

# Rack Mount Power Supply PCFX-220P Series

Flex ATX, Small 1U Size PC Power Supply



PCFX-220P-X2S

**RoHS  
Directive**

**Flex ATX**  
Continuous Max. **170W** Peak Power **220W**

Model	Description	Stock
PCFX-220P-X2S	With mounting hook	Standard stock
PCFX-220P-X2P	Without mounting hook, flat type	Standard stock

**Model Name Coding**  
**PCFX - 220 P - X 2 \***

①	②	③	④	⑤	⑥
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1. Series name  
 2. Output power  
 3. Peak output compliant  
 3. ATX output  
 4. +3.3V output equipped  
 5. S: Standard  
 P: Without mounting hook, flat type

## Features

- Downsizing Flex ATX complying with the ATX specification
- 41mm in height compliant to 1U rack servers
- High power factor is achieved with PFC circuit.
- Worldwide range
- By building in the thermal-sensing variable speed fan, noise reduction can be realized. Heat-related issue for CPU can be settled with fan speed changeover switch.

Refer to "Product Page Guideline" on p.11

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

## Function



## Input

AC input	90 - 264V (worldwide range)
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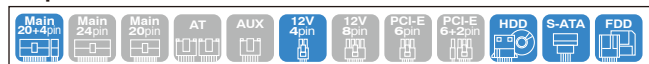
## Output

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current / max. power (continuous)	10A	10A	10A	0.3A	2A
	Total 75W		Total 170W		
Peak current / peak power (5 sec max.)	12A	12A	12A	0.3A	2A
	Total 85W		Total 220W		
Min. current	0A	0A	0.5A	0A	0A

## Dimensions

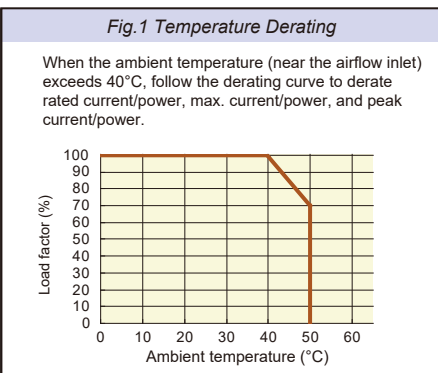
W×H×D (mm)	81.5×41×150 (Flex ATX size)
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## Output connector



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

Items		Specification					Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (90* - 264 VAC)					Worldwide range	
	Input Frequency	50 / 60Hz					47 - 63Hz	
	Efficiency	75% typ. (100 VAC), 80% typ. (240 VAC) *Characteristic data: Fig.2					At rated input/output	
	Power Factor	90% min. *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	250VA max. *Characteristic data: Fig.3					At rated input/output	
Output	Rated Voltage	+3.3V	+5V	+12V	-12V	+5VSB		
	Rated Current	8A	8A	8A	0.3A	1A		
	Max. Current / Power	10A	10A	10A	0.3A	2A	Max. output power: 170W	
		75W max.						
	Peak Current / Power	12A	12A	12A	0.3A	2A	Peak output power: 220W Time: 5 sec or less	
		85W max.						
	Min. Current	0A	0A	0.5A	0A	0A		
	Total Voltage Accuracy (%)	±5 max.	±5 max.	±5 max.	±10 max.	±5 max.	Total accuracy of temperature, input, and load fluctuations	
	Max. Ripple Voltage (mVp-p)	50 max.	50 max.	100 max.	100 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 100MHz oscilloscope. *Characteristic data: Fig.15	
Max. Spike Voltage (mVp-p)	100 max.	100 max.	200 max.	200 max.	100 max.			
Protection	Overcurrent Protection	OCP Point (A)	13.2 min.	13.2 min.	13.2 min.	Short protection		
		Method	All outputs except for +5VSB shutdown			Fold back current limiting	All outputs shutdown	All other outputs are at rated input/output. +12V output shall be min. current at +3.3V and +5V outputs measurement
		Recovery	Reclosing AC input (5 sec min. interval)			Automatic recovery		
	Overvoltage Protection	OVP Point (V)	3.7 to 4.3	5.7 to 7.0	13.4 to 15.6	-	-	
		Method	All outputs except for +5VSB shutdown			-	-	
		Recovery	Reclosing AC input (10 sec min. interval)			-	-	
Environment	Operating Temp. / Humidity	0 to 50°C* / 10 to 90%					No condensation *Refer to Fig.1	
	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	Lift one bottom edge up to 50mm and let it fall. Number of bumps: 3 each of 4 edges					JIS-C-0043-1995, at no operation	
Insulation	Dielectric Strength	AC input - DC output/FG: 1500 VAC for 1 minute					Cut-off current: 10mA	
	Insulation Resistance	AC input - DC output/FG: 50MΩ min.					At 500 VDC	
	Leakage Current	1mA max. (100 VAC) / 2mA max. (240 VAC) *Characteristic data: Fig.5					YEW. TYPE3226 (1kΩ) or equivalent	
EMC	Line Noise Immunity	±2000V (pulse width: 100/1000ns, 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-A compliant *Characteristic data: Fig.6 and 7					Margin 4dB min.	
	Harmonic Current Regulation	IEC61000-3-2 (Ver.2.1) Class D, EN61000-3-2 (A14) Class D compliant						
Others	Safety Standards	UL60950-1, c-UL, CE Marking (IEC62368-1), CCC						
	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.12					At rated output	
	Reliability Grade	FA (industrial equipment grade, double-sided PCB with plated through hole)					Follow our standard	
	MTBF	100,000H min.					Based on EIAJ RCR-9102	
	Weight	800 g 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		



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 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, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input.	Signal input between the pin 16 of MA24P connector and COM pin
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 MA24P connector

## Signal Circuit

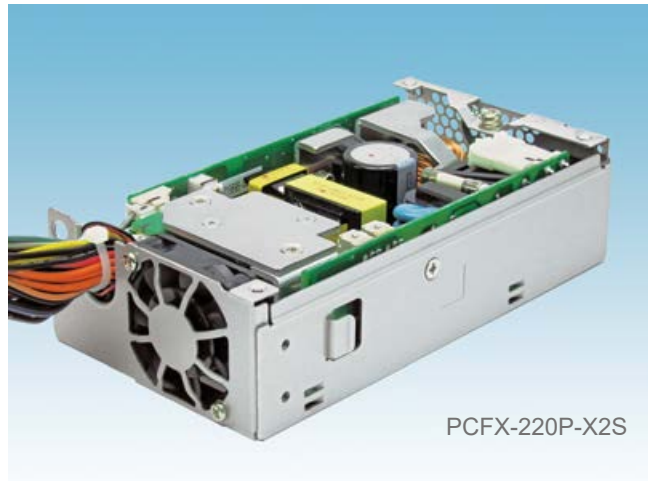
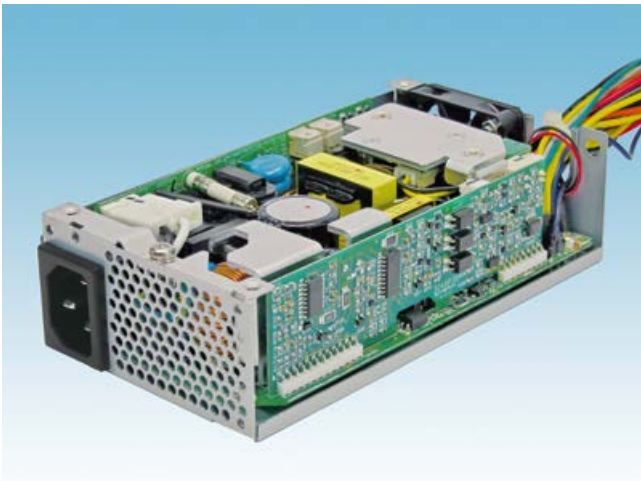
Input Signal Circuit	(PS_ON#)	Output Signal Circuit	(PWR_OK)
	<p>Inside: +5VSB, Resistor</p> <p>Outside: <math>I_{in} \leq 10 \text{ mA}</math></p> <p>At Q1 on: <math>I_c \leq 1.6 \text{ mA}</math>, <math>V_{be} \leq 0.8 \text{ V}</math></p>		<p>Inside: +5V, 1kΩ, Resistor</p> <p>Outside: +5V, Resistor</p> <p>At Q1 on: <math>I_b \leq 1.0 \text{ mA}</math>, <math>V_o \leq 0.8 \text{ V}</math></p>

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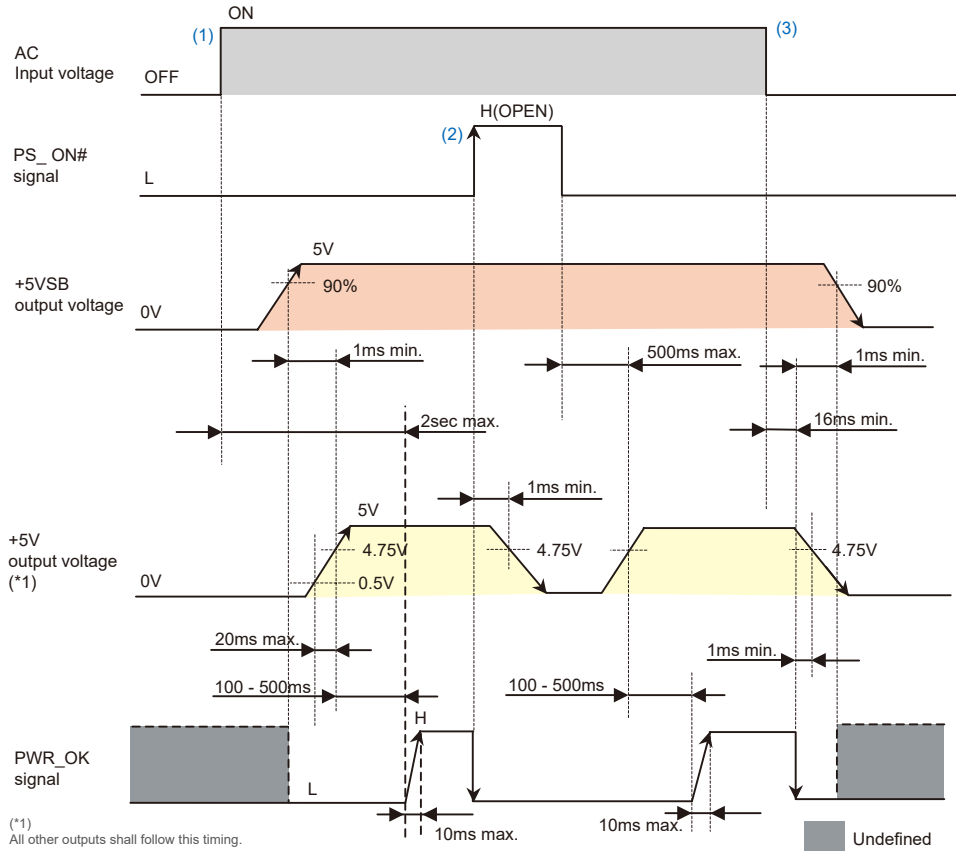
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## Internal Structure

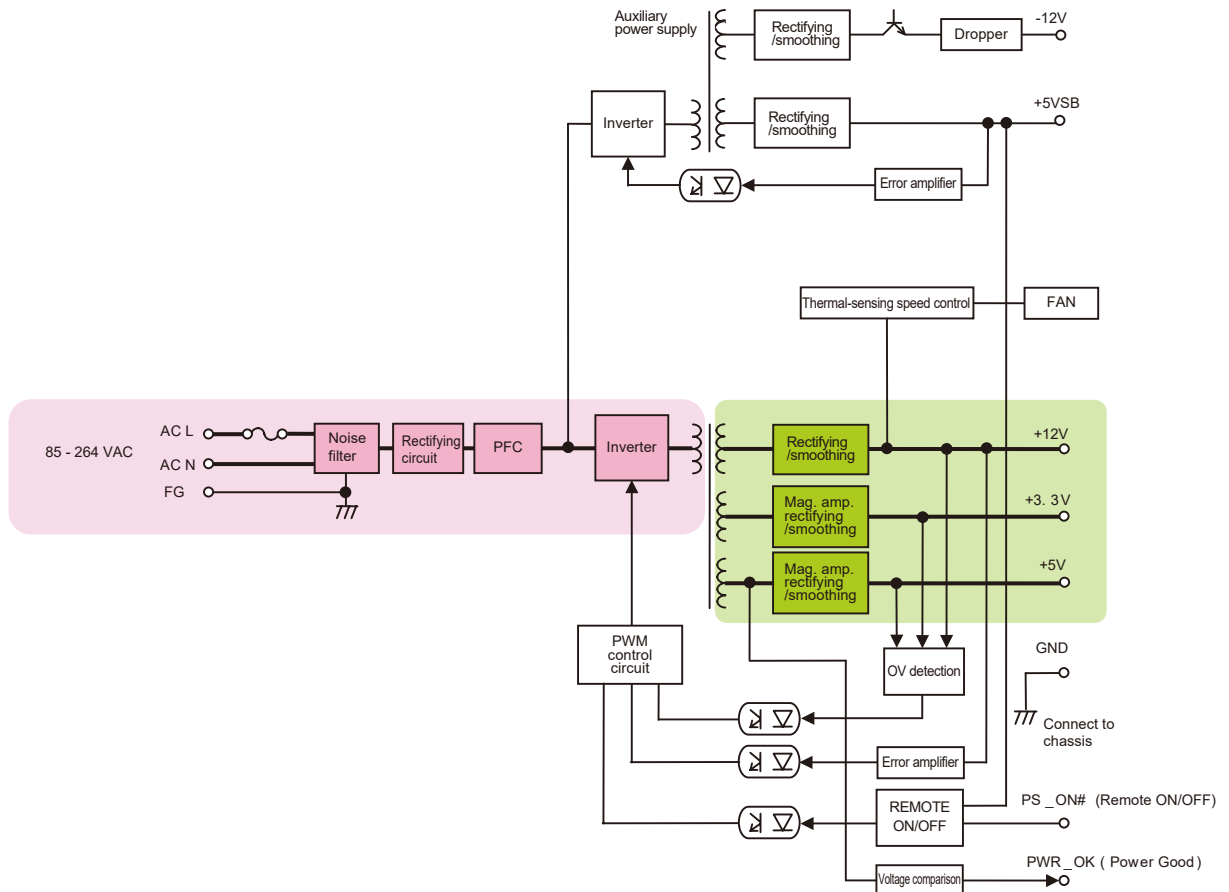


# Sequence Diagram



- (1) All outputs start up by being supplied AC input under the condition of PS\_ON# 'L'. PWR\_OK is delivered to 'H' at 100 - 500ms after +5V output has risen.
- (2) At PS\_ON# 'H' input, all outputs except for +5VSB shut down.
- (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 / Output Harness

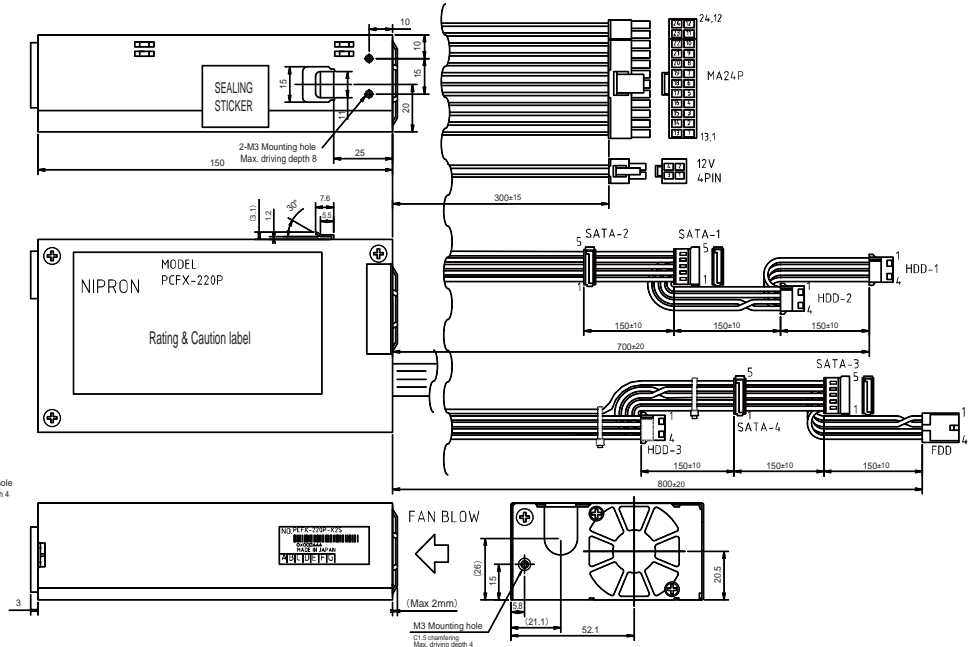
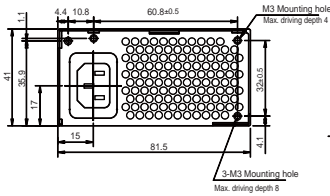
## PCFX-220P-X2S

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE	CN NAME	CONNECTOR TYPE	PIN No.	CN NAME	CONNECTOR TYPE	PIN No.	CN NAME	CONNECTOR TYPE	PIN No.
FDD	Housing: 171622-4(AMP) or equivalent Terminal: 171024-1(AMP) or equivalent	1	+12V	YELLOW	UL1007 AWG #20	SATA -3	Housing: C18PF00100(CvLux) or equivalent Terminal: BPNIC181010APP00(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	SATA -4	Housing: C18PF100100(CvLux) or equivalent Terminal: C18PF100100(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	HDD-3	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1
		2	+5V	RED				2			2			
		3	COM	BLACK				3			3			
		4	+3.3V	ORANGE				4			4			
HDD-1	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1	+12V	YELLOW	UL1007 AWG #20	HDD-2	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1	SATA -1	Housing: C18PF100100(CvLux) or equivalent Terminal: BPNIC181010APP00(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	HDD-3	Housing: C18PF100100(CvLux) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1
		2	COM	BLACK				2			2			
		3	+5V	RED				3			3			
		4	+3.3V	ORANGE				4			4			

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
MA24P (20PIN)	Housing: CP-0120010-C (CvLux) Terminal: 13PIN (CP-0100105 (CvLux) or equivalent) or other CP-0100102 (CvLux) or equivalent	1	+3.3V	ORANGE	UL1007 AWG #20
		2	+3.3V	ORANGE	
		3	COM	BLACK	
		4	+5V	RED	
		5	COM	BLACK	
		6	+5V	RED	
		7	COM	BLACK	
		8	P.G.	GRAY	
		9	+5V	VIOLET	
		10	+12V	YELLOW	
		11	+3.3V	ORANGE	
		12	-12V	BLUE	
		13	P.S. ON	GREEN	
14	-12V	BLUE			
15	COM	BLACK			
16	COM	BLACK			
17	COM	BLACK			
18	COM	BLACK			
19	COM	BLACK			
20	-	N.C.	-		
21	+5V	RED	-		
22	+5V	RED	-		

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
MA24P (4PIN)	Housing: CP-0120010-C (CvLux) Terminal: CP-0100102 (CvLux)	11	+12V	YELLOW	UL1007 AWG #20
		12	+3.3V	ORANGE	
		23	+5V	RED	
		24	COM	BLACK	

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
12V 4PIN	Housing: 851104(MOLEX) or equivalent Terminal: 851104(MOLEX) or equivalent	1	COM	BLACK	UL1007 AWG #20
		2	COM	BLACK	
		3	+12V	YELLOW	
		4	+12V	YELLOW	



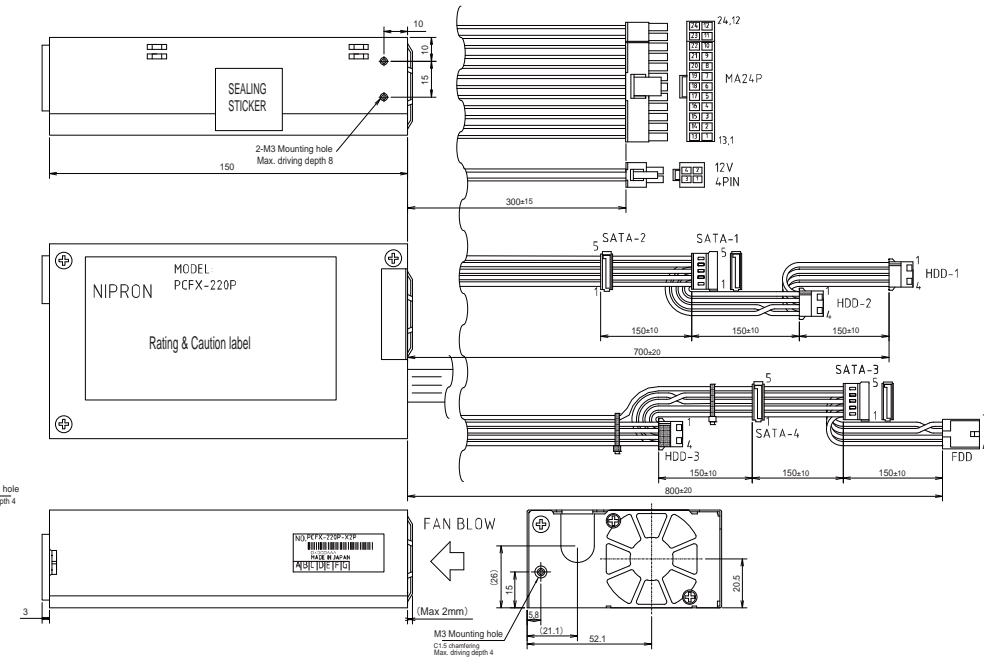
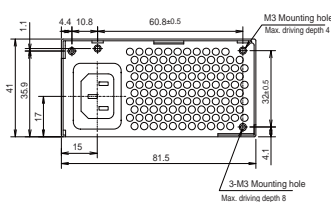
## PCFX-220P-X2P

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE	CN NAME	CONNECTOR TYPE	PIN No.	CN NAME	CONNECTOR TYPE	PIN No.	CN NAME	CONNECTOR TYPE	PIN No.
FDD	Housing: 171622-4(AMP) or equivalent Terminal: 171024-1(AMP) or equivalent	1	+12V	YELLOW	UL1007 AWG #20	SATA -3	Housing: C18PF00100(CvLux) or equivalent Terminal: BPNIC181010APP00(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	SATA -4	Housing: C18PF100100(CvLux) or equivalent Terminal: C18PF100100(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	HDD-3	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1
		2	+5V	RED				2			2			
		3	COM	BLACK				3			3			
		4	+3.3V	ORANGE				4			4			
HDD-1	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1	+12V	YELLOW	UL1007 AWG #20	HDD-2	Housing: LCP-04(JST) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1	SATA -1	Housing: C18PF100100(CvLux) or equivalent Terminal: BPNIC181010APP00(CvLux) or equivalent Other: C18181APP00(CvLux) or equivalent	1	HDD-3	Housing: C18PF100100(CvLux) or equivalent Terminal: SLCC21F-20(JST) or equivalent	1
		2	COM	BLACK				2			2			
		3	+5V	RED				3			3			
		4	+3.3V	ORANGE				4			4			

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
MA24P (20PIN)	Housing: CP-0120010-C (CvLux) Terminal: 13PIN (CP-0100105 (CvLux) or equivalent) or other CP-0100102 (CvLux) or equivalent	1	+3.3V	ORANGE	UL1007 AWG #20
		2	+3.3V	ORANGE	
		3	COM	BLACK	
		4	+5V	RED	
		5	COM	BLACK	
		6	+5V	RED	
		7	COM	BLACK	
		8	P.G.	GRAY	
		9	+5V	VIOLET	
		10	+12V	YELLOW	
		11	+3.3V	ORANGE	
		12	-12V	BLUE	
		13	P.S. ON	GREEN	
14	-12V	BLUE			
15	COM	BLACK			
16	COM	BLACK			
17	COM	BLACK			
18	COM	BLACK			
19	COM	BLACK			
20	-	N.C.	-		
21	+5V	RED	-		
22	+5V	RED	-		

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
MA24P (4PIN)	Housing: CP-0120010-C (CvLux) Terminal: CP-0100102 (CvLux)	11	+12V	YELLOW	UL1007 AWG #20
		12	+3.3V	ORANGE	
		23	+5V	RED	
		24	COM	BLACK	

CN NAME	CONNECTOR TYPE	PIN No.	FUNCTION	COLOR	WIRE TYPE
12V 4PIN	Housing: 851104(MOLEX) or equivalent Terminal: 851104(MOLEX) or equivalent	1	COM	BLACK	UL1007 AWG #20
		2	COM	BLACK	
		3	+12V	YELLOW	
		4	+12V	YELLOW	





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## 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 version) [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

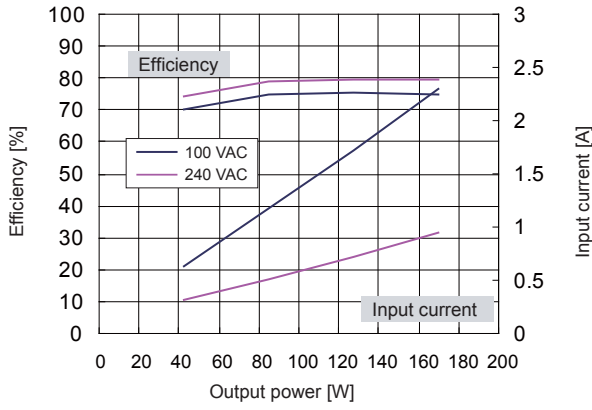
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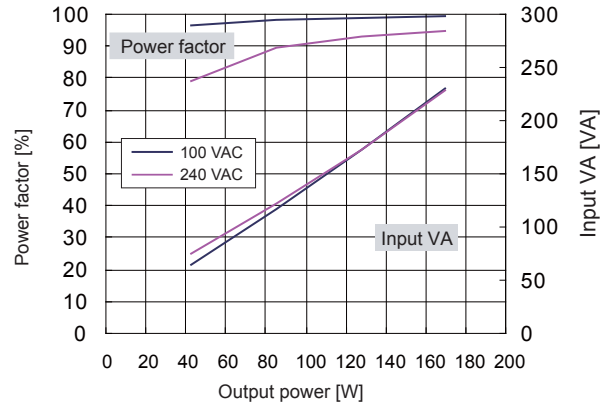
Non-backup Power Supply

# Characteristics Data PCFX-220P-X2S (Examples of actual measurement)

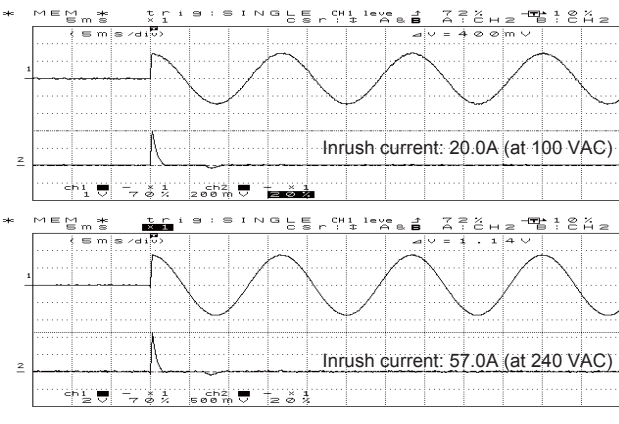
• Fig.2 Efficiency / Input Current vs. Output Power



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



• Fig.4 Inrush Current



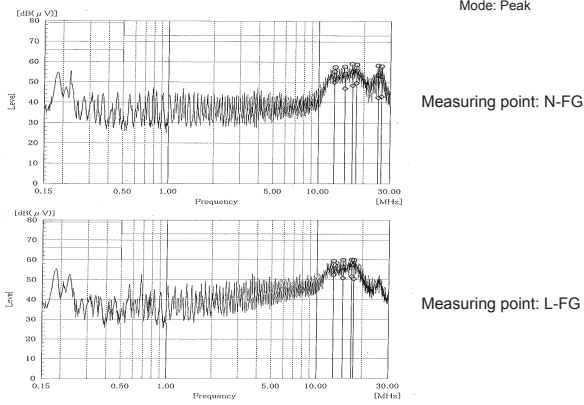
• Fig.5 Leakage Current

Input: 100 / 200 / 230 / 240 VAC  
Load: Rated and min. load

	Rated load	Min. load
100 VAC	0.38mA	0.38mA
200 VAC	0.68mA	0.70mA
230 VAC	0.78mA	0.78mA
240 VAC	0.92mA	0.91mA

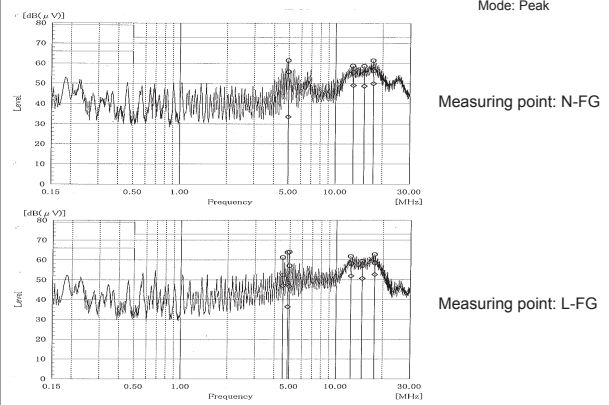
• Fig.6 Conducted Emission at 100 VAC

Input: 100 VAC  
Load: Rated  
Mode: Peak



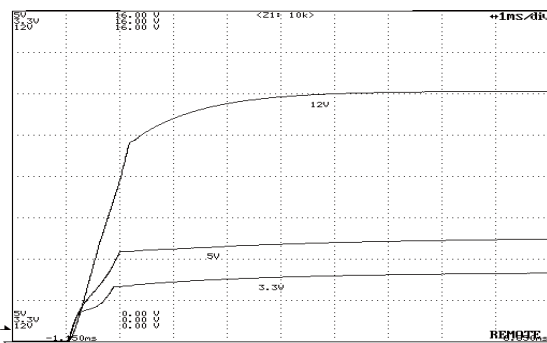
• Fig.7 Conducted Emission at 230 VAC

Input: 230 VAC  
Load: Rated  
Mode: Peak



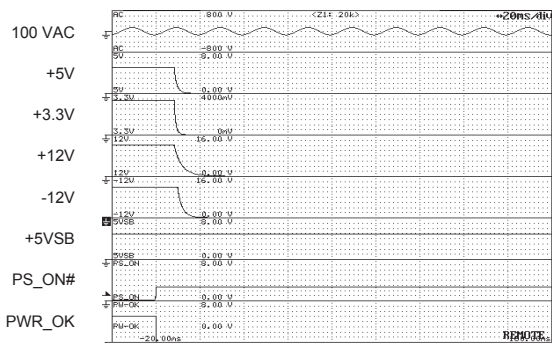
• Fig.8 Rising Characteristics at 100 VAC

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



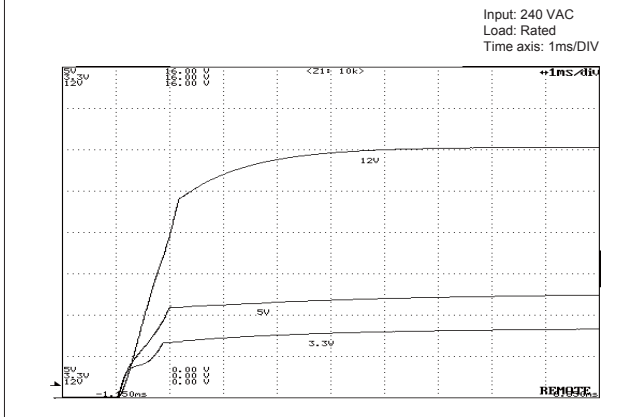
• Fig.9 Falling Characteristics at 100 VAC when REMOTE goes Off

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

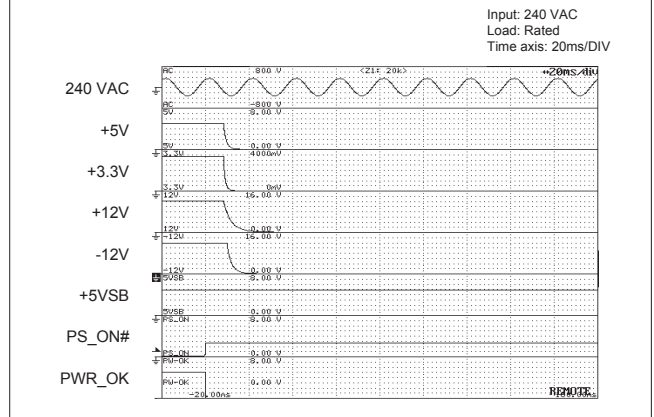


# Characteristics Data PCFX-220P-X2S (Examples of actual measurement)

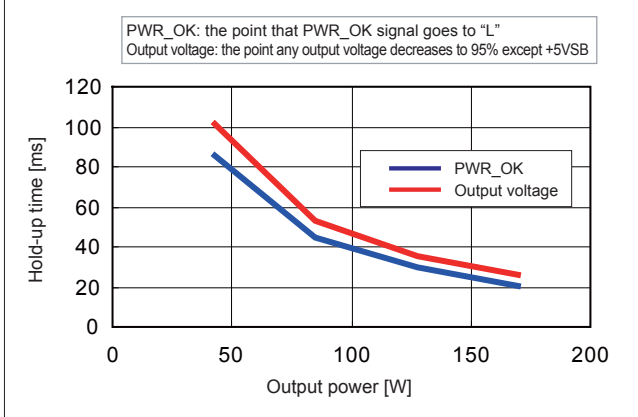
● Fig.10 Rising Characteristics at 240 VAC



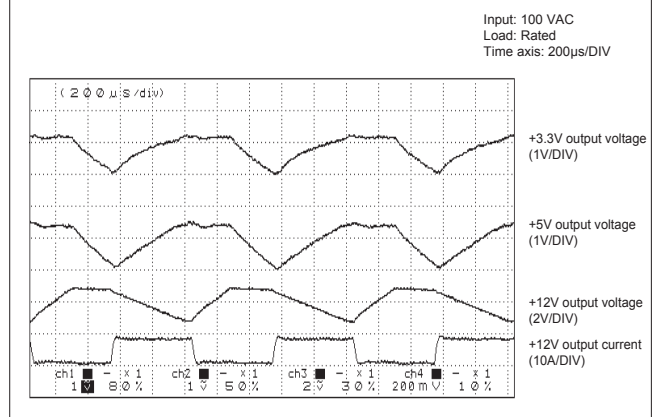
● Fig.11 Falling Characteristics at 240 VAC when REMOTE goes Off



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



● Fig.13 Dynamic Load Fluctuation Characteristics at 1kHz



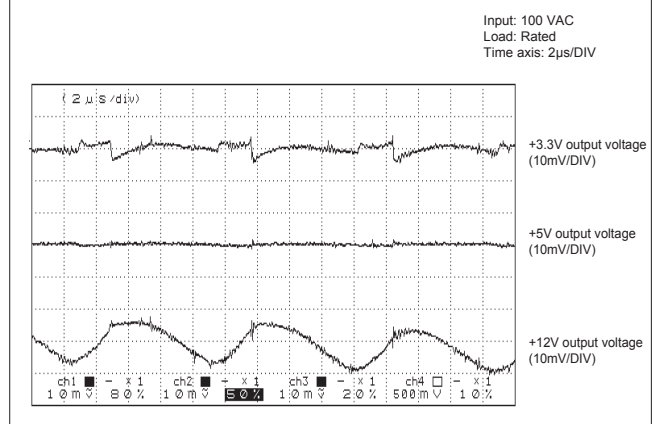
● Fig.14 Output Voltage Regulation

	Output			
	Min. load	Rated load	Peak load	
+12V output	0.5A	8A	12A	
+5V output	0A	8A	12A	
+3.3V output	0A	8A	12A	

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+3.3V output (min. load)	3.384 V	3.384 V	3.384 V	3.384 V	3.384 V	3.384 V
+3.3V output (rated load)	3.306 V	3.306 V	3.306 V	3.306 V	3.305 V	3.305 V
+3.3V output (peak load)	3.277 V	3.277 V	3.277 V	3.278 V	3.278 V	3.278 V
+5V output (min. load)	5.115 V	5.114 V	5.114 V	5.114 V	5.114 V	5.114 V
+5V output (rated load)	4.999 V	4.999 V	4.999 V	4.999 V	4.998 V	4.998 V
+5V output (peak load)	4.956 V	4.957 V	4.958 V	4.958 V	4.958 V	4.958 V
+12V output (min. load)	12.150 V	12.149 V	12.149 V	12.149 V	12.150 V	12.149 V
+12V output (rated load)	12.086 V	12.085 V	12.085 V	12.085 V	12.084 V	12.084 V
+12V output (peak load)	12.071 V	12.071 V	12.071 V	12.071 V	12.072 V	12.073 V

● Fig.15 Ripple and Spike Voltage



● Fig.16 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

Input: 100 VAC  
Load: Rated  
Operating time: 24 consecutive hours

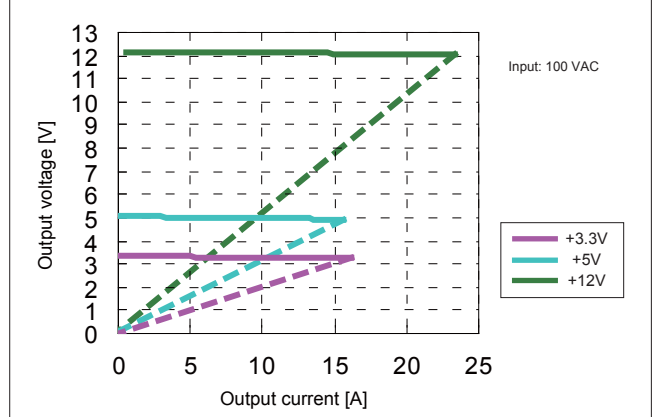
Intake air temp.	20°C	30°C	40°C
Expected service life (yr)	approx. 30	approx. 15	approx. 7.6

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

■ Fan

Ambient temp.	20°C	30°C	40°C
Expected service life (yr)	approx. 8.6	approx. 8.6	approx. 8.6

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



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