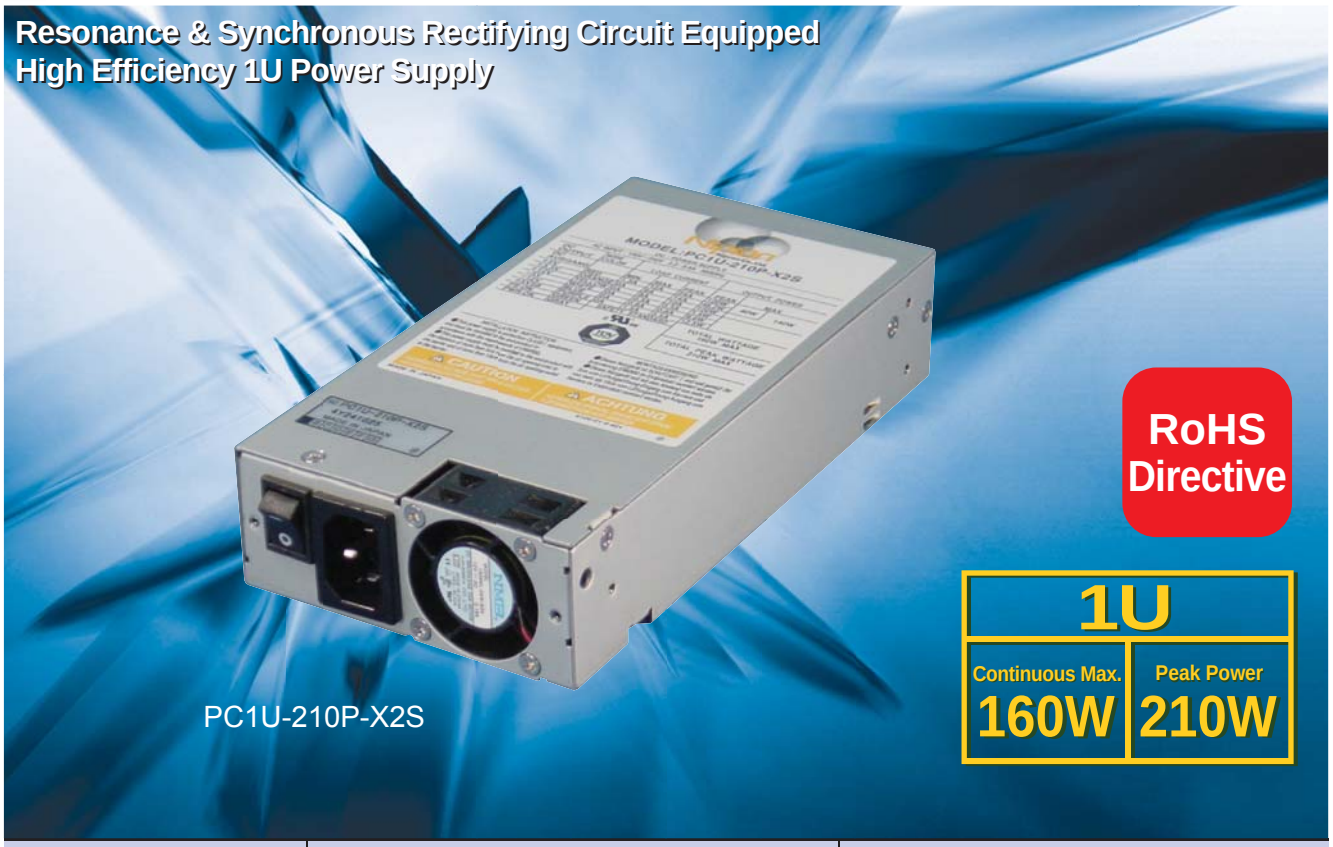
Rack Mount Power Supply PC1U-210P Series



Model	Description	Stock
PC1U-210P-X2S	——	Standard stock
PC1U-210P-X2S-02	With output harness	Standard stock

■Model Name Coding

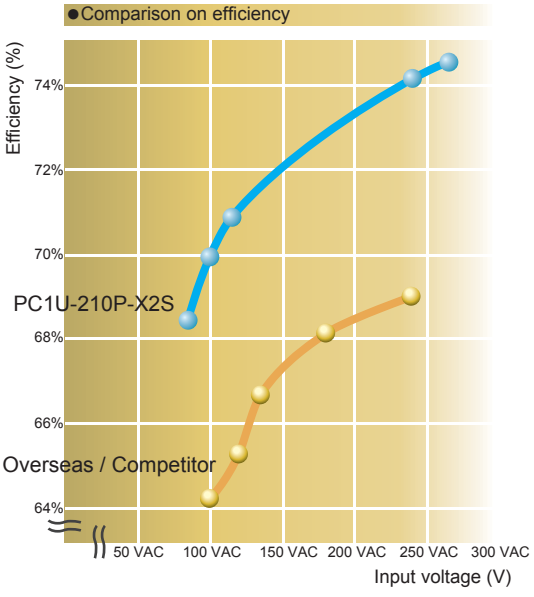
PC1U - 210 P - X 2 S - *
① ② ③ ④ ⑤ ⑥ ⑦

1. Series name
2. Output power
3. Peak output compliant
4. ATX output
5. +3.3V output equipped
6. Standard
7. - : No output harness
02: With output harness

Features

- 40.5mm in height compliant to 1U rack servers.
- Resonance & Synchronous rectification circuit equipped resulting in high efficiency power supply.
- Mag. Amp. constant voltage control for +12V output.
- Slow speed of fan even at standby mode to reduce the heat of +5VSB
- Output harnesses can be easily customized to meet various requirements.
- Double-sided through hole PCB suitable for industrial use.

●Comparison on efficiency



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)

Output

Output voltage	*+3.3V*	*+5V*	*+12V*	*-5V*	*-12V*	*+5VSB*
Max. current / max. power (continuous)	6A	12A	8A	0.3A	0.8A	1.5A
	Total 80W					
	Total 140W					
	Total 160W					
Peak current / peak power (5 sec max.)	14A	24A	10A	0.3A	0.8A	2.5A
	Total 24A / 120W					
	Total 210W					
Min. current	0A	1.5A	0A	0A	0A	0A

Dimensions

W×H×D (mm)	100×40.5×190 (1U size)

Output connector

PC1U-210P-X2S (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.321 “Detachable Output Harness” for details

PC1U-210P-X2S-02

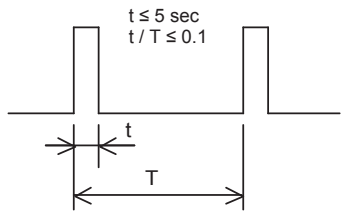
Main 20+4pin | Main 24pin | Main 20pin | AT | AUX | 12V 4pin | 12V 8pin | PCI-E 6pin | PCI-E 6+2pin | HDD | S-ATA | FDD

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
	Input Frequency		50 / 60Hz						47 - 63Hz
	Efficiency		70% typ. (100 VAC), 74% typ. (240 VAC) *Characteristic data: Fig.2						At rated input/output
	Power Factor		98% min. (100 VAC), 92% min. (240 VAC) *Characteristic data: Fig.3						
	Inrush Current		50A peak (100 VAC), 100A peak (240 VAC) *Characteristic data: Fig.4						At rated input/output at cold start (25°C)
	Input VA		320VA max. *Characteristic data: Fig.3						At rated input /output
Output	Rated Voltage		+3.3V	+5V	+12V	-5V	-12V	+5VSB	
	Rated Current		6A	12A	5A	0.3A	0.8A	1.5A	
	Max. Current / Power		6A	12A	8A	0.3A	0.8A	1.5A	Max. output power: 160W
			80W max.						
			140W max.						
	Peak Current / Power		14A	24A	10A	0.3A	0.8A	2.5A	Peak output power: 210W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.1
			24A / 120W max.						
	Min. Current		0A	1.5A	0A	0A	0A	0A	
	Total Voltage Accuracy (%)		±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	Total accuracy of temperature, input, and load fluctuations
	Max. Ripple Voltage (mVp-p)		50 max.	50 max.	120 max.	100 max.	150 max.	50 max.	Two wires are coming out from the output connector and connected into one at the edge of 50cm max. long. 10μF electrolytic capacitor and 0.1μF film capacitor are placed on it and it is measured by the 20MHz oscilloscope. *Characteristic data: Fig.15
	Max. Spike Voltage (mVp-p)		100 max.	100 max.	170 max.	100 max.	200 max.	100 max.	
Protection	Overcurrent Protection	OCP Point (A)	14.1 min.	26.4 min.	11 min.	Short protection			All other outputs are at rated input/output.
		Method	All outputs shutdown except for +5VSB			Fold back current limiting		All outputs shutdown	When measuring +5V, min. current on other output.
		Recovery	Reclosing AC input (5 sec min. interval)					Automatic recovery	
	Overvoltage Protection	OVP Point (V)	3.8 - 4.3	6.0 - 7.0	14 - 15.6	-	-	-	
		Method	All outputs shutdown except for +5VSB			-	-	-	
		Recovery	Reclosing AC input (5 sec min. interval)			-	-	-	
Environment	Operating Temp. / Humidity		0 to 50°C / 10 to 90%						No condensation
	Storage Temp. / Humidity		-25 to 70°C / 10 to 95%						No condensation
	Vibration		Displacement amplitude: 0.15mm (10-55Hz), Sweep cycles: 10, Test duration: 45 minutes each axis						JIS-C-0040-1995
	Mechanical Shock		Acceleration of 150m/s² for 11ms one time each in the X, Y and Z directions. No malfunction, damage, loosening or coming-off						JIS-C-0040-1995
Insulation	Dielectric Strength		AC input - DC output/FG: 1500 VAC for 1 minute						Cut-off current: 10mA (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. (240 VAC) *Characteristic data: Fig. 5						YEW. TYPE3226 (1kΩ) or equivalent
EMC	Line Noise Immunity		±2000V (pulse width: 100/800ns, repetitive cycle: 10-50ms)						No 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 compliant *Characteristic data: Fig.6 and 7						
	Harmonic Current Regulation		IEC61000-3-2 Class A, EN61000-3-2 Class A compliant						At rated input/output
Others	Safety Standard		UL60950, CSA C22.2 No. 950 (c-UL), IEC60950, EN60950-1						
	Cooling System		Forced air cooling						At PS_ON# 'H', fan rotates at low speed
	Output Grounding		Capacitor grounding						
	Output Hold-up Time		PWR_OK holds up 16ms min. after AC failure *Characteristic data: Fig.12						At rated 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. (PC1U-210P-X2S) / 1.2kg typ. (PC1U-210P-X2S-02)						
	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

Fig.1 Duty Ratio

Peak current/power shall be 5 sec or less continuously.
For repetitive loads, duty ratio shall be 10% or less.

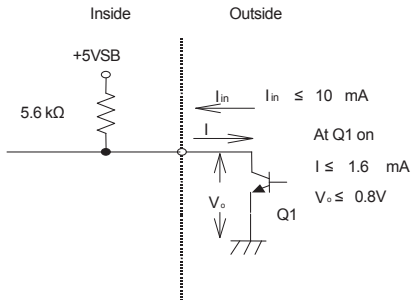


Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

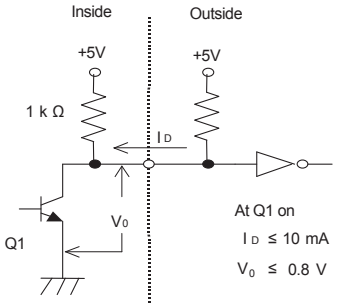
	Items	Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V +12V, -5V, and -12V outputs shutdown with 'H' or 'OPEN' input.	Signal input between the pin 14 of Output1(MAIN) connector and COM pin
Input Signal	+3.3V SENSE	The input terminal to detect the voltage of +3.3V output; by connecting to the load terminal, only the line drop of the + side of the output cable is compensated.	The pin 11 of Output1(MAIN) connector
Output Signal	Normal Output Signal (PWR_OK)	'H' signal is delivered when the +5V output is normal (detection delay time: 100 - 500ms).	The pin 8 of Output1(MAIN) connector

Signal Circuit

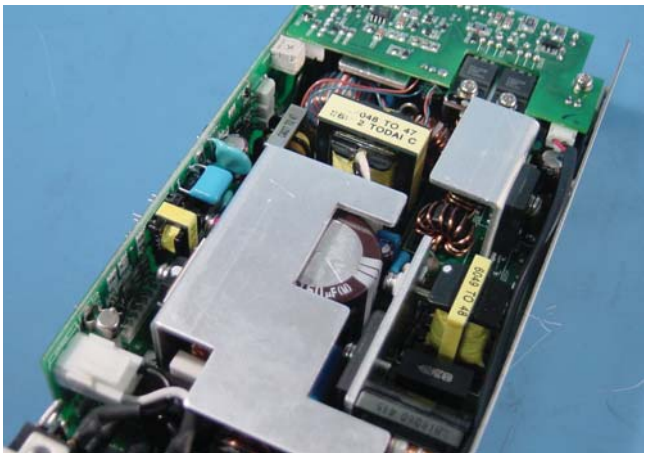
Input Signal Circuit — *(PS_ON#)*



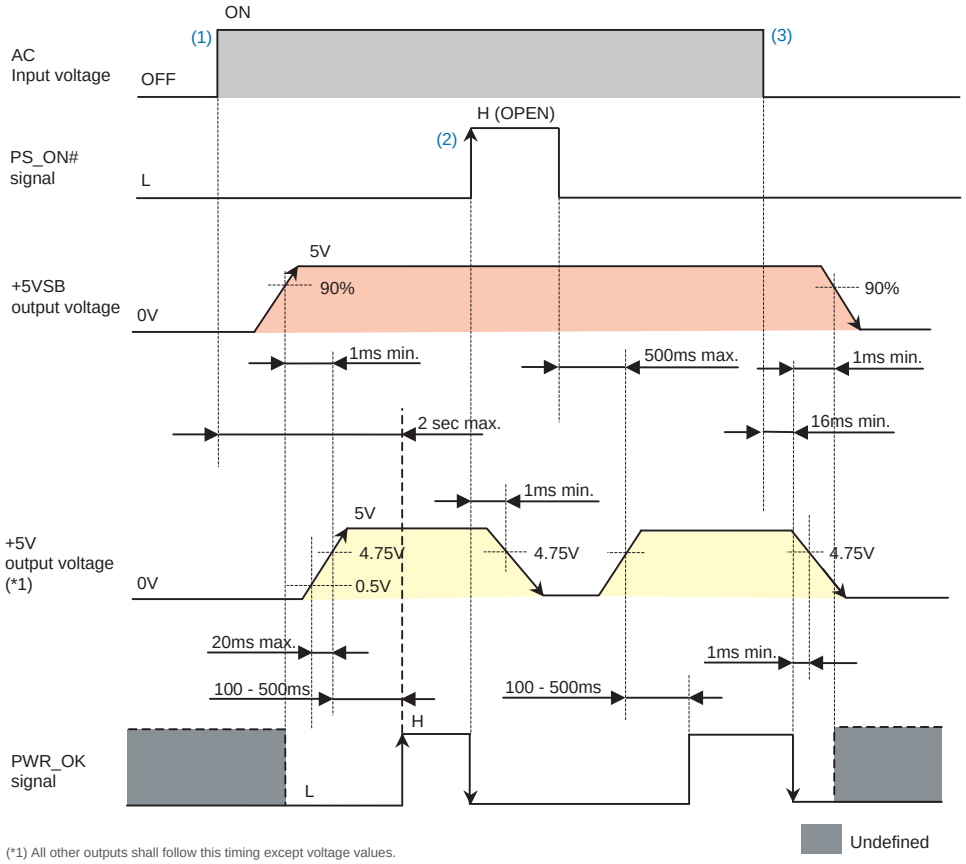
Output Signal Circuit — *(PWR_OK)*



Internal Structure

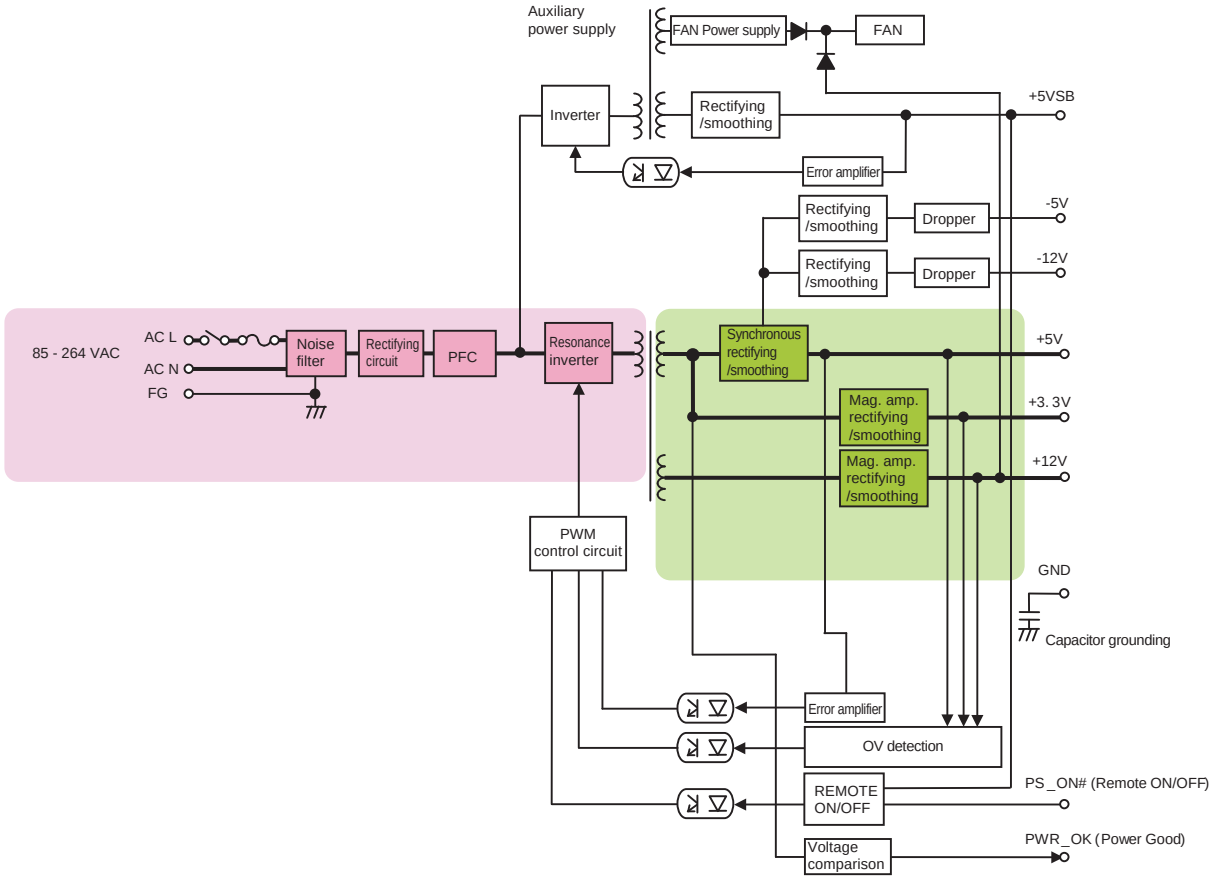


Sequence Diagram



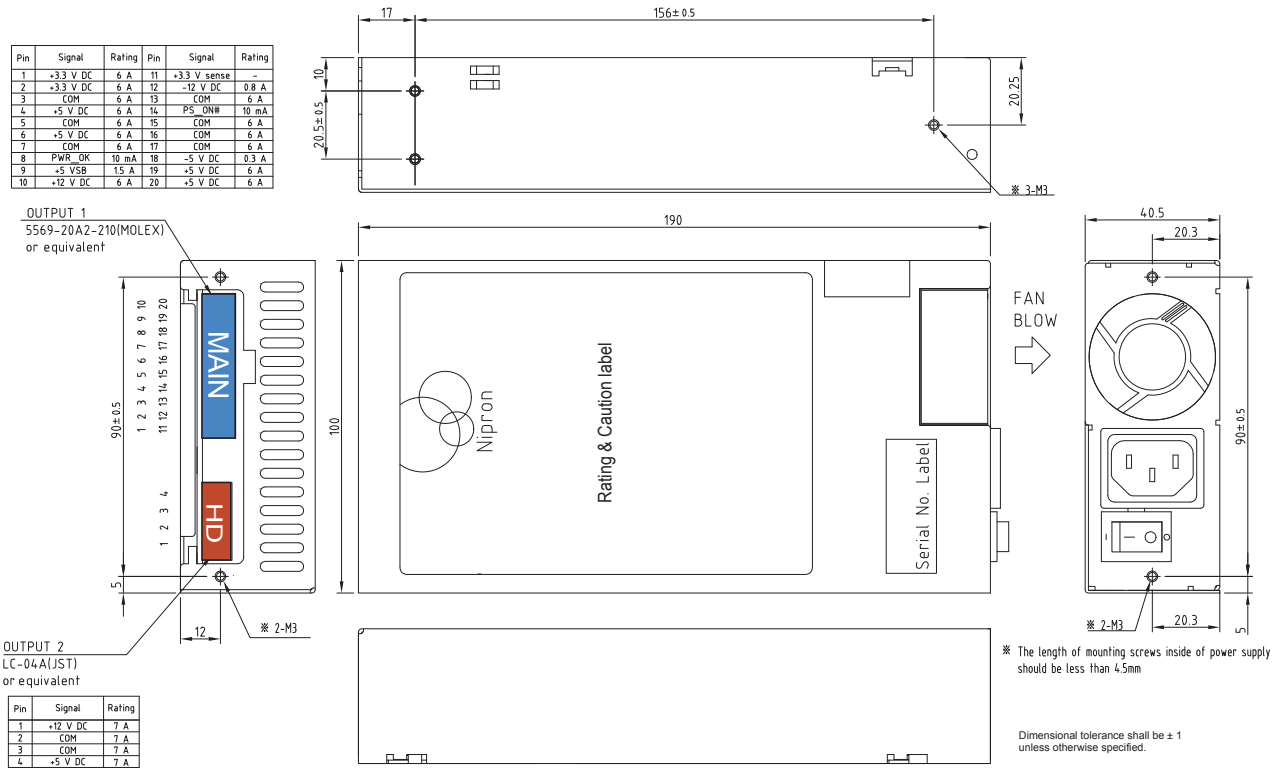
(*1) All other outputs shall follow this timing except voltage values.
(1) All outputs start up at PS_ON# 'L' status when AC input is turned on. PWR_OK 'H' is delivered 100 - 500ms after +5V has started up.
(2) All outputs except +5VSB shutdown with PS_ON# 'H' (OPEN) signal.
(3) PWR_OK 'L' is delivered 16ms or longer after blackout. Also, all outputs including +5VSB shutdown 1ms or later after that.

Block Diagram



Outline Drawing

Pin	Signal	Rating	Pin	Signal	Rating
1	+3.3 V DC	6 A	11	+3.3 V sense	–
2	+3.3 V DC	6 A	12	-12 V DC	0.8 A
3	COM	6 A	13	COM	6 A
4	+5 V DC	6 A	14	PS_ON#	10 mA
5	COM	6 A	15	COM	6 A
6	+5 V DC	6 A	16	COM	6 A
7	COM	6 A	17	COM	6 A
8	PWR_OK	10 mA	18	-5 V DC	0.3 A
9	+5 VSB	1.5 A	19	+5 V DC	6 A
10	+12 V DC	6 A	20	+5 V DC	6 A



Pin	Signal	Rating
1	+12 V DC	7 A
2	COM	7 A
3	COM	7 A
4	+5 V DC	7 A

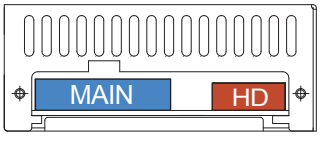
Note) Total power of each output is prescribed by specifications.

■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
Main power cable MAIN		
WH-M2420-400	MAIN 400±15 24-pin	
WH-M2020-400	MAIN 400±15 20-pin	
WH-M2020-192	MAIN 192±15 20-pin	
WH-MAT20-400	MAIN 400±15 AT / for +3.3V	
HD power cable HD		
WH-PV404-600	HD 300±20 150±10 150±10 peripheral (HD) FD; 300±20 +12V 4-pin	



Acceptable cable(s)

MAIN 1 model | HD 1 model

*PC1U-210P-X2S-02 comes with WH-M2020-400 and WH-PV404-600 in each.

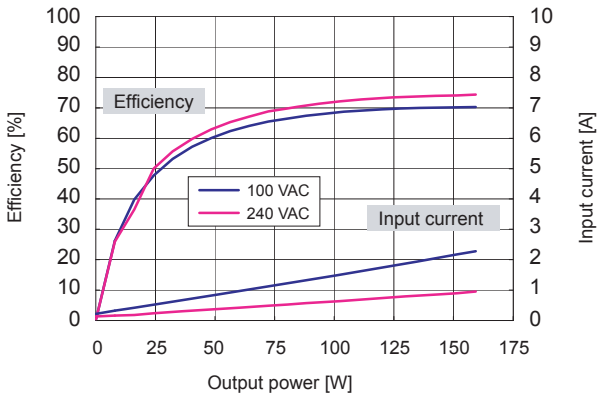
Optional Components Sold Separately

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]

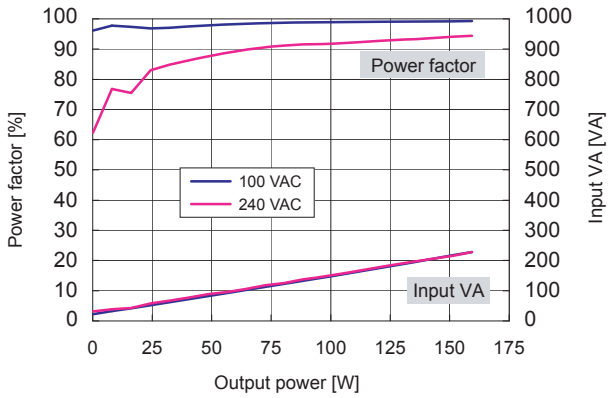
Other Optional Components			
Model	*Description*	*Model*	*Description*
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2820	20-pin extension harness (600mm)	WH5105-02	12V 4-pin connector conversion harness (320mm)
WH2747	20-pin extension harness (450mm)	WH5055	AT 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

Characteristics Data (Examples of actual measurement)

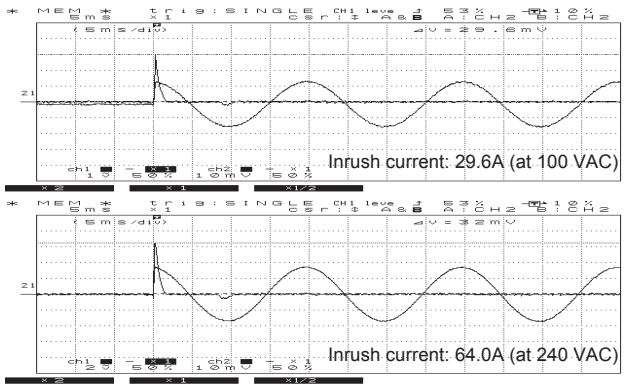
● Fig.2 Efficiency / Input Current vs. Output Power



● Fig.3 Power Factor / Input VA vs. Output Power



● Fig.4 Inrush Current



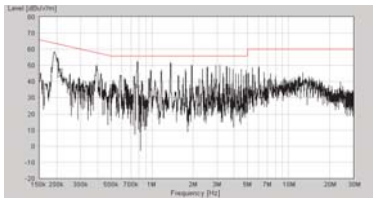
● Fig.5 Leakage Current

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

	Rated load	Min. load
100 VAC	0.18mA	0.16mA
240 VAC	0.38mA	0.36mA

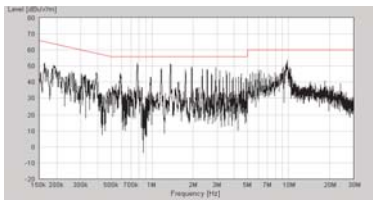
● Fig.6 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak



VCCI Class B

Measuring point: L-FG

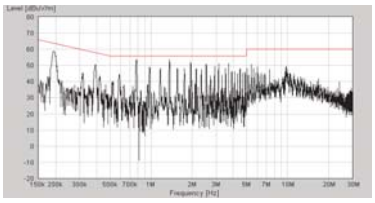


Measuring point: N-FG

In-house measurement data

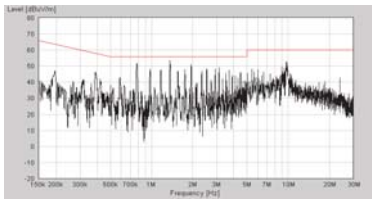
● Fig.7 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: Peak



VCCI Class B

Measuring point: L-FG

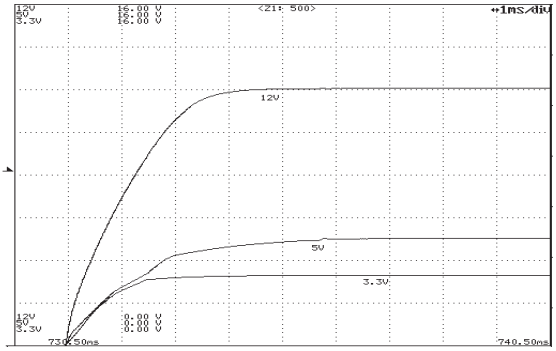


Measuring point: N-FG

In-house measurement data

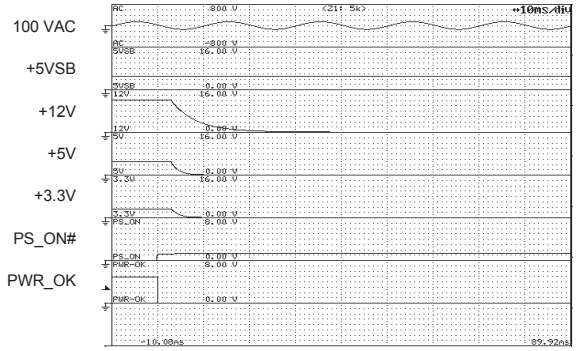
● Fig.8 Rising Characteristics at 100 VAC

Input: 100 VAC
Load: Rated
Time axis: 1ms/DIV



● Fig.9 Falling Characteristics at 100 VAC when REMOTE goes Off

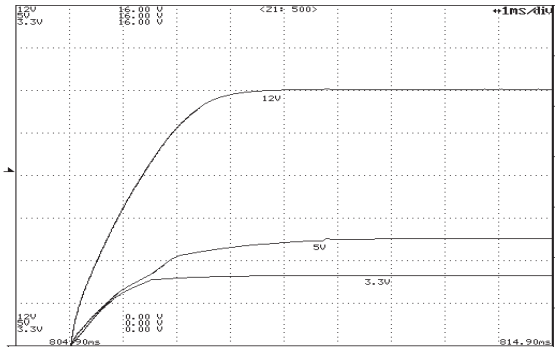
Input: 100 VAC
Load: Rated
Time axis: 10ms/DIV



Characteristics Data (Examples of actual measurement)

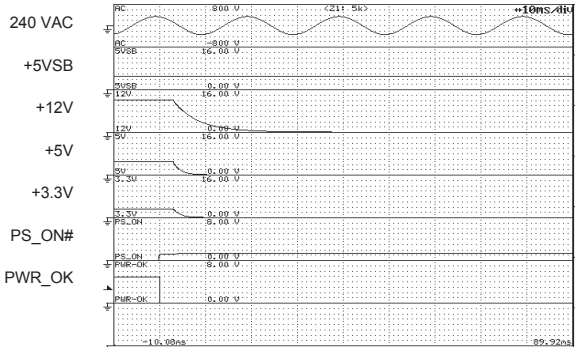
● Fig.10 Rising Characteristics at 240 VAC

Input: 240 VAC
Load: Rated
Time axis: 1ms/DIV



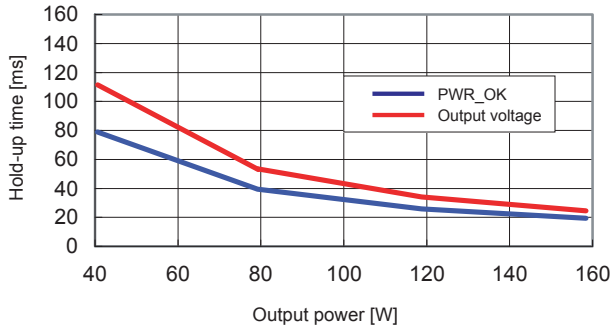
● Fig.11 Falling Characteristics at 240 VAC when REMOTE goes Off

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



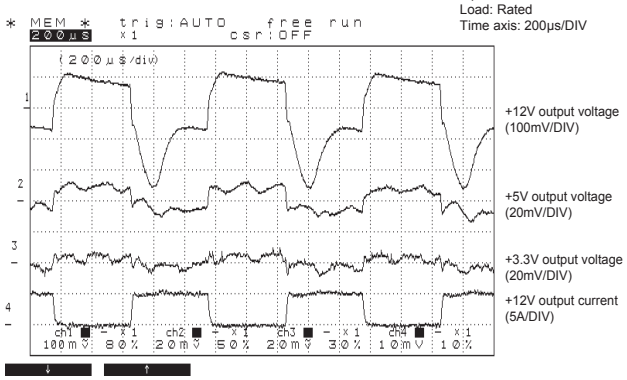
● Fig.12 Output Hold-up Time vs. Output Power

PWR_OK: the point that PWR_OK signal goes to "L"
Output voltage: the point any output voltage decreases to 95% except +5VSB



● Fig.13 Dynamic Load Fluctuation Characteristics at 1kHz

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



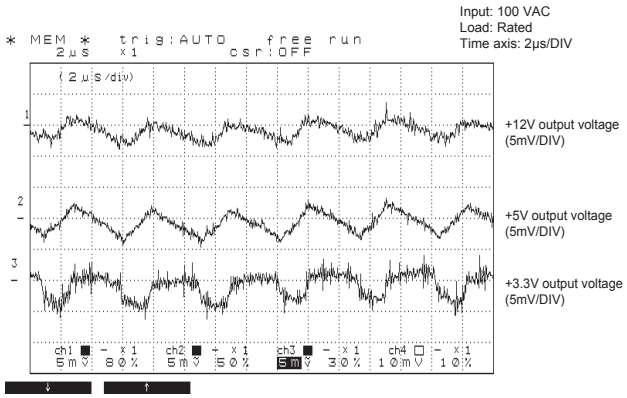
● Fig.14 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V output	0A	5A	10A
+5V output	1.5A	12A	24A
+3.3V output	0A	6A	14A

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V output (min. load)	12.185 V	12.187 V	12.189 V	12.190 V	12.190 V	12.190 V
+12V output (rated load)	12.068 V	12.071 V	12.073 V	12.076 V	12.077 V	12.078 V
+12V output (peak load)	12.001 V	12.008 V	12.012 V	12.015 V	12.018 V	12.023 V
+5V output (min. load)	5.128 V	5.128 V	5.128 V	5.128 V	5.128 V	5.128 V
+5V output (rated load)	5.029 V	5.029 V	5.029 V	5.029 V	5.029 V	5.029 V
+5V output (peak load)	4.967 V	4.967 V	4.967 V	4.967 V	4.967 V	4.967 V
+3.3V output (min. load)	3.353 V	3.353 V	3.353 V	3.353 V	3.353 V	3.353 V
+3.3V output (rated load)	3.298 V	3.299 V	3.299 V	3.299 V	3.299 V	3.299 V
+3.3V output (peak load)	3.255 V	3.255 V	3.256 V	3.256 V	3.256 V	3.256 V

● Fig.15 Ripple and Spike Voltage

Input: 100 VAC
Load: Rated
Time axis: 2μs/DIV



● Fig.16 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	50°C
Expected service life (yr)	approx. 18	approx. 9.1	approx. 4.6	approx. 2.3

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

■ Fan

Ambient temp.	20°C	30°C	40°C	50°C
Expected service life (yr)	approx. 14	approx. 9.4	approx. 6.5	approx. 4.5

● Fig.17 Over Current Protection (V-I Characteristic)

Input: 100 VAC