

2022 January

# Desktop PC Power Supply HN5P5-350P series



ATX Power Supply

CONTINUOUS MAX.: 240 W

PEAK POWER: 346 W



ATX power supply with a built-in lithium-ion battery

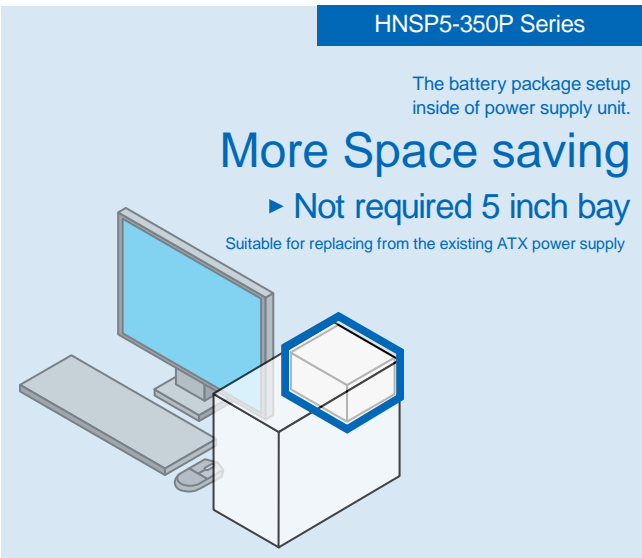
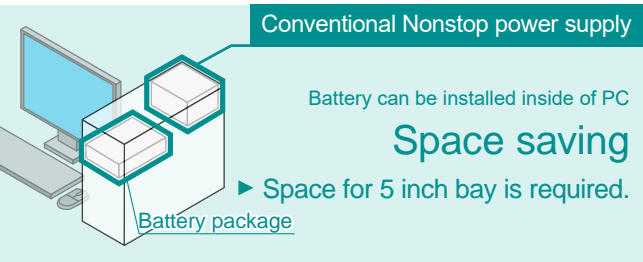
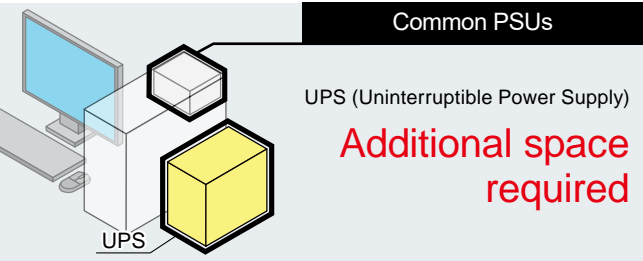
HN5P5-350P series

Continuous: 245.4W Peak: 346W



More space can be saved because of the battery package in a housing

More space can be saved compared to commonly found UPS because of the battery package in the housing. It is also possible to implement UPS function by replacing the existing ATX power supply with HN5P5-350P.



Smooth battery replacement is possible

The battery pack supports the replacement from the mounting surface of the power supply unit, making it unnecessary to disassemble the PC or removing the power supply unit from the housing.



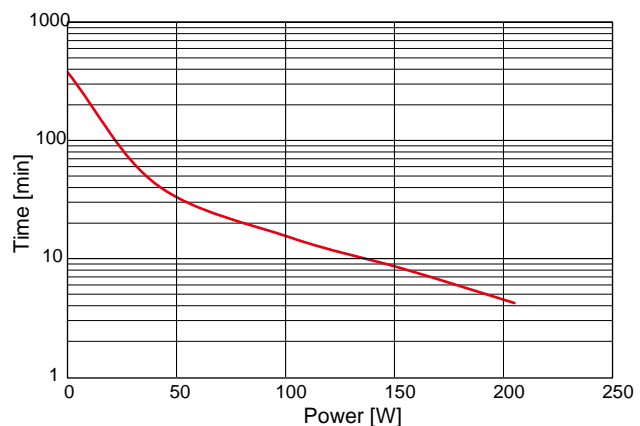
Specifications

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current/power (continuous)	12A	12A	20A	0.5A	1A
	Total 66.4W		240W	6W	5W
	Total 240.4W				
Peak current/power (within 5s)	Total 245.4W				
	22A	22A	28A	0.5A	2A
	Total 113W		336W	6W	10W
	Total 346W				
Min. load current	0A	0A	0A	0A	0A

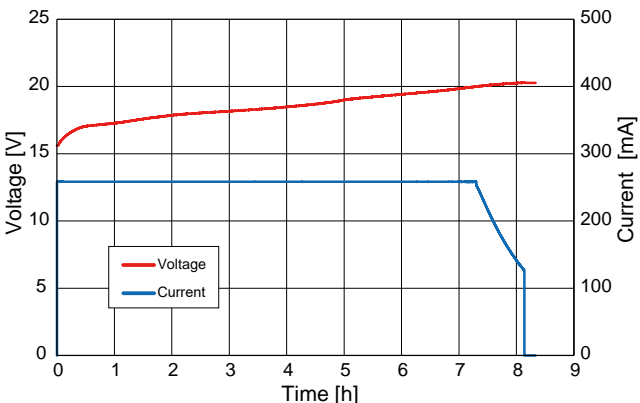
Lithium-ion battery for long time backup

While the power is normally supplied through the AC power grid, if there is a drop in the AC input voltage or a blackout, the backup power kicks in safely by switching to the built-in battery without any interruption.

Discharge time



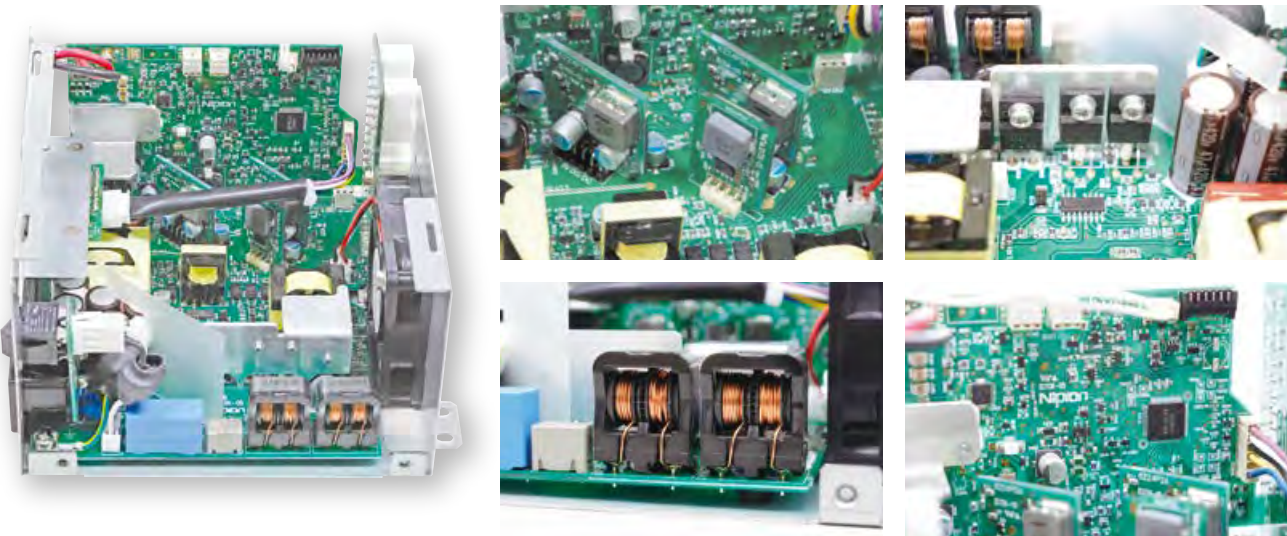
Charge time



- 1. The battery is charged only while the PS\_ON signal 'L' is input.
- 2. It is not charged when the battery temperature is below 10°C or above 50°C.
- 3. Discharge at an ambient temperature between 0°C and 50°C.

High quality and highly-reliable manufacturing

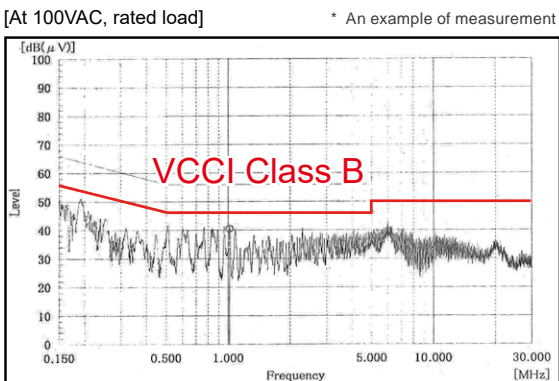
The power supply is designed with an optimum component layout, and produced in Japan. Also, in order to satisfy a variety of requirements for the power supply units from customers around the world, product evaluation tests are conducted thoroughly to find weaknesses. High reliability is achieved to enable long-term severe 24/7 operation at the rated power.



Low noise

With the enhancement of noise filter circuits and optimization of component arrangement, the conducted emission for the power supply unit alone clears VCCI Class B. Elimination of an external noise filter makes it possible to reduce the cost and man-hour.

Conducted emission characteristics



Other features

- Shutdown control signal from RS232C/USB
- Safe design which prevents screws from falling inside the power supply during battery replacement.
- Minimum load current 0A for all outputs
- Low sound noise by adopting a temperature controlled variable speed fan.



# Desktop PC Power Supply HN5P5-350P Series

ATX power supply with built-in Li-ion battery  
No external battery required!



Model	Description
HN5P5-350P-S20-B1V	With RS232C signal unit
HN5P5-350P-S20-B6V	With USB signal unit
<div>■Model Name Coding</div> <div>HN5P5-350P-S20-B*V</div> <div>① ② ③ ④⑤⑥ ⑦⑧⑨</div> <div>① Series name ② Output power ③ Peak power available ④ Standard ⑤ DC input voltage (battery voltage) 24V ⑥ Modification ⑦ Built-in Non-stop circuit ⑧ Signal unit (1: RS232C signal unit, 6: USB signal unit) ⑨ Low sound noise (Equipped with thermal-sensing variable speed fan)</div>	

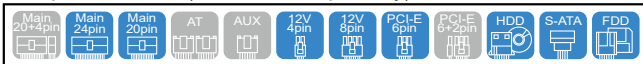
## Features

- More space can be saved because of the battery package in a housing
- Double-sided through hole PCB suitable for industrial use.
- Achieved low noise and low leakage current
- Min. load current is 0A for all outputs.
- By building in the thermal-sensing variable speed fan, noise reduction can be realised.
- Signal for shutdown control by RS232C / USB

## Dimension

W×H×D (mm)	150×85×140
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## Output connector (cables sold separately)



Safety standard	UL	CSA	EN	CE	CCC
Reliability grade	HFA	FA	HOA	OA	

## Function



## Input

AC input	85-264 VAC (Worldwide range, with PFC)
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## Output

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Max. current/ max. power (continuous)	12A Total 66.4W	12A Total 66.4W	20A 240W	0.5A 6W	1A 5W
Peak current/ peak power (within 5s)	22A Total 113W	22A Total 113W	28A 336W	0.5A 6W	2A 10W
Max. current/ max. power (continuous) at backup	12A Total 66.4W	12A Total 66.4W	16A 192W	0.5A 6W	2A 10W
Min. current	0A	0A	0A	0A	0A

## General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

Items			Specification					Measurements conditions, etc.
AC Input	Rated Voltage		100-240VAC (85~264VAC)					Worldwide range *See <Fig.1> Low input voltage derating.
	Input Frequency		50/60Hz					Frequency range 47-63Hz
	Efficiency		84% typ (100VAC), 88% typ (240VAC) *Characteristic data: Fig.4					At rated output
	Power Factor		96% min. (100VAC),90% min. (240VAC) *Characteristic data: Fig.5					
	Inrush Current *1		50A peak (100VAC), 100A peak (240VAC) *Characteristic data: Fig.6					At rated output, cold start (25°C) Reclosing interval of 60 s or longer
	Input Current		2.9A typ (100VAC), 1.2A typ (240VAC) *Characteristic data: Fig.4					Rated output when charging
Rated Battery	Rated Voltage		18V					Lithium-ion battery
	Rating Capacity		2500mAh					State of Charge at shipment: 30% max.
	Safety Standard of Battery		IEC62133, UN38.3					
Output	Rated Voltage		+3.3V	+5V	+12V	-12V	+5VSB	Standard value at measuring of input/output characteristics Max. output power: 245.4W Refer to the derating condition
	Rated Current		8A	8A	14A	0.5A	1A	
	Max. Current / Power		12A	12A	20A	0.5A	1A	
			66.4W max.		240W	6W	5W	
			240.4W max.					
			245.4W max.					
	Peak Current / Power		22A	22A	28A	0.5A	2A	
			113W max.		336W	6W	10W	
			336W max.					
			346W max.					
	Rated Current at Backup Operation		6A	6A	12A	0.5A	1A	Peak output power: 346W Time: 5 sec or less Duty ratio of repetitive load: 10% or less (Refer to <Fig.2> Duty Ratio.)
	Max. Current / Power at Backup Operation		12A	12A	16A	0.5A	2A	
			66.4W max.		192W	6W	10W	
			200W max.					
			205W max.					
Min. Current		0A	0A	0A	0A	0A		
Total Voltage Accuracy (%)		±5 max.	±5 max.	±5 max.	±10 max.	±5 max.	Accuracy against output voltage value including temperature and time lapse drifts as well as input/load regulation.	
Max. Ripple Voltage (mVp-p)		50 max.	50 max.	120 max.	120 max.	50 max.	Connect an electrolytic capacitor (47μF) and a ceramic capacitor (0.1μF) on the test board and measure with an oscilloscope of 100MHz bandwidth. The test board shall be separated from load wires and within 150mm from the output terminals. *Characteristic data: Fig.17	
Max. Spike Voltage (mVp-p)		100 max.	100 max.	200 max.	200 max.	100 max.		
Protection	Over Current Protection	OCP point (A)	23 min.	23 min.	29 min.	Short circuit protection		No loads except for the measured voltage
		Method	All outputs of +3.3V, +5V, +12V and -12V are shut down.			Hold down current limiting	All outputs shut down	All outputs shut down if +5VSB is short (automatic recovery)
		Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		AC input re-entry time interval is 270s or longer
	Over Current Protection at Backup Operation	OCP point (A)	23 min.	23 min.	20 min.	Short circuit protection		No loads except for the measured voltage
		Method	All outputs shut down.			Hold down current limiting	All outputs shut down	All outputs shut down if +5VSB is short (automatic recovery)
		Recovery	Reclosing AC input, and switching PS_ON# signal from 'H' to 'L'			Automatic recovery	Reclosing of AC input	
Over Voltage Protection	OVP point (V)	3.7~4.3	5.7~7.0	13.4~15.6	—	—	AC input re-entry time interval is 270s or longer	
	Method	All outputs of +3.3V, +5V, +12V and -12V are shut down.			—	—		
	Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			—	—		
Environment	Operating Temp./ Humidity		0-60°C/10-90%					*Refer to <Fig.3> Temperature derating. No condensation
	Storage Temp./Humidity *2		-20-70°C/10-90%					No condensation
	Vibration		2G, 10-55Hz, 10 sweep cycles in each X, Y, Z direction					Follow JIS-C-60068-2-6 at no operation
	Mechanical Strength		Lift one bottom edge 50mm high with the opposite edge placed on a test bench, and let it fall. Repeat 3 times on the other three edges as well, and no malfunction shall be observed.					Follow JIS-C-60068-2-31 at no operation
Insulation	Dielectric Strength		AC input - FG/DC output: 1500 VAC for 1 minute					Cut-off current 10mA
	Insulation Resistance		AC input - FG/DC output: 50MΩ min.					At 500VDC
	Leakage Current		0.2mA max. (100 VAC) / 0.4mA max. (200 VAC) / 0.5mA max. (240 VAC) *Characteristic data: Fig.7					
EMC	Line Noise Immunity		±2,000V (pulse width of 100/1000ns, cycle period of 30 to 100Hz, normal/common mode with positive/negative polarity for 10 minutes)					There shall be no fluctuation of DC output or malfunction.
	Electrostatic Discharge		EN61000-4-2 compliant					
	Radiated, Radio-Frequency, Electromagnetic Field		EN61000-4-3 compliant					
	Fast Transient Burst		EN61000-4-4 compliant					
	Lightning Surge		EN61000-4-5 compliant					
	Radio Frequency Conducted Immunity		EN61000-4-6 compliant					
	Power-Frequency Magnetic Field Immunity		EN61000-4-8 compliant					
	Voltage dips/Regulation		EN61000-4-11 compliant					
	Conducted Emmission		VCCI/FCC/CISPR22-B/EN55022 class B compliant *Characteristic data: Fig.8, 9					To be measured on the single power supply
Others	Harmonic Current Regulations		IEC 61000-3-2 class D compliant					At rated input and load
	Safety Standard		UL62368, CSA62368 (c-UL) approved, EN62368, PSE (Ordinance item 2) compliant, CE Marking					Class I equipment: Embedded type power supply
	Cooling System		Forced air cooling: thermal-sensing variable speed fan embedded					Fan speed changes according to operating temp. and load condition. Maximum rotation during backup operation.
	Output Grounding		Connected chassis (FG)					
	Reliability Grade		FA (Industrial equipment grade to use double-sided PWBs with through holes)					Original design category
	MTBF		50,000 H min					Based on EIAJ RCR-9102
	Weight		1.7 kg typ					
Warranty		Three years after delivery: If any defects belong to us, the defective unit shall be repaired or replaced at our cost.					Except for errors caused by operation not specified in this specification.	

\*1 Charging current equal to or less than 100μs into X-capacitor in input filter circuit shall not be defined as inrush current.

\*2 Re-charging once at least per year (or 6 months if available) is required for 6 months or longer storage.

When re-charging is not conducted beyond the period, the battery may not recover enough capacity.

1 year or less storage : -20 to lower than +20°C/10-95%

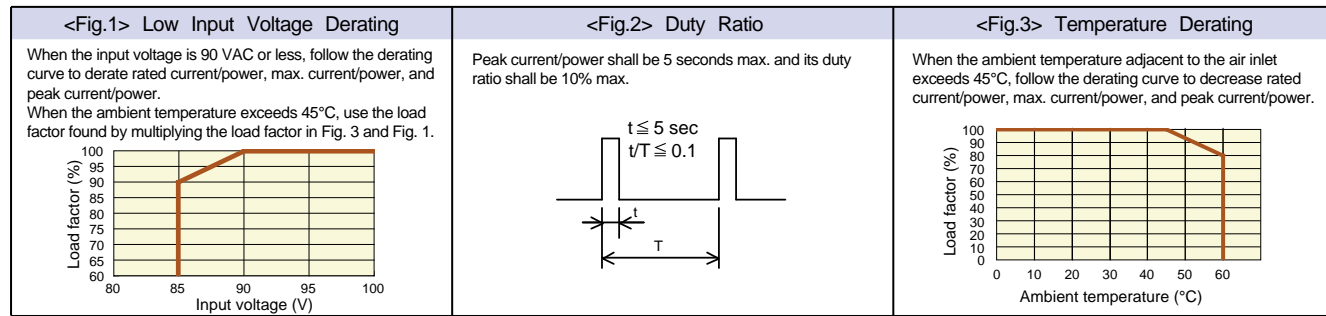
Within 90 days storage : -20 to lower than +40°C/10-95%

Within 30 days storage : -20 to lower than +50°C/10-95%

If the storage temperature exceeds 50°C, the battery shall be stored separately.

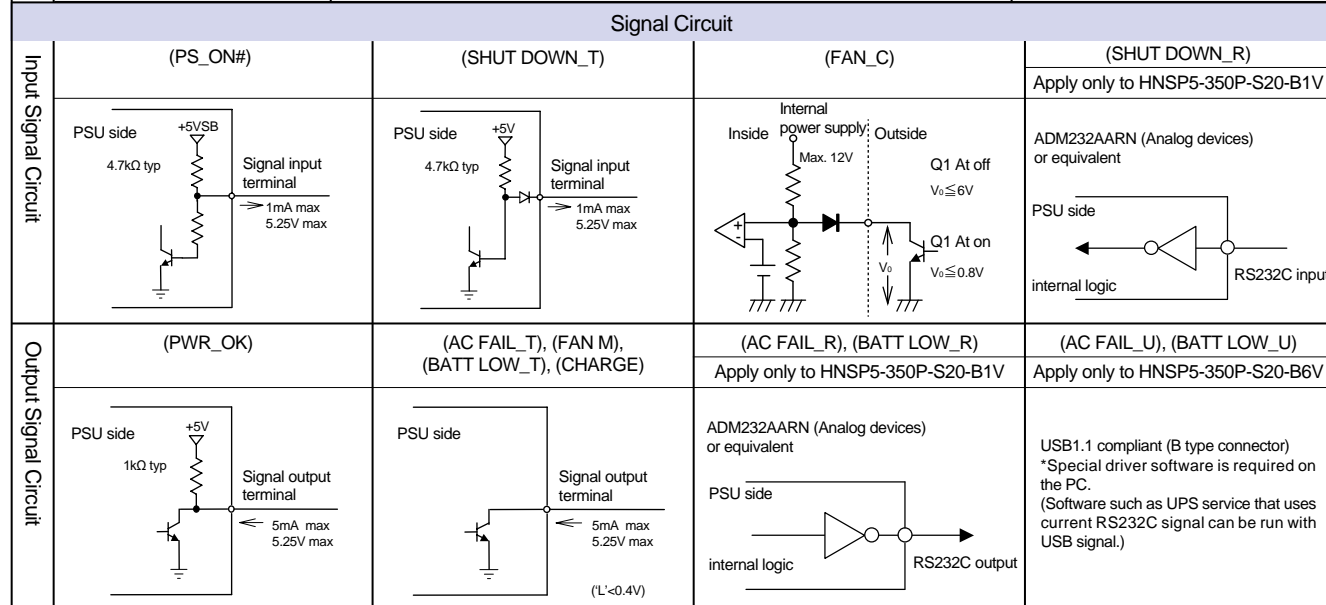
When the input voltage is applied after long term storage, the power supply may charge the battery for about 8 hours.

## General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

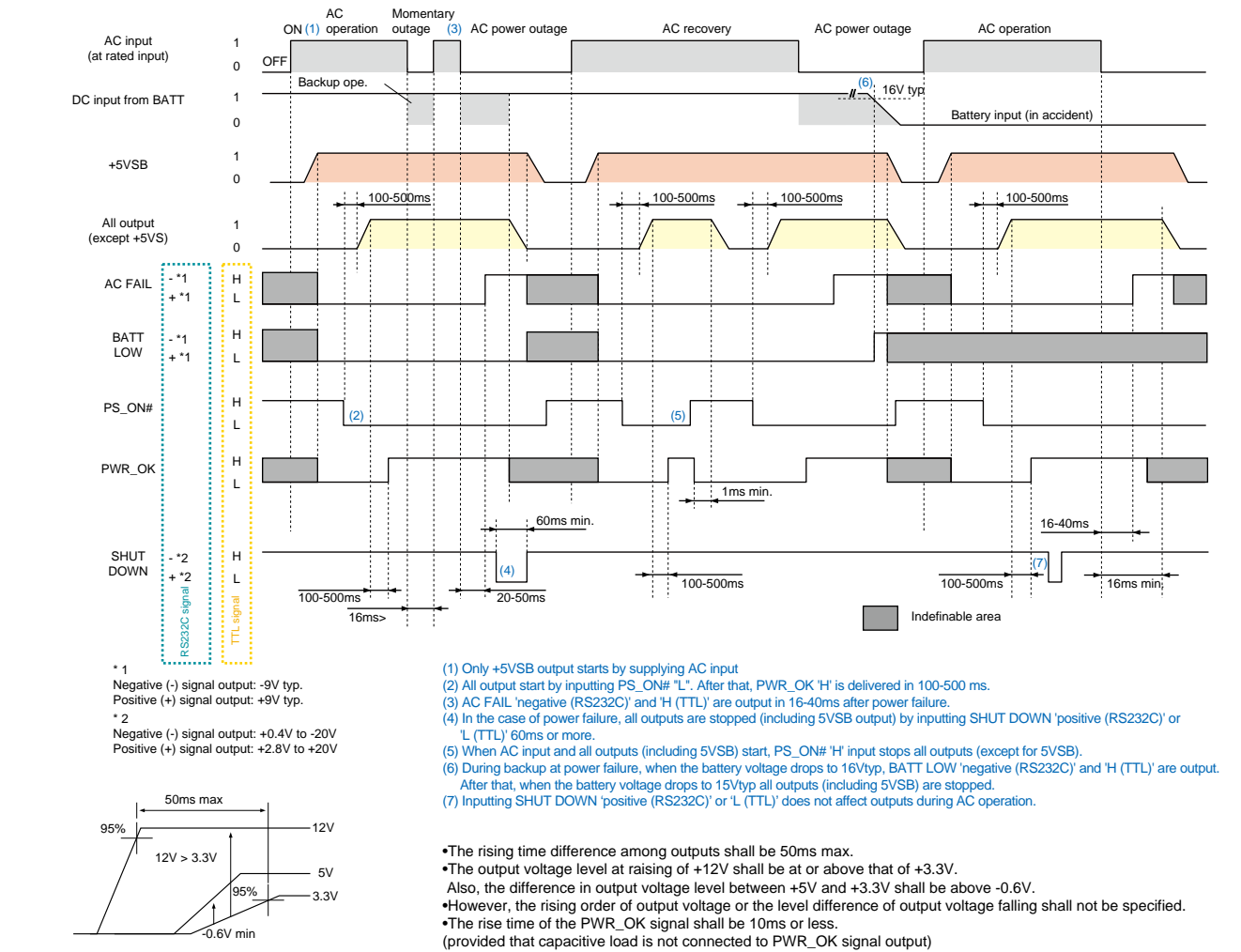


## Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

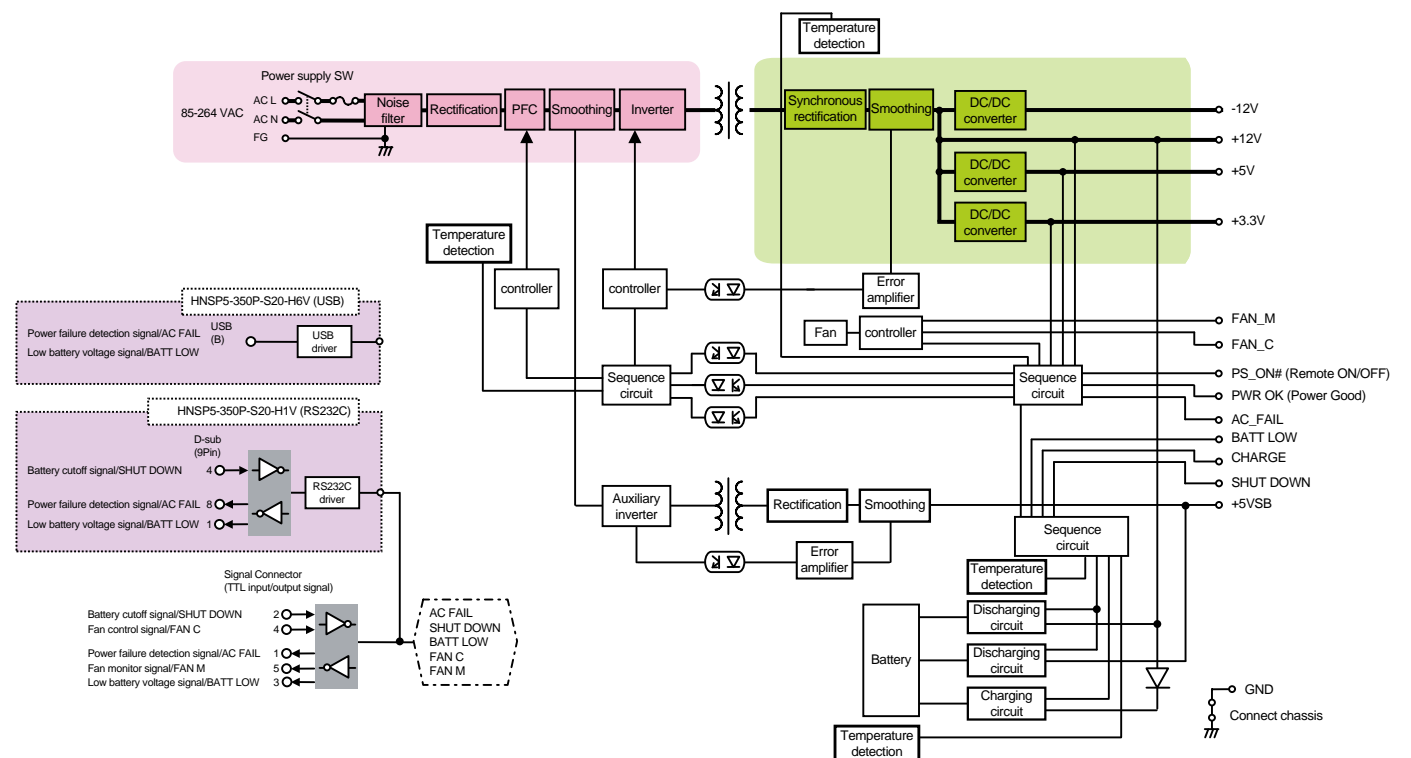
	Items	Specification	Note
Input Signal	Output ON/OFF control signal (PS_ON#)	+3.3V, +5V, +12V and -12V outputs will turn on at 'L' input. +3.3V, +5V, +12V and -12V outputs shut down at 'H' or 'OPEN' input. (Battery connection shuts off when 'H' or 'OPEN' is received at backup operation.)	MAIN1 connector 22 pin, SIG connector 6 pin
	+3.3V SENSE	Input terminal for voltage detection of +3.3V; voltage drop of +side output cable is compensated when connected to load end.	MAIN1 connector 2 pin
	Battery shutdown signal for TTL (SHUT_DOWN_T)	Battery connection shuts off at 'L' input with 60ms or longer. (Valid only at battery backup operation)	SIG connector 2 pin
	Battery shutdown signal for RS232C (SHUT_DOWN_R)	Battery connection shuts off with 'positive (2.4V or higher)' input. (60ms or longer)	Apply only to HN5P5-350P-S20-B1V Front panel RS232C connector 4 pin
	Fan control signal (FAN_C)	Control terminal of a fan motor. Fan motor operates at a maximum speed upon receipt of 'L'. (Disabled during battery backup operation)	SIG connector 4 pin
Output Signal	Normal output signal (PWR_OK)	'H' is delivered when +5V output is ON.	MAIN1 connector 21 pin
	Fan monitoring signal (FAN_M)	Two pulses per rotation of individual motors are delivered. Duty ratio of square wave shall be 0.5 (typical). (Interval between the signals becomes longer at low speed and shorter at high speed.) The signal stops 'L' or 'OPEN' when the fan stops operating due to malfunction.	SIG connector 5 pin 
	Power failure detection signal for TTL (AC_FAIL_T)	'OPEN' is delivered at low AC input voltage or power failure. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after power failure at rated input/output)	SIG connector 1 pin At rated output
	Power failure detection signal for RS232C (AC_FAIL_R)	'-9V typical' is delivered at low AC input or power failure detection. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after power failure at rated input/output)	Apply only to HN5P5-350P-S20-B1V Front panel RS232C connector 8 pin At rated output
	Power failure detection signal for USB (AC_FAIL_U)	Data signal equivalent to 'Negative' of AC_FAIL_R signal is delivered at low AC input or power failure detection. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after power failure at rated input/output)	Apply only to HN5P5-350P-S20-B6V Front panel USB connector At rated output
	Low battery voltage signal for TTL (BATT_LOW_T)	'OPEN' is delivered when battery terminal voltage falls down to 16V typical. ('OPEN' is delivered when a battery pack is not connected)	SIG connector 3 pin
	Low battery voltage signal for RS232C (BATT_LOW_R)	'-9V typical' is delivered when battery voltage falls down to 16V typical. ('-9V typical' is delivered when a battery pack is not connected.)	Apply only to HN5P5-350P-S20-B1V Front panel RS232C connector 1 pin
	Low battery voltage signal for USB (BATT_LOW_U)	Data signal equivalent to 'Negative' of BATT_LOW_R signal is delivered when battery voltage falls down to 16V typical. (Data signal equivalent to 'Negative' of BATT_LOW_R signal is delivered when a battery pack is not connected.)	Apply only to HN5P5-350P-S20-B6V Front USB connector
	CHARGE	'L' is delivered when charging a battery.	SIG connector 8 pin



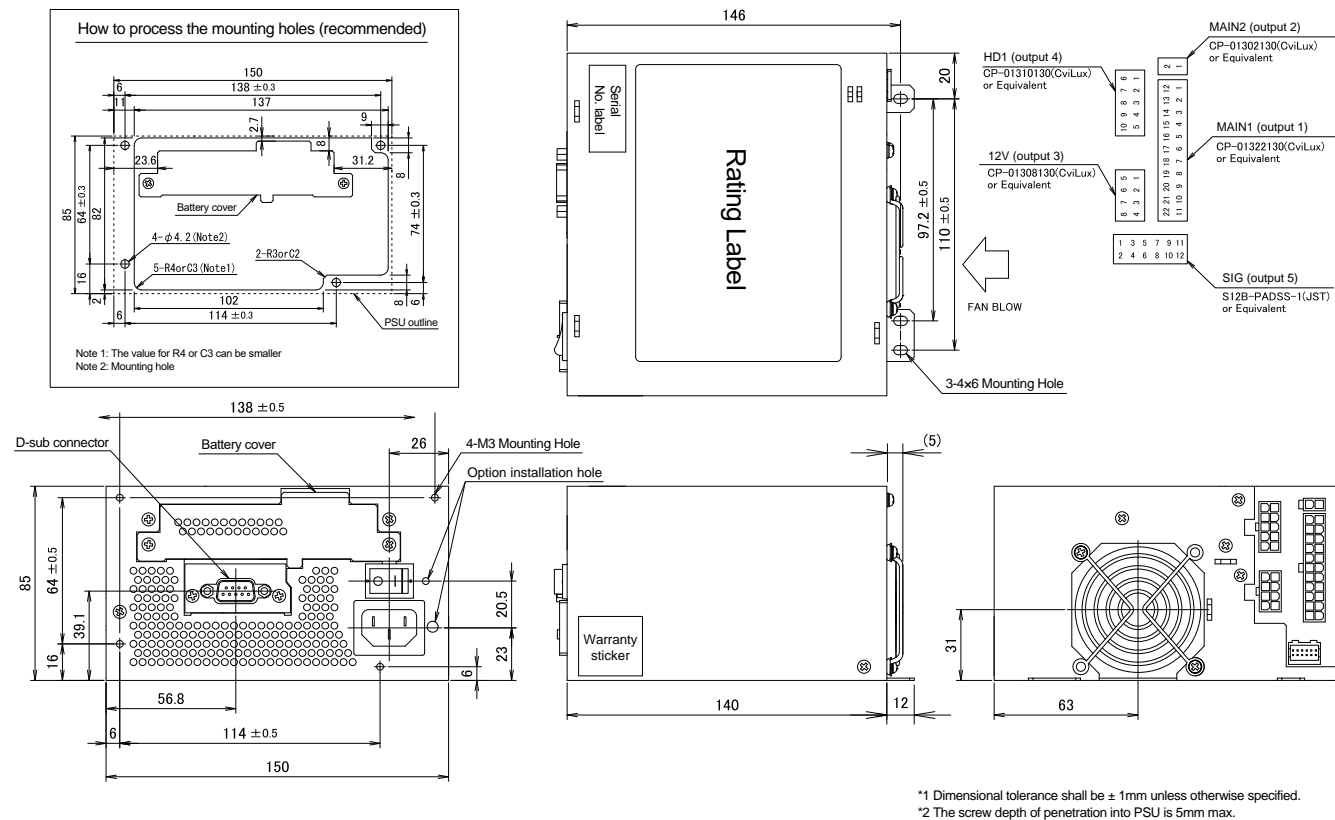
## Sequence Timing Chart



## Block Diagram





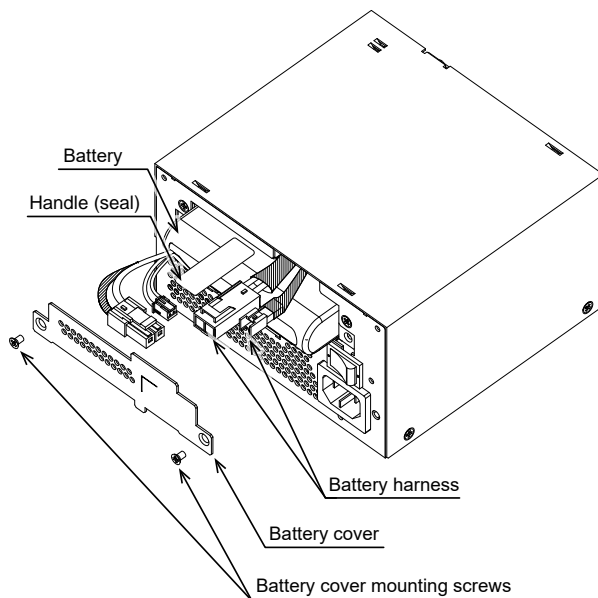


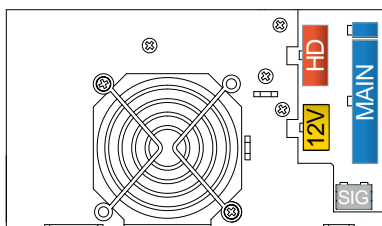
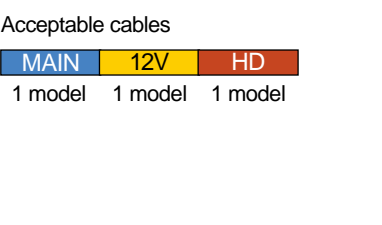

## Battery replacement

• Replacement preparation  
The battery is replaceable only when the unit is turned off (no output).  
If the unit is in operation (outputting power), turn it off and disconnect it from the AC cord before replacing the battery.

- Battery replacement
- (1) Use a screwdriver to remove the 2 battery cover mounting screws.
  - (2) Remove the battery cover.
  - (3) Remove the battery connector and 2 battery harness connectors.
  - (4) Grasp the handle (seal) and remove the battery.
  - (5) Install the new battery by reversing the above procedure.

- Note
- Do not use a battery other than the specified one.
  - If the battery is leaking, do not touch the fluid.
  - Do not drop or give a strong impact on the battery.
  - Do not hold the harness when removing the battery.
  - Do not put the battery into the fire, decompose, modify, or destroy it.






Detachable output harness				
Model	Length and type of connector		Output port allocation	
Main harness <span>MAIN</span>				
WH-M2022-500	<span>MAIN</span>	500±10 → 20Pin		
WH-M2022-300	<span>MAIN</span>	300±10 → 20Pin		
WH-M2422-500	<span>MAIN</span>	500±15 → 24Pin		
12V harness <span>12V</span>				
WH-V0808-500	<span>12V</span>	500±15 → 12V 8Pin		
WH-V0408-500	<span>12V</span>	500±15 → 12V 4Pin		
WH-VG208-500	<span>12V</span>	500±15 → 12V 4Pin PCI-E 6Pin		
WH-VV208-500-02	<span>12V</span>	500±10 → 12V 8Pin 12V 8Pin		
WH-VG208-500-02	<span>12V</span>	500±10 → 12V 8Pin PCI-E 6Pin		
HD harness <span>HD</span>				
WH-PP610-850	<span>HD</span>	550±15 → 150±15 → 150±15 → 150±15		
WH-PS610-850	<span>HD</span>	550±15 → 150±15 → 150±15 → 150±15		
WH-PS710-850	<span>HD</span>	550±15 → 150±15 → 150±15 → 150±15		
WH-PS810-1000	<span>HD</span>	550±15 → 150±15 → 150±15 → 150±15		

Acceptable cables

MAIN 12V HD

1 model 1 model 1 model

Cable			
Photos	Model	Category	Description
	WH2601-02	RS232C communication cable	For Windows 2000/XP/Vista/7 It can be used with HNSP5-350P-S20-B1V [RoHS]
	WH2967	USB communication cable	USB communication cable It can be used with HNSP5-350P-S20-B6V [RoHS]
	WH2753-02	AC power cord	125VAC 12A (tracking resistance type) [PSE]

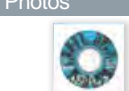
Software			
Photos	Model	Category	Description
	NSP Pro 2 (CD Media)	Automatic shutdown software	For Windows 2000/XP/Vista/7/10
* NSP Pro 2 can be downloaded for free from our website (NSP Pro 2 product page). * Windows 2000 and XP can also use UPS service, which is the standard service of the OS.			

Fig.4 Efficiency/Input Current vs. Output Power

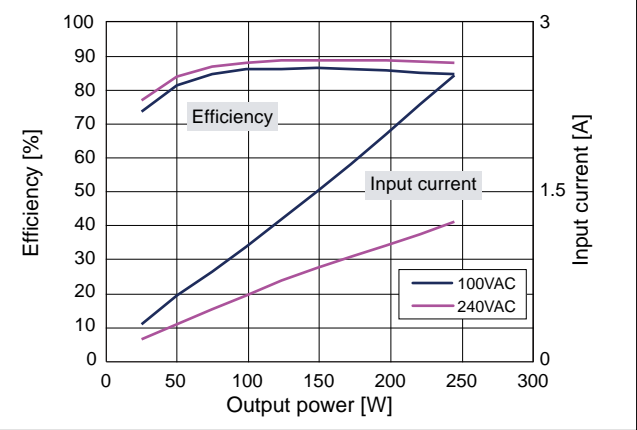


Fig.5 Power Factor/Input VA vs. Output Power

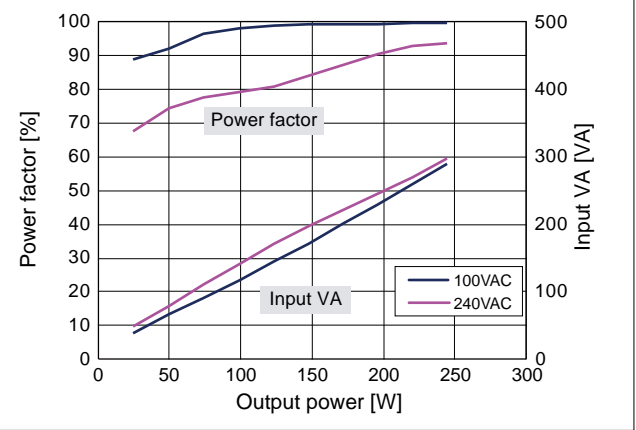


Fig.7 Inrush Current

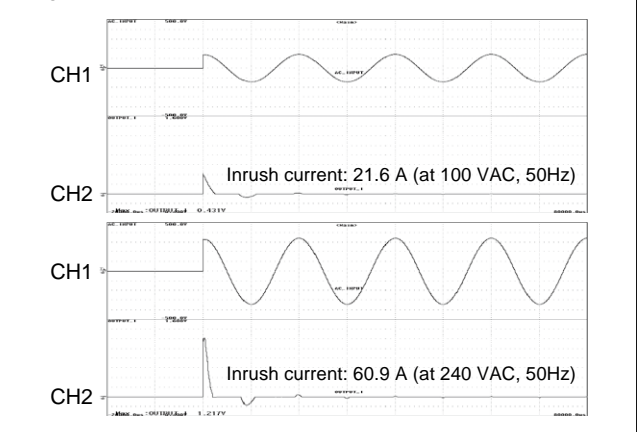


Fig.7 Leakage Current

Input : 100, 200, 240 VAC  
Load : Rated load and Min. load

	Rated load	Min. load
100 VAC	0.05mA	0.06mA
200 VAC	0.11mA	0.11mA
240 VAC	0.14mA	0.14mA

Fig.8 Conducted Emission at 100 VAC

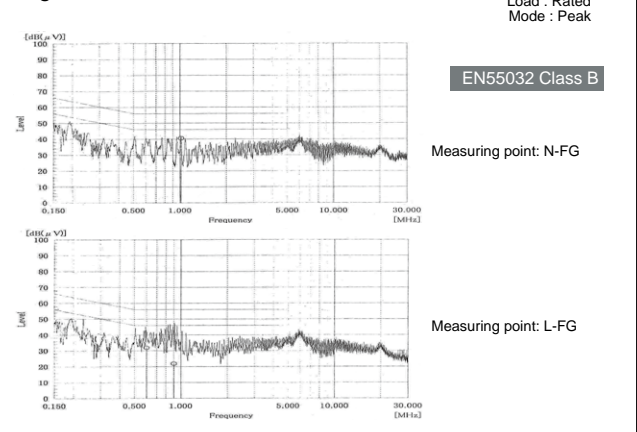


Fig.9 Conducted Emission at 230 VAC

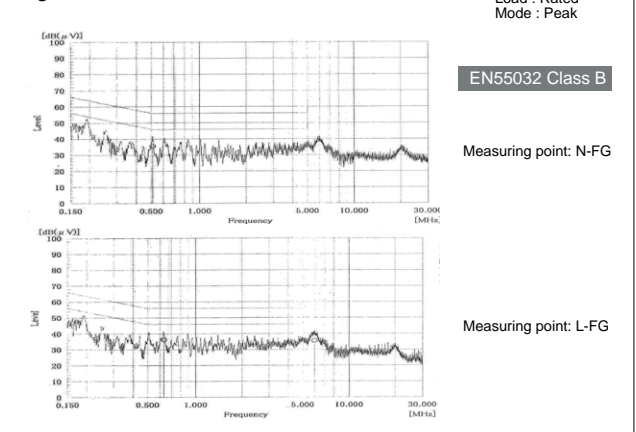


Fig.10 Rising Characteristics at 100 VAC

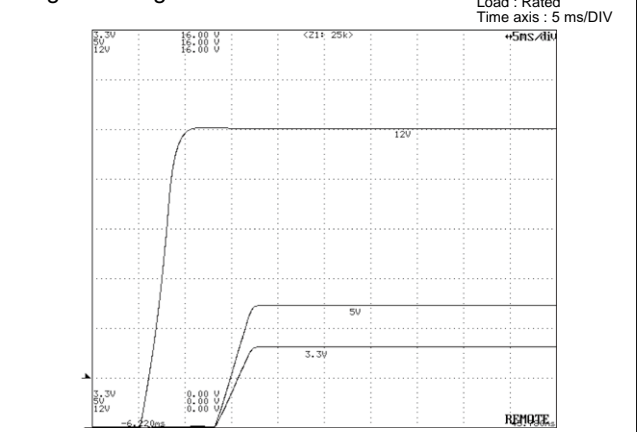


Fig.11 Falling Characteristics at 100 VAC

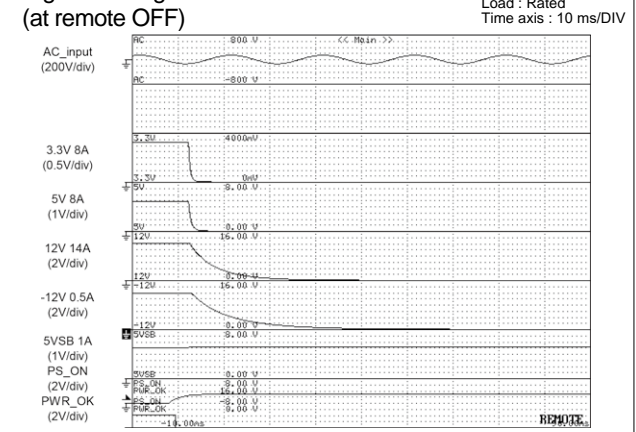


Fig.12 Rising Characteristics at 240 VAC

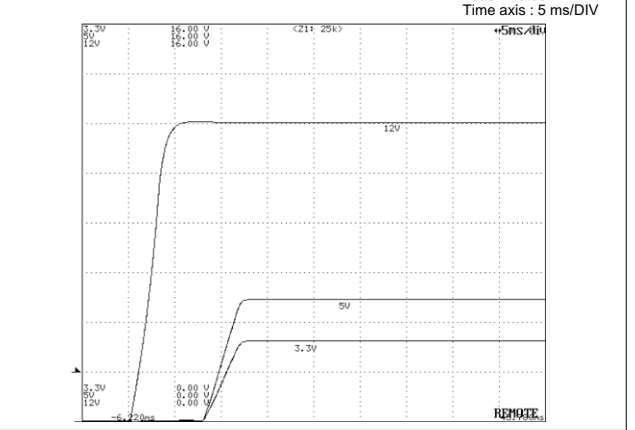


Fig.13 Falling Characteristics at 240 VAC (at remote OFF)

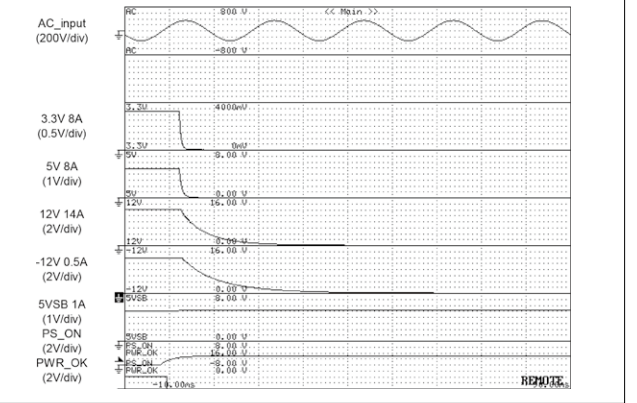


Fig.14 Output Hold-up Time

Load: Rated

Temp.	Input voltage	Output 90% or less	PWR_OK drop
-5°C	100 VAC	19.6ms	15.9ms
	240 VAC	19.9ms	16.2ms
25°C	100 VAC	20.2ms	17.2ms
	240 VAC	21.0ms	17.4ms
45°C	100 VAC	21.6ms	18.6ms
	240 VAC	22.4ms	19.2ms
65°C	100 VAC	28.0ms	24.4ms
	240 VAC	27.9ms	24.3ms

\*Refer to p.2 about the output hold-up time while connected to a battery.

Fig.15 Dynamic Load Fluctuation Characteristics

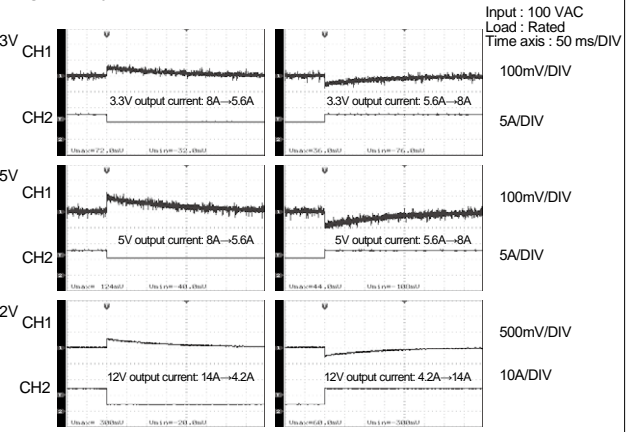


Fig.16 Output Voltage Regulation (Load Fluctuation)

	85V	100V	240V	264V
AC input				
12V output	0A	0A	14A	14A
5V output	0A	8A	8A	8A
3.3V output	0A	8A	8A	8A

AC input	85V	100V	240V	264V
3.3V output (min.)	3.329V	3.328V	3.323V	3.323V
3.3V output (rated)	3.255V	3.254V	3.252V	3.252V
5V output (min.)	5.063V	5.063V	5.050V	5.051V
5V output (rated)	4.906V	4.904V	4.903V	4.903V
12V output (min.)	12.171V	12.172V	12.180V	12.179V
12V output (rated)	12.054V	12.053V	12.056V	12.056V

Fig.17 Ripple and Spike Voltage

Load: Rated

Temp.	AC Input voltage	+3.3V Ripple (mV)	+3.3V Noise (mV)	+5V Ripple (mV)	+5V Noise (mV)	+12V Ripple (mV)	+12V Noise (mV)	-12V Ripple (mV)	-12V Noise (mV)	+5VSB Ripple (mV)	+5VSB Noise (mV)
-5°C	100V	20.5	30.3	26.2	39.4	26.7	58.4	45.1	63	30.5	48.9
	240V	20.4	30.2	26.0	39.5	26.7	58.6	45.4	63.8	30.6	49.8
25°C	100V	19.3	28.1	23.9	37.2	24.8	54.1	34.6	48.8	23.8	40.9
	240V	18.6	28.4	23.6	35.8	24.5	56.4	34.8	49.9	23.2	41.4
50°C	100V	19.1	28.7	23.4	33.2	19.9	49.1	25.9	38.5	20.4	37.5
	240V	18.3	26.5	21.6	33.3	21.0	48.9	25.5	37.3	19.6	37.9
65°C	100V	16.0	23.9	19.3	28.9	18.0	44.9	20.0	33.4	18.2	37.3
	240V	15.3	22.8	18.2	28.0	18.0	42.6	20.0	30.7	17.5	37.1

Fig.18 Ambient Temperature vs. Lifetime Expectancy (without battery)

Input : 100 VAC  
Load : Rated

■Electrolytic capacitors

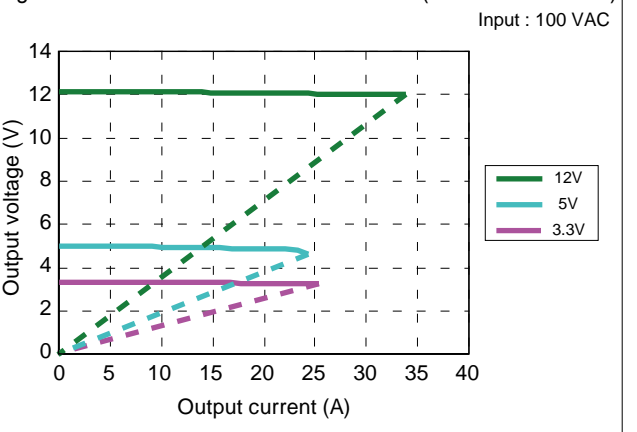
Power supply intake temperature	25°C	35°C	45°C
Lifetime expectancy	Approximately 15 years		

\* The lifetime shall be 15 years at longest due to deterioration of the sealing rubber characteristics.

■Fan

Fan ambient temperature	25°C	45°C
Lifetime expectancy	Approx. 11.4 years	Approx. 9.5 years

Fig.19 Overcurrent Protection Characteristics (V - I Characteristics)





## Nipron Co., Ltd.

●Sales department and R&D department  
1-3-30, Nishinagasu-cho, Amagasaki-city, Hyogo, 660-0805, Japan.  
TEL: +81-6-7220-3657 FAX: +81-6-6487-2212  
URL: <http://www.nipron.com/>

### ●Contact us

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