

Desktop PC Power Supply mPCSA-500P-X2S

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500W ATX Power Supply with Medical Standard. Amazing Hold-up Time Achieved !



mPCSA-500P-X2S

**RoHS
Directive**

ATX	
Continuous Max. 300W	Peak Power 500W

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 4. ATX output 2. Output power 5. +3.3V output equipped 3. Peak output compliant 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
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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 Total 160W	22A Total 285W	22A Total 301W	0.5A	2A
Peak current / peak power (5 sec max.)	30A Total 200W	33A Total 482W	30A Total 500.5W	0.5A	2.5A
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 8+2pin	HDD	S-ATA	FDD
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Refer to p.139 "Detachable Output Harness" for details

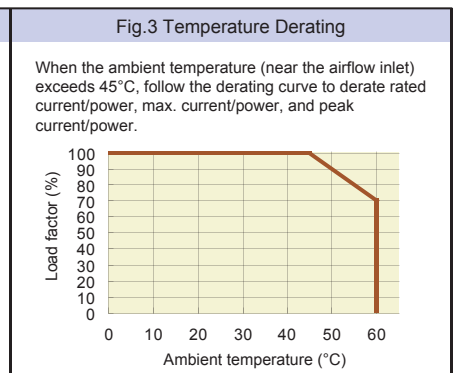
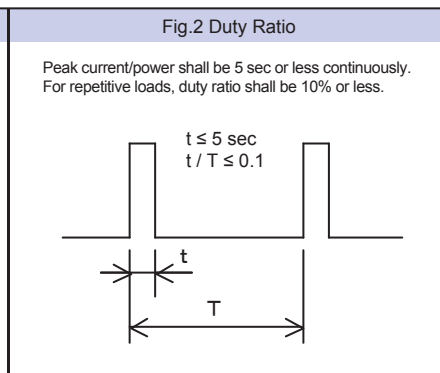
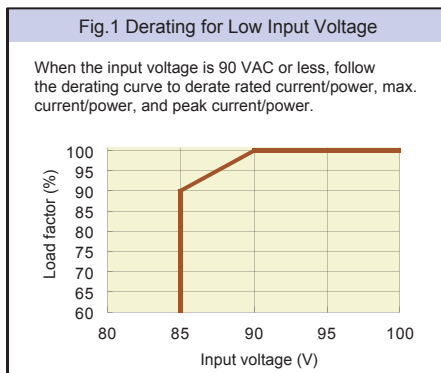
General Specification Condition: at normal temperature and humidity unless otherwise specified

BRAIN Power Supply

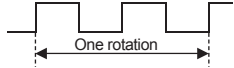
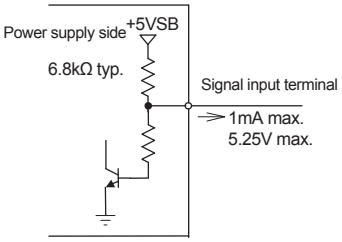
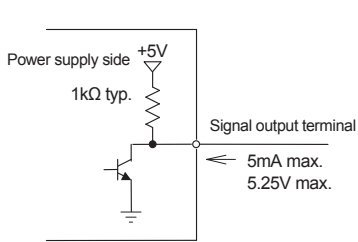
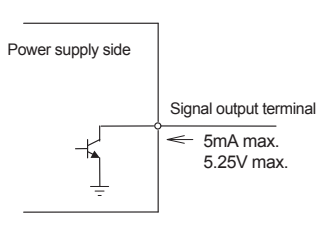
Desktop PC Power Supply

Non-backup Power Supply

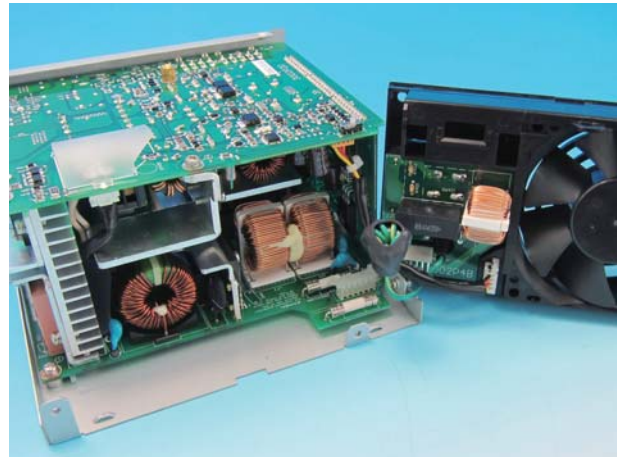
Items		Specification					Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 V)					Worldwide range, *Refer to Fig.1	
	Input Frequency	50 / 60Hz					47 - 63Hz	
	Efficiency	73% typ. (100 VAC), 77% typ. (240 VAC) *Characteristic data: Fig.4					At rated input/output	
	Power Factor	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 754VA max. (100 VAC), 714VA max. (240 VAC)					At rated input and max. output 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.						
	Peak Current / Power	285W 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.	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						YE.V. 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		



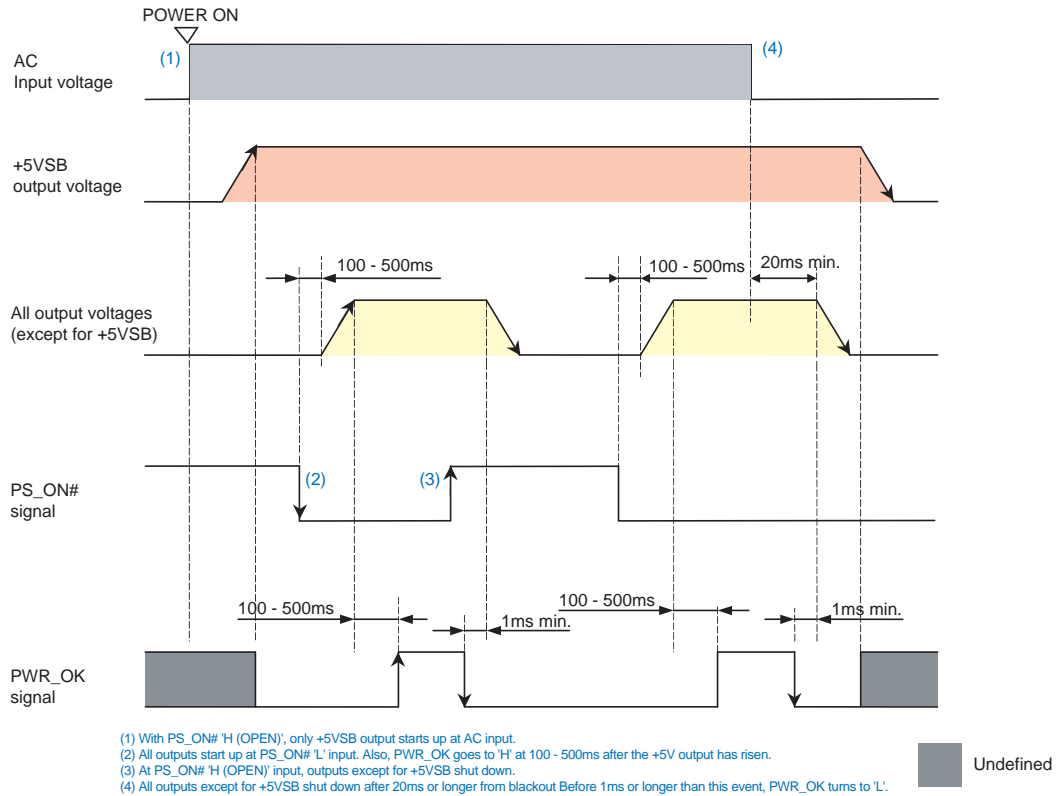
Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

	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
	+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
	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#)	(PWR_OK)	(FAN M)
	 <p>1mA max. 5.25V max.</p> <p>($L' \leq 0.8V, 2.0V \leq H'$)</p>	 <p>5mA max. 5.25V max.</p> <p>($L' < 0.4V$)</p>	 <p>5mA max. 5.25V max.</p> <p>($L' < 0.4V$)</p>

Internal Structure

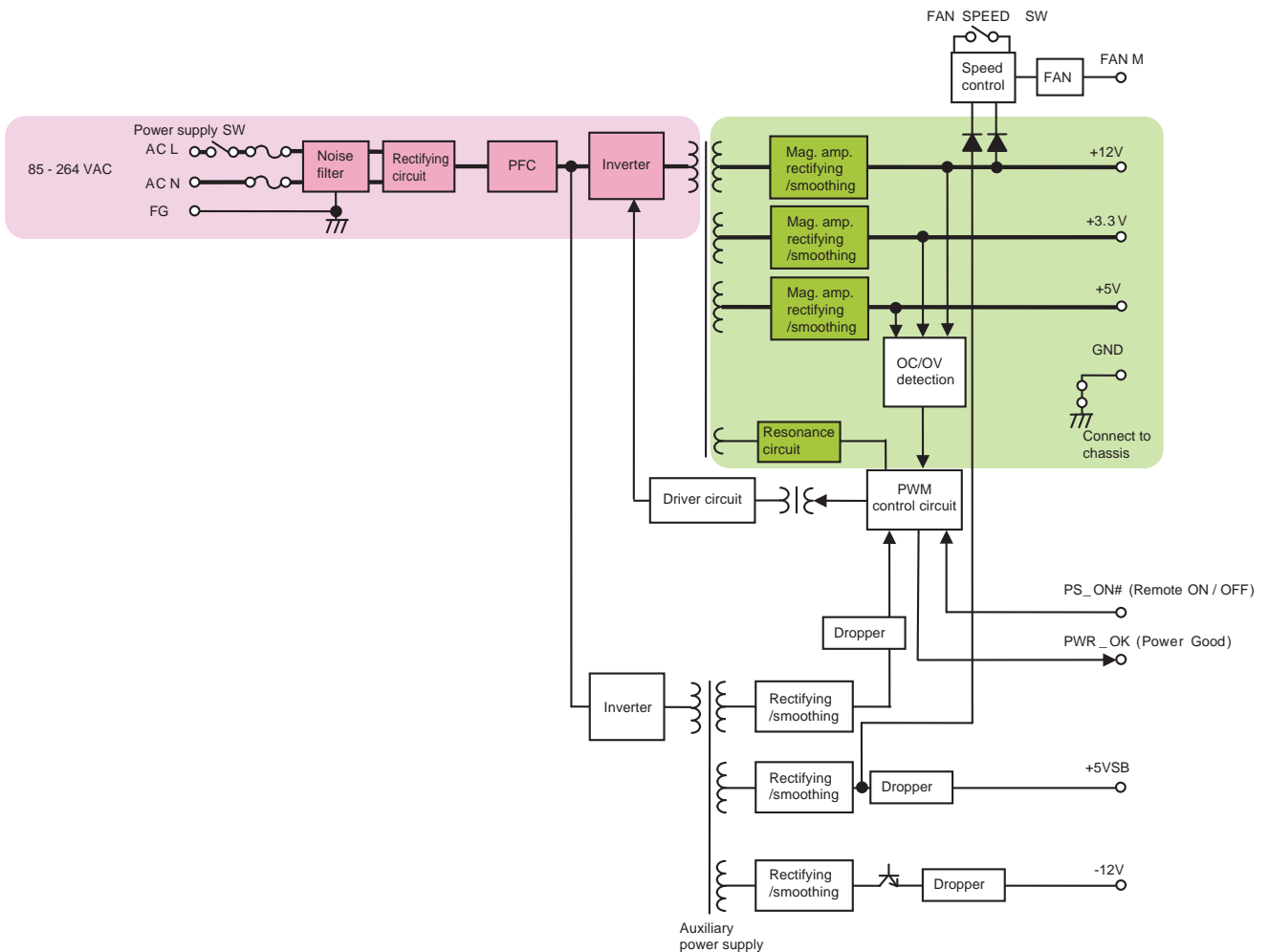


Sequence Diagram



BRAIN Power Supply
Desktop PC Power Supply
Non-backup Power Supply

Block Diagram



Outline Drawing

BRAIN Power Supply
Desktop PC Power Supply
Non-backup Power Supply

Pin assignments

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

Power supply mounting hole processing drawing (Recommended)

Note 1: Smaller dimension for R4 and C3 is acceptable.
Note 2: Threaded hole for mounting.

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

■ Installation direction
The unit can be installed in any directions.

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

*Dimensional tolerance shall be ± 0.5 unless otherwise specified.



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			
WH-M2424-500		500±15			
12V power cable 12V					
WH-V0808-500		500±15			
WH-V0408-500		500±15			
WH-VG208-500		500±15			
WH-VV208-500-02		500±10			
WH-VG208-500-02		500±10			
HD power cable HD					
WH-PP610-850		550±15			peripheral (HD)
WH-PS610-850		550±15			FD
WH-PS710-850		550±15			S-ATA
		850±15			
SIG cable SIG					
WH-S0610-500		500±15			
WH-S0610-500-01		500±15			
WH-S0310-500		500±15			
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

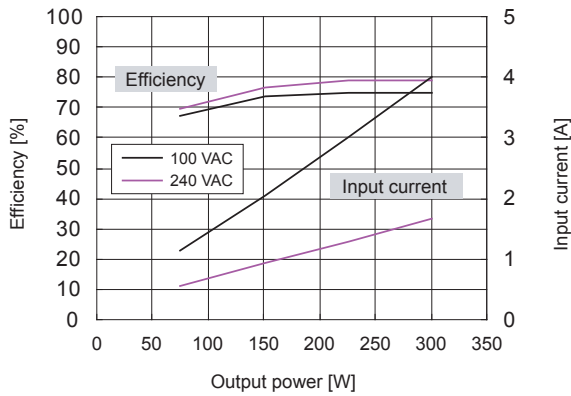
BRAIN
Power
Supply

Desktop PC Power Supply

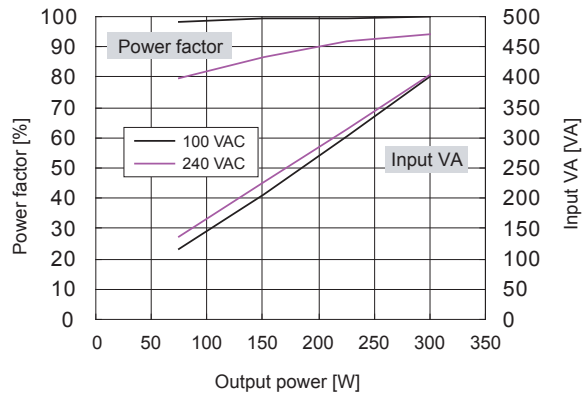
Non-backup Power Supply

Characteristics Data (Examples of actual measurement)

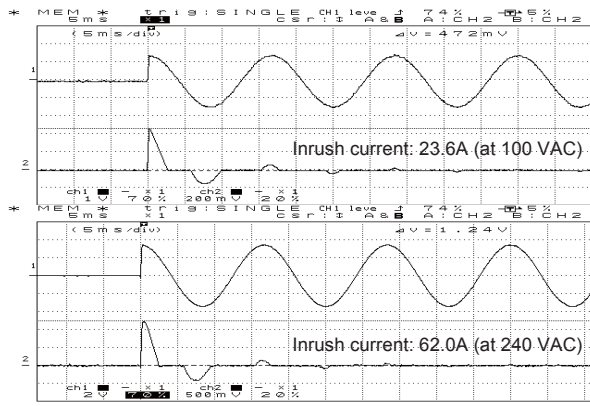
• Fig.4 Efficiency / Input Current vs. Output Power



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



• Fig.6 Inrush Current



• Fig.7 Leakage Current

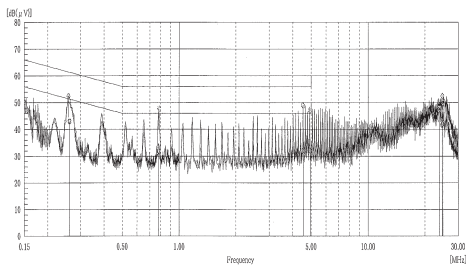
Input: 100 / 264 VAC
Load: Rated and min. load

	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

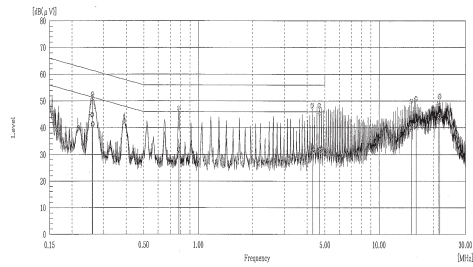
VCCI Class B



• Fig.9 Conducted Emission at 240 VAC

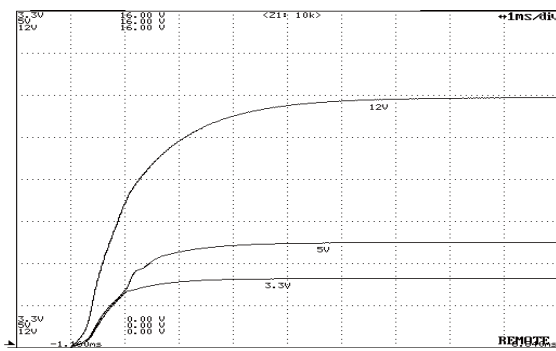
Input: 240 VAC
Load: Rated
Mode: Peak

VCCI Class B



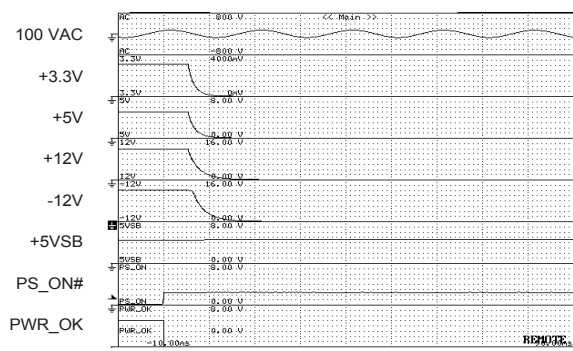
• Fig.10 Rising Characteristics at 100 VAC

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



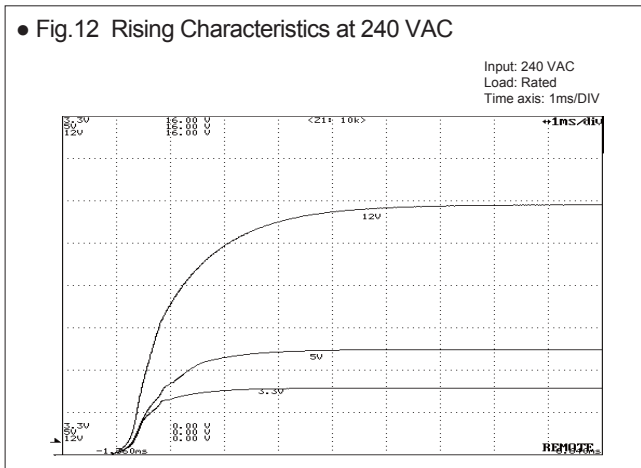
• Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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

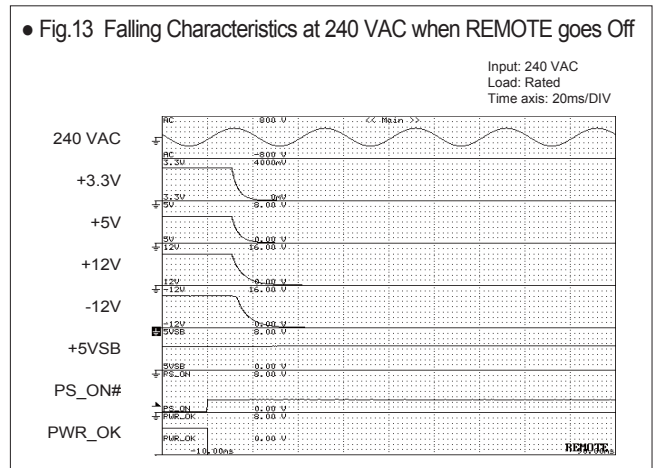


Characteristics Data (Examples of actual measurement)

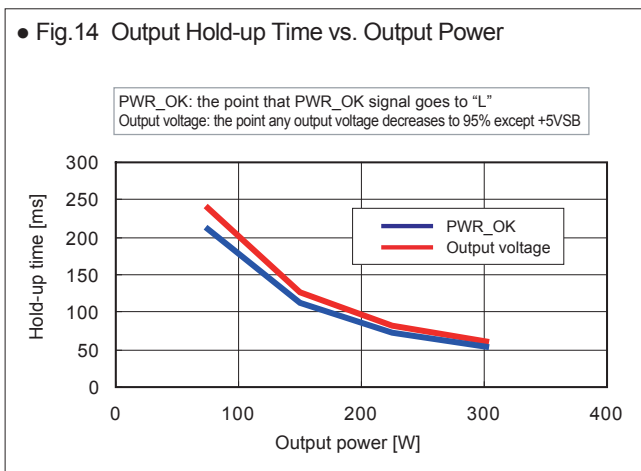
• Fig.12 Rising Characteristics at 240 VAC



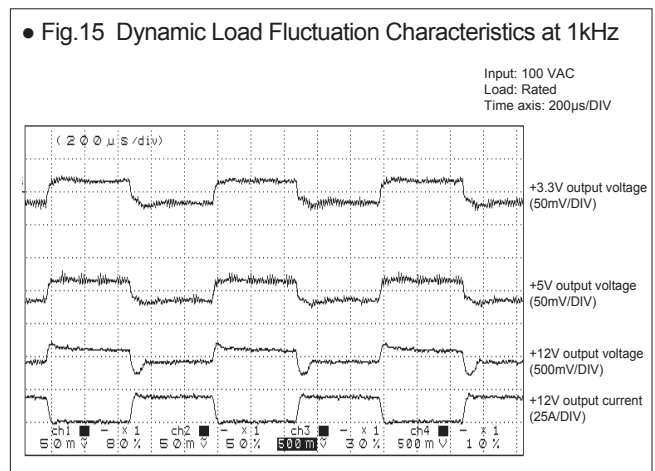
• Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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



• Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

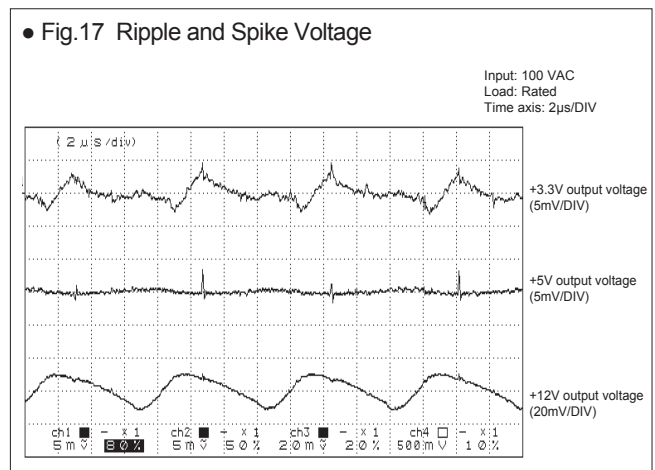


• Fig.16 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V output	0A	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



• 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)

