

# Single Output High Capacity Power Supply mGPSA-360 Series

Medical standard IEC60601-1 2nd and 3rd approved. Single output large capacity power supply



| Model           | Description | Stock          |
|-----------------|-------------|----------------|
| mGPSA-360-12-TP | +12V output | Standard stock |
| mGPSA-360-24-TP | +24V output | Standard stock |

**Model Name Coding**  
**mGPSA - 360 - \* - T P**  
 ① ② ③ ④ ⑤ ⑥

1. Medical safety standard certified  
 2. Series name  
 3. Output power  
 4. 12/+12V output  
 24:+24V output  
 5. Signal output : TTL signal  
 6. Fan signal : Rotation pulse signal

- Features**
- Medical and industrial power supply with simple design for low price
  - Power supply back-up functionality available at AC fail (+24V output only)
  - Medical standard IEC60601-1 2nd, and 3rd approved
  - Various safety standards (UL/CSA60950-1, UL/CSA60601-1) are approved
  - High efficiency
  - Width 1U, height 3U; easily fits into 19-inch racks
  - External remote ON-OFF control signal available
  - Worldwide range input (85-264 VAC), power factor 96% or higher with PFC circuit
  - +12VSB output available

| Safety standard / Approval | UL  | CSA | EN  | CE | CCC |
|----------------------------|-----|-----|-----|----|-----|
| Reliability Grade          | HFA | FA  | HOA | OA |     |

**Function**

DC start   RS 232C   USB   TTL   PFC   Silence   5VSB FAN   TSFC FAN   Connection   RoHS

**Input**

|       |                             |
|-------|-----------------------------|
| Input | 85-264VAC (worldwide range) |
|       | 120-370VDC*                 |

\*The rated input voltage range at the application of safety standard is "100-240 VAC (50/60Hz)". In the case of DC input use, an external DC fuse shall be equipped to protect from power supply failure.

**Output**

| Output voltage                                 | +12V        | +24V            | +12VSB       |
|--|-------------|-----------------|--------------|
| Max. current/ max. power (continuous)          | 30A<br>360W | 15A<br>360W     | 0.3A<br>3.6W |
| Peak current / peak power (5 sec. max.) 100VAC | 40A<br>480W | 20.8A<br>499.2W | -            |
| Peak current / peak power (5 sec. max.) 200VAC | 40A<br>480W | 25A<br>600W     | -            |
| Min. current                                   | 0A          | 0A              | 0A           |

**Dimensions**

|            |                                      |
|------------|--------------------------------------|
| W×H×D (mm) | 128×41×230 (Width 1U/Height 3U size) |
|------------|--------------------------------------|

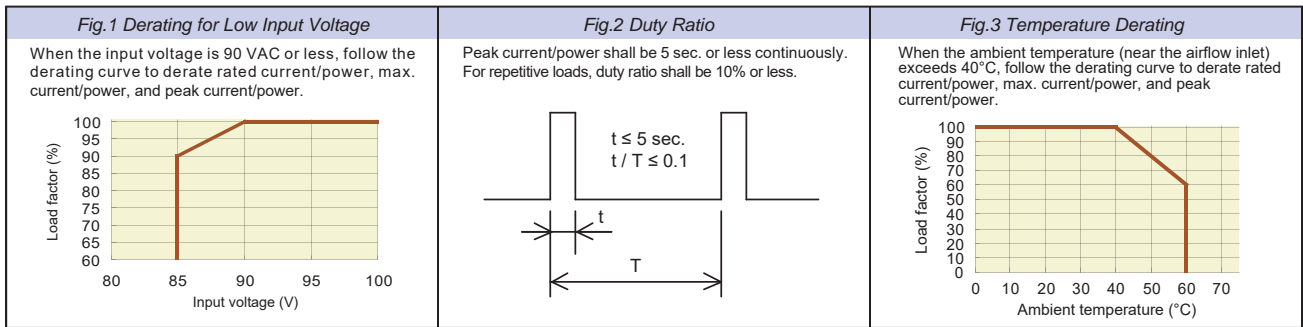
mGPSA-360-24 Efficiency chart

| Load          | Input  | Efficiency |
|---------------|--------|------------|
| Rated 24V 15A | 85VAC  | 79.2%      |
|               | 100VAC | 80.6%      |
|               | 132VAC | 82.5%      |
|               | 176VAC | 83.9%      |
|               | 200VAC | 84.7%      |
|               | 220VAC | 84.8%      |
|               | 264VAC | 87.9%      |

# General Specification Condition: at normal temperature and humidity unless otherwise specified

| Items                       | Specification   | Measurement conditions, etc.  |  |  |
|-----------------------------|---|---|--|--|
| AC Input                    | Rated Voltage   | 100 - 240 VAC (85* - 264 VAC)<br>DC120-370V*1   | Worldwide range<br>*Refer to Fig.1   |  |
|                             | Input Frequency   | 50 / 60Hz   | 47 - 63Hz  |  |
|                             | Efficiency  | 80% typ. (100 VAC), 83% typ. (240 VAC) *Characteristic data: Fig.4  | At rated output  |  |
|                             | Power Factor  | 96% min. (100 VAC), 90% min. (240 VAC) *Characteristic data: Fig.5  |  |  |
|                             | Inrush Current  | 31A peak (100 VAC), 75A peak (240 VAC) *Characteristic data: Fig.6  | At rated input/output at cold start (25°C)*2   |  |
|                             | Input Current   | 4.5A typ. (100 VAC), 1.8A typ. (240 VAC)<br>6.3A typ. (100 VAC), 3.0A typ. (240 VAC:24V), 2.4A typ. (240VAC:12V)                        | At rated input and max. output<br>At rated input and peak output                         |  |
| Output                      | Model   | mGPSA-360-12-TP   mGPSA-360-24-TP   Common for all models   |  |  |
|                             | Rated Voltage   | +12V   +24V   +12VSB  |  |  |
|                             | Rated Current / Power   | 30A   15A   0.3A<br>360W   360W   3.6W  |  |  |
|                             | Peak Current / Power  | 100 VAC   | 40A   20.8A<br>480W   499.2W   | Time: 5 sec. or less<br>Duty ratio of repetitive load: 10% or less |
|                             |   | 200 VAC   | 40A   25A<br>480W   600W   |  |
|                             | Min. Current  | 0A  | 0A   |  |
|                             | Setup Voltage at Factory  | 12V±2%  | 24V±2%   | 12V±10%  |
|                             | Voltage Adjustable Range  | 12V±10%   | 24V -5% +20%   | -  |
|                             | Static Input Fluctuation  | 48mV max.   | 96mV max.  | 120mV max.   |
|                             | Static Load Fluctuation   | 100mV max.  | 150mV max.   | 600mV max.   |
|                             | Time-Lapse Drift  | 48mV max.   | 96mV max.  | 120mV max.   |
|                             | Temperature Fluctuation   | 0.02%/°C max.   | 0.02%/°C max.  | 0.02%/°C max.  |
| Max. Ripple Voltage (mVp-p) | -10 to 0°C  | 160 max.  | 160 max.   |  |
|                             | 0 to 60°C   | 120 max.  | 120 max.   |  |
| Max. Spike Voltage (mVp-p)  | -10 to 0°C  | 180 max.  | 180 max.   |  |
|                             | 0 to 60°C   | 150 max.  | 150 max.   |  |
| Protection                  | Overcurrent Protection  | OCP Point (A)   101% min. of peak current<br>Method   Hold down current limiting → Output shutdown                                      | 101% min. of peak current<br>Hold down current limiting                                  |  |
|                             | Recovery (Overcurrent)  | At AC Operation   Reclosing of AC input   | Automatic recovery   |  |
|                             | Overvoltage Protection  | OVP Point (V)   13.8 - 16   29.2 - 35.0<br>Method   Output shutdown   | -  |  |
|                             | Recovery (Overvoltage)  | At AC Operation   Reclosing of AC input   | -  |  |
| Environment                 | Operating Temp. / Humidity  | -10 to 60°C* / 10 to 90%  | *Refer to Fig.3 No condensation  |  |
|                             | Storage Temp. / Humidity  | -25 to 75°C / 10 to 95%   | No condensation  |  |
|                             | Vibration   | Acceleration amplitude: 2G (10 - 55Hz), Sweep cycles: 10, Test duration: 10 minutes each axis   | JIS-C-60068-2-6, at no operation   |  |
| Insulation                  | Mechanical Shock  | Lift one bottom edge up to 50mm and let it fall. Number of bumps: 3 each of 4 edges   | JIS-C-60068-2-31, at no operation  |  |
|                             | Dielectric Strength   | AC input - DC output: 4000 VAC for 1 minute<br>AC input - FG: 2000 VAC for 1 minute   | Cut-off current: 10mA<br>Completion inspection: 3000 VAC/min. between AC input-DC output |  |
|                             | Insulation Resistance   | AC input - DC output: 50MΩ min. AC input - FG: 50MΩ min.<br>DC output - FG: 50MΩ min.   | At 500 VDC   |  |
| EMC                         | Leakage Current   | 0.21mA max. (100 VAC) / 0.5mA max. (240 VAC) *Characteristic data: Fig.7  | YEW, TYPE3226 (1kΩ) or equivalent  |  |
|                             | Line Noise Immunity   | ± 2000V (pulse width: 100/1000ns, repetitive cycle: 30-100Hz, normal/common mode with pos./neg. polarity for 10 minutes)                | Measured by INS-410<br>No fluctuation of DC output or malfunction                        |  |
|                             | Electrostatic Discharge   | EN61000-4-2 compliant   |  |  |
|                             | Radiated, Radio-Frequency EM Field  | EN61000-4-3 compliant   |  |  |
|                             | Fast Transient Burst  | EN61000-4-4 compliant   |  |  |
|                             | Lightning Surge   | EN61000-4-5 compliant   |  |  |
|                             | RF Conducted Immunity   | EN61000-4-6 compliant   |  |  |
|                             | Magnetic Field Immunity   | EN61000-4-8 compliant   |  |  |
| Others                      | Voltage Dip / Regulation  | EN61000-4-11 compliant  |  |  |
|                             | Conducted Emission  | VCCI-B, FCC-B, EN55022-B, CISPR22-B compliant *Characteristic data: Fig.8,9   | Measured by single unit  |  |
|                             | Harmonic Current Regulation   | IEC61000-3-2 (Ver.2.1) Class D, EN61000-3-2 (A14) Class D compliant   | At rated input/output  |  |
|                             | Safety Standard   | UL60601-1, CSA C22.2 NO 601. 1(c-UL), ANSI/AAMI ES60601-1, UL60950-1, CSA60950-1 (c-UL) approved, PSE (ministerial ordinance) compliant |  |  |
|                             | Cooling System  | Forced air cooling  | Thermal-sensing variable speed fan embedded  |  |
|                             | Output Grounding  | Capacitor grounding   |  |  |
|                             | Output Hold-up Time   | PWR_OK holds up 20ms min. after AC failure *Characteristic data: Fig.14   | At rated output  |  |
|                             | Reliability Grade   | FA (industrial equipment grade, double-sided through hole PCB)  | Follow our standard  |  |
| MTBF                        | 70,000 H min.   | Based on EIAJ RCR-9102  |  |  |
| Weight                      | 1.4 kg typ.   |   |  |  |
| Warranty                    | 3 years after delivery. If any faults belong to us, the defective unit shall be repaired or replaced at our cost. | Except for errors caused by operation not listed  |  |  |

\*1 The rated input voltage range at the application of safety standard is "100-240 VAC (50/60Hz)". If it is used with DC input, an external DC fuse shall be equipped in case of the power supply failure.  
\*2 The inrush current into input noise filter is not specified unless its period is more than 100µs.



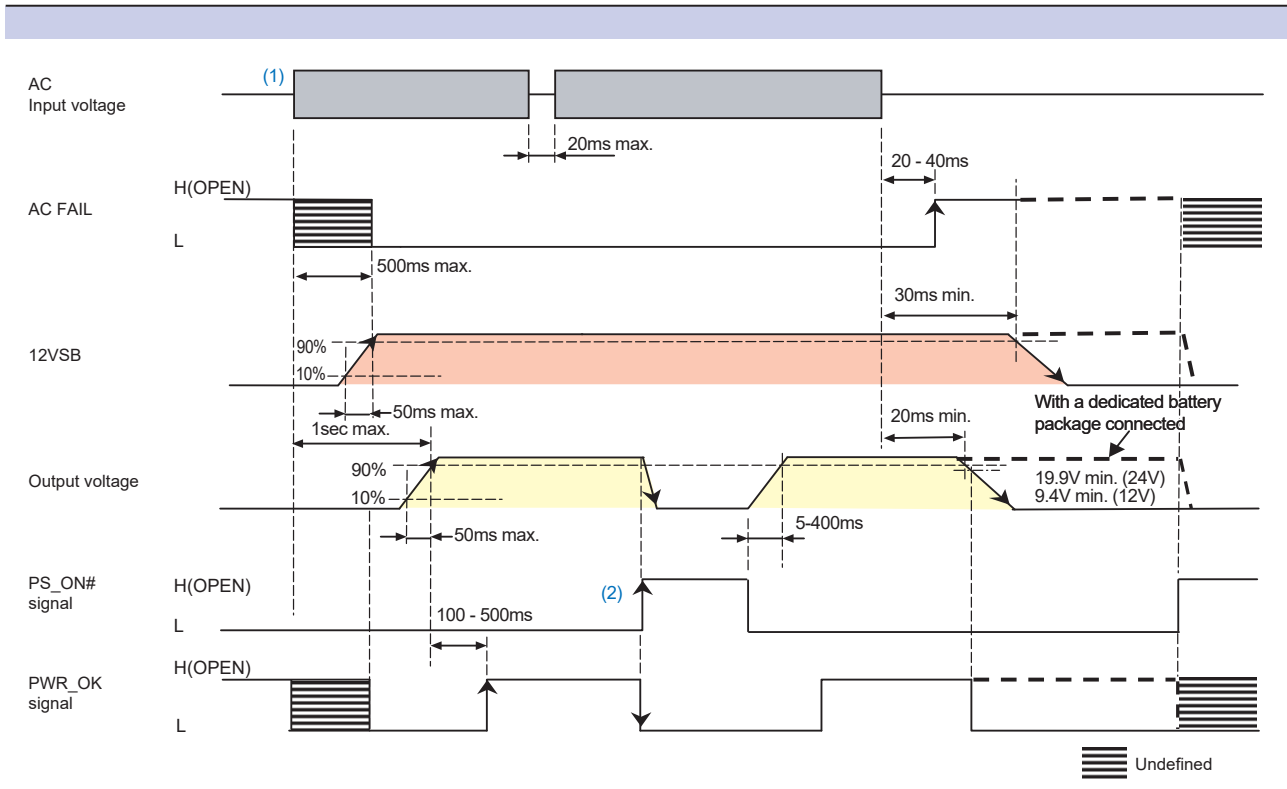
### Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

| Items  | Specification  | Note   |
|--|--|--|
| <b>Input Signal</b><br>Output ON / OFF Control Signal (PS_ON#) | The power supply starts up with 'L' input and shuts down with 'H' or 'OPEN' input (except for 12VSB).<br>*The output also shuts down if PS_ON signal is switched to OFF ('H') during backup operation with the dedicated battery package connected. If this is the case, 12VSB will shut down.       | The pin 4 of SIG connector                             |
| <b>Output Signal</b><br>Normal Output Signal (PWR_OK)          | 'H' signal is delivered at normal output (detection delay time: 100 - 500ms).<br>Voltage detection: 19.9V or higher for 24V output, 9.4V or higher for 12V output  | The pin 5 of SIG connector                             |
| Fan Monitor Signal (FAN_M1, FAN_M2)                            | Two cycle pulses per one rotation of the fan motor are delivered (open collector output).  | The pin 2 of SIG connector, the pin 3 of SIG connector |
| Blackout Detection Signal (AC FAIL)                            | The signal goes 'OPEN' at low AC input voltage and blackout detection (open collector output).<br>detection voltage: 80 VAC typ., detection delay time: 20 - 40ms after AC input failure.  | The pin 6 of SIG connector                             |
| Low Battery Voltage Signal (BATT LOW)                          | The low battery voltage signal, "BATT_LOW" will be sent from the power supply after receiving from the dedicated battery package.<br>*Only available when a dedicated battery package is connected.<br>Detailed specifications shall be based on the specification of the battery package connected. | The pin 7 of SIG connector                             |

| Signal Circuit       |                             |                       |          |                  |           |            |
|----------------------|-----------------------------|-----------------------|----------|------------------|-----------|------------|
| Input Signal Circuit | (PS_ON#)                    | Output Signal Circuit | (PWR_OK) | (FAN_M1, FAN_M2) | (AC FAIL) | (BATT LOW) |
|                      | <p>(L ≤ 0.8V, 2.0V ≤ H)</p> |                       |          |                  |           |            |

### Sequence Diagram

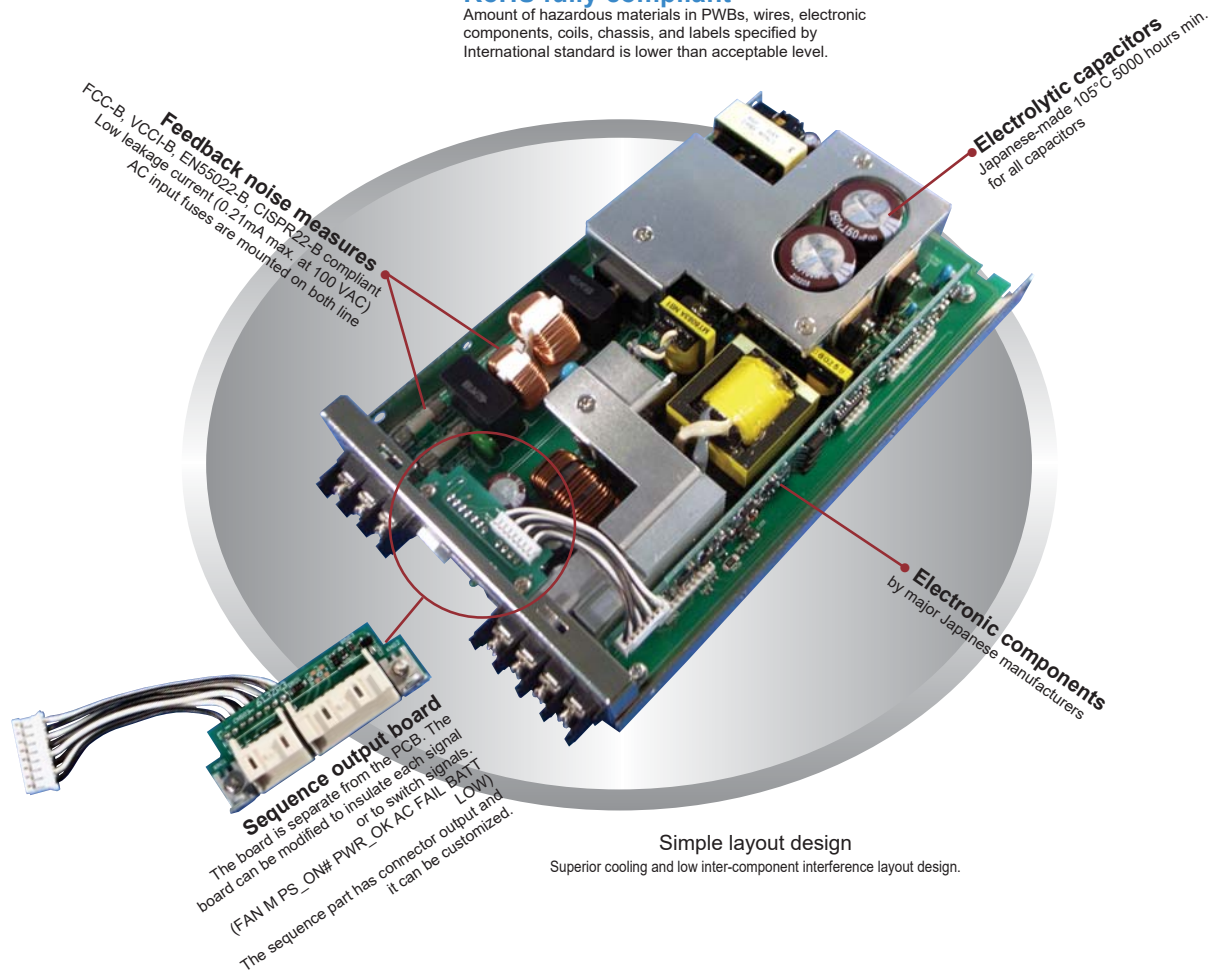


\* The time chart for when a dedicated battery package is connected is shown with thick broken lines.  
 (1) All outputs start up by being supplied AC input under the condition of PS\_ON# 'L'. PWR\_OK 'H' (OPEN) is delivered at 100 - 500ms after the output has risen.  
 (2) At PS\_ON# 'H' (OPEN) input, outputs except for +12VSB shut down (all outputs including 12VSB shut down at backup operation).

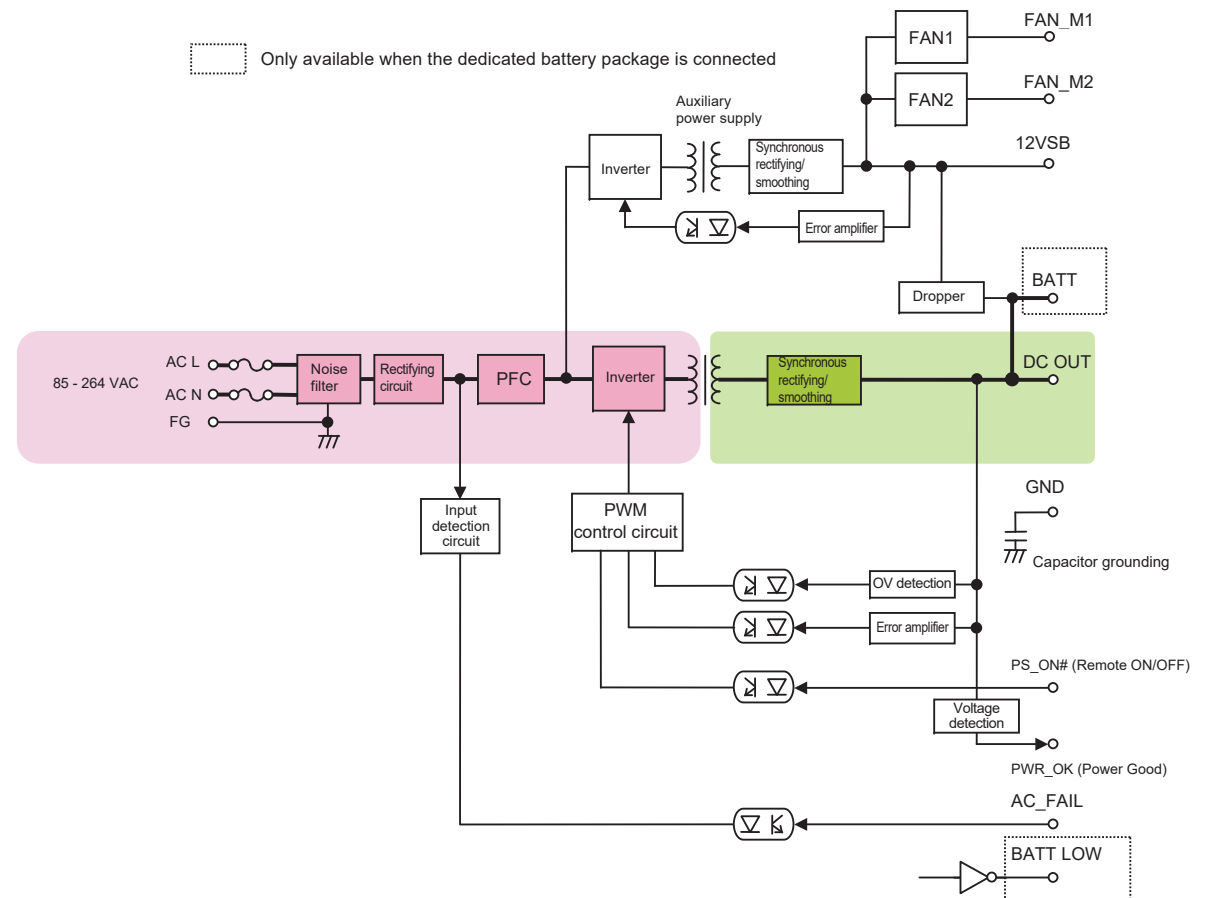
### Internal Structure

#### RoHS fully compliant

Amount of hazardous materials in PWBs, wires, electronic components, coils, chassis, and labels specified by International standard is lower than acceptable level.

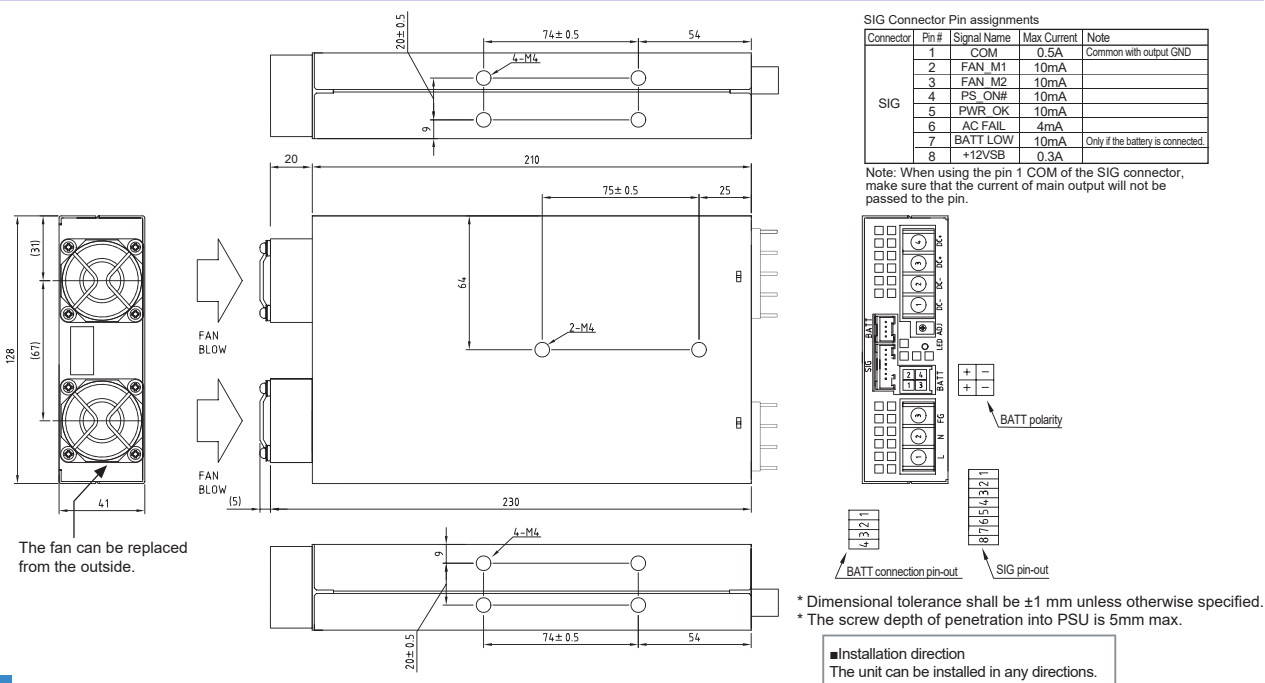


### Block Diagram





## Outline Drawing



## Optional Components (Sold Separately)

| Battery package |                |       |                                    |             |
|-----------------|----------------|-------|------------------------------------|-------------|
| Picture         | Model          | Type  | Shape (size)                       | Backup Time |
|                 | BS14A-H24/2.5L | Ni-MH | 1U/3U size<br>(W×D×H=128×211×41mm) |             |

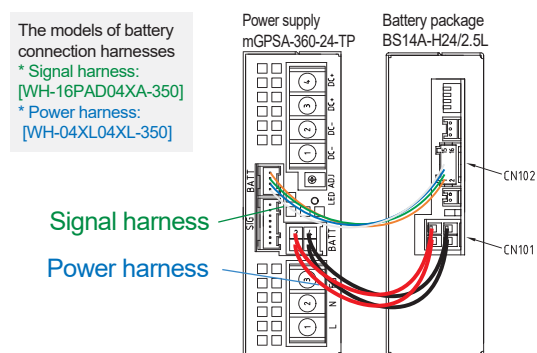
\* The backup time is a reference value at initial use; it is not a guaranteed value.  
\* The backup time can be extended with parallel connection.  
\* Battery package can be connected to mGPSA-360-24-TP (backup type) only.

| Cable   |                     |  |  |  |
|---------|---------------------|--|--|--|
| Picture | Model               | Type   | Description  |  |
|         | WH-08XA08XA-500     | Signal harness                                 | For BATT_LOW, AC_FAIL, FAN_M, PS_ON, PWR_OK, and +12VSB          |  |
|         | WH-16PAD04XA-350    | Signal harness for connecting the battery pack | Signal harness to connect one battery package (BS14A-H24/2.5L)*  |  |
|         | WH-16PAD04XA-350-01 | Signal harness for connecting the battery pack | Signal harness to connect two battery packages (BS14A-H24/2.5L)* |  |
|         | WH-04XL04XL-350     | Power harness for connecting the battery pack  | Power harness to connect one battery package (BS14A-H24/2.5L)*   |  |
|         | WH-02XL04XL-350-01  | Power harness for connecting the battery pack  | Power harness to connect two battery packages (BS14A-H24/2.5L)*  |  |

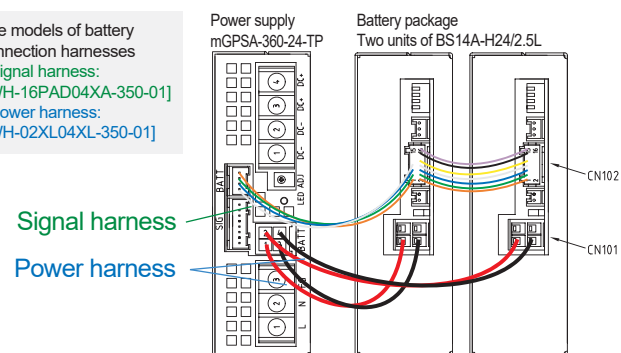
\* The harness is necessary to connect with the battery package (BS14A-H24/2.5L) for backup operation (see the following figures "Configurations of Battery Connection Harnesses").

## Battery connection harness and connection images

Connecting one battery package (BS14A-H24/2.5L)



Connecting two battery packages (BS14A-H24/2.5L)



# mGPSA Series Features

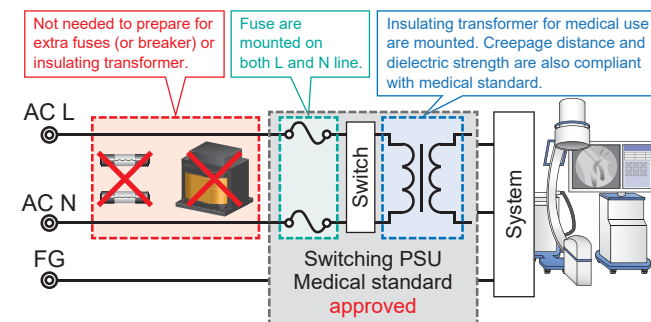
## Advantages of Medical Standards Approved Power Supply

### ► Power supply NOT APPROVED

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 APPROVED

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.

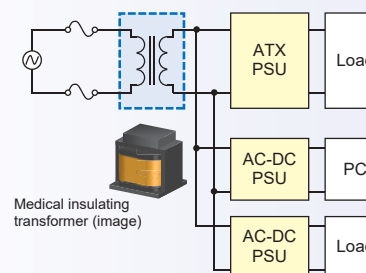


## Front PC Power Supply for Medical System

Combination of mGPSA-360 and 24 VDC input ATX power supply, enables low leakage current medical standard compliant ATX output power supply. Backup functionality is also available with the dedicated battery package "BS14A-H24/2.5L". Whole system can be efficiently backup.

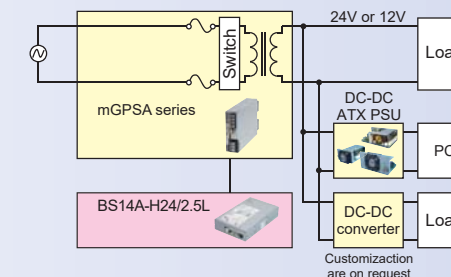
### Previous configuration

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.



## 24 VDC input ATX power supply

### PCUI-180P-X2SP1



**ATX** Continuous output: 120W Peak output: 180W  
Input: 24 VDC (21.6-26.4V)

### PCUI-180P-X2SF1



**SFX** Continuous output: 150W Peak output: 180W  
Input: 24 VDC (21.6-26.4V)

### PCFD-180-X2S



**FANLESS ATX** Continuous output: 90W Peak output: 180W  
Input: 24 VDC (20-36V)

Case design to mount PCFD-180P corresponding to SFX size is ongoing.

#### Product features

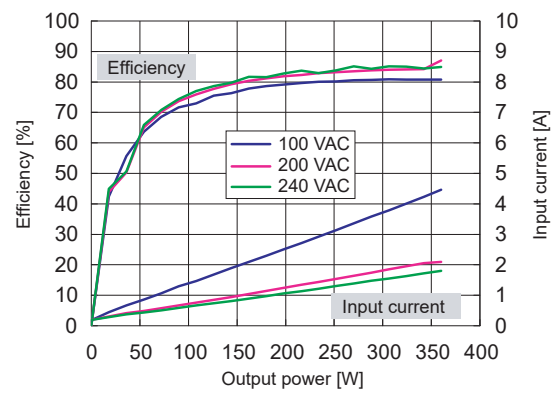
- DC input, non-isolated ATX/SFX power supply
- Mounting surfaces compliant with PS/2(ATX) and SFX power supply
- Can be used as medical standard compliant ATX output power supply by connecting with a medical standard approved 24V output power supply

#### Product features

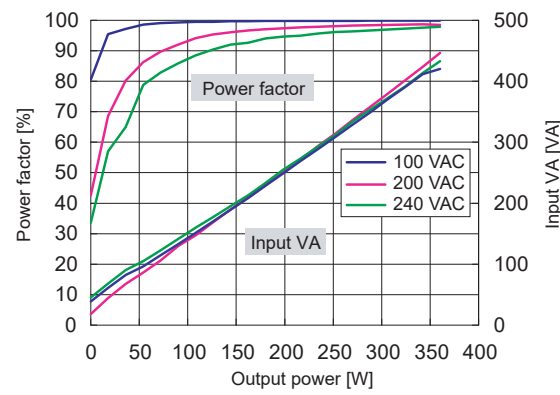
- DC input compact fanless ATX power supply
- Backup functionality is available
- Can be used as medical standard compliant ATX output power supply by connecting with a medical standard approved 24V output power supply

### Characteristics Data mGPSA-360-24-TP (Examples of actual measurement)

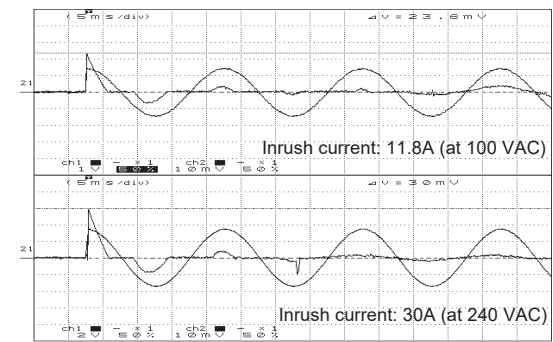
● Fig.4 Efficiency / Input Current vs. Output Power



● Fig.5 Power Factor / Input VA vs. Output Power



● Fig.6 Inrush Current

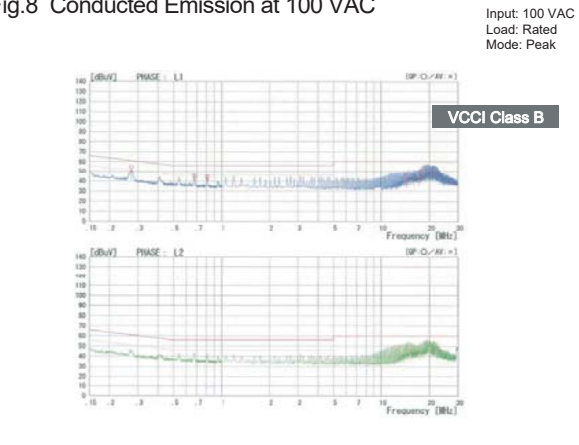


● Fig.7 Leakage Current

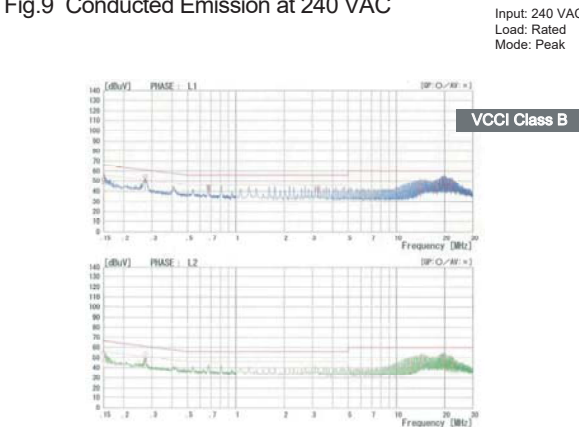
Input: 100 / 240 VAC  
Load: Rated and min. load

|         | Rated load | Min. load |
|---------|------------|-----------|
| 100 VAC | 0.06mA     | 0.08mA    |
| 240 VAC | 0.18mA     | 0.20mA    |

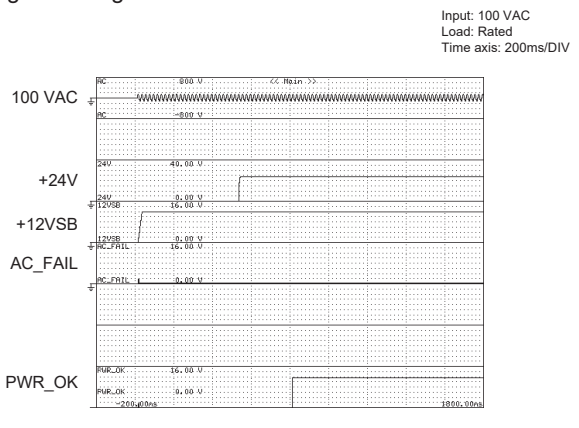
● Fig.8 Conducted Emission at 100 VAC



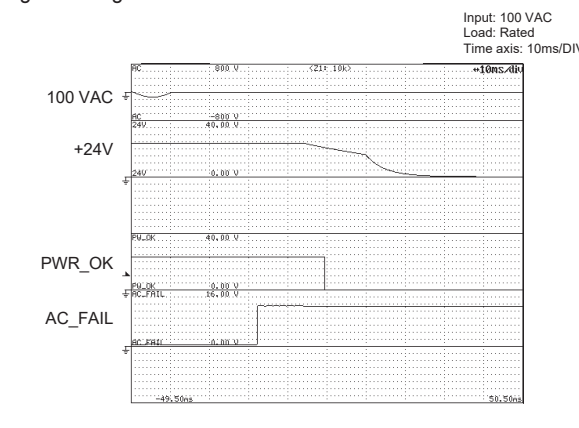
● Fig.9 Conducted Emission at 240 VAC



● Fig.10 Rising Characteristics at 100 VAC

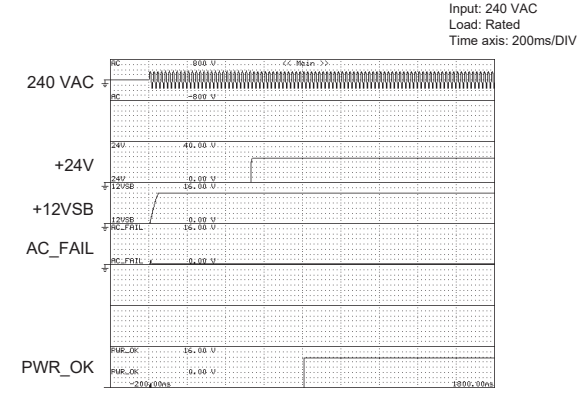


● Fig.11 Falling Characteristics at 100 VAC

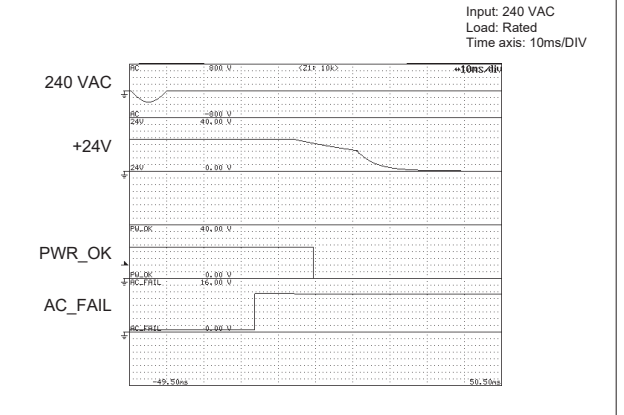


### Characteristics Data mGPSA-360-24-TP (Examples of actual measurement)

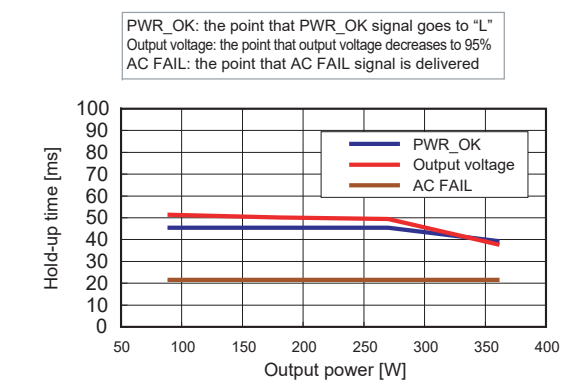
● Fig.12 Rising Characteristics at 240 VAC



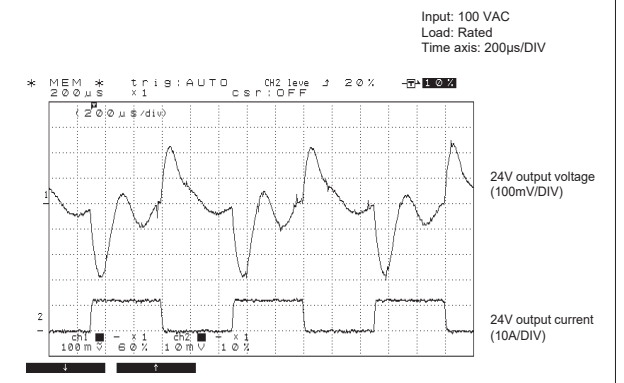
● Fig.13 Falling Characteristics at 240 VAC



● Fig.14 Output Hold-up Time vs. Output Power



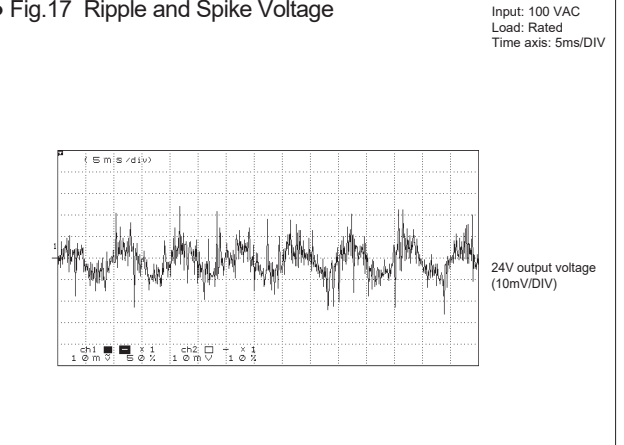
● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz



● Fig.16 Output Voltage Regulation

| Output                  | AC input voltage |          |          |          |          |          |
|-------------------------|------------------|----------|----------|----------|----------|----------|
|                         | 85 VAC           | 100 VAC  | 132 VAC  | 176 VAC  | 240 VAC  | 264 VAC  |
| 24V output (min. load)  | 24.017 V         | 24.017 V | 24.017 V | 24.017 V | 24.018 V | 24.017 V |
| 24V output (50%)        | 24.008 V         | 24.006 V | 24.007 V | 24.007 V | 24.006 V | 24.007 V |
| 24V output (rated load) | 23.995 V         | 23.994 V | 23.994 V | 23.995 V | 23.994 V | 23.993 V |
| 24V output (peak)       | 23.992 V         | 23.991 V | 23.990 V | 23.990 V | 23.990 V | 23.992 V |

● Fig.17 Ripple and Spike Voltage



● Fig.18 Ambient Temperature vs. Expected Service Life

Input: 100 VAC  
Load: Rated  
Operating time: 24 consecutive hours

| Intake air temp.           | 20°C         | 30°C         | 40°C        |
|----------------------------|--------------|--------------|-------------|
| Expected service life (yr) | approx. 24.3 | approx. 12.2 | approx. 6.1 |

\* Lifetime shall be 15 years at longest due to deterioration of sealing plates.

| Ambient temp.              | 25°C       | 40°C       | 50°C        |
|----------------------------|------------|------------|-------------|
| Expected service life (yr) | approx. 13 | approx. 13 | approx. 8.7 |

● Fig.19 Over Current Protection (V-I Characteristic)

