MICRO AUDIO

SMPS630-G

DATA SHEET

Switching power supply for audio applications

Sheet : 1862020
Revision 1.1.0

Features

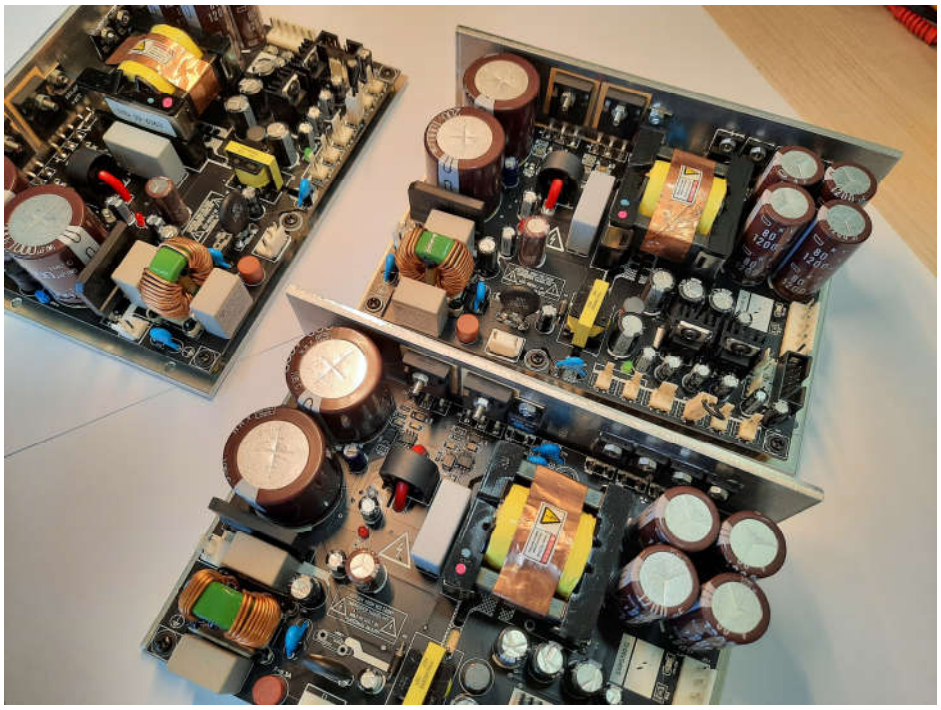
- 110VAC / 240VAC Input (Selectable)
- Standby input
- 3 AUX output
- DC Error input
- Amp enable output
- Delay output
- Onboard standby power supply
- 17.5CM * 12.5CM * 5CM

Typical applications

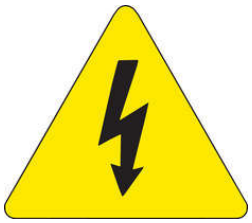
* Professional audio systems
* Consumer audio products
* HiFi audio systems

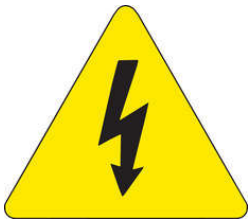
Highlights

* High reliability
* High efficiency
* Low EMI signature



Safety Warning





The **SMPS630-G** operates at mains voltage
and carries hazardous voltages up to 345VDC 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 **5 minutes** before handling it.

IMPROPER HANDLING MAY RESULT IN PERSONAL INJURY

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

Introduction

The SMPS630-G is an unregulated high efficiency switch mode power supply specifically designed for audio applications, were high system reliability is a required feature.

SMPS630-G 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

- Unregulated SMPS.
- Selectable input voltage range (110 VAC / 240 VAC).
- Multiple output voltage range (+-40 VDC ~ +-95 VDC). Single or dual. NOTE-1
- Standby switch input eliminates the need for mechanical switches.
- Onboard standby power supply with two outputs (+12VDC & +3.3VDC).
- Amplifier enable output (OPTO Isolated).
- DC Error input.
- Regulated AUX output +-5 VDC ~ +-18 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

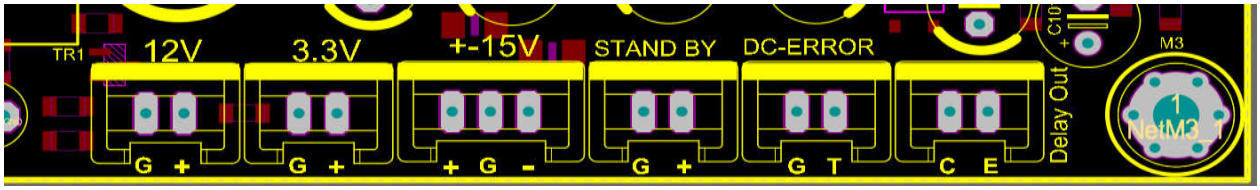
NOTE-1 :

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

General Performance Data

Parameter	Symbol	Min	Typ	Max	Unit	Note-1	Note-2
Input voltage 110V	VAC_range_lo	110	120	135	V_AC		
Input voltage 230V	VAC_range_hi	220	230	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	6	6	6	ADC		For +-55VDC as example
Output current (Peak)	IPK_main output	*	*	12	ADC		
Output power main	Pout	*	600	*	W		
Over current triggers @	OCP_trigger	*	14	16	ADC		Based on output voltage
Thermal trigger	TH_trigger	*	70	75	C		
Output voltage (12V)	VAux1_reg	12	12	12	VDC	Regulated	
AUX_1 output current	I_Aux1	*	75	150	mA		
Output voltage (3.3V)	VAux2_reg	3.3	3.3	3.3	VDC	Regulated	
AUX_2 output current	I_Aux2	*	50	75	mA		
Output voltage (+-15V)	VAux3_reg	5	*	18	VDC	Regulated	Based on order
AUX_3 output current	I_Aux3		100	125	mA		
Output voltage (VDR)	VDR_reg	12	*	18	VDC	Regulated	Based on order
VDR output current	I_VDR		100	250	mA		
In-rush current	2.5R NTC			*	A	TBD	
Efficiency	Full power	*	*	*	%	TBD	
Idle Losses	SMPS not loaded	*	*	*	W	TBD	SMPS is ON
Stand-by loss		*	*	*	W	TBD	SMPS in Stand By

Connector Pinouts 1/3



AUX1 12V (Standby power supply output - 1)				
Connector	Pin number	Type	Function	Notes
12V	+	Output	+12VDC	Positive rail
12V	G	GND	GND	GND rail
AUX2 3.3V (Standby power supply output - 2)				
Connector	Pin number	Type	Function	Notes
3.3V	+	Output	+3.3VDC	Positive rail
3.3V	G	GND	GND	GND rail (Shared with output - 1)
AUX3 +-15V (Regulated output)				
Connector	Pin number	Type	Function	Notes
+-15	+	Output	+15VDC	Positive rail (Regulated)
+-15	G	GND	GND	GND
+-15	-	Output	-15VDC	Negative rail (Regulated)
Standby				
Connector	Pin number	Type	Function	Notes
Standby	T	Input	Standby	Standby input trigger
Standby	G	GND	GND	GND
DC-Error				
Connector	Pin number	Type	Function	Notes
DC-Error	T	Input	DC Error	DC Error trigger input
DC-Error	G	GND	GND	GND
Delay out (Isolated output)				
Connector	Pin number	Type	Function	Notes
Delay-out	C	Output	Collector	Open collector output
Delay-out	E	Output	Emitter	Open collector output

Connector pinout detailed description and operation

The 12V & the 3.3V outputs

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, and the 3.3V is usually used to feed microcontroller circuits with power. 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 SMPS630 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 SMPS630 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 SMPS630 into PROTECT mode.

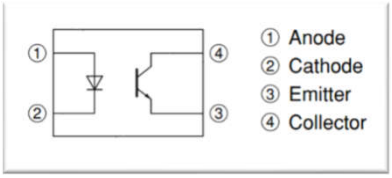
The Delay out (Output 1)

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).

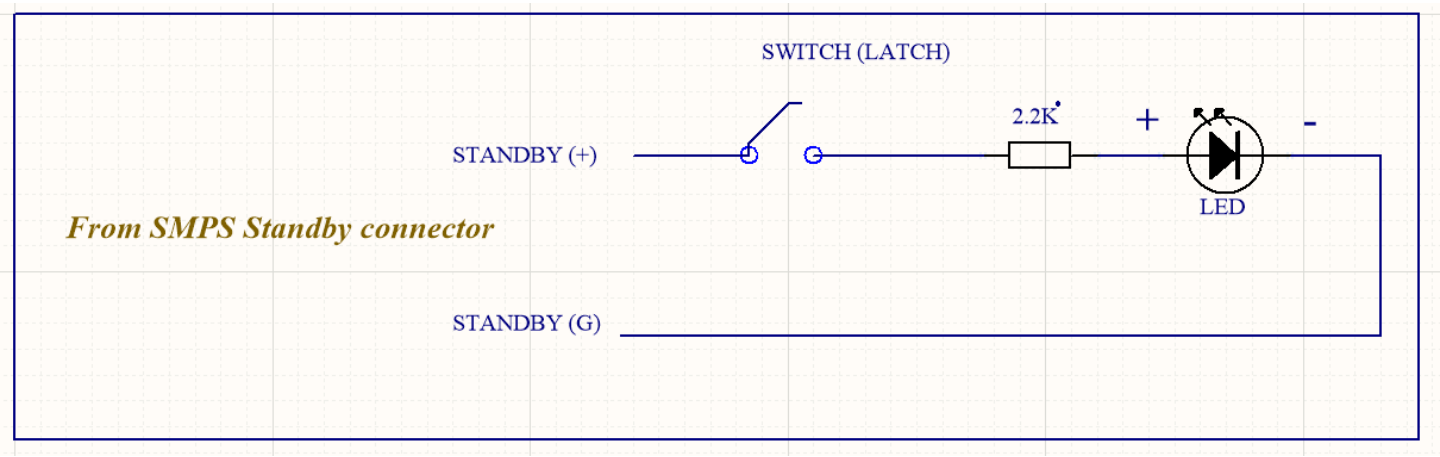
* External circuit needed to perform the speaker protection

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

Example picture showing the output



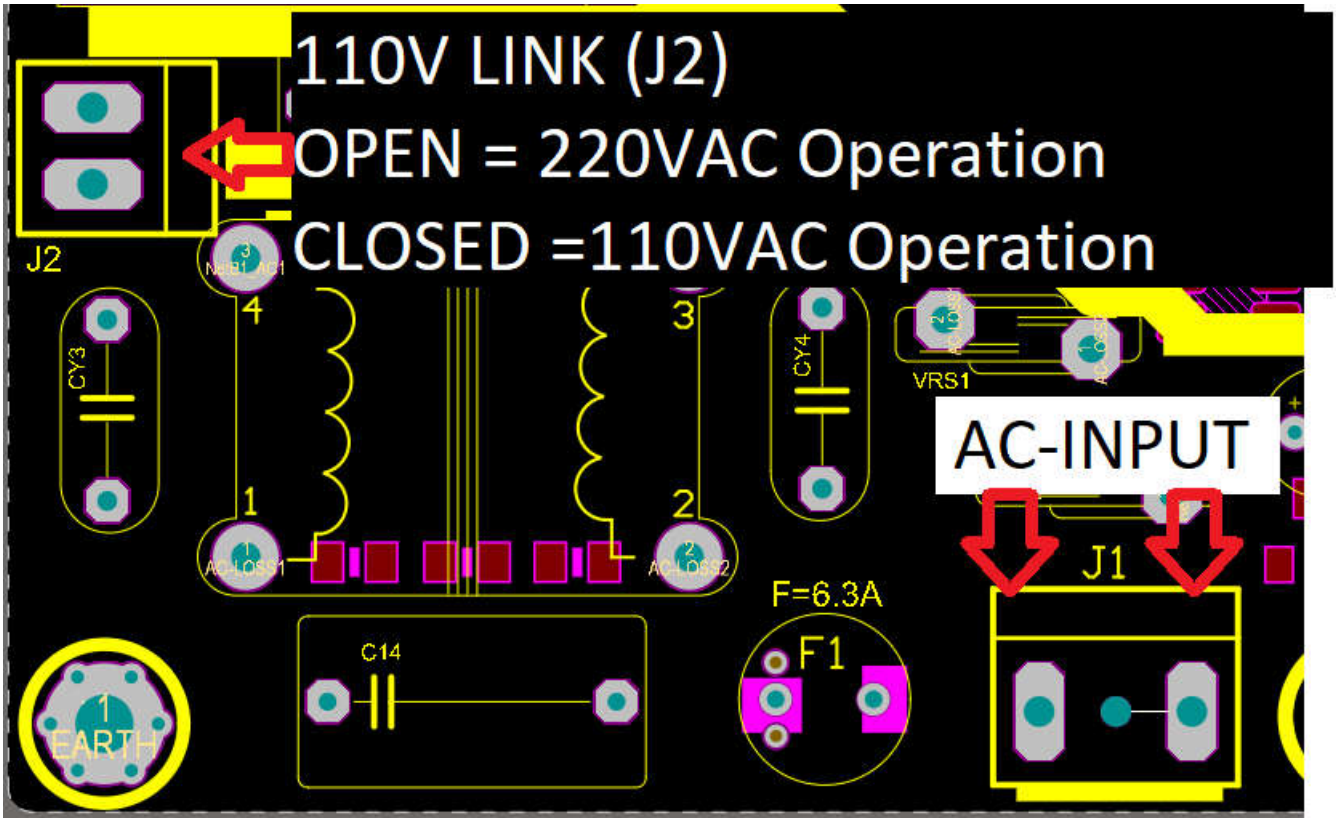
Below is the wiring for the standby switch, with switches comes with LED inside.



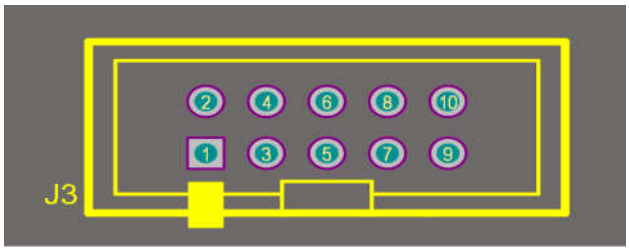
Mains AC – INPUT Connector & Voltage selector connector

Connector (J1) is the AC input connector from your mains, 110VAC or 240VAC

Connector (J2) is the voltage selector connector, see status below
(J2) OPEN = 240VAC Operation
(J2) CLOSED = 110VAC Operation



Connector Pinouts 2/3

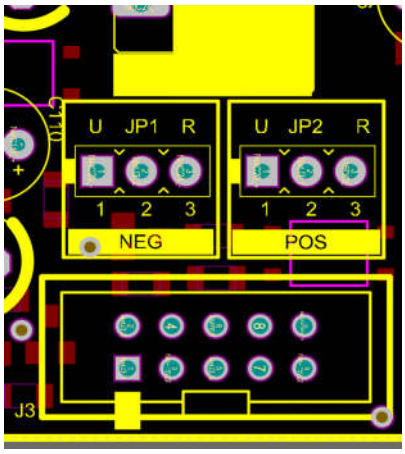


Connector **J3**				
Connector	Pin number	Type	Function	Notes
J3	1	Output	Positive Output	Selectable Output (VAUX / UNREG,REG)
J3	2	Output	Negative Output	Selectable Output (VAUX / UNREG,REG)
J3	3	GND	GND	Ground
J3	4	NC	NC	Do not connect
J3	5	Output	Emitter	Amplifier enable (Opto isolated) E
J3	6	Output	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

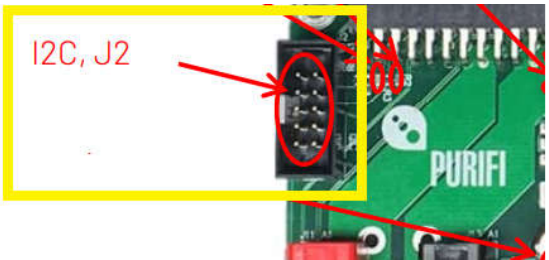
For example, shorting pin1 with pin2 on **JP1** will give you **-25VDC** on **Pin2 of J3**
For example, shorting pin1 with pin2 on **JP2** will give you **+25VDC** on **Pin1 of J3**

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**

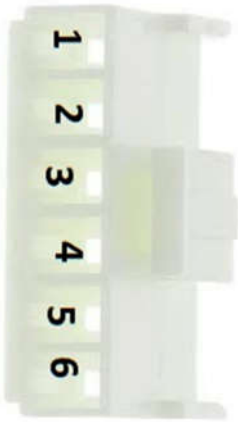
As shown in the picture, JP1 is marked as NEG = Negative rail
And JP2 is marked as POS = Positive rail

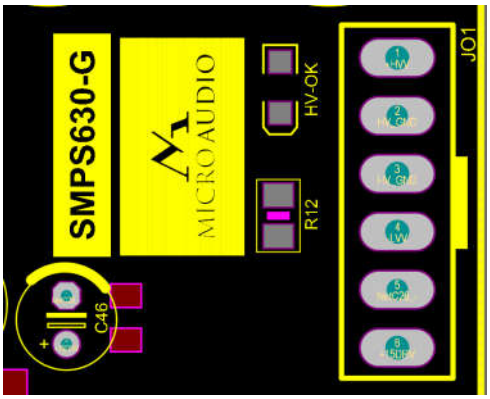
→ Please check with your multimeter the final voltage before connecting your circuit.
→ **WARNING**: This connector CANNOT be used with the PURIFI amplifier (I2C, J2), and it is not compatible with that connector, the connector is marked in the PURIFI as (I2C, J2),
→**This is not a plug and play connector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



Connector Pinouts 3/3

Connector (JO1)





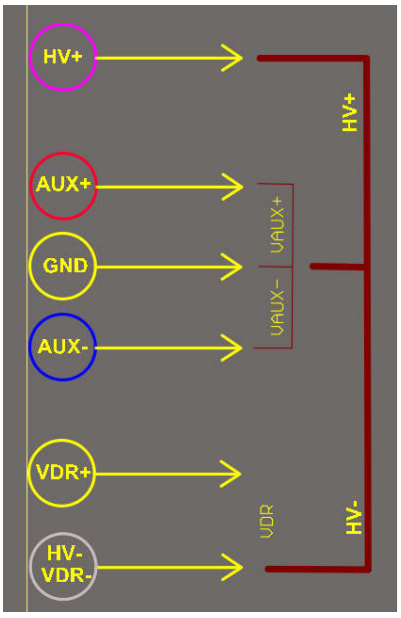
JO1 - Main output connector

J2				
Connector	Pin number	Type	Function	Notes
JO1	1	Output	**HV+**	Positive supply rail
JO1	2	**GND**	**GND**	Ground
JO1	3	**GND**	**GND**	Ground
JO1	4	Output	**HV-**	Negative supply rail
JO1	5	Output	VDR-	Negative bootstrap driver voltage
JO1	6	Output	VDR+	Positive bootstrap driver voltage

Bootstrap Driver Voltage (VDR)

The SMPS630-G 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 →



Thermal consideration

The SMPS630-G will heat in idle (**RUN MODE**) and it may hit 55C in hot environments, therefore the FAN Output is there to be used, disabling the FAN will decrease the life of the components in the power supply. However, the SMPS will run without any issues without the FAN, but it is recommended to enable the FAN.

The SMPS630-G thermal protection is set at 70C, and this value cannot be changed without modification of the SMPS. If the SMPS enters thermal protection you must use the FAN in that case.

Power supply bus pumping

The SMPS630-G is an unregulated SMPS, therefore bus pumping will occur when used with **Class-d amplifiers ONLY**. 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.

ELNA 10000uF 80V 35mm * 50mm

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

A good starting point is minimum 4700uf per rail and up to 12000uF

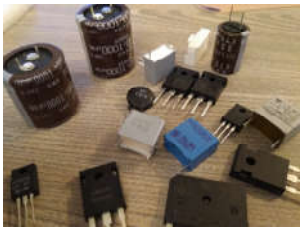
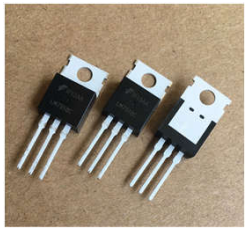
→ Warning : The maximum output capacitance the SMPS can accept is **12000uF** per rail, so the total is **24000uF.** Increasing that value will simply trip the over current protection.

NOTE-1 :

Empty PCBs for extra capacitors are available, please check availability based on your requirements.

Quality of components used

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.

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 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.




How the protection system works?

SMPS630-G uses perfect & efficient protection system to protect the SMPS case of any over current or short circuit event.

For example, in short circuit event the SMPS will immediately go into shutdown mode, this mechanism will protect the SMPS section from any failure.

The over current trip point will NOT be activated if the SMPS drawing the PEAK current for short period of time (maximum 3 seconds) in addition to the hold up time needed, that was another thing to consider in case of peak pulses for short periods. The hold up time is the time needed to fill the over current circuit tank to the calculated threshold, then tripping the SMPS.

In music reproduction drawing the peak current is NOT enough to charge the over current circuit tank to the calculated threshold, unless there was high current draw to activate the protection circuit.

So, to show an example on that
The SMPS can deliver its peak output current for short periods (3 Seconds Max), while not hitting the point where the over current threshold is set, hitting the threshold will immediately trip the protection circuit. That means you can draw the peak current in music reproduction use if you don't hit the trip point.

Again, there is a hold up time between the PEAK and the THRESHOLD then trip the protection circuit.

And in a short circuit event, the protection circuit will be activated in milli seconds.

Why the over current detection is made as LATCH not auto recover?

The decision was made to use the LATCH method because a 600W power supply gives 50% extra head room means it is being used hard, the LATCH method was the best option to protect the SMPS in case of over current or short circuit event.

Function of protection

Protection	Trip point	Notes
Over current	14A	Latch
Thermal	70C	Auto Re-start
Short circuit	*	Latch
DC-Error trigger	*	Latch

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This module is designed for use in music reproduction equipment only. No representations are made as to fitness for other uses.

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