

Single Output High Capacity Power Supply mGPSA-360 Series

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



mGPSA-360-24-TP backs up power in blackout with a battery package connected.



■ Battery package BS14A-H24/2.5L

RoHS Directive

1U/3U	
Continuous Max. 360W	Peak Power 480W - 600W

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	4.12:+12V output 24:+24V output
2. Series name	5. Signal output : TTL signal
3. Output power	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

mGPSA-360-24 Efficiency chart

mGPSA-360-24		
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%

Safety standard / Approval	UL	CSA	EN	CE	GCC
Reliability Grade	HFA	FA	HOA	OA	

Function



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 360W	15A 360W	0.3A 3.6W
Peak current / peak power (5 sec. max., 100VAC)	40A 480W	20.8A 499.2W	-
Peak current / peak power (5 sec. max., 200VAC)	40A 480W	25A 600W	-
Min. current	0A	0A	0A

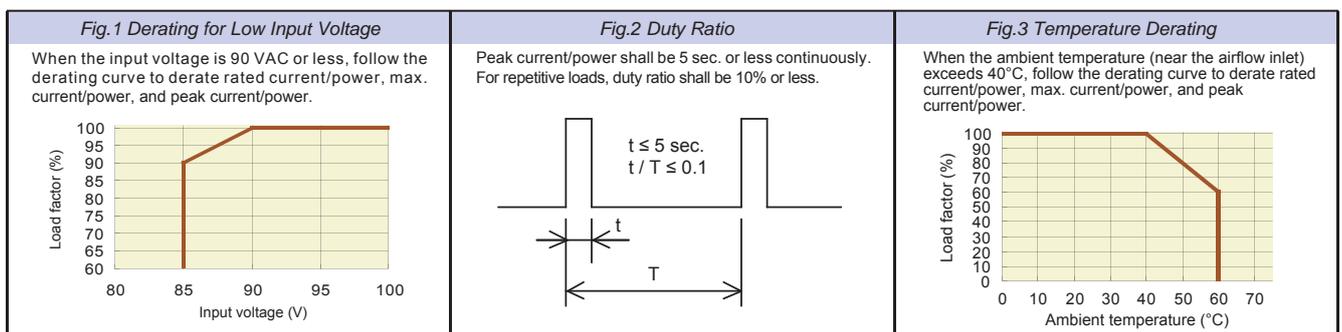
Dimensions

W×H×D (mm)	128×41×230 (Width 1U/Height 3U size)
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General Specification Condition: at normal temperature and humidity unless otherwise specified

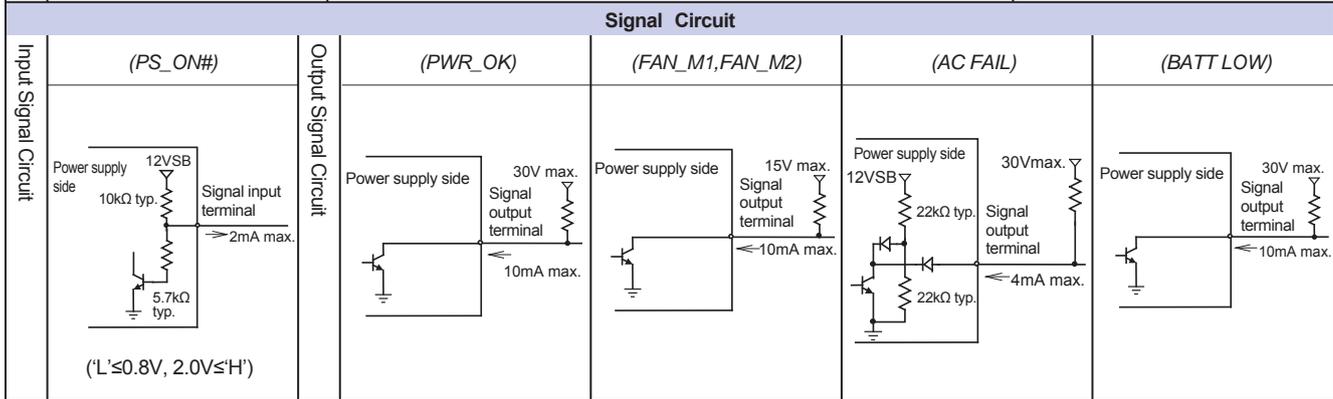
Items		Specification			Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC) DC120-370V*1			Worldwide range *Refer to Fig. 1	
	Input Frequency	50 / 60Hz			47 - 63Hz	
	Efficiency	80% typ. (100 VAC), 83% typ. (240 VAC) *Characteristic data: Fig. 4			At rated output	
	Power 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) 6.3A typ. (100 VAC), 3.0A typ. (240 VAC:24V), 2.4A typ. (240VAC:12V)			At rated input and max. output 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	
			360W	360W	3.6W	
	Peak Current / Power	100 VAC	40A	20.8A	-	Time: 5 sec. or less Duty ratio of repetitive load: 10% or less
			480W	499.2W	-	
		200 VAC	40A	25A	-	
			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.	160 max.	Two wires are coming out from the output terminal block and connected into one at the edge of 100cm max. long. 47µF electrolytic capacitor and 0.1µF ceramic capacitor are placed on it and it is measured by the 100MHz oscilloscope. *Characteristic data: Fig. 17	
	0 to 60°C	120 max.	120 max.	120 max.		
Max. Spike Voltage (mVp-p)	-10 to 0°C	180 max.	180 max.	180 max.		
	0 to 60°C	150 max.	150 max.	150 max.		
Protection	Overcurrent Protection	OCP Point (A)	101% min. of peak current		101% min. of peak current	
		Method	Hold down current limiting → Output shutdown		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	-	
Recovery(Overvoltage)	Method	Output shutdown		-		
	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	
	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	
Insulation	Dielectric Strength	AC input - DC output: 4000 VAC for 1 minute AC input - FG: 2000 VAC for 1 minute			Cut-off current: 10mA Completion inspection: 3000 VAC/min. between AC input-DC output	
	Insulation Resistance	AC input - DC output: 50MΩ min. AC input - FG: 50MΩ min. DC output - FG: 50MΩ min.			At 500 VDC	
	Leakage Current	0.21mA max. (100 VAC) / 0.5mA max. (240 VAC) *Characteristic data: Fig. 7			YEW. TYPE3226 (1kΩ) or equivalent	
EMC	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 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				
	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		
Others	Safety Standard	UL60601-1, CSA C22.2 NO 601. 1(c-UL), ANSI/AAMI ES60601-1, UL60950-1, CSA60950-1 (c-UL) approved, CE Marking, 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

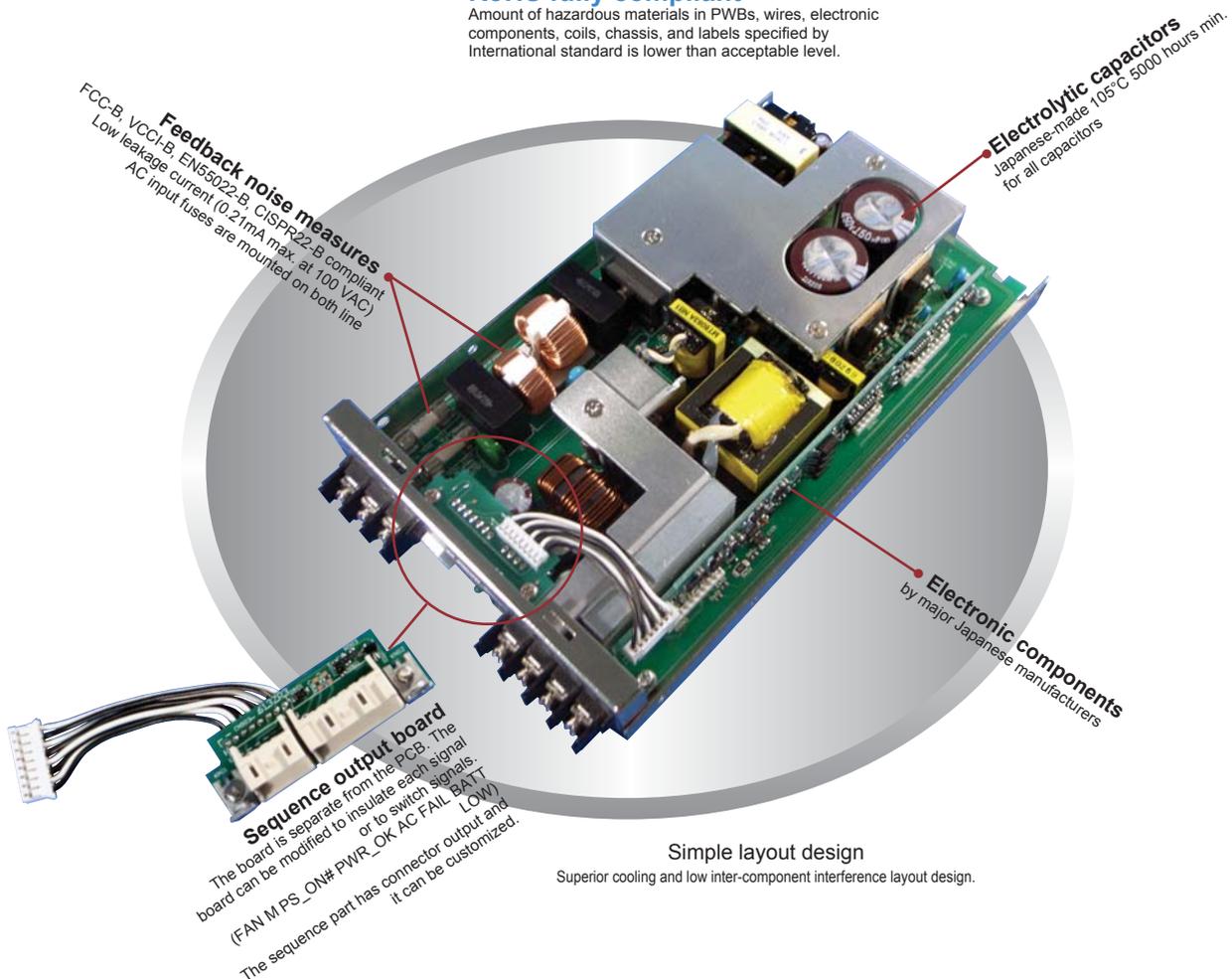
Items	Specification	Note
Input Signal Output ON / OFF Control Signal (PS_ON#)	The power supply starts up with 'L' input and shuts down with 'H' or 'OPEN' input (except for 12VSB). *The output also shuts down if PS_ON signal is switched to OFF ('H') during backup operation with the dedicated battery package connected. If this is the case, 12VSB will shut down.	The pin 4 of SIG connector
Output Signal Normal Output Signal (PWR_OK)	'H' signal is delivered at normal output (detection delay time: 100 - 500ms). 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). 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) *Only available when a dedicated battery package is connected.	The low battery voltage signal, "BATT_LOW" will be sent from the power supply after receiving from the dedicated battery package. If the battery package is not connected, the status shall be 'OPEN'. Detailed specifications shall be based on the specification of the battery package connected.	The pin 7 of SIG connector



Internal Structure

RoHS fully compliant

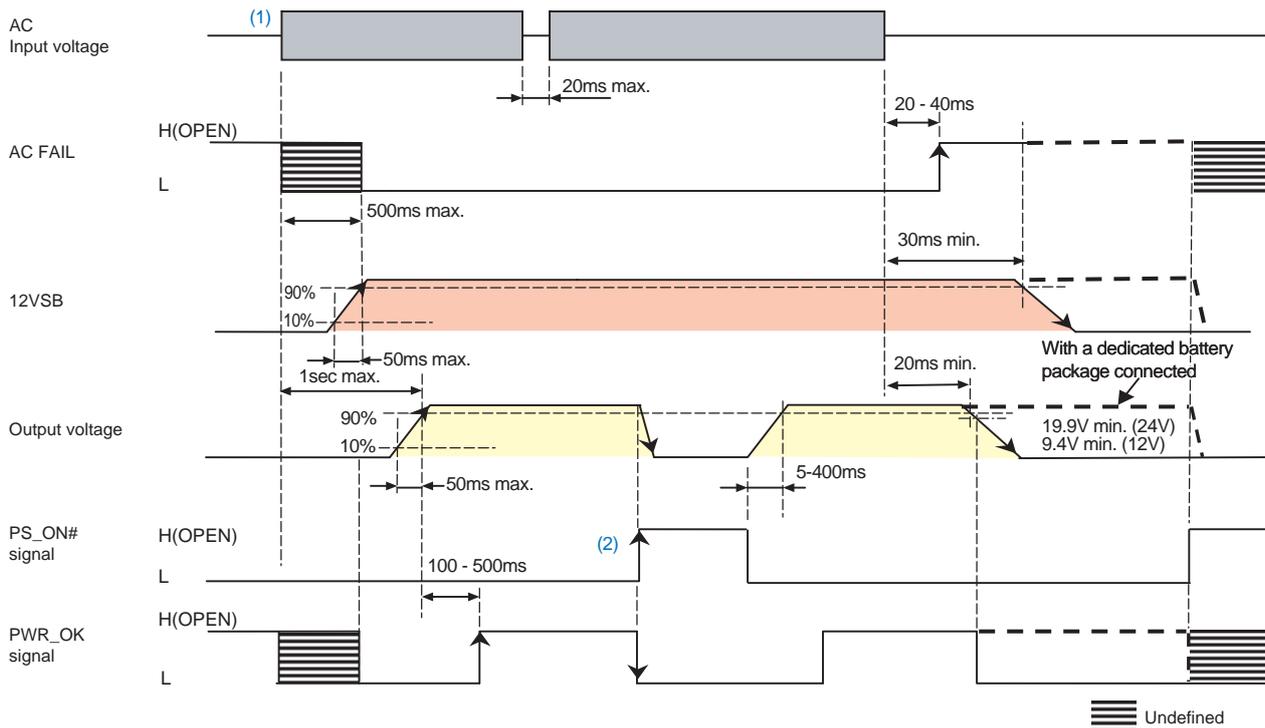
Amount of hazardous materials in PWBs, wires, electronic components, coils, chassis, and labels specified by International standard is lower than acceptable level.



Simple layout design

Superior cooling and low inter-component interference layout design.

Sequence Diagram

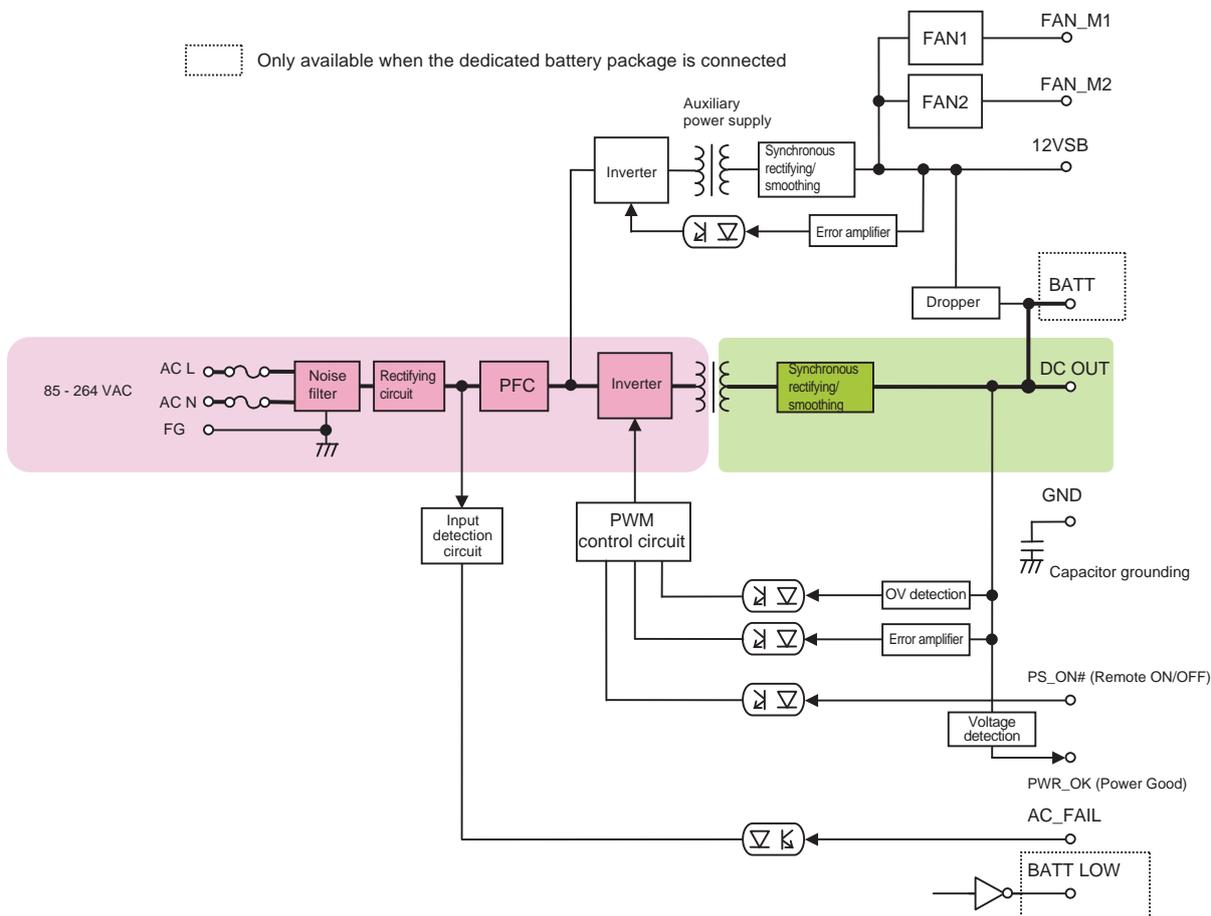


* The time chart for when a dedicated battery package is connected is shown with thick broken lines.

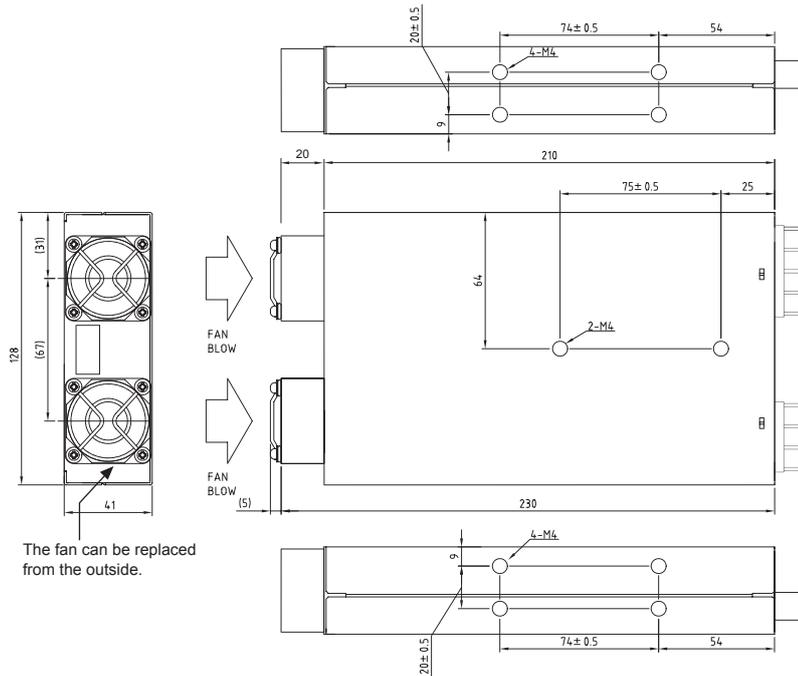
(1) All outputs start up by being supplied AC input under the condition of PS_ON# 'L'. PWR_OK 'H (OPEN)' is delivered at 100 - 500ms after the output has risen.

(2) At PS_ON# 'H (OPEN)' input, outputs except for +12VSB shut down (all outputs including 12VSB shut down at backup operation).

Block Diagram



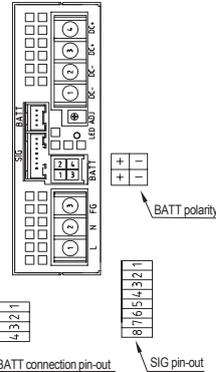
Outline Drawing



SIG Connector Pin assignments

Connector	Pin #	Signal Name	Max Current	Note
SIG	1	COM	0.5A	Common with output GND
	2	FAN_M1	10mA	
	3	FAN_M2	10mA	
	4	PS_ON#	10mA	
	5	PWR_OK	10mA	
	6	AC_FAIL	4mA	
	7	BATT_LOW	10mA	Only if the battery is connected.
	8	+12VSB	0.3A	

Note: When using the pin 1 COM of the SIG connector, make sure that the current of main output will not be passed to the pin.



- * Dimensional tolerance shall be ±1 mm unless otherwise specified.
- * The screw depth of penetration into PSU is 5mm max.

■ Installation direction
The unit can be installed in any directions.

Optional Components (Sold Separately)

Battery package				
Picture	Model	Type	Shape (size)	Backup Time
	BS14A-H24/2.5L	Ni-MH	1U/3U size (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.				

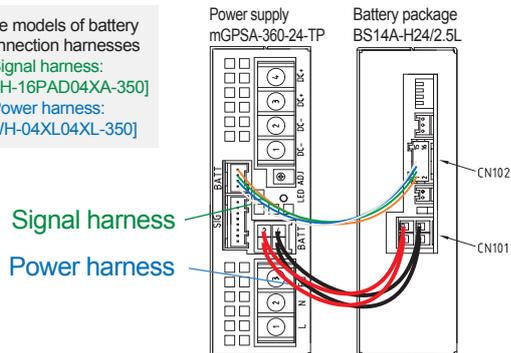
Cable				
Picture	Model	Type	Description	
	WH-08XA08XA-500	Signal harness	For BATT_LOW, AC_FAIL, FAN_M, PS_ON, PWR_OK, and +12VSB	
	WH-16PAD04XA-350	Signal harness for connecting the battery pack	Signal harness to connect one battery package (BS14A-H24/2.5L)*	
	WH-16PAD04XA-350-01	Signal harness for 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 SIG Battery Connection Harnesses").				

Battery connection harness and connection images

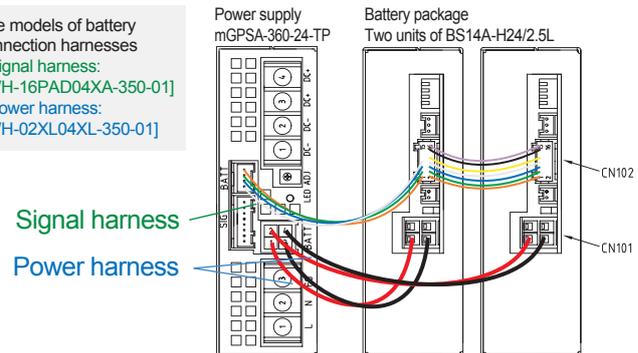
Connecting one battery package (BS14A-H24/2.5L)

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

The models of battery connection harnesses
 * Signal harness:
 [WH-16PAD04XA-350]
 * Power harness:
 [WH-04XL04XL-350]



The models of battery connection harnesses
 * Signal harness:
 [WH-16PAD04XA-350-01]
 * Power harness:
 [WH-02XL04XL-350-01]



mGPSA Series Features

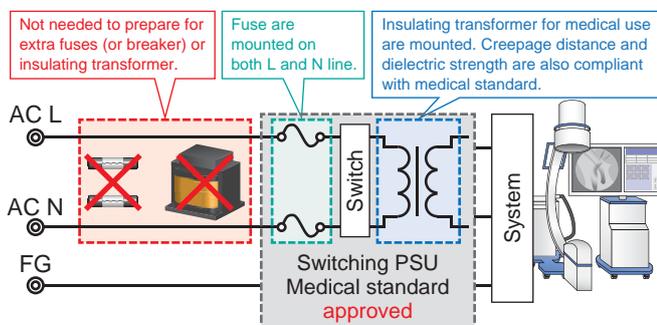
Advantages of Medical Standards Approved Power Supply

► 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.

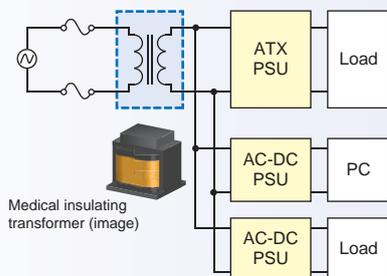


Front PC Power Supply for Medical System

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.

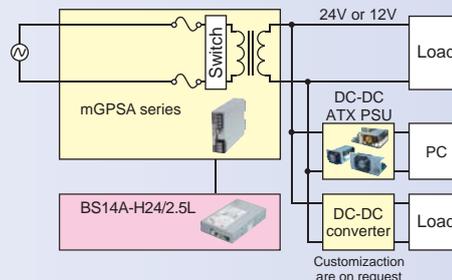
Previous configuration

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

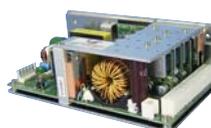


SFX Continuous output : 150W Peak output : 180W
Input: 24 VDC (21.6-26.4V)

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

PCFD-180-X2S



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

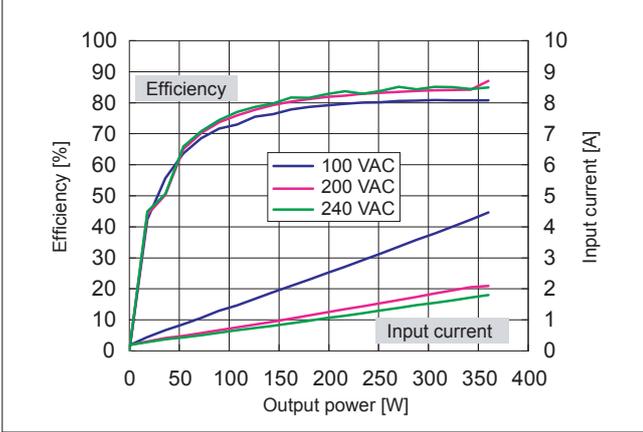
Case design to mount PCFD-180P corresponding to SFX size is ongoing.

Product features

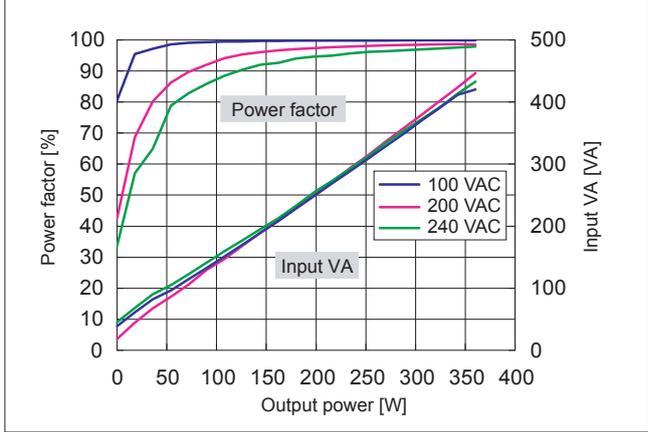
- DC input compact fanless ATX power supply
- Backup functionality is available
- Can be used as medical standard compliant ATX output power supply by connecting with a medical standard approved 24V output power supply

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

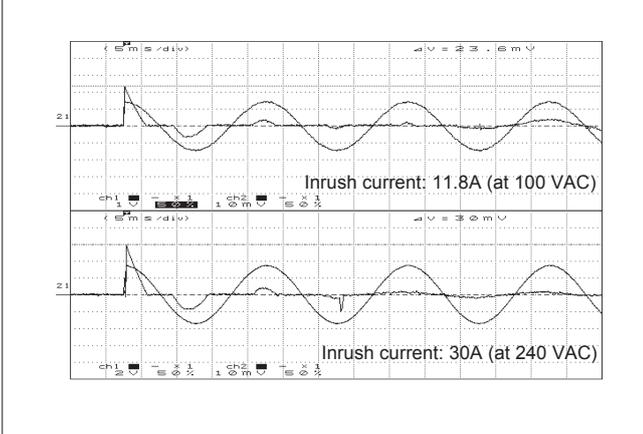
● Fig.4 Efficiency / Input Current vs. Output Power



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



● Fig.6 Inrush Current

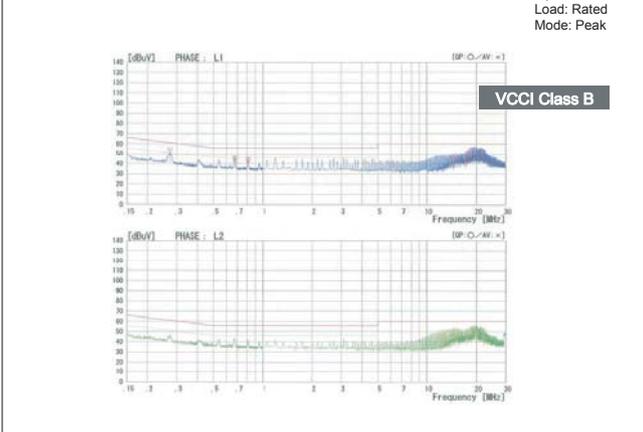


● Fig.7 Leakage Current

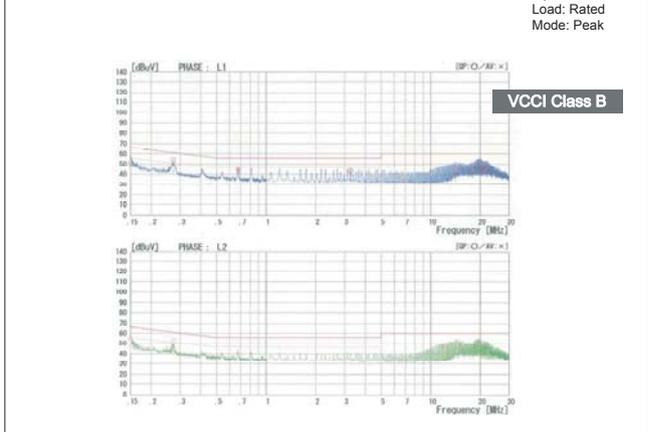
Input: 100 / 240 VAC
Load: Rated and min. load

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

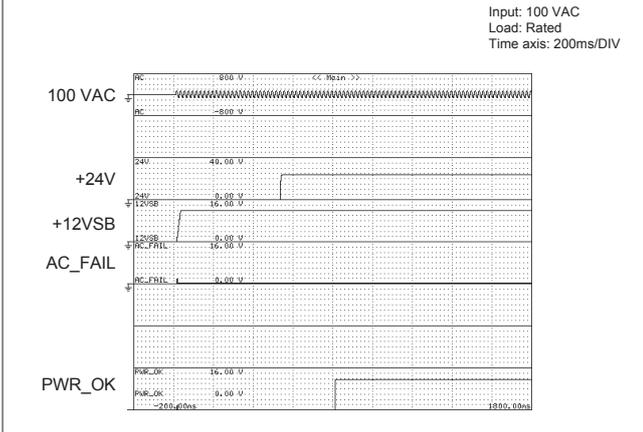
● Fig.8 Conducted Emission at 100 VAC



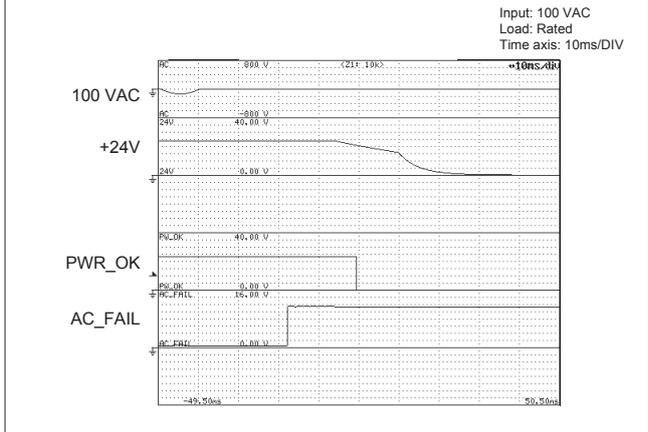
● Fig.9 Conducted Emission at 240 VAC



● Fig.10 Rising Characteristics at 100 VAC

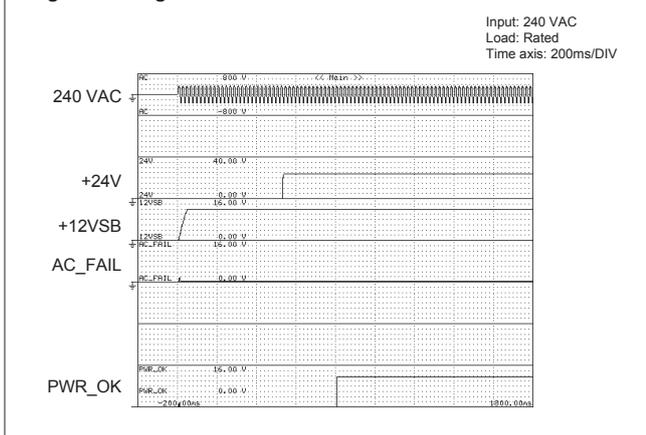


● Fig.11 Falling Characteristics at 100 VAC

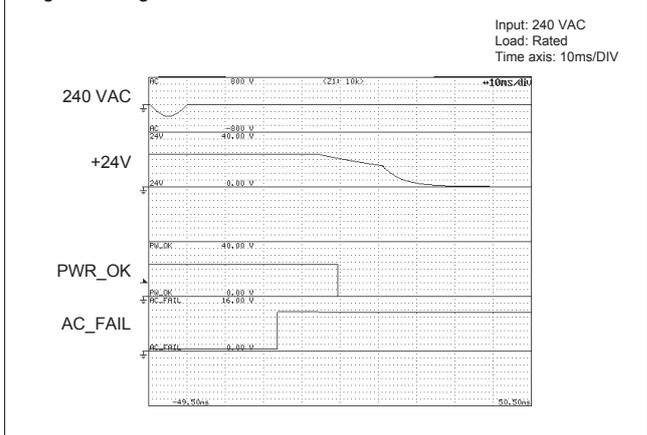


Characteristics Data mGPSA-360-24-TP (Examples of actual measurement)

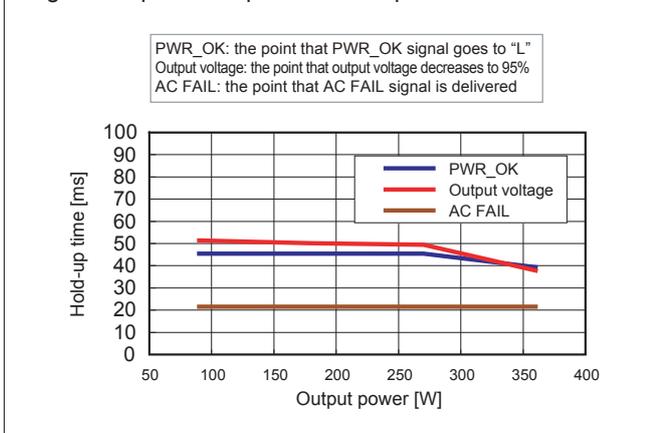
● Fig.12 Rising Characteristics at 240 VAC



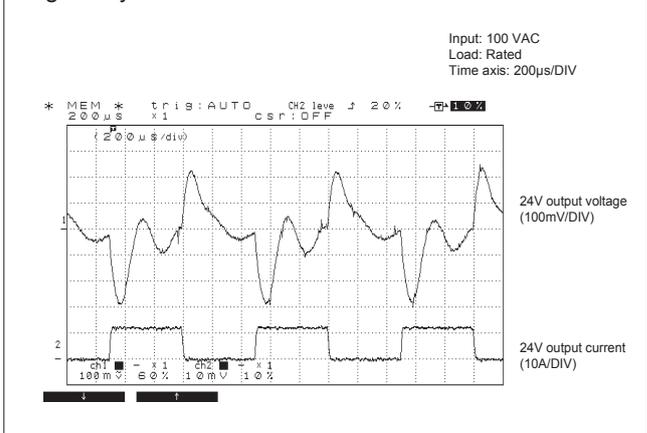
● Fig.13 Falling Characteristics at 240 VAC



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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

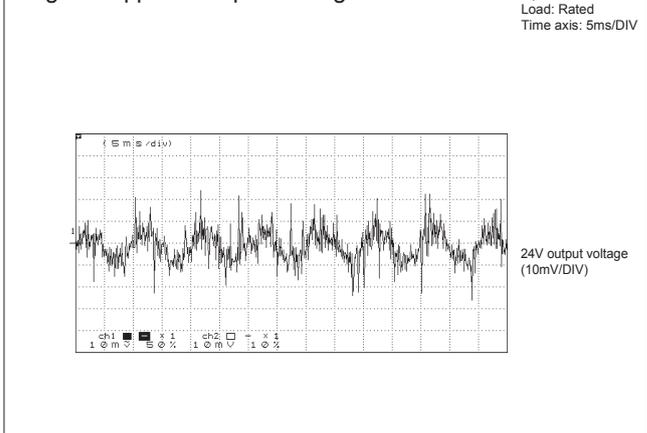


● Fig.16 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
24V output	0A	15A	17A

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

■ Electrolytic capacitors

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.

■ Fan

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)

