

Single Output High Capacity Power Supply GPSA-360 Series

Single Output High Capacity Power Supply



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

■ Model Name Coding

GPSA - 360 - ** - TP

① ② ③ ④ ⑤

1. Series name	3.12: +12V output	4. Signal output: TTL signal
2. Output power	24: +24V output	5. Fan signal: Rotation pulse signal

Features

- Industrial power supply with simple design for low price
- Power supply back-up functionality available at AC fail (+24V output only)
- Various safety standards (IEC/UL/CSA60950-1) are approved.
- Medical standard approved models are also added to our line-up (Refer to p.29 for details)
- 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

GPSA-360-24 Efficiency chart

GPSA-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	CCC
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

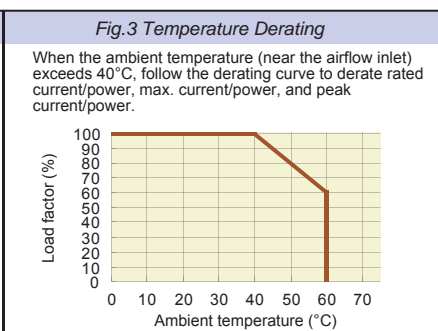
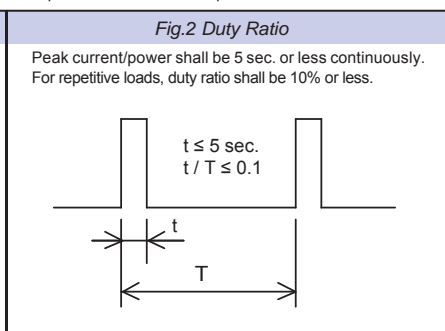
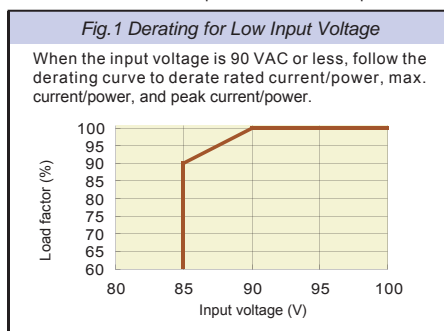
Dimensions

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

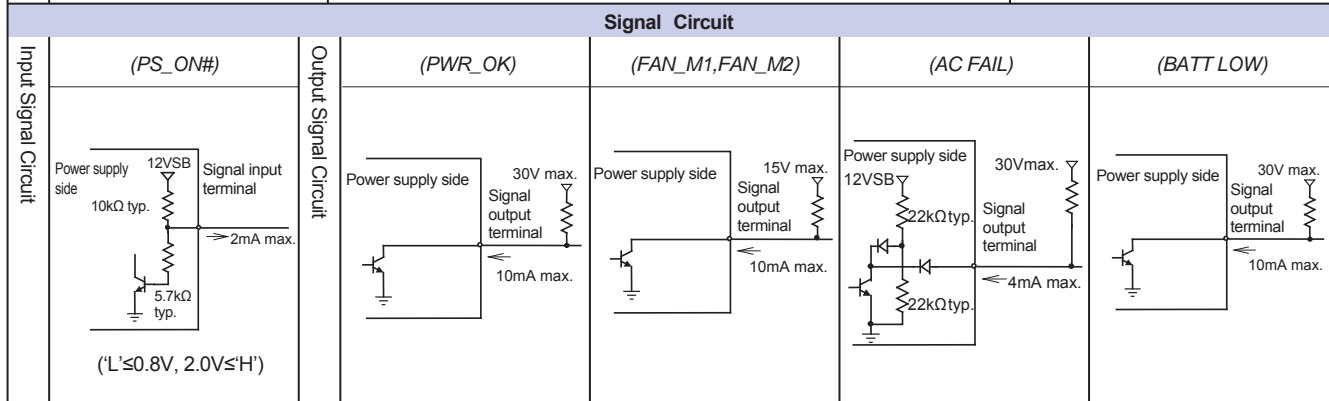
Items		Specification			Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC) DC120-370V*1			Worldwide range *Refer to Fig.1	
	Input Frequency	50 / 60Hz			47 - 63Hz	
	Efficiency	80% typ. (100 VAC),83% typ. (240 VAC) *Characteristic data: Fig.4			At rated output	
	Power Factor	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	GPSA-360-12-TP	GPSA-360-24-TP	Common for all models		
	Rated Voltage	+12V	+24V	+12VSB		
	Rated Current / Power	30A 360W	15A 360W	0.3A 3.6W		
	Peak Current / Power	100VAC	40A 480W	20.8A 499.2W	-	
			40A 480W	25A 600W	-	
	Min. Current	200VAC	0A	0A	0A	
	Setup voltage at factory	12V±2%			24V±2%	
	Voltage adjustable range	12V±10%			24V -5%,+20%	
	Static input fluctuation	48mV max.			96mV max.	
	Static load fluctuation	100mV max.			150mV max.	
	Time-lapse drift	48mV max.			96mV max.	
	Temperature fluctuation	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		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	-	
	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	
	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/minutes 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	IEC60950-1,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

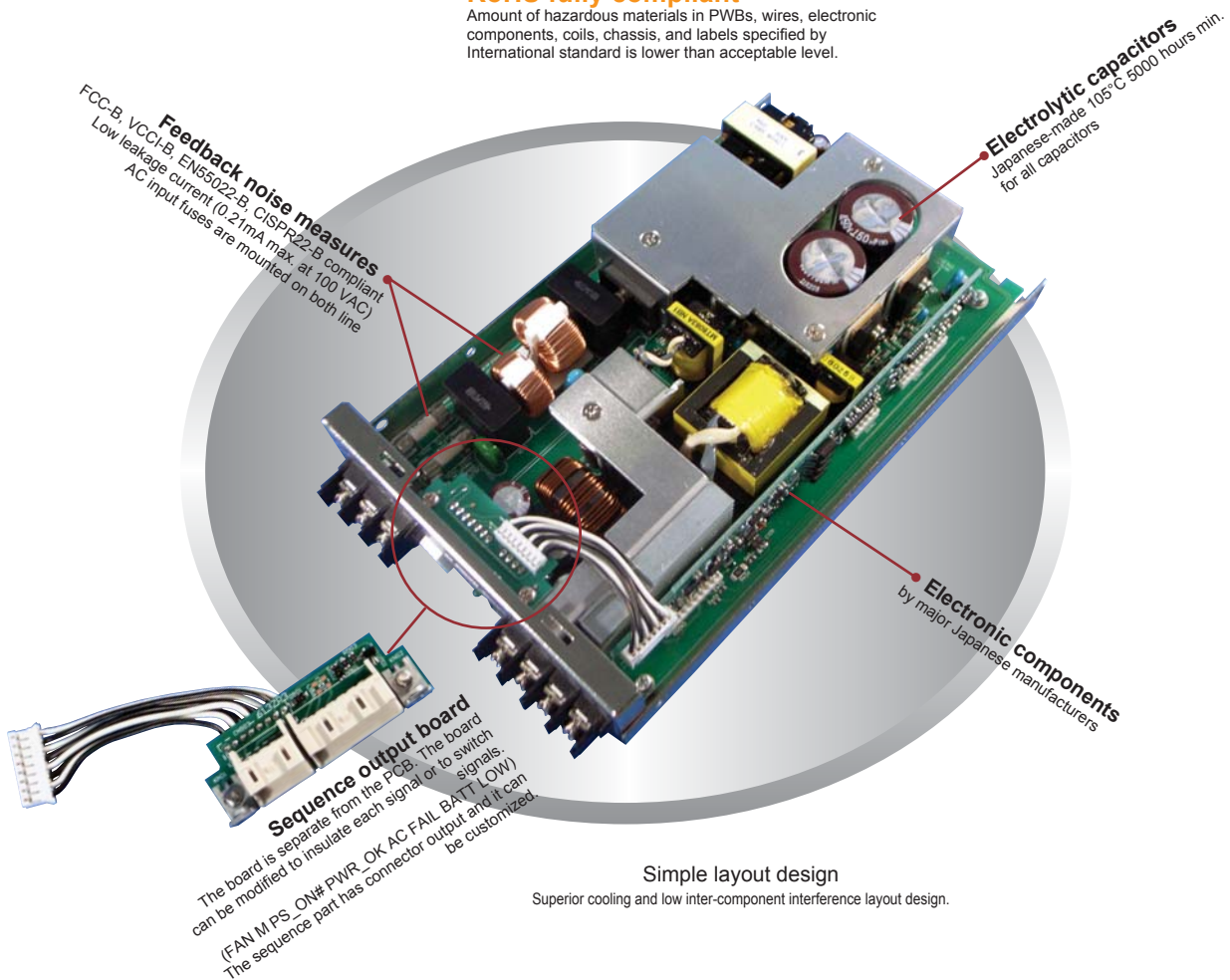
Items	Specification	Note
Input Signal Output ON / OFF Control Signal (PS_ON#)	The power supply starts up with 'L' input and shuts down with 'H' or 'OPEN' input (except for 12VSB). *The output also shuts down if PS_ON signal is switched to OFF ('H') during backup operation with the dedicated battery package 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
Output Signal 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
Output Signal 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. In the case that the load factor is 5% or less: 20-60ms (no time limitation in standby mode))	The pin 6 of SIG connector
Output Signal 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



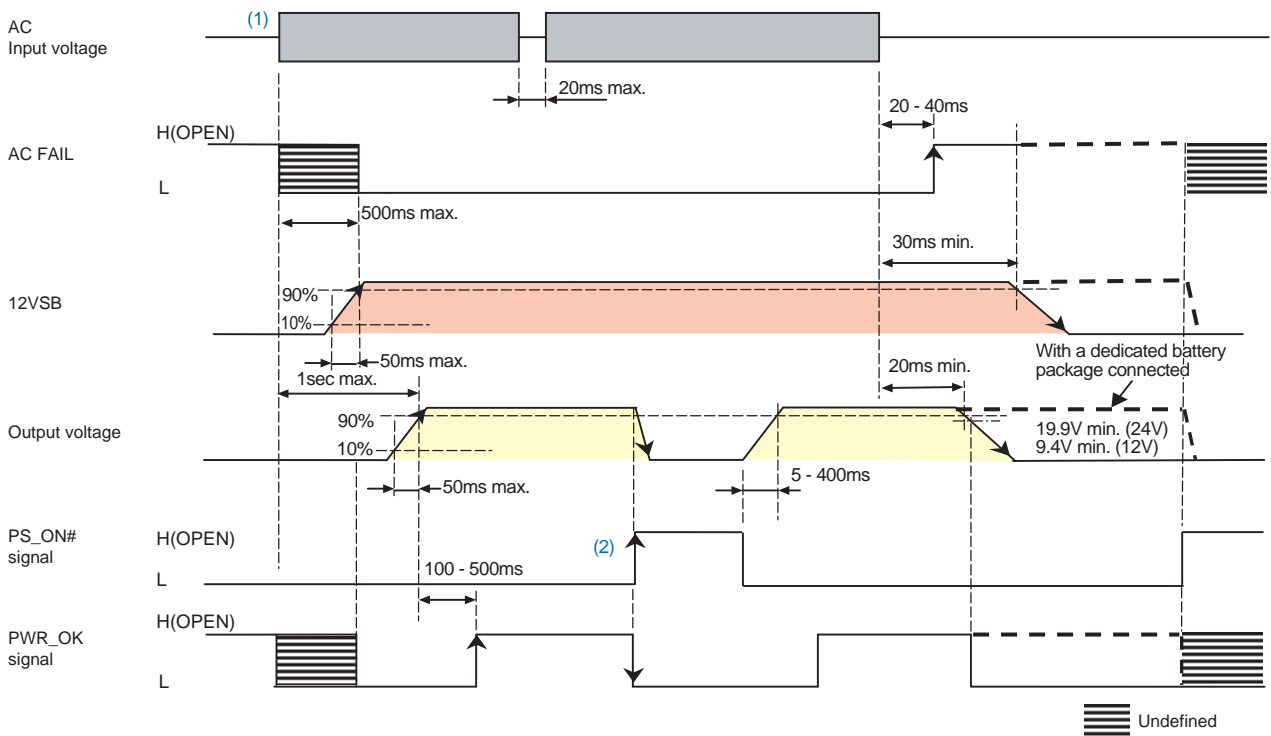
Internal Structure

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.



Sequence Diagram

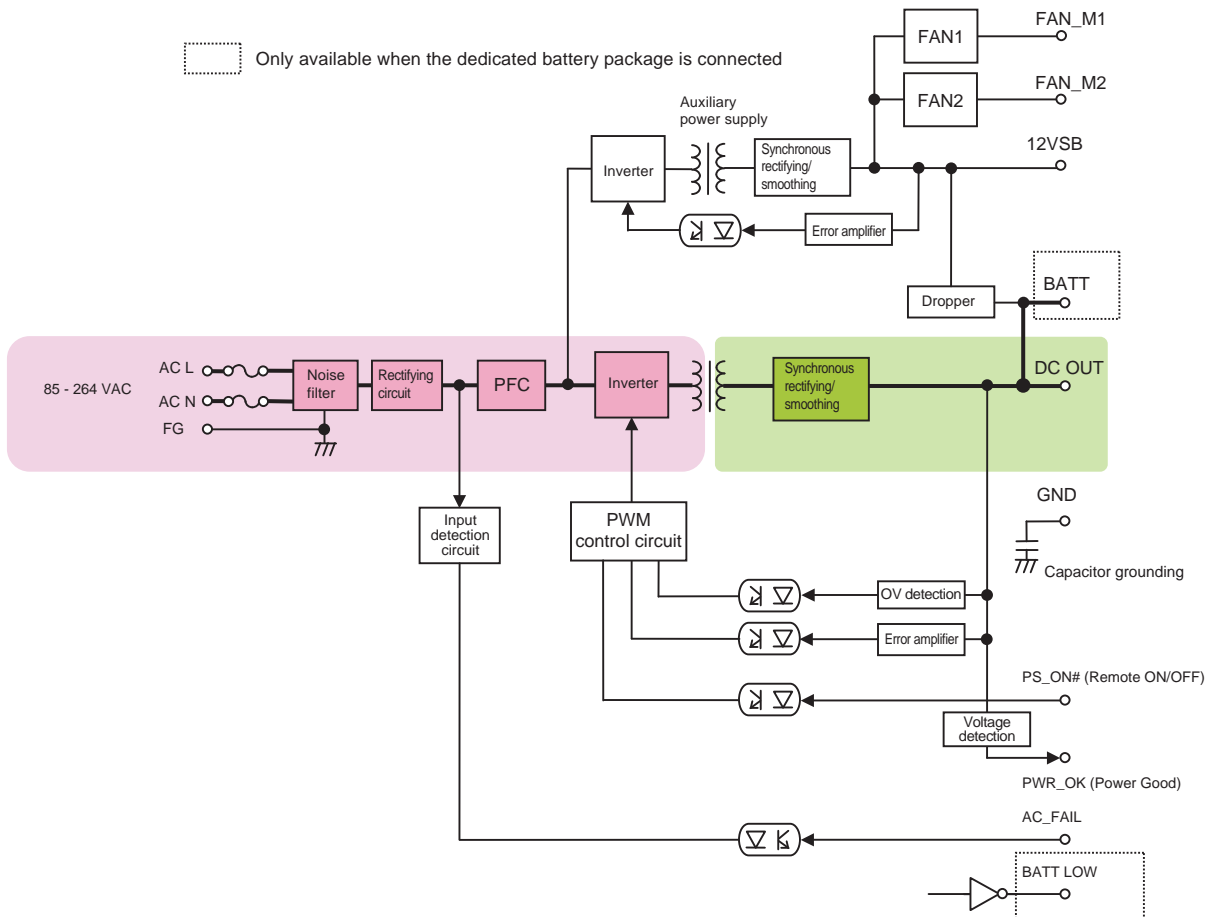


* The time chart for when a dedicated battery package is connected is shown with thick broken lines.

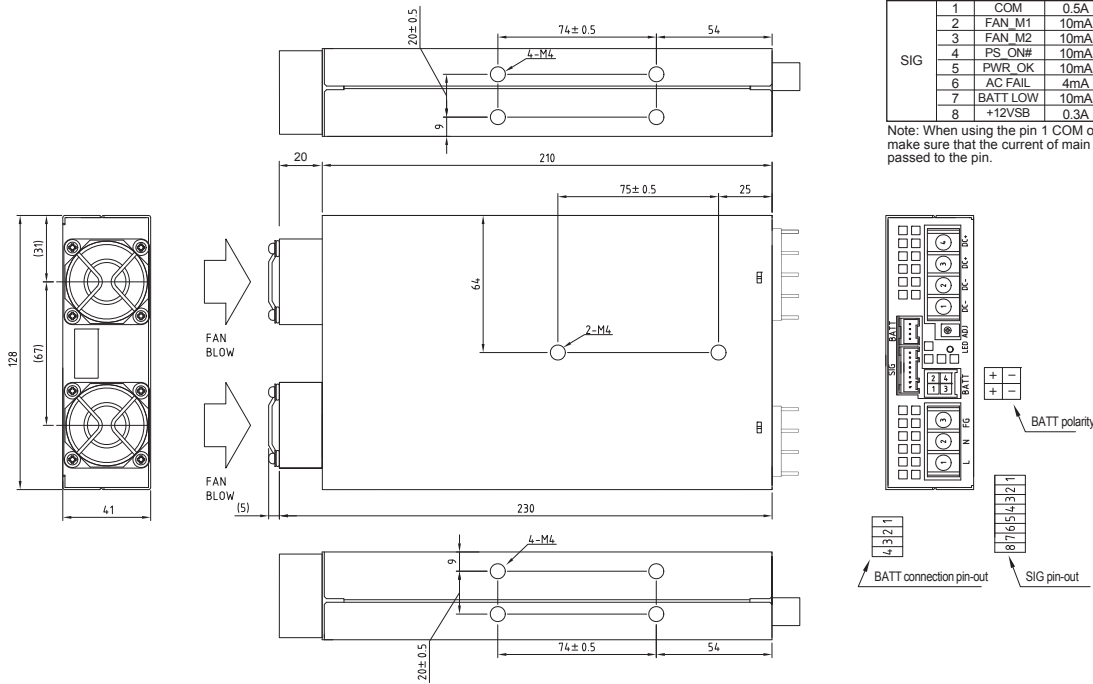
(1) All outputs start up by being supplied AC input under the condition of PS_ON# 'L'. PWR_OK 'H (OPEN)' is delivered at 100 - 500ms after the output has risen.

(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



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.

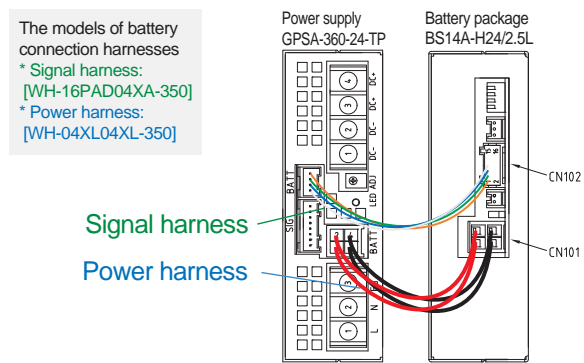
Optional Components (Sold Separately)

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 GPSA-360-24-TP (backup type) only.				

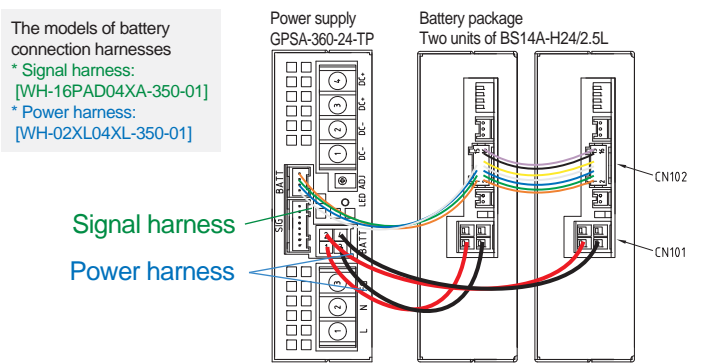
Cable			
Picture	Model	Type	Description
	WH-08XA08XA-500	Signal harness	For BATT_LOW, AC_FAIL, FAN_M, PS_ON, PWR_OK, and +12VSB
	WH-16PAD04XA-350	Signal harness for connecting the battery pack	Signal harness to connect one battery package (BS14A-H24/2.5L)*
	WH-16PAD04XA-350-01	Signal harness for connecting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



Connection In Series And Parallel

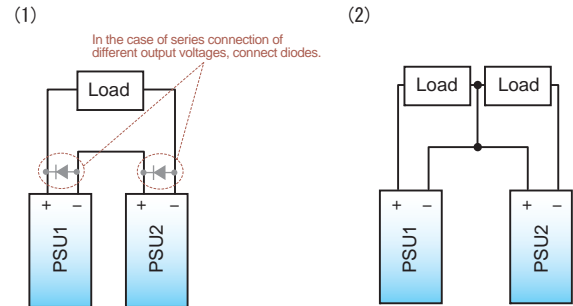
Series operation

Series connection is available as shown on the right.

* Series connection with different output voltage of GPSA is available, such as 12V and 24V.

Note: In the case that different voltages are connected in series like Fig. (1) on the right;

1. The output current shall be the rated current or less of the smaller rated current among the PSU1 and PSU2 connected in series.
2. Connect diodes for protection as shown in the Fig. (1). Current rating of the diode shall be 1.5 times or more of rated output current whose unit has larger rated output current among PSU1 and PSU2. Also, use Schottky diodes whose forward voltage is lower than the forward voltage of the diodes used in the PSU.

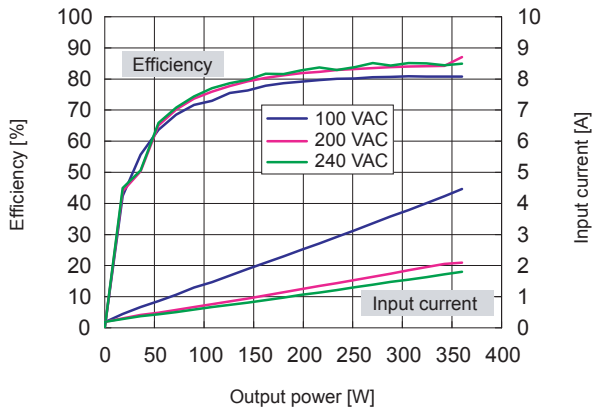


Parallel operation

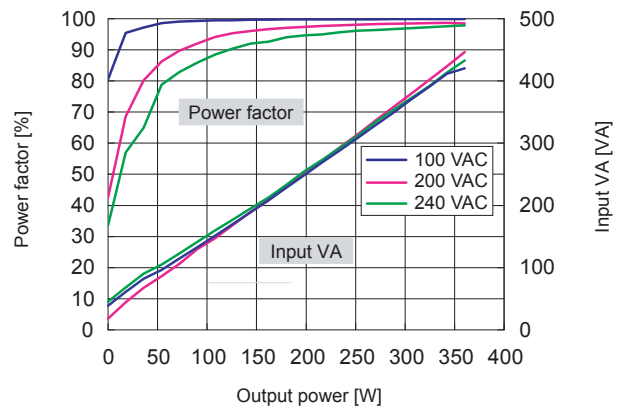
Parallel operation is unacceptable.

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

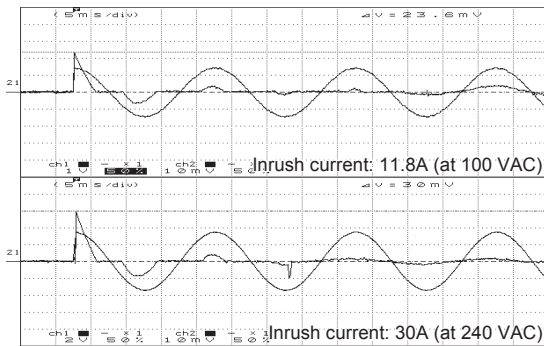
• Fig.4 Efficiency / Input Current vs. Output Power



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



• Fig.6 Inrush Current



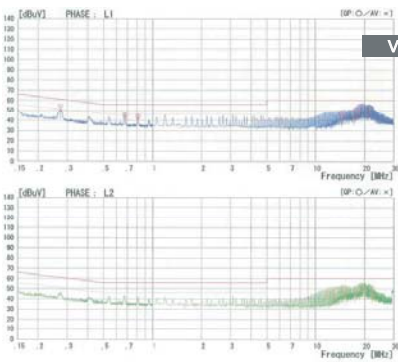
• Fig.7 Leakage Current

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

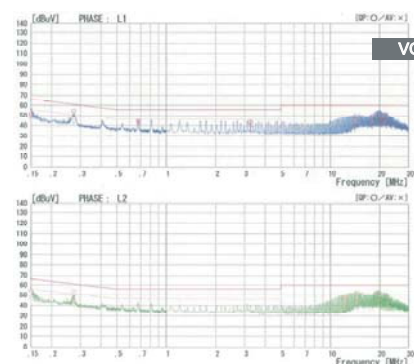
• Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak



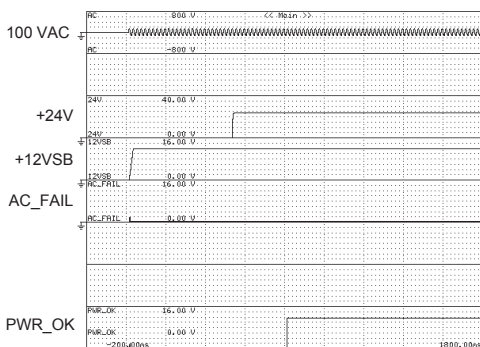
• Fig.9 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: Peak



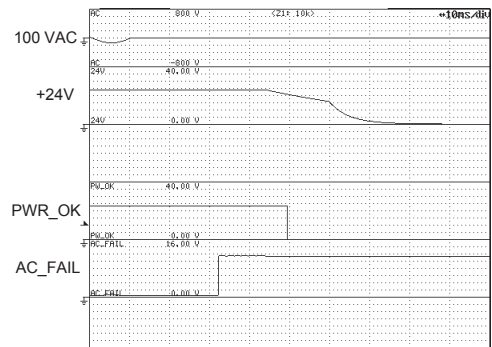
• Fig.10 Rising Characteristics at 100 VAC

Input: 100 VAC
Load: Rated
Time axis: 200ms/DIV



• Fig.11 Falling Characteristics at 100 VAC

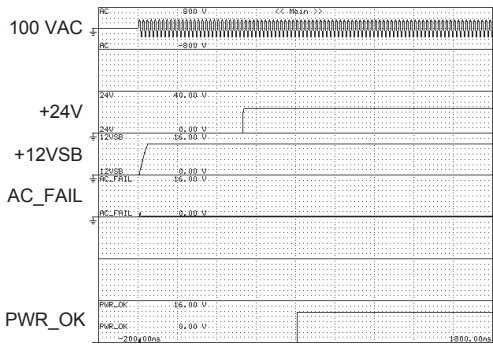
Input: 100 VAC
Load: Rated
Time axis: 10ms/DIV



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

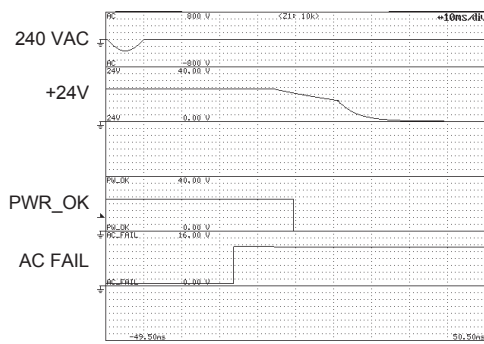
● Fig.12 Rising Characteristics at 240 VAC

Input: 240 VAC
Load: Rated
Time axis: 200ms/DIV



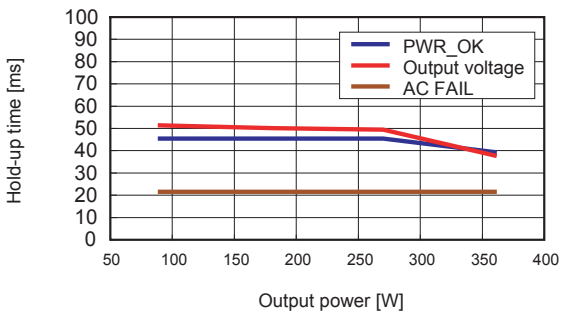
● Fig.13 Falling Characteristics at 240 VAC

Input: 240 VAC
Load: Rated
Time axis: 10ms/DIV



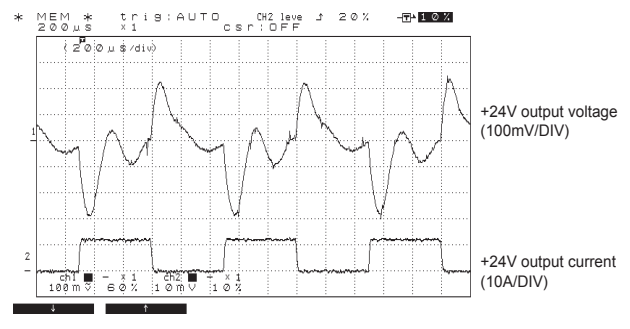
● Fig.14 Output Hold-up Time vs. Output Power

PWR_OK: the point that PWR_OK signal goes to "L"
Output voltage: the point that output voltage decreases to 95%
AC FAIL: the point that AC FAIL signal is delivered



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

Input: 100 VAC
Load: Rated
Time axis: 200µs/DIV



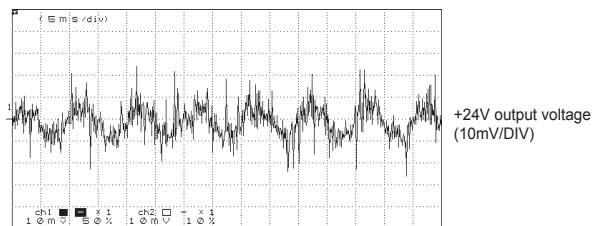
● Fig.16 Output Voltage Regulation

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 load)	23.992 V	23.991 V	23.990 V	23.990 V	23.990 V	23.992 V

● Fig.17 Ripple and Spike Voltage

Input: 100 VAC
Load: Rated
Time axis: 5ms/DIV



● Fig.18 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

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.

■ 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)

Input: 100 VAC

