

# Medical standard approved !! PCB type AC-DC switching-mode power supply

## Special Power Supply with Medical approved

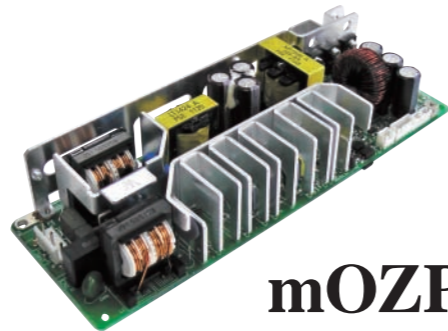
Medical standard **IEC60601-1 2nd and 3rd approved**  
Ultra-high efficiency,  
PCB type AC-DC switching-mode power supply

Medical standard **IEC60601-1 3rd approved**  
High efficiency,  
PCB type AC-DC switching-mode power supply



### mOZP-350

Continuous Max. **350W** (natural air cooling)  
**500W** (forced air cooling)  
Peak Power **600W**



### mOZP-200

Continuous Max. **200W**  
Peak Power **400W**

Recently, medical market is rapidly developing. The high functionality of the devices in medical application gives us improvements in convenience at medical practice such as digital data of electronic medical chart, networking information of patients and digitalization at medical facilities.

Since increasing of equipments with development of medical market, we have to consider more of all equipments that should be perfectly safe and assured. There are key components as considered of safety for the device, especially "Power supply". The failures of power supply bring on various troubles not only the sudden and terminated stop, but also an electrical leakage, a fire, or a negative effect on the equipment. Nipron has manufactured tough and indestructible power supply from the beginning of our inception. As a result, we gained high reputation on our products as safe and high reliable ones. Throughout this experiences and knowledge, the various power supplies are developed now. Today, we are delighted to introduce the PCB type medical power supply, mOZP-350/200, as our brand-new products.

## What is Medical Standards Management Board?

### •Medical Standard

Standard which intend to medical electrical system. Requirements about electric systems used in medical practice are contained. Also contained is technical requirements which exceed general information processing system about basic requirement of safety such as electrification, insulation.

### •International Standard

There are various specifications based on IEC60601-1. Requirements for power supply is applied basic standard of 60601-1, and the certification which our medical power supplies are approved is under UL60601-1 2nd edition or 3rd edition (some models obtained both 2nd/3rd editions.) Currently, the 3rd edition is issued and it is required to have the risk management activities. Since it was not enough to manage the quality of medical systems only by ISO9001, ISO14971 was issued and we have to satisfy the requirements based on it. Nipron will investigate and handle it with full efforts.

### Risk Management System

It defines that being aimed at preventing such conditions, the hazard for operators, safety and quality, due to the unacceptable residual risk and improve the reliability of products. After we specify the hazard for the certain products with medical safety and related products, we evaluate and estimate the risk on them and control the risk, and then, it defines the method for effectiveness monitoring of controlling.

Classification		IEC specification NO. (Establishment date)	IEC specification NO. (Establishment date)
Safety	Basic Standard	IEC 60601-1 (1988)	• Medical electrical equipment: general requirement of safety ↔ JIS T 0601-1 (1999)
		IEC 60601-1 (1993)	
		IEC 60601-1 (1995)	
		IEC 60601-1-1 (1992)	
		IEC 60601-1-1 (1995)	
	Particular Standard	IEC 60601-1-2 (1993)	• Electromagnetic compatibility (EMC) - requirement and test
		IEC 60601-1-3 (1994)	• General requirement about radiation protection
		IEC 60601-1-4 (1996)	• Medical electrical system for programming - safety
		IEC 60601-1-5 (200X)	• Image quality and dose of Diagnostic X-ray apparatus
		IEC 60601-2-28 (1993)	• X-ray source assembly - safety
Quality Management	Basic Standard	IEC 60601-2-32 (1994)	• Related equipment (devices) - safety
		IEC 60601-2-45/Ed.1 (1998) → IEC60601-2-45/Ed.2 (2001) → IEC60601-2-45/Ed.3 (200X)	• Breast X-ray apparatus and breast filming stereotactic equipment ↔ JIS Z 4751-2-45 (2001)
	Particular Standard	IEC 61223-1 (1993)	• Evaluation and routine determination of quality maintenance for Medical picture category: general rule ↔ JIS Z 4752-1 (2001)
		IEC 61223-2-10 (1999) IEC 61223-3-2 (1996) → IEC61223-3-2/Ed.2 (200X)	• Invariance test for breast X-ray apparatus • Acceptance for breast X-ray apparatus

## About the Means of Protection

The 2nd and 3rd have many different requirements. The big differences are compliance to risk management system and Means of Protection. Since the risk management is introduced in the previous page, we introduce the Means of Protection herewith.

### The Means of Protection

- **MOOP (Means Of Operator Protection)**  
⇒ The means of protection is to reduce the non-operator's risk of electrical shock
- **MOPP (Means Of Patient Protection)**  
⇒ The means of protection is to reduce the operator's risk of electrical shock  
The criteria for certification is harder than MOOP

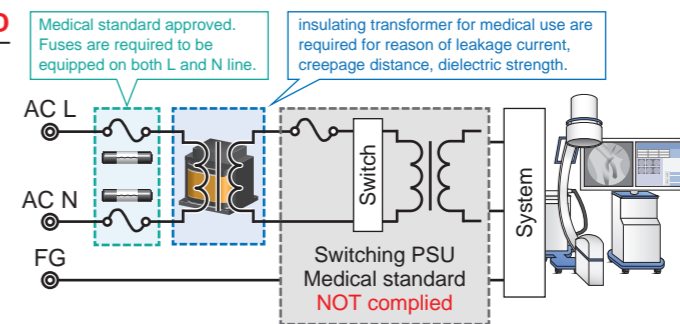
Model	IEC60601-1 2nd	IEC60601-1 3rd
mPCSA-500P-X2S	○	○ (MOPP)
mNSP3-450P-S20 series	○	○ (MOPP)
mPCSL-210-X2S	○	○ (MOOP)
mGP3A-360 series	○	○ (MOOP)
mGP3A-750 series	compliant	
HPCSA-1000P-E2S	compliant	
HPCSF-400P-X2S	×	compliant
mOZP-350 series	○	○ (MOPP)
mOZP-350 series (with a standby unit)	×	Can be approved as MOOP
mOZP-200 series	×	○ (MOOP)
mOZP-200 series (with a standby unit)	×	○ (MOOP)
OZM-015 series	×	compliant
OZM-030 series	×	compliant

## Advantages of Medical Standards Complied Power Supply

### Applying standards for power supply installed system

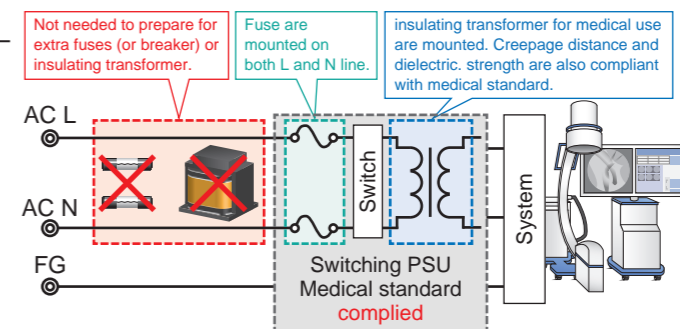
#### ► Power supply **NOT COMPLIED**

When power supply does not comply with the standards, customers are required to prepare for input fuses and insulating transformer etc. Because fuses and transformer will be installed separately, system will be large and expensive.



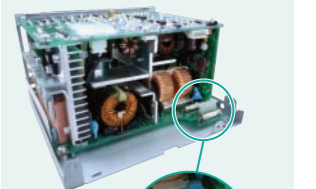
#### ► Power supply **COMPLIED**

These series are all done to be double and reinforced insulation. That is why we are able to satisfy this requirement. You will not need to prepare for extra fuses or transformer. Also, it is compact and inexpensive rather than using power supplies those are not complying with the standards.

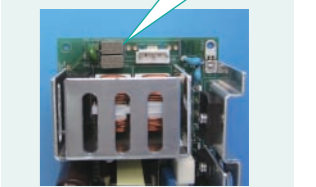


#### Medical power supply Example of the places: mounted fuses

mNSP3-450P internal picture



Fuses on both N and L line.

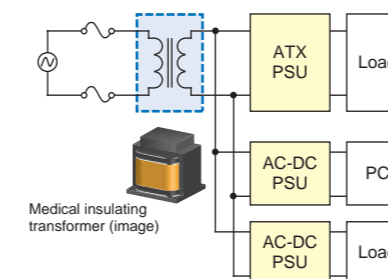


mOZP-350 picture

## Front PC Power Supply for Medical System

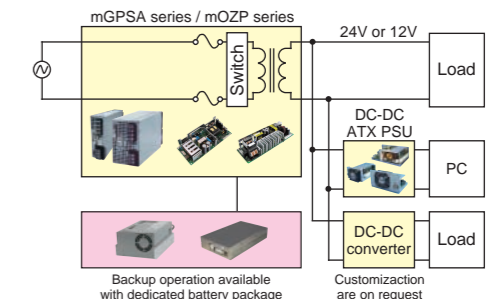
### Previous configuration

Previously, it is required the big insulation transformer which is correspond to all ATX and AC-DC power supplies.



### Nipron configuration

Nipron medical power supplies do not require the insulation transformer which affects the cost reduction and the space saving. By connecting the dedicated battery package, the backup system for blackout can be achieved.

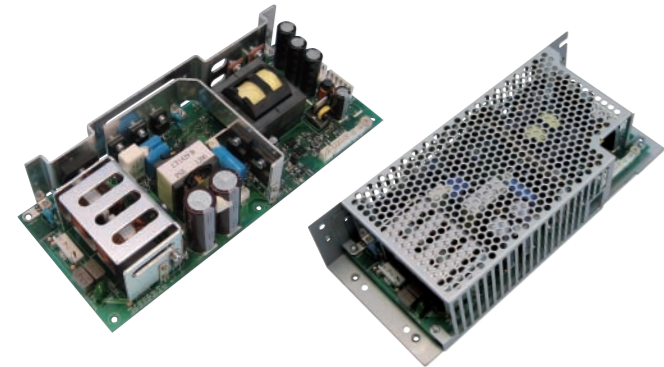


Medical standard IEC60601-1 2nd and 3rd approved  
Ultra-high efficiency, PCB type AC-DC switching-mode power supply

# mOZP-350

Continuous Max. 350W (natural air cooling)  
500W (forced air cooling)

Peak Power 600W



- ✓ **Industry-leading level ultra-high efficiency 95% achieved**
- ✓ **Continuous 350W, peak 600W large output capacity\***
- ✓ **Standby power at remote OFF is reduced**  
The reduction of electrical power lost and CO2 is achieved by suppressing the power consumption in standby mode.  
(an example of actual measurement)  
0.05W typ. at 100 VAC input    0.2W typ. at 200 VAC input
- ✓ **Equipped with current balance circuit and easy to operate in parallel.**
- ✓ **Low noise and low leakage current**  
Conducted emission **VCCI Class B** passes without external noise filter. It gives a cost reduction for preparing equipment on the user's side. Besides, the leakage current is reduced to 0.06mA typ. at 100 VAC and 0.12mA typ. at 200 VAC. It achieves both low noise and low leakage current.

\*Output voltage: 24V min.

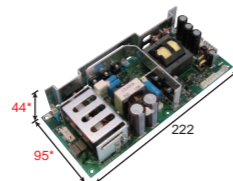
## + Seven different types of usage can be matched in medical practices!! +

\*In case# 3, 5, 6, and 7, medical standard shall be as compliant. Please contact us for the details.

### TYPE 1, 2

At parallel operation

- It **changes** into large capacity power supply (type 1)
- Continuous output power **changes** into nearly double by forced-air cooling (type 2)



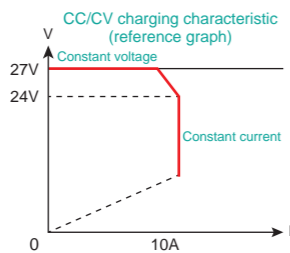
\*Equivalent size of 240W / 300W products in competitors

As a replacement of the fan-less power supply for large capacity, it is possibly build in your device since the power supply can output 350W continuously and 600W at peak and it is the equivalent size from competitors power supply in 240W/300W.

### TYPE 3

With constant current control board embedded, mOZP-350 **changes** into a constant voltage (CV) / constant current (CC) power supply for battery charging (type 3).

Although mOZP-350 is constant voltage power supply, it can be used as constant current power supply with a special PCB. Constant current power supply is required for many equipment such as battery charger, LED display, and chemical equipment. Besides, the voltage/current can be adjusted freely by volume and it has a sensor input part for the thermal compensation of charging voltage. It is best suited for lead-acid battery charger etc.



#### Utilizing as charger

Constant current / constant voltage output characteristic is suitable for various battery charger such as lead-acid or lithium ion battery. Sensor input part for thermal compensation is equipped in order to control the charging voltage according to the lead-acid battery temperature. It also contributes to the long-lifetime of battery.

Just connecting the harness with thermistor to the sensor input part for the thermal compensation!!



#### Arbitrary current is settable by volume knob!!

Constant current PCB can be set the current value by volume knob. (Contact us for detailed adjustable current range)

#### Utilizing as LED display power supply

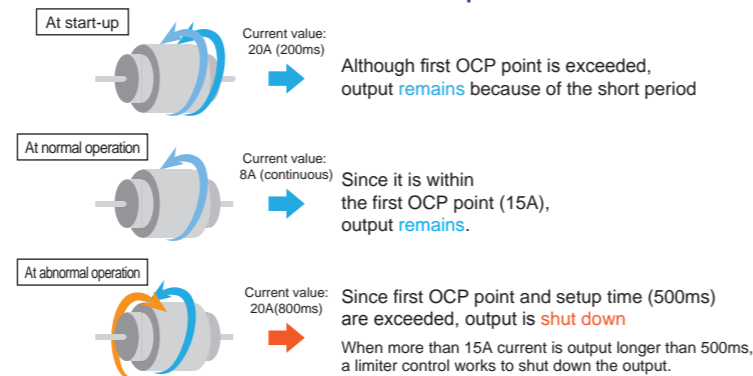
### TYPE 4

It **changes** into the power supply that has two sets of overcurrent protection (OCP) with timer by connecting an overcurrent limiting PCB (type 4).

<Additional PCB setting value>  
First OCP: 15A  
Timer setting: 500ms

In the case of using a motor with 10A rated (using mOZP-350 of peak output 25A)

Usage example



#### For the protection against the shaft-locked operation of DC motor

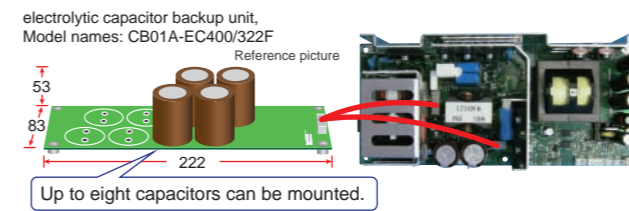
The peak overcurrent at startup operation is not sensed up to the second OCP point. In the case of continuous overcurrent because of a shaft-locked operation and so on, the current can be shut down by arbitrary timer configuration (around 200ms - 5 sec) and current setting in order to avoid the burning of wire, connector, and motor itself.

The set current is adjustable by volume knob  
Timer setting is also modifiable

### TYPE 5

Connected with electrolytic capacitor backup unit, it **changes** into a 0.4-1.0 sec backup power supply (type 5).

Achieving low cost measures for instantaneous blackout. It is required for semiconductor equipment or machine tool etc.



#### Rapid charging available

Capacitor package can be charged from AC input within 30 sec.

#### Modification for longer backup time is also possible.

Since the PCB design is able to add the extra capacitor, the backup time can be modified to be longer than 1 sec (at 350W load) if required.

#### Capacitor charging completion signal equipped

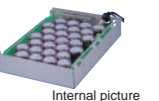
With detecting higher than 300V of capacitor voltage, open collector 'L' signal is delivered. It enables the confirmation of breaking/disconnection of capacitor backup unit and of its failure/degradation. Besides, an initial inspection is also possible.

#### Capacitor package is also connectable

Capacitor package (BS13A-EC400/422F) is also connectable

Model: BS13A-EC400/422F

- Expected service life 12 years min. (at 40°C)
- Available at both low and high temperature
- 1.4kg lightweight

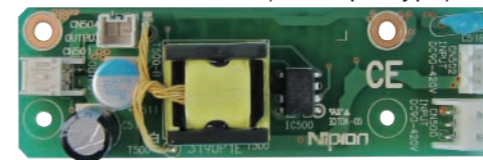


### TYPE 6,7

With standby power supply unit (+5V / +12V), it **changes** into a standby mode or a remote ON/OFF function power supply (type 6).

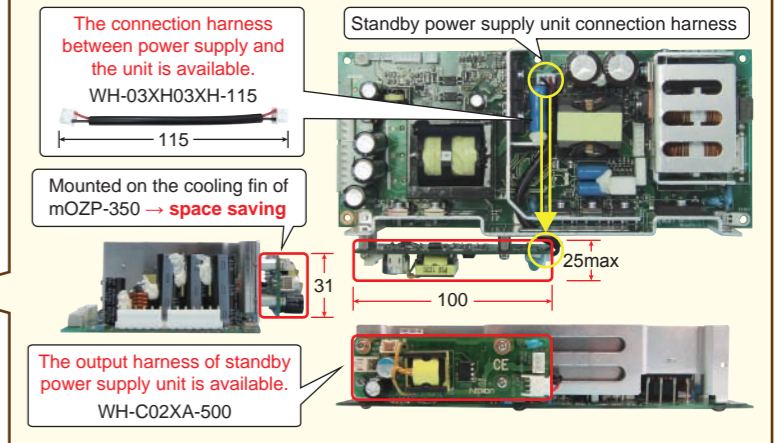
The features are downsizing and cost reduction by cutting rectifying bridge and filter. In addition, the power consumption at light load is reduced so that it complies with ErP directive Lot 6.

Model: PS-10WP-5VSB(5V output type)



Output: +5V (1.5A, Peak: 2.0A)  
Size(WxHxD): 31x25x100(mm)

#### Standby power supply unit connection diagram



In addition, by the developing of other output boards, it **changes** into a multi outputs power supply (type 7).

## + Nipron with wide selection in medical power supplies!! +

<b>mOZP-200 series</b>  Medical standard IEC60601-1 3rd approved PCB type AC-DC switching-mode power supply <b>Continuous Max. 200W</b> <b>Peak Power 400W</b>	<b>mPCSL-210-X2S</b>  Medical standard IEC60601-1 3rd as well as 2nd approved with the risk management file. Slim size PC power supply <b>Continuous Max. 210W</b>
<b>mGPSA-360 / 750 series</b> Medical standard IEC60601-1 2nd and 3rd approved Unit type single output power supply  <b>Continuous Max. 360W</b> <b>Peak Power 600W</b>  <b>Continuous Max. 720W</b> <b>Peak Power 1200W</b> <small>*mGPSA-750 series will be compliant</small>	<b>mNSP3-450P series / mPCSA-500P series</b> Medical standard IEC60601-1 2nd and 3rd approved <b>Non-stop ATX power supply</b>  <b>Continuous Max. 300W</b> <b>Peak Power 450W</b> <b>ATX power supply</b>  <b>Continuous Max. 300W</b> <b>Peak Power 500W</b>
<b>OZM series</b> <b>OZM-015 series</b>  Triple outputs type <b>Continuous Max. 15W</b> <b>OZM-030 series</b>  Dual outputs Triple outputs type <b>Continuous Max. 30W</b> Medical standard IEC60601-1 3rd compliant design Dual outputs, PCB type AC-DC switching-mode power supply	<b>HPCSA-1000P-E2S / HPCSF-400P-X2S / HPC1U-400P-X2S</b> Medical standard IEC60601-1 3rd compliant <b>80PLUS SILVER approved 1000W peak power ATX power supply</b>  <b>Continuous Max. 822W</b> <b>Peak Power 1000W</b> <b>80PLUS BRONZE approved SFX power supply</b>  <b>Continuous Max. 310W</b> <b>Peak Power 400W</b> <b>80PLUS BRONZE approved 1U size power supply</b>  <b>Continuous Max. 305W</b> <b>Peak Power 400W</b>