

# Desktop PC Power Supply eNSP3-450P Series

0A Min. Load Current for All Outputs, High Power Nonstop Power Supply



eNSP3-450P-S20-H1V

**RoHS  
Directive**

<b>ATX</b>	
<b>NSP</b> (nonstop power supply)	
Continuous Max. <b>350W</b>	Peak Power <b>450W</b>

Model	Description	Stock
eNSP3-450P-S20-H1V	With RS232C signal unit	Standard stock
eNSP3-450P-S20-H2V	With buzzer unit	Contact us
eNSP3-450P-S20-H6V	With USB signal unit	Standard stock
eNSP3-450P-S20-H0V	No signal unit	Contact us
eNSP3-450P-C20-H1V	CCC approved and with RS232C signal unit	Standard stock
eNSP3-450P-C20-H2V	CCC approved and with buzzer unit	Contact us
eNSP3-450P-C20-H6V	CCC approved and with USB signal unit	Standard stock

<b>■ Model Name Coding</b> <b>eNSP3 - 450 P - * 2 0 - H * V</b> ①      ②      ③      ④ ⑤ ⑥      ⑦ ⑧ ⑨			1. Series name 2. Output power 3. Peak output compliant	4. S: Standard, C: CCC approved 5. DC input voltage (battery voltage) 24V type 6. Modification code 7. Nonstop circuit embedded	8. Type of signal unit (1: RS232C signal unit, 2: buzzer unit 6: USB signal unit, 0: no signal unit) 9. Silent type (thermal-sensing variable speed fan embedded)
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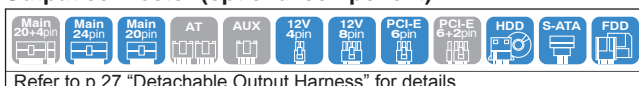
## Features

- With backup function, it protects your PC from blackout.
- Completely independent voltage-stabilizing circuit is mounted for all outputs. Min. load current is 0A for all outputs.
- High capacity peak output: 450W
- 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.
- CCC approved (eNSP3-450P-C20 series)

## Dimensions

W×H×D (mm)	150×86×140 (PS/2 size)
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## Output connector (optional component)



Refer to "Product Page Guideline" on p.13

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

\*CCC: only eNSP3-450P-C20-H\*V

## Function

DC start	RS 232C	USB	TTL	PFC	Silence	5VSB FAN	TSFC FAN	Connection	RoHS
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\*RS232C: only eNSP3-450P-\*20-H1V  
 \*USB: only eNSP3-450P-\*20-H6V

## Automatic shutdown compliant OS



## Input

AC input	85 - 264V (worldwide range)
DC input	24V (dedicated battery package*)

\*Battery package is optional (sold separately).

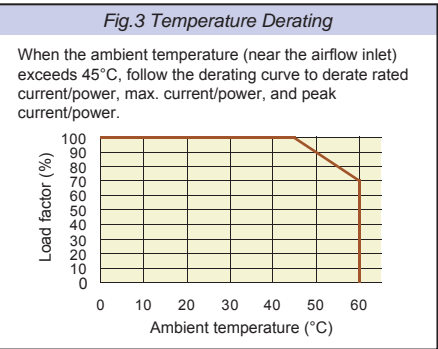
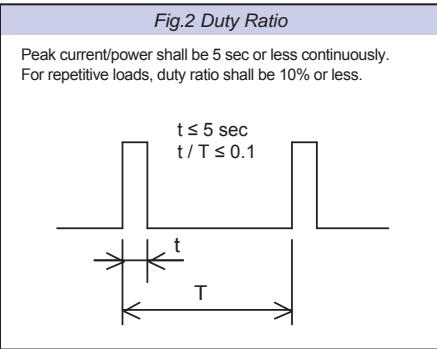
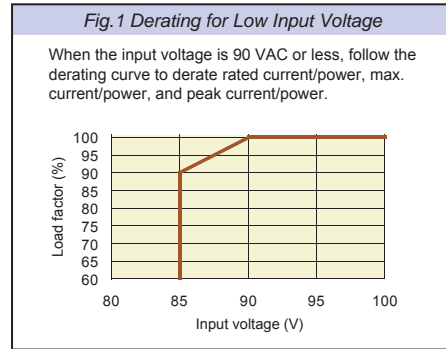
## Output

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 432W				
Total 450.5W					
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

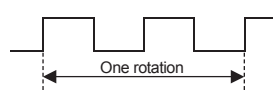
Items		Specification					Measurement conditions, etc.	
AC Input	Rated Voltage	100 - 240 VAC (85* - 264 VAC), Startup voltage: 80±10 VAC					Worldwide range, *Refer to Fig.1	
	Input Frequency	50 / 60Hz					47 - 63Hz	
	Efficiency	73% typ. (100 VAC), 77% typ. (240 VAC) *Characteristic data: Fig.4					At 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)	
DC 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	24 VDC (corresponds to dedicated battery package)					No battery startup	
	Battery Discharge Cut-off Voltage	17V typ. (shutdown of battery circuit)						
Output	Efficiency (at Battery Operation)	73% typ.					At rated input/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: 450.5W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.2	
		334W max.						
	Min. Current	0A						
		200W max.						
	Total Voltage Accuracy (%)	±4 max.					Total accuracy of temperature, input, and load fluctuations	
Max. Ripple Voltage (mVp-p)	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.							
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.	
	Recovery (Overcurrent)	Method	All outputs except for +5VSB shutdown All outputs shutdown at battery operation			Fold back current limiting		Same as +3.3, +5, +12V
		At AC Operation	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		
	Overvoltage Protection	At Battery Operation	Reclosing AC input			Automatic recovery		Reclosing AC input
OVP Point (V)		3.76 - 4.3	5.74 - 7.0	13.4 - 15.6	-	-		
Recovery (Overvoltage)	Method	All outputs except for +5VSB shutdown All outputs shutdown at battery operation			-	-		
	At AC Operation	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			-	-		
Charge	At Battery Operation	Reclosing AC input			-	-		
	With Dedicated Ni-MH Battery Connected	Charge voltage	35V max. (automatically switches to the voltage that complies with the dedicated battery)					
Environment	With Dedicated Lead Battery Connected	Charge current	0.7A max. (microcomputer with charge control function is embedded on the battery.)					
	Operating Temp. / Humidity	Charge voltage	27.3V typ. (at 25°C with fully-charged battery, thermal compensation)					
Insulation	Storage Temp. / Humidity	Charge current	0.5±0.2A (at 24V battery voltage)					
	Vibration	Operating Temp. / Humidity	0 to 60°C* / 10 to 90%					
	Mechanical Shock	Storage Temp. / Humidity	-25 to 70°C / 10 to 95%					
	Dielectric Strength	Vibration	Displacement amplitude: 0.075mm (10-55Hz), Sweep cycles: 10, Test duration: 45 minutes each axis					
EMC	Insulation Resistance	Mechanical Shock	Lift one bottom edge up to 50mm and let it fall. Number of bumps: 3 each of 4 edges					
	Leakage Current	Dielectric Strength	AC input - DC output/FG/DC input: 1500 VAC for 1 minute					
	Line Noise Immunity	Insulation Resistance	AC input - DC output/FG/DC input: 50MΩ min.					
	Electrostatic Discharge	Leakage Current	0.5mA max. (100 VAC) / 1mA max. (200 VAC) *Characteristic data: Fig.7					
	Radiated, Radio-Frequency EM Field	Line Noise Immunity	±2000V (pulse width: 100/1000ns, repetitive cycle: 30-100Hz, normal/common mode with pos./neg. polarity for 10 minutes)					
	Fast Transient Burst	Electrostatic Discharge	EN61000-4-2 compliant					
	Lightning Surge	Radiated, Radio-Frequency EM Field	EN61000-4-3 compliant					
RF Conducted Immunity	Fast Transient Burst	EN61000-4-4 compliant						
Magnetic Field Immunity	Lightning Surge	EN61000-4-5 compliant						
Voltage Dip / Regulation	RF Conducted Immunity	EN61000-4-6 compliant						
Conducted Emission	Magnetic Field Immunity	EN61000-4-8 compliant						
Harmonic Current Regulation	Voltage Dip / Regulation	EN61000-4-11 compliant						
Others	Safety Standard	Conducted Emission	VCCI-B, FCC-B, EN55022-B, CISPR22-B compliant *Characteristic data: Fig.8 and 9					
	Cooling System	Harmonic Current Regulation	IEC61000-3-2 (Ver.2.1) Class D, EN61000-3-2 (A14) Class D compliant					
	Output Grounding	Safety Standard	UL60950, CSA C22.2 No.60950 (c-UL), EN60950, CE Marking (LVD, EMC)					
	Output Hold-up Time	Cooling System	Forced air cooling: fan control can be switched between thermal-sensing variable speed and stabilized full rotation modes.					
Reliability Grade	Output Grounding	Connected chassis (FG)*						
MTBF	Output Hold-up Time	PWR_OK holds up 16ms min. after AC failure *Characteristic data: Fig.14						
Weight	Reliability Grade	FA (industrial equipment grade, double-sided through hole PCB)						
Warranty	MTBF	83,000H min.						
	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.						



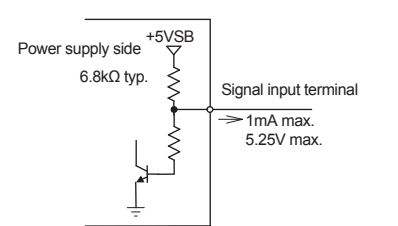
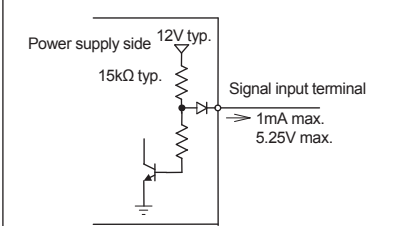
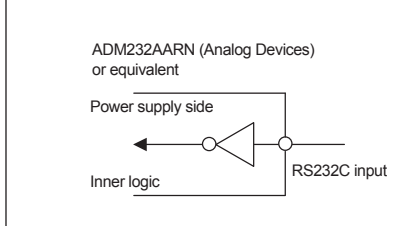
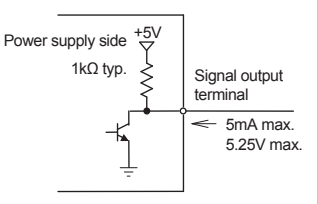
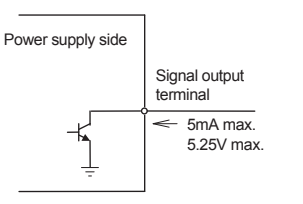
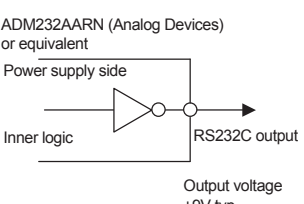
# Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

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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. (During the backup operation, battery 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.)
	Battery Shutdown Signal for TTL (SHUT_DOWN_T)	Battery connection is shutdown with 'L' input (60ms min. input). (available only during the backup operation)	Signal input between the pin 2 of SIG connector and COM pin
	Battery Shutdown Signal for RS232C (SHUT_DOWN_R)	Battery connection is shutdown with 'positive (+2.4V min.)' input (60ms min. input). (available only during the backup operation)	Apply to only eNSP3-450P-*20-H1V The pin 4 of front panel RS232C 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
	Blackout Detection Signal for TTL (AC_FAIL_T)	The signal goes 'OPEN' at low AC input voltage and blackout detection (open collector output). (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 eNSP3-450P-*20-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 eNSP3-450P-*20-H6V Front panel USB connector
	Low Battery Voltage Signal for TTL (BATT_LOW_T)	The signal goes 'OPEN' when the battery terminal voltage decreases to 19V typ. (open collector output). 'L' is delivered when the battery package is not connected.	The pin 3 of SIG connector
	Low Battery Voltage Signal for RS232C (BATT_LOW_R)	'Negative (-9V typ.)' is delivered when the battery terminal voltage decreases to 19V typ. ('positive (+9V typ.)' is delivered when the battery package is not connected.)	Apply to only eNSP3-450P-*20-H1V The pin 1 of front panel RS232C connector
	Low Battery Voltage Signal for USB (BATT_LOW_U)	The equivalent data signal of BATT_LOW_R 'negative' is delivered when the battery terminal voltage decreases to 19V typ. (The equivalent data signal of BATT_LOW_R 'positive' is delivered when the battery package is not connected.)	Apply to only eNSP3-450P-*20-H6V Front panel USB connector
	Buzzer Noise	Buzzer noise is delivered at blackout (the volume can be adjusted). Note: The buzzer may go off for a few seconds when AC input is turned on or interrupted.	Apply to only eNSP3-450P-*20-H2V
	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.	

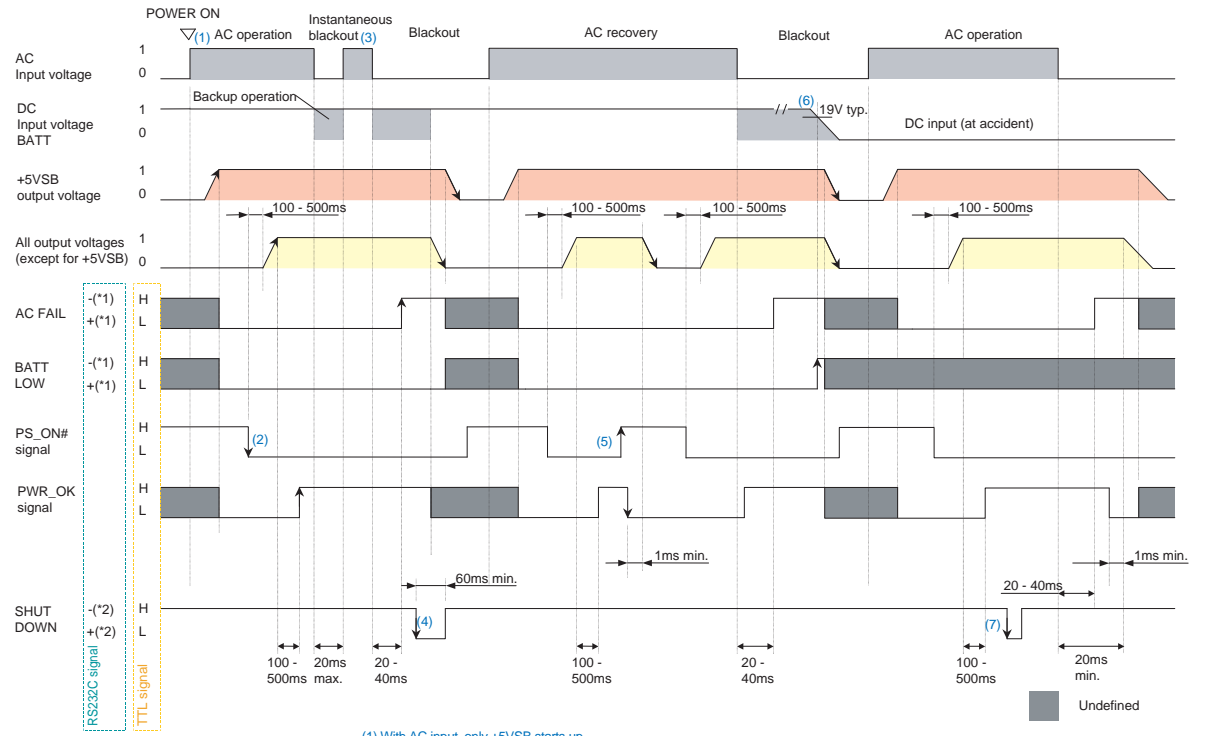
## Signal Circuit

	(PS_ON#)	(SHUT_DOWN_T)	(SHUT_DOWN_R) Apply to only eNSP3-450P-*20-H1V
Input Signal Circuit	 (L' ≤ 0.8V, 2.0V ≤ H')	 (L' ≤ 0.4V, 2.4V ≤ H')	
Output Signal Circuit	 (L' < 0.4V)	 (L' < 0.4V)	 Output voltage ±9V typ.
		(AC_FAIL_U), (BATT_LOW_U)	(AC_FAIL_U), (BATT_LOW_U) Apply to only eNSP3-450P-*20-H6V

## Internal Structure



# Sequence Diagram eNSP3-450P-S20-H1V connected w/ dedicated battery package

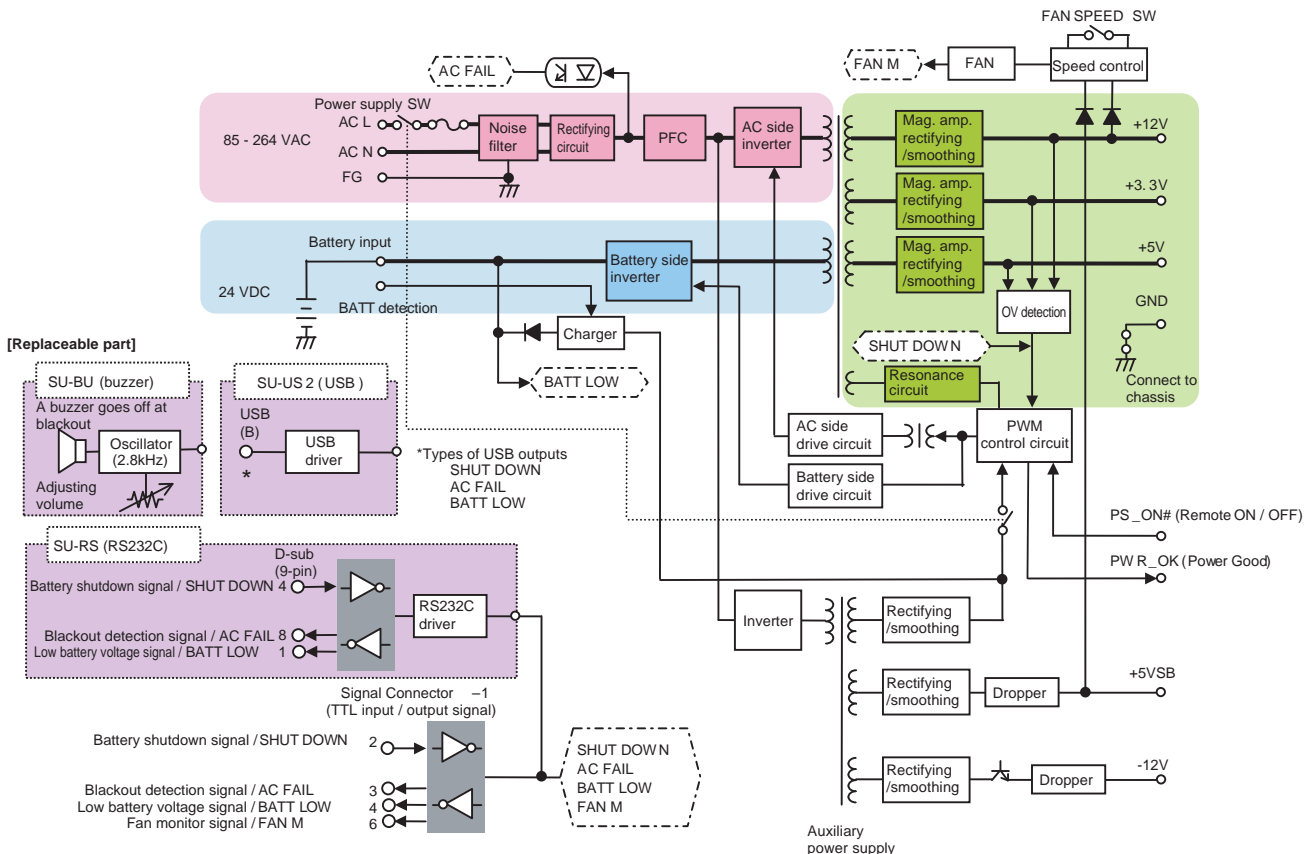


(\*1)  
Negative signal output is -9V typ.  
Positive signal output is +9V typ.

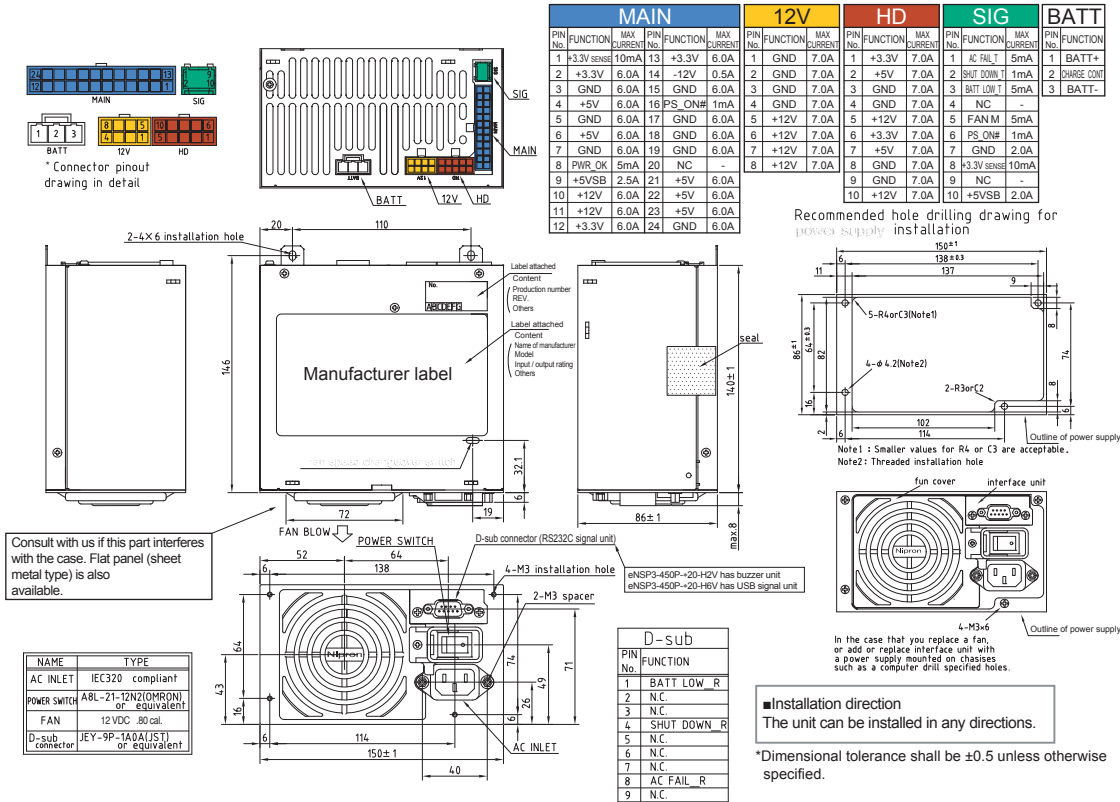
(\*2)  
Negative signal input should be +0.4V to -20V.  
Positive signal output should be +2.8V to +20V.

- (1) With AC input, only +5VSB starts up.
- (2) With PS\_ON# 'L' input, all outputs start up. After 100 - 500ms, PWR\_OK goes 'H'.
- (3) AC FAIL 'negative (RS232C)' and 'H (TTL)' are delivered 20 - 40ms after blackout.
- (4) At blackout, all outputs including +5VSB shut down with SHUT DOWN 'positive (RS232C)' or 'L (TTL)' input of 60ms min.
- (5) When AC input and all outputs including +5VSB start up, all outputs except for +5VSB shutdown with PS\_ON# 'H'.
- (6) When the battery voltage decreases to 19V typ. at backup operation, BATT LOW 'negative (RS232C)' and 'H (TTL)' are delivered; after it decreases to 17V typ., all outputs including +5VSB shutdown.
- (7) At AC input, the output does not change even SHUT DOWN 'positive (RS232C)' or 'L (TTL)' input.

# Block Diagram



# Outline Drawing



## Optional Components Sold Separately

Detachable Output Harness		Length and Type of Connector		Output Port Allocation	
Model					
<b>Main power cable</b> MAIN					
WH-M2024-500	MAIN	500±15	20-pin		
WH-M2424-500	MAIN	500±15	24-pin		
<b>12V power cable</b> 12V					
WH-V0808-500	12V	500±15	12V 8-pin		
WH-V0408-500	12V	500±15	12V 4-pin		
WH-VG208-500	12V	500±15	12V 4-pin PCI-E 6-pin		
WH-VV208-500-02	12V	500±10	12V 8-pin 12V 8-pin		
WH-VG208-500-02	12V	500±10	12V 8-pin PCI-E 6-pin		
<b>HD power cable</b> HD					
WH-PP610-850	HD	550±15	150±15 150±15	peripheral (HD)	
WH-PS610-850	HD	550±15	150±15 150±15	FD	
WH-PS710-850	HD	550±15 850±15	150±15 150±15	S-ATA	
<b>SIG cable</b> SIG					
WH-S0610-500	SIG	500±15	SIG-1		
WH-S0610-500-01	SIG	500±15	SIG-2		
WH-S0310-500	SIG	500±15	SIG-3		
<b>Harness set</b> 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

Battery Package					
Page	Picture	Model	Type	Shape (size)	Backup Time
P.402		BS11A-P24/2.3L(K)	Lead	5-inch bay fixed type (WxDxH=146x190x37mm)	
P.404		RBS02A-P24/2.3L(K)	Lead	5-inch bay fixed, removable type (WxDxH=146x245x42mm)	
P.405		BS12A-P24/5.0L	Lead	5-inch bay 2-unit fixed type (WxDxH=146x190x74.9mm)	
P.409		BS10A-H24/2.0L	Ni-MH	5-inch bay fixed type (WxDxH=146x200x38mm)	
P.413		BS22A-H24/2.0L	Ni-MH	5-inch bay fixed type (WxDxH=146x210x41mm)	

\*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]
	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 eNSP3-450P-*20-H1V)
	SU-US2	USB signal unit	Automatic shutdown is possible with USB. (standard equipment for eNSP3-450P-*20-H6V)
	SU-BU	Buzzer unit	Buzzer noise is delivered at blackout (the volume can be adjusted). (standard equipment for eNSP3-450P-*20-H2V)
	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.

Software			
Picture	Model	Type	Description
	NSP Pro 2	Automatic shutdown software	Dedicated to Windows 2000 / XP / Vista / 7

\*Free software "NSP Pro 2" available at our web-site  
\*The UPS service of Windows 2000 and XP available

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
WH2884	Battery extension cable (450mm)	ACC5077	PS_ON terminal short connector
WH2812	PCI-E 6-pin connector conversion harness	WH5073	PS_ON terminal short 20-pin harness

BRAIN  
Power  
Supply

Desktop PC Power Supply

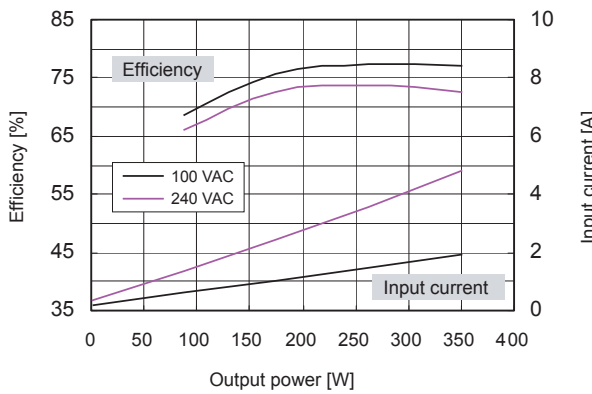
Nonstop (Uninterruptible / No Power-interruption) Power Supply

# Characteristics Data eNSP3-450-S20-H1V (Examples of actual measurement)

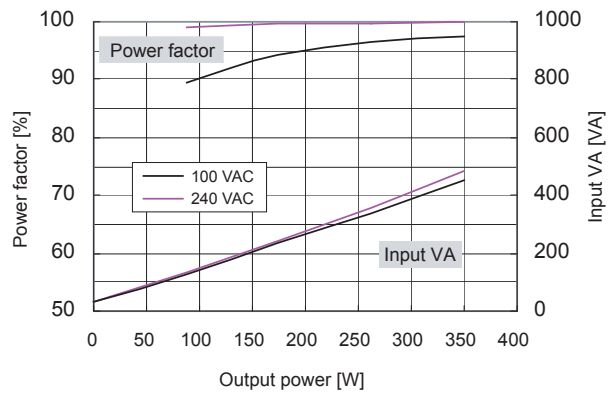
BRAIN Power Supply  
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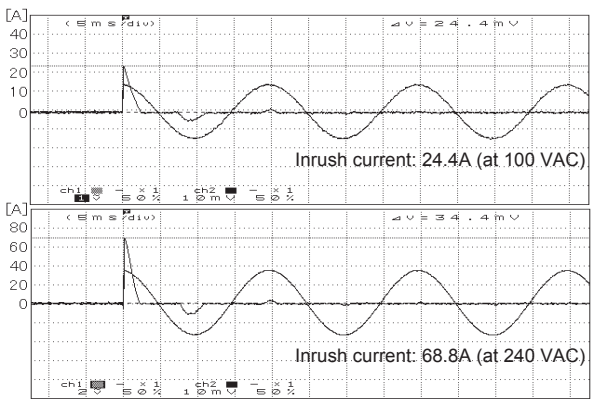
● Fig.4 Efficiency / Input Current vs. Output Power



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



● Fig.6 Inrush Current



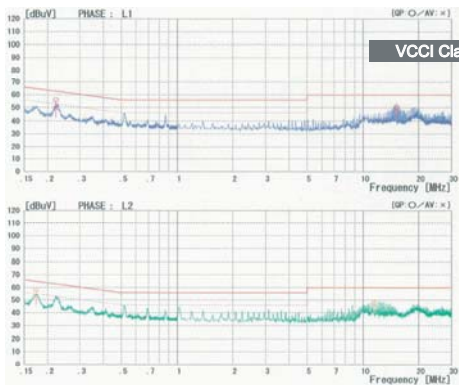
● Fig.7 Leakage Current

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

	Rated load	Min. load
100 VAC	0.29mA	0.26mA
240 VAC	0.66mA	0.64mA

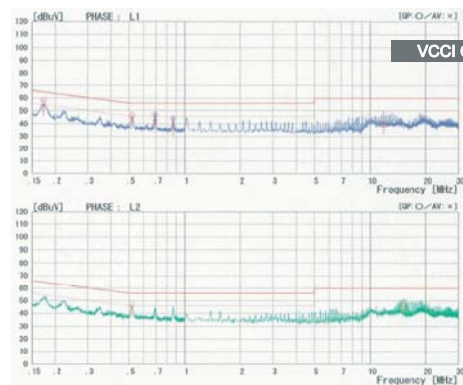
● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC  
Load: Rated  
Mode: Peak



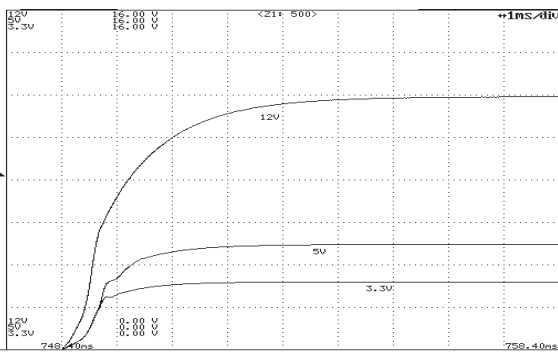
● Fig.9 Conducted Emission at 240 VAC

Input: 240 VAC  
Load: Rated  
Mode: Peak



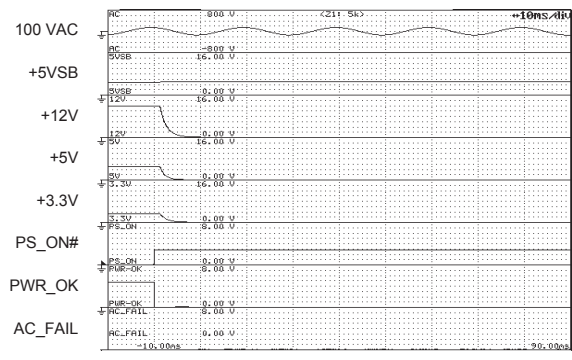
● Fig.10 Rising Characteristics at 100 VAC

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



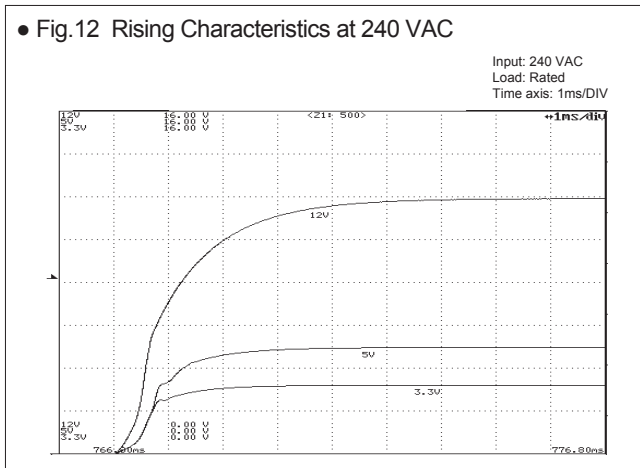
● Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

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

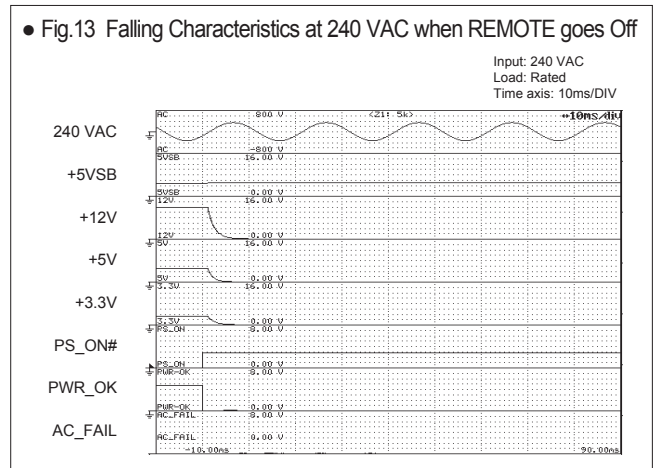


# Characteristics Data eNSP3-450-S20-H1V (Examples of actual measurement)

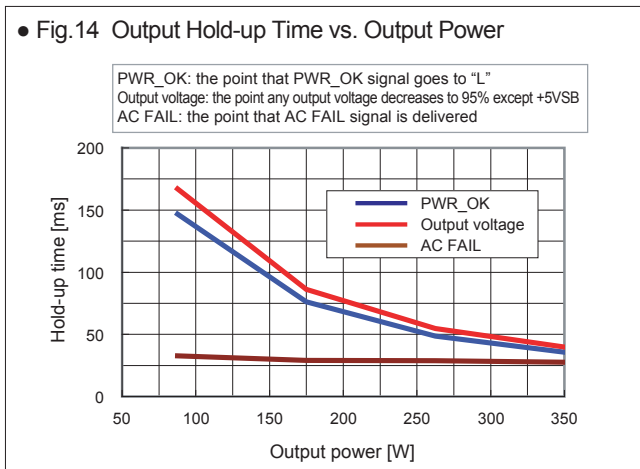
● Fig.12 Rising Characteristics at 240 VAC



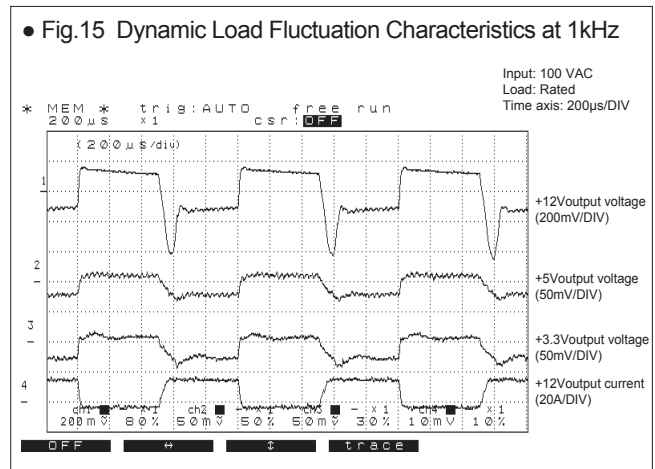
● Fig.13 Falling Characteristics at 240 VAC when REMOTE goes Off



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



● Fig.15 Dynamic Load Fluctuation Characteristics at 1kHz



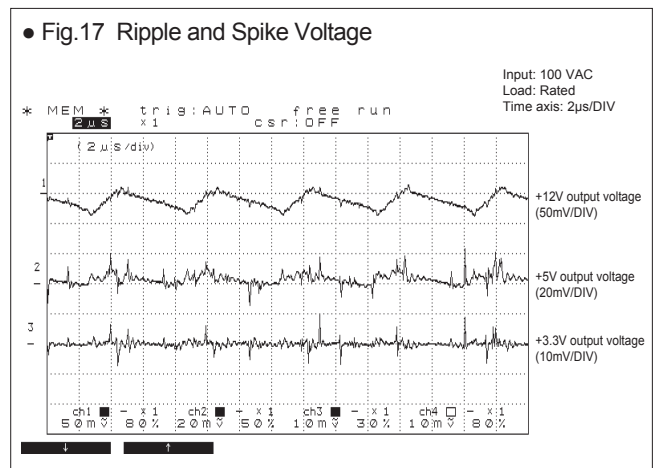
● Fig.16 Output Voltage Regulation

Output	Rated load	Min. load	Peak load
+12V output	18A	0A	15A
+5V output	16A	0A	33A
+3.3V output	11.5A	0A	30A

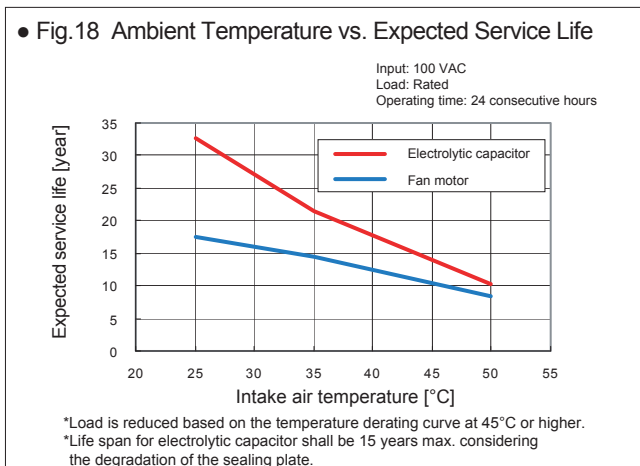
  

AC input voltage	85 VAC	100 VAC	132 VAC	176 VAC	240 VAC	264 VAC
+12V output (rated load)	12.00 V	12.00 V	12.00 V	12.00 V	12.00 V	12.00 V
+12V output (min. load)	12.15 V	12.15 V	12.15 V	12.15 V	12.15 V	12.15 V
+12V output (peak load)	11.96 V	11.95 V	11.96 V	11.95 V	11.95 V	11.95 V
+5V output (rated load)	5.00 V	5.00 V	5.00 V	5.00 V	5.00 V	5.00 V
+5V output (min. load)	5.14 V	5.14 V	5.14 V	5.14 V	5.14 V	5.14 V
+5V output (peak load)	4.91 V	4.91 V	4.91 V	4.91 V	4.91 V	4.91 V
+3.3V output (rated load)	3.30 V	3.30 V	3.30 V	3.30 V	3.30 V	3.30 V
+3.3V output (min. load)	3.42 V	3.42 V	3.42 V	3.42 V	3.42 V	3.42 V
+3.3V output (peak load)	3.20 V	3.20 V	3.20 V	3.20 V	3.20 V	3.20 V

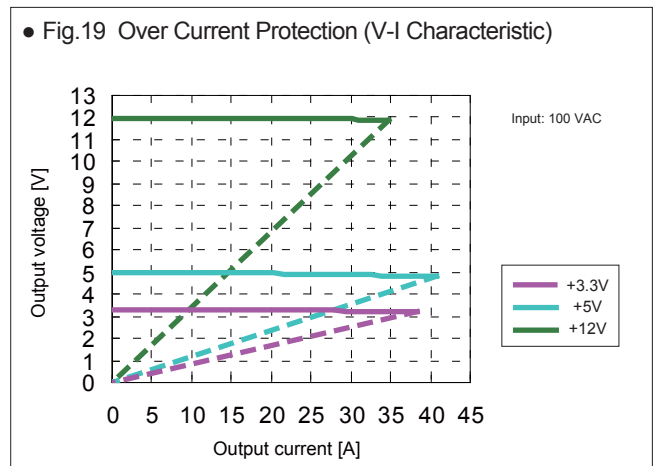
● Fig.17 Ripple and Spike Voltage



● 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