

# Rack Mount Power Supply PC1U-400P-E2S

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## Ultra-High Efficiency EPS1U PC Power Supply



**RoHS Directive**

**1U**  
**Continuous Max. 300W** | **Peak Power 400W**

PC1U-400P-E2S

BRAIN Power Supply

Rack Mount Power Supply

Non-backup Power Supply

Model	Description	Stock
PC1U-400P-E2S	—	Standard stock
<b>Model Name Coding</b> <b>PC1U - 400 P - E 2 S</b> ①      ②      ③      ④      ⑤      ⑥		
1. Series name                      4. EPS output 2. Output power                    5. +3.3V output equipped 3. Peak output compliant        6. Standard		

### Features

- High efficiency of 80% typ. at 240 VAC to contribute Energy saving and CO2 reduction
- Min. load current is 0A for all output. Driving stably with brand new high performance CPU.
- Output harnesses can be easily customized to meet various requirements.

Refer to "Product Page Guideline" on p.13

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

AC input	85 - 264V (worldwide range)
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### Output

Output voltage	+3.3V	+5V	+12V1	+12V2	-12V	+5VSB
Max. current / max. power (continuous)	16A	13A	18A	16A	0.5A	1.5A
	Total 90W		Total 264W			
	Total 300W					
Peak current / peak power (+12V1: 0.5 sec, Others: 5 sec max.)	16A	16A	22A	16A	0.5A	2.5A
	Total 110W		Total 384W			
	Total 400W					
Min. current	0A	0A	0A	0A	0A	0A

### Introduction of modified products

**SILENT TYPE** power supply with lower fan speed by lowering input voltage to drive

■Model: PS6122

■Output

Output voltage	+3.3V	+5V	+12V1	+12V2	-12V	+5VSB
Max. current / max. power (continuous)	10A	7A	10A	10A	0.3A	1A
	Total 35.8W		Total 120A			
	Total 164.4W					
Peak current / peak power (+12V1: 0.5 sec, Others: 5 sec max.)	16A	16A	22A	16A	0.5A	2.5A
	Total 110W		Total 384W			
	Total 400W					
Min. current	0A	0A	0A	0A	0A	0A

\*Min. lot is 50 pcs: Lead time 100days  
 Please ask for detail

### Dimensions

W×H×D (mm)	106×40×300 (1U size)
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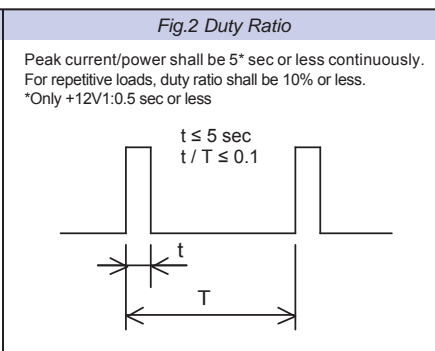
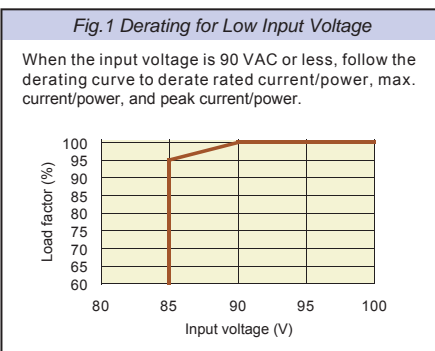
### Output connector (optional component)

Main 20+4pin  
  Main 24pin  
  Main 20pin  
  AT  
  AUX  
  12V 4pin  
  12V 8pin  
  PCI-E 6pin  
  PCI-E 6+2pin  
  HDD  
  S-ATA  
  FDD

Refer to p.297 "Detachable Output Harness" for details

# 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)						Worldwide range *Refer to Fig.1	
	Input Frequency	50 / 60Hz						47 - 63Hz	
	Efficiency	75% typ. (100 VAC), 80% typ. (240 VAC) *Characteristic data: Fig.3						At rated input/output	
	Power Factor	96% min. (100 VAC), 90% min. (240 VAC) *Characteristic data: Fig.4							
	Inrush Current	30A peak (100 VAC), 72A peak (240 VAC) *Characteristic data: Fig.5						At rated output	
Input VA	4.0A typ. (100 VAC), 1.6A typ. (240 VAC) *Characteristic data: Fig.4						At rated input and max. output (25°C)		
Output	Rated Voltage	+3.3V	+5V	+12V1	+12V2	-12V	+5VSB		
	Rated Current	10A	10A	9A	8A	0.5A	1.5A		
	Max. Current / Power	16A	13A	18A	16A	0.5A	1.5A	Max. output power: 300W	
		90W max.		264W max.					
	Peak Current / Power	16A	16A	22A	16A	0.5A	2.5A	Peak output power: 400W Time: 5 sec or less (only +12V1:0.5 sec or less) Duty ratio of repetitive load: 10% or less *Refer to Fig.2	
		110W max.		384W max.					
	Min. Current	0A	0A	0A	0A	0A	0A		
	Total Voltage Accuracy (%)	+5/-4 max.	+5/-4 max.	+5/-4 max.	+5/-4 max.	+5/-4 max.	+5/-4 max.	Total accuracy of temperature, input, and load fluctuations	
Max. Ripple Voltage (mVp-p)	50 max.	50 max.	80 max.	80 max.	80 max.	50 max.	Two wires are coming out from the output connector and connected into one at the edge of 50cm 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.16		
Max. Spike Voltage (mVp-p)	100 max.	100 max.	200 max.	200 max.	200 max.	100 max.			
Protection	Overcurrent Protection	OCP Point (A)	18 min.	18 min.	20 min.	18 min.	Short protection	All other outputs are at rated input/output	
		Method	All outputs shutdown except for +5VSB (60 sec min. interval)				Hold down current limiting or all outputs shutdown		All outputs shutdown
		Recovery	Reclosing AC input or PS_ON# signal 'H' to 'L'				Automatic recovery		
	Overvoltage Protection	OVP Point (V)	3.9 - 4.5	5.7 - 6.5	13.4 - 15.6		-	Zener clamp	
Method		All outputs shutdown except for +5VSB (60 sec min. interval)				-			
Recovery		Reclosing AC input or PS_ON# signal 'H' to 'L'				-			
Environment	Operating Temp. / Humidity	0 to 50°C / 5 to 85%						No condensation	
	Storage Temp. / Humidity	-10 to 60°C / 5 to 85%						No condensation	
	Vibration	Displacement amplitude: 0.075mm (10-55Hz), Sweep cycles: 10, Test duration: 45 minutes each axis						JIS-C-60068-2-6, at no operation	
	Mechanical Shock	Lift one bottom edge up to 50mm and let it fall. Repeat 3 times for each of 4 edges. No malfunction						JIS-C-60068-2-31, at no operation	
Insulation	Dielectric Strength	AC input - DC output/FG: 1500 VAC for 1 minute						Cut-off current: 15mA (Humidity: 60% max.)	
	Insulation Resistance	AC input - DC output/FG: 50MΩ min.						At 500 VDC (Humidity: 60% max.)	
	Leakage Current	0.5mA max. (100 VAC) / 1mA max. (200 VAC) *Characteristic data: Fig. 6						YEW. TYPE3226 (1kΩ) or equivalent	
	Line Noise Immunity	±2000V (pulse width: 100/800ns, repetitive cycle: 10-50ms)						Measured by INS-410 No fluctuation of DC output or malfunction	
EMC	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 compliant *Characteristic data: Fig.7 and 8						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	UL60950, CSA C22.2 (c-UL)							
Others	Cooling System	Forced air cooling						Fan rotates at low speed depending on the internal temperature of power supply even PS_ON# signal 'H'.	
	Output Grounding	Connected chassis (FG)*						*It can be customized to connect to capacitor	
	Output Hold-up Time	PWR_OK holds up 20ms min. after AC failure. *Characteristic data: Fig.13						At rated output	
	Reliability Grade	FA (industrial equipment grade, double-sided through hole PCB)						Follow our standard	
	MTBF	70,000H min.						Based on EIAJ RCR-9102	
	Weight	1.7kg 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	

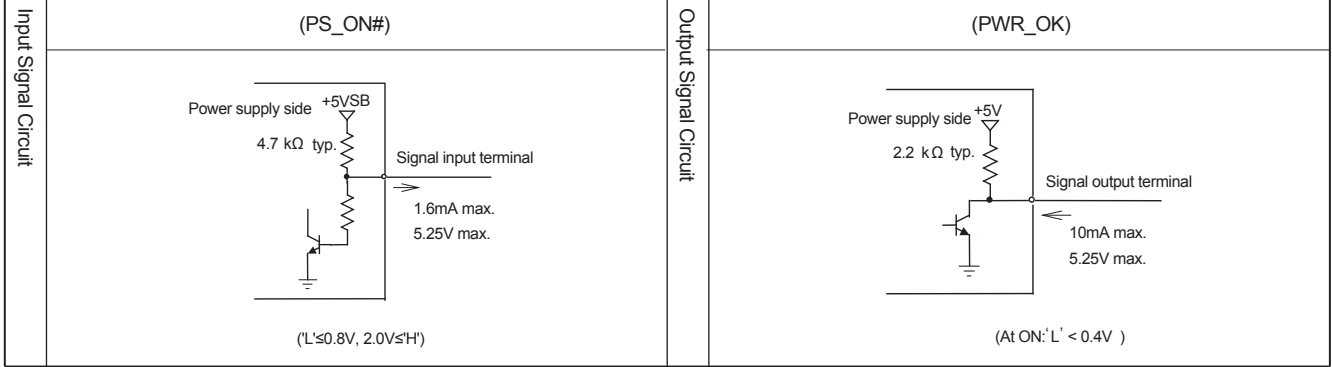


BRAIN Power Supply  
 Rack Mount Power Supply  
 Non-backup Power Supply

# 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#)	+3.3V, +5V +12V1, +12V2, and -12V outputs shutdown with 'H' or 'OPEN' input. Note: When 'OPEN' is received, the voltage of PS_ON# terminal is 2.0V or less.	Signal input between the pin 2 of MAIN2 connector and COM pin
+3.3V SENSE	The input terminal to detect the voltage of +3.3V output; by connecting to the load terminal, only the line drop of the + side of the output cable is compensated.	The pin 4 of MAIN2 connector
Output Signal Normal Output Signal (PWR_OK)	'H' signal is delivered at normal output (detection delay time: 100 - 500ms).	The pin 3 of MAIN2 connector

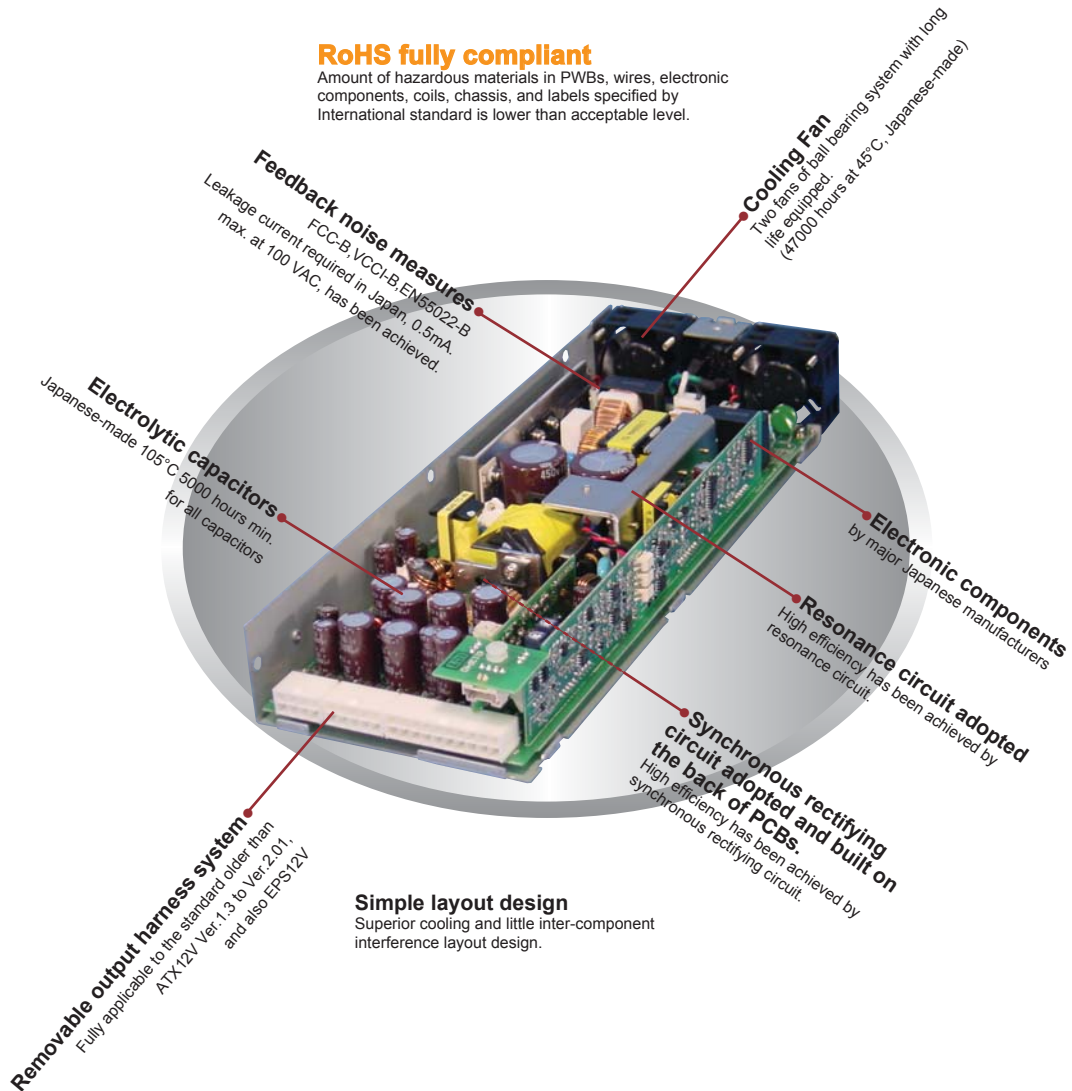
## Signal Circuit



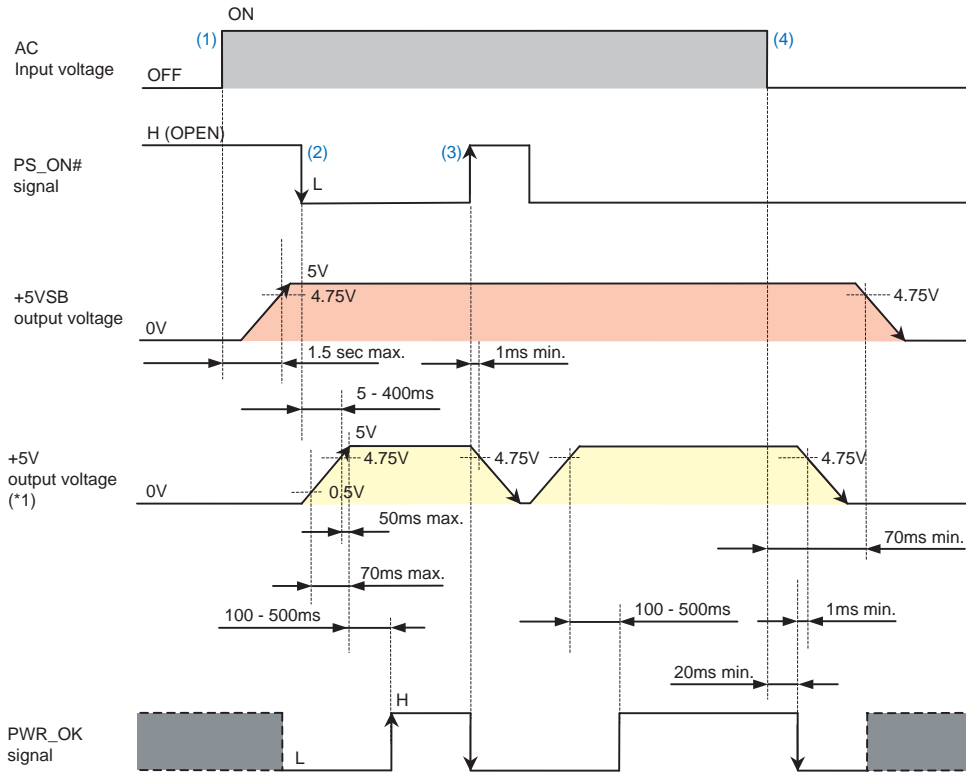
## Internal Structure

### 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

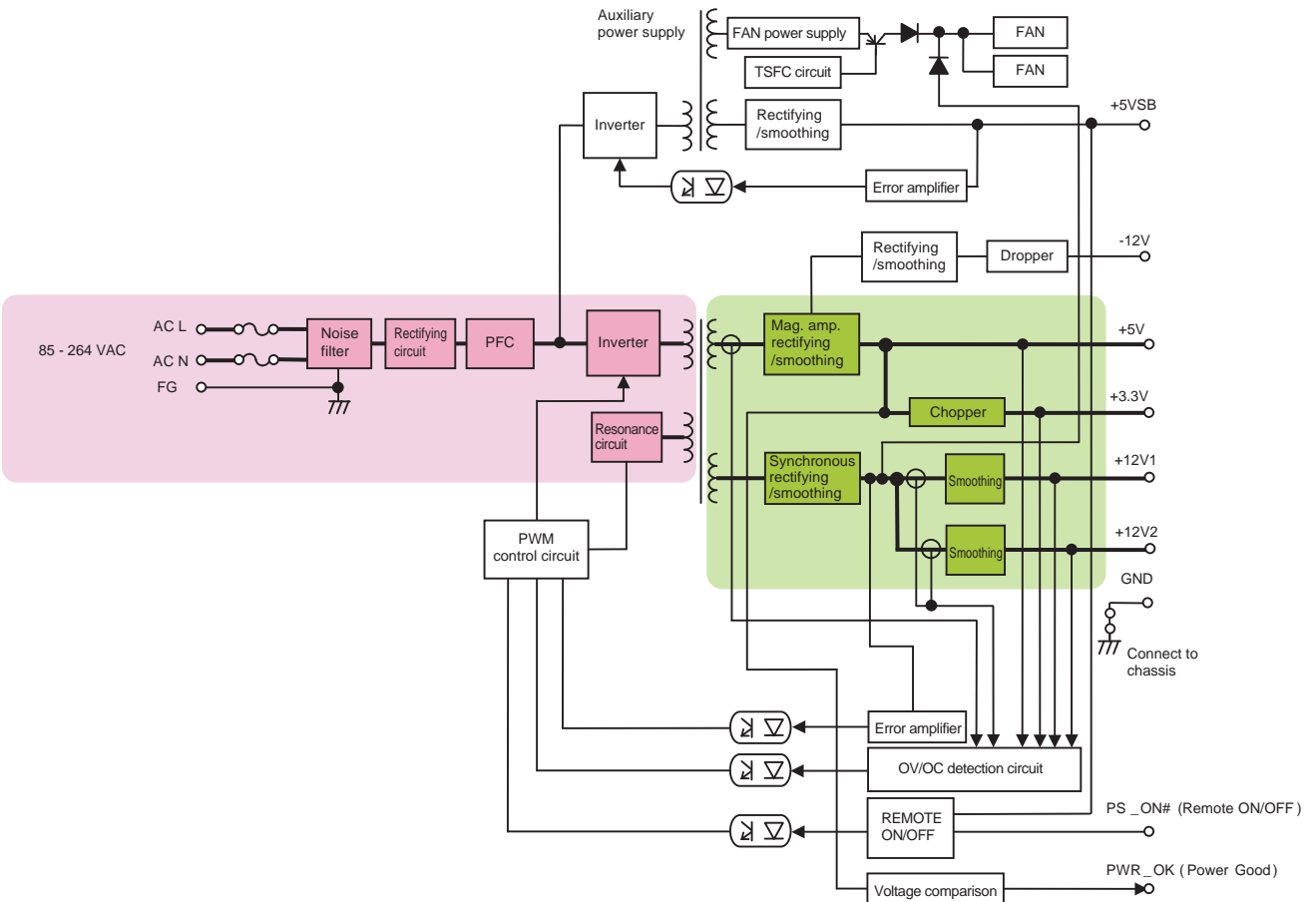


(\*1) All other outputs shall follow this timing except voltage values. In addition, rising time difference among outputs shall be 50ms max.

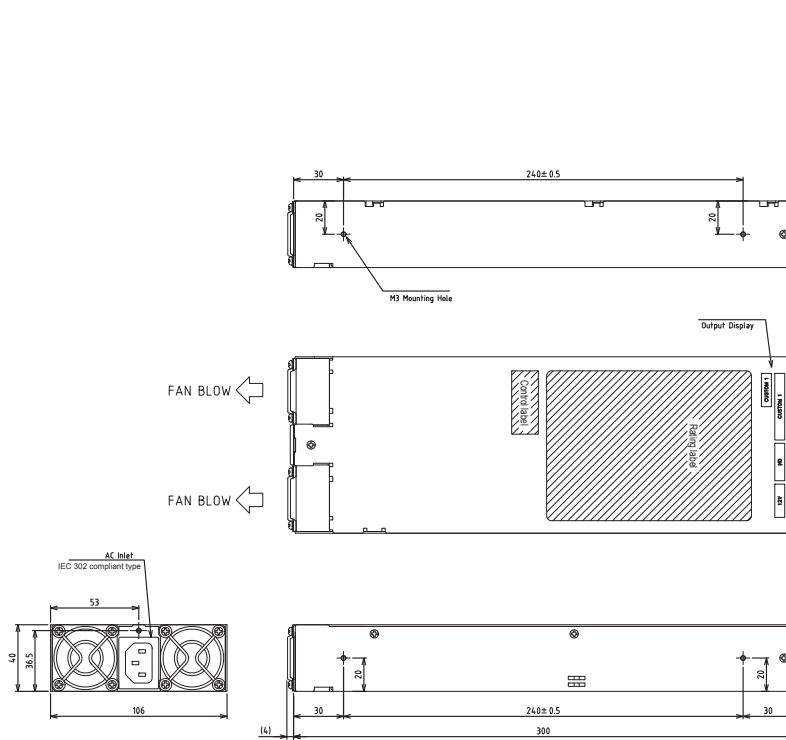
- (1) Only +5VSB starts up with PS\_ON# 'H' (OPEN) when AC input is turned on.
- (2) All outputs start up with PS\_ON# 'L'. Also, PWR\_OK 'H' is delivered 100 - 500ms after +5VSB has started up.
- (3) All outputs except +5VSB shut down with PS\_ON# 'H' signal.
- (4) PWR\_OK 'L' is delivered 20ms or longer after blackout. Also, +5V output shuts down 1ms or later after PWR\_OK 'L' delivery, and +5VSB shuts down 70ms or longer than that.

■ Undefined

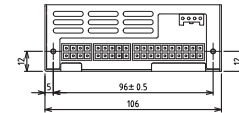
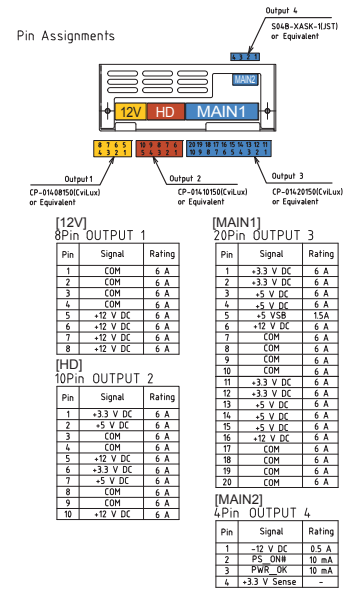
# Block Diagram



# Outline Drawing



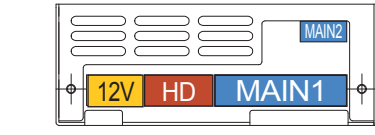
Note: Dimensional tolerance shall be ± 1mm unless otherwise specified.  
 Driving depth of mounting screws inside power supply shall be 6mm max.  
 Output connector 1 is corresponding to standard 12V harness.  
 Output connector 2 is corresponding to standard HD harness.  
 Output 3 and 4 are designated harnesses, not unacceptable to standard harnesses.



Installation direction  
 The unit can be installed in any directions.



## Optional Components Sold Separately

Detachable Output Harness		
Model	Length and Type of Connector	Output Port Allocation
<b>Main power cable</b> MAIN 1, 2		
WH6113-13	500±15 20-pin	
WH6113-12	500±15 24-pin	
<b>12V power cable</b> 12V		
WH-V0808-500	500±15 12V 8-pin	
WH-V0408-500	500±15 12V 4-pin	
WH-VG208-500	500±15 12V 4-pin PCI-E 6-pin	
WH-VV208-500-02	500±10 12V 8-pin 12V 8-pin	
WH-VG208-500-02	500±10 12V 8-pin PCI-E 6-pin	
<b>HD power cable</b> HD		
WH-PP610-850	550±15 150±15 150±15	
WH-PS610-850	550±15 150±15 150±15	
WH-PS710-850	550±15 150±15 150±15	
	850±15	



Acceptable cable(s)  
 MAIN 1, 2 12V HD  
 1 model 1 model 1 model

## Optional Components Sold Separately

Cable			
Picture	Model	Type	Description
	WH2753	AC power cord	125 VAC 12A [PSE]
	WH2753-02	AC power cord	125 VAC 12A (tracking resistance type) [PSE]

Other Optional Components			
Model	Description	Model	Description
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2820	20-pin extension harness (600mm)	WH5105-02	12V 4-pin connector conversion harness (320mm)
WH2747	20-pin extension harness (450mm)	WH5055	AT connector conversion harness
WH2892-02	20-pin extension harness (200mm)	ACC5046	Harness with PS_ON switch
WH2812	PCI-E 6-pin connector conversion harness	ACC5077	PS_ON terminal short connector
		WH5073	PS_ON terminal short 20-pin harness

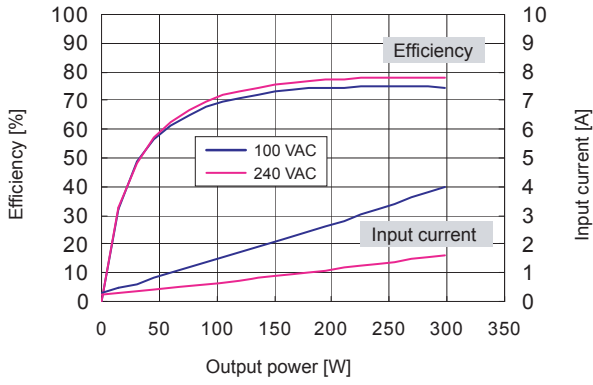
BRAIN  
Power  
Supply

Rack Mount Power Supply

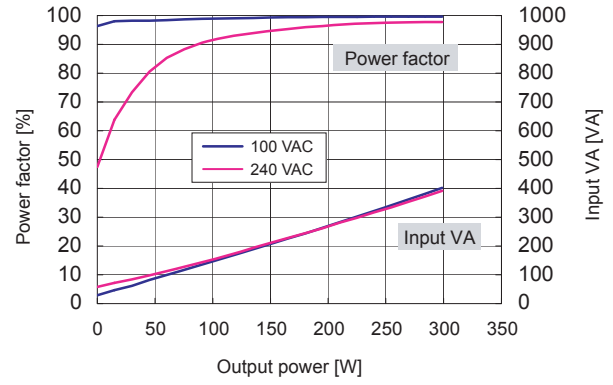
Non-backup Power Supply

# Characteristics Data (Examples of actual measurement)

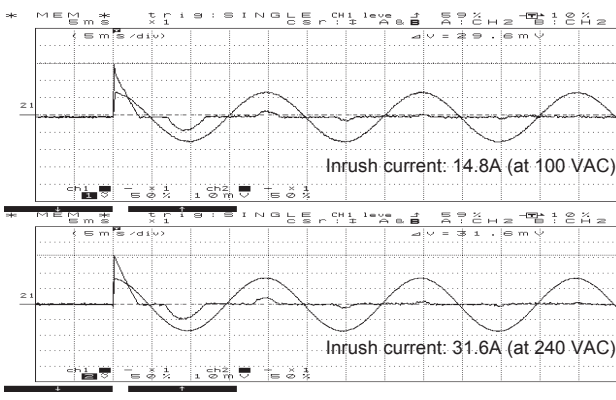
• Fig.3 Efficiency / Input Current vs. Output Power



• Fig.4 Power Factor / Input VA vs. Output Power



• Fig.5 Inrush Current



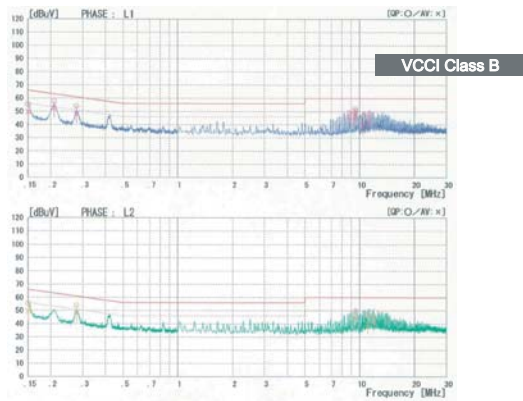
• Fig.6 Leakage Current

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

	Rated load	Min. load
100 VAC	0.26mA	0.32mA
240 VAC	0.83mA	0.83mA

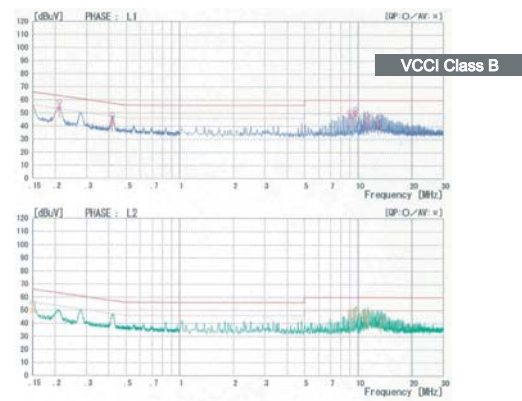
• Fig.7 Conducted Emission at 100 VAC

Input: 100 VAC  
Load: Rated  
Mode: Peak



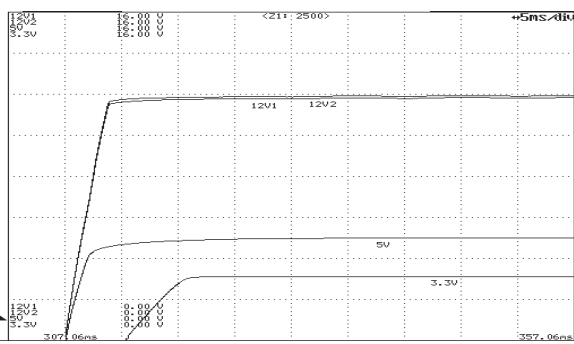
• Fig.8 Conducted Emission at 240 VAC

Input: 240 VAC  
Load: Rated  
Mode: Peak



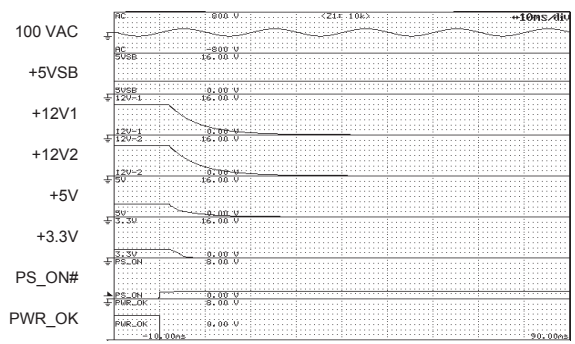
• Fig.9 Rising Characteristics at 100 VAC

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



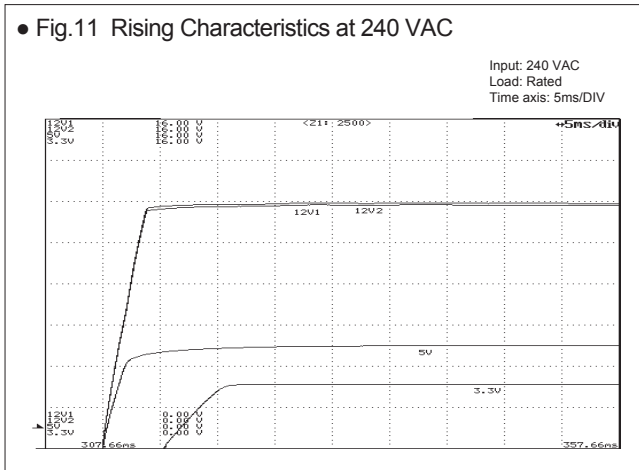
• Fig.10 Falling Characteristics at 100 VAC when REMOTE goes Off

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

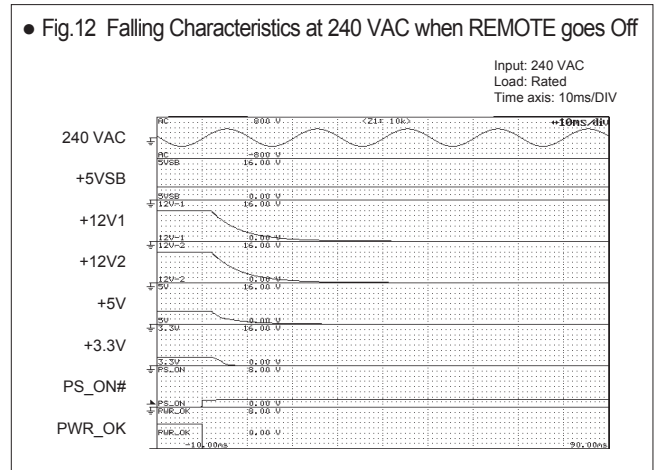


# Characteristics Data (Examples of actual measurement)

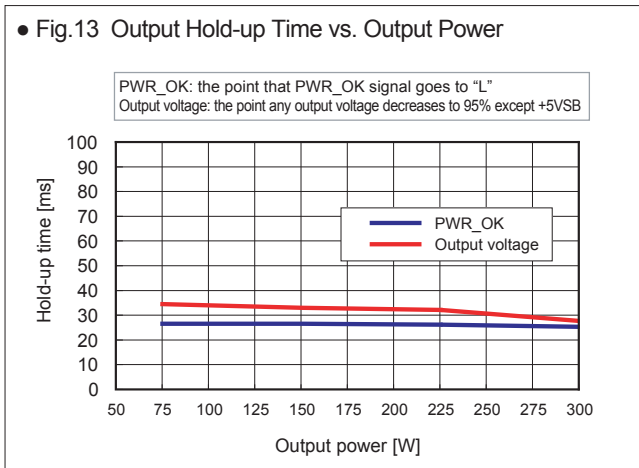
• Fig.11 Rising Characteristics at 240 VAC



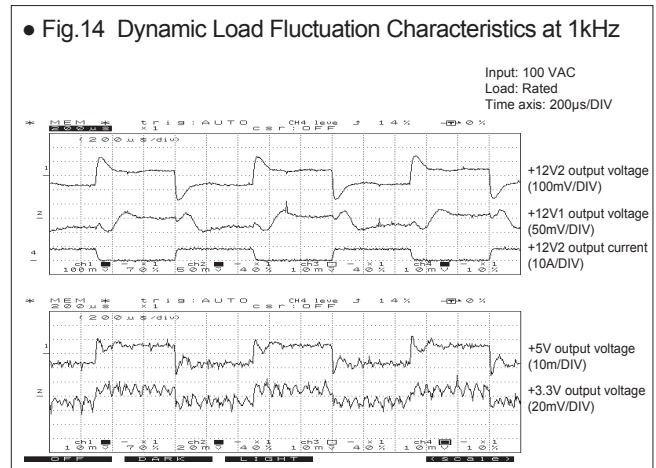
• Fig.12 Falling Characteristics at 240 VAC when REMOTE goes Off



• Fig.13 Output Hold-up Time vs. Output Power



• Fig.14 Dynamic Load Fluctuation Characteristics at 1kHz



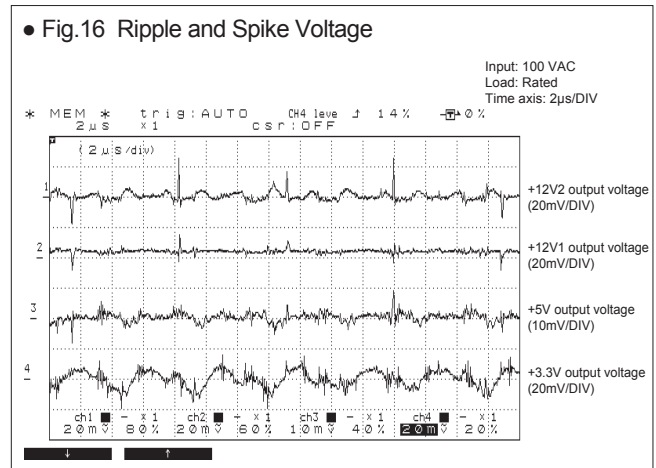
• Fig.15 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V1 output	0A	9A	22A
+12V2 output	0A	8A	16A
+5V output	0A	10A	16A
+3.3V output	0A	10A	16A

	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V1 output (min. load)	12.075 V	12.072 V	12.072 V	12.071 V	12.069 V	12.070 V
+12V1 output (rated load)	11.938 V	11.937 V	11.936 V	11.935 V	11.935 V	11.934 V
+12V1 output (peak load)	11.786 V	11.785 V	11.783 V	11.782 V	11.781 V	11.780 V
+12V2 output (min. load)	12.068 V	12.066 V	12.065 V	12.064 V	12.064 V	12.064 V
+12V2 output (rated load)	11.947 V	11.947 V	11.946 V	11.945 V	11.944 V	11.943 V
+12V2 output (peak load)	11.878 V	11.877 V	11.876 V	11.876 V	11.874 V	11.874 V
+5V output (min. load)	5.141 V	5.141 V	5.140 V	5.140 V	5.140 V	5.140 V
+5V output (rated load)	5.038 V	5.038 V	5.037 V	5.037 V	5.036 V	5.036 V
+5V output (peak load)	4.998 V	4.997 V	4.997 V	4.997 V	4.996 V	4.996 V
+3.3V output (min. load)	3.346 V	3.345 V	3.345 V	3.345 V	3.345 V	3.345 V
+3.3V output (rated load)	3.215 V	3.214 V	3.214 V	3.213 V	3.213 V	3.213 V
+3.3V output (peak load)	3.240 V	3.240 V	3.239 V	3.239 V	3.239 V	3.239 V

• Fig.16 Ripple and Spike Voltage



• Fig.17 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

Input: 85 VAC  
Load: Rated  
Operating time: 24 consecutive hours

Intake air temp.	20°C	30°C	40°C	45°C
Expected service life (yr)	approx. 20	approx. 10	approx. 5.1	approx. 2.5

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

■ Fan

Ambient temp.	20°C	30°C	40°C	50°C
Life expectancy (yr)	approx. 14	approx. 9.4	approx. 6.5	approx. 4.5

• Fig.18 Over Current Protection (V-I Characteristic)

