Desktop PC Power Supply mPCSA-500P-X2S

Model	Description	Stock
mPCSA-500P-X2S	———	Standard stock

■Model Name Coding

mPCSA - 500 P - X 2 S
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

- Medical standard IEC60601-1 2nd and 3rd approved
- CCC approved.
- Completely independent voltage-stabilizing circuit is mounted for all outputs. Min. load current is 0A for all outputs.Driving stably with brand new high performance CPU.
- High capacity peak output: 500W
- 74ms output hold-up time at instantaneous blackout with 200W. Reliable in a poor power condition place.
- By building in the thermal-sensing variable speed fan, noise reduction can be realised. Heat-related issue for CPU can be settled with fan speed changeover switch.
- Fan can be replaced.
- Designed to last 10 years min. with continuous rated operation at 45°C.
- 99% of power factor at 100VAC achieved with active filter (PFC) equipped.

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*	*-12V*	*+5VSB*
Max. current / max. power (continuous)	20A	22A	22A	0.5A	2A
	Total 160W				
	Total 285W				
	Total 301W				
Peak current / peak power (5 sec max.)	30A	33A	30A	0.5A	2.5A
	Total 200W				
	Total 482W				
	Total 500.5W				
Min. current	0A	0A	0A	0A	0A

Dimensions

W×H×D (mm)	150×86×140 (PS/2 size)

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.139 “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 V)					Worldwide range, *Refer to Fig.1
	Input Frequency		50 / 60Hz					47 - 63Hz
	Efficiency		73% typ. (100 VAC), 77% typ. (240 VAC) *Characteristic data: Fig.4					At rated input/output
	Power Factor		99% typ. (100 VAC), 94% typ. (240 VAC) *Characteristic data: Fig.5					
	Inrush Current		31A peak (100 VAC), 75A peak (240 VAC) *Characteristic data: Fig.6					At rated input/output at cold start (25°C)
	Input VA		436VA max. (100 VAC), 435VA max. (240 VAC) *Characteristic data: Fig.5					At rated input and max. output
			754VA max. (100 VAC), 714VA max. (240 VAC)					At rated input and peak output
Output	Rated Voltage		+3.3V	+5V	+12V	-12V	+5VSB	
	Rated Current		10A	12A	16A	0.5A	2A	Total rated output power: 301W
	Max. Current / Power		20A	22A	22A	0.5A	2A	Max. output power: 301W
			160W max.					
			285W max.					
	Peak Current / Power		30A	33A	30A	0.5A	2.5A	Peak output power: 500.5W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.2
			200W max.					
			482W max.					
	Min. Current		0A	0A	0A	0A	0A	
	Total Voltage Accuracy (%)		±4 max.	±4 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.	120 max.	50 max.	Two wires are coming out from the output connector and connected into one at the edge. 10μF electrolytic capacitor and 0.1μF ceramic capacitor are placed on it and it is measured. *Characteristic data: Fig.17
	Max. Spike Voltage (mVp-p)		100 max.	100 max.	170 max.	170 max.	100 max.	
Protection	Overcurrent Protection	OCP Point (A)	31 min.	34 min.	31 min.	105% min. of peak current		All other outputs are at rated input/output
		Method	All outputs except for +5VSB shutdown			Fold back current limiting	Same as +3.3V, +5V, +12V	
		Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		
	Overvoltage Protection	OVP Point (V)	3.76 - 4.3	5.74 - 7.0	13.4 - 15.6	-	-	
		Method	All outputs except for +5VSB shutdown			-	-	
		Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			-	-	
Environment	Operating Temp. / Humidity		0 to 60°C* / 10 to 90%					No condensation *Refer to Fig.3
	Storage Temp. / Humidity		-25 to 70°C / 10 - 95%					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. 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					It is having a 4kV dielectric strength between AC input to DC output. However, for finished product, 1.5kV shall be applied to prevent excess voltage to basic insulation part.
	Insulation Resistance		AC input - FG/DC output: 50MΩ min.					
	Leakage Current		0.12mA max. (100 VAC) / 0.3mA max. (200 VAC) *Characteristic data: Fig.7					YEW. TYPE3226 (1kΩ) or equivalent
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、EN55022-B compliant *Characteristic data: Fig.8 and 9					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
Others	Safety Standard		UL60601-1, CSA C22.2 No.601.1, UL60950-1, CSA C22.2 No.60950-1(c-UL), CCC(S&E), CE Marking(LVD, EMC)					
	Cooling System		Forced air cooling: fan control can be switched between thermal-sensing variable speed and stabilized full rotation modes.					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 16ms min. after AC failure *Characteristic data: Fig.14					At rated output
	Reliability Grade		FA (industrial equipment grade, double-sided through hole PCB)					Follow our standard
	MTBF		93,000 H min.					Based on EIAJ RCR-9102
	Weight		1.8 kg 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

Fig.1 Derating for Low Input Voltage

When the input voltage is 90 VAC or less, follow the derating curve to derate rated current/power, max. current/power, and peak current/power.

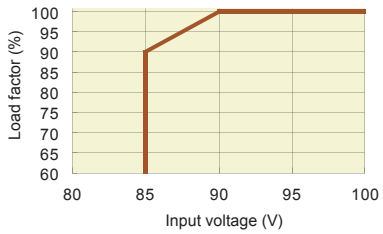


Fig.2 Duty Ratio

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

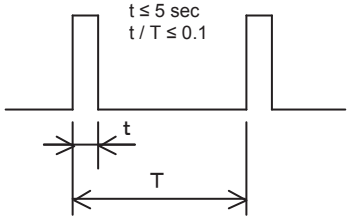
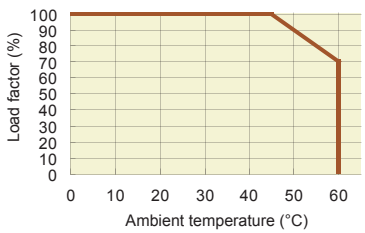
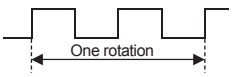


Fig.3 Temperature Derating

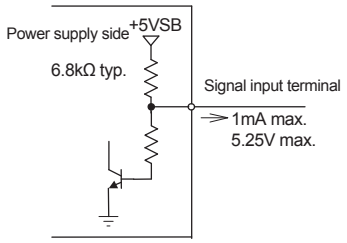
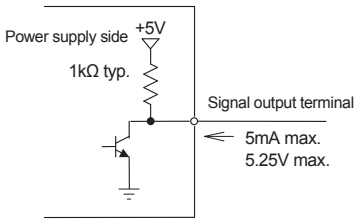
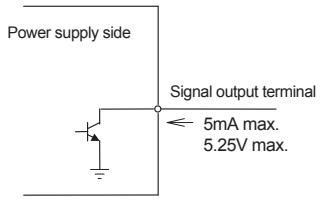
When the ambient temperature (near the airflow inlet) exceeds 45°C, follow the derating curve to derate rated current/power, max. current/power, and peak current/power.



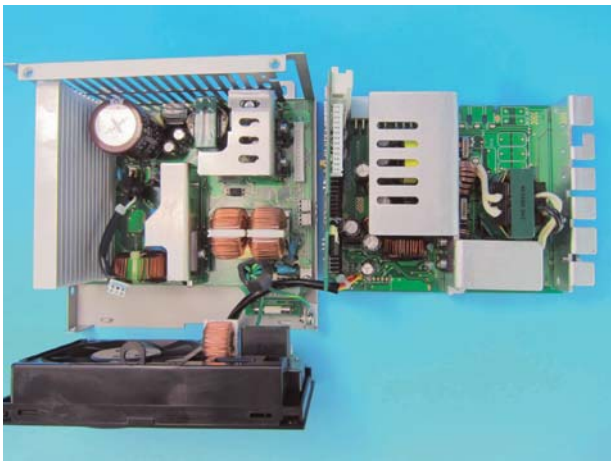
Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

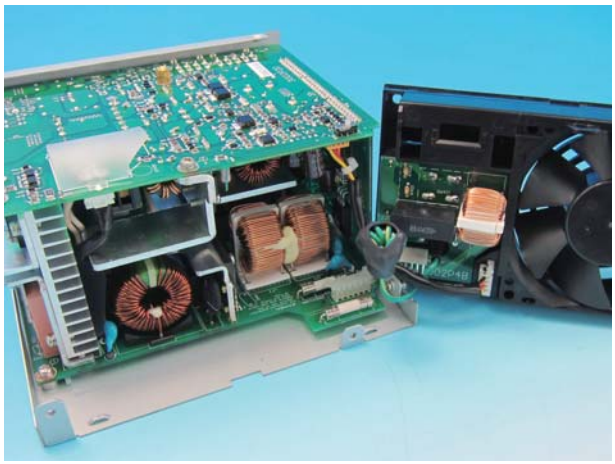
	Items	Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input.	The pin 16 of MAIN connector and the pin 6 of SIG connector
Input Signal	+3.3V SENSE	The input terminal to detect the voltage of +3.3V output; by connecting to the load terminal, only the line drop of the + side of the output cable is compensated.	The pin 1 of MAIN connector and the pin 8 of SIG connector
Output Signal	Normal Output Signal (PWR_OK)	'H'signal is delivered at normal output (detection delay time: 100 - 500ms).	The pin 8 of MAIN connector
Output Signal	Fan Monitor Signal (FAN M)	Two cycle pulses per one rotation of the fan motor are delivered.	The pin 5 of SIG connector 

Signal Circuit

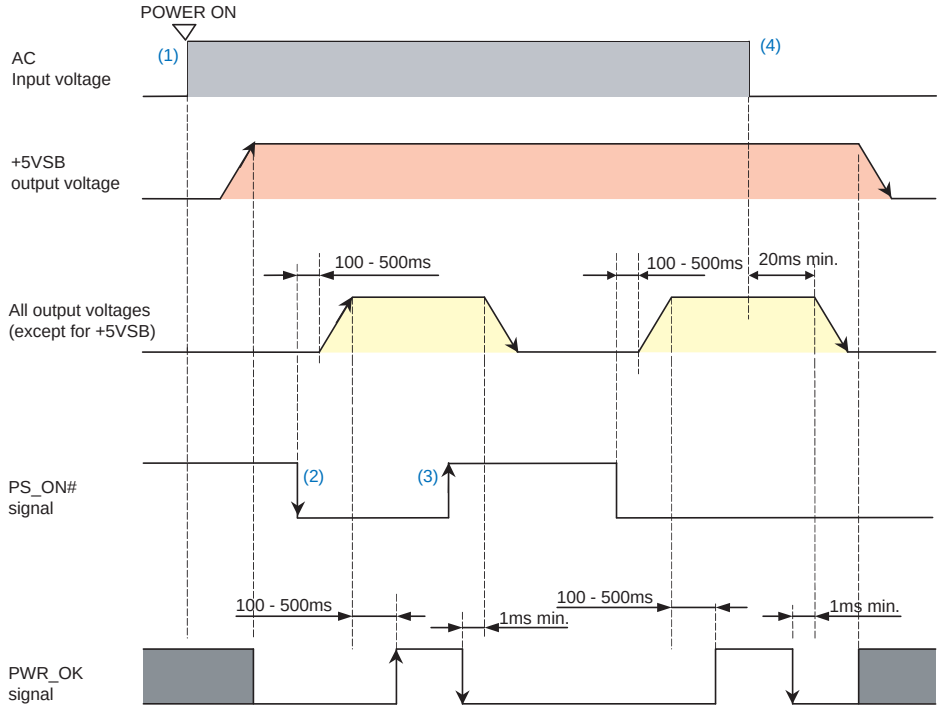
Input Signal Circuit	*(PS_ON#)*	Input Signal Circuit	*(PWR_OK)*	*(FAN M)*
	 ('L'≤0.8V, 2.0V≤'H')		 ('L'<0.4V)	 ('L'<0.4V)

Internal Structure





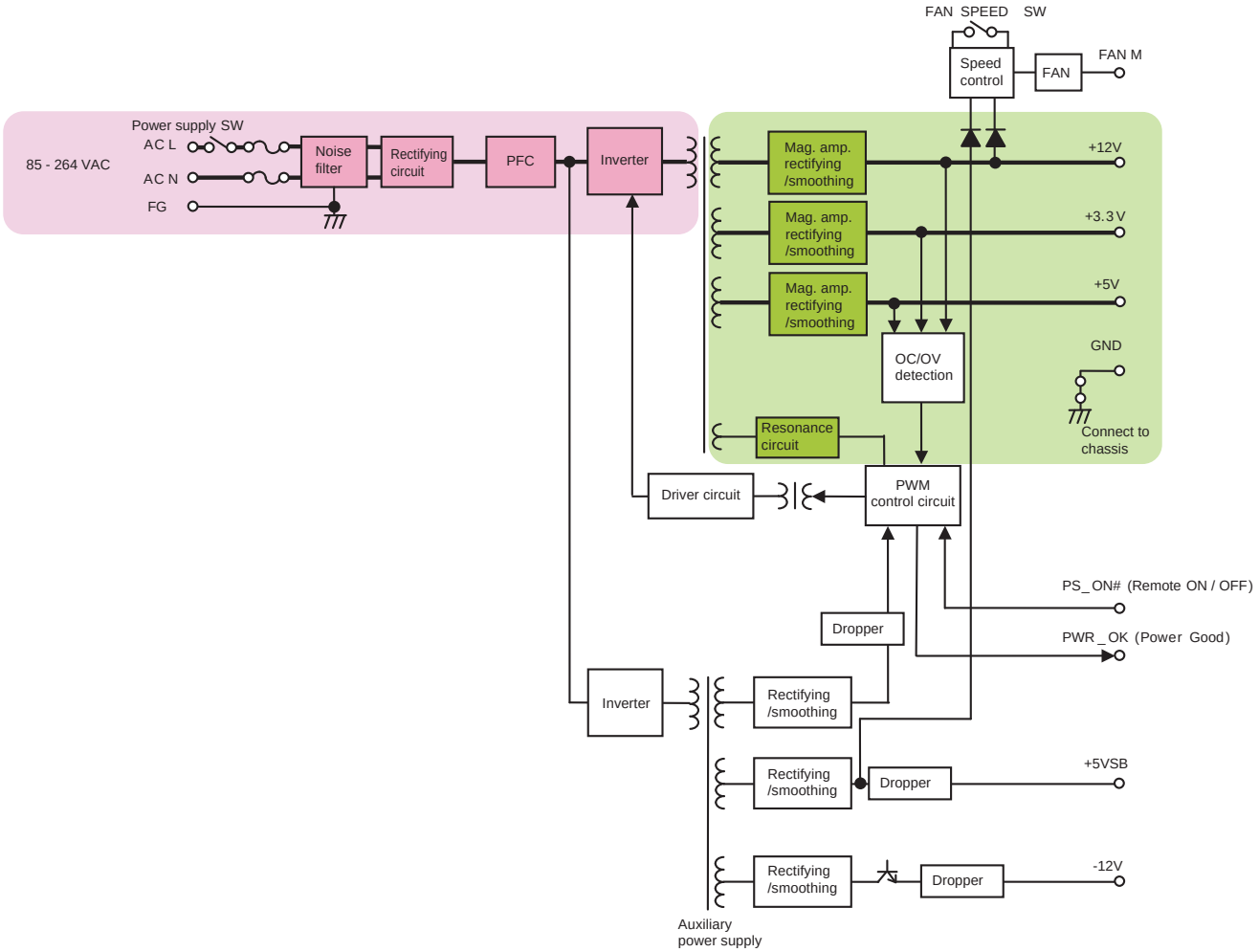
Sequence Diagram



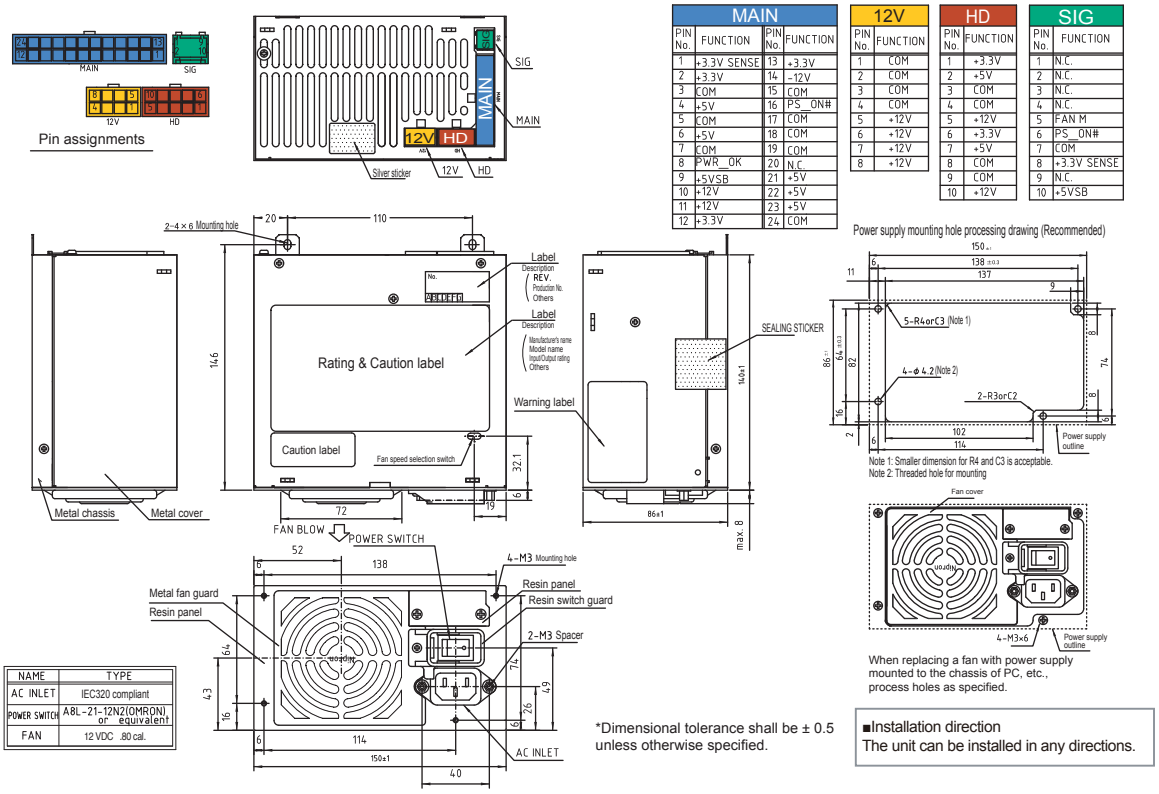
(1) With PS_ON# 'H (OPEN)', only +5VSB output starts up at AC input.
(2) All outputs start up at PS_ON# 'L' input. Also, PWR_OK goes to 'H' at 100 - 500ms after the +5V output has risen.
(3) At PS_ON# 'H (OPEN)' input, outputs except for +5VSB shut down.
(4) All outputs except for +5VSB shut down after 20ms or longer from blackout Before 1ms or longer than this event, PWR_OK turns to 'L'.

Undefined

Block Diagram



Outline Drawing



MAIN			
PIN No.	FUNCTION	PIN No.	FUNCTION
1	+3.3V SENSE	13	+3.3V
2	+3.3V	14	-12V
3	COM	15	COM
4	+5V	16	PS_ON#
5	COM	17	COM
6	+5V	18	COM
7	COM	19	COM
8	PWR_OK	20	N.C.
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	COM

12V	
PIN No.	FUNCTION
1	COM
2	COM
3	COM
4	COM
5	+12V
6	+12V
7	+12V
8	+12V

HD	
PIN No.	FUNCTION
1	+3.3V
2	+5V
3	COM
4	COM
5	+12V
6	+3.3V
7	+5V
8	COM
9	COM
10	+12V

SIG	
PIN No.	FUNCTION
1	N.C.
2	N.C.
3	N.C.
4	N.C.
5	FAN M
6	PS_ON#
7	COM
8	+3.3V SENSE
9	N.C.
10	+5VSB

NAME	TYPE
AC INLET	IEC320 compliant
POWER SWITCH	A8L-21-12N2(OMRON) or equivalent
FAN	12 VDC .80 cal.

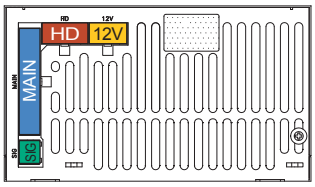
*Dimensional tolerance shall be ± 0.5 unless otherwise specified.

■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-M2024-500	MAIN 500±15 → 20-pin	
WH-M2424-500	MAIN 500±15 → 24-pin	
12V power cable 12V		
WH-V0808-500	12V 500±15 → 12V 8-pin	
WH-V0408-500	12V 500±15 → 12V 4-pin	
WH-VG208-500	12V → 12V 4-pin; 500±15 → PCI-E 6-pin	
WH-VV208-500-02	12V 500±10 → 12V 8-pin; 12V 8-pin	
WH-VG208-500-02	12V 500±10 → 12V 8-pin; PCI-E 6-pin	
HD power cable HD		
WH-PP610-850	HD 550±15 → 150±15, 150±15 → peripheral (HD)	
WH-PS610-850	HD 550±15 → 150±15, 150±15 → FD	
WH-PS710-850	HD 550±15 → 150±15, 150±15 → S-ATA; 850±15	
SIG cable SIG		
WH-S0610-500	SIG 500±15 → SIG-1	
WH-S0610-500-01	SIG 500±15 → SIG-2	
WH-S0310-500	SIG 500±15 → SIG-3	
Harness set MAIN 12V HD		
WHS2828	[contents] / WH-M2024-500 (1) / WH-M2424-500 (1) / WH-V0808-500 (1) / WH-VG208-500 (1) / WH-PP610-850 (1) / WH-PS610-850 (2)	



Acceptable cable(s)

MAIN	12V	HD	SIG
1 model	1 model	1 model	1 model

Optional Components Sold Separately

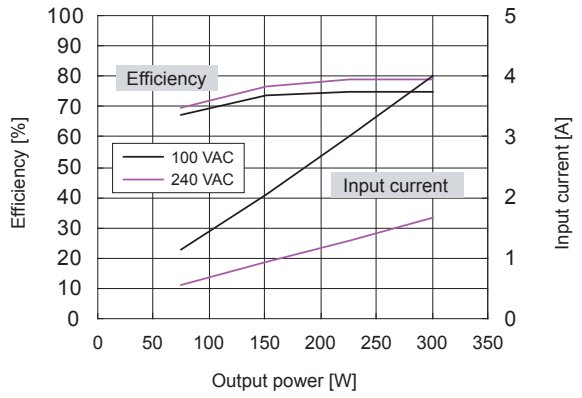
Cable			
Picture	*Model*	*Type*	*Description*
	WH2753	AC power cord	125 VAC 12A [PSE]
	WH2753-02	AC power cord	125 VAC 12A (tracking resistance type) [PSE]

Parts / Unit			
Picture	*Model*	*Type*	*Description*
	ACC2734	AC power cord retention clamp	It prevents the slipping of AC power cord (WH2753, WH2753-02)and operational mistakes of power switch. *In some cases, the clamp (ACC2734) might not be possible mounted to a commercial AC power cord.

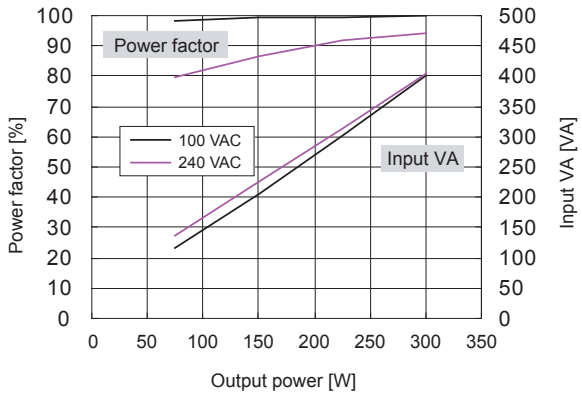
Other Optional Components			
Model	*Description*	*Model*	*Description*
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2820	20-pin extension harness (600mm)	WH5105-02	12V 4-pin connector conversion harness (320mm)
WH2747	20-pin extension harness (450mm)	WH5055	AT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

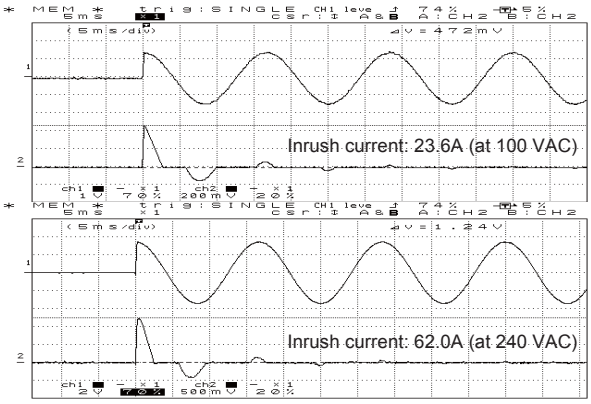
● Fig.4 Efficiency / Input Current vs. Output Power



● Fig.5 Power Factor / Input VA vs. Output Power



● Fig.6 Inrush Current



● Fig.7 Leakage Current

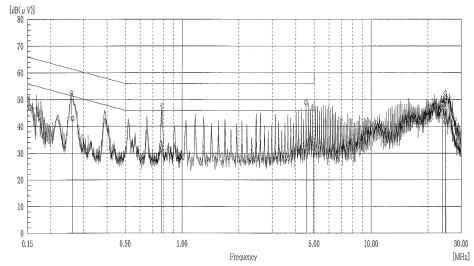
Input: 100 / 264 VAC
Load: Rated and min. load

	Rated load	Min. load
100 VAC	0.08mA	0.10mA
264 VAC	0.22mA	0.22mA

● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak

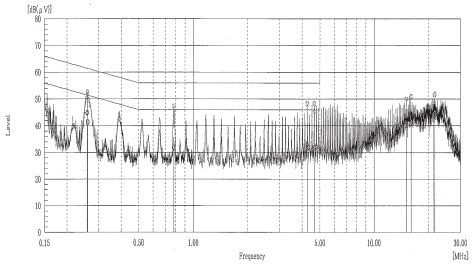
VCCI Class B



● Fig.9 Conducted Emission at 240 VAC

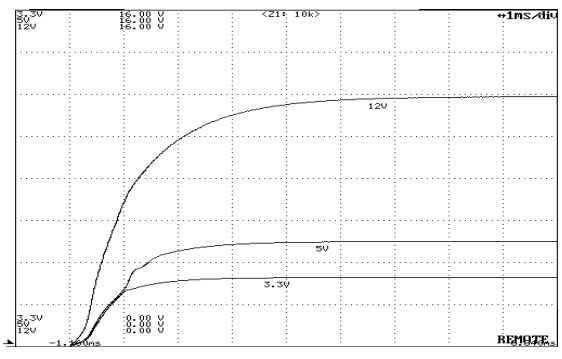
Input: 240 VAC
Load: Rated
Mode: Peak

VCCI Class B



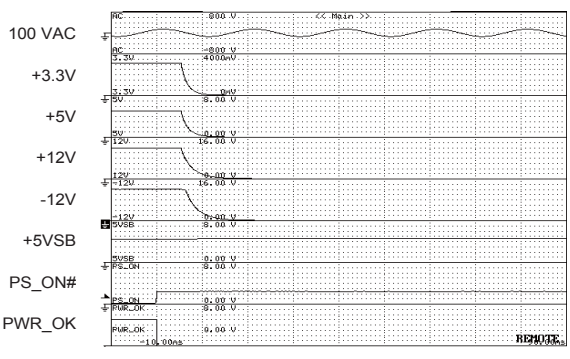
● Fig.10 Rising Characteristics at 100 VAC

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



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

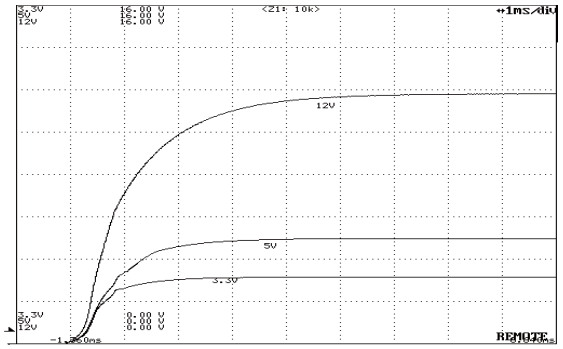
Input: 100 VAC
Load: Rated
Time axis: 20ms/DIV



Characteristics Data (Examples of actual measurement)

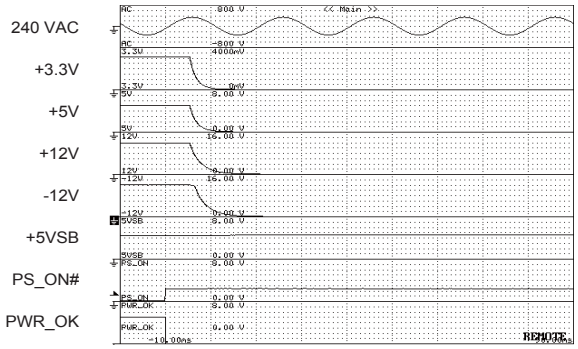
● Fig.12 Rising Characteristics at 240 VAC

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



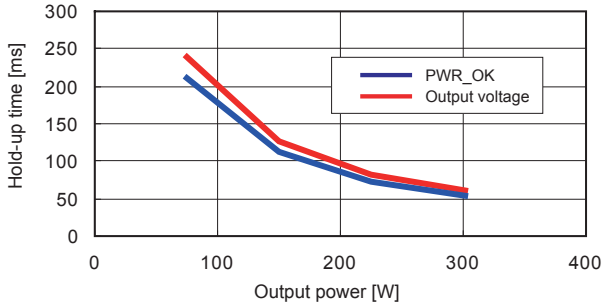
● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off

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



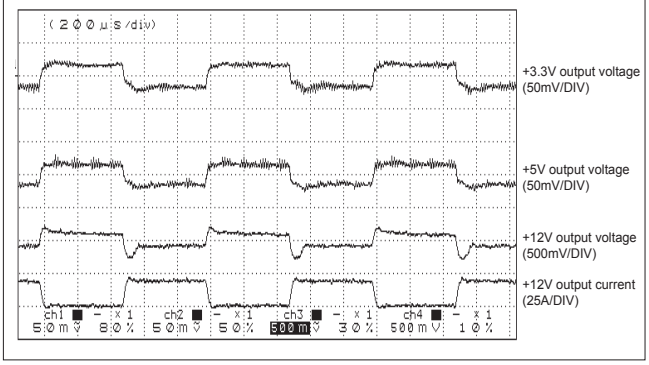
● Fig.14 Output Hold-up Time vs. Output Power

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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

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



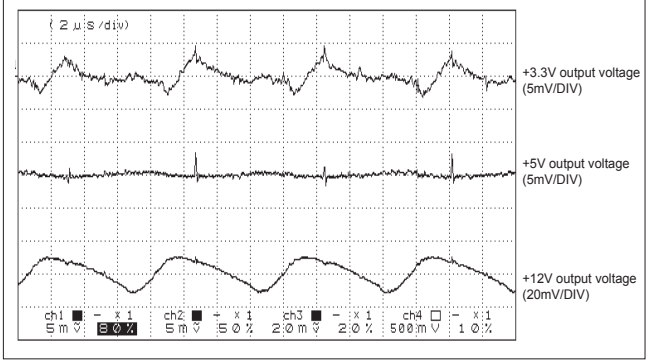
● Fig.16 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V output	0A	16A	30A
+5V output	0A	12A	33A
+3.3V output	0A	10A	30A

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+3.3V output (min. load)	3.411 V	3.411 V	3.411 V	3.411 V	3.412 V	3.411 V
+3.3V output (rated load)	3.297 V	3.297 V	3.297 V	3.297 V	3.297 V	3.297 V
+3.3V output (peak load)	3.183 V	3.185 V	3.185 V	3.185 V	3.186 V	3.186 V
+5V output (min. load)	5.160 V	5.160 V	5.160 V	5.160 V	5.160 V	5.160 V
+5V output (rated load)	5.022 V	5.022 V	5.021 V	5.021 V	5.021 V	5.021 V
+5V output (peak load)	4.870 V	4.873 V	4.872 V	4.873 V	4.874 V	4.874 V
+12V output (min. load)	12.098 V	12.098 V	12.098 V	12.098 V	12.098 V	12.098 V
+12V output (rated load)	11.957 V	11.956 V	11.956 V	11.955 V	11.954 V	11.954 V
+12V output (peak load)	11.865 V	11.869 V	11.868 V	11.870 V	11.870 V	11.870 V

● Fig.17 Ripple and Spike Voltage

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



● Fig.18 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

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

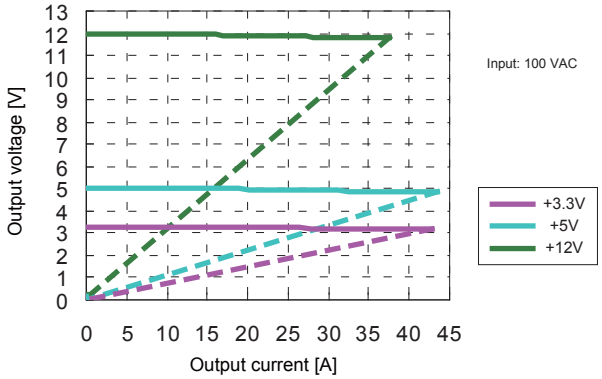
Intake air temp.	20°C	30°C	40°C	45°C
Expected service life (yr)	approx. 121	approx. 60	approx. 30	approx. 21

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

■ Fan

Ambient temp.	20°C	30°C	40°C	45°C
Expected service life (yr)	approx. 13	approx. 8.7	approx. 5.8	approx. 3.9

● Fig.19 Over Current Protection (V-I Characteristic)



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