

Desktop PC Power Supply eNSP4-500P Series

Corresponds to Capacitor Package, 1 sec Backup Power Supply

BRAIN
Power
Supply

Desktop PC Power Supply

Nonstop (Uninterruptible / No Power-interruption) 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
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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	9. Silent type (thermal-sensing fan embedded)
	7. Nonstop circuit 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)
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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 8pin	HDD	S-ATA	FDD
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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

DC start	RS 232C	USB	TTL	PFC	Silence	5VSB FAN	TSFC FAN	Connection	RoHS
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*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				
Min. current	0A	0A	0A	0A	0A

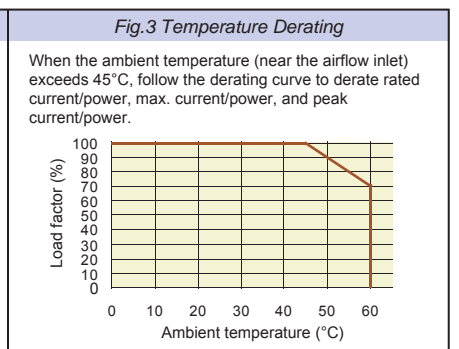
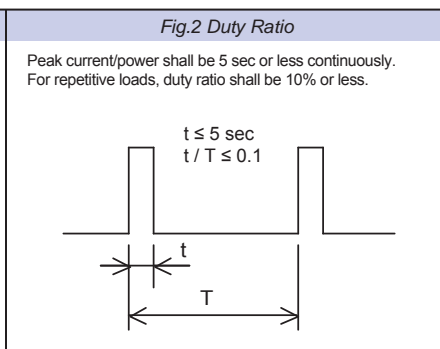
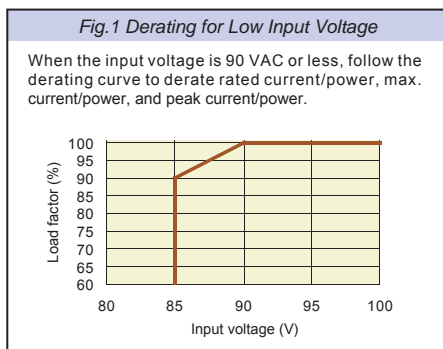
General Specification Condition: at normal temperature and humidity unless otherwise specified

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Items		Specification					Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC), 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)	
	Input VA	513VA max. (100 VAC), 487VA max. (240 VAC) *Characteristic data: Fig.5 679VA max. (100 VAC), 643VA max. (240 VAC)					At rated input and max. output 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	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	0A	0A	0A	0A	0A		
		482W max.						
	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		Same as +3.3, +5, +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 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						
	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	
Environment	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/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						
	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 Standard	UL60950, CSA C22.2 No.60950 (c-UL), EN60950, CE Marking (LVD, EMC)						
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 the 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	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	

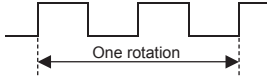
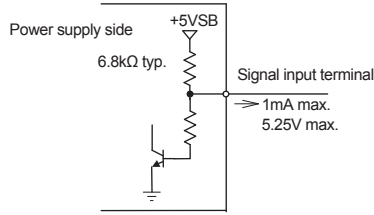
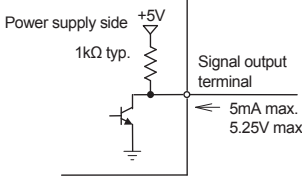
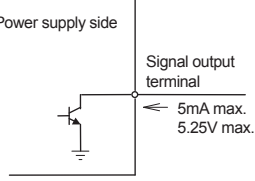
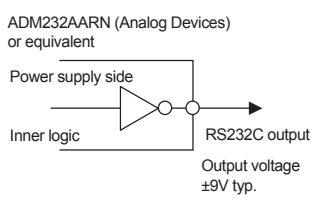


Signal Input / Output Specification (Condition : at normal temperature and humidity unless otherwise specified)

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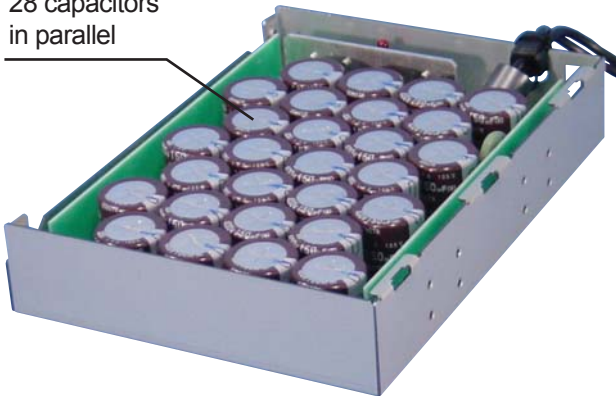
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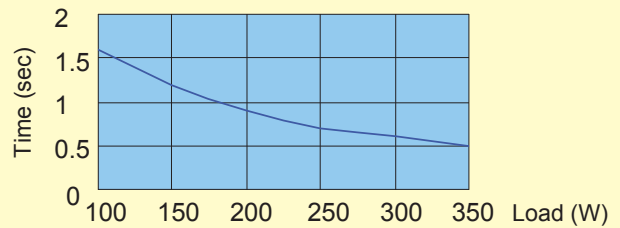
Items	Specification	Note		
Input Signal	Output ON / OFF Control Signal (PS_ON#) +3.3V SENSE	+3.3V, +5V +12V, and -12V outputs shutdown with 'H' or 'OPEN' input. (During the backup operation, capacitor connection is shut off with 'H' or 'OPEN' input.) The input terminal to detect the voltage of +3.3V output; by connecting to the load terminal, only the line drop of the + side of the output cable is compensated.	Signal input between the pin 16 of MAIN connector and COM pin 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) Blackout Detection Signal for TTL (AC FAIL_T) Blackout Detection Signal for RS232C (AC FAIL_R) Blackout Detection Signal for USB (AC FAIL_U) Fan Monitor Signal (FAN M)	'H' signal is delivered at normal output (detection delay time: 100 - 500ms). '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) '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) 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) 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.	The pin 8 of MAIN connector The pin 1 of SIG connector Apply to only eNSP4-500P-SA0-H1V The pin 8 of front panel RS232C connector Apply to only eNSP4-500P-SA0-H6V Front panel USB connector 	
Signal Circuit				
Input Signal Circuit	<p>(PS_ON#)</p>  <p>($L \leq 0.8V, 2.0V \leq H$)</p>			
Output Signal Circuit	<p>(PWR_OK)</p>  <p>($L < 0.4V$)</p>	<p>(AC FAIL_T), (FAN M)</p>  <p>($L < 0.4V$)</p>	<p>(AC FAIL_R)</p> <p>Apply to only eNSP4-500P-SA0-H1V</p>  <p>Output voltage $\pm 9V$ typ.</p>	<p>(AC FAIL_U)</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

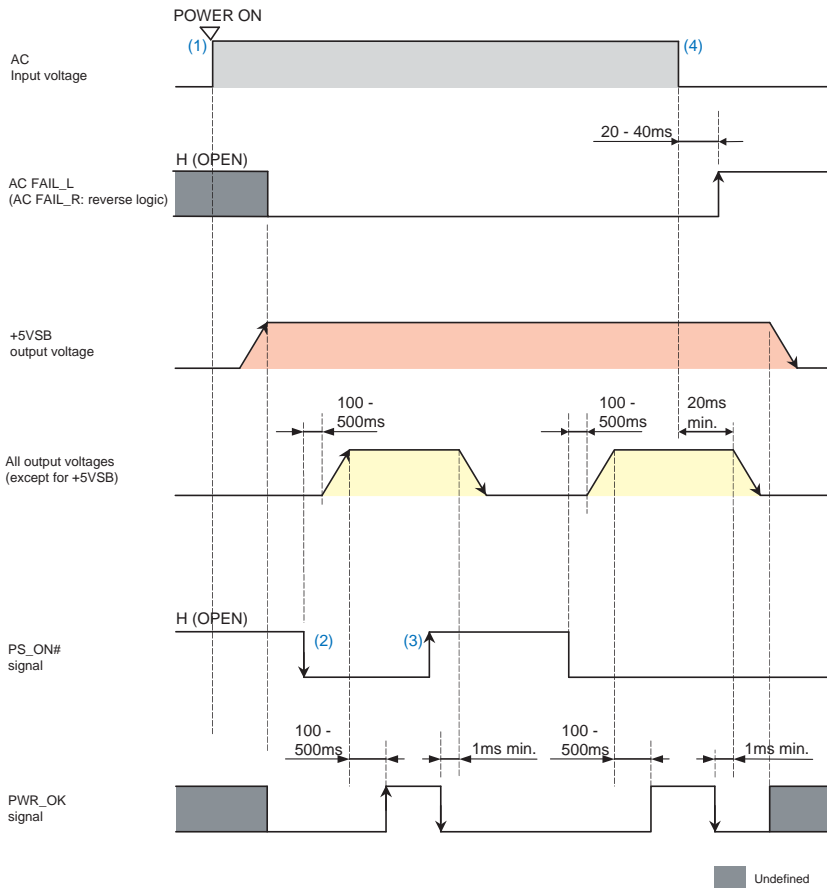


Backup Time



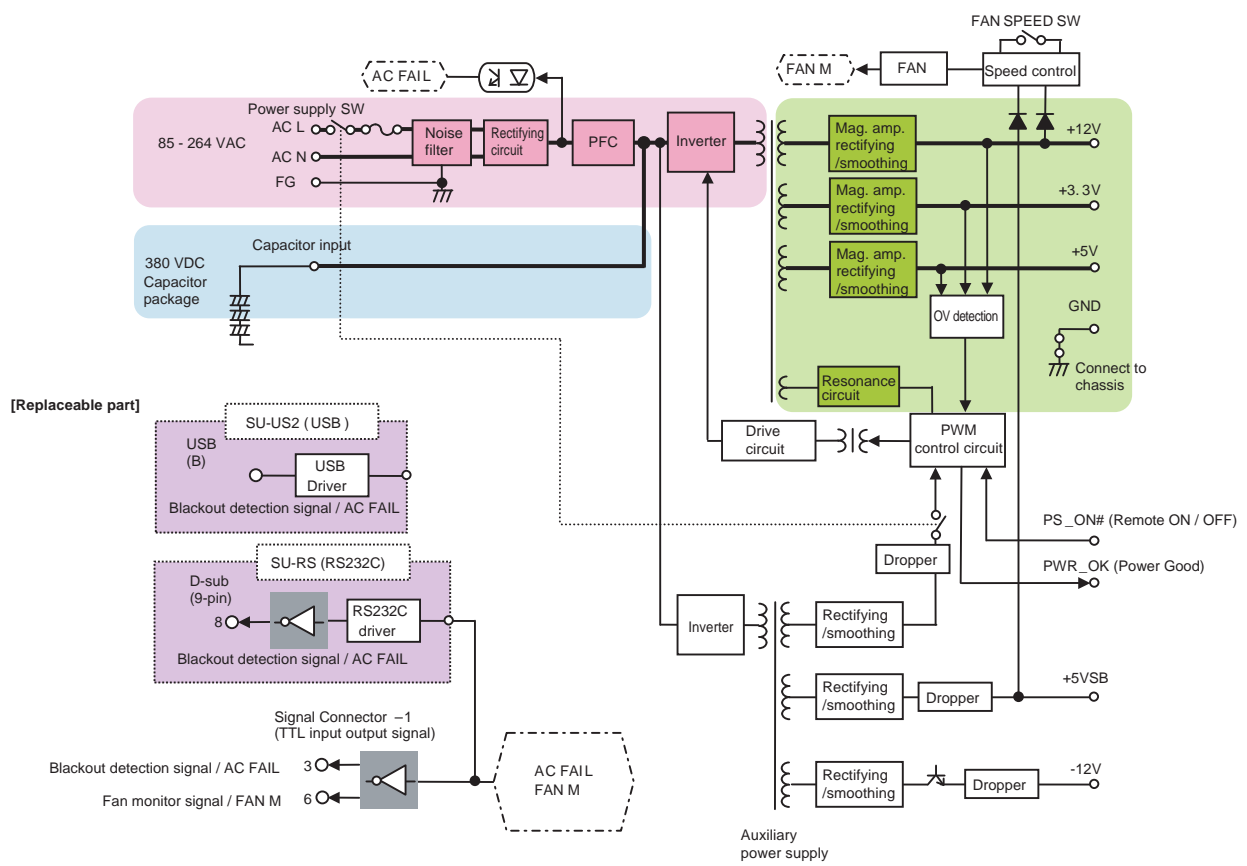
In some cases, the capacitor package is used at semiconductor factory to backup power until the private power-generating facilities start up.

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

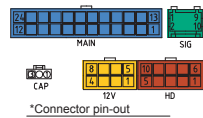


Outline Drawing

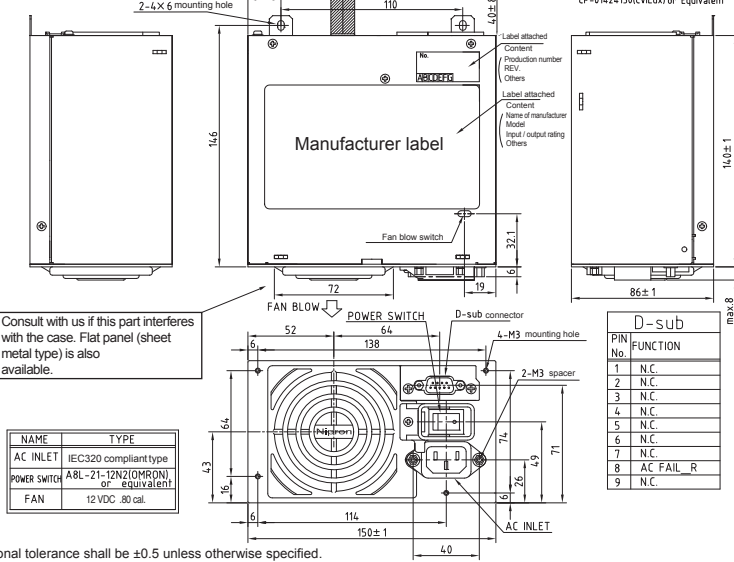
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*Connector pin-out



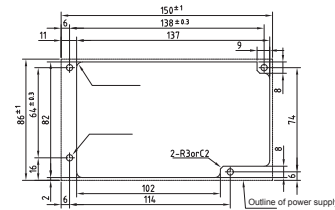
Consult with us if this part interferes with the case. Flat panel (sheet metal type) is also available.

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

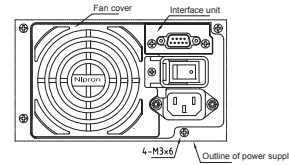
*Dimensional tolerance shall be ±0.5 unless otherwise specified.

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	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									

How to process the mounting holes (recommended)



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

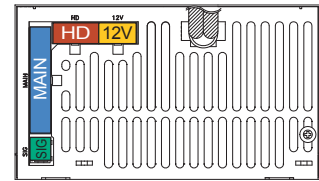


When replacing the fan, adding or replacing the interface unit with the power supply mounted to chassis of PC, etc., make sure to process the mounting holes as specified.

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

Optional Components Sold Separately


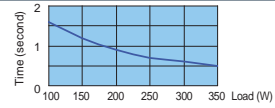
Detachable Output harness			Output Port Allocation	
Model	Length and Type of Connector			
Main power cable MAIN				
WH-M2024-500	500±15 → 20-pin			
WH-M2424-500	500±15 → 24-pin			
12V power cable 12V				
WH-V0808-500	500±15 → 12V 8-pin			
WH-V0408-500	500±15 → 12V 4-pin			
WH-VG208-500	500±15 → 12V 4-pin 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	500±15 → 150±15 → 150±15 → peripheral (HD)			
WH-PS610-850	500±15 → 150±15 → 150±15 → FD			
WH-PS710-850	500±15 → 150±15 → 150±15 → SATA			
	850±15 →			
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				
WHHS2828	[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

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

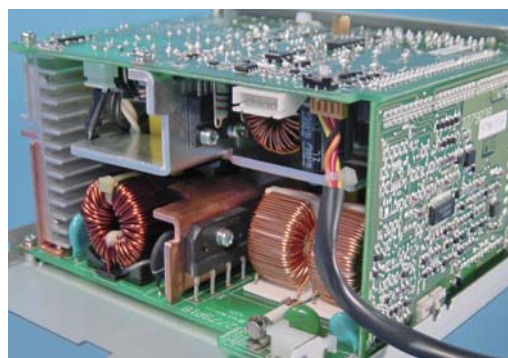
*The backup time is a reference value at initial use; it is not a guaranteed value.

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]	
 *reference image	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

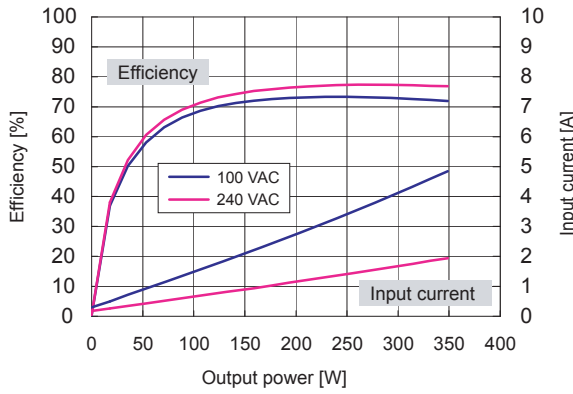


Characteristics Data eNSP4-500P-SA0-H1V (Examples of actual measurement)

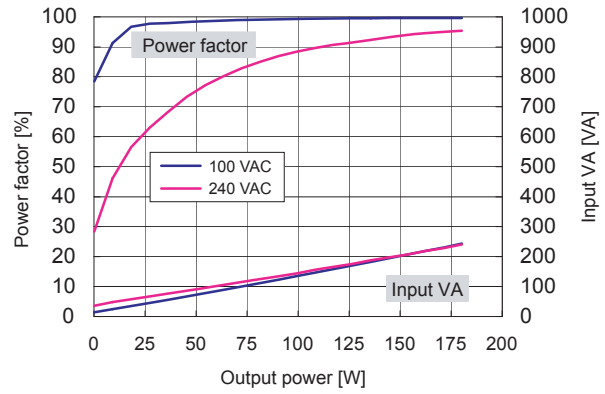
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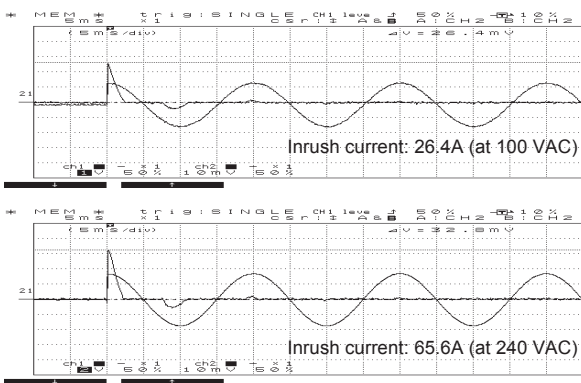
● Fig.4 Efficiency / Input Current vs. Output Power



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



● Fig.6 Inrush Current



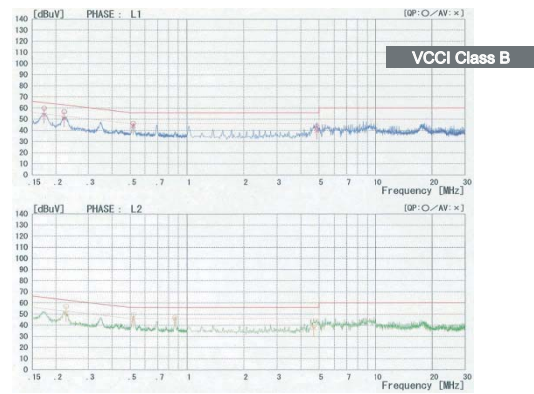
● Fig.7 Leakage Current

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

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

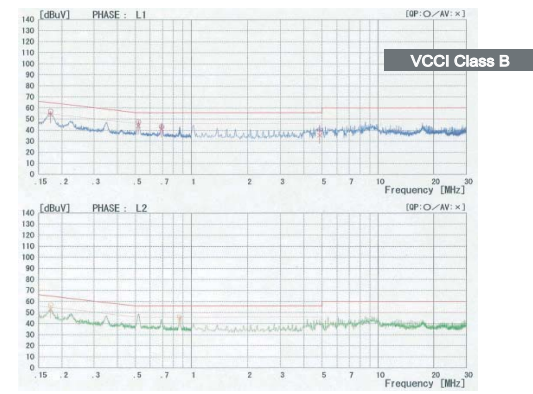
● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak



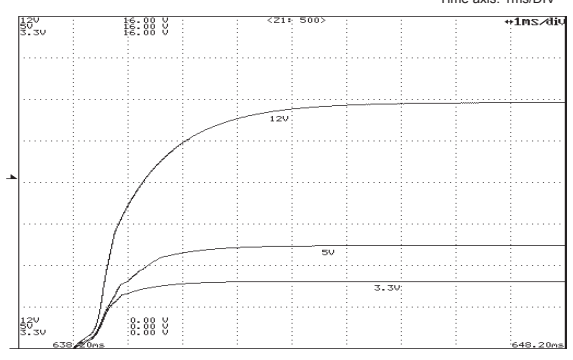
● Fig.9 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: Peak



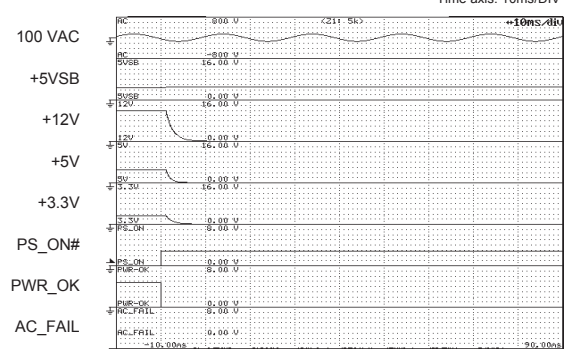
● Fig.10 Rising Characteristics at 100 VAC

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



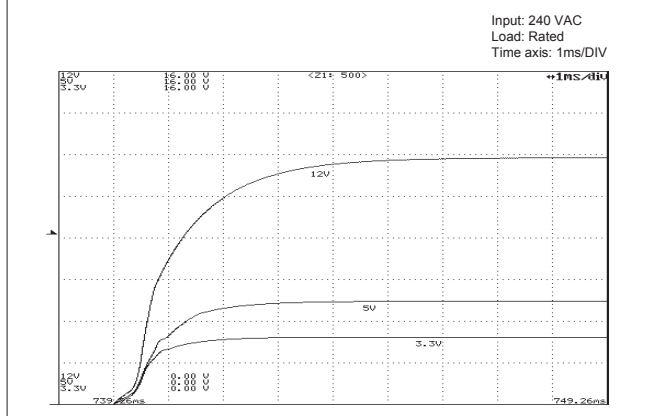
● Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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

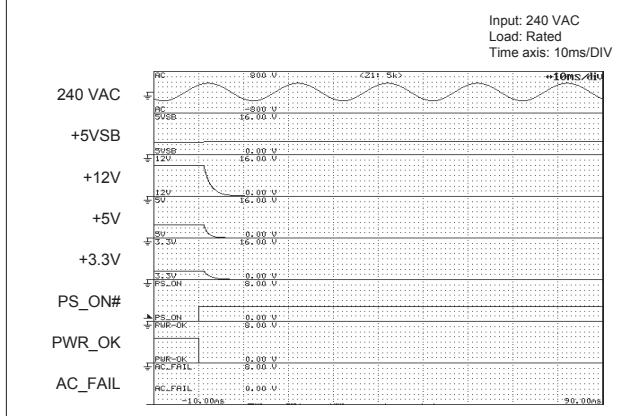


Characteristics Data eNSP4-500P-SA0-H1V (Examples of actual measurement)

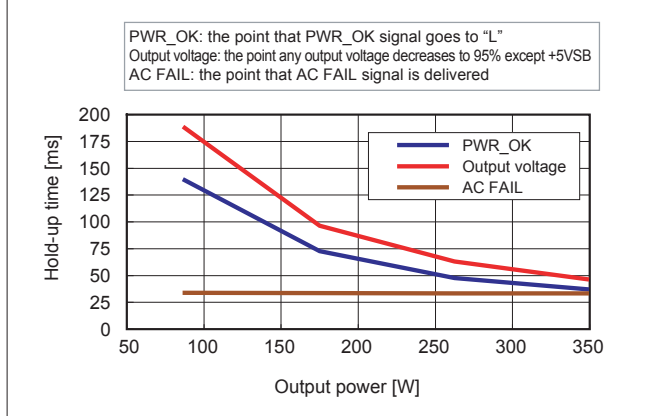
● Fig.12 Rising Characteristics at 240 VAC



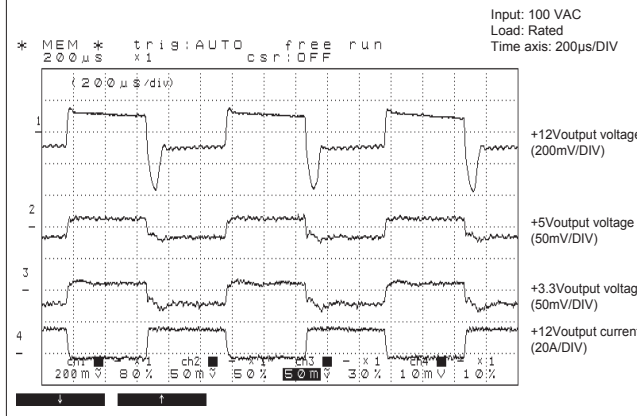
● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz

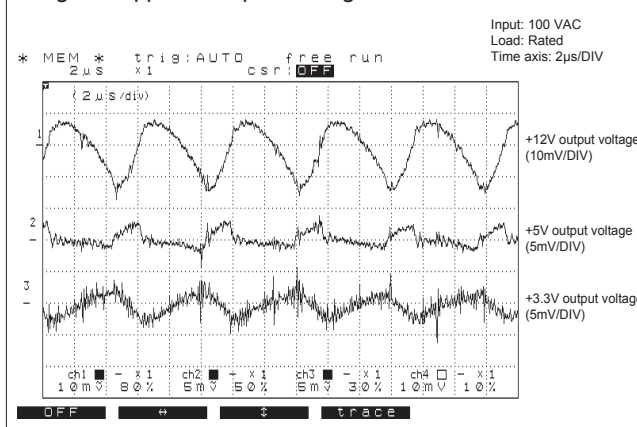


● Fig.16 Output Voltage Regulation

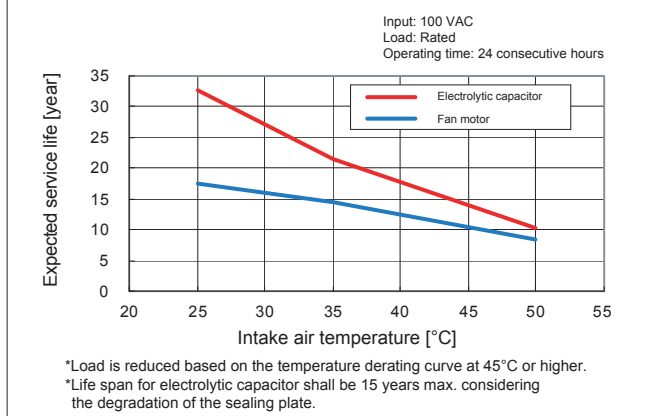
Output	Min. load	Rated load	Peak load
+12V output	0A	18A	12A
+5V output	0A	16A	12A
+3.3V output	0A	11.5A	10A

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	3.403 V	3.403 V	3.403 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

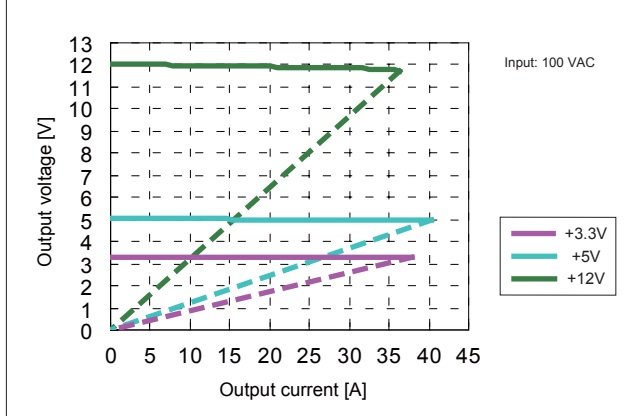
● Fig.17 Ripple and Spike Voltage



● 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