SMPS1K-PFCR3
DATA SHEET

High End switching power supply for audio applications

Sheet : 26072022
Revision 4.0

Features

- 110VAC ~ 250VAC Input (PFC)
- Standby input
- Plug & Play with Purifi amplifiers
- DC Error input
- Amp enable output
- Onboard standby power supply
- 23.5CM * 13CM * 5.8CM
- **0.1W** Power consumption in standby mode

CE

Typical applications

* Professional audio systems
* Consumer audio products
* HiFi audio systems

Highlights

* High reliability
* High efficiency
* Low EMI signature
* Power factor corrector

Safety compliance

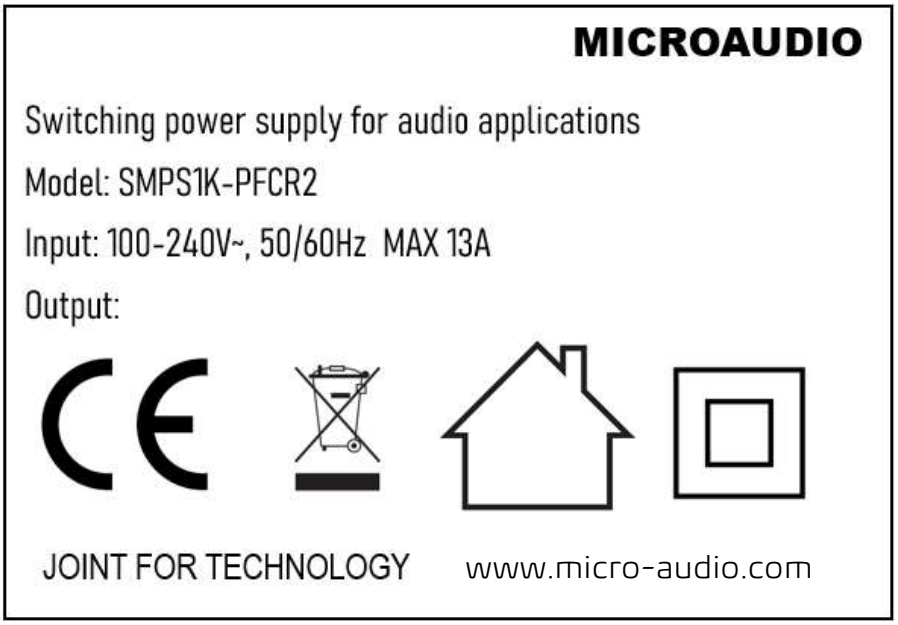
The SMPS1K-PFCR2 is safety tested according to the following standards:

- IEC60065:2014 + A11:2017
- IEC62368-1:2014 + A11:2017
- UL62368-1:2014 Ed.2
- CSA62368-1:2014 Ed.2
- AS/NZS 623681.1:2018

Relevant standards

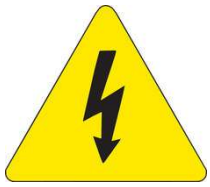
* IEC60065:2014 + A11:2017
* IEC62368-1:2014 + A11:2017
* UL62368-1:2014 Ed.2
* CSA62368-1:2014 Ed.2
* AS/NZS 623681.1:2018

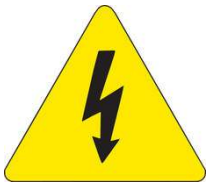
Testing laboratory (LCS)
https://en.lcs-cert.com/
Certificate Number: LCSA051622098S



SMPS1K-PFCR3

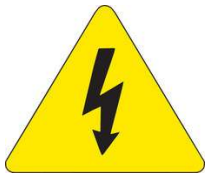
Safety Warning



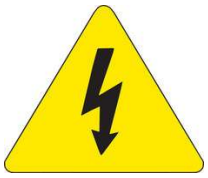


The SMPS1K-PFC operates at mains voltage
and carries hazardous voltages up to 420VDC at accessible parts.
These parts may never be exposed to inadvertent touch.

Observe extreme care during installation and never touch any part of the unit while it is connected to the mains. Disconnect the unit from the mains and allow all capacitors to discharge for 15 minutes before handling it.



IMPROPER HANDLING MAY RESULT IN PERSONAL INJURY



Ignoring the safety warning may lead to a nasty surprise on later stage!

SMPS1K-PFCR3

SMPS1K-PFC will not tolerate with any mistake

How may a nasty surprise occur?

1- Connecting the SMPS to the AC line in the wrong way, like swapping (LIVE with GROUND) for example.

2- Swapping the polarity at the connected equipment, either from the MAIN output or the AUX outputs.

3- Shorting any pin from the SMPS inputs / outputs to your chassis somehow.

4- Touching any part of the SMPS while the SMPS is connected to your AC line or even In standby mode, or before discharging the onboard capacitors.

5- Connecting the power supply to your amplifier while the power supply is still charged.

6- Conducting tests on the SMPS / AMPLIFIER while its ON & connected to your amplifier or vise versa by probing some test points.

7- Moving the entire setup from location to another while its NOT mounted properly on the chassis (AMP + SMPS + EXTRA Capacitors Bank) while they are powered ON Or when the SMPS is not fully discharged.

8- Trying to build or complete your setup while you are TIRED!

If you don't have enough knowledge into electronics and electricity, Then SMPS1K-PFC is not a good choice for you!

Again, its only one mistake needed to destroy your entire setup in no time if you don't check and verify every step while you are working.

SMPS1K-PFC can easily deliver up to 21A at 240VAC operation, and that current is more than enough to destroy your entire setup in addition to a cloud of smoke if anything goes wrong!

I am repeating these warnings in order to eliminate the chance for any mistake.

Usually, installation is very smooth if followed by inspecting each step.

Introduction

The SMPS1K-PFC is a high efficiency **Safety Class 2 unregulated** high efficiency switch mode power supply specifically designed for audio applications, where high system reliability is a required feature.

The SMPS1K-PFC is a SMPS with power factor corrector front end, excellent PFC regulation guarantees low voltage drop at the output across the entire load curve.

SMPS1K-PFC also features an advanced over current protection & thermal protection, AC-Line loss detection to immediately stop the SMPS once disconnected from the AC-LINE.

This SMPS is the result of countless hours of design, development, testing for each circuit to combine one reliable product.

Detailed description of specifications

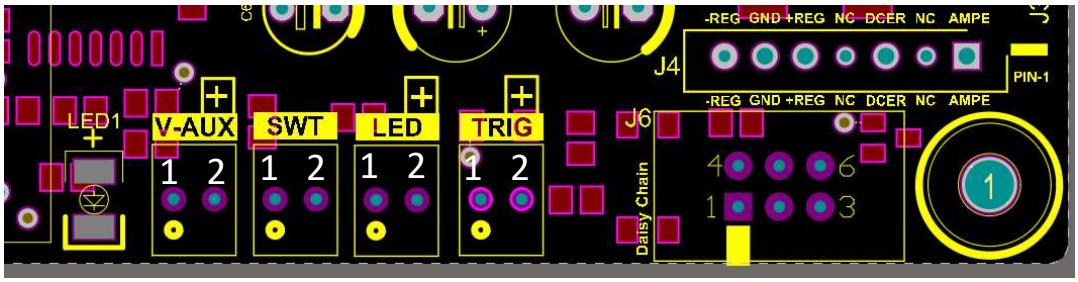
- Power factor corrector.
- Unregulated SMPS.
- Wide input voltage range (110 VAC ~ 250 VAC).
- Multiple output voltage range (+-40 VDC ~ +-85 VDC). Single or dual. NOTE-1
- Standby switch input eliminates the need for mechanical switches.
- Onboard standby power supply (+12VDC 200mA).
- Amplifier enable output (OPTO Isolated).
- Delayed output (OPTO Isolated).
- DC Error input.
- AUX1 regulated output +-5 VDC ~ +-24 VDC.
- IDC connector can select regulated or unregulated AUX voltage via jumpers.
- Bootstrap VDR supply output +12VDC ~ +18VDC (Completely isolated output) should be tied to –HV in class-d amplifier applications.
- AC-Line loss detection

NOTE-1 :

Output voltage is set by transformer selection; a list of available voltages are mentioned later.

SMPS1K-PFCR3

Connector Pinouts 1/3

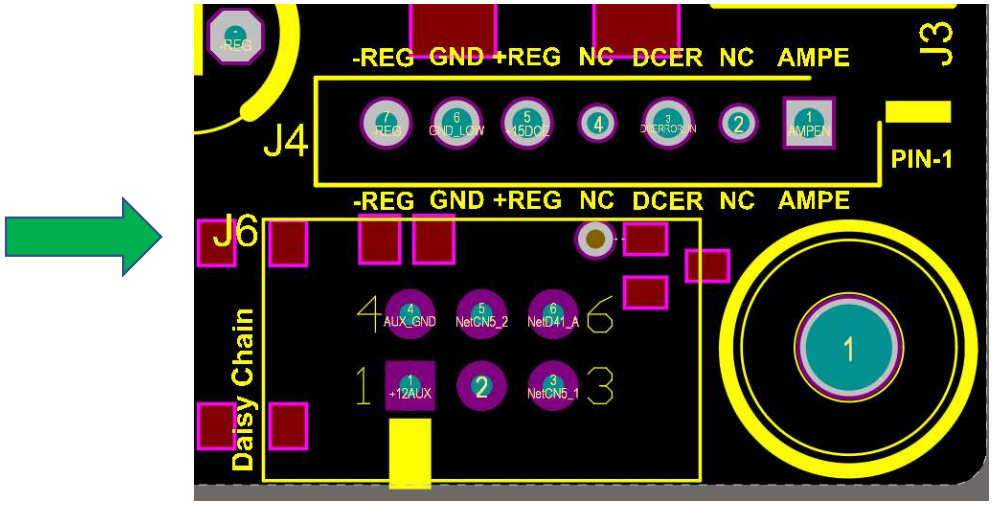


(V-AUX) 5 / 12V (Standby power supply output V-AUX)				
Connector	Pin number	Type	Function	Notes
12V	2	Output	+12VDC	Positive rail
12V	1	GND	GND	GND rail

(SWT) Standby control switch				
Connector	Pin number	Type	Function	Notes
Standby	1	Input	Standby	Standby input trigger
Standby	2	GND	GND	GND

(TRIG) Trigger Input (TRIG)				
Connector	Pin number	Type	Function	Notes
Trigger	2	Input	Trigger	Trigger input from 8V ~ 12V
Trigger	1	GND	GND	GND (Of the 8 ~ 12V trigger)

(LED) Delay out (Isolated output)				
Connector	Pin number	Type	Function	Notes
LED OUT	1	Output	-	LED - output
LED OUT	2	Output	+	LED+ output



Connector J6

Connector J6 is the chain option found in the SMPS1K-PFCR2 to seamlessly link multiple power supplies (the control signals) and turn them ON / OFF by one switch or from one trigger input to minimize the wiring and makes it easy to integrate in no time.

One ribbon cable can link multiple power supplies, up to 6 power supplies can be turned ON / OFF with a single switch without complex wiring.

This option also drops the standby power supplies from the slave units, only one master SMPS will drive 5 slave units.

SMPS1K-PFCR3

Connectors J2 & J4
Or J4 only based on model

3.3 Aux connector, J4

Pin	Signal	Rating	I/O	Description
1	PSUDIS /AMPON		O I	PSU off control signal (SW Mode), or Amplifier Disable (HW Mode) – *pull low to enable Amp*
2	SDA READY		I O	I2C Data (SW Mode), or Amplifier Ready (HW Mode) – "all good for operation" when high
3	SCL /FATAL		I O	I2C clock (SW Mode), or Amplifier "error/fail" (HW Mode) – *signal goes low on error*
4	+5V		P	5V output (from onboard regulator), 20mA max load. Requires R1 mounted
5	+VUNREG		P	Voltage regulator input, positive rail
6	GND		P	Ground
7	-VUNREG		P	Voltage regulator input, negative rail

Connectors J2 & J4 are connected in parallel, and they are pin to pin compatible with the Purifi EVAL1 & EVAL2 amplifiers. And using the same type of connectors.

You must check and verify your connections and setup before you connect this connector to your amplifier.

Pin 1 location is shown on the SMPS PCB, its just a straightforward connection without any complications.

Connectors **J2** & **J4** Supports REGULATED voltage ONLY, and they don't provide UNREGULATED voltage.

If you need UNREGULATED voltage, you must get it from **J3** and set CN4 & CN6 as needed to get REGULATED or UNREGULATED voltage.

Splitter PCBs are available for splitting purposes, for J2,J3,J4.

High quality cables are available for J2,J3,J4 in multiple lengths.

The trigger input (CN3)

Feed this input with any voltage between 9VDC to 12VDC to turn ON / OFF the SMPS from an external source like AV receivers.
Either input will control the SMPS ON / OFF function. The standby input switch or the external trigger. Priority is for the first trigger signal.
This input will not affect your AV receiver or the SMPS as it will not give voltage to your device or the SMPS.

SMPS1K-PFCR3

General Performance Data

Parameter	Symbol	Min	Typ	Max	Unit	Note-1	Note-2
Input voltage	VAC_range_lo	100	*	250	V_AC		
Input frequency		47	50	63	Hz		
Switching frequency	F_sw	*	65	*	Khz		
Output voltage main	V_main output	40		84	VDC	Unregulated	Based on order
Output current (Continous)	I_main output	*	8	9	ADC		
Output current (Peak)	IPK_main output	*	*	13	ADC	**15A** Limit @ 240VAC	**10A** Limit @ 100V AC
Output power main	Pout	*	*	**1000**	W		
Over current triggers @	OCP_trigger	*	14	16	ADC		
Thermal trigger	TH_trigger	*	70	75	C		
Output voltage (12V)	VAux1_reg	12	12	12	VDC	Regulated	
AUX_1 output current	I_Aux1	*	200	220	mA		
Output voltage (+-15V)	VAux3_reg	5	*	18	VDC	Regulated	Based on order
AUX_2 output current	I_Aux3	*	100	200	mA		
Output voltage (VDR)	VDR_reg	12	*	18	VDC	Regulated	Based on order
VDR output current	I_VDR		100	220	mA		
In-rush current	5R NTC			*	A	TBD	
Efficiency	Full power	*87*	*90*	*91*	%		
Idle Losses	SMPS not loaded	*	*	*	W		SMPS is ON
Stand-by loss		*0.09*	*0.1*	*0.15*	W		SMPS in Stand By

SMPS1K-PFCR3

Connector pinout detailed description and operation

The 12V output

Those outputs are coming directly from the standby power supply, and they reflect what voltage they provide.
The standby power supply will remain ON as long as the module is connected to your power line, switching the main SMPS on /off will NOT affect the standby power supply operation at all.
The 12V output can be used for the FAN. Polarity of each pin is marked on the PCB.

The +-15V output

This output is the auxiliary regulated output of the SMPS, and its output voltage is determined by the installed voltage regulators. And can be anywhere from +-12VDC up to +-18VDC.
This output is protected with fuse resistors.

The Standby input

This connector is where you will connect the switch that controls the SMPS on/off operation, shorting this connector will put the SMPS into RUN MODE opening this connector pins will put the SMPS into STANDBY mode. Latching switch is needed.

A latching switch is a switch that maintains its state after being activated.
A push-to-make, push-to-break

(SEE NEXT PAGE ON HOW TO WIRE THE SWITCH WITH LED)

Example:- http://www.ulincos.com/product.php?id=55

The DC-Error input

In the event of a critical failure occurring in the connected amplifier, the SMPS1K-PFC needs to be switched off immediately. Once this input is triggered the SMPS will enter PROTECT mode and will not auto-recover. To reset the DC Error the SMPS1K-PFC must be disconnected from mains for at least 5 minutes to allow the primary capacitors to drain. Shorting the pins of this input will put the SMPS1K-PFC into PROTECT mode.

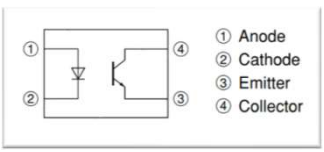
The Delay out (Output 1)

This is an open collector output controlled by a turn on delay circuit that will close the transistor after 3 seconds from the full operation of the SMPS, so time starts counting AFTER the SMPS is fully operational, and it will turn off immediately if you disconnect the SMPS from the AC-LINE or putting the SMPS into standby mode. The idea behind this is to control an existing circuit like turn on delay circuit or any other circuit, so you guarantee that your speakers are not connected to the amplifier if the SMPS is not functional for some reason, and will immediately disconnect your speakers once you switch off the SMPS, transistor pins are marked on the PCB
(E = Emitter & C = Collector).

* External circuit needed to perform the speaker protection

This output is isolated (opt isolator) none of the transistor pins are referenced to the SMPS.

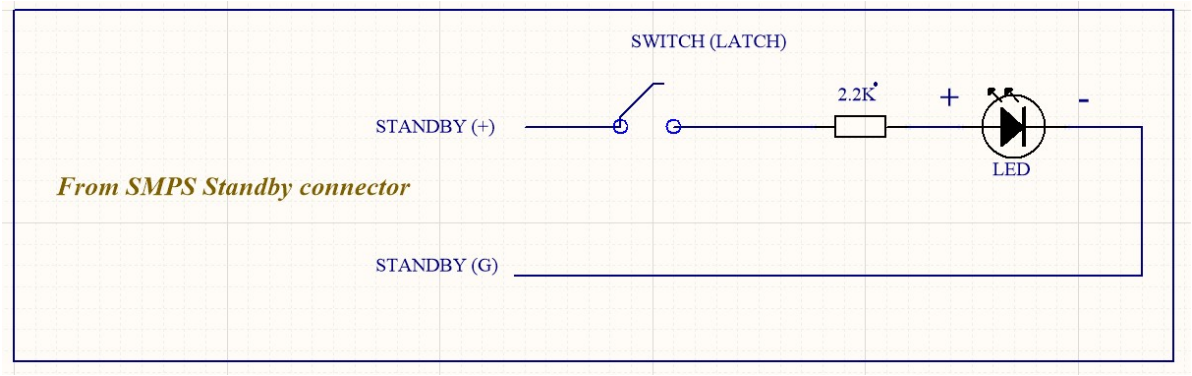
Example picture showing the output



SMPS1K-PFCR3

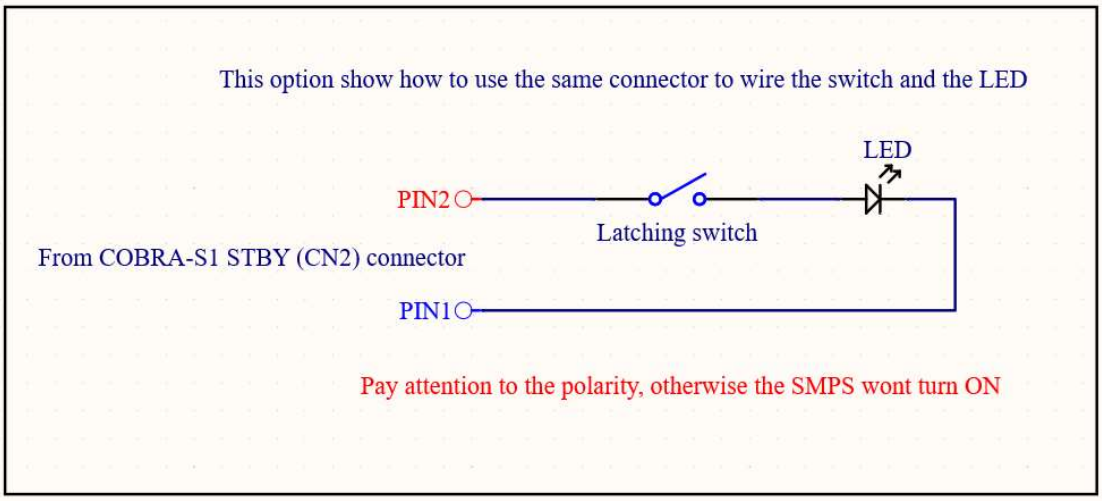
Below is the wiring for the standby switch, with switches comes with LED inside

RESISTOR IS NOT NEEDED, JUST CONNECT THE SWITCH WITHOUT THE RESISTOR.

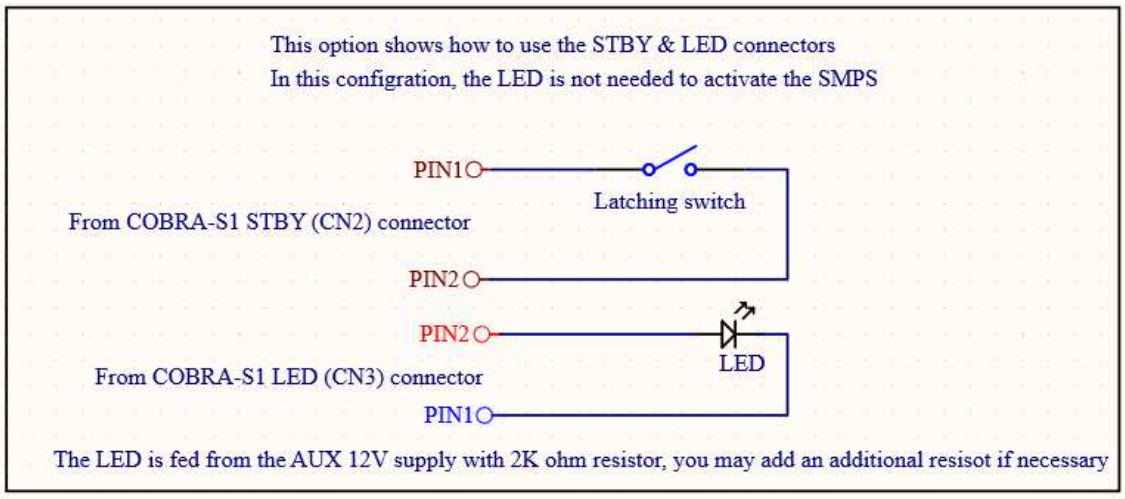


Below is the wiring for the standby switch

OPTION-1



OPTION-2



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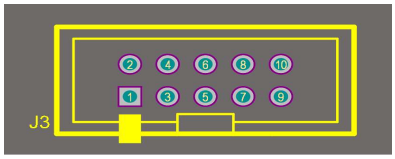
Connector Pinouts 2/3

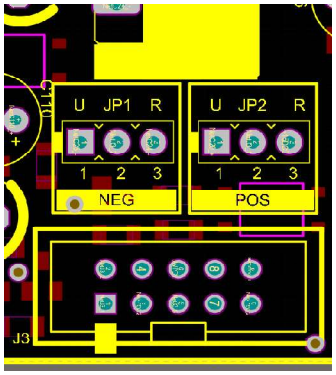


Connector **J3**				
Connector	Pin number	Type	Function	Notes
J3	1	Output	Positive Output	Select able Output (VAUX / UNREG,REG)
J3	2	Output	Negative Output	Délectable Output (VAUX / UNREG,REG)
J3	3	GND	GND	Ground
J3	4	NC	NC	Do not connect
J3	5	Output	Emitter	Amplifier enable (Opto isolated) E
J3	6	Output	Collector	Amplifier enable (Opto isolated) C
J3	7	NC	NC	Do not connect
J3	8	NC	NC	Do not connect
J3	9	GND	GND	Ground
J3	10	Input	DC-Error	DC-Error trigger input

Jumpers JP1 & JP2 description

Jumper Setting (VAUX Regulated or Unregulated)

JP1 (Negative rail **Pin2 J3.2**) and JP2 (Positive rail on **Pin1 J3.1**) are used to select the output voltage on pin J3.1 and J3.2, two options are possible



- Position 1-2: Unregulated VAUX
- Position 2-3: Regulated VAUX

Unregulated situation

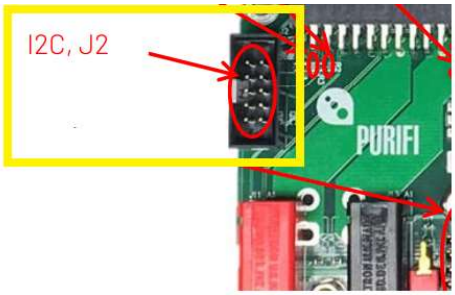
For example, shorting pin1 with pin2 on **JP1** will give you **-25VDC** on **Pin2 of J3**
For example, shorting pin1 with pin2 on **JP2** will give you **+25VDC** on **Pin1 of J3**

Regulated situation

For example, shorting pin2 with pin3 on **JP1** will give you **-15VDC** on **Pin2 of J3**
For example, shorting pin2 with pin3 on **JP2** will give you **+15VDC** on **Pin1 of J3**

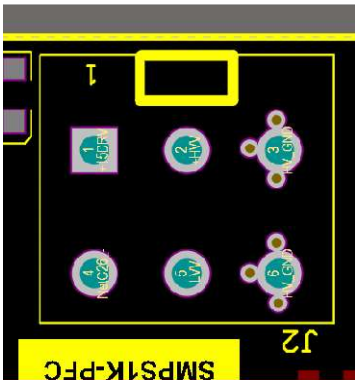
As shown in the picture, JP1 is marked as NEG = Negative rail
And JP2 is marked as POS = Positive rail

→ Please check with your multimeter the final voltage before connecting your circuit.
→ **WARNING**: This connector CANNOT be used with the PURIFI amplifier (I2C, J2), and it is not compatible with that connector, the connector is marked in the PURIFI as (I2C, J2),
→**This is not a plug and play connector for Purifi amplifier**.



Connector Pinouts 3/3

Connector (J2)



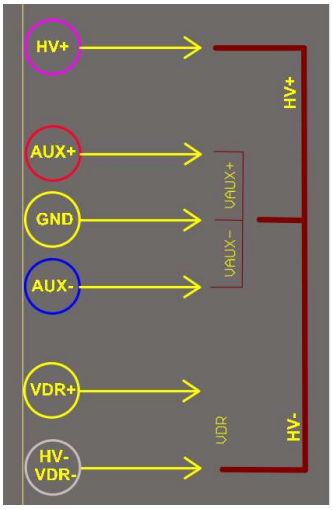
J2 - Main output connector

J2				
Connector	Pin number	Type	Function	Notes
J2.1	1	Output	VDR+	Positive bootstrap driver voltage
J2.2	2	Output	**HV+**	Positive supply rail
J2.3	3	**GND**	**GND**	Ground
J2.4	4	Output	VDR-	Negative bootstrap driver voltage
J2.5	5	Output	**HV-**	Negative supply rail
J2.5	6	**GND**	**GND**	Ground

Bootstrap Driver Voltage (VDR)

The SMPS1K-PFC provides a regulated Bootstrap Driver Voltage (VDR) which is used to power the driver circuit of any Class-D amplifier. Most amplifier modules need the VDR voltage referenced to the negative supply rail (HV-). In order to achieve this, the VDR- should be connected to the main negative supply rail (HV-) at the amplifier side. The VDR+ must be connected to the amplifier VDR supply input.
The Bootstrap Driver Voltage (VDR) can be specified at the order time 12V , 15V, 18V.
The Bootstrap Driver Voltage (VDR) is an isolated output from all other outputs.

SMPS output wiring in Class-D example →



SMPS1K-PFCR3

SMPS1K-PFC output power

The output power of this power supply is
@ 120VAC the output power is 1000W and 1200W PEAK, and @ 230VAC the output power
Is 1500W and 1800W PEAK.

However, The SMPS1K-PFC is designed for music reproduction and is therefore not able to deliver its Maximum output power for long-term.
The RMS value of any common music signal generally doesn't exceed 1/8th of the maximum peak power.

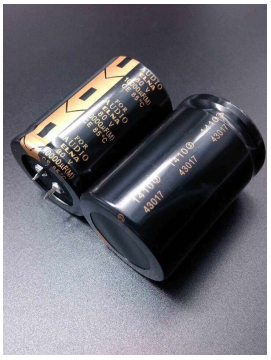
The maximum long-term test conducted was for 30 seconds @ (120VAC) full load with forced air.
Trying to repeat our lab tests may destroy the entire SMPS.

Power supply bus pumping

The SMPS1K-PFC is an unregulated SMPS, therefore bus pumping will occur when used with class-d amplifiers.
There are two possible solutions to overcome this issue.

1- Use extra capacitance at the output of the SMPS
2- Operate your amplifiers in out of phase configuration, in stereo mode.

However, in normal music reproduction the onboard capacitors are good enough.



ELNA 10000uF 80V 35mm * 50mm

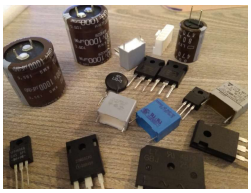
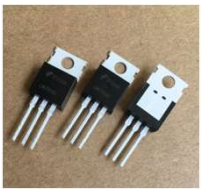
Extra capacitance PCB, accepts capacitors from 25mm up to 35mm

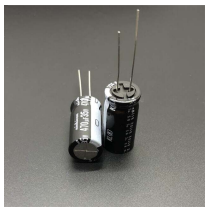
→ Warning : The maximum output capacitance the SMPS can accept is **40000uF** per rail, so the total is **44000uF.** Increasing that value will simply trip the over current protection.

Quality of components used

SMPS1K-PFCR3

We only use the highest quality components into all the SMPS units we produce.
What you see in the picture is what you will get, you will get more than what you pay for.
We are not showing high grade components in the pictures and send you cheap chines parts like other SMPS manufactures do.
Our prices are better than others, we offer more features into our products with great technical support.
Our standard product line uses high grade parts, our custom versions uses higher grade parts based on customer request.
→

Technical Support

Technical support is more important than the product itself, we believe that a product without technical support Is a dead product.

Our SMPS units are covered with 12 months warranty from the date of purchase and can be upgraded to two years at extra cost with (Replace without questions warranty).

All SMPS we produce can be fixed in case of any problem. As they are not made to be sent to trash if they fail like other manufactures do, we don't ask the customer to send us the unit back to fix it and waste your valuable time.

Additional EMI / RFI noise filter

Using additional EMI / RFI noise filter is up to you, the SMPS has its own EMI / RFI noise filter , using additional filtering will not harm the installation.

→ Use only EMI / RFI noise filter from trusted manufacturers, don't use any cheap chines EMI / RFI noise filters.
→ SMPS1K-PFC or SMPS650-PFC requires an EMI / RFI noise filter with 10A fuse rating as minimum.




TO REMIND YOU AGAIN !

How may a nasty surprise occur?

1- Connecting the SMPS to the AC line in the wrong way, like swapping (LIVE with GROUND) for example.

2- Swapping the polarity at the connected equipment, either from the MAIN output or the AUX outputs.

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6- Conducting tests on the SMPS / AMPLIFIER while its ON & connected to your amplifier or vise versa by probing some test points.

7- Moving the entire setup from location to another while its NOT mounted properly on the chassis (AMP + SMPS + EXTRA Capacitors Bank) while they are powered ON Or when the SMPS is not fully discharged.

8- Trying to build or complete your setup while you are TIRED!

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Again, its only one mistake needed to destroy your entire setup in no time if you don't check and verify every step while you are working.

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Usually, installation is very smooth if followed by inspecting each step.

SMPS1K-PFCR3

Disclaimer

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