

Desktop PC Power Supply ePCSA-500P Series

Total 60,000 Units Sales Record, Best-Selling Model with Outstanding Reliability and Performance



ePCSA-500P-X2S

RoHS Directive

ATX	
Continuous Max.	Peak Power
350W	500W

BRAIN Power Supply
Desktop PC Power Supply

Non-backup Power Supply

Model	Description	Stock
ePCSA-500P-X2S	_____	Standard stock
ePCSA-500P-X2C	CCC certified	Standard stock

Model Name Coding ePCSA - 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. S: Standard C: CCC approved
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Features

- All outputs equipped with voltage regulation circuit individually 0A (Zero amp.) as min. load for all outputs. Driving stably with brand new high performance CPU.
- 500W high power ATX power supply
- 74ms output hold-up time with 200W at momentary blackout to cover poor power condition
- 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.
- Removable cooling fan
- Designed to last 10 years min. with continuous rated operation at 45°C
- Active filter (PFC) equipped to meet 99% of power factor at 100 VAC

Refer to "Product Page Guideline" on p.11

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

*CCC: only ePCSA-500P-X2C

Function

DC start	RS 232C	USB	TTL	PFC	Silence	5VSB FAN	TSFC FAN	Connection	RoHS
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Input

AC input	85 - 264V (worldwide range)
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Output

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current/ max. power (continuous)	20A	22A	22A	0.5A	2A
	Total 160W				
	Total 334W				
Peak current / peak power (5 sec max.)	30A	33A	30A	0.5A	2.5A
	Total 200W				
	Total 482W				
Min. current	0A	0A	0A	0A	0A

Dimensions

W×H×D (mm)	150×86×140 (PS / 2 size)
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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
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*Refer to p.89 "Detachable output harness" for details

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

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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	73% typ. (100 VAC), 77% typ. (240 VAC) *Characteristic data: Fig.4					At rated input/output	
	Power Factor	99% typ. (100 VAC), 97% 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	513VA max. (100 VAC), 487VA 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	11.5A	16A	18A	0.5A	2A	Rated output power: 350W	
	Max. Current / Power	20A	22A	22A	0.5A	2A	Max. output power: 350W	
		160W max.						
	Peak Current / Power	334W max.					Peak output power: 500.5W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.2	
		30A	33A	30A	0.5A	2.5A		
		200W max.						
	Min. Current	482W max.						
		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.			
Max. Spike Voltage (mVp-p)	100 max.	100 max.	170 max.	170 max.	100 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		
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 +3.3, +5, and +12V
		At AC Operation	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			-	-		
At AC Operation		Reclosing AC input or switching PS_ON# signal from 'H' to 'L'			-	-		
Environment	Operating Temp. / Humidity	0 to 60°C* / 10 to 90%					*Refer to Fig.3 No condensation	
	Storage Temp. / Humidity	-25 to 70°C / 10 to 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 - DC output/FG: 1500 VAC for 1 minute						
	Insulation Resistance	AC input - DC output/FG: 50MΩ min.					At 500 VDC	
	Leakage Current	0.5mA max. (100 VAC) / 1mA 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)					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	
Safety Standards	UL60950, CSA C22.2 No.60950, EN62368-1, CCC*, CE Marking (IEC62368-1)					*Only for ePCSA-500P-X2C		
Others	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 to 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 PCB with plated through hole)					Follow our standard	
	MTBF	96,000H min.					Based on EIAJ RCR-9102	
	Weight	1.8kg 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.

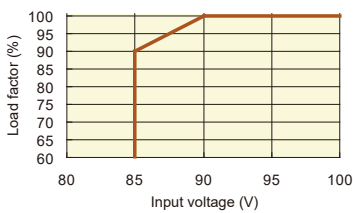


Fig.2 Duty Ratio

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

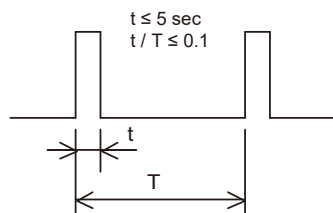
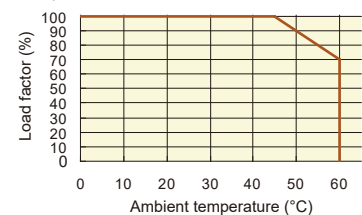


Fig.3 Temperature Derating

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

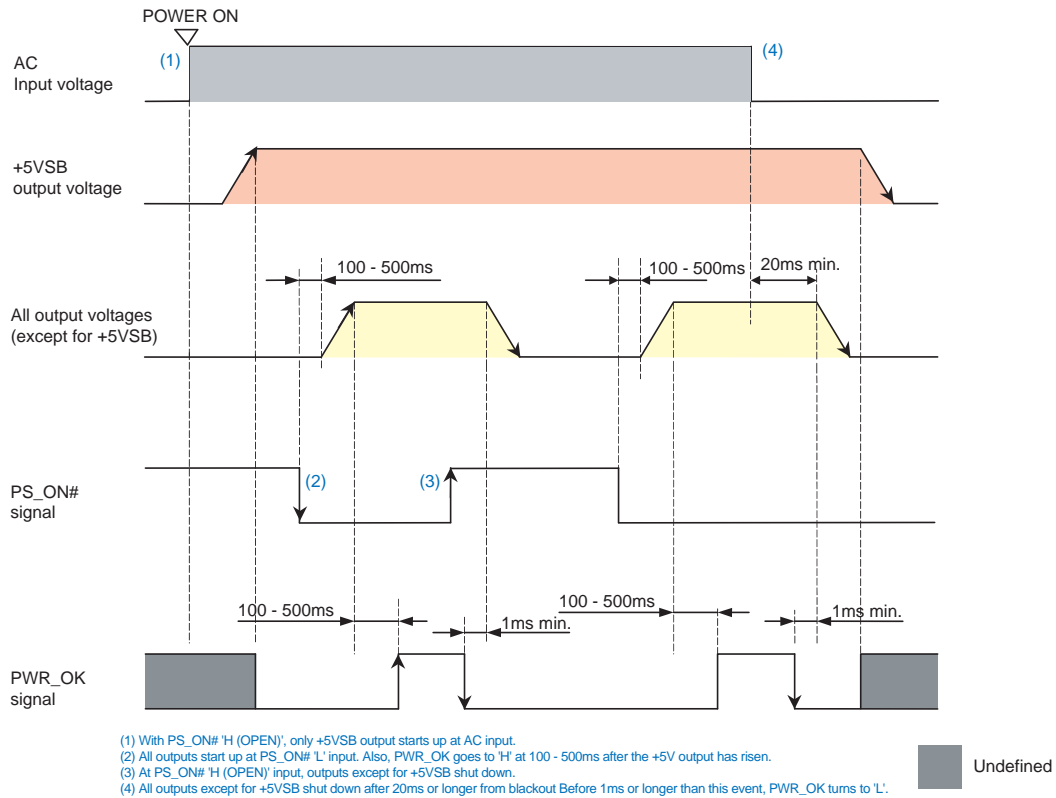
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Items	Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input.
	+3.3V SENSE	The input terminal to detect the voltage of +3.3V output; by connecting to the load terminal,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

Signal Circuit			
Input Signal Circuit	(PS_ON#)	(PWR_OK)	(FAN M)
	<p>($L' \leq 0.8V, 2.0V \leq H'$)</p>	<p>($L' < 0.4V$)</p>	<p>($L' < 0.4V$)</p>

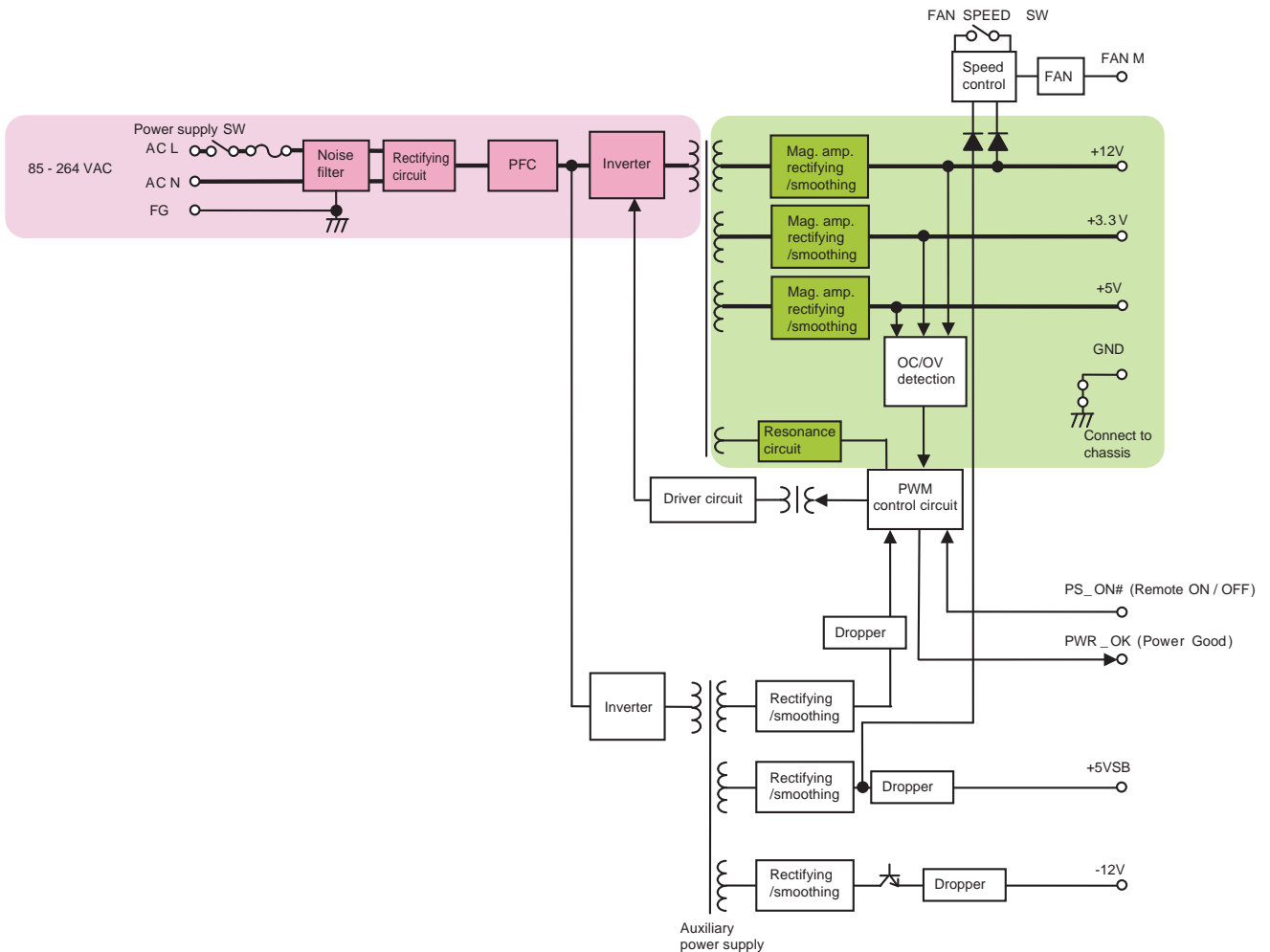
- Removable Fan due to functional plastic panel**
 Various functions, such as, Fan replacement in front, switch barrier to prevent wrong operation.
- Cooling Fan**
 Fan alarm is equipped with fan monitor signal output. Sound reduction. High speed rotation at high internal temperature. Reliable structure with ball-bearing system and long-life Japanese-made fan of 40°C 150,000 hours.
- Electrolytic capacitors**
 Japanese-made 105°C 2000-7000 hours min. for all capacitors
- Feedback noise measures**
 FCC-B, VCCI-B, EN55022-B, CISPR22-B. Leakage current required in Japan, 0.5mA max. at 100 VAC, has been achieved.
- Simple layout design**
 Superior cooling and low inter-component interference layout design. Adapting the connection system for inter-unit connections.
- RoHS fully compliant**
 Amount of hazardous materials in PWBs, wires, electronic components, coils, chassis, and labels specified by international standard is lower than acceptable level.
- Removable Output harness system**
 Fully applicable to the standard order than ATX12V Ver. 1.3, - Ver. 2.01 and also to EPS12V
- Electronic components**
 by major Japanese manufacturers

Sequence Diagram



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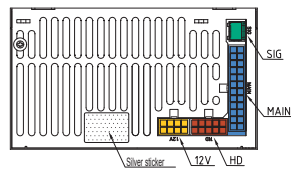
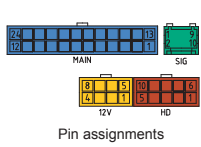
Block Diagram



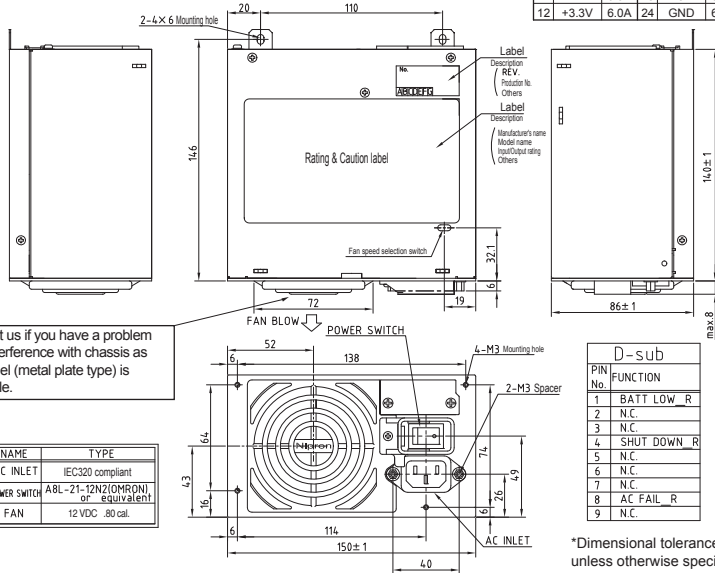
Outline Drawing

BRAIN Power Supply
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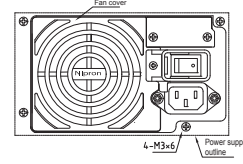
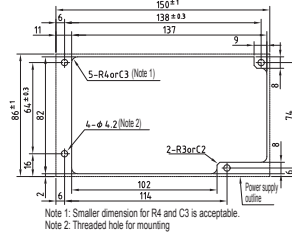
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MAIN			12V			HD			SIG		
PIN No.	FUNCTION	MAX CURRENT	PIN No.	FUNCTION	MAX CURRENT	PIN No.	FUNCTION	MAX CURRENT	PIN No.	FUNCTION	MAX CURRENT
1	+3.3V SENSE	10mA	13	+3.3V	6.0A	1	+3.3V	7.0A	11	NC	-
2	+3.3V	6.0A	14	-12V	0.5A	2	+5V	7.0A	2	NC	-
3	GND	6.0A	15	GND	6.0A	3	GND	7.0A	3	NC	-
4	+5V	6.0A	16	PS_ON#	1mA	4	GND	7.0A	4	NC	-
5	GND	6.0A	17	GND	6.0A	5	+12V	7.0A	5	FAN M	5mA
6	+5V	6.0A	18	GND	6.0A	6	+12V	7.0A	6	PS_ON#	1mA
7	GND	6.0A	19	GND	6.0A	7	+5V	7.0A	7	GND	2.0A
8	PWR_OK	5mA	20	NC	-	8	GND	7.0A	8	+3.3V SENSE	10mA
9	+5VSB	2.5A	21	+5V	6.0A	9	+12V	7.0A	9	NC	-
10	+12V	6.0A	22	+5V	6.0A	10	+12V	7.0A	10	+5VSB	2.0A
11	+12V	6.0A	23	+5V	6.0A						
12	+3.3V	6.0A	24	GND	6.0A						



Power supply mounting hole processing drawing (Recommended)

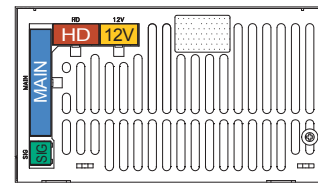


When replacing a fan with power supply mounted to the chassis of PC, supply process holes as specified.

Installation direction
The unit can be installed in any directions.

Optional Components Sold Separately



Detachable Output Harness		Length and Type of Connector		Output Port Allocation	
Model					
Main power cable MAIN					
WH-M2024-500	500±15	20-pin			
WH-M2424-500	500±15	24-pin			
12V power cable 12V					
WH-V0808-500	500±15	12V 8-pin			
WH-V0408-500	500±15	12V 4-pin			
WH-VG208-500	500±15	12V 4-pin PCI-E 6-pin			
WH-VV208-500-02	500±10	12V 8-pin 12V 8-pin			
WH-VG208-500-02	500±10	12V 8-pin PCI-E 6-pin			
HD power cable HD					
WH-PP610-850	550±15	150±15 150±15		peripheral (HD)	
WH-PS610-850	550±15	150±15 150±15		FD	
WH-PS710-850	550±15 850±15	150±15 150±15		S-ATA	
SIG cable SIG					
WH-S0610-500	500±15	SIG-1			
WH-S0610-500-01	500±15	SIG-2			
WH-S0310-500	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

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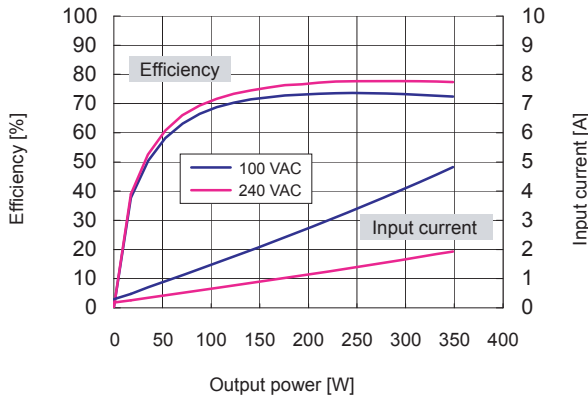
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Characteristics Data ePCSA-500P-X2S (Examples of actual measurement)

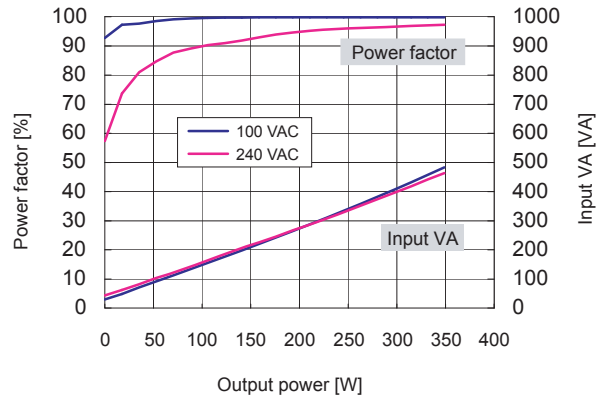
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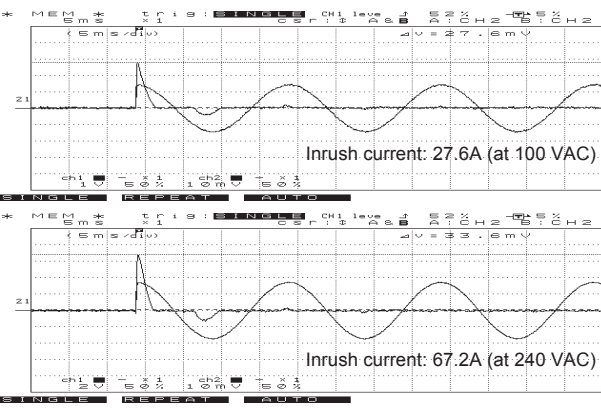
• Fig.4 Efficiency / Input Current vs. Output Power



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



• Fig.6 Inrush Current



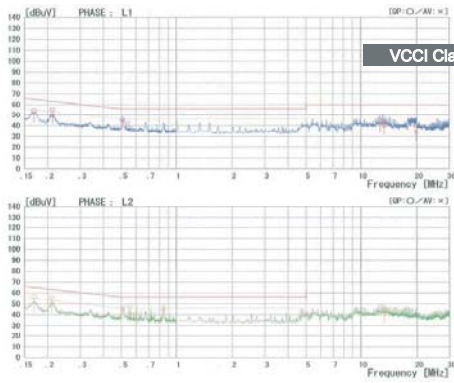
• Fig.7 Leakage Current

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

	Rated load	Min. load
100 VAC	0.28mA	0.23mA
240 VAC	0.45mA	0.45mA

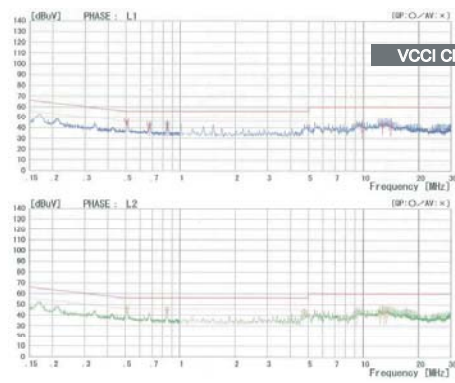
• Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak



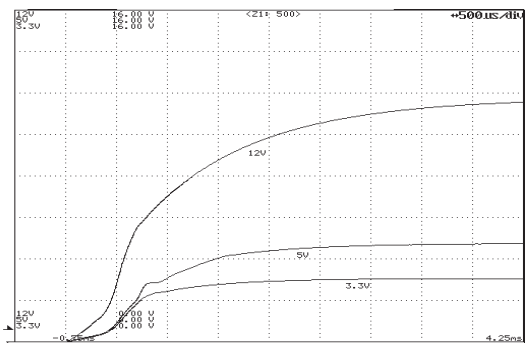
• Fig.9 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: Peak



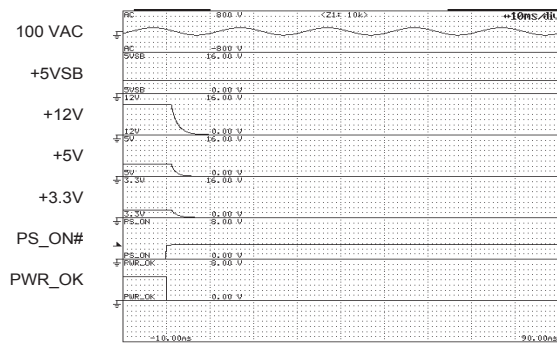
• Fig.10 Rising Characteristics at 100 VAC

Input: 100 VAC
Load: Rated
Time axis: 500µs/DIV



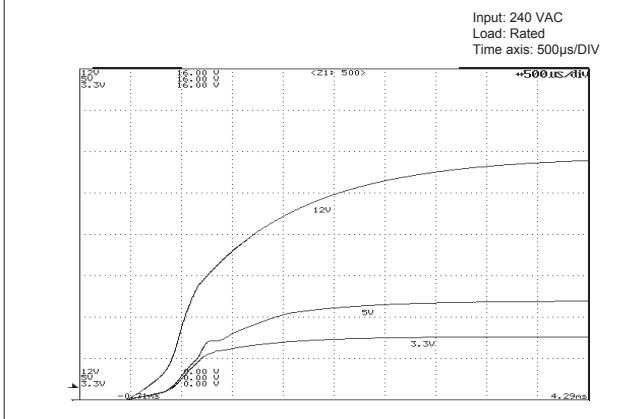
• Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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

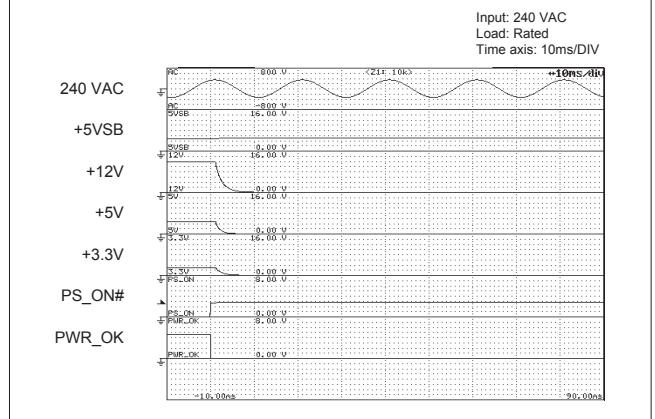


Characteristics Data ePCSA-500P-X2S (Examples of actual measurement)

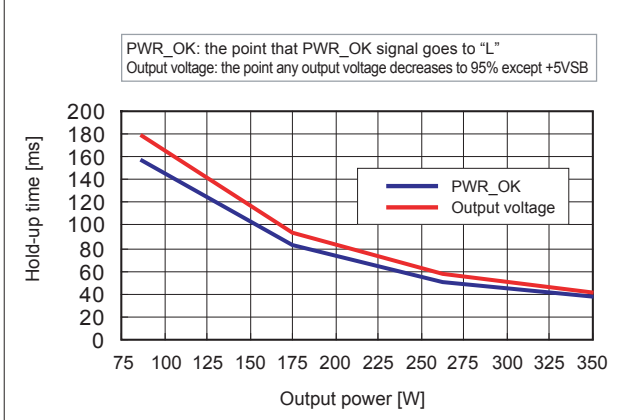
● Fig.12 Rising Characteristics at 240 VAC



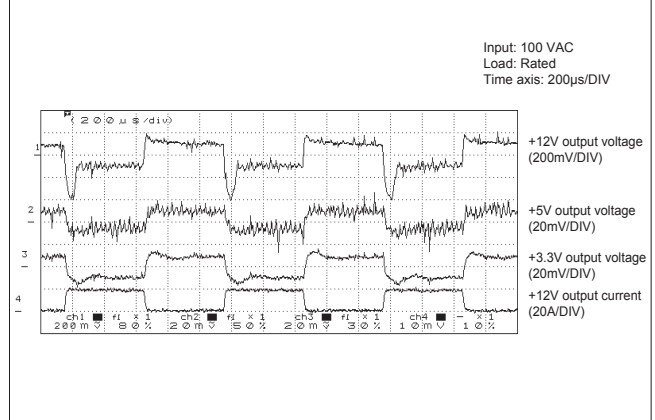
● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

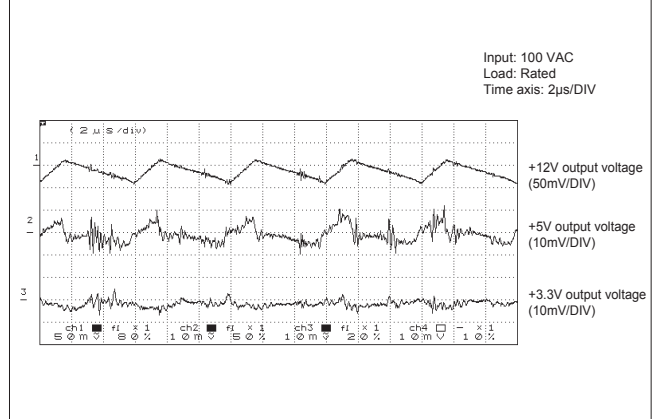


● Fig.16 Output Voltage Regulation

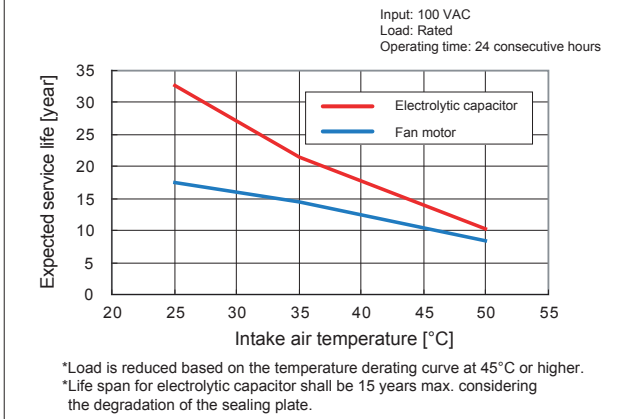
Output	Min. load	Rated load	Peak load
+12V output	0A	18A	30A
+5V output	0A	16A	33A
+3.3V output	0A	11.5A	30A

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V output(min. load)	12.086 V	12.088 V	12.087 V	12.087 V	12.087 V	12.087 V
+12V output(rated load)	11.955 V	11.956 V	11.954 V	11.955 V	11.955 V	11.955 V
+12V output(peak load)	11.896 V	11.896 V	11.895 V	11.896 V	11.896 V	11.896 V
+5V output(min. load)	5.130 V	5.130 V	5.130 V	5.130 V	5.130 V	5.130 V
+5V output(rated load)	5.005 V	5.005 V	5.005 V	5.005 V	5.005 V	5.005 V
+5V output(peak load)	4.914 V	4.914 V	4.914 V	4.914 V	4.914 V	4.914 V
+3.3V output(min. load)	3.402 V	3.402 V	3.402 V	3.402 V	3.402 V	3.402 V
+3.3V output(rated load)	3.307 V	3.307 V	3.307 V	3.307 V	3.307 V	3.307 V
+3.3V output(peak load)	3.239 V	3.239 V	3.239 V	3.239 V	3.239 V	3.239 V

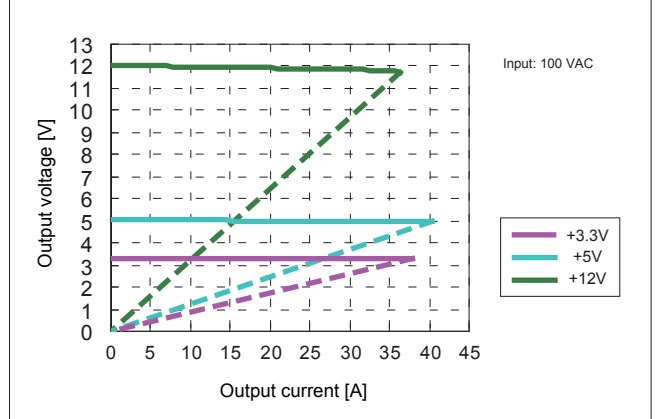
● Fig.17 Ripple and Spike Voltage



● Fig.18 Ambient Temperature vs. Expected Service Life



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



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