

Desktop PC Power Supply eNSP4-500P Series

Corresponds to Capacitor Package, 1 sec Backup Power Supply



eNSP4-500P-SA0-H1V



[Optional components]
Capacitor package BS13A-EC400/422F

**RoHS
Directive**

ATX	
NSP (nonstop power supply)	
Continuous Max. 350W	Peak Power 500W

Model	Description	Stock
eNSP4-500P-SA0-H1V	With RS232C signal unit	Standard stock
eNSP4-500P-SA0-H6V	With USB signal unit	Contact us
eNSP4-500P-SA0-H0V	No signal unit	Contact us

Model Name Coding
eNSP4 - 500 P - S A 0 - H * V
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

1. Series name	4. Standard	8. Type of signal unit
2. Output power	5. Backup at AC input circuit	(1: RS232C signal unit, 6: USB signal unit, 0: no signal unit)
3. Peak output compliant	6. Modification code	
	7. Nonstop circuit embedded	9. Silent type (thermal-sensing fan embedded)

Features

- High capacity ATX12V power supply (typical value at 180W output) with 1 sec backup time in the case of blackout if a capacitor package is connected
- Advantages in using capacitor package
 - No need for maintenance (no need for regular replacement)
 - Adjusts to low and high temperature (0°C to 60°C)
 - 2-minutes quick charge (in the case of frequent blackouts)
 - Light (approximately half the weight of our 5-inch bay embedded lead battery)
- AC_FAIL signal (delivered at blackout: RS232C, TTL)
- Completely independent voltage-stabilizing circuit is mounted for all outputs (+12V constant voltage). All outputs correspond to 0A min. load current
- 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.
- Designed to last 10 years min. with continuous rated operation at 45°C
- Output harnesses can be easily customized to meet various requirements.
- Signal unit and fan can be replaced.

Dimensions

W×H×D (mm) 150×86×140 (PS/2 size)

Output connector (optional component)



Refer to p.41 "Detachable Output Harness" for details

Refer to "Product Page Guideline" on p.11

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

Function



*RS232C: only eNSP4-500P-SA0-H1V

*USB: only eNSP4-500P-SA0-H6V

Input

AC input	85 - 264V (worldwide range)
DC input	380V (dedicated capacitor package*)

*Capacitor package is optional (sold separately)

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				
	Total 500.5W				
Min. current	0A	0A	0A	0A	0A

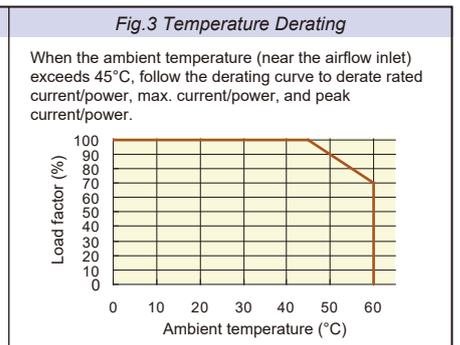
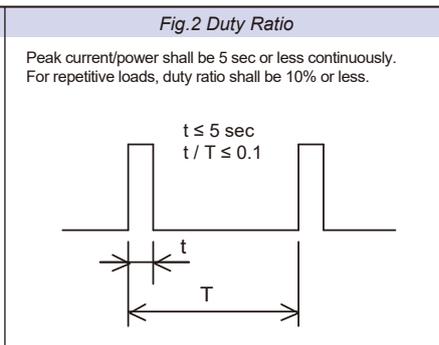
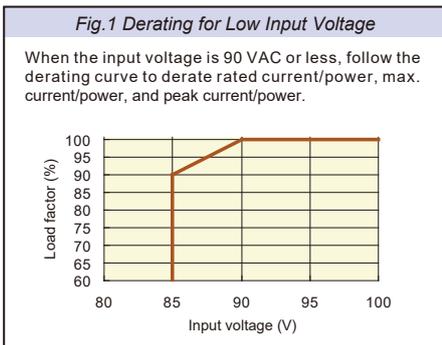
General Specification Condition: at normal temperature and humidity unless otherwise specified

BRAIN
Power
Supply

Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) Power Supply

Items		Specification					Measurement conditions, etc.
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC), Startup voltage: 80±10 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)
AC Input	Input VA	513VA max. (100 VAC), 487VA max. (240 VAC) *Characteristic data: Fig.5					At rated input and max. output
		679VA max. (100 VAC), 643VA max. (240 VAC)					At rated input and peak output
DC Input	Rated Voltage	380 VDC (corresponds to dedicated capacitor package)					Input to the primary circuit (common with AC input circuit)
	Efficiency (at Capacitor Operation)	80% typ.					At rated input/output
Output	Rated Voltage	+3.3V	+5V	+12V	-12V	+5VSB	
	Rated Current	11.5A	16A	18A	0.5A	2A	
	Max. Current / Power	20A	22A	22A	0.5A	2A	Max. output power: 350W
		160W 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
		334W max.					
		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.	28 min.	105% min. of peak current	All other outputs are at rated input/output.
		Method	All outputs except for +5VSB shutdown All outputs shutdown at backup operation			Fold back current limiting	
	Recovery	At AC Operation	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery	
		At Capacitor Operation	Reclosing AC input			Automatic recovery	Reclosing AC input
	Overvoltage Protection	OVP Point (V)	3.76 - 4.3	5.74 - 7.0	13.4 - 15.6	-	-
Method		All outputs except for +5VSB shutdown All outputs shutdown at backup operation			-	-	
	Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			-	-	
Charge	Charge Voltage	380V typ.					Primary circuit (common with AC input circuit)
	Charge Current	Current control circuit is mounted on the dedicated capacitor package					
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
Insulation	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
	Dielectric Strength	AC/DC input - FG/DC output: 1500 VAC for 1 minute					
	Insulation Resistance	AC/DC input - FG/DC output: 50MΩ min.					
	Leakage Current	0.5mA max. (100 VAC) / 1mA max. (200 VAC) *Characteristic data: Fig.7					YEW. TYPE3226 (1kΩ) or equivalent
	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
EMC	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					
Others	Conducted Emission	VCCI-B, FCC-B, EN55022-B, CISPR22-B compliant *Characteristic data: Fig.8 and 9					When connecting a capacitor package, ground the capacitor package and power supply on the same chassis
	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, CE Marking (IEC62368-1)					
	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 the capacitor
Others	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	95,000H 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

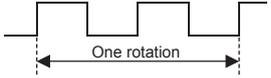
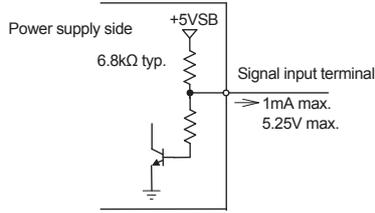
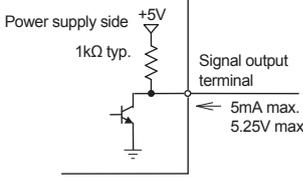
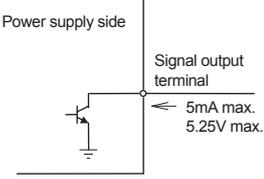
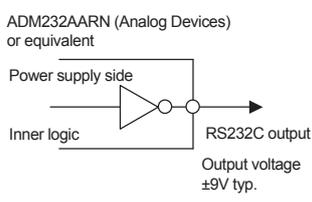


Signal Input / Output Specification (Condition : at normal temperature and humidity unless other wise specified)

BRAIN
Power
Supply

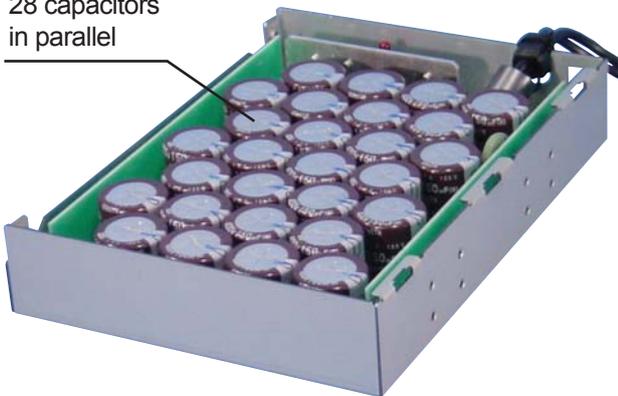
Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) Power Supply

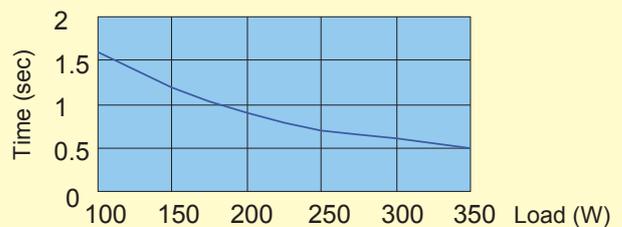
Items	Specification	Note		
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V +12V, and -12V outputs shutdown with 'H' or 'OPEN' input. (During the backup operation, capacitor connection is shut off with 'H' or 'OPEN' input.)	Signal input between the pin 16 of MAIN connector and COM pin	
	+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, the pin 8 of SIG connector (The pin 8 of SIG connector is given priority if both are connected.)	
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	
	Blackout Detection Signal for TTL (AC FAIL_T)	'H' is delivered at low AC input voltage and blackout detection. (detection voltage: 75 VAC typ., detection delay time: 20 - 40ms after AC input failure)	The pin 1 of SIG connector	
	Blackout Detection Signal for RS232C (AC FAIL_R)	'Negative (-9V typ.)' is delivered at low AC input voltage and blackout detection. (detection voltage: 75 VAC typ., detection delay time: 20 - 40ms after AC input failure)	Apply to only eNSP4-500P-SA0-H1V The pin 8 of front panel RS232C connector	
	Blackout Detection Signal for USB (AC FAIL_U)	The equivalent data signal of AC FAIL_R 'negative' is delivered at low AC input voltage and blackout detection. (detection voltage: 75 VAC typ., detection delay time: 20 - 40ms after AC input failure)	Apply to only eNSP4-500P-SA0-H6V Front panel USB connector	
Fan Monitor Signal (FAN M)	Two cycle pulses per one rotation of the fan motor are delivered (open collector output). Duty ratio of the pulse shall be 0.5 typ. (Interval between the signals becomes longer at low speed and shorter at high speed.) The signal remains 'L' or 'OPEN' when the fan stops caused by any failure or malfunction.			
Signal Circuit				
Input Signal Circuit	(PS_ON#)			
	 <p>($L \leq 0.8V, 2.0V \leq H$)</p>			
Output Signal Circuit	(PWR_OK)	(AC FAIL_T), (FAN M)	(AC FAIL_R)	
	 <p>($L < 0.4V$)</p>	 <p>($L < 0.4V$)</p>	<p>Apply to only eNSP4-500P-SA0-H1V</p>  <p>Output voltage $\pm 9V$ typ.</p>	<p>Apply to only eNSP4-500P-SA0-H6V</p> <p>USB1.1 standard compliant (B type connector) *Dedicated software driver needs to be installed to the PC (Existing UPS services or other softwares that use RS232C signal can be used with USB signal).</p>

Internal Structure (capacitor package)

400V 150 μ F
28 capacitors
in parallel

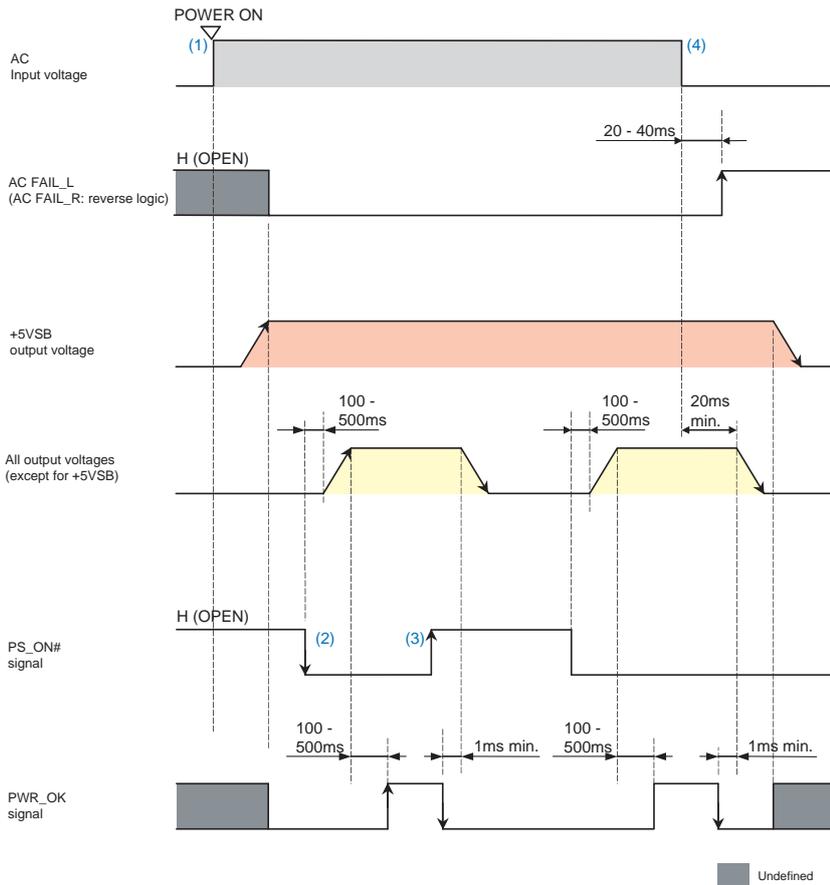


Backup Time



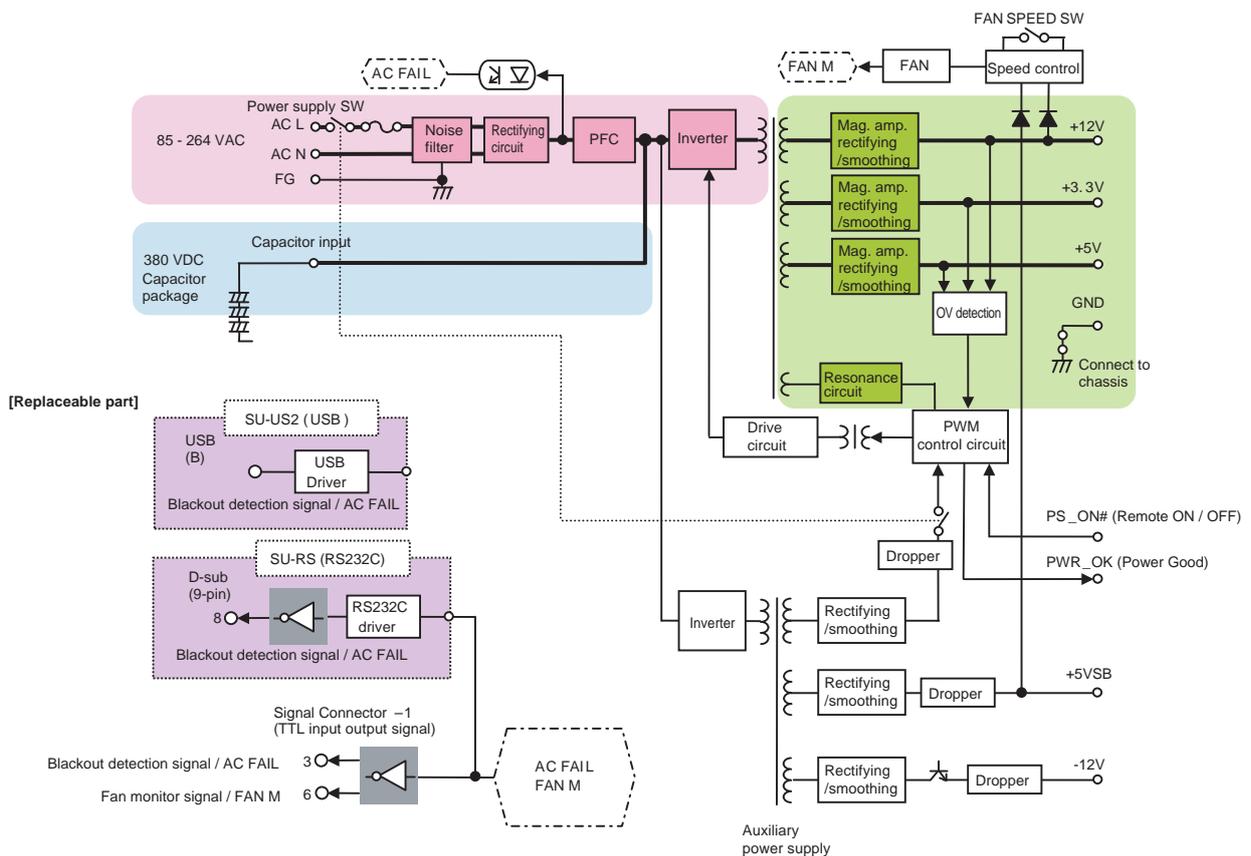
In some cases, the capacitor package is used at semiconductor factory to backup power until the private power-generating facilities start up.

Sequence Diagram



- (1) With PS_ON# 'H (OPEN)', only +5VSB output starts up at AC input.
- (2) With PS_ON# 'L' input, all outputs start up. After 100 - 500ms, PWR_OK goes 'H'.
- (3) With PS_ON# 'H (OPEN)' input, outputs except for +5VSB shut down.
- (4) At blackout all outputs (except for +5VSB) shut down after 20ms min. PWR_OK 'L' is delivered 1ms min. before the shutdown. Also, AC FAIL 'negative (RS232C)' and 'H (OPEN)(TTL)' are delivered 20 - 40ms after the blackout.

Block Diagram

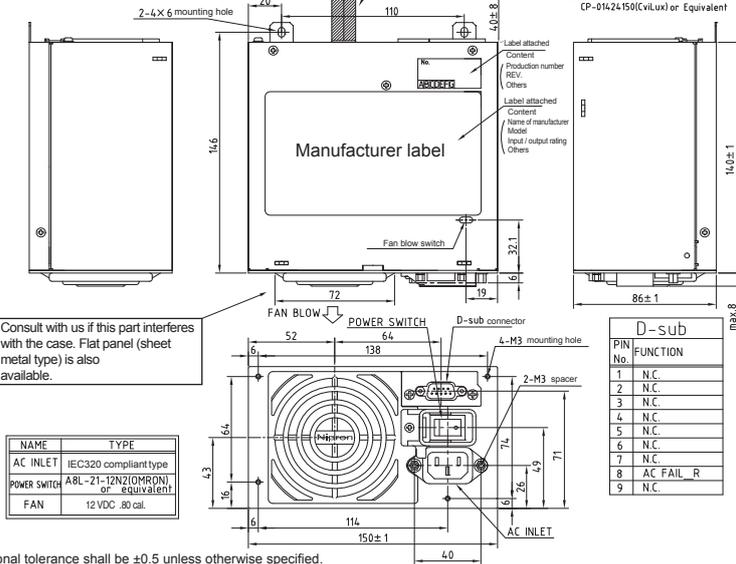
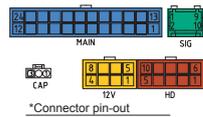


Outline Drawing

BRAIN Power Supply

Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) Power Supply



Consult with us if this part interferes with the case. Flat panel (sheet metal type) is also available.

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

*Dimensional tolerance shall be ±0.5 unless otherwise specified.

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

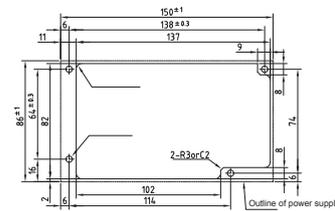
CP-01424150(CvLux) or Equivalent

CP-01408150(CvLux) or Equivalent

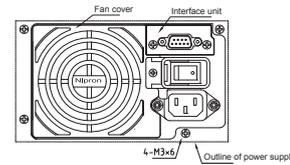
CP-01410150(CvLux) or Equivalent

S108-PADSS-1U1T1

How to process the mounting holes (recommended)



Note 1: The value for R4 or C3 can be smaller.
Note 2: Mounting hole.



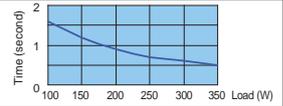
When replacing the fan, adding or replacing the interface unit with the power supply mounted to chassis of PC, etc., make sure to process the mounting holes as specified.

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

Optional Components Sold Separately

Detachable Output harness		Output Port Allocation			
Model	Length and Type of Connector				
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	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="background-color: #0070C0; color: white; padding: 2px;">MAIN</div> <div style="background-color: #FFD700; padding: 2px;">12V</div> <div style="background-color: #C00000; padding: 2px;">HD</div> <div style="background-color: #008000; padding: 2px;">SIG</div> </div> <p>1 model 1 model 1 model 1 model</p>			
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 → 150±15 → 150±15 → SATA				
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)				

Optional Components sold Separately

Capacitor Package					
Page	Picture	Model	Type	Shape (size)	Backup Time
P.417		BS13A-EC400/422F	Capacitor	5-inch bay fixed type (WxDxH=146x200x38 mm)	

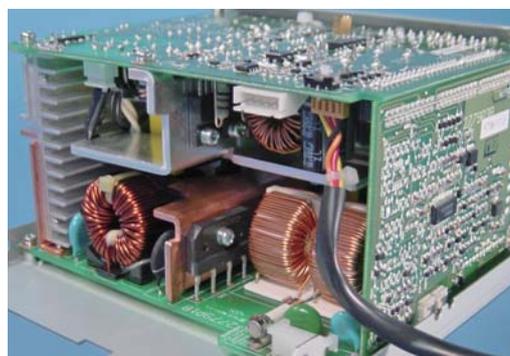
*The backup time is a reference value at initial use; it is not a guaranteed value.

Cable				
Picture	Model	Type	Description	
	WH2601-02	RS232C communication cable	Dedicated to Windows 2000 / XP / Vista / 7. The cable can be used with power supplies equipped with SU-RS (RS232C signal unit). [RoHS]	
 <small>*reference image</small>	WH2967	USB communication cable	USB communication cable The cable can be used with power supplies equipped with SU-US2 (USB signal unit). [RoHS]	
	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	
	SU-RS	RS232C signal unit	Automatic shutdown is possible with RS232C (standard equipment for eNSP4-500P-SA0-H1V)	
	SU-US2	USB signal unit	Automatic shutdown is possible with USB (standard equipment for eNSP4-500P-SA0-H6V)	
	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	

Internal Structure

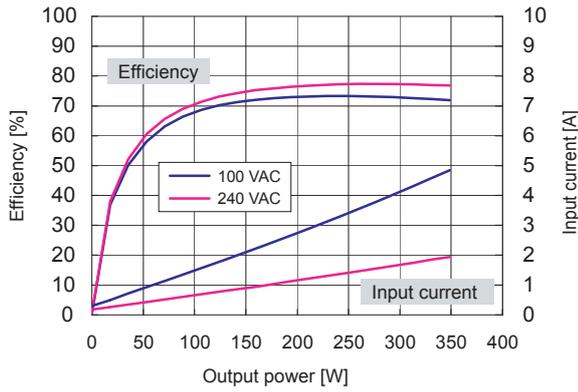


Characteristics Data eNSP4-500P-SA0-H1V (Examples of actual measurement)

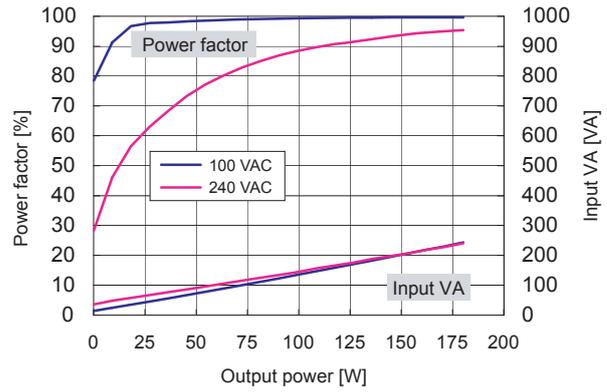
BRAIN Power Supply
Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) Power Supply

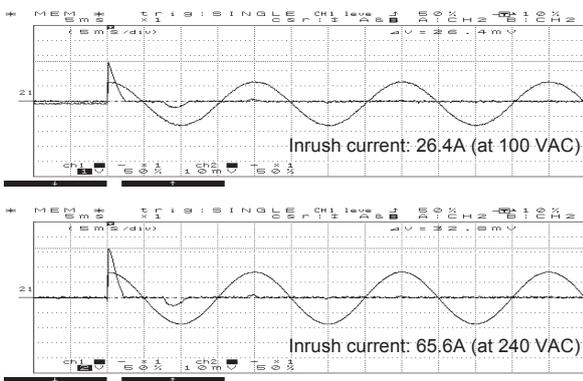
● Fig.4 Efficiency / Input Current vs. Output Power



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



● Fig.6 Inrush Current



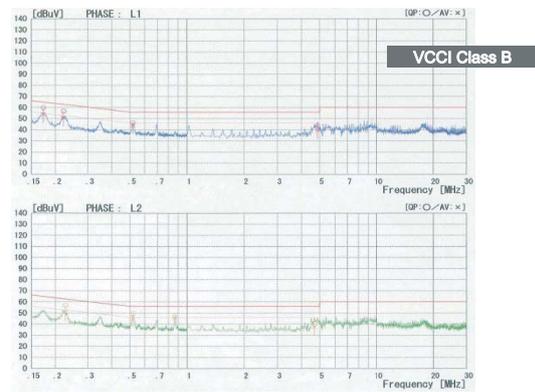
● Fig.7 Leakage Current

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

	Rated load	Min. load
100 VAC	0.29mA	0.26mA
240 VAC	0.58mA	0.61mA

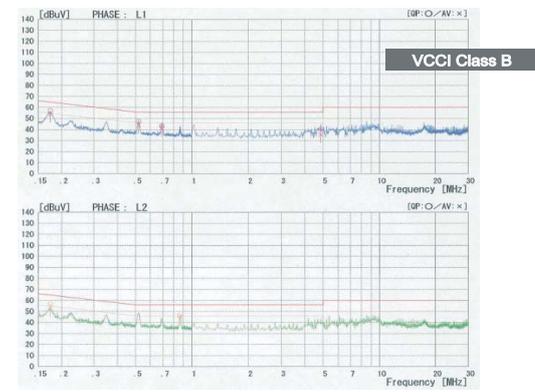
● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak



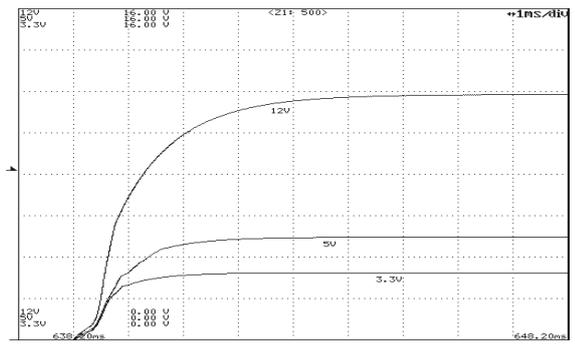
● Fig.9 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: Peak



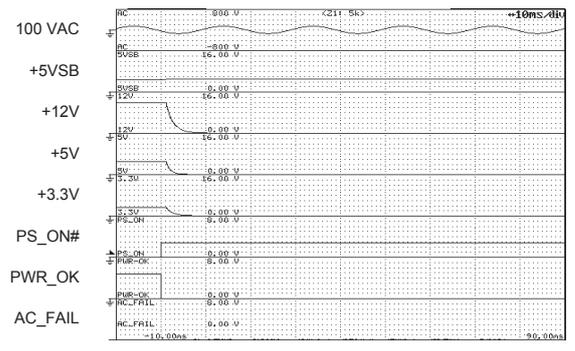
● Fig.10 Rising Characteristics at 100 VAC

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



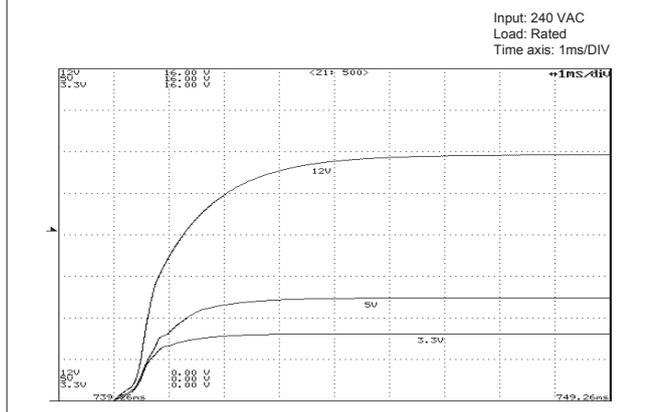
● Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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

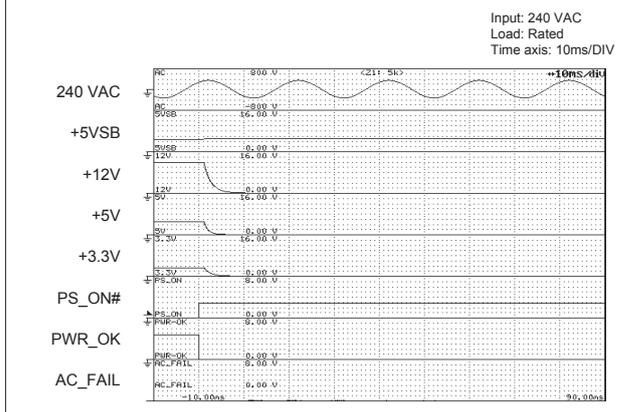


Characteristics Data eNSP4-500P-SA0-H1V (Examples of actual measurement)

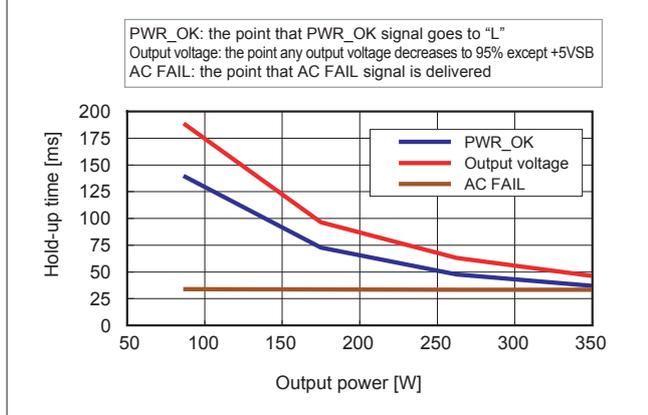
● Fig.12 Rising Characteristics at 240 VAC



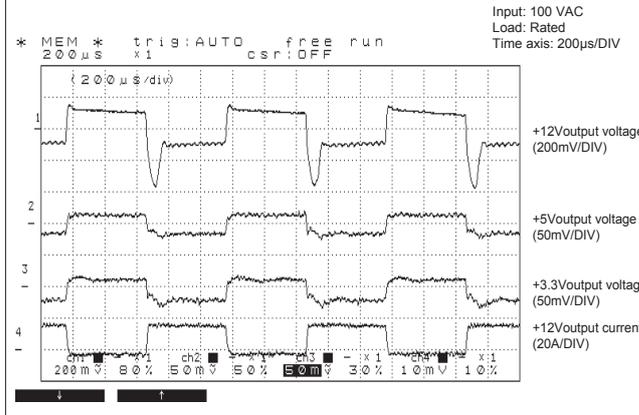
● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

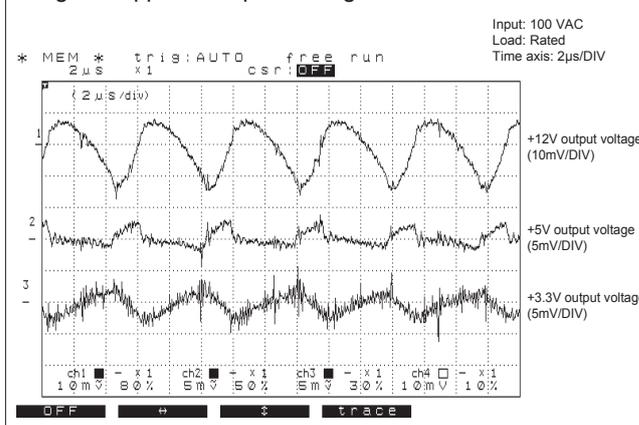


● Fig.16 Output Voltage Regulation

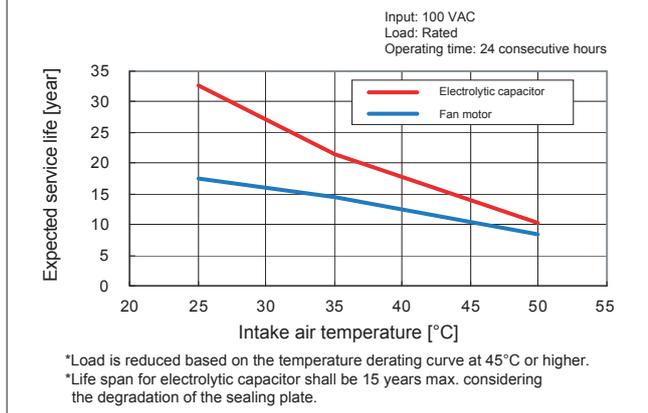
Output	Min. load	Rated load	Peak load
+12V output	0A	18A	12A
+5V output	0A	16A	12A
+3.3V output	0A	11.5A	10A

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V output(min. load)	12.174 V	12.173 V	12.172 V	12.172 V	12.171 V	12.172 V
+12V output(rated load)	11.982 V	11.980 V	11.979 V	11.979 V	11.978 V	11.978 V
+12V output(peak load)	11.892 V	11.889 V	11.888 V	11.888 V	11.887 V	11.887 V
+5V output(min. load)	5.133 V	5.133 V	5.133 V	5.132 V	5.132 V	5.132 V
+5V output(rated load)	4.985 V	4.984 V	4.984 V	4.984 V	4.983 V	4.983 V
+5V output(peak load)	4.882 V	4.881 V	4.881 V	4.880 V	4.880 V	4.880 V
+3.3V output(min. load)	3.404 V	3.403 V				
+3.3V output(rated load)	3.280 V	3.279 V	3.279 V	3.279 V	3.279 V	3.278 V
+3.3V output(peak load)	3.182 V	3.181 V	3.180 V	3.180 V	3.180 V	3.180 V

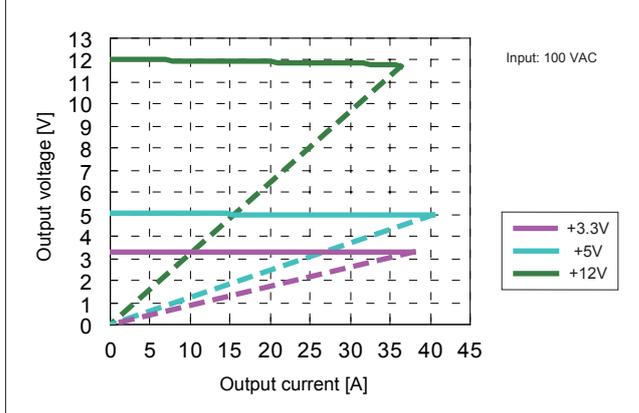
● Fig.17 Ripple and Spike Voltage



● Fig.18 Ambient Temperature vs. Expected Service Life



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



BRAIN Power Supply
Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) Power Supply