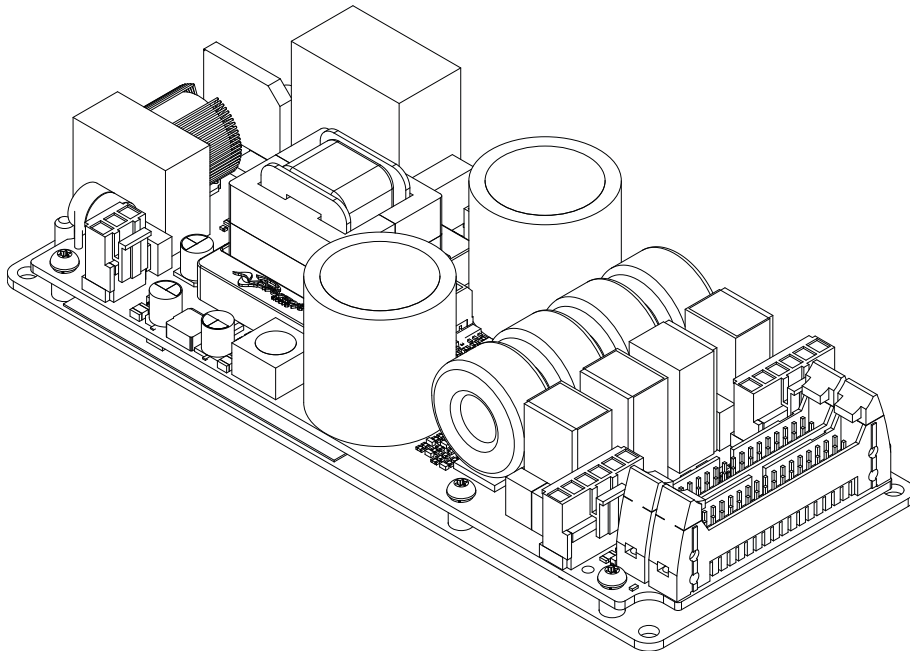




# MiniMod 4



## USER GUIDE

powersoft\_MiniMod4\_uguide\_en

Data are subject to change without notice.  
For latest update please refer to the  
online version available on [www.powersoft-audio.com](http://www.powersoft-audio.com).

## Table of contents







<b>1.Important safety instructions</b>	<b>iii</b>		
<b>2.Importantes instructions de sécurité</b>	<b>iv</b>		
<b>3.Instrucciones de seguridad importantes</b>	<b>v</b>		
<b>4.Importanti istruzioni di sicurezza</b>	<b>vi</b>		
<b>5.Regulatory information</b>	<b>vii</b>		
<b>6.Electrostatic Discharge (ESD)</b>	<b>viii</b>		
<b>7.MiniMod4</b>	<b>1</b>		
7:1.Welcome	1		
7:2.Unpacking & checking for shipping damage	1		
7:3.Disposal of the packing material	1		
<b>8.Thermal constraints</b>	<b>2</b>		
8:1.Heatsink performance	2		
<b>9.Electromagnetic Compatibility (EMC) &amp; Safety</b>	<b>3</b>		
9:1.AC MAINS filter	3		
9:2.Cabling	3		
9:3.Ferrite cores	3		
9:4.Chassis shielding	3		
9:5.Mains Fuse	3		
9:6.Earth connection	3		
<b>10.Mechanical drawings</b>	<b>4</b>		
<b>11.Connections</b>	<b>5</b>		
11:1.Grounding	5		
11:2.Bill of connectors	5		
11:2.1.PL2 pinout (B3P-VH JST)	6		
11:2.3.PL1000, PL3000 pinout	6		
11:2.2.PL4 pinout (molex 22-27-2031)	6		
11:2.4.PL1001, PL2001 pinout	9		
11:3.LED encoding	9		
11:4.Internal Signal Path Polarity	10		
11:5.Output Configuration	10		
<b>12.Protections</b>	<b>12</b>		
12:1.Fan control	12		
12:1.1.Primary AC mains overcurrent protection	12	12:1.3.Primary thermal protection	12
12:1.2.Primary AC mains overvoltage protection	12	<b>12:2.Amplifier protections</b>	<b>12</b>
		12:2.1.Amplifier Thermal protection	12
		12:2.2.Output short circuit	12
		12:2.3.High frequency protection	13
		<b>13.Cable Kit - KT000349</b>	<b>14</b>
		13:1.Mains Cable – CB000727	14
		13:2.Output cable, 4 x SE – CB000731	15
		13:3.Output cable, 2 x BTL – CB000730	16
		13:4.Output cable, 2 x PTL – CB000733	17
		13:5.Output cable, 1 x PBTL – CB000732	18
		<b>14.Evaluation Board - KTP00477</b>	<b>19</b>
		14:1.Switch functions	19
		14:2.Test points	20
		14:3.LED Description	21
		14:4. Thermal Limiter THR	22
		14:5.Clip limiter + limiter bypass	23
		14:6.Mute/Unmute	23
		14:7.AUX Voltage selector	23
		14:8.TempMon LED bar	23
		14:9.Bypass entire EVB	23
		14:10.Block diagram	24
		14:11.Silkscreen	25
		14:12.Schematic	26
		14:13.Power + Energy Save	28
		<b>15.Support and warranty</b>	<b>29</b>
		15:1.Service	29
		15:2.Warranty	29
		15:2.1.Return of Goods	29
		15:2.2.Repair or replacement	29
		15:2.3.Cost and responsibility of transport	29
		15:3.Assistance	29
		<b>16.Specifications</b>	<b>30</b>

Page intentionally left blank

# 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.**









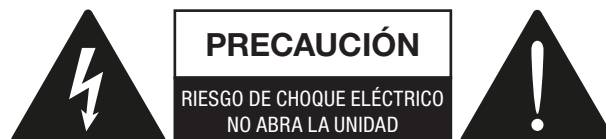
**ADOPTER DES TECHNIQUES CORRECTES DE CONNEXION ET D'ISOLEMENT LORSQUE LA CONNEXION EN MODE BRIDGE HAUT-PARLEUR EST UTILISÉ.**

## 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.




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, GOTE 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 and 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:** MiniMod4

**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
2014/53/EU	Radio Equipment Directive

The following harmonized standards are applied:

EN 55103-1: 2009 /A1: 2012  
EN 55103-2: 2009 /IS: 2012  
EN 55032: 2012  
EN 55035: 2017  
EN 60065: 2014 /AC: 2016

Scandicci,  
February 2019

Luca Lastrucci  
Managing Director

For compliance questions only: [compliance@powersoft.it](mailto: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 MiniMod4 module.

We know you are eager to use the MiniMod4 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 MiniMod4 is a four channel amplifier modules specifically designed to drive high power loudspeakers.

The MiniMod4 represents an important evolution in power amplifier modules: extremely compact and lightweight MiniMod4 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 0.55 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 MiniMod4 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:

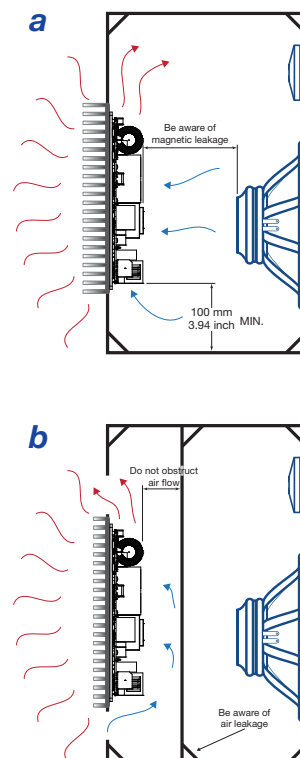
Supposing that the thermal protection of the module ( $T_{mod}$ ) is

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

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: YUNPEN YK03T1

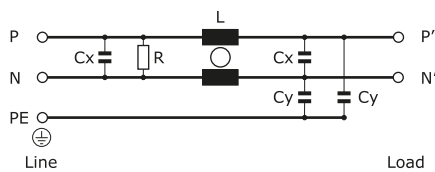


FIGURE 2: Typical electrical schematic of the EMI Filter.

### 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);
- ▶ use electromagnetic compatible connectors.
- ▶ place ferrites as close to the module as possible

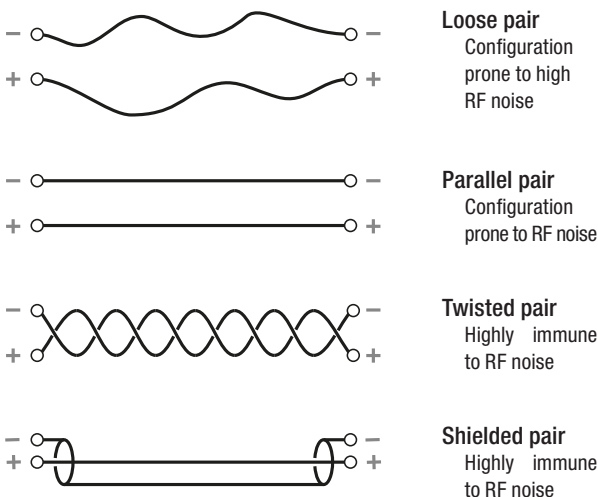


FIGURE 4: Cabling configuration.

### 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.

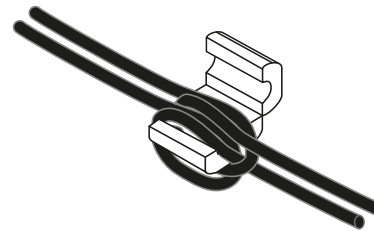


FIGURE 3: Ferrite core installation on I/O wirings.

### 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.

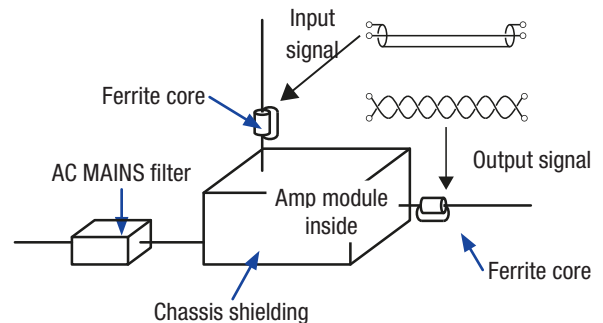



FIGURE 5: Tools and best practice for improving the electromagnetic compatibility.

### 9:5.Mains Fuse

MiniMod 4 is equipped with an internal Time Delay fuse rated at 4A. This fuse must be replaced only by an authorized Powersoft service center.

### 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. It is absolutely necessary to verify this fundamental requirement of safety and, in case of doubt, require an accurate check by a qualified personal.

It 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

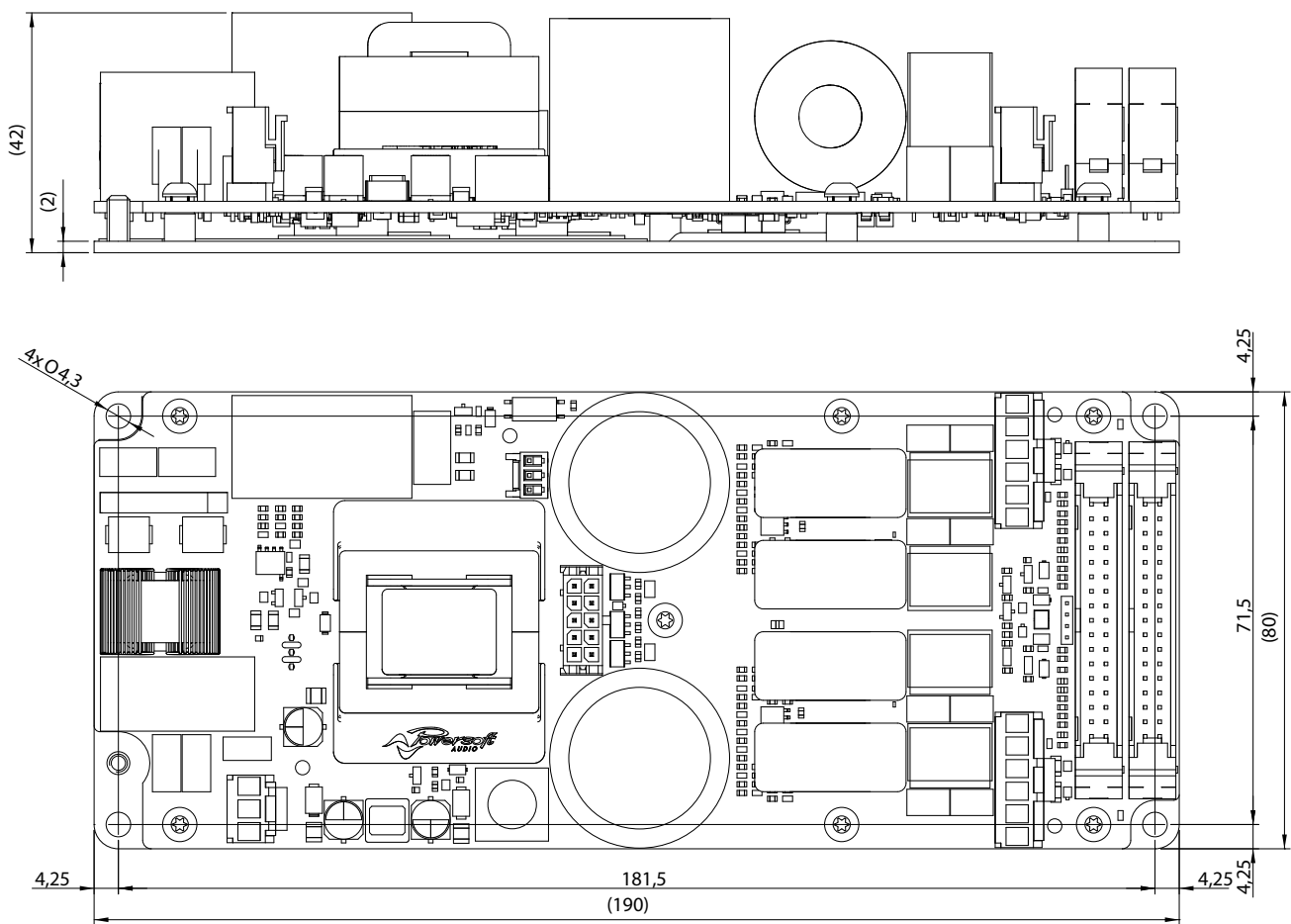
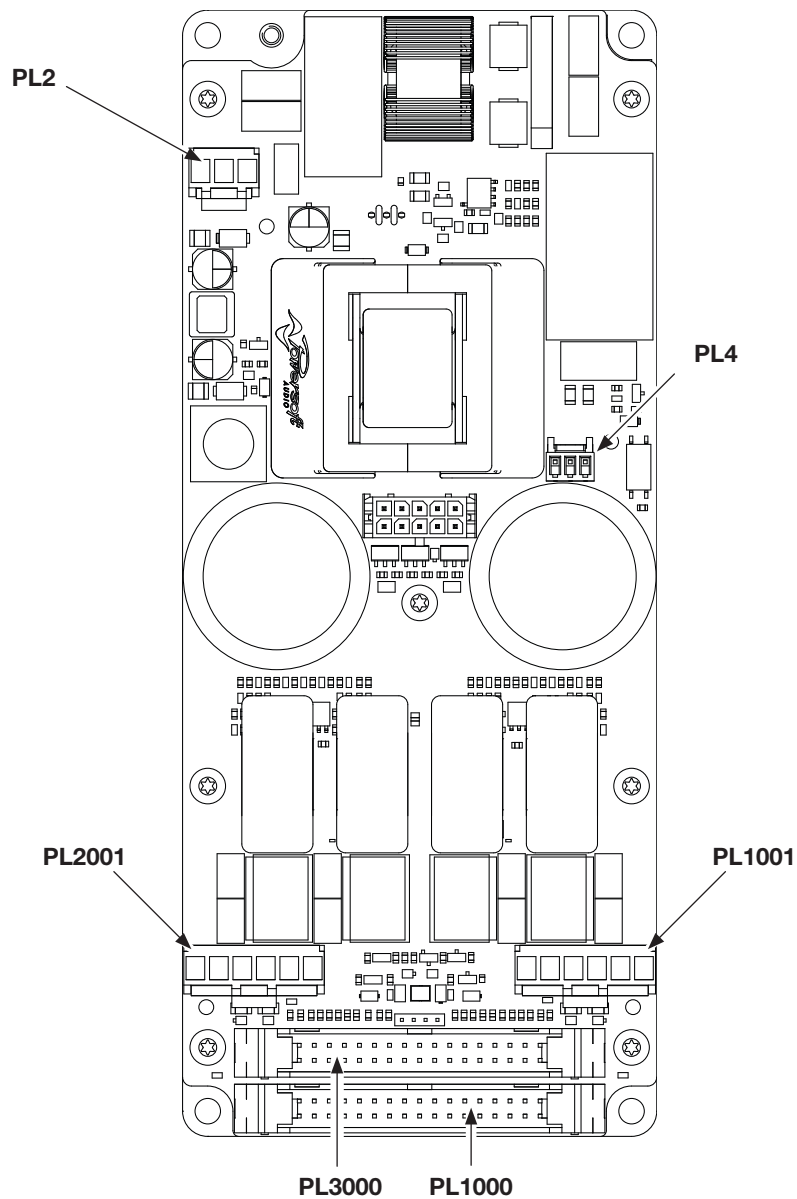


FIGURE 6: MiniMod4 side and back plate (all dimensions in millimeters).

## 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 PL2001	Output connector	JST B6P-VH
PL2	AC Mains	JST B3P-VH
PL4	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.PL2 pinout (B3P-VH JST)

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

### 11:2.2.PL4 pinout (molex 22-27-2031)

Pin#	Symbol	Description
1	GND	Ground connection
2	HOT	+12 V, 100 mA max current draw (fan)
3	GND	Ground connection

The PL4 molex plug in intended for connecting a fan whose activation is driven by the temperature.

### 11:2.3.PL1000, PL3000 pinout

PL1000 pinout (IDC 34p)

Pin#	Name	IN	OUT	POWER	Range	Scale Factor	Impedance	Tolerance	Description
1	SDPWS	P			Active High, Logic input 3,3 to 12Vdc		1kΩ		Powers Supply Shut Down
2	READY 1		P		high when output stage is operative 3,9-4,1		1KΩ		Channel 1 Ready
3	RESERVED								
4	+5VDC OUT			P	+5Vdc out 20mA max current available			+/-5%	
5	AUXVSEL	P			Open: select 15V for auxiliary voltage. Short to ground: select 12V for auxiliary voltage				Internal pull-up 10kΩ @ 12V
6	IN 1 +	P			Unbalanced: 1,41Vrms for full output shorting pin 7 to GND. 8Vrms absolute max input.		9,4kΩ		Channel 1 Positive Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		9,4kΩ		
7	IN 1 -	P			Unbalanced: 1,41Vrms for full output. 8Vrms absolute max input.		4,7kΩ		Channel 1 Negative Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		3,1kΩ		
8	GND			P					Ground
9	VOUT1MON		P			20V/V	4,5kΩ		Channel 1 Output Voltage Monitor
10	PROTECT 13		P		Level 1 (4.5V to 5V) not in protection. Level 0 (0V to 0.5V) in Protection		4,7kΩ		Channel 1 & Channel 3 Output Stage Protection Monitor
11	IOUT1MON		P			See table 1	4,7kΩ		Channel 1 Output Current Monitor
12	TEMPMON		P		0-5V		100kΩ		NTC sensor tap output
13	+12/15VDC OUT			P	+12V @ 0,8A or +15V @ 0,6A			+/-10%	Positive regulated analog section supply (same as pin 22)
14	-12/15VDC OUT			P	-12V @ 0,2A or -15V @ 0,2A			+/-10%	Negative regulated analog section supply (same as pin 21)
15	MUTE13	P			Active Low, To be pulled to GND by current sink at least 2mA				CH1-CH3 Output stage disable PWM
16	+VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Positive Monitor
17	-VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Negative Monitor
18	-VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Negative Monitor
19	+VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Positive Monitor
20	MUTE24	P			Active Low, To be pulled to GND by current sink at least 2mA				CH2-CH4 Output stage disable PWM
21	-12/15VDC OUT			P	-12V @ 0,2A or -15V @ 0,2A			+/-10%	Negative regulated analog section supply (same as pin 21)
22	+12/15VDC OUT			P	+12V @ 0,8A or +15V @ 0,6A			+/-10%	Positive regulated analog section supply (same as pin 22)
23	TEMPMON		P		0-5V	See table 1	1kΩ		NTC sensor tap output
24	IOUT2MON		P			8,35A/V	4,7kΩ		Channel 2 Output Current Monitor



Pin#	Name	IN	OUT	POWER	Range	Scale Factor	Impedance	Tolerance	Description
25	PROTECT 24		P		Level 1 (4.5V to 5V) not in protection. Level 0 (0V to 0.5V) in Protection		4,7k $\Omega$		Channel 2 & Channel 4 Output Stage Protection Monitor
26	VOUT2MON		P			20V/V	4,5k $\Omega$		Channel 2 Output Voltage Monitor
27	GND			P					Ground
28	IN 2 -	P			Unbalanced: 1,41Vrms for full output. 8Vrms absolute max input.		4,7k $\Omega$		Channel 2 Negative Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		3,1k $\Omega$		
29	IN 2 +	P			Unbalanced: 1,41Vrms for full output shorting pin 7 to GND. 8Vrms absolute max input.		9,4k $\Omega$		Channel 2 Positive Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		9,4k $\Omega$		
30	GND			P					Ground
31	+5VDC OUT			P	+5Vdc out 20mA max current available			+/-5%	
32	RESERVED								
33	READY 2		P		Open Collector, high when output stage is operative	4V	1K $\Omega$		Channel 2 Ready
34	SDPWS	P			Active High, Logic input 3,3 to 12Vdc		1k $\Omega$		Powers Supply Shut Down

PL3000 pinout (IDC 34p)

Pin#	Name	IN	OUT	POWER	Range	Scale Factor	Impedance	Tolerance	Description
1	SDPWS		P		Active High, Logic input 3,3 to 12Vdc		1kΩ		Powers Supply Shut Down
2	READY 3		P		Open Collector, high when output stage is operative		1KΩ		Channel 3 Ready
3	RESERVED								
4	+5VDC OUT			P	+5Vdc out 20mA max current available			+/-5%	
5	AUXVSEL	P			Open: select 15V for auxiliary voltage. Short to ground: select 12V for auxiliary voltage				Internal pull-up 10kΩ @ 12V
6	IN 3 +	P			Unbalanced: 1,41Vrms for full output shorting pin 7 to GND. 8Vrms absolute max input.		9,4kΩ		Channel 3 Positive Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		9,4kΩ		
7	IN 3 -	P			Unbalanced: 1,41Vrms for full output. 8Vrms absolute max input.		4,7kΩ		Channel 3 Negative Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		3,1kΩ		
8	GND			P					Ground
9	VOUT3MON		P			20V/V	4,5kΩ		Channel 3 Output Voltage Monitor
10	PROTECT 13		P		Level 1 (4.5V to 5V) not in protection. Level 0 (0V to 0.5V) in Protection		4,7kΩ		Channel 1 & Channel 3 Output Stage Protection Monitor
11	IOUT3MON		P			8,35A/V	4,7kΩ		Channel 3 Output Current Monitor
12	TEMPMON		P		0-5V	See Table 1	1kΩ		NTC sensor tap output
13	+12/15VDC OUT			P	+12V @ 0,8A or +15V @ 0,6A			+/-10%	Positive regulated analog section supply (same as pin 22)
14	-12/15VDC OUT			P	-12V @ 0,2A or -15V @ 0,2A			+/-10%	Negative regulated analog section supply (same as pin 21)
15	MUTE13	P			Active Low, To be pulled to GND by current sink at least 2mA				CH2-CH4 Output stage disable PWM
16	+VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Positive Monitor
17	-VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Negative Monitor
18	-VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Negative Monitor
19	+VCCMON		P		20V/V 2V max		4,5kΩ		Rail Bus Positive Monitor
20	MUTE	P			Active Low, To be pulled to GND by current sink at least 2mA				CH1-CH2-CH3-CH4 Output stage disable PWM
21	-12/15VDC OUT			P	-12V @ 0,2A or -15V @ 0,2A			+/-10%	Negative regulated analog section supply (same as pin 21)
22	+12/15VDC OUT			P	+12V @ 0,8A or +15V @ 0,6A			+/-10%	Positive regulated analog section supply (same as pin 22)
23	TEMPMON		P		0-5V	See Table 1	1kΩ		NTC sensor tap output
24	IOUT4MON		P			8,35A/V	4,7kΩ		Channel 4 Output Current Monitor
25	PROTECT 24		P		Level 1 (4.5V to 5V) not in protection. Level 0 (0V to 0.5V) in Protection		4,7kΩ		Channel 2 & Channel 4 Output Stage Protection Monitor
26	VOUT4MON		P			20V/V	4,5kΩ		Channel 4 Output Voltage Monitor
27	GND			P					Ground
28	IN 4 -	P			Unbalanced: 1,41Vrms for full output. 8Vrms absolute max input.		4,7kΩ		Channel 4 Negative Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		3,1kΩ		
29	IN 4 +	P			Unbalanced: 1,41Vrms for full output shorting pin 7 to GND. 8Vrms absolute max input.		9,4kΩ		Channel 4 Positive Balanced input. 26dB Input to Output Overall Gain
					Balanced: 0,705Vrms for full output. 8Vrms absolute max input.		9,4kΩ		

Pin#	Name	IN	OUT	POWER	Range	Scale Factor	Impedance	Tolerance	Description
30	GND			P					Ground
31	+5VDC OUT			P	+5Vdc out 20mA max current available			+/-5%	
32	RESERVED								
33	READY 4		P		Open Collector, high when output stage is operative		1K $\Omega$		Channel 4 Ready
34	SDPWS	P			Active High, Logic input 3,3 to 12Vdc		1k $\Omega$		Powers Supply Shut Down

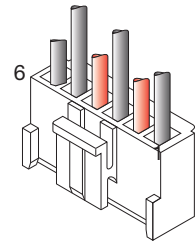
### 11:2.4.PL1001, PL2001 pinout

PL1001 pinout (B6P-VH JST)

Pin#	Symbol	Polarity	Description
1	GND	-	Channel 1 Negative
2	HOT	+	Channel 1 Positive
3	GND	-	Channel 3 Negative
4	HOT	+	Channel 3 Positive
5	GND		Parallel Ground
6	Signal		Parallel Signal

PL2001 pinout (B6P-VH JST)

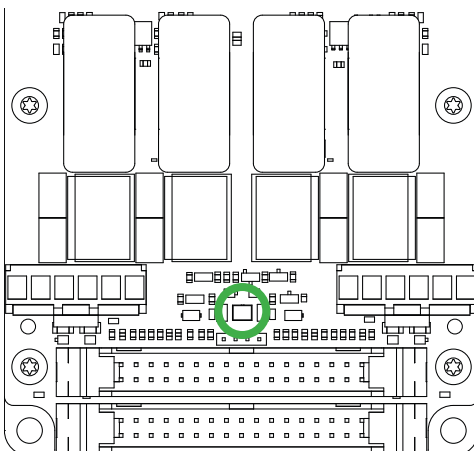
Pin#	Symbol	Polarity	Description
1	GND	+	Channel 2 Positive
2	HOT	-	Channel 2 Negative
3	GND	+	Channel 4 Positive
4	HOT	-	Channel 4 Negative
5	GND		Parallel Ground
6	Signal		Parallel Signal



Loudspeaker wires housing: JST VHR-6N

### 11:3.LED encoding

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



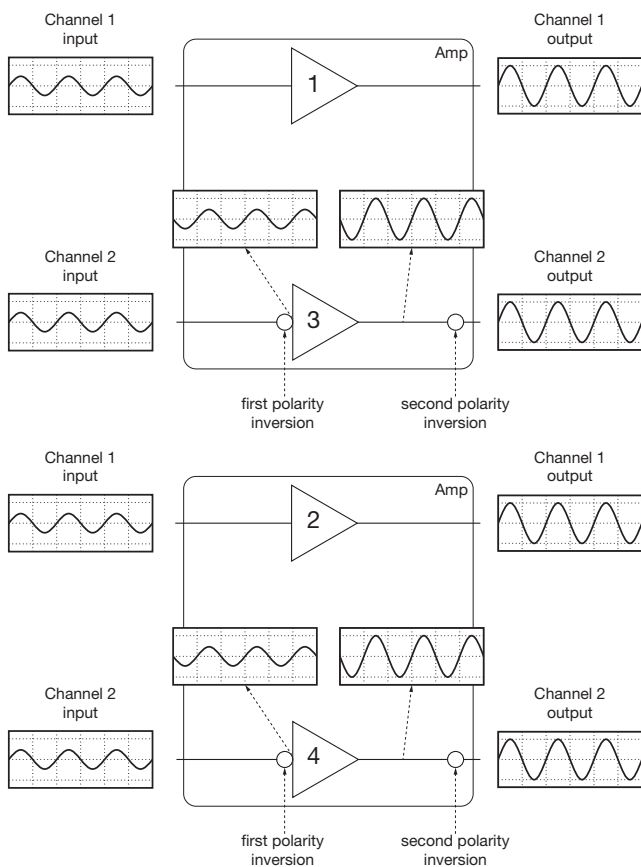
Priority	Status	Description
	Steady ON	Everything Good
1°	1 pulse (100ms ON 200ms OFF)	PGOOD not good
5°	2 pulses (100ms ON 200ms OFF)	Output stage temperature too high
4°	3 pulses (100ms ON 200ms OFF)	transformer temperature too high
6°	4 pulses (100ms ON 200ms OFF)	high frequency protection
2°	5 pulses (100ms ON 200ms OFF)	transformer NTC broken
3°	6 pulses (100ms ON 200ms OFF)	output stage NTC broken

## 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 polarity reversed, one with respect to the other within the pair, when entering the amplifier. 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. Both channels 1 and 2 are fed with the same sine signal.

## 11:5. Output Configuration

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

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

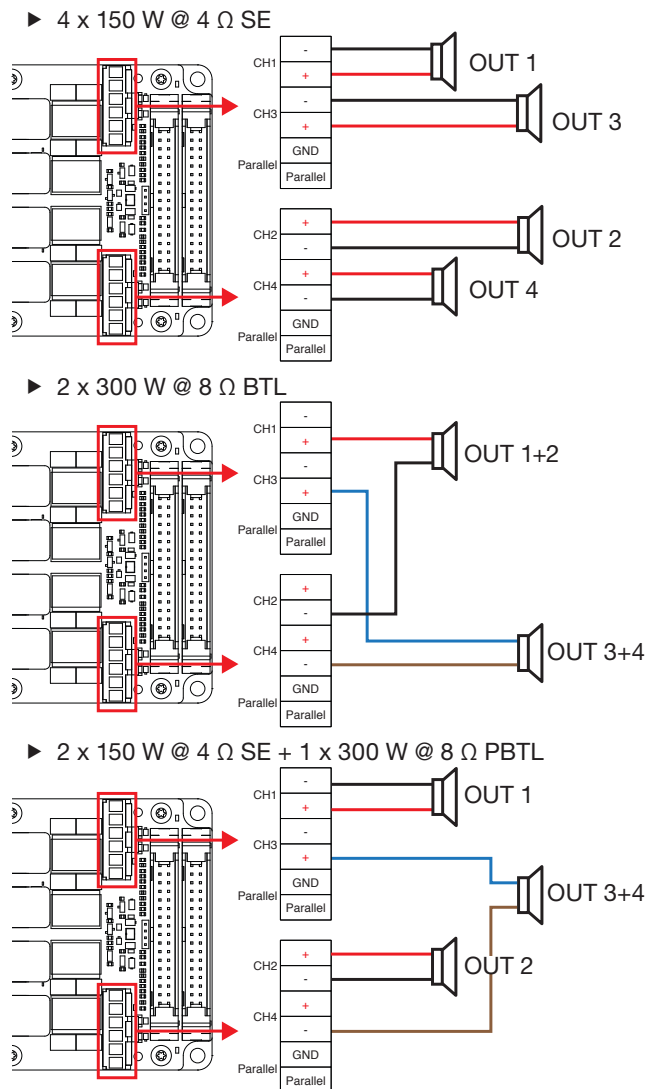
2 x BTL (Bridge Tied Load): Two couples of channels bridged.

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 X, 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.



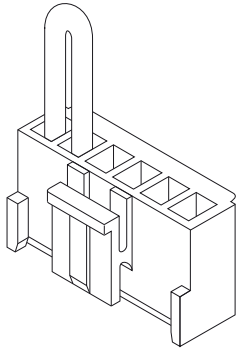
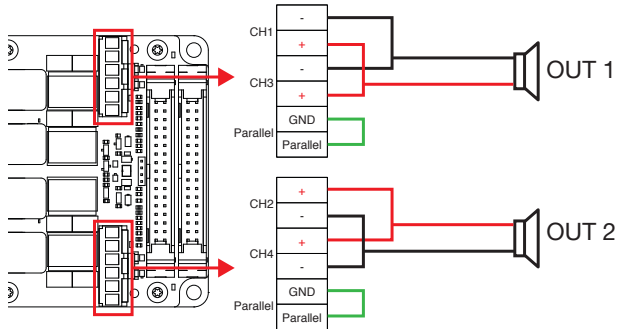
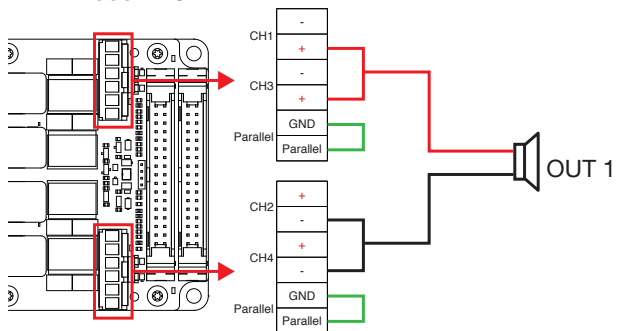


FIGURE 8: Short-circuited pins on the output connector.

► 2 x 300 W @ 2 Ω PTL



► 1 x 600 W @ 4 Ω PBTL



## 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.

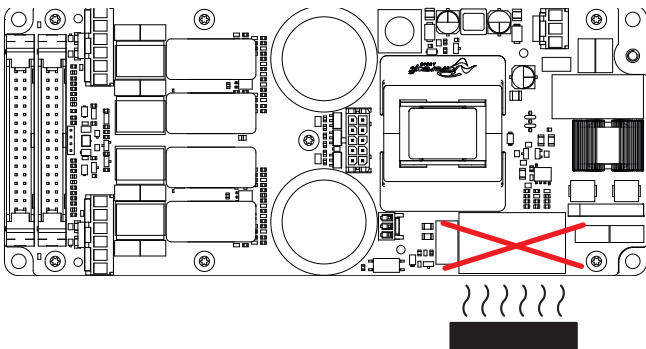
The architecture of Powersoft's amplifiers encompass several protection mechanisms triggered by harmful signal and temperature. Protection systems and triggers are independently implemented in the power supply section (power supply protection) and the amplifier section (amplifier protections) in order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

### 12:1.Fan control

By activating the parallel mode on one of the output connectors, implies parallel mode set on both couple of channels. For safety reasons we suggest to apply the parallel mode on both connectors.

The fan is not provided with the package, Powersoft recommends:

- ▷ 40x40= SUNON series MB60151Vx, or series MF60151Vx



Do not position the fan as indicated above as this may result in wrong temperature readings.

T (°C)	V
25	2.71
30	2.47
35	2.24
40	2.02
45	1.82
50	1.63
55	1.46
60	1.3
65*	1.16
70	1.04
75	0.93
80	0.83
85	0.75

\*FAN ACTIVATION THRESHOLD

TABLE 1: Temperature to voltage relationship on TEMPON pins in PL1001

### 12:1.1.Primary AC mains overcurrent protection

A 4A time-delay fuse prevents against dangerous mains overcurrent in case of an internal failure. The fuse is soldered on the PCB, it can be replaced only by authorized Powersoft Service Center.

### 12:1.2.Primary AC mains overvoltage protection

AC mains overvoltage threshold is set to 280 V<sub>rms</sub>. If the AC mains voltage exceeds 280 V<sub>rms</sub> the primary power supply stops working. The power supply turns on again when the AC mains voltage drops under 275 V<sub>rms</sub>.

### 12:1.3.Primary thermal protection

The temperature is detected by the NTC inside the power transformer. The limiting factor is set as follows: fan starts to run as soon as the transformer reaches 80°, amplifier starts to reduce the output stage voltage as soon as the transformer reaches 100°. When the temperature exceeds 120°, output stage goes in safety thermal switch off.

Protection status is reported as follow:

Priority	Status	Description
	Steady ON	Everything Good
1°	1 pulse (100ms ON 200ms OFF)	PGOOD not good
5°	2 pulses (100ms ON 200ms OFF)	Output stage temperature too high
4°	3 pulses (100ms ON 200ms OFF)	transformer temperature too high
6°	4 pulses (100ms ON 200ms OFF)	high frequency protection
2°	5 pulses (100ms ON 200ms OFF)	transformer NTC broken
3°	6 pulses (100ms ON 200ms OFF)	output stage NTC broken

In case of a broken NTC, or when the temperature is <-30°, the protection status will be reported as follows:

2°	5 pulses (100ms ON 200ms OFF)	transformer NTC broken
----	-------------------------------	------------------------

### 12:1.4.Auxiliary Undervoltage Protection

In case the Aux voltage drops below 10.5 V, the protection status will be reported as follows:

1°	1 pulse (100ms ON 200ms OFF)	PGOOD not good
----	------------------------------	----------------

## 12:2.Amplifier protections

### 12:2.1.Amplifier Thermal protection

The temperature is detected by the NTC in the middle of the PCB, close to the fixing screw. The limiting factor is set as follows: amplifier starts to reduce the output stage voltage as soon as the NTC reaches 85°, when the temperature exceeds 100°, output stage goes in safety thermal switch off.

Protection status is reported as follow:

Priority	Status	Description
	Steady ON	Everything Good
1°	1 pulse (100ms ON 200ms OFF)	PGOOD not good
5°	2 pulses (100ms ON 200ms OFF)	Output stage temperature too high
4°	3 pulses (100ms ON 200ms OFF)	transformer temperature too high
6°	4 pulses (100ms ON 200ms OFF)	high frequency protection
2°	5 pulses (100ms ON 200ms OFF)	transformer NTC broken
3°	6 pulses (100ms ON 200ms OFF)	output stage NTC broken

In case of a broken NTC, or when the temperature is <-30°, the protection status will be reported as follows:

3° 6 pulses (100ms ON 200ms OFF) output stage NTC broken

### 12:2.2. Output short circuit

If the load impedance is too low or the loudspeaker line has a short circuit (because of voice coil damages, wires short circuit, improper wiring, etc), the amplifier output current

rises to harmful values. When the output current reaches 12A<sub>peak</sub> the amplifier section switches off instantly, the power supply still working. When the short circuit is activating the protect pin goes to Level 0 (0 – 0,5mV<sub>rms</sub>)

### 12:2.3. High frequency protection

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 input signal is above 20 kHz greater than 450mV<sub>rms</sub>, the protection will activate starting the fan. Increasing the input signal, the amp module will reduce the output stage voltage until switching off the output stage.

Protection status is reported as follow:

Priority	Status	Description
	Steady ON	Everything Good
1°	1 pulse (100ms ON 200ms OFF)	PGOOD not good
5°	2 pulses (100ms ON 200ms OFF)	Output stage temperature too high
4°	3 pulses (100ms ON 200ms OFF)	transformer temperature too high
6°	4 pulses (100ms ON 200ms OFF)	high frequency protection
2°	5 pulses (100ms ON 200ms OFF)	transformer NTC broken
3°	6 pulses (100ms ON 200ms OFF)	output stage NTC broken

## Cable Kit - KT000349

For module evaluation only.

### 13:1.Mains Cable – CB000727



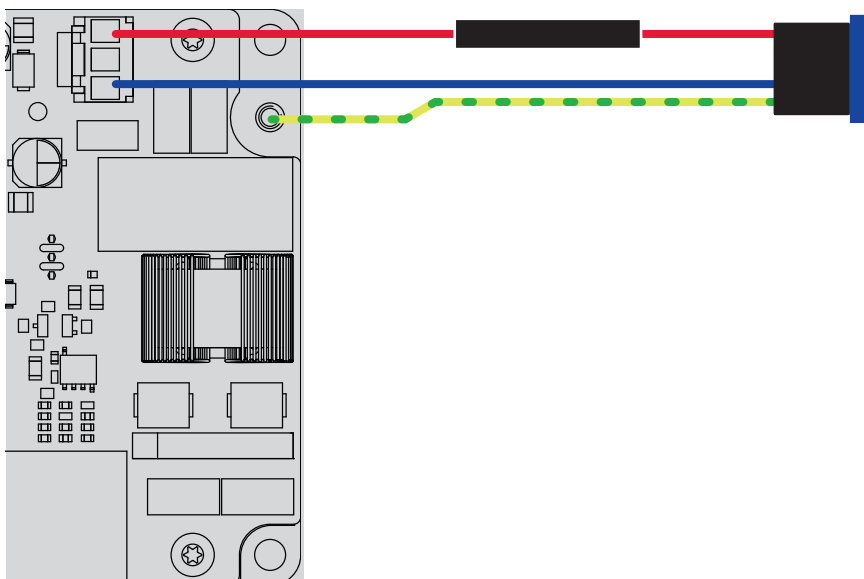
#### Bill of Materials

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	Yell/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

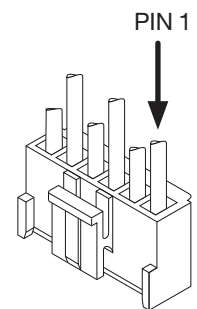
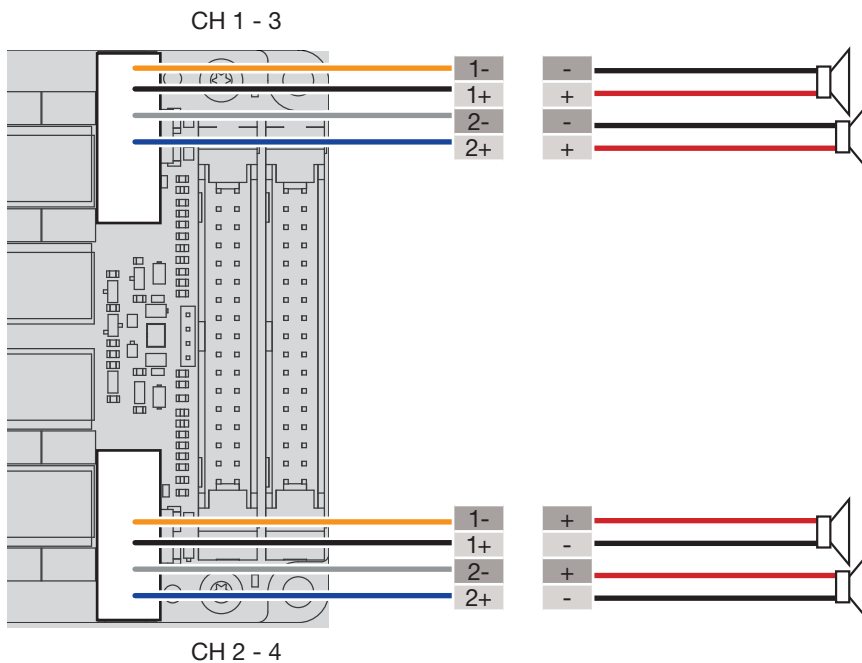
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
1	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
1	White Cable	16 AWG
1	Blue Cable	16 AWG
1	Orange Cable	16 AWG
1	Grey Cable	16 AWG

### 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.U.	N.U.	N.U.
6	N.U.	N.U.	N.U.

### 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.U.	N.U.	N.U.
6	N.U.	N.U.	N.U.



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



### Bill of Materials

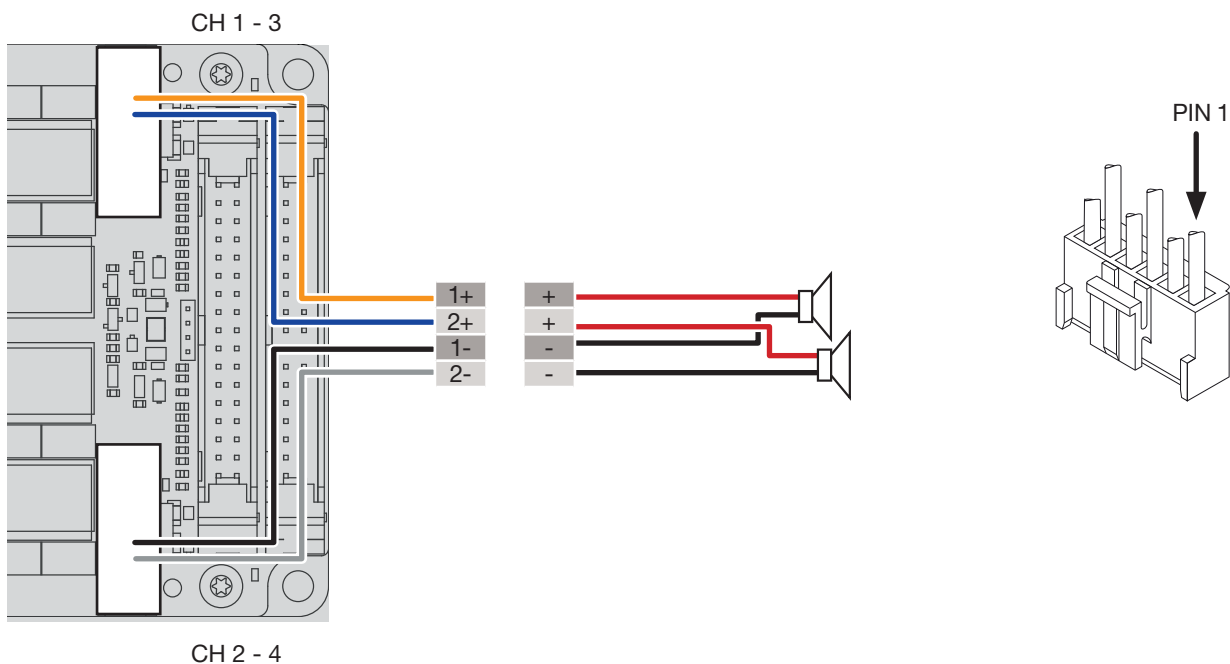
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
1	White Cable	16 AWG
1	Blue Cable	16 AWG
1	Orange Cable	16 AWG
1	Grey Cable	16 AWG

### Pin Out CH 1-3

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

### Pin Out CH 2-4

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



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



### Bill of Materials

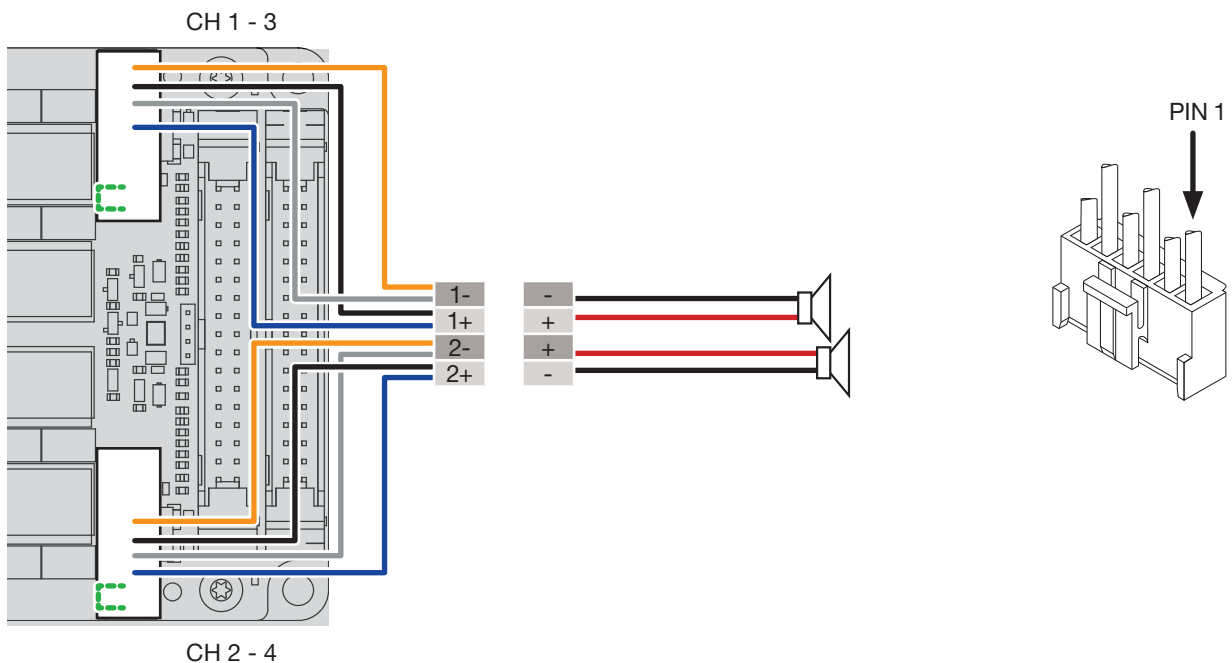
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
8	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
2	White Cable	16 AWG
2	Blue Cable	16 AWG
2	Orange Cable	16 AWG
2	Grey Cable	16 AWG
2	Loop Cable	16 AWG

### 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.U.	N.U.
6	LOOP	N.U.	N.U.

### 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.U.	N.U.
6	LOOP	N.U.	N.U.



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



### Bill of Materials

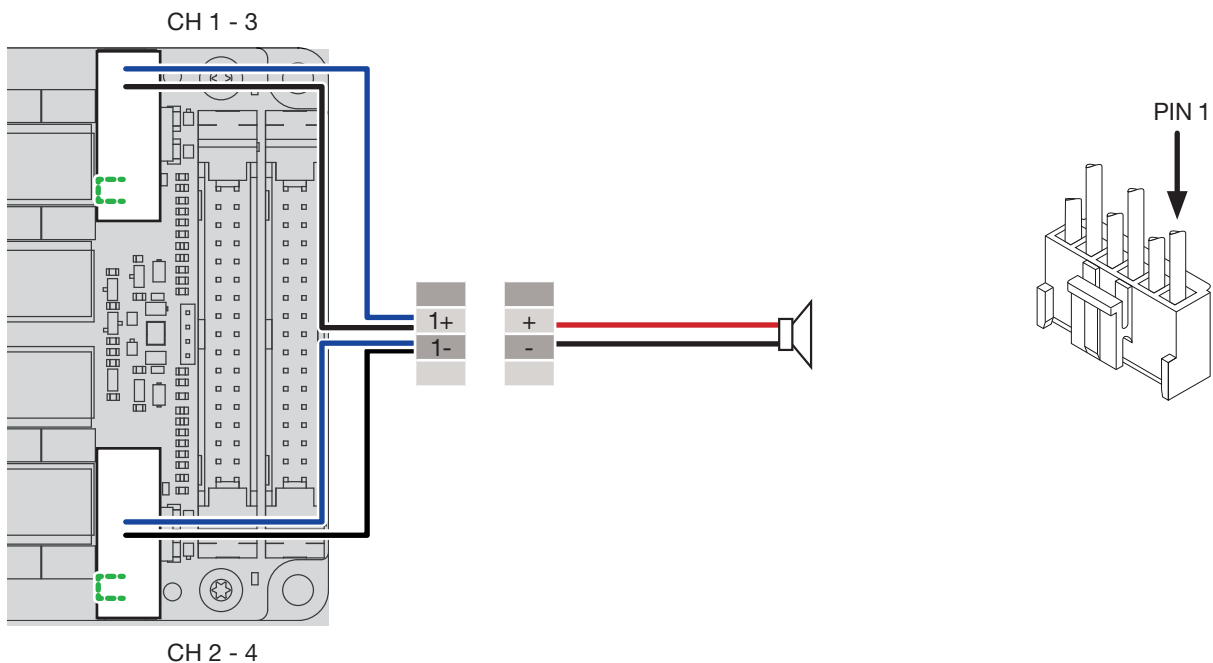
Q	Part Description	MPN / Specs
1	Speakon	NL4MP-UC
2	JST Connector	VHR-6N
4	JST Contacts	SVH-21T-P1.1 (22 ~ 18 AWG), SVH-41T-P1-1 (20 ~ 16 AWG)
2	White Cable	16 AWG
2	Blue Cable	16 AWG
2	Loop Cable	16 AWG

### Pin Out CH 1-3

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

### Pin Out CH 2-4

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

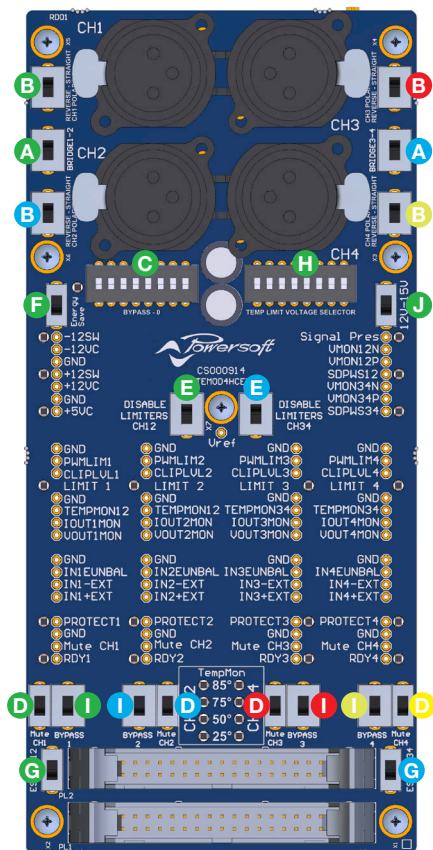


# Evaluation Board - KTP00477

# 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 any Powersoft module without using a DSP. When using amp modules that feature on board clip and thermal limiters (such as the 4HC, or DigiMod PFC2/4), the limiters on the EVB can be bypassed.



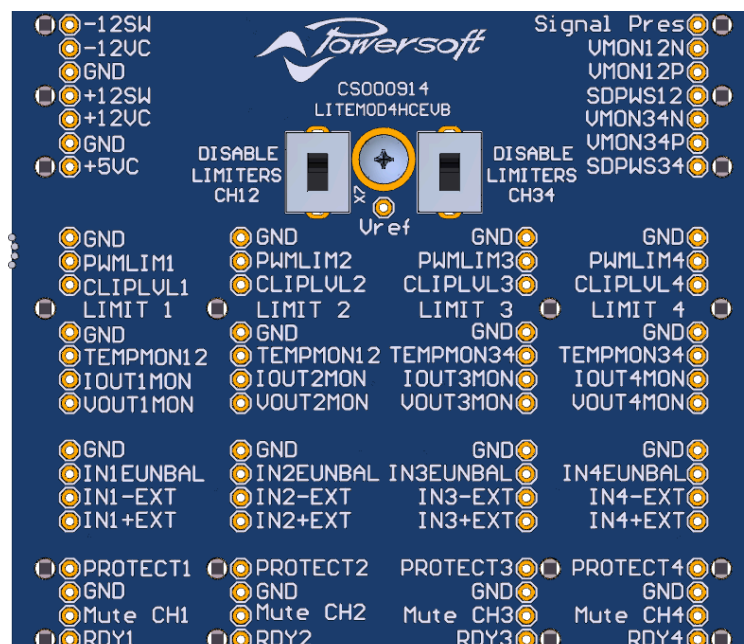
Description	Status		Suggested Position
		Lever pos. meaning	
<b>A</b> CH1-CH2 Bridge Mode	<input type="checkbox"/>	OFF	OFF
<b>A</b> CH3-CH4 Bridge Mode	<input type="checkbox"/>	OFF	OFF
<b>B</b> CH1 Polarity Reverse	<input type="checkbox"/>	ON	OFF
<b>B</b> CH2 Polarity Reverse	<input type="checkbox"/>	ON	OFF
<b>B</b> CH3 Polarity Reverse	<input type="checkbox"/>	ON	OFF
<b>B</b> CH4 Polarity Reverse	<input type="checkbox"/>	ON	OFF
<b>C</b> Bypass_0	<input type="checkbox"/>	OFF	OFF
<b>D</b> CH1 Mute	<input type="checkbox"/>	OFF	OFF
<b>D</b> CH2 Mute	<input type="checkbox"/>	OFF	OFF
<b>D</b> CH3 Mute	<input type="checkbox"/>	OFF	OFF
<b>D</b> CH4 Mute	<input type="checkbox"/>	OFF	OFF
<b>E</b> Voltage Limiter Disable CH 1-2	<input type="checkbox"/>	ON	OFF
<b>E</b> Voltage Limiter Disable CH 3-4	<input type="checkbox"/>	ON	OFF
<b>F</b> Energy Save	<input type="checkbox"/>	ON	OFF
<b>G</b> ESMODE CH1-2	<input type="checkbox"/>	OFF	OFF
<b>G</b> ESMODE CH2-3	<input type="checkbox"/>	OFF	OFF
<b>H</b> Thermal Limiter Threshold Setup	<input type="checkbox"/>	ON	See 14.4
<b>I</b> CH1 Bypass	<input type="checkbox"/>	OFF	ON
<b>I</b> CH2 Bypass	<input type="checkbox"/>	OFF	ON
<b>I</b> CH3 Bypass	<input type="checkbox"/>	OFF	ON
<b>I</b> CH4 Bypass	<input type="checkbox"/>	OFF	ON
<b>J</b> Auxilliary Voltage Selector	<input type="checkbox"/>	OFF	OFF

Switch	Status ON	Status OFF
<b>A</b> Bridge Mode	Ch1 routed to both Ch1, Ch2 Ch3 routed to both Ch3, Ch4	Each input connector is routed on its related channel
<b>B</b> Polarty Reverse	Reverse polarity for each input XLR (see block diagram for better comprehension of Polarty Reverse insertion point)	Standard polarity
<b>C</b> Bypass_0	Output sourced to IDC connector directly from input XLRs. When ON, all EVB limiting circuitry is bypassed (to be used in conjunction with Bypass 1-4 (I) configured in status OFF)	Input signal pass through internal preamplifiers and limiters.
<b>D</b> Mute	Mute related channel (disable output stage PWM generator)	Related channel unmuted
<b>E</b> Limiters Disable	thermal and voltage limiters disabled. Signal pass through internal preamplifier stage anyway.	Thermal and voltage limiters engaged.
<b>F</b> 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.
<b>G</b> 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).

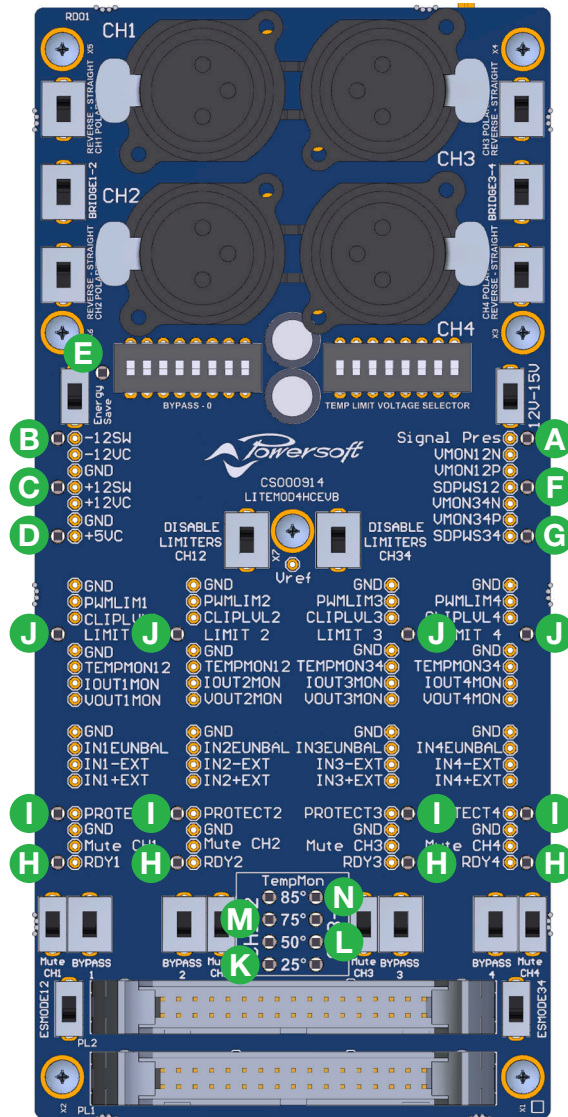
Switch	Status ON	Status OFF
<b>H</b> Thermal Limiter Threshold Setup	Set threshold according to the attached table amplifier dependant too.	
<b>I</b> Bypass 1-4	Signal goes to inner preamplifier and limiter circuitry	Signal disconnected from internal limiters. In order to completely bypass inner circuitry, Input bypass should be OFF and Limiter Bypass ON
<b>J</b> 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. Thermal Limiter THR

Thermal limiter monitors TEMPMON12-34 signals coming from the modules connected to each output connector of evaluation board. Once TEMPMON signal matches the threshold set, the limiter starts reducing input signal of related couple of channels. Threshold of thermal limiter must be setup adjusting the switches of “TEMP LIMIT VOLTAGE SELECTOR” as described in the table below. Threshold will be the same for all channels.

**TEMP LIMIT VOLTAGE SELECTOR**

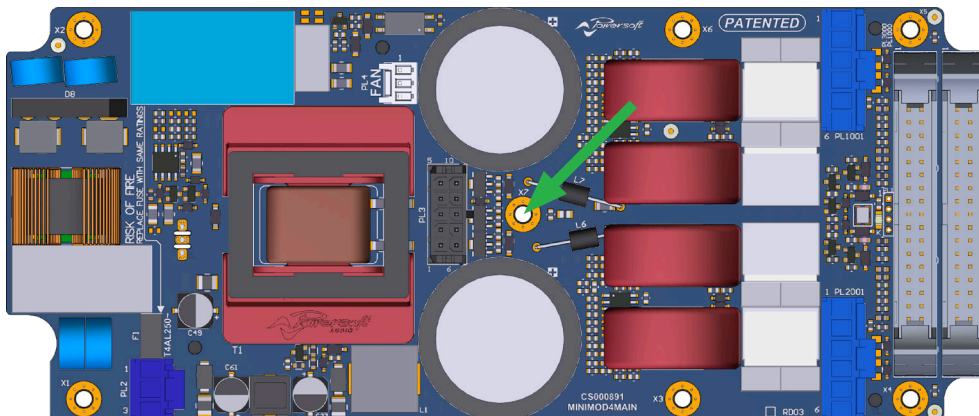
	1	2	3	4	5	6	7	8	Threshold ID
	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	g
	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	f
	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	e
	OFF	ON	ON	ON	ON	OFF	OFF	OFF	d
	OFF	ON	ON	ON	ON	ON	OFF	OFF	c
	OFF	ON	ON	ON	ON	ON	ON	OFF	b
	OFF	ON	ON	ON	ON	ON	ON	ON	a



For Minimod4, heatsinked on a standard aluminum plate, the setup that guarantee operation continuity without any thermal shut down intervention, are thresholds #c. Lower thresholds are allowed to be set, but additional precautions must be taken if it is wanted to avoiding module going into a thermal shut down.

Plate Temperature (°C)	TEMPMON12-34	Threshold ID
25	2.62	
30	2.42	
35	2.22	a
40	2.02	
45	1.83	
50	1.65	b
55	1.49	
60	1.33	
65	1.2	
70	1.07	
75	0.96	c
80	0.86	d
85	0.77	
90	0.69	
95	0.62	

*Tempmon vs. Temperature for Minimod4 (measured with a not-heatsinked amplifier)*



*Temperature is Measured on the metal plate underneath indicated point.*



## 14:5.Clip limiter + limiter bypass

A clip limiter limits a max THD of output signal of about 3%. This limiter cannot be adjusted by the user. Threshold has been intentionally set to a high THD value in order to get a maximum output power while having an acceptable distortion. Clip limiter threshold drops when thermal limiter is engaged.

Thermal and voltage limiters can be enabled (ON status) or disabled by these switches. When the switches are enabled limiters are not working but differently by the bypass function, signal pass through internal preamplifier stage anyway. The purpose of this feature is a quick A/B comparison of amplifier with or without clip limiter active.

## 14:6.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

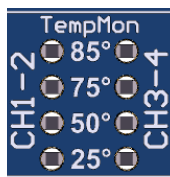
## 14:7.AUX Voltage selector

By default most of Powersoft modules provide an auxiliary supply voltage of +/-12V. By activating (ON status) this switch, Minimod4 provide an auxiliary volt of +/-15V available on MiniMod4 only.

## 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 inputs (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:

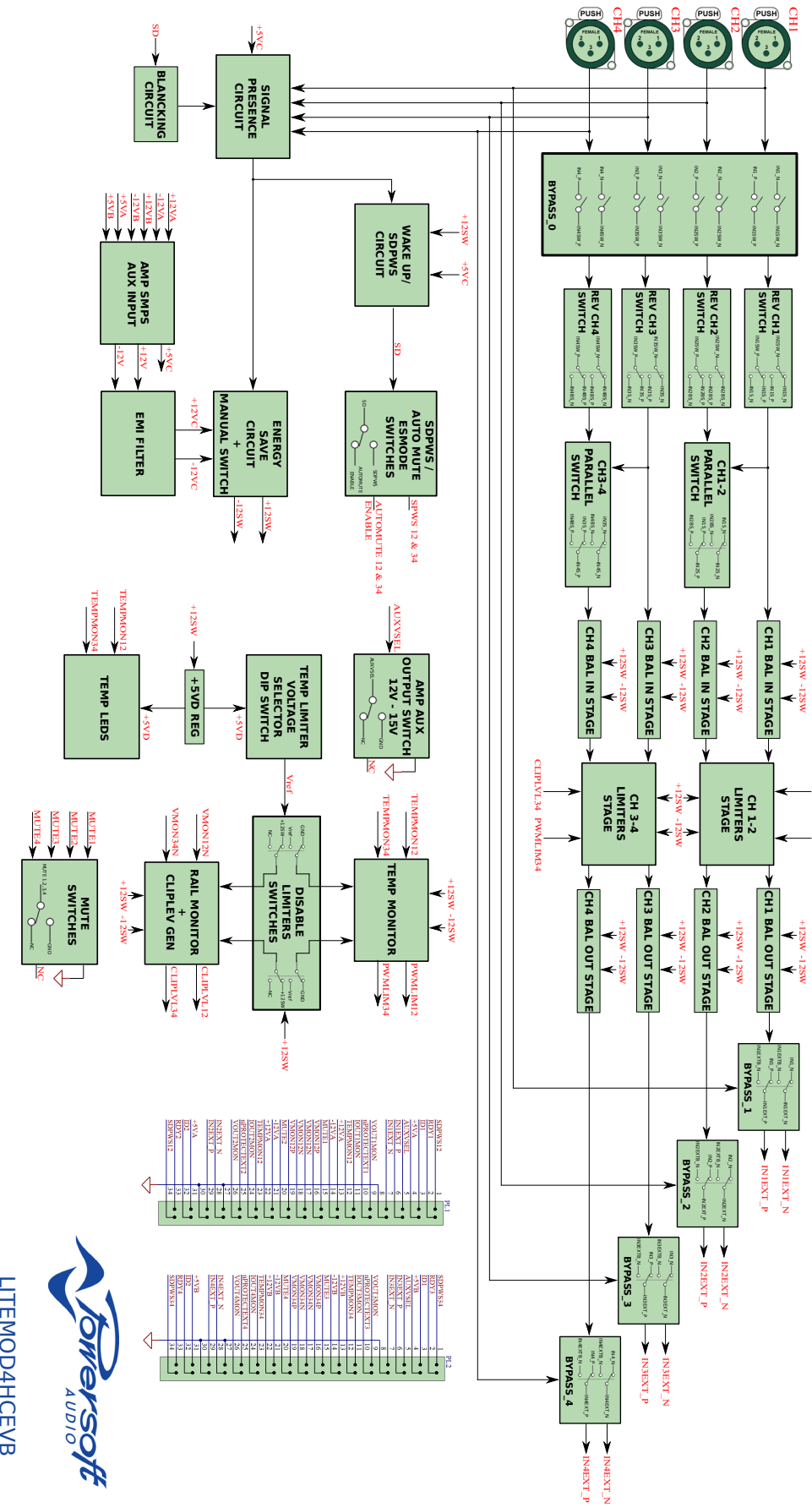
Channel to be bypassed	BYPASS_0								BYPASS_1-4			
	1	2	3	4	5	6	7	8	1	2	3	4
CH1	OFF	OFF	-	-	-	-	-	-	ON	-	-	-
CH2	-	-	OFF	OFF	-	-	-	-	-	ON	-	-
CH3	-	-	-	-	OFF	OFF	-	-	-	-	ON	-
CH4	-	-	-	-	-	-	OFF	OFF	-	-	-	ON

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

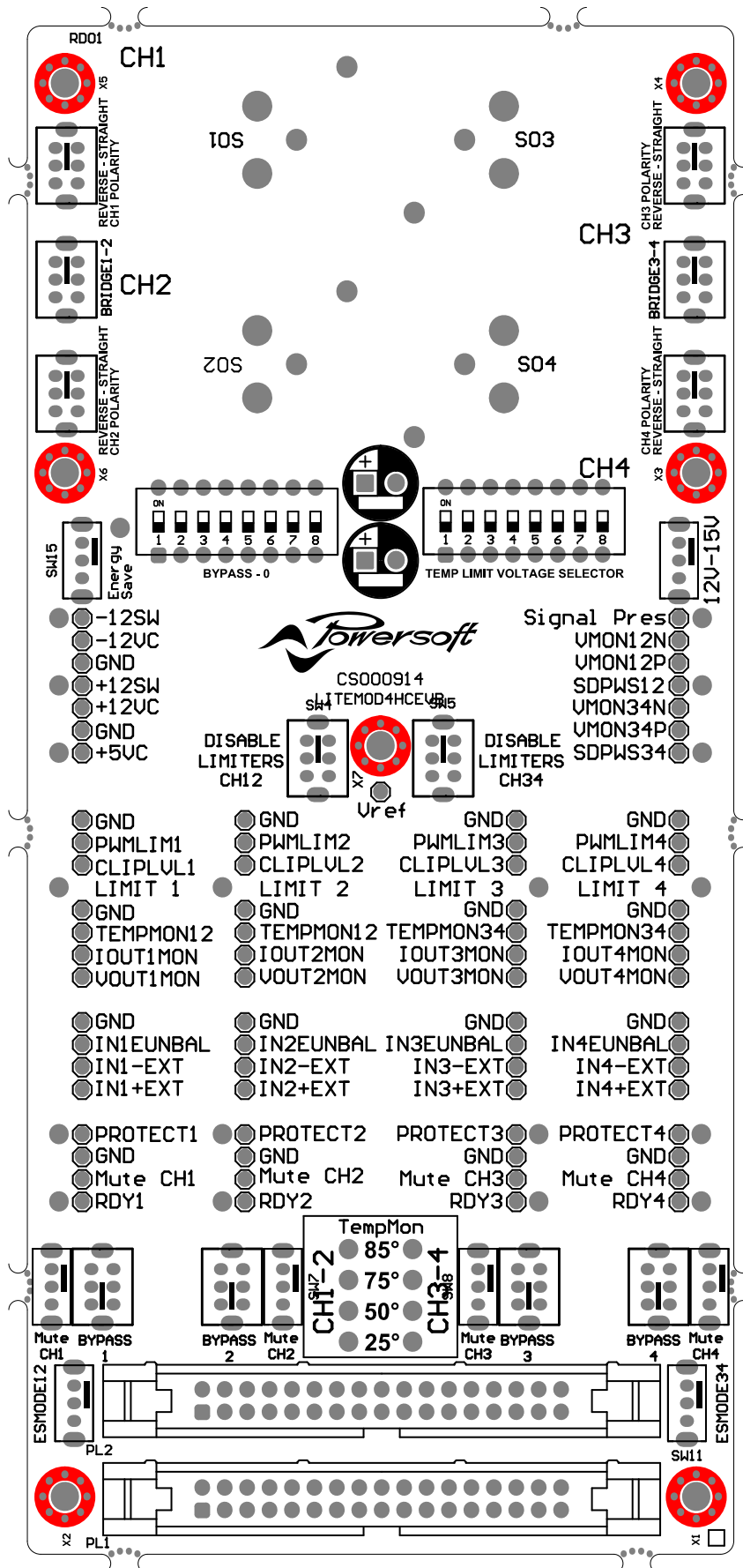
Channel to be activated	BYPASS_0								BYPASS_1-4			
	1	2	3	4	5	6	7	8	1	2	3	4
CH1	ON	ON	-	-	-	-	-	-	OFF	-	-	-
CH2	-	-	ON	ON	-	-	-	-	-	OFF	-	-
CH3	-	-	-	-	ON	ON	-	-	-	-	OFF	-
CH4	-	-	-	-	-	-	ON	ON	-	-	-	OFF

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

# 14:10. Block diagram

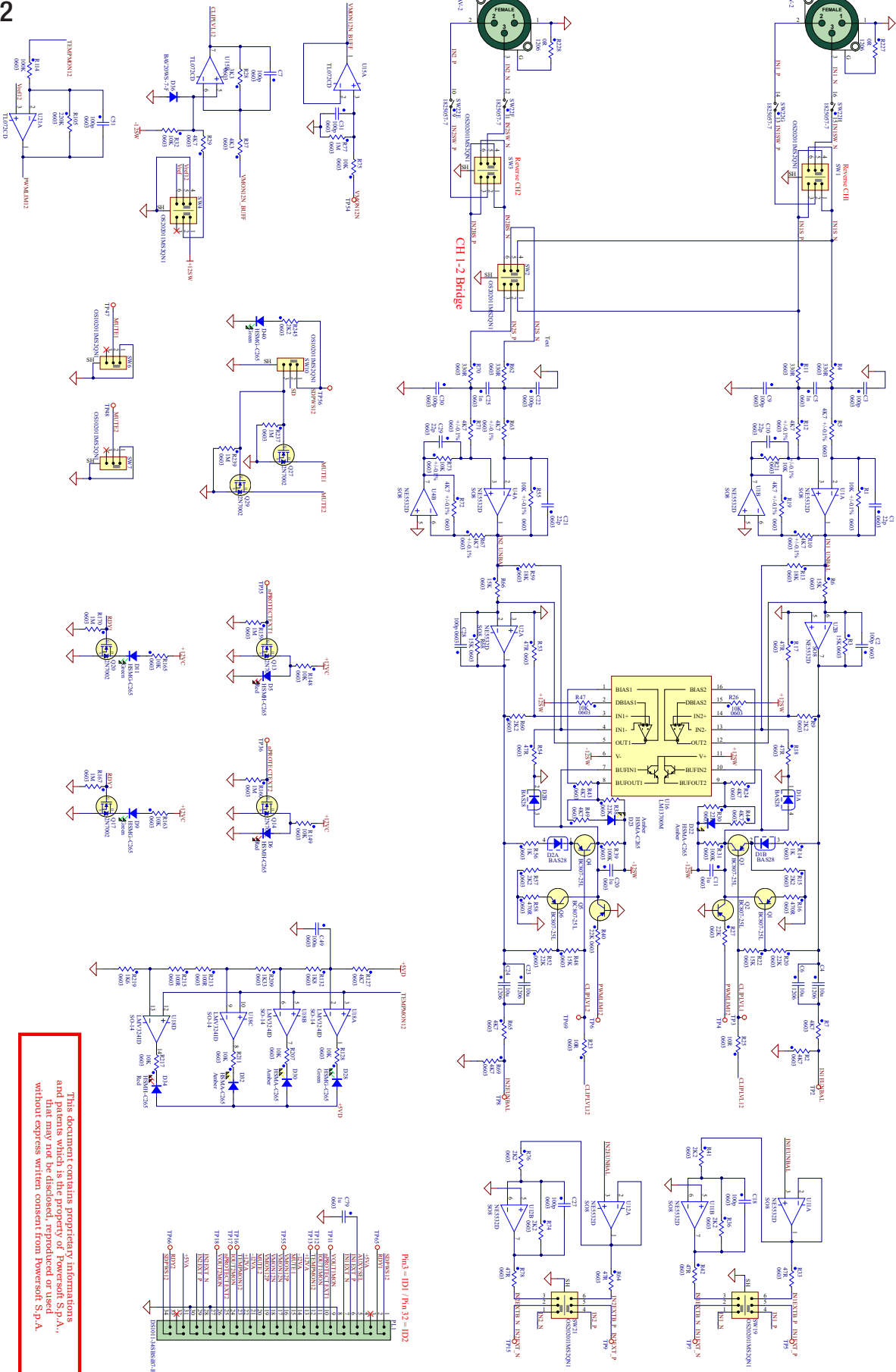


14:11.Silkscreen



# 14:12.Schematic

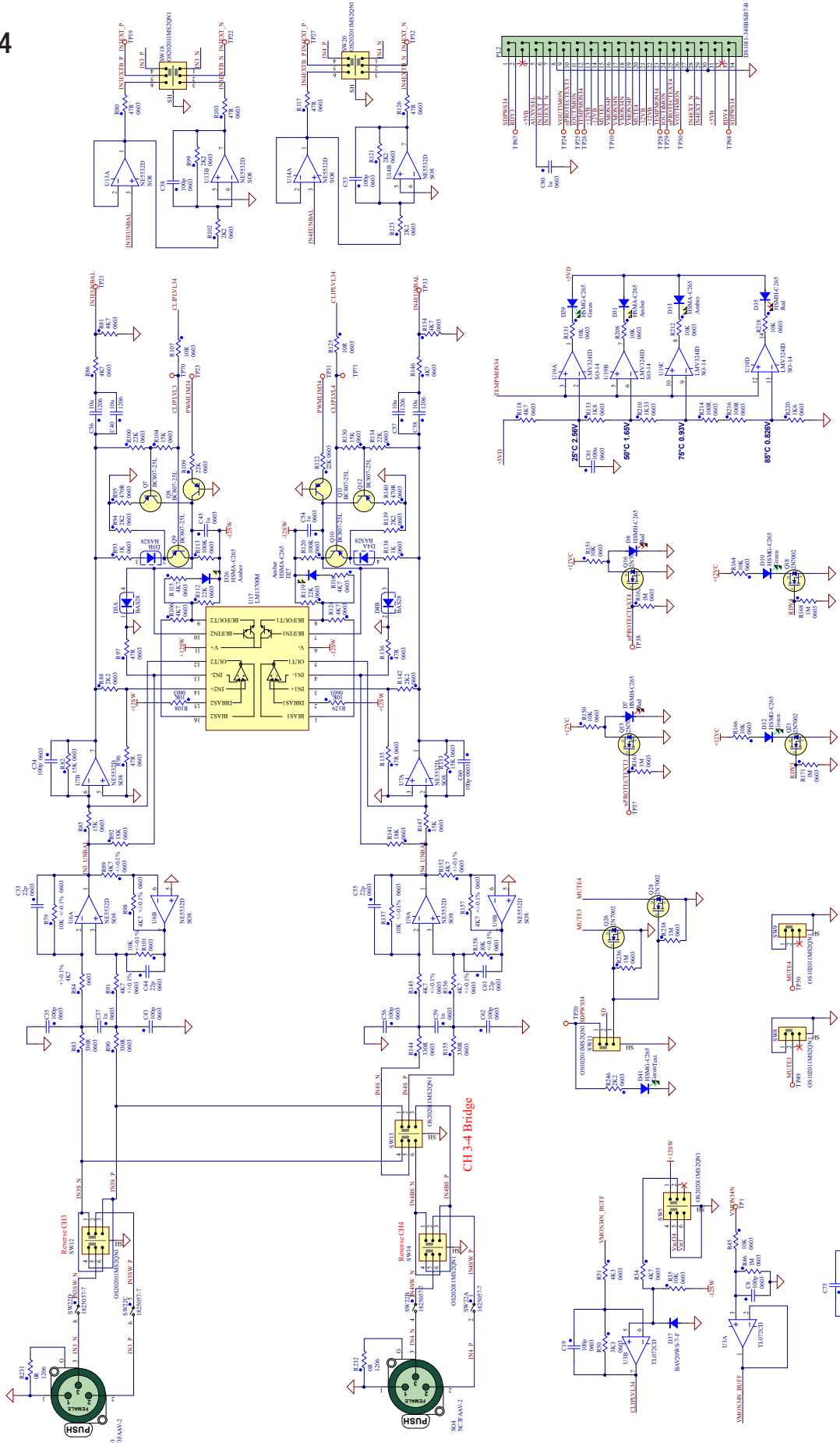
## CH1-2



PH3 = ID1 / Ph3-1 - ID2

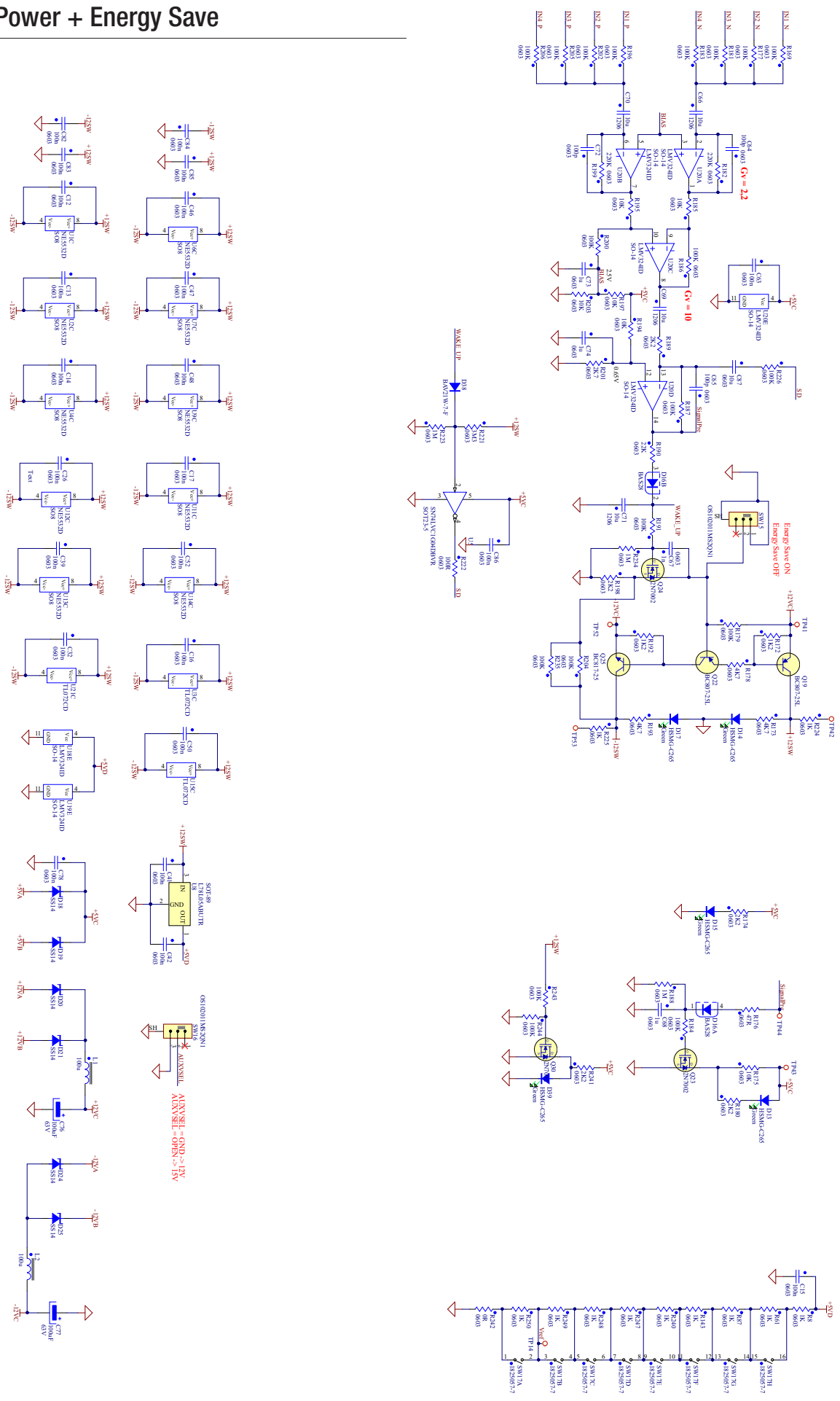
This document contains proprietary information and may not be disclosed, reproduced or used without express written consent from PowerSoft S.p.A.

# CH3-4



This document contains proprietary information and patents which is the property of Powersoft S.p.A., that may not be disclosed, reproduced or used without express written consent from Powersoft S.p.A.

# 14:13.Power + Energy Save



## 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](mailto: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](mailto: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	150 W
Maximum output power per channel @ 8Ω	75 W
Maximum output power @ 8Ω bridge mode	300 W
Maximum output power @ 2Ω parallel mode	300 W
Maximum output power @ 4Ω parallel bridge mode	600 W
Maximum total power all channels driven	600 W
Max Output Voltage and Current	
Single Ended	35 V <sub>peak</sub> / 10 A <sub>peak</sub>
BTL	70 V <sub>peak</sub> / 10 A <sub>peak</sub>
PBTL	70 V <sub>peak</sub> / 20 A <sub>peak</sub>

Audio	
Gain	26 dB
Frequency Response (±1 dB , 1 W @ 8 Ω)	10 Hz - 30 kHz
Noise Floor	Typical -80 dBV (A)
Crosstalk Separation (1 kHz)	Typical > 70 dB
Input sensitivity	4 dBu
Input impedance	13 kΩ balanced
THD+N (from 0.1 W to 1/2 Power)	< 0.1% (typical < 0.05%)
DIM (from 0.1 W to 1/2 Power)	< 0.1% (typical < 0.05%)

Construction	
Dimensions	190 x 80 x 42 mm
Weight	500 g

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
<b>Consumption</b>	
Standby	< 2. a W
Idle	< 10 W
Rated Load (1/4 Max Power)	150 W
AC Current	Nominal 1.5 A   Max 7 A
Inrush Current	18

Aux Supplies	
Max aux supply current draw @ +12 V	800 mA
Max aux supply current draw @ -12 V	200 mA
Max aux supply current draw @ +5V	50 mA
Fan plug - 12V Fan	100 mA

Thermal & Environment	
Operating temperature & Humidity	-20° to 65° C, 0 to 90% Non condensing
Thermal Dissipation	Cooling Plate + Optional Fan
	@ 230 V
1/8 Max Output Power @ 4Ω	127 BTU/h
	@ 115 V
1/8 Max Output Power @ 4Ω	112 BTU/h
Vibration	ETSI EN 300 019-2-2
EMC immunity	EN 55103-2
EMC emissions	EN 55103-1
Safety standards	IEC 60065





Powersoft S.p.A.  
Via Enrico Conti, 5  
50018 Scandicci (FI) Italy

Tel: +39 055 735 0230  
Fax: +39 055 735 6235

General inquiries: [info@powersoft.it](mailto:info@powersoft.it)  
Sales: [sales@powersoft.it](mailto:sales@powersoft.it)  
Application & technical support: [support@powersoft.it](mailto:support@powersoft.it)  
Service & maintenance: [service@powersoft.it](mailto:service@powersoft.it)  
Compliance questions: [compliance@powersoft.it](mailto:compliance@powersoft.it)

[powersoft-audio.com](http://powersoft-audio.com)