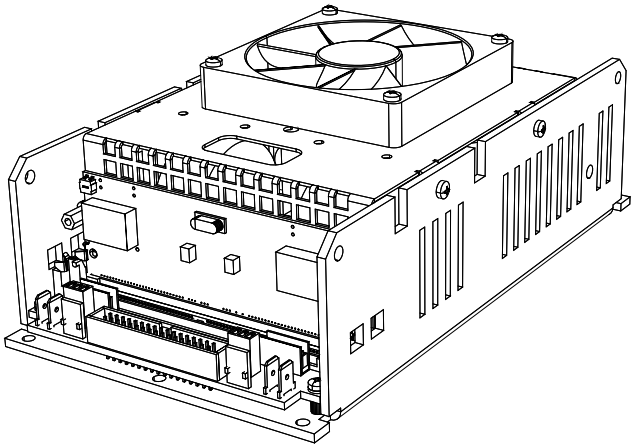
DigiMod 3004PFC2



USER MANUAL

rev. 1.1

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DigiMod 3004PFC2

User Manual

Table of contents

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DigiMod 3004PFC2

User Manual

1 Welcome

Congratulations on your purchase of the Powersoft DigiMod 3004PFC2 module.

We know you are eager to use the DigiMod 3004PFC2 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 DigiMod 3004PFC2 is a two channel amplifier modules specifically designed to drive high power loudspeakers such as woofers, subwoofers and 2-way line arrays.

The DigiMod 3004PFC2 represents an important evolution in the DigiMod Series family of products: delivering up to 1000 W on 4 Ω per channel (2000 W on 8 Ω in mono-bridged mode), the DigiMod 3004PFC2 reaches a new level of excellence in terms of power consumption and sonic performance.

The Class D fixed frequency design of the pulse width modulation ensures maximum performances, high predictability and total immunity from intermodulation artifacts.

DigiMod 3004PFC2 is fully compatible with all existing Powersoft DSP solutions providing a powerful and flexible signal processing tools on board of your loudspeaker.

The new design of the power supply equipped with PFC and Smart Rails Management reduces power consumption and enhances reliability and consistency in all operating conditions.

The DigiMod 3004PFC2 shares the same compact mechanical layout of the other DigiMod Series models guaranteeing scalability to existing and future

2 Unpacking & checking for shipping damage

Your Powersoft product was 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.

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.

4 Important safety instructions

CAUTION: 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.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE. OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHOULD NOT BE PLACED ON THIS APPARATUS.

CHECK PROPER CHASSIS EARTH CONNECTION BEFORE OPERATE.

SAFEGUARDS: This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following instructions for its installation, use and servicing.

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this amplifier near water.
- Clean only with a dry cloth.
- Ensure a proper ventilation.
- Install in accordance with Powersoft's instructions.
- Do not install near any heat sources or apparatus that produce heat.
- Only use attachments/accessories specified by Powersoft.

EXPLANATIONS OF GRAPHICAL SYMBOLS

The Lightning Flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.

The Exclamation Point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

NOTES: This equipment has been tested and found to comply by Competent Body (Directive 2004/108/EC) pursuant to the product family standard for audio professional use:

- EN 55103-1 and EN 55103-2 standard (with the limits for E4 and E5 electromagnetic environment);
- EN 61000-3-2 and EN 61000-3-3 standard.

This equipment has been tested and found to comply by Notified Body 2014 (Directive 2006/95/EC) pursuant to the audio apparatus safety requirements: Standard EN 60065.

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

5 Precautions regarding installation

5.1 Location

Install the amplifier in a ventilated enclosure (IP20 at least), where it will not be directly exposed to high temperature or humidity.
Do not install the amplifier in a location that is exposed to direct rays of the sun, or near to hot appliances or radiators. Excessive heat can adversely affect the operation and internal components. Installation of the module in a damp or dusty environment may result in malfunction or accident.

Placing and using the amplifier for long periods on heat-generation sources will affect performances. Avoid placing the amplifier on heat-generating sources. Install this amplifier as far as possible from tuners and TV sets. An amplifier installed in close proximity to such equipment may cause noise or degradation of the picture.

5.2 Wiring

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.

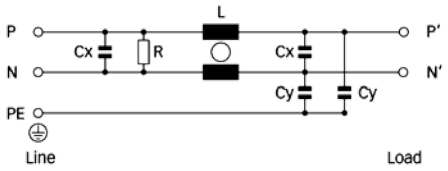
POWERSOFT cannot be considered responsible for eventual damages caused to persons, things or data for the missing of accurate earth link.

Provide the installed unit with bipolar switch to unconnect both mains connection with at least 3 mm – 118 mil – of distance between switch contacts.

Before powering this device verify that the module is supplied with the correct voltage rating.
Verify that your mains connection is capable to satisfy the power ratings of the device.

Do not use this unit if the electrical power cord is frayed or broken. Do not remove the cover. Removing the cover will expose you to potentially dangerous voltage.
The amplifier itself, its input mains and output power connection wirings must not to be accessible to the final user.

EMC filter shall be mounted on AC MAINS power supply wiring. Powersoft suggest the Schaffner FN2030-10-06 model.



5.3 Fire and liquids

Do not spill water or other liquids into or on the unit.
No naked flame sources such like lighted candles should be placed on the module.
The enclusure apparatus shall be designed so that the start and spread of fire is prevented as much as possible , and shall not give rise to danger of fire to the surrounding of the apparatus. This is achieved as follows:

- by using good engineering practice in design and production of the enclosure apparatus to avoid potential ignition sources;
- by using materials of low flammability for internal parts in the vicinity of potential ignition sources;
- by using fire enclosures to limit the spread of fire.

6 Thermal constrains

This device must be correctly heatsinked for proper and reliable operation.

Cooling of the DigiMod 3004PFC2 is achieved by means of the built-in fan cooler which shall be improved by assembling to the module's chassy a proper external passive heat sink.

The built-in fan cooler (80x80 mm, 24 V_{dc}) and an appropriate external heat sink guarantee by design thermal efficiency and reliability up to 50°C enviromental temperature with 6 dB power crest factor program operation, both channels driven on 4 Ω load.

Proper heatsink planarity is strongly suggested to allow thermal transfer from the bottom plate to the heat sink; thermal compound is recommended.

In case of installation inside of loudspeaker enclosure, proper spacing of at least 100 mm is necessary between the frame of the unit and side components or surfaces 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.

In FIGURE 1.a the module and the loudspeakers share the same chamber into the cabinet. This is the dafault 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 fan blockage.

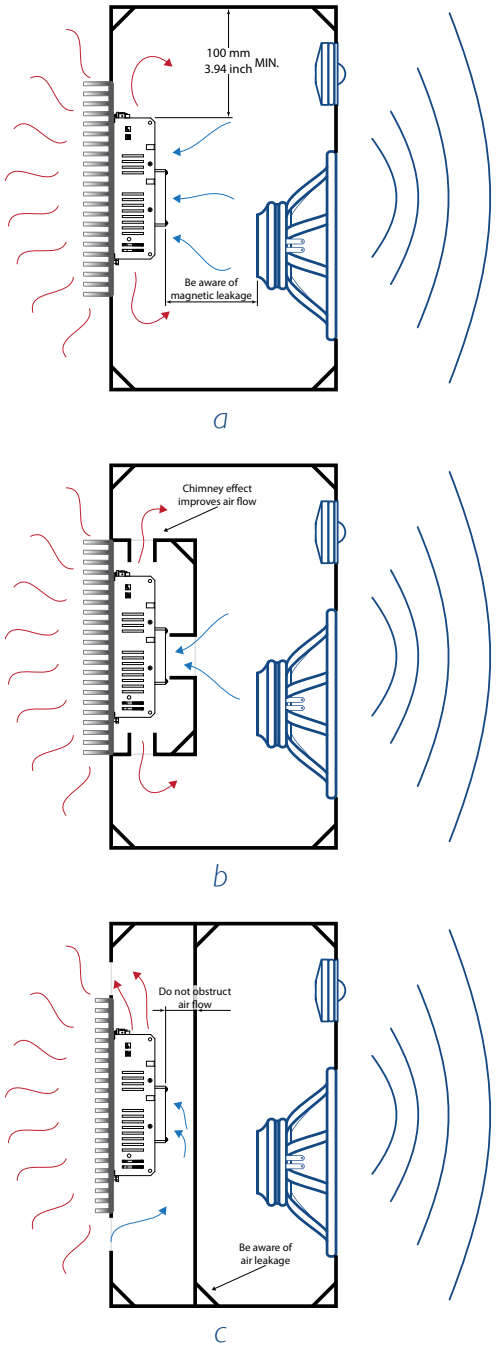


FIGURE 1: Module cooling solutions (for descriptive purpose heatsink fins are set in wrong direction); a) Module and loudspeaker into the same chamber; b) Module in a separate sealed chamber; c) Module in a separate vented chamber.

In FIGURE 1.b the module is placed in a separate chamber: we suggest to cut holes in front of the fan and on the top and bottom surfaces of the chamber. Thanks to the holes, the fan takes fresh air from the loudspeakers volume and blows it inside the module; the warm air flows outside the module's chamber helped by the chimney effect.

FIGURE 1.c shows the more efficient cooling configuration, but is less effective against dust and moisture that can get into the module and damage it. By allowing external air flow, it is possible to reduce the fins width on the heat sink by maintaining good cooling performances.

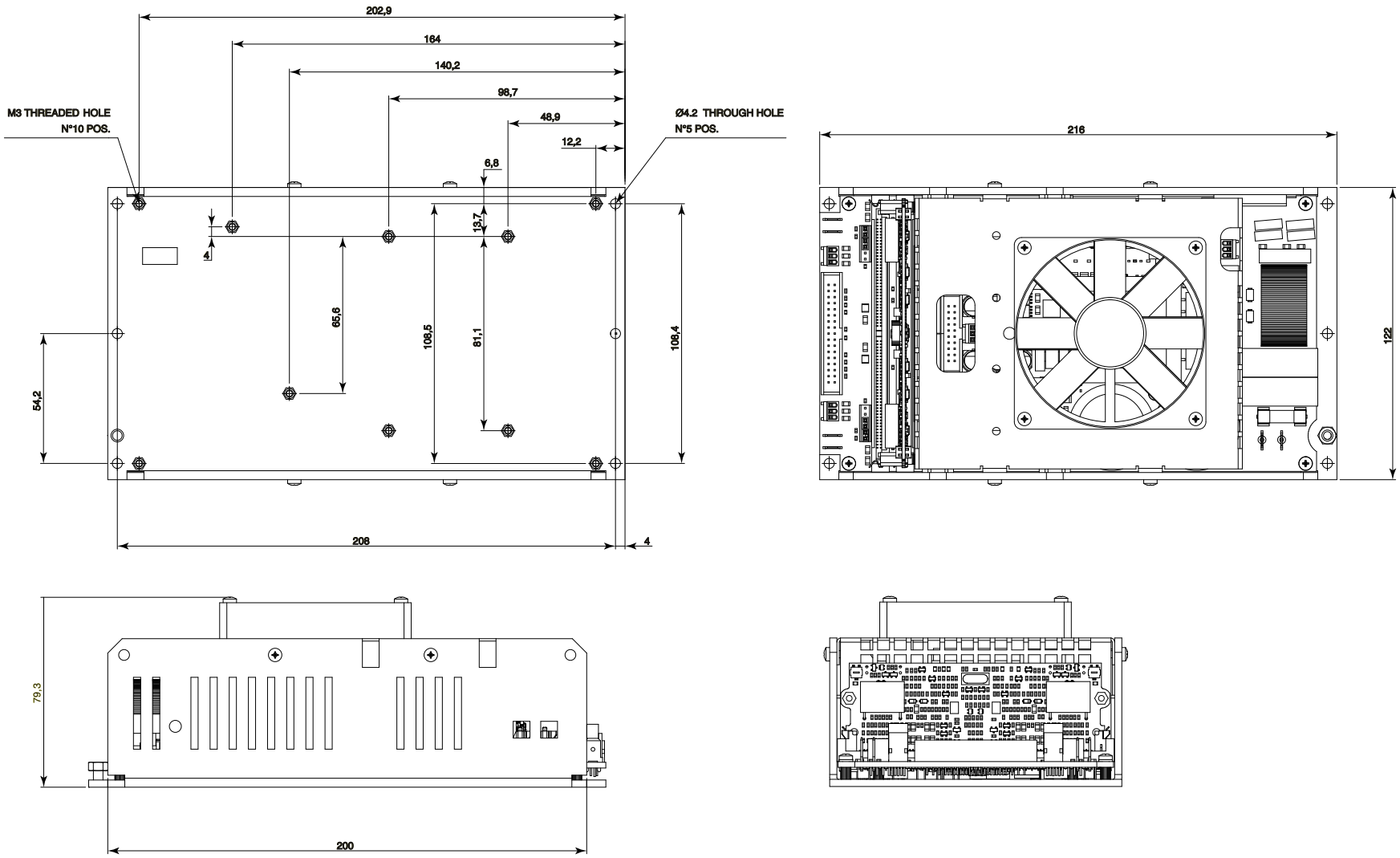


FIGURE 2: DigiMod 3004PFC2 mechanical drawings.
All dimensions in millimiters.

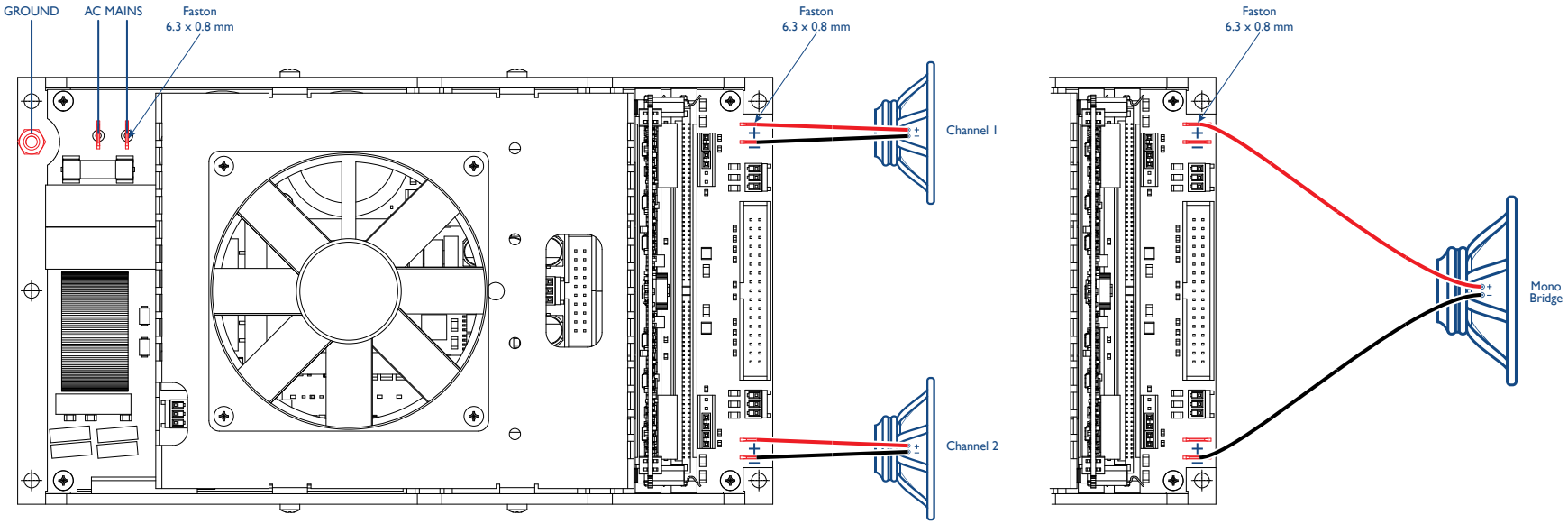


FIGURE 3: DigiMod 3004PFC2 – AC MAINS and audio output wiring.

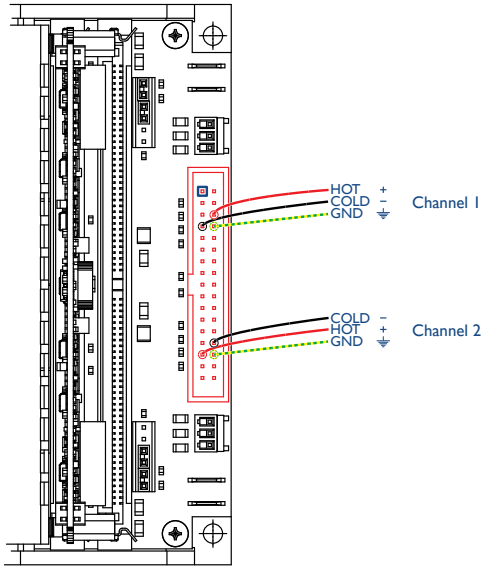


FIGURE 4: DigiMod 3004PFC2 – two input channels wiring.

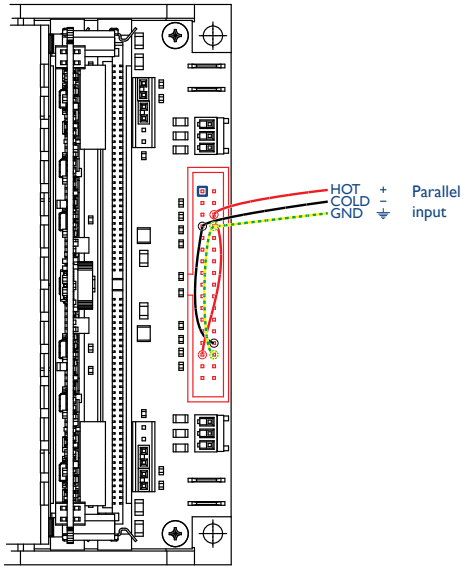
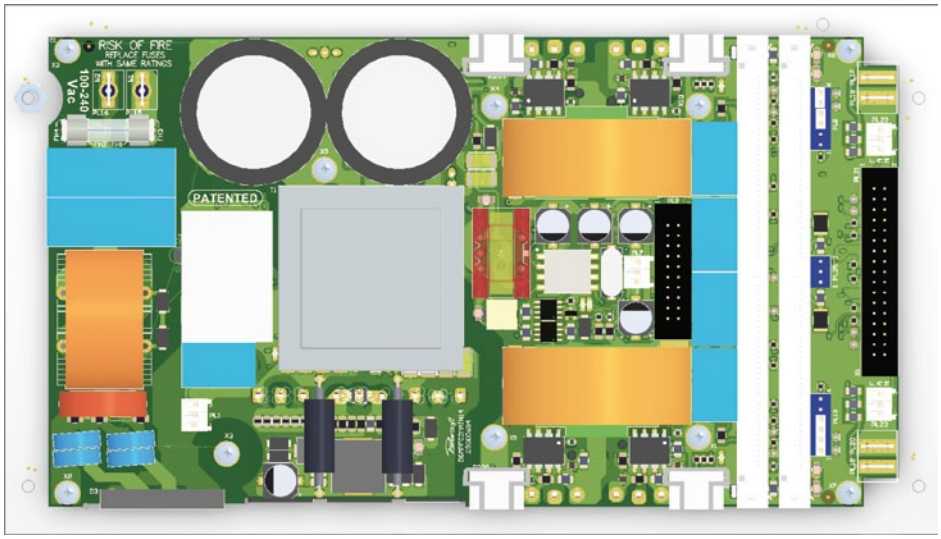
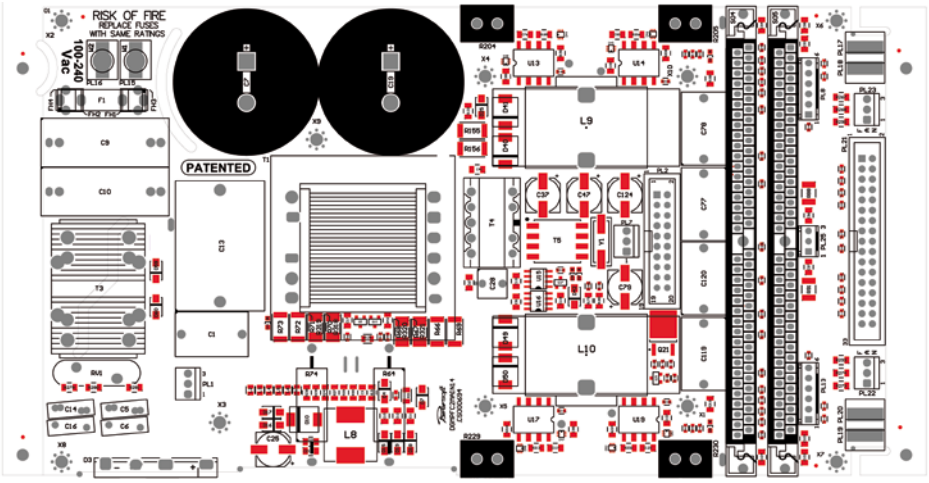


FIGURE 5: DigiMod 3004PFC2 – parallel input wiring.

9 Surface components layout





9.1 Bill of connectors

CODE	NAME	TYPE
SO5	DSP/external circuit board socket	72-pin SIMM Socket
PL21	Input connector	IDC flat cable 34 ways
PL2	Test Connector (reserved)	IDC flat cable 20 ways
PL17	Signal OUT 1 +	Faston 6.3x0.8 mm Male
PL18	Signal OUT 1 – (GND)	Faston 6.3x0.8 mm Male
PL19	Signal OUT 2 –	Faston 6.3x0.8 mm Male
PL20	Signal OUT 2 + (GND)	Faston 6.3x0.8 mm Male
PL8	Bypass Channel 1	
PL13	Bypass Channel 2	
PL23	FAN	Molex 22-27-2031
PL22	FAN	Molex 22-27-2031
PL7	FAN	Molex 22-27-2031

10 Main connectors pinout

The following image and tables show the pinout of main input and output connectors PL8, PL13, PL21 and the SIMM board.

FIGURE 6 shows the default jumpers configuratin for PL8 and PL13 connectors. By means of these jumpers it is possible to change the main gain and enable the DSP and external circuits.

Gain at +38dB is intended for low level inputs which need more boost, such as consumer devices; take care on raising the gain since this involves more noise at output stages.

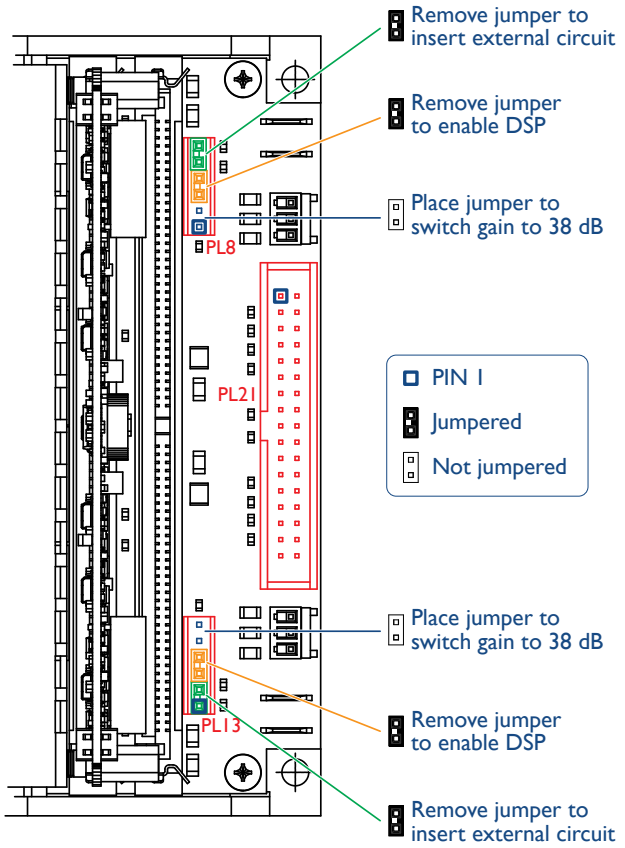


FIGURE 6: DigiMod 3004PFC2 main connectors pinout.

DSP and external circuits – such as filters or volume regulators – can be independently activated by removing related jumpers on PL8 and PL13. Both DSP and external circuits can be layed on a 72-pin SIMM board which would be plugged into the SO5 socket; for more informations about SIMM specifications, please contact Powersoft. SIMM board pinout is shown on FIGURE 7.

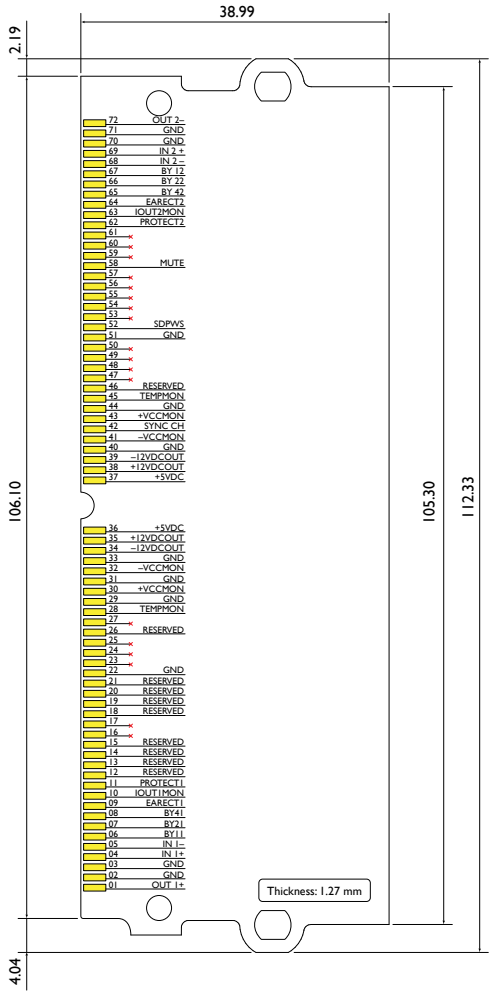


FIGURE 7: 72-pin SIMM board pinout; dimensions in millimiters.

10.1 PL 8 Pinout

Pin#	Name	IN	OUT	Impedance	Description
1	BY31	●		2.7 kΩ + 47 Ω	Channle 1 Unbalanced Intput
2-3	BY41		●	**32dB gain** 2.7 kΩ + 47Ω **38dB gain** 5.4 kΩ + 47 Ω	Channle 1 Unbalanced Output
4-5	BY21	●			Channle 1 Unbalanced Input
6	BY11		●	47 Ω	Channle 1 Unbalanced Output

10.2 PL 13 Pinout

Pin#	Name	IN	OUT	Impedance	Description
1	BY12		●	47 Ω	Channle 2 Unbalanced Output
2-3	BY22	●			Channle 2 Unbalanced Input
4-5	BY42		●	**32dB gain** 2.7 kΩ + 47Ω **38dB gain** 5.4 kΩ + 47 Ω	Channle 2 Unbalanced Output
6	BY32	●		2.7 kΩ + 47 Ω	Channle 2 Unbalanced Input

10.3 PL21 pinout

Pin#	Name	Type	Description	Range	Scale Factor	Impedance
1	SDPWS	IN	Power supply shut down. Active High. Enable enegy save mode	$3,3V_{DC} < V_{IH} < 12V_{DC}$	\	1KΩ
2	READY 1	OUT	Channel 1 PWM state. High when output 1 PWM generation is enabled	$3,3V_{DC} < V_{OH} < 5V_{DC}$ $0V_{DC} < V_{OL} < 1V_{DC}$	\	47KΩ - external cap. needed (1nF min)
3	MODEL ID	OUT	Amplifier model ID resistor. Connected between pin 32 and GND	MODEL ID pins all shorted together. 1KΩ to GND (450uA max)		
4	RESERVED - Do not connect					
5	GND	POWER				
6	IN 1+	IN	Channel 1 balanced input (non-inverting)	$2,7V_{RMS}$ input for full output Absolute MAX input= $8V_{RMS}$	\	10KΩ
			Channel 1 unbalanced input (non-inverting, when shorting pin 7 to GND)		\	
7	IN 1-	IN	Channel 1 balanced input (inverting)		\	
			Channel 1 unbalanced input (inverting, when shorting pin 6 to GND)		\	
8	GND	POWER				
9	VOUT1MON	OUT	Channel 1 output voltage monitor	$0\text{-}8V_{DC}$	20V/V	4,5KΩ
10	PROTECT 1	OUT	Channel 1 output stage protection monitor. Low when output is in protect state	$2V_{DC} < V_{OH} < 10V_{DC}$ $0V_{DC} < V_{OL} < 1V_{DC}$	\	100KΩ
11	IOUT1MON	OUT	Channel 1 output current monitor	$0\text{-}6,5V_{DC}$	8,35A/V	4,5KΩ
12	TEMPMON 12	OUT	Output stages 1&2 temperature monitor. Highest temperature between channel 1 and 2 is outputted	$0\text{-}5V_{DC}$	see userguide	Temperature dependent (≈7KΩ @25°C)
13	$+12V_{DC}$ OUT	POWER	Regulated $+12V_{DC}$ supply output (for audio circuits)	(+/-5%) Max current (total)= 0,5A	\	Protected with series Polyswitch
14	$-12V_{DC}$ OUT	POWER	Regulated $-12V_{DC}$ supply output (for audio circuits)	(+/-5%) Max current (total)= 0,5A	\	Protected with series Polyswitch
15	MUTE 1	IN	Channel 1 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=$0,2V_{DC}$ | Isink=20mA (min)	\	\
16	+VCCMON	OUT	Positive rail bus monitor	$+7,5V_{DC}$ MAX	20V/V	4,5KΩ
17	-VCCMON	OUT	Negative rail bus monitor	$-7,5V_{DC}$ MAX	20V/V	4,5KΩ
18	-VCCMON	OUT	Negative rail bus monitor	$-7,5V_{DC}$ MAX	20V/V	4,5KΩ
19	+VCCMON	OUT	Positive rail bus monitor	$+7,5V_{DC}$ MAX	20V/V	4,5KΩ

Table continues on the next page...

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Pin#	Name	Type	Description	Range	Scale Factor	Impedance
20	MUTE 2	IN	Channel 2 hardware mute. Active low. Disable output stage PWM generator	VIL (max)=0,2V_{DC} | Isink=20mA (min)	\	\
21	-12V_{DC} OUT	POWER	Regulated -12V_{DC} supply output (for audio circuits)	(+/-5%) Max current= see pin 14	\	\
22	+12V_{DC} OUT	POWER	Regulated +12V_{DC} supply output (for audio circuits)	(+/-5%) Max current= see pin 13	\	\
23	TEMPMON 12	OUT	Output stages 1&2 temperature monitor. Highest temperature between channel 1 and 2 is outputted	0-5V_{DC}	see userguide	Temperature dependent (≈7KΩ @25°C)
24	IOUT2MON	OUT	Channel 2 output current monitor	0-6,5V_{DC}	8,35A/V	4,5KΩ
25	PROTECT 2	OUT	Channel 2 output stage protection monitor. Low when output is in protect state	2V_{DC}< V_{OH} <10V_{DC} 0V_{DC}< V_{OL} <1V_{DC}	\	100KΩ
26	VOUT2MON	OUT	Channel 2 output voltage monitor	0-8V_{DC}	20V/V	4,5KΩ
27	GND	POWER				
28	IN 2-	IN	Channel 2 balanced input (inverting)	2,7V_{RMS} input for full output Absolute MAX input= 8V_{RMS}	\	10KΩ
			Channel 2 unbalanced input (inverting, when shorting pin 29 to GND)		\	
29	IN 2+	IN	Channel 2 balanced input (non-inverting)		\	
			Channel 2 unbalanced input (non-inverting, when shorting pin 28 to GND)		\	
30	GND	POWER				
31	RESERVED - Do not connect					
32	MODEL ID	OUT	Amplifier model ID resistor. Connected between pin 32 and GND	\	\	see pin 3
33	READY 2	OUT	Channel 2 PWM state. High when output 2 PWM generation is enabled	3,3V_{DC}< V_{OH} <5V_{DC} 0V_{DC}< V_{OL} <1V_{DC}	\	47KΩ - external cap. needed (1nF min)
34	SDPWS	IN	Power supply shut down. Active High. Enable enegy save mode	3,3V_{DC}< V_{IH} <12V_{DC}	\	1KΩ

11 Audio path block diagram

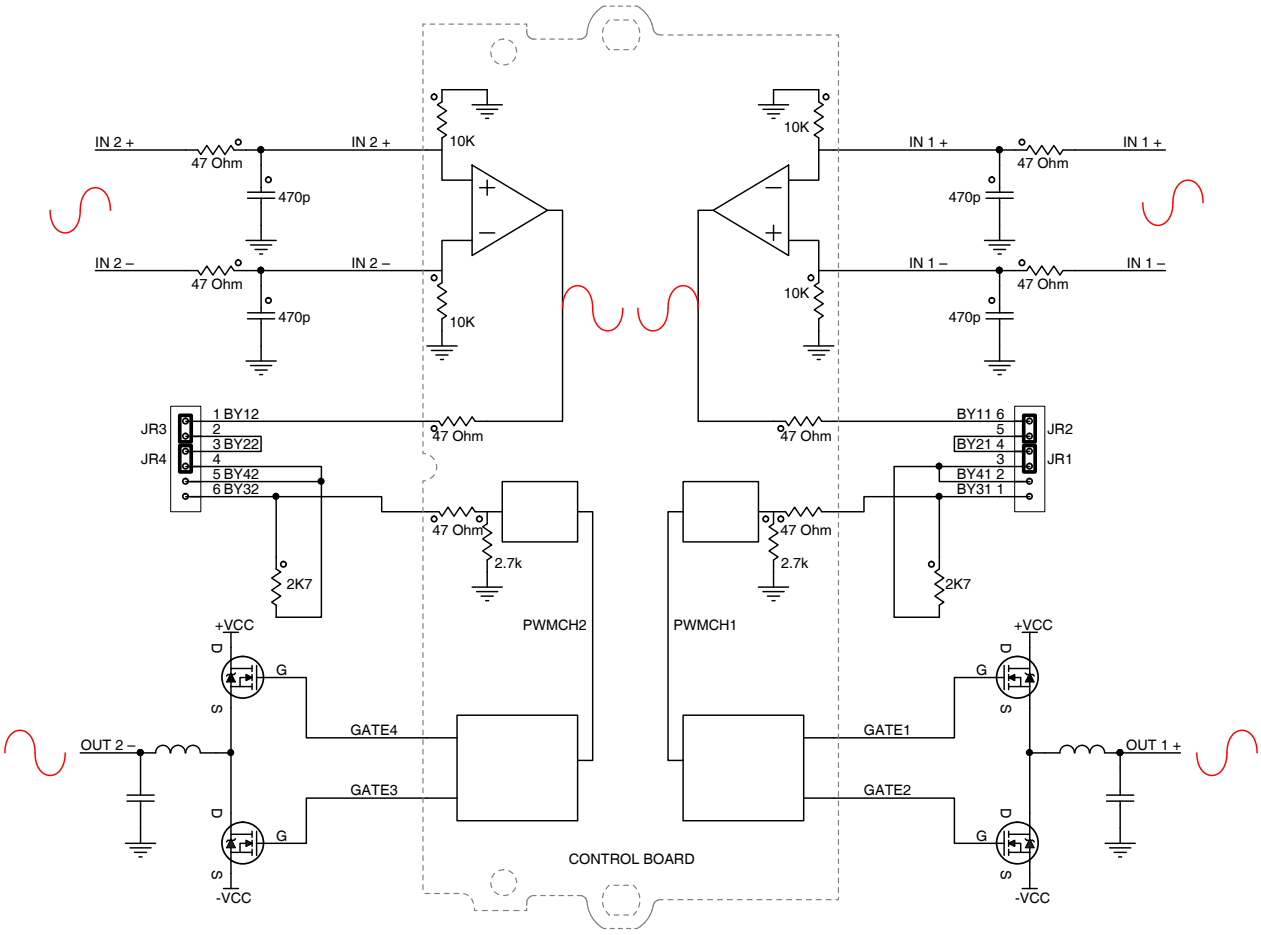

FIGURE 8: Audio path block diagram.

12 Internal signal path polarity

In order to increase the power's supply energy storage efficiency, signals coming from channels 1 and 2 are polarity reversed one with respect to the other 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 catered 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 weighing 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.

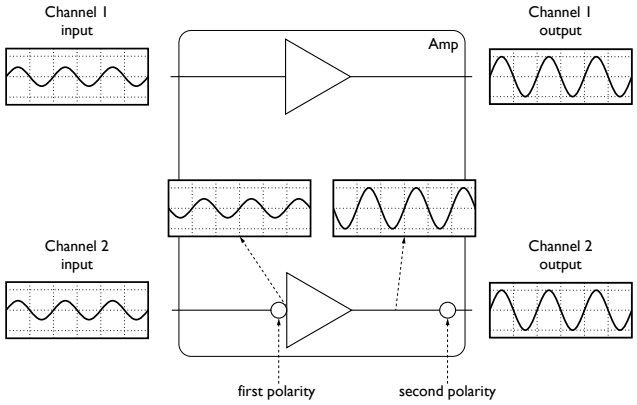

FIGURE 9: Internal signal path polarity with example input signals. Both channels 1 and 2 are fed with the same sine signal.

13 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.

13.1 Power supply protections

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

13.1.1 Primary AC mains overcurrent protection

AC main overcurrent are filtered by a 10 A time-lag fuse (also known as time-delay or low blow-fuse). The purpose of the time lag fuse is to allow the supply in electricity for a short time before the fuse actually blows. If the time-lag fuse blows out the amplifier switch off; replace the fuse with a proper 10 A time-lag fuse in order to restore the full functionality of the amplifier.

13.1.2 Primary AC mains overvoltage protection

AC mains overvoltage threshold is set to 295 V_{rms}. If the AC mains voltage exceeds 295 V_{rms} the power supply stop working; the device does not turn completely off but falls in a "sleeping" mode: the power supply turns on again when the AC mains voltage drops under 290 V_{rms}.

AC mains overvoltage are well tolerated by the power supply: non damages can be caused to the system even in case of severe overvoltage up to 385 V_{rms}.

13.1.3 Primary thermal protection

The temperature is detected at power supply's Q6 and Q7 MOSFETs located on the Main Board bottom surface.

The working temperature of the power supply triggers the heat dissipated by the device: if the temperature rises exceeding components tolerances, the primary hardware thermal protection starts lowering the rails voltage in order to lower the heat wasted and keep the overall efficiency high.

The process is auto-adaptive and aims to maintain the system up even in heavy thermal condition. If the rails voltage drops down to ±33 V the Main Board microcontroller shut down the amplifier section (i.e. shut down the Control Board), the power supply still running. This may happen rarely in harsh conditions: the amplifier does not switch off but neither signal processing nor fan cooling are active. In these conditions, while the temperature slowly decreases, the rails voltage rises: when the rails voltage reaches ±33V, the amplifiers section switch on again. If cooling is not effective, the system may start oscillate.

13.2 Amplifier protections

The amplifier section protections are managed by the Control Board and the Main Board in tandem.

Amplifier protections are triggered by audio signal current and voltage – by comparing input and output – and NTC, negative temperature coefficient, thermistors. NTC thermistors provide thermal feedback to the Control Board, to the Main Board and possibly to the DSP Board.

NTC resistance decreases with increasing temperature: the table below 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 on the SO5 socket.

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

T (°C)	V	T (°C)	V
-40	4.82	60	1.3
-35	4.76	65	1.16
-30	4.69	70	1.04
-25	4.6	75	0.93
-20	4.5	80	0.83
-15	4.37	85	0.75
-10	4.22	90	0.67
-5	4.05	95	0.61
0	3.86	100	0.55
5	3.66	105	0.5
10	3.43	110	0.46
15	3.2	115	0.42
20	2.96	120	0.38
25	2.71	125	0.35
30	2.47	130	0.33
35	2.24	135	0.31
40	2.02	140	0.29
45	1.82	145	0.27
50	1.63	150	0.25
55	1.46		

13.2.1 Secondary thermal protection

Microcontrollers on the Main Board and on the Control Board manage fans rotation depending on the mean temperature of the module sensed by the NTC thermistors.

The Main Board and the Control Board microcontrollers work in parallel by triggering fan speed rotation and output power modulation at different temperature threshold. The Main Board's circuitry implements a fan speed control that operates at lower temperature with respect to Control Board fan management; Main Board actions have priority on Control Board actions.

In heavy thermal conditions the system reduces the available power drawn by the amplifiers section by means of a reduction of the output current: this lower the heat dissipation and improve cooling, but reduces the signal output level. In parallel to the power drop operated by the Control Board microcontroller, the Main Board microcontroller reduces the rails tension to ±70V.

The table below shows the temperature thresholds that trigger the microcontrollers and the actions operated accordingly.

13.3 Harmful signal protections

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

13.3.1 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 54 A_{peak} (38 A_{rms}) the Control Board microcontroller shut down the amplifier section, the power supply still working. After 2 seconds the Control Board microcontroller switches on the amplifier section: if the short circuit still persists, the current rises and the amplifier is switched off again. The microcontroller toggles the amplifiers on and off every 2 seconds until the short circuit is removed.

13.3.2 High frequency stationary loud signals

High frequency stationary signals, like steady sinusoid signals – improperly referred as continuous signals – with high amplitude tend to stress the amplifier section of the module as well as the loudspeakers voice coils.

When a high frequency stationary loud signals is feed into the amplifier the Control Board limits its mean current depending on its level and frequency. The process is auto adaptive and frequency driven: at higher frequency the limiter acts faster.

The system limits output current of loud signals in the band 10 kHz – 20 kHz with output amplitude higher than 95 V_{rms}; above 20 kHz the protection operates when the output amplitude exceeds 48 V_{rms}.

13.4 Auxiliary power protections

Auxiliary plugs are protected against short circuit: a poliswitch opens the auxiliary circuits when the current drawn exceeds 2.2A.

13.5 Control Board protection LEDs

The Control Board is equipped with a protection LED per channel (see LED chart). The protection LED lights when one of the following protection systems turns on:

- Output short circuit;
- Thermal protection;
- Rails undervoltage.

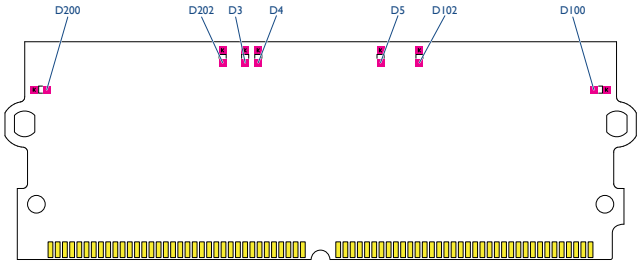

FIGURE 10: Control Board LEDs.

TEMPMON (V)	T (°C)	Main Board Fan	Main Board Power	Control Board Fan	Control Board Power
$V_T > 2.02$	$T_{mean} < 40$	OFF	W_{max}	OFF	W_{max}
$1.63 < V_T < 2.02$	$40 < T_{mean} < 50$	ON SLOW	W_{max}	OFF	W_{max}
$1.30 < V_T < 1.63$	$50 < T_{mean} < 60$	ON FAST	W_{max}	OFF	W_{max}
$1.04 < V_T < 1.30$	$60 < T_{mean} < 70$	ON FAST	W_{max}	ON FAST	W_{max}
$0.9 < V_T < 1.06$	$70 < T_{mean} < 75$	ON FAST	V_{rails} = ±70 V	ON FAST	1/2 W_{max}
$0.69 < V_T < 0.9$	$75 < T_{mean} < 90$	ON FAST	V_{rails} = ±70 V	ON FAST	1/10 W_{max}
$V_T < 0.69$	$T_{mean} > 90$	ON FAST	V_{rails} = ±70 V	Amplifiers shut down	

14 LED chart

Both the Main Board and the Control Board are equiped with status LED and protection LED; refer to FIGURE 10 and FIGURE 11 for LED localization and the following table for LED description.

14.1 Control Board LED chart

LED ID	Type	Description	Idle mode	Signal mode
D3	status	Auxiliary +12 V active	ON	ON
D4	status	Auxiliary +5 V active	ON	ON
D5	status	Auxiliary –12 V active	ON	ON
D102	protection	Control Board protection engaged on CH 1	NORMALLY OFF	NORMALLY OFF
D202	protection	Control Board protection engaged on CH 2	NORMALLY OFF	NORMALLY OFF
D100	status	Current calibration / current drawn by CH 1	NORMALLY OFF	BLINK
D200	status	Current calibration / current drawn by CH 2	NORMALLY OFF	BLINK

14.2 Main Board LED chart

LED ID	Type	Description	Idle mode	Signal mode
D6	status	rails +Vcc	ON	ON
D8	status	rails –Vcc	ON	ON
D37	protection	Main Board secondary protection engaged	NORMALLY OFF	NORMALLY OFF
D39	status	Mute	ON when MUTE ON	ON when MUTE ON
D20	protection	Main Board primary protection engaged	NORMALLY OFF	NORMALLY OFF

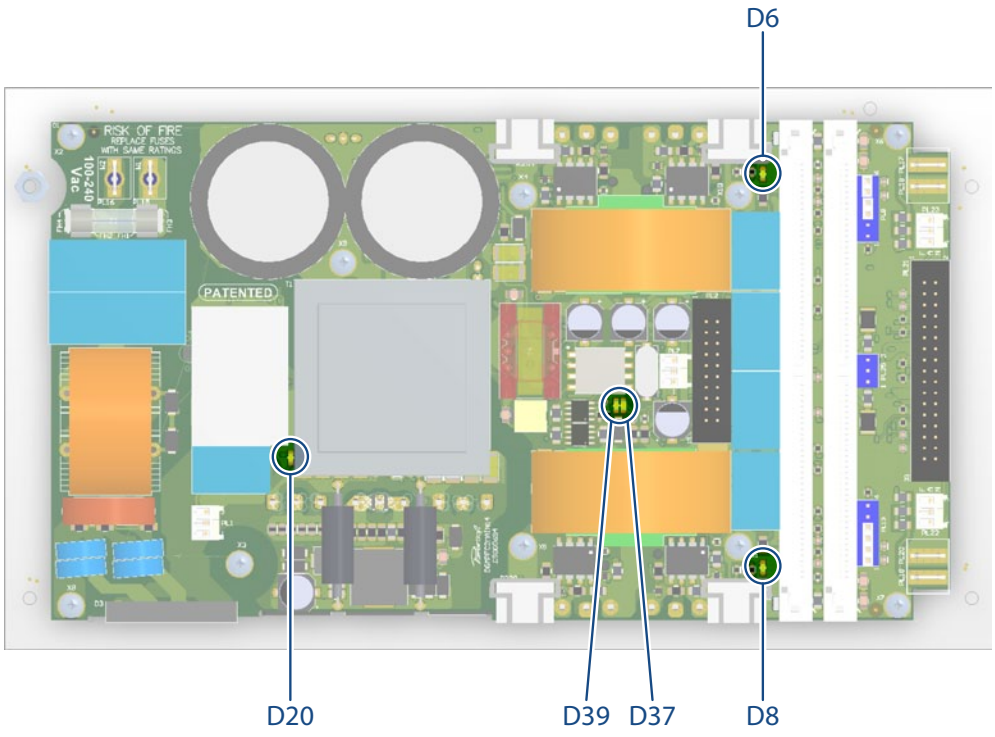

FIGURE 11: Main Board LEDs.

15 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.

16 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.ù

16.1 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.

16.2 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.

16.3 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).

17 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-DM3004PFC2-17345.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 Enrico Conti, 13-15
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.html

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

18 Specifications

General						
	Number of channels	2 ins - 2 outs				
	Output power	2-channel mode			mono-bridged mode	
	EIAJ Test Standard, 1 kHz, 1% THD	4 Ω / Ch	8 Ω / Ch	16 Ω / Ch	8 Ω / Ch pair	16 Ω / Ch pair
		1600 W	1100 W	600 W	3200 W	1600 W
	Max output voltage	150 V_{peak} (106 V_{rms})				
	Max output current	54 A_{peak} (38 A_{rms})				
	Max aux supply current draw	500 mA - Max Capacitive Load TBD				
AC Mains Power						
	Nominal power requirements	AC 100 V - 240 V, 50/60 Hz with PFC				
	Operating range	AC 90 V - 264 V				
	Efficiency	> 75% (typical)				
	Power factor cos (φ)	> 0.90 @ 4 Ω full power				
	Power consumption					
	1/8 of max power @ 8 Ω bridged	600 W				
Thermal						
	Max environmental operating temperature	40° C				
	Thermal dissipation	Fan, variable speed, temperature controlled				
		115 V		230 V		
	1/8 of max output power @ 4 Ω	TBD	TBD	TBD	TBD	
	1/4 of max output power @ 4 Ω	TBD	TBD	TBD	TBD	
Audio						
	Gain	32dB/38dB				
	Voltage gain	40/80				
	Frequency response	10 Hz - 25 kHz (-3 dB) for 1 W @ 4 Ω				
	S/N ratio (amplifier section)	> 115 dBA (20 Hz - 20 kHz, A weighted)				
	Crosstalk separation	-71 dB @ 1 kHz (4 Ω)				
	Input sensitivity @ 8 Ω	2.7 V_{RMS} / @ 32 dB gain				
	Max input level	8 V_{RMS}				
	Input impedance	10 kΩ balanced				
	THD+N [1]	< 0.05% 1 W to full power @ 4 Ω (typically <0.05%)				
	DIM100 IMD [1]	< 0.05% 1 W to full power @ 4 Ω (typically <0.02%)				
	Slew rate [1]	50 V/µs @ 8 Ω, input filter bypassed				
	Damping factor [1]	> 10000 @ 100 Hz				
	Output type	unbalanced to ground				
DSP & Networking (optional board)						
	Connector	72-pin SIMM socket (DSP-D and DSP- 4 compatible) + IDC32P (Compatible with DSP-Lite)				
	Configuration	Fully supported within Powersoft Armonía™ Pro Audio Control Suite				
Construction						
	Dimensions	216 mm x 122 mm x 79 mm (8.5" x 4.8" x 3.1")				
	Weight	1550 g (3.4 lb)				
	Volume	TBD				

1) Guaranteed by design

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