2014	

Construction	
Dimensions	216 x 120 x 47 mm
Weight	1100 g



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Service & maintenance: service@powersoft.it
Compliance questions: compliance@powersoft.it

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