

Rack Mount Power Supply PCFD Series

24, 48 VDC Input Fanless ATX Power Supply



PCFD-180P-X2S

PCFD series can be backed up at blackout with battery package connected.



■ Battery package
BS17A-H24/2.0L
Refer to p.411 for details

**RoHS
Directive**

Other	
Continuous Max.	Peak Power
90W	180W

BRAIN Power Supply

Rack Mount Power Supply

Non-backup Power Supply

Model	Description	Stock	Standard Price (without tax)
PCFD-180P-X2S	24 VDC input	Standard stock	¥15,000
PCFD4-180P-X2S	48 VDC input	Contact us	¥15,800

■ Model Name Coding

PCFD* - 180 P - X 2 S

① ② ③ ④ ⑤ ⑥ ⑦

- Series name
- DC input voltage (- : 24V type, 4: 48V type)
- Output power
- Peak output compliant
- ATX output
- +3.3V output equipped
- Standard

Features

- DC input Compact Fanless ATX power supply
- Easily customized as output is consisted of chopper units.
- Each output operates with rated load individually. (Min. load current is 0A for all output.)
- 24V output voltage is easily available. (24V output is always provided.)
- Backup operation at blackout is available.

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

Refer to [] only for PCFD4-180P-X2S

DC input	20 - 36V [36 - 80V]
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Output

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
At natural air cooling (basic structure)	10A	10A	7.5A	0.3A	1A
	Total 60W				
Within output power cross regulation (Max. output power: 90W)					
At natural air cooling (Special AL heatsink is required)	10A	10A	8.5A	0.3A	1A
	Total 70W				
Within output power cross regulation (Max. output power: 102W)					
Forced air cooling* (External FAN is required)	10A	10A	10A	0.3A	1.5A
	Within output power cross regulation (Peak output power: 120W)				
Peak current / peak power (5 sec max.)	10A	10A	15A	0.3A	1.8A
Within output power cross regulation (Peak output power: 180W)					
Min. current	0A	0A	0A	0A	0A

*In forced air cooling, air flow of 0.5m³/min. or more to parts surface is required.

Dimensions

W×H×D (mm)	93×55×160
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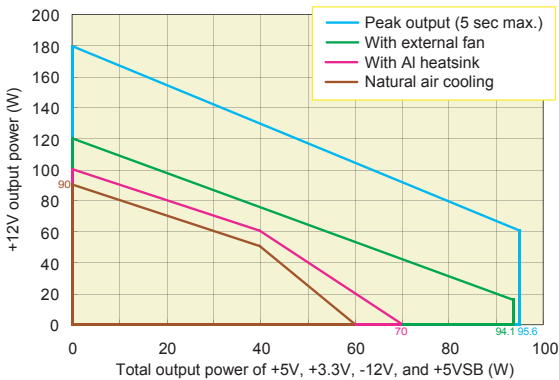
Output connector (optional component)

Main 20+4pin, Main 24pin, Main 20pin, AT, AUX, 12V 4pin, 12V 5pin, PCI-E 6pin, PCI-E 8+22pin, HDD, S-ATA, FDD

*Refer to p.371 "Detachable output harness" for details

Fig.1 Output Power Cross Regulation

Total of each output power (Voltage times current) shall be within the output power cross regulation graph

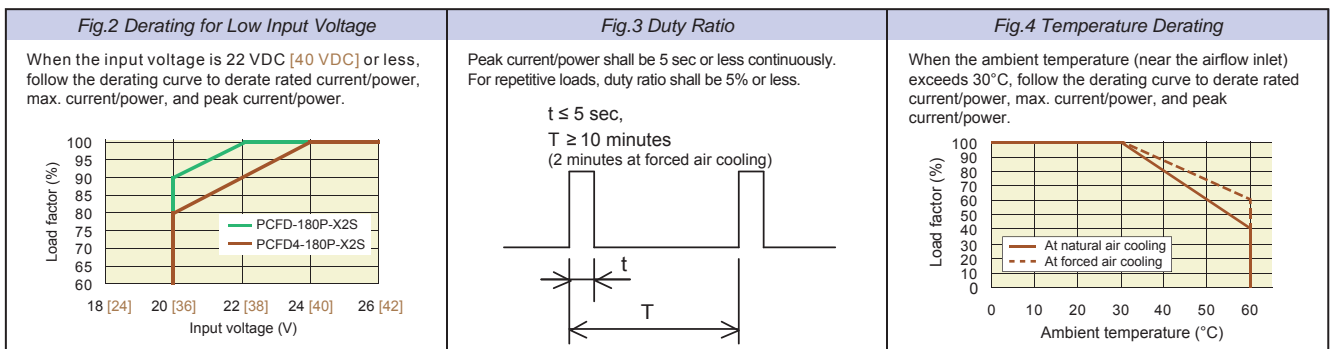


General Specification Condition: at normal temperature and humidity unless otherwise specified

Refer to [] only for PCFD4-180P-X2S

Items		Specification					Measurement conditions, etc.	
DC Input	Rated Voltage	24 VDC (20* - 36 VDC) / 6.7A [48 VDC (36* - 80 VDC)] *Characteristic data: Fig.7 and 8 (Input current value is applied at forced air cooling at rated load.)					*Refer to Fig.2	
	Efficiency	75% min. *Characteristic data: Fig.5					At rated input/output	
	Inrush Current	N/A *1 [6A peak max.]					Charging current into X-capacitor of input filter is not specified unless its period is more than 100μs. [At 48 VDC input and rated load, input reclosing interval should be 10 sec or longer.]	
	Input VA at standby mode	10W typ. (24 VDC) [10W typ. (48 VDC)] *Characteristic data: Fig.5 3W typ. (24 VDC) [3W typ. (48 VDC)]					PS_ON signal 'H' or 'OPEN' at rated load of 5VSB PS_ON signal 'H' or 'OPEN' at no load of 5VSB	
Output	Rated Voltage	+3.3V	+5V	+12V	-12V	+5VSB		
	Rated Current	4A	4A	4A	0.3A	1A		
	Max. Current / Power	At Natural Air Cooling (Basic Structure)	10A	10A	7.5A	0.3A	1A	Max. output power: 90W
			60W max.					
			Within output power cross regulation *Refer to Fig.1					
	At Natural Air Cooling (Special AL Heatsink is Required*)	10A	10A	8.5A	0.3A	1A	Peak output power: 102W *Refer to p.372 'Optional Components'	
		70W max.						
		Within output power cross regulation *Refer to Fig.1						
	Forced Air Cooling* (External FAN is Required)	10A	10A	10A	0.3A	1.5A	Peak output power: 120W *Refer to p.372 'Installation'	
		70W max.						
		Within output power cross regulation *Refer to Fig.1						
	Peak Current / Power		10A	10A	15A	0.3A	1.8A	Peak output power: 180W Time: 5 sec or less *Refer to Fig.3
Min. Current		0A	0A	0A	0A	0A		
Total Voltage Accuracy (%)	At Max. Power	±5 max.	±5 max.	±5 max.	±10 max.	±5 max.	Voltage accuracy of each rated output when input voltage changes from min. to max. while loads are changed statically within Output power cross regulation chart.	
	At Peak Power	±5 max.	±5 max.	±5 max.	±10 max.	±5 max.		
Max. Ripple Voltage (mVp-p)		50 max.	50 max.	120 max.	120 max.	50 max.	Measured on a test board connected with a 47μF capacitor. The test board shall be away from load wire and within 150mm from output terminals. *Characteristic data: Fig.19	
Max. Spike Voltage (mVp-p)		100 max.	100 max.	170 max.	170 max.	100 max.		
Protection	Overcurrent Protection	OCP Point (A)	10.5 min.	10.5 min.	-	0.32 min.	1.9 min.	At rated output current, except measured output At min. output current, except measured output
		Method	Hold down current limiting → +3.3V, +5V, +12V and -12V output latch stop			Fold back current limiting	Hold down current limiting	All outputs shutdown when +5VSB is shorted. *3
		Recovery	Reclosing AC input (10 sec min. interval), or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		
	Overvoltage Protection	OVP Point (V)	3.7 - 4.3	5.7 - 7.0	13.8 - 15.6	-	5.7 - 7.0	Excessive voltage applied to +3.3V, +5V and +12V output is unacceptable due to circuit characteristics.
Method		All outputs latch stop						
Recovery		Reclosing AC input (10 sec min. interval)						
Environment		Operating Temp. / Humidity					0 to 60°C* / 10 to 90%	*Refer to Fig.4 No condensation
Storage Temp. / Humidity		-20 to 70°C / 10 to 95%					No condensation	
Vibration		Acceleration amplitude: 2gn (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					DC input - DC output/FG: 1000 VAC for 1 minute [1500 VAC for 1 minute]	Cut off current: 20mA
Insulation Resistance		DC input - DC output/FG: 50MΩ min.					At 500 VDC	
DC output - FG: 50MΩ min.								
EMC		Line Noise Immunity					±1000V (pulse width: 100/1000ns, repetitive cycle: 30-100Hz, normal/common mode with pos./neg. polarity for 1 minute)	Measured by INS-410 No fluctuation of DC output or malfunction
Electrostatic Discharge		EN61000-4-2 compliant						
Others		Safety Standard					IEC60950-1 compliant	
Cooling System		Natural air cooling or forced air cooling by external fan						
Output Grounding		Capacitor grounding						
Output Hold-up Time		PWR_OK holds up 8ms [20ms] min. after DC failure *Characteristic data: Fig.13					At rated output	
Reliability Grade		FA (industrial equipment grade, double-sided through hole PCB)					Follow our standard	
MTBF		100,000H min.					Based on EIAJ RCR-9102	
Weight		0.71kg typ.						
Warranty		1 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 Inrush current, in general, is specified as peak charging current into electrolytic capacitors used for smoothing in primary circuit shortly after input voltage is turned on. This power supply adopts capacitor-less circuit, there does not exist inrush current under the definition like this.
- *2 Overcurrent protection point of +12V output shall be defined at 25°C of the temperature of AL chassis. (Overcurrent detection level of +24V decreases as the ambient temp. and component temperature rise due to overcurrent - temperature protection circuit equipped in +12V output.)
- *3 All other outputs shut down when +5VSB output is fully shorted providing its output voltage is 1V or less. All outputs are automatically recovered when the shortage of +5VSB is removed. However, the protection method moves to hold-down current limiting so that the output voltage at short is 1 to 3 volts left. All other outputs go to latch lock. All outputs except +5VSB remains in shutdown even after the short of +5VSB has been removed. In this case, conduct reclosing of PS_ON# signal or input voltage after 10 sec or longer for recovery.



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

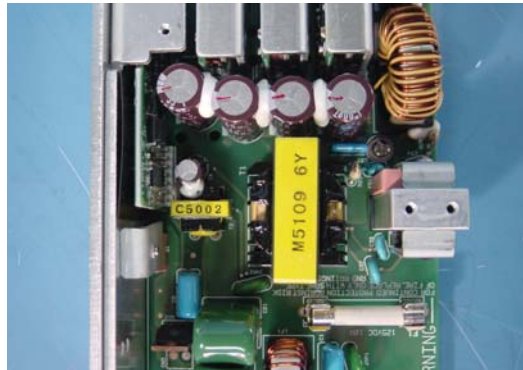
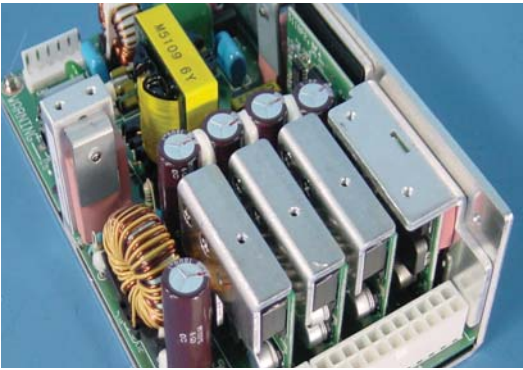
Items	Specification	Note	
Input Signal	Output ON / OFF Control Signal (PS_ON#) +3.3V SENSE	+3.3V, +5V, +12V, and -12V outputs are delivered with 'L' input. +3.3V, +5V, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input and, protection circuit is activated to reset locked latch circuit at output shutdown status. Reclosing interval from PS_ON# 'H' or 'OPEN' input (output OFF) to 'L' input (output ON) shall be 5 sec min. 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. (Guaranteed compensation voltage: 0.1V max.)	Signal input between the pin 22 of CN10 connector and COM pin The pin 2 of CN10 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 21 of CN10 connector
Signal Circuit			
Input Signal Circuit	<p>(PS_ON#)</p> <p>(+3.3V SENSE)</p> <p>To voltage control circuit 100Ω typ. 38kΩ typ. 10kΩ typ. Power supply side</p> <p>+3.3V output 0.1V max. +3.3V SENSE</p> <p>+3.3V SENSE is to be connected to + side of the load. Potential difference between power supply connector and + side between power supply connector and + side of the load shall be 0.1V or less. In case of excessive potential difference, it may damage the resistor (100Ω) inside the power supply.</p>		
Output Signal Circuit	<p>(PWR_OK)</p> <p>Power supply side +5V 1kΩ typ. PWR_OK 5mA max. 5.5V max.</p>		

BRAIN
Power
Supply

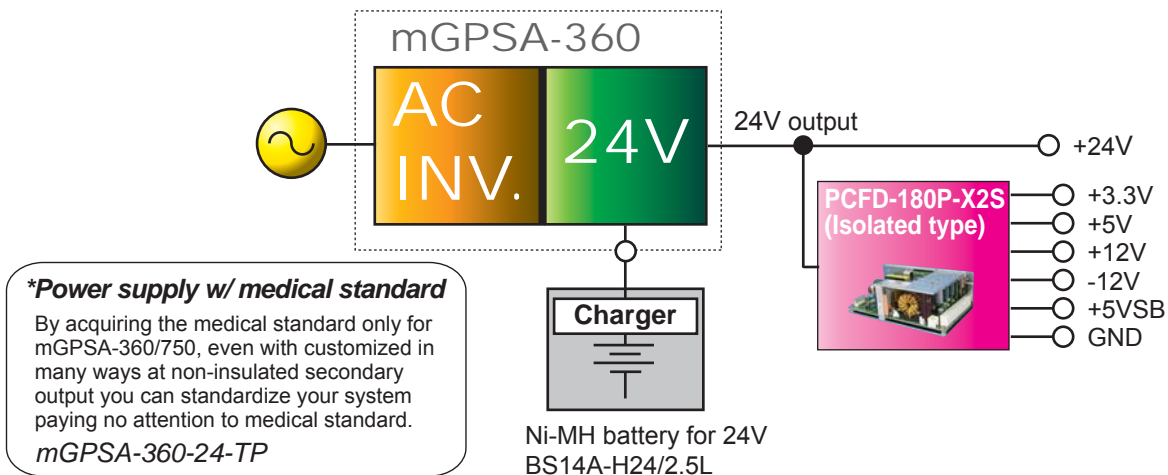
Rack Mount Power Supply

Non-backup Power Supply

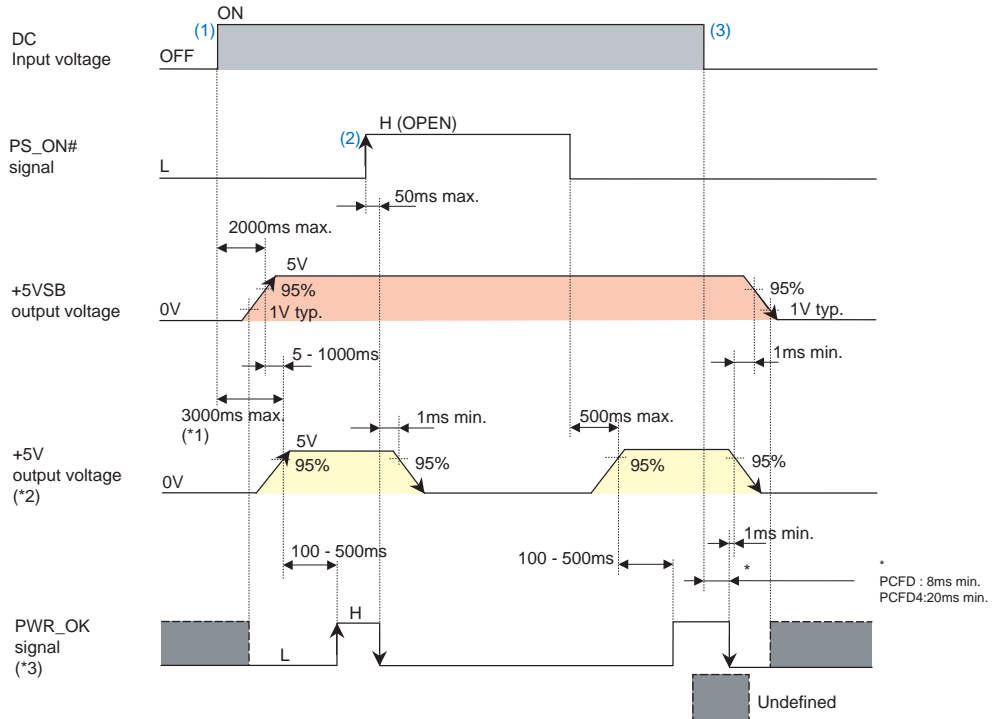
Internal Structure (PCFD-180P-X2S)



Connecting mGPSA with PCFD brings ATX power supply (24V and ATX output is isolated) compliant with medical standard

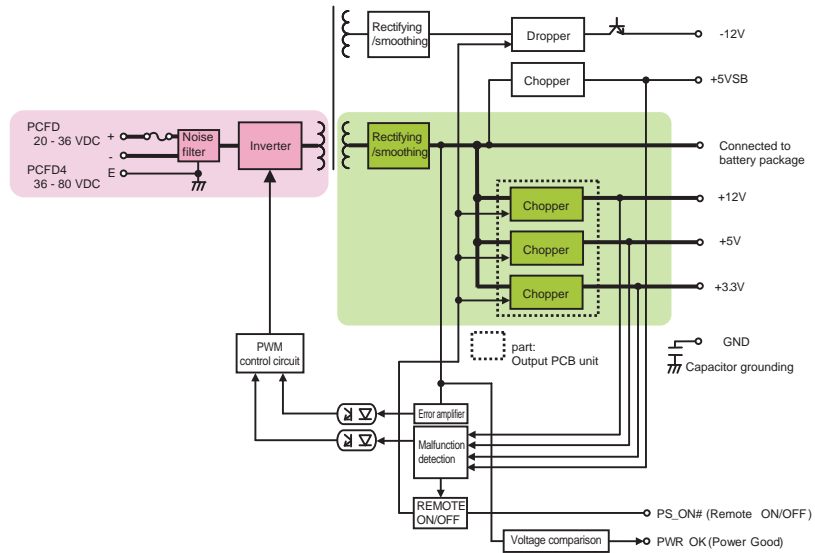


Sequence Diagram



- (*1) Reclosing interval after shutting down the input: more than 10 sec min.
 - (*2) All other outputs except for +5V shall follow this timing and the rising time difference from +5V should be 30ms or less. The order of each output voltages of fall time or the difference level of output voltages is unregulated.
 - (*3) A rise and a fall time of PWR_OK signal shall be less than 1ms at the time of the capacitive load is not connected to signal output.
- (1) All outputs start up by being supplied DC input under the condition of PS_ON# 'L'. PWR_OK 'H' is delivered at 100 - 500ms after +5V output has risen.
 (2) At PS_ON# 'H(OPEN)' input, all outputs except for +5VSB shut down.
 (3) PWR_OK turns to 'L' after 8ms or longer from DC input failure. 1ms later than this event, the +5V output shuts down and another 1ms later followed by +5VSB shutdown.

Block Diagram



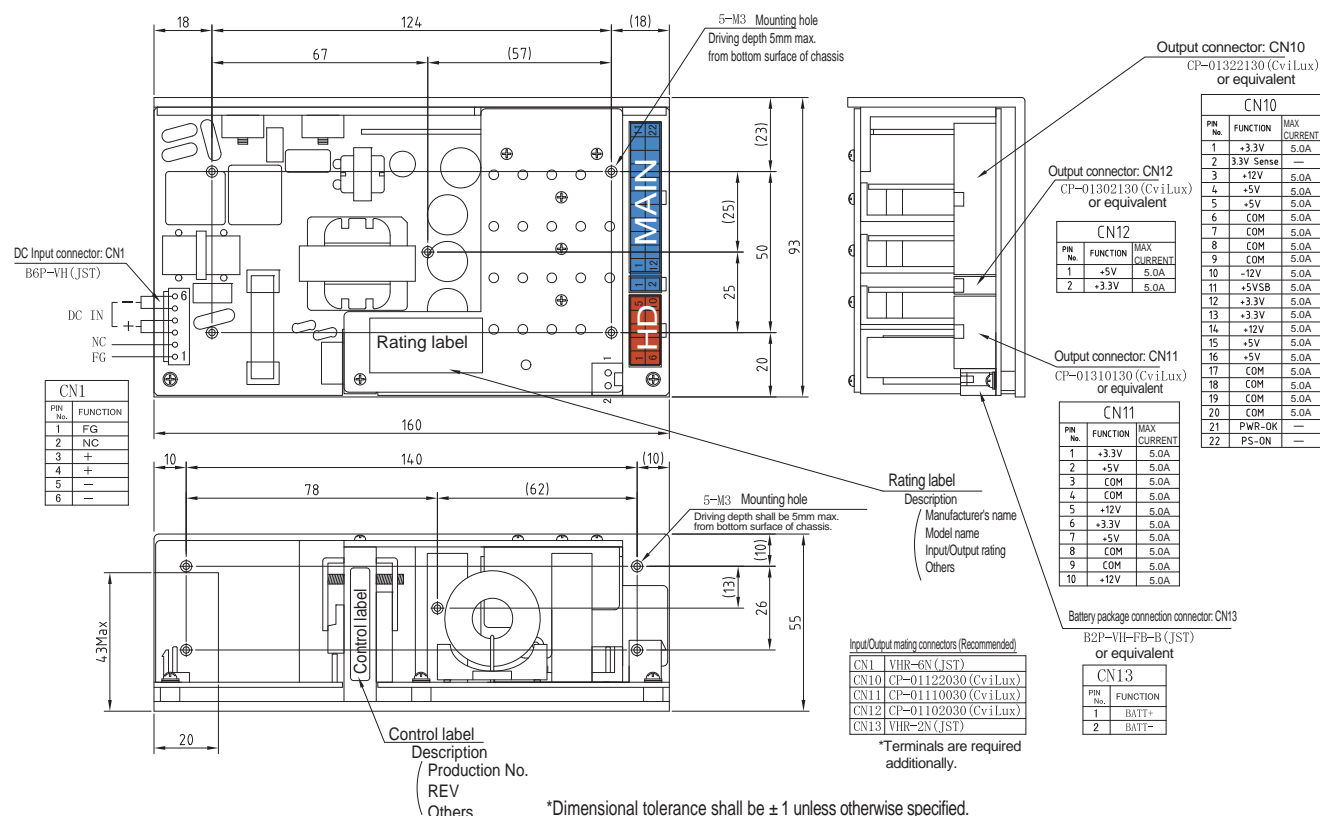
SFX mounting surface applicable case under development !

Case design to mount PCFD-180P corresponding to SFX12V APPENDIX D size is ongoing.



Outline Drawing

PCFD-180P-X2S



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Optional Components Sold Separately

Detachable Output Harness		Output Port Allocation
Model	Length and Type of Connector	
Main power cable MAIN		
WH-M2022-500	500±15 → 20-pin	
WH-M2022-300	300±15 → 20-pin	
WH-M2022-500-01*	500±15 → 20-pin	
WH-M2422-500	500±15 → 24-pin	
HD power cable HD		
WH-PP610-850	550±15 → 150±15 → 150±15 → peripheral (HD)	<p>Acceptable cable (s) MAIN HD 1 model 1 model</p>
WH-PS610-850	550±15 → 150±15 → 150±15 → FD	
WH-PS710-850	550±15 → 150±15 → 150±15 → S-ATA	

*For battery package connection, select "WH-M2022-500-01" as main power cable.

Picture	Model	Type	Description
	WH-02VH02VH-250	Battery package connection harness (Power harness)	Power harness to connect power supply with battery package "BS17A-H24/2.0L"*

*Required for backup operation at blackout in case of connection with battery package "BS17A-H24/2.0L"

Cables (Signal Harness to Connect Battery Package)			
Model	Description	Model	Description
WH-S0604-500	6-pin connector type	WH-C04PH-500	Cut-off type at wire end

Optional Components Sold Separately

Cables (Signal Harness to Connect Battery Package)																											
Picture	Model	Compatible Pin Assignments		Picture	Model	Compatible Pin Assignments																					
	WH-S1004-500 The pin assignments of the serial port connector (internal connector) on mother board	DCD RXD(SIN) TXD(SOUT) DTR GND	<table border="1"> <tr><td>1</td><td>2</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td></tr> <tr><td>9</td><td></td></tr> </table> DSR RTS CTS RI	1	2	3	4	5	6	7	8	9			WH-S1004-500-01 The pin assignments of the serial port connector (internal connector) on mother board	DCD TXD(SOUT) GND RTS RI	<table border="1"> <tr><td>1</td><td>2</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td></tr> <tr><td>9</td><td></td></tr> </table> RXD(SIN) DTR DSR CTS	1	2	3	4	5	6	7	8	9	
1	2																										
3	4																										
5	6																										
7	8																										
9																											
1	2																										
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5	6																										
7	8																										
9																											

*Harnesses for automatic shutdown at blackout.
Please select the compatible conversion signal harness to the pin assignments of serial port connector for your motherboard.

Battery Package					
Page	Picture	Model	Type	Shape (size)	Backup time
P.411		BS17A-H24/2.0L	Ni-MH	3.5 inch bay fixed type (W×D×H=101.5×180×25 mm)	

*The backup time is a reference value at initial use; it is not a guaranteed value.

Parts / Unit			
Picture	Model	Type	Description
	AF5113-1605	Heatsink for Fanless power supply (side mounting)	Higher power can be gained with connection to Fanless power supply (90W → 102W)
	AF5113-1609	Heatsink for Fanless power supply (bottom mounting)	Higher power can be gained with connection to Fanless power supply (90W → 102W)

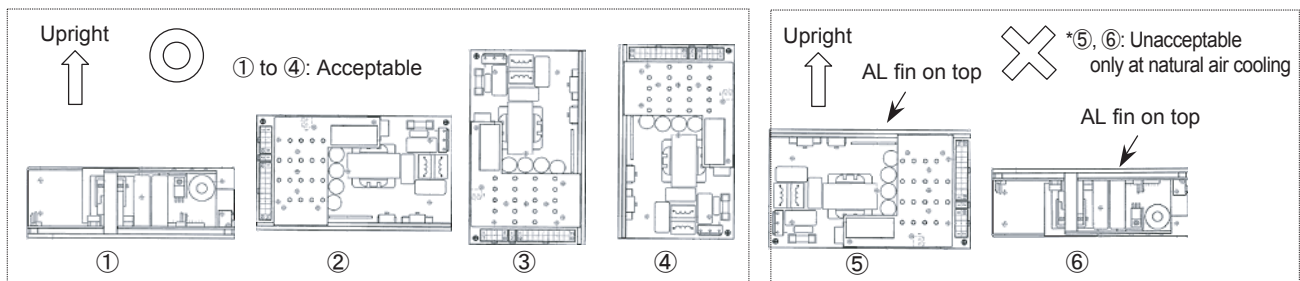
Software			
Picture	Model	Type	Description
	NSP Pro 2	Automatic shutdown software	Dedicated to Windows 2000 / XP / Vista / 7

*Free software "NSP Pro 2" available at our web-site
*The UPS service of Windows 2000 and XP available

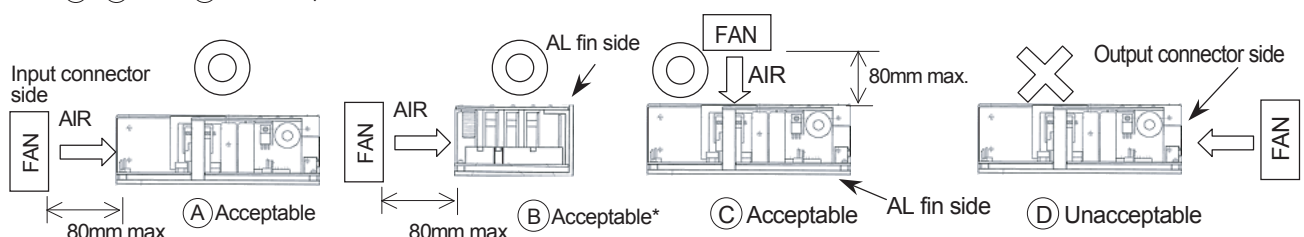
Other Optional Components			
Model	Description	Model	Description
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2820	20-pin extension harness (600mm)	WH5105-02	12V 4-pin connector conversion harness (320mm)
WH2747	20-pin extension harness (450mm)	WH5055	AT connector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

Installation

- In installation, keep 5mm or more clearance both from the edge of PCB and the height dimension of power supply to meet insulation and dielectric strength.
- At natural air cooling, keep enough clearance on top to avoid poor convection. Never install in the directions marked "X" shown below.



- All directions from ① to ⑥ above are acceptable. However, in case of external fan installed, follow the direction of (A) to (C) below, (D) is not acceptable. Also, air flow of Fan shall be 0.5m³/min. or more and its air direction shall be the arrow direction below.



*In case of (B), the fan motor shall be installed in the middle of longitudinal direction of power supply.

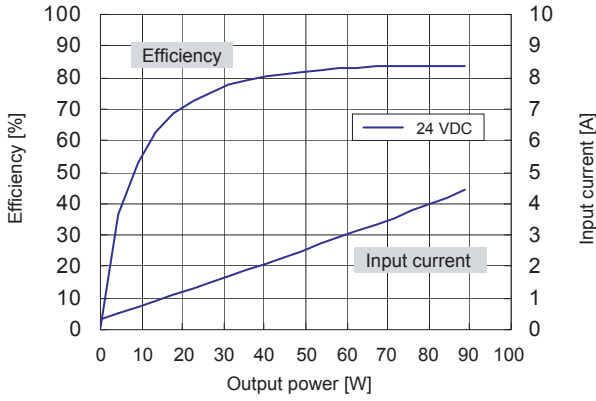
Characteristics Data PCFD-180P-X2S (Examples of actual measurement)

BRAIN Power Supply

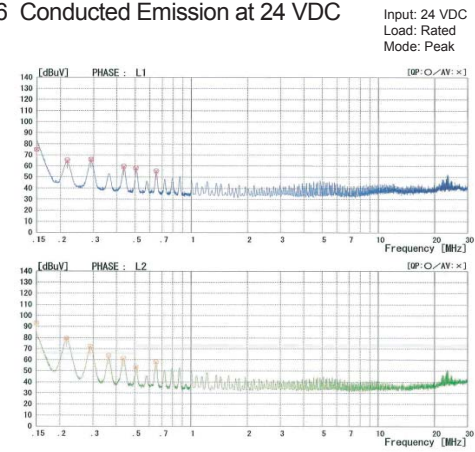
Rack Mount Power Supply

Non-backup Power Supply

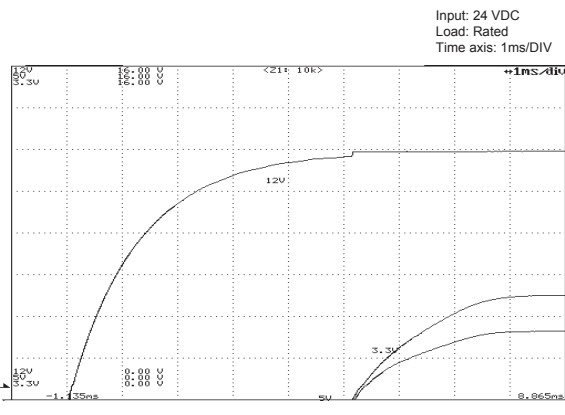
• Fig.5 Efficiency / Input Current vs. Output Power



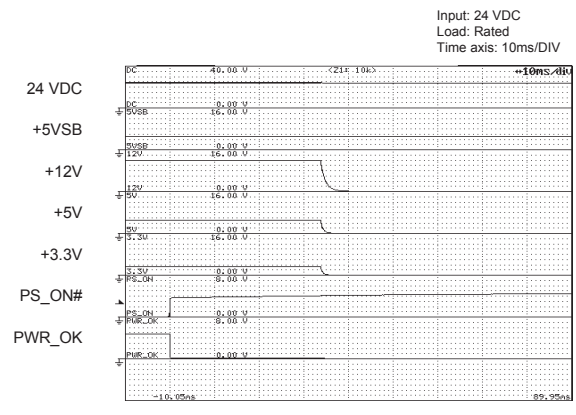
• Fig.6 Conducted Emission at 24 VDC



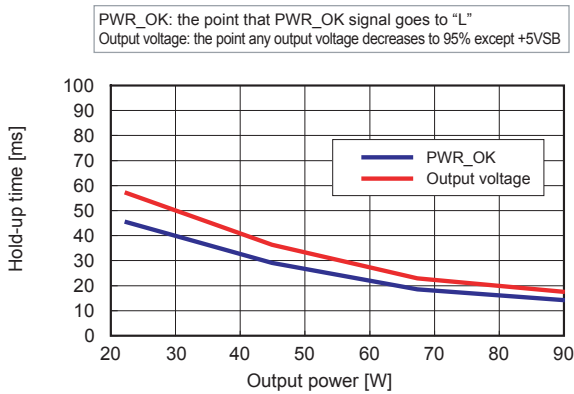
• Fig.7 Rising Characteristics at 24 VDC



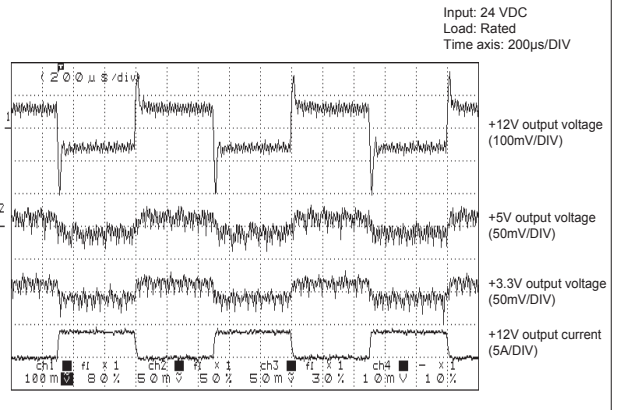
• Fig.8 Falling Characteristics at 24 VDC when REMOTE goes Off



• Fig.9 Output Hold-up Time vs. Output Power



• Fig.10 Dynamic Load Fluctuation Characteristics at 1kHz

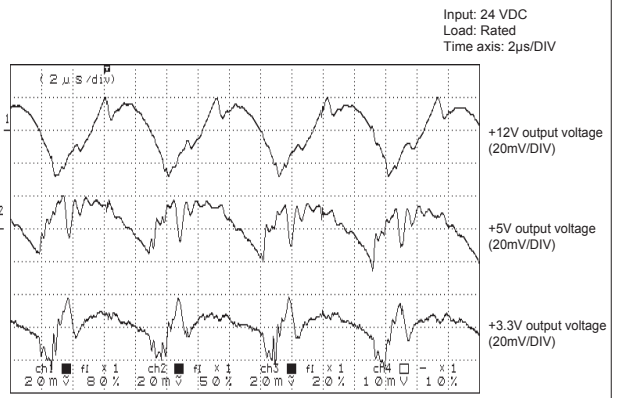


• Fig.11 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V output	0A	7.5A	15A
+5V output	0A	10A	10A
+3.3V output	0A	10A	10A

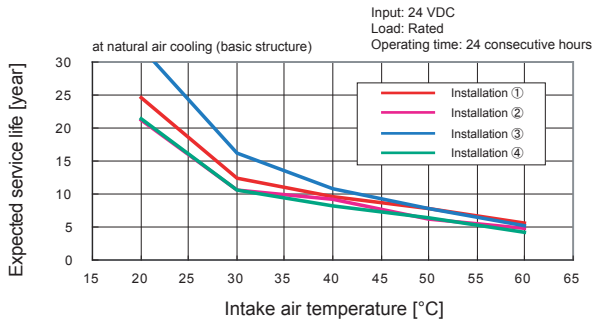
DC input voltage	20 VDC	24 VDC	28 VDC	32 VDC	36 VDC
+12V output (min. load)	11.914 V	11.915 V	11.914 V	11.915 V	11.915 V
+12V output (rated load)	11.745 V	11.766 V	11.771 V	11.772 V	11.773 V
+12V output (peak load)	11.376 V	11.372 V	11.385 V	11.393 V	11.389 V
+5V output (min. load)	5.080 V	5.081 V	5.080 V	5.081 V	5.081 V
+5V output (rated load)	5.010 V	5.009 V	5.008 V	5.008 V	5.008 V
+5V output (peak load)	4.930 V	4.927 V	4.926 V	4.925 V	4.924 V
+3.3V output (min. load)	3.353 V	3.353 V	3.353 V	3.353 V	3.353 V
+3.3V output (rated load)	3.302 V	3.302 V	3.301 V	3.301 V	3.301 V
+3.3V output (peak load)	3.246 V	3.245 V	3.244 V	3.243 V	3.243 V

• Fig.12 Ripple and Spike Voltage



Characteristics Data PCFD-180P-X2S (Examples of actual measurement)

● Fig.13 Ambient Temperature vs. Expected Service Life



*Load is reduced based on the temperature derating curve at 30°C or higher.
 *Life span for electrolytic capacitor shall be 15 years max. considering the degradation of the sealing plate.
 *For installation condition, refer to p.372 "Installation".

● Fig.14 Over Current Protection (V-I Characteristic)

