

# Rack Mount Power Supply HPC1U-400P-X2S

80PLUS & ErP Directive Compliant.  
Low Power Consumption and High Efficiency 1U Size Power Supply!



**ErP Directive**  
Standby power:  
0.5W max.

**RoHS Directive**

HPC1U-400P-X2S

**Standby Power**  
at 100 VAC at 230 VAC  
**0.08W 0.08W**

**1U**  
Continuous Max. **305W** Peak Power **400W**

\*Standby power is an example of actual measurement.

Model	Description	Stock
HPC1U-400P-X2S		Standard stock
<b>Model Name Coding</b> <b>HPC1U - 400 P - X 2 S</b> ①      ②      ③      ④      ⑤      ⑥		
	1. Series name 2. Output power 3. Peak output compliant	4. ATX output 5. +3.3V output equipped 6. Standard

## Features

- 1U size with 80 PLUS BRONZE will be scheduled.
- High efficiency with synchronous rectification circuit
- Less than 1W standby power complying with ErP directive
- Min. load current is 0A for all outputs.
- Safety standard approved (IEC/UL/CSA/CE)
- By building in the thermal-sensing variable speed fan, noise reduction can be realised.

Refer to "Product Page Guideline" on p.13

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

## Function



## Input

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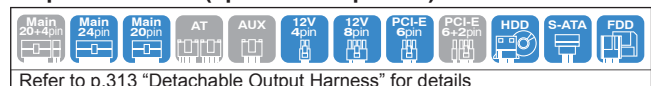
## Output

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current / max. power (continuous)	16A Total 90W	16A Total 300W	25A Total 305W	0.5A 6W	1.5A 7.5W
Peak current / peak power (5 sec max.)	20A Total 120W	20A Total 390W	30A Total 400W	0.5A 6W	2A 10W
Min. current	0A	0A	0A	0A	0A

## Dimensions

W×H×D (mm)	100×41×190 (1U size)
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## Output connector (optional component)

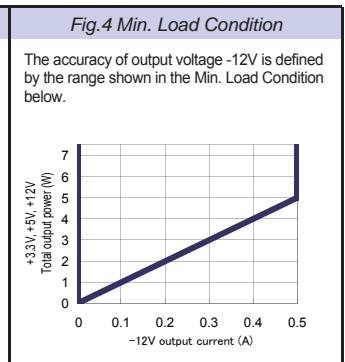
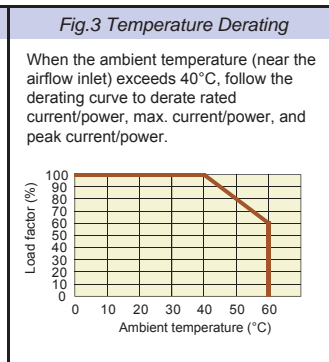
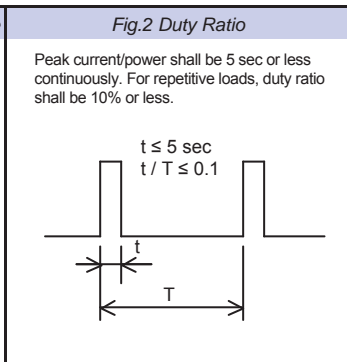
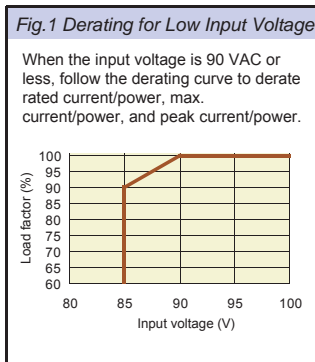


Refer to p.313 "Detachable Output Harness" for details

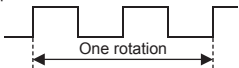
# General Specification Condition: at normal temperature and humidity unless otherwise specified

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

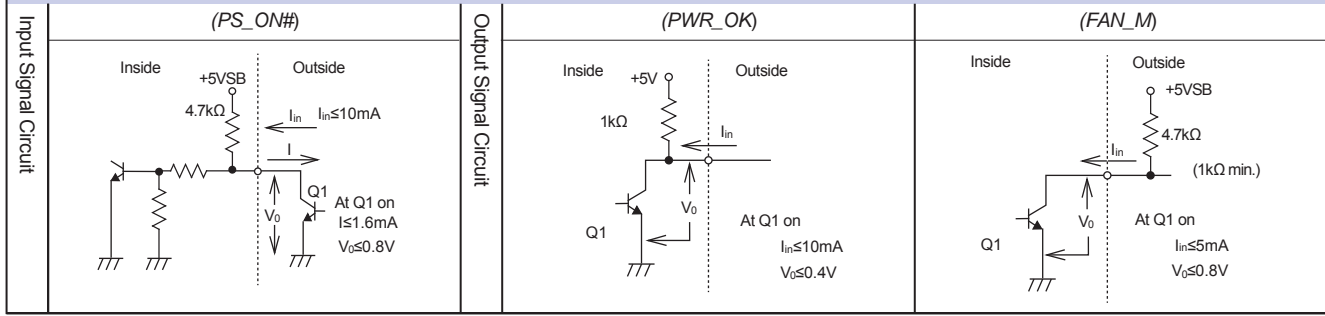
Items		Specification					Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC)					Worldwide range, *Refer to Fig.1	
	Input Frequency	50 / 60Hz					47 - 63Hz	
	Efficiency	82% typ. (100 VAC), 85% typ. (240 VAC) *Characteristic data: Fig.5					At rated input/output, 80PLUS BRONZE approved	
	Power Factor	96% min. (100 VAC), 90% min. (240 VAC)					At rated input/output	
	Inrush Current	31A peak (100 VAC), 75A peak (240 VAC) *Characteristic data: Fig.6					Input reclosing interval shall be 10 sec min. At rated input/output at cold start (25°C).	
	Input Current	3.8A typ. (100 VAC), 1.6A typ. (240 VAC)						
Output	Rated Voltage	+3.3V	+5V	+12V	-12V	+5VSB		
	Rated Current	8A	8A	19A	0.5A	1.0A	Reference value during the measurement of input/output characteristics	
	Max. Current / Power	16A	16A	25A	0.5A	1.5A	Max. output power: 305W	
		90W max.		300W	6W	7.5W		
		305W max.						
	Peak Current / Power	20A	20A	30A	0.5A	2.0A	Peak output power: 400W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.2	
		120W max.		360W	6W	10W		
		390W max.						
		Min. Current	0A	0A	0A	0A	0A	
		Total Voltage Accuracy (%)	±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	Total accuracy of temperature, input, and load fluctuations *Refer to Fig.4
	Max. Ripple Voltage (mVp-p)	50 max.	50 max.	120 max.	120 max.	50 max.	Measured on a test board connected with a 47µF electrolytic capacitor and 0.1µF ceramic capacitor by 100MHz oscilloscope. The test board shall be away from load wire and within 150mm from output terminals.	
	Max. Spike Voltage (mVp-p)	100 max.	100 max.	170 max.	170 max.	100 max.		
Protection	Overcurrent Protection	OCP Point (A)	21 min.	21 min.	31 min.	Short protection		
		Method	All outputs except for +5VSB shutdown			Hold down current limiting	All outputs shutdown	
	Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		Reclosing AC input (10 sec min. interval)	
	Overvoltage Protection	OVP Point (V)	3.76~4.3	5.74~7.0	13.4~15.6	-	(7.0)	
Method		All outputs except for +5VSB shutdown			-	Zener clamp		
	Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			-	-	Reclosing AC input (10 sec min. interval)	
Environment	Operating Temp. / Humidity	0 to 60°C* / 10 to 90%					No condensation *Refer to Fig.3	
	Storage Temp. / Humidity	-20 to 70°C / 10 to 95%					No condensation	
	Vibration	Acceleration amplitude: 2g (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. Number of bumps: 3 each of 4 edges					JIS-C-60068-2-31, at no operation	
Insulation	Dielectric Strength	AC input - FG/DC output: 1500 VAC for 1 minute					Cut-off current: 10mA	
	Insulation Resistance	AC input - FG/DC output: 50MΩ min.					At 500 VDC	
	Leakage Current	1.0mA max. (100 VAC) / 2.0mA max. (200 VAC) / 2.4mA max. (240 VAC) *Characteristic data: Fig.7					IEC60950 compliant	
EMC	Line Noise Immunity	±2000V (pulse width: 100/1000ns, repetitive cycle: 30-100Hz, normal/common mode with pos./neg. polarity for 10 minutes each)					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, CISPR22-B, EN55022-B compliant *Characteristic data: Fig.8 and 9					Measured by single unit	
	Harmonic Current Regulation	IEC61000-3-2 (Ver 2.1) Class D compliant					At rated input/output	
Others	Safety Standard	UL60950, CSA60950 (c-UL) approved CE Marking (LVD,EMC)						
	Cooling System	Forced air cooling: thermal-sensing variable speed fan embedded					Fan speed changes by temperature and load.	
	Output Grounding	Connected chassis (FG)						
	Output Hold-up Time	PWR_OK holds up 16ms min. after AC failure *Characteristic data: Fig.14					At 200W output	
	Reliability Grade	FA (industrial equipment grade, double-sided through hole PCB)					Follow our standard	
	MTBF	80,000H min.					Based on EIAJ RCR-9102	
	Weight	1.0kg 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		



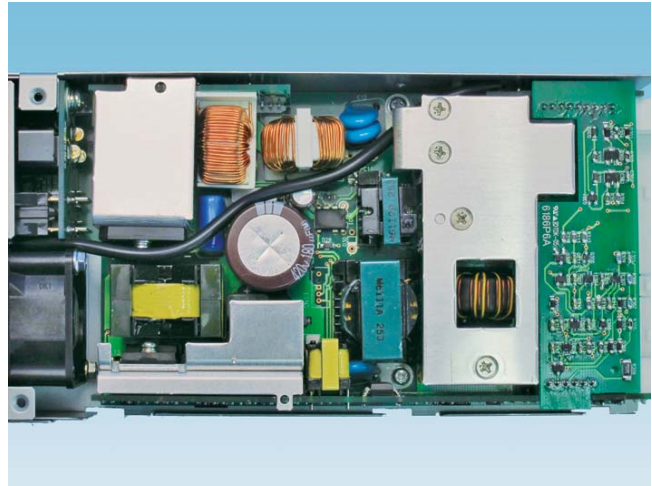
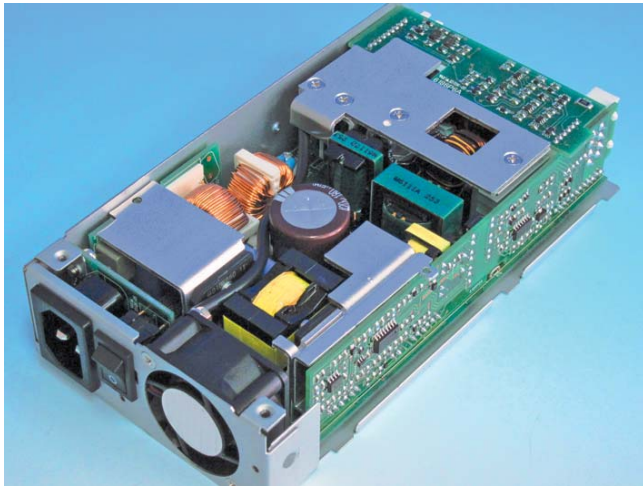
# Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

	Items	Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V, +12V, and -12V outputs are delivered with 'L' input. +3.3V, +5V, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input.	The pin 22 of MAIN1 connector
	+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 2 of MAIN1 connector and The pin 8 of SIG connector
	FAN Control Signal (FAN_C)	The control terminal of fan motor; the fan motor is forcibly rotated at full speed at 'L' input.	The pin 4 of SIG connector
Output Signal	Normal Output Signal (PWR_OK)	'H' signal is delivered when the +5V output is normal	The pin 21 of MAIN1 connector
	Fan Monitor Signal (FAN_M)	Two cycle pulses per one rotation of the fan motor are delivered (open collector output). Duty ratio of the pulse shall be 0.5 typ. (Interval between the signals becomes longer at low speed and shorter at high speed.) The signal remains 'L' or 'OPEN' when the fan stops caused by any failure or malfunction.	The pin 5 of SIG connector 

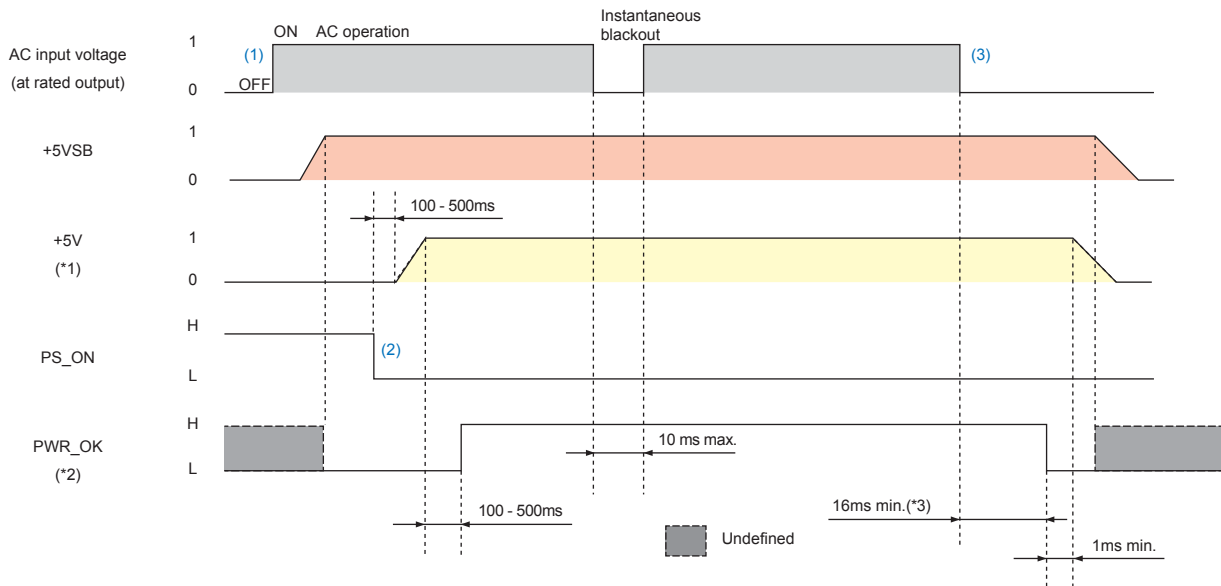
## Signal Circuit



## Internal Structure



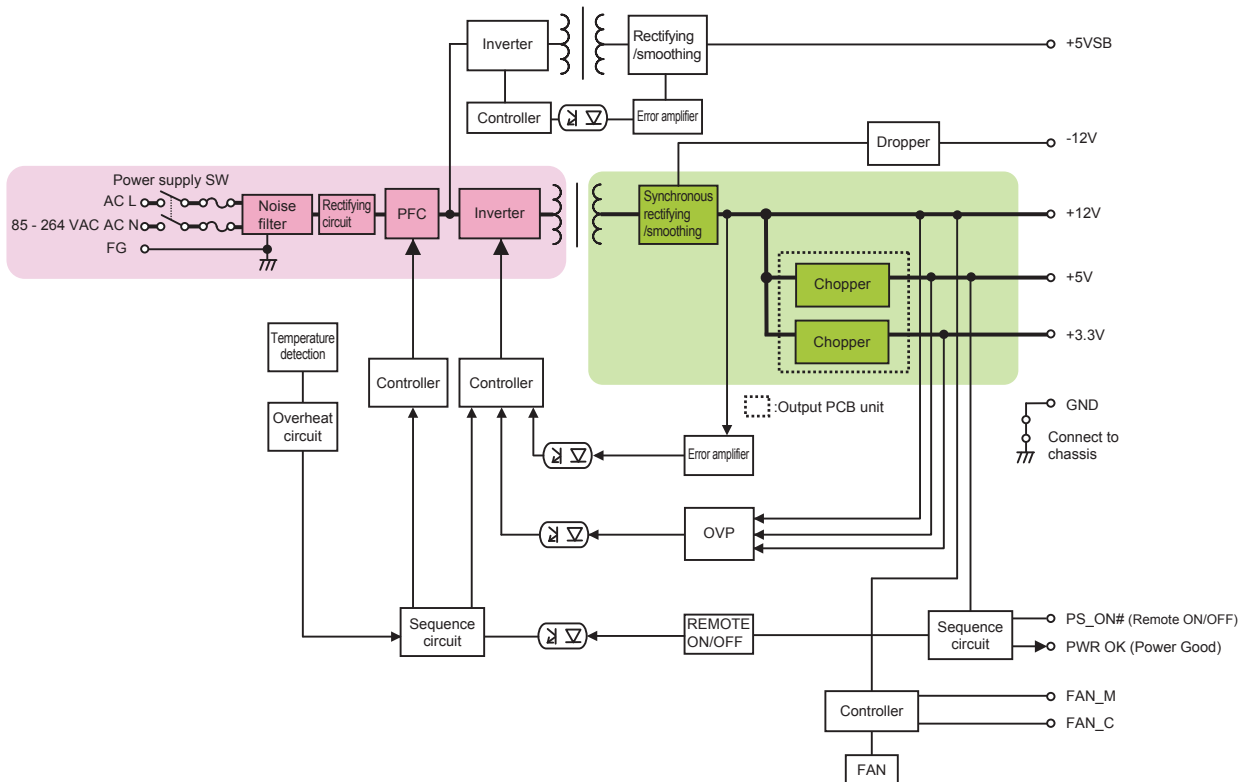
# Sequence Diagram



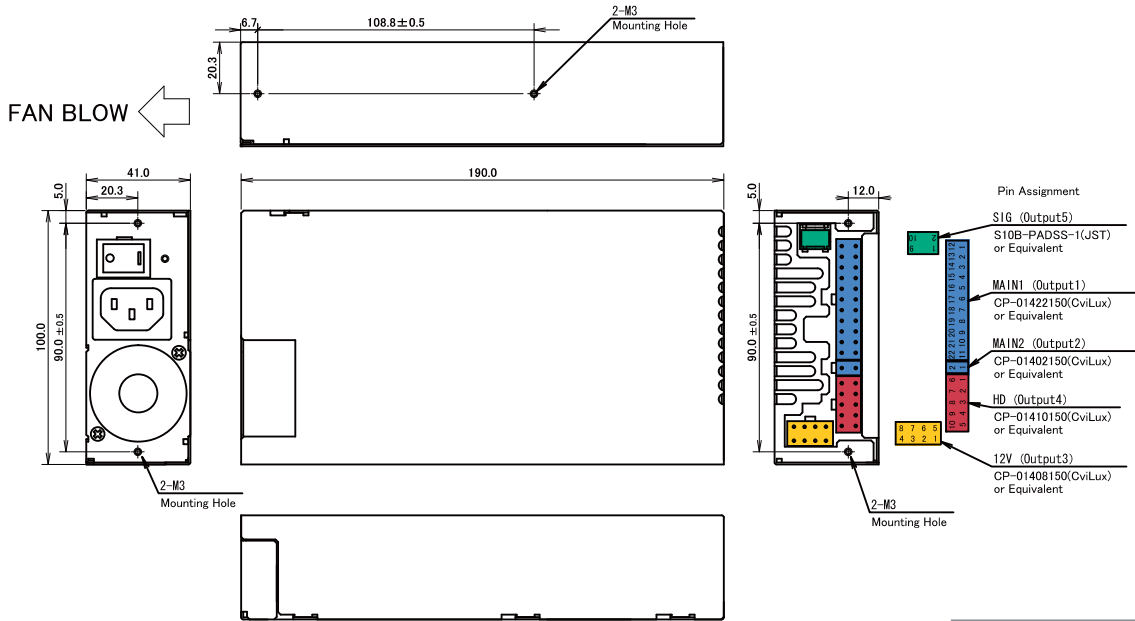
(\*1) All other outputs except for CH2(+5V) shall follow this timing and the rising time difference from CH2(+5V) shall be 50ms or less. In addition, output voltage level of CH3(+12V) at rising shall be more than the voltage level of CH1(+3.3V). The difference of output voltage level of CH2(+5V) and CH1(+3.3V) should be between -0.6V and +2.25V. Each output voltage at the time of trailing rank or level differences are unregulated.  
 (\*2) A rise and a fall time of PWR\_OK signal shall be less than 100μs at the time of the capacitive load is not connected to signal output.  
 (\*3) At 200W output

(1) With PS\_ON# 'H', only +5VSB output starts up at AC input.  
 (2) All outputs start up at PS\_ON# 'L' input. Also, PWR\_OK goes to 'H' at 100 - 500ms after the +5V output has risen.  
 (3) PWR\_OK turns to 'L' after 16ms or longer from blackout. 1ms later than this event, the +5V output shuts down.

# Block Diagram



# Outline Drawing

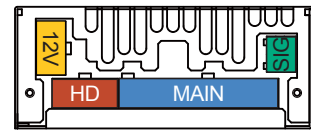


\*1 Design tolerance of dimensions is ± 1mm  
 \*2 The screw depth of penetration into PSU is 5mm max.

■ 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> <span style="background-color: #0070C0; color: white; padding: 2px;">MAIN</span>		
WH-M2022-500	<span style="background-color: #0070C0; color: white; padding: 2px;">MAIN</span> 500±10 → 20-pin	
WH-M2022-300	<span style="background-color: #0070C0; color: white; padding: 2px;">MAIN</span> 300±10 → 20-pin	
WH-M2422-500	<span style="background-color: #0070C0; color: white; padding: 2px;">MAIN</span> 500±15 → 24-pin	
<b>12V power cable</b> <span style="background-color: #FFD700; color: black; padding: 2px;">12V</span>		
WH-V0808-500	<span style="background-color: #FFD700; color: black; padding: 2px;">12V</span> 500±15 → 12V 8-pin	
WH-V0408-500	<span style="background-color: #FFD700; color: black; padding: 2px;">12V</span> 500±15 → 12V 4-pin	
WH-VG208-500	<span style="background-color: #FFD700; color: black; padding: 2px;">12V</span> 500±15 → 12V 4-pin PCI-E 6-pin	
WH-VV208-500-02	<span style="background-color: #FFD700; color: black; padding: 2px;">12V</span> 500±10 → 12V 8-pin 12V 8-pin	
WH-VG208-500-02	<span style="background-color: #FFD700; color: black; padding: 2px;">12V</span> 500±10 → 12V 8-pin PCI-E 6-pin	
<b>HD power cable</b> <span style="background-color: #C00000; color: white; padding: 2px;">HD</span>		
WH-PP610-850	<span style="background-color: #C00000; color: white; padding: 2px;">HD</span> 550±15 → 150±15 → 150±15 → peripheral (HD)	
WH-PS610-850	<span style="background-color: #C00000; color: white; padding: 2px;">HD</span> 550±15 → 150±15 → 150±15 → FD	
WH-PS710-850	<span style="background-color: #C00000; color: white; padding: 2px;">HD</span> 550±15 → 150±15 → 150±15 → S-ATA 850±15 → S-ATA	
<b>SIG cable</b> <span style="background-color: #008000; color: white; padding: 2px;">SIG</span>		
WH-S0610-500	<span style="background-color: #008000; color: white; padding: 2px;">SIG</span> 500±15 → SIG-1	
WH-S0610-500-01	<span style="background-color: #008000; color: white; padding: 2px;">SIG</span> 500±15 → SIG-2	
WH-S0310-500	<span style="background-color: #008000; color: white; padding: 2px;">SIG</span> 500±15 → SIG-3	



Acceptable cable(s)

MAIN	12V	HD	SIG
1 model	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

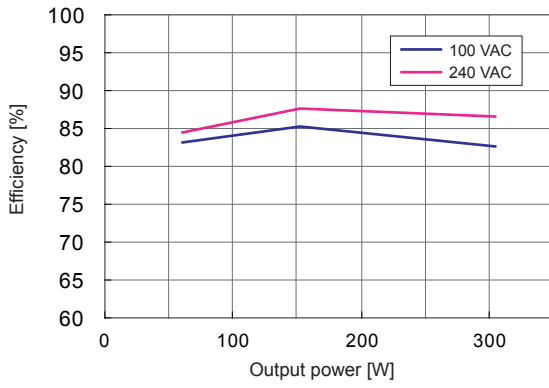
Non-backup Power Supply



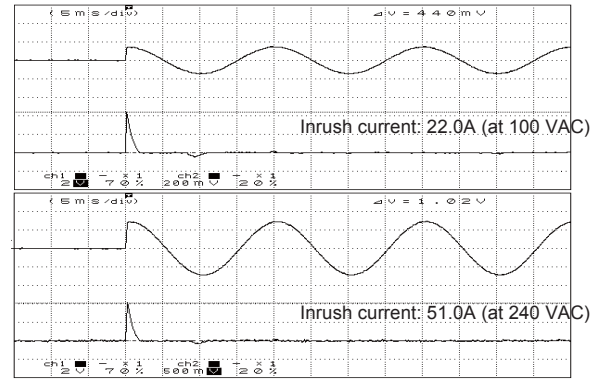
# Characteristics Data (Reference only)

\* Specification is subject to change due to proposed product

● Fig.5 Efficiency / Input Current vs. Output Power



● Fig.6 Inrush Current



● Fig.7 Leakage Current

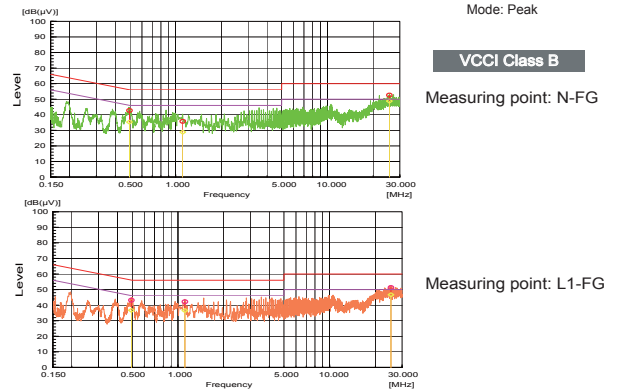
Input: 100 / 200 / 240 VAC  
Load: Rated and min. load  
Measurement conditions: IEC60950 compliant

	Rated load	Min. load
100 VAC	0.17mA	0.17mA
200 VAC	0.34mA	0.35mA
240 VAC	0.40mA	0.40mA

\* Contact us if a lower leakage current model is required.

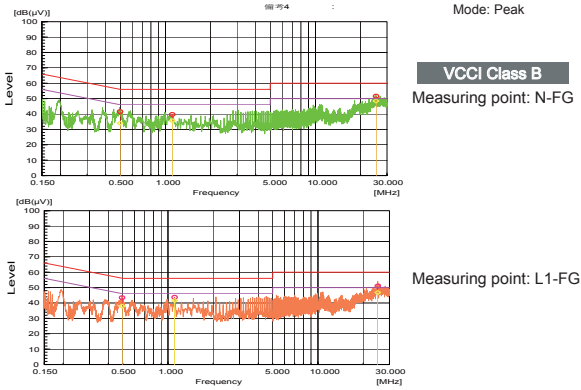
● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC  
Load: Rated  
Mode: Peak



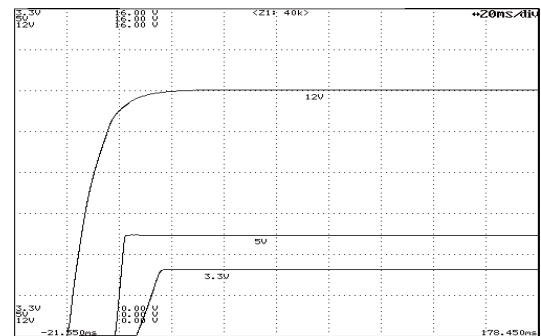
● Fig.9 Conducted Emission at 230 VAC

Input: 230 VAC  
Load: Rated  
Mode: Peak



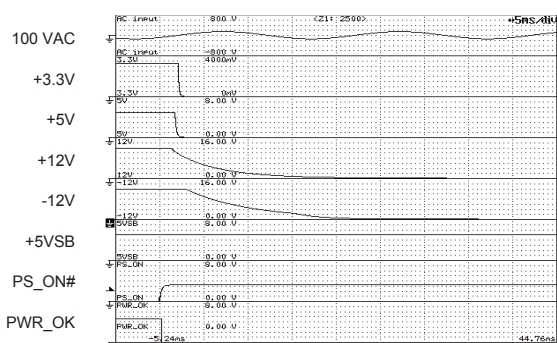
● Fig.10 Rising Characteristics at 100 VAC

Input: 100 VAC  
Load: Rated  
Time axis: 20ms/DIV



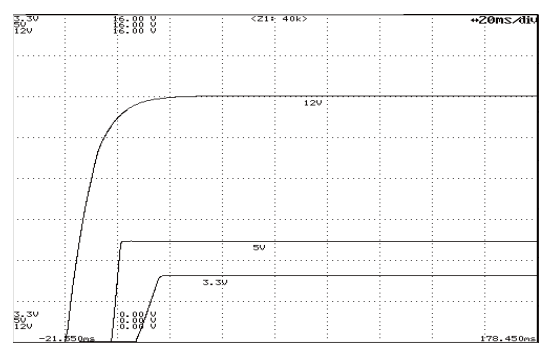
● Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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



● Fig.12 Rising Characteristics at 240 VAC

Input: 240 VAC  
Load: Rated  
Time axis: 20ms/DIV



BRAIN Power Supply

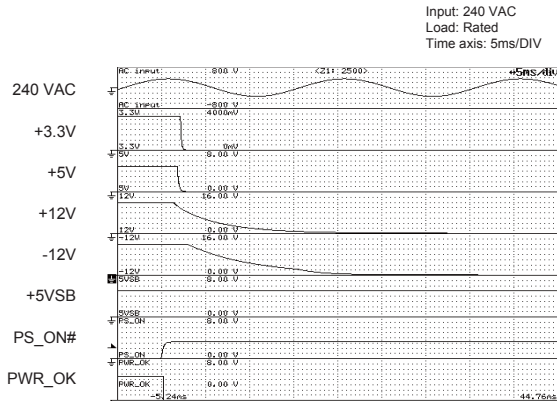
Rack Mount Power Supply

Non-backup Power Supply

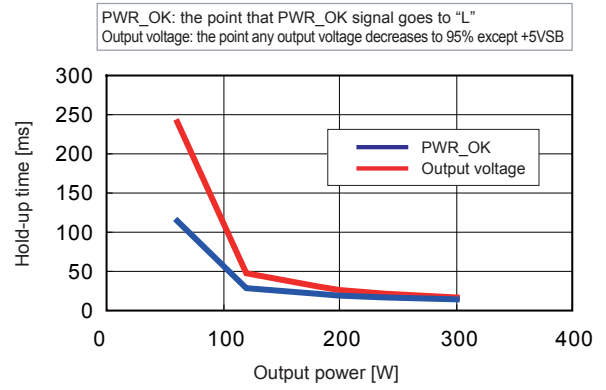
# Characteristics Data (Reference only)

\* Specification is subject to change due to proposed product

● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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

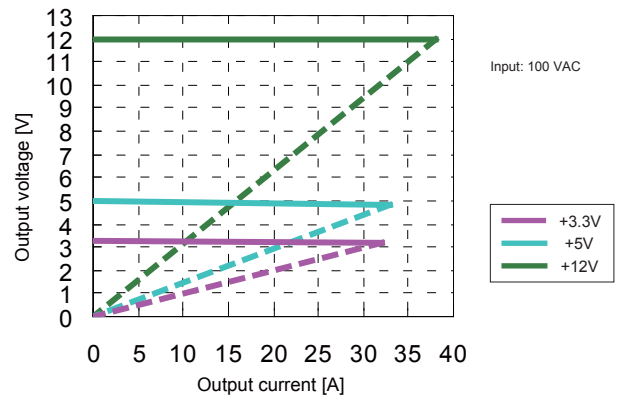


● Fig.15 Output Voltage Regulation

Output	Min. load	Rated load
+12V output	0A	19A
+5V output	0A	8A
+3.3V output	0A	8A

AC input voltage	100 VAC	115 VAC	240 VAC
+12V output (min. load)	12.155 V	12.154 V	12.155 V
+12V output (rated load)	12.101 V	12.101 V	12.101 V
+5V output (min. load)	5.011 V	5.013 V	5.015 V
+5V output (rated load)	4.961 V	4.961 V	4.961 V
+3.3V output (min. load)	3.318 V	3.318 V	3.319 V
+3.3V output (rated load)	3.279 V	3.279 V	3.279 V

● Fig.16 Over Current Protection (V-I Characteristic)



BRAIN  
Power  
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Non-backup Power Supply