Desktop PC Power Supply NSP2-250-F2S

Model	Description	Stock
NSP2-250-F2S	———	Standard stock

■Model Name Coding

NSP2 - 250 - F 2 S
① ② ③ ④ ⑤

1. Series name
2. Output power
3. +24V output
4. DC input voltage (battery voltage) 24V type
5. Standard

Features

- +24V output is added to AT power supply (with remote ON).
- Saves space and cost with brain power supply (AT) suitable for mechatronics and mechanism system power supply (+24V) combined
- Each of +5V, +12V, and +24V has an independent stabilizing circuit.
- The unit can be used only with 24 VDC input (5V min. 0.5A needed).

Dimensions

W×H×D (mm)	150×86×140 (PS/2 size)

Output connector

Main 20+4pin, Main 24pin, Main 20pin, AT, AUX, 12V 4pin, 12V 8pin, PCI-E 6pin, PCI-E 6+2pin, HDD, S-ATA, FDD

Refer to “Product Page Guideline” on p.13

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

Function

DC start, RS 232C, USB, TTL, PFC, Silence, 5VSB FAN, TSFC FAN, Connection, RoHS

Automatic shutdown compliant OS

This model can automatically shut down* the OS but please note that 5VSB does not stop after shutdown

*For automatic shutdown, shutdown software or UPS services is required

Input

AC input	90 - 264V (worldwide range)
DC input	20 - 32V (battery package can be connected)

*Battery package is optional (sold separately)

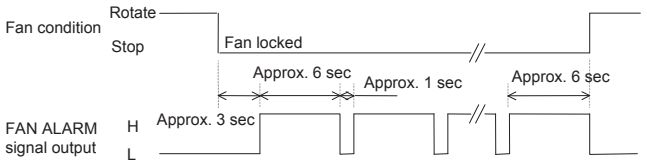
Output

Output voltage	*+5V*	*+12V*	*+24V*	*-5V*	*-12V*	*+5VSB*
Max. current / max. power (continuous)	10A	4A	6A	0.2A	0.2A	1.0A
	Total 232W					
	Total 240.4W					
Peak current / peak power (10 sec max.)	10A	6A	8A	0.5A	0.5A	1.0A
	Total 240W					
	Total 255W					
Min. current	0.5A	0A	0A	0A	0A	0A

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

	Items		Specification						Measurement conditions, etc.
AC Input	Rated Voltage		115 - 230 VAC (90 - 264 VAC)						Worldwide range
	Input Frequency		50 / 60Hz						47 - 63Hz
	Efficiency		73% typ. *Characteristic data: Fig.1						At rated input/output
	Power Factor		*Characteristic data: Fig.2						
	Inrush Current		50A peak (100 VAC), 100A peak (230 VAC) *Characteristic data: Fig.3						At rated input/output at cold start (25°C)
	Input VA		370VA typ. *Characteristic data: Fig.2						At rated input/output
DC Input	Rated Voltage		24 VDC (20 - 32 VDC)						DC startup available
	Battery Discharge Cut-off Voltage		17V±1V (shutdown of the battery circuit)						
	Efficiency (at Battery Operation)		73% typ.						At rated input/output
Output	Rated Voltage		+5V	+12V	+24V	-5V	-12V	+5VSB	
	Rated Current		8A	4A	6A	0.2A	0.2A	1.0A	
	Max. Current / Power		10A	4A	6A	0.2A	0.2A	1.0A	Max. output power: 240.4W
			232W max.						
	Peak Current / Power		10A	6A	8A	0.5A	0.5A	1.0A	Peak output power: 255W Time: 10 sec or less
			240W max.						
	Min. Current		0.5A	0A	0A	0A	0A	0A	
	Total Voltage Accuracy (%)		±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	Constant voltage accuracy against rated output voltage including static input regulation and temperature/time-lapse drift
	Max. Ripple Voltage (mVp-p)		50 max.	120 max.	240 max.	50 max.	120 max.	50 max.	Connect a capacitor (47μF) on the test board to measure. The board shall be separated from load wires and within150mm from the output terminals *Characteristic data: Fig.14
	Max. Spike Voltage (mVp-p)		200 max.	200 max.	480 max.	200 max.	200 max.	200 max.	
Protection	Overcurrent Protection	OCP Point (A)	10.5 min.	6.3 min.	8.4 min.	0.525 min.		1.05 min.	All other outputs are at rated loads and input voltage
		Method	All outputs except for +5VSB shutdown All outputs shutdown at DC operation			Hold-down current limiting			
	Recovery (Overcurrent)	At AC Operation	Reclosing AC input*			Automatic recovery			*Reclose input 10 sec min. after turning off the power switch (if the power switch is ON, reclosing AC input does not make recovery)
		At Battery Operation	Reclosing AC input*			Automatic recovery			
	Overvoltage Protection	OVP Point (V)	5.5 - 7	14 - 18	28 - 34	-	-	-	
		Method	All outputs except for +5VSB shutdown			-	-	-	
	Recovery (Overvoltage)	At AC Operation	Reclosing AC input*			-	-	-	*Reclose input 10 sec min. after turning off the power switch (if the power switch is ON, reclosing AC input does not make recovery)
		At Battery Operation	Reclosing AC input*			-	-	-	
Charge	Charge Voltage		27.6V typ.						The terminal voltage with no load
	Charge Current		0.5±0.25A typ.						At 20 to 24V battery voltage
Environment	Operating Temp. / Humidity		0 to 50°C / 30 to 85%						No condensation
	Storage Temp. / Humidity		-25 to 70°C / 30 to 90%						No condensation
	Vibration		Displacement amplitude: 0.15mm (10-55Hz), Sweep cycles: 10, Test duration: 45 minutes each axis						JIS-C-0040-1995, at no operation
	Mechanical Shock		Acceleration of 150m/s² for 11ms one time each in the X, Y and Z directions. No malfunction, damage, loosening or coming-off						JIS-C-0041-1995, at no operation
Insulation	Dielectric Strength		AC input - DC output/FG/DC input: 1500 VAC for 1 minute						Current: 20mA or less
	Insulation Resistance		AC input - DC output/FG/DC input: 50MΩ min.						At 500 VDC
			DC input - DC output/FG: 50MΩ min.						
			AC input - DC output: 50MΩ min.						
	Leakage Current		1mA max. (100 VAC) / 2mA max. (200 VAC) *Characteristic data: Fig.4						
EMC	Line Noise Immunity		± 2000V (pulse width: 100/800ns, repetitive cycle: 10-50ms)						No fluctuation of DC output or malfunction
	Electrostatic Discharge		EN61000-4-2 compliant						
	Radiated, Radio-Frequency EM Field		EN61000-4-3 compliant						
	Fast Transient Burst		EN61000-4-4 compliant						
	Lightning Surge		EN61000-4-5 compliant						
	RF Conducted Immunity		EN61000-4-6 compliant						
	Magnetic Field Immunity		EN61000-4-8 compliant						
	Voltage Dip / Regulation		EN61000-4-11 compliant						
	Conducted Emission		VCCI-A, FCC-A, EN55022-A compliant *Characteristic data: Fig.5 and 6						Measured by single unit
	Harmonic Current Regulation		IEC1000-3-2 Class D, EN61000-3-2 compliant						At rated input/output
Others	Cooling System		Forced air cooling						
	Output Grounding		Capacitor grounding						
	Output Hold-up Time		*Characteristic data: Fig.11						At rated output
	Reliability Grade		FA (industrial equipment grade, double-sided through hole PCB)						Follow our standard
	MTBF		91,000H 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

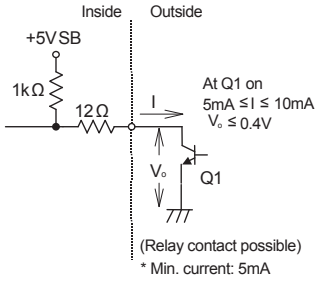
Signal Input/Output Specification Condition: at normal temperature and humidity unless otherwise specified

	Items	Specification	Note
Input Signal	Output ON/OFF Control Signal (PS_ON#)	+5V, +12V, +24V, -5V, and -12V outputs shutdown with 'H' or 'OPEN' input.	Signal input between the pin 2 of P9 connector and COM pin
	Battery Shutdown Signal for TTL (SHUT DOWN_T)	Battery connection and all outputs are shutdown with 'L' input (This function is only available during backup (DC) operation.)	Signal input between the pin 2 of P12 connector and COM pin
	Battery Shutdown Signal for RS232C (SHUT DOWN_R)	Battery connection and all outputs are shutdown with 'positive' input. (This function is only available during backup (DC) operation.)	The pin 4 of front panel RS232C connector
	Operation Switch Control (BATT CHECK)	At 'L' input, AC inverter is forcibly shutdown, and it will be switched to battery (DC) operation to make pseudo blackout.	The pin 5 of P12 connector
Input Signal	Normal Output Signal (PWR_OK)	'H' signal is delivered when the +5V output is normal (detection delay time: 200 - 350ms).	The pin 8 of P1 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: 80 VAC typ., detection delay time: 20 - 40ms after AC input failure)	The pin 3 of P12 connector
	Blackout Detection Signal for RS232C (AC FAIL_R)	'Negative' is delivered at low AC input voltage and blackout detection. (detection voltage: 80 VAC typ., detection delay time: 20 - 40ms after AC input failure)	The pin 8 of front panel RS232C connector
	Low Battery Voltage Signal for TTL (BATT LOW_T)	The signal goes 'OPEN' when the battery terminal voltage decreases to 19.3±0.7V typ. (open collector output). 'L' is delivered when the battery package is not connected.	The pin 4 of P12 connector
	Low Battery Voltage Signal for RS232C (BATT LOW_R)	'Negative' is delivered when the battery terminal voltage decreases to 19.3±0.7V typ. ('positive' is delivered when the battery package is not connected.)	The pin 1 of front panel RS232C connector
	Fan Alarm Signal (FAN ALARM)	When the fan lock status continues, square waves, as shown below, are delivered constantly. 	The pin 6 of P12 connector

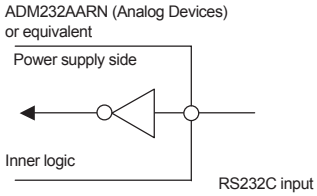
Signal Circuit

Input Signal Circuit

(PS_ON#), (SHUT DOWN_T), (BATT CHECK)

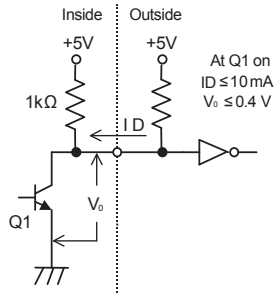


(SHUT DOWN_R)

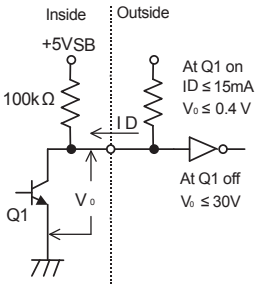


Output Signal Circuit

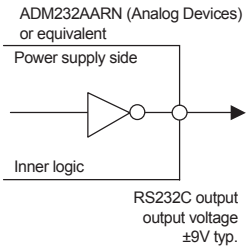
(PWR_OK)



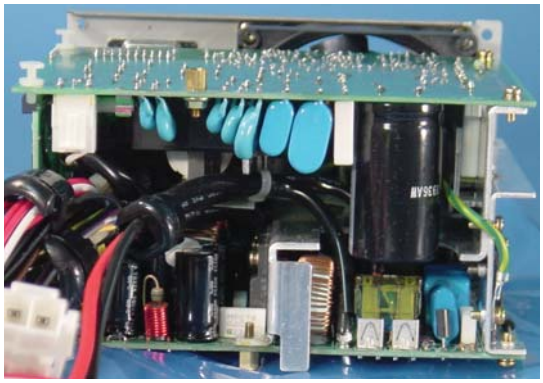
(AC FAIL_T), (FAN ALARM), (BATT LOW_T)



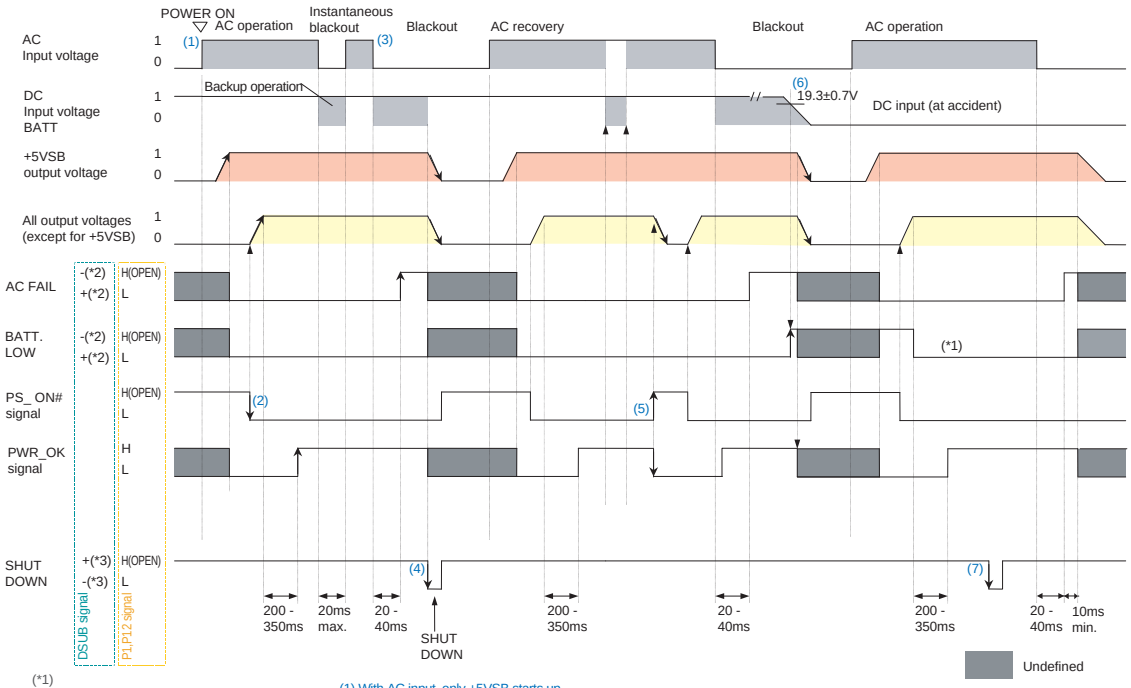
(AC FAIL_R), (BATT LOW_R)



Internal Structure



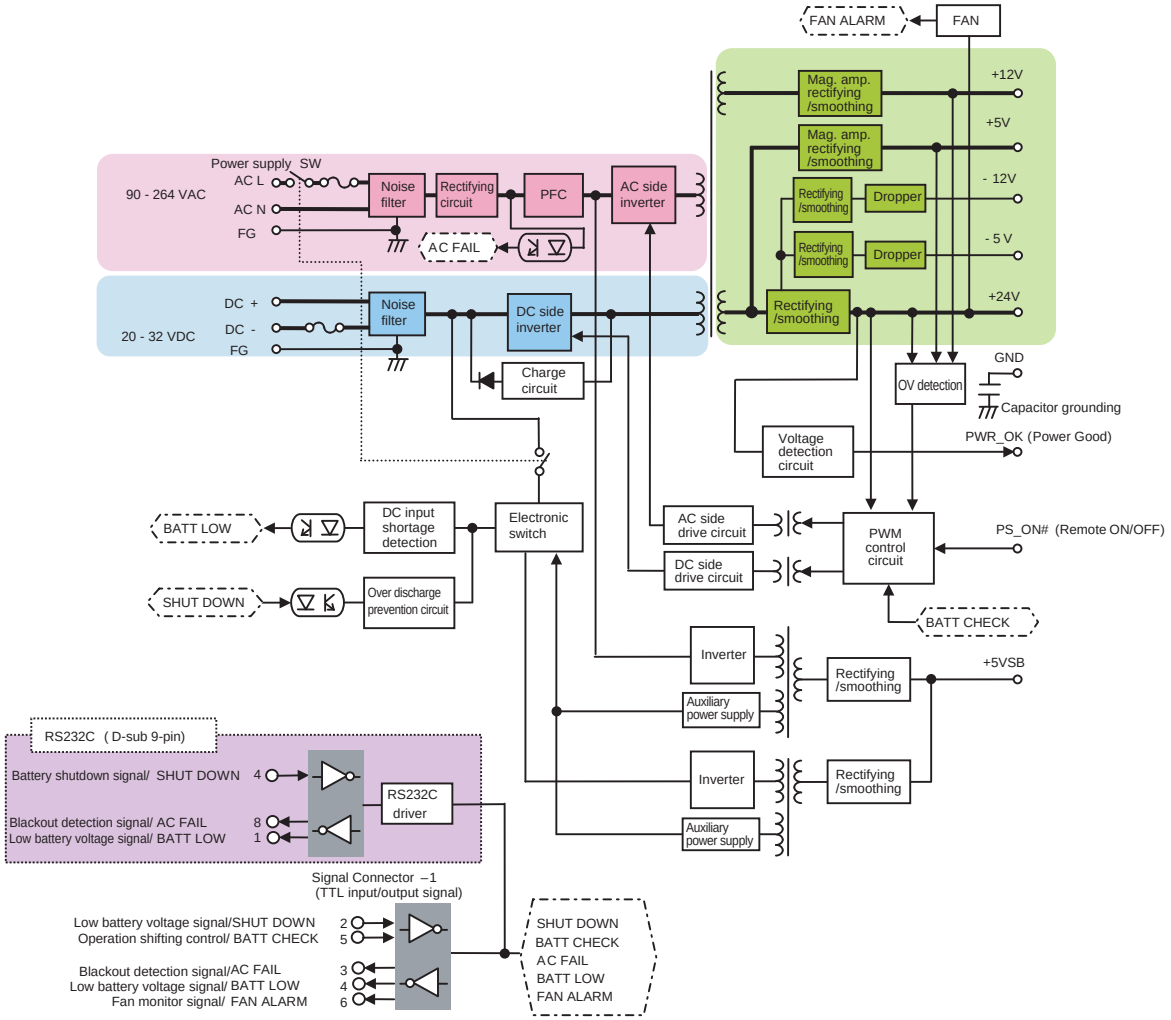
Sequence Diagram NSP2-250P-F2S connected w/ dedicated battery package



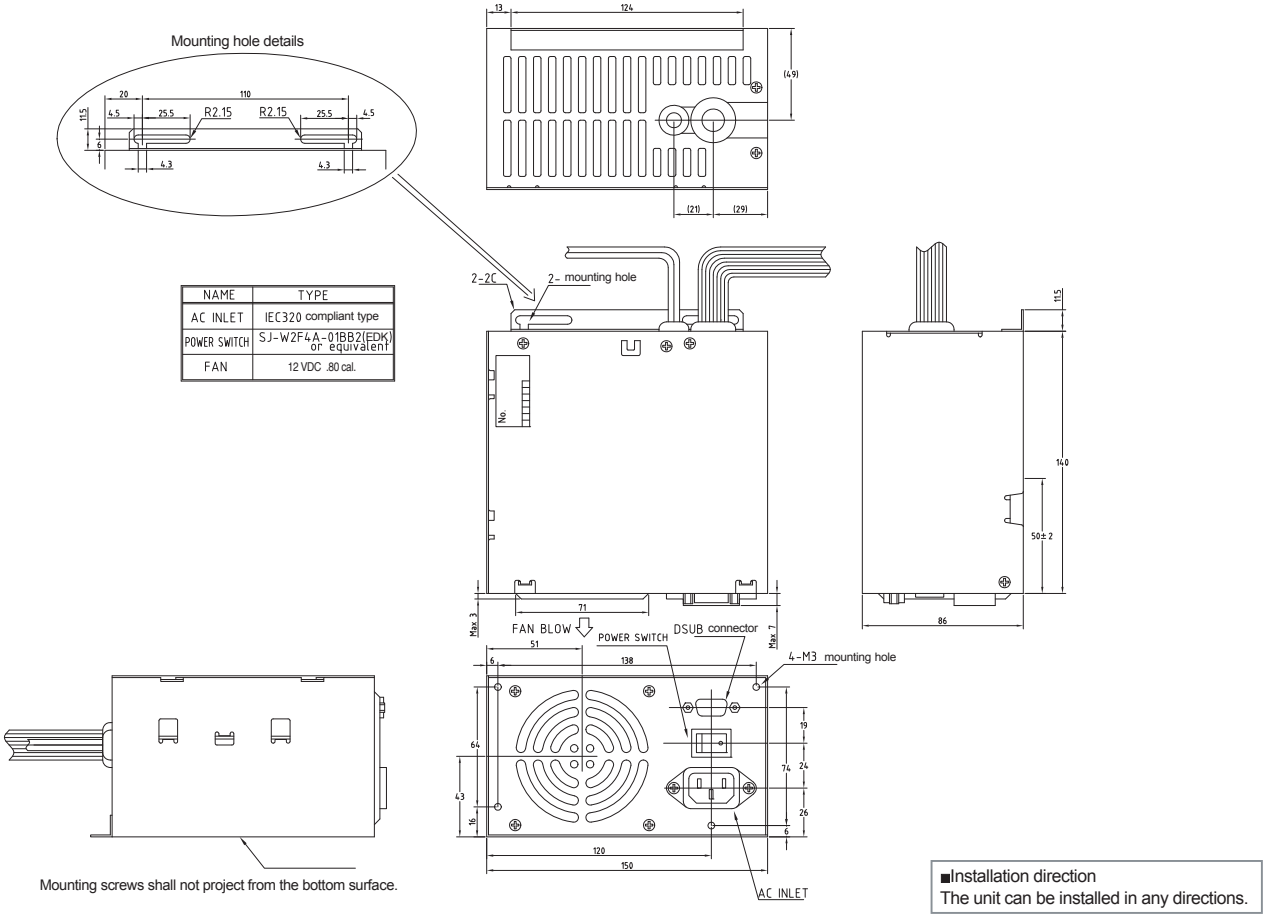
(*1)
Due to charger output, BATT.LOW is not delivered.
(*2)
Negative signal output is -9V typ.
Positive signal output is +9V typ.
(*3)
Negative signal input should be +0.4V to -30V.
Positive signal output should be +2.8V to +30V.

(1) With AC input, only +5VSB starts up.
(2) With PS_ON# 'L' input, all outputs start up. After 200 - 350ms, 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.
(5) When AC input and all outputs including +5VSB are turned on, all outputs except for +5VSB shutdown with PS_ON# 'H' (OPEN) input.
(6) When the battery voltage decreases to 19.3±0.7V typ. at backup operation, BATT LOW 'negative (RS232C)' and 'H (TTL)' are delivered; after it decreases to 17±1V 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



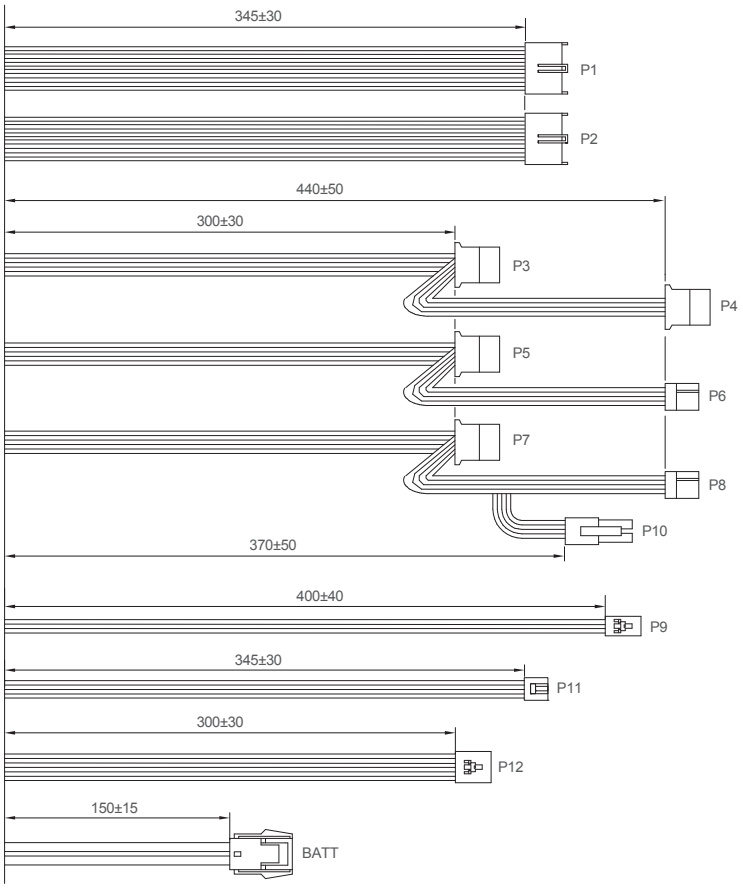
Outline Drawing



NAME	TYPE
AC INLET	IEC320 compliant type
POWER SWITCH	SJ-W2F4A-01BB2(EDK) or equivalent
FAN	12 VDC .80 cal.

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

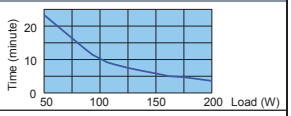
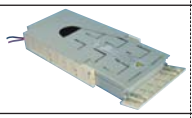
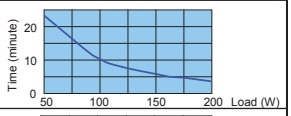
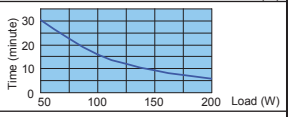
Output Harness



CN NAME	PIN No.	FUNCTION	WIRE Color	CONNECTOR TYPE
P1	1	PWR_OK	ORANGE	Housing:8500-064(ALEX) Terminal:23T-6204(ALEX) or equivalent
	2	+5V	RED	
	3	+12V	YELLOW	
	4	-12V	BLUE	
	5	GND	BLACK	
	6	GND	BLACK	
P2	1	GND	BLACK	Housing:8500-061(ALEX) Terminal:23T-6204(ALEX) or equivalent
	2	GND	BLACK	
	3	-5V	WHITE	
	4	+5V	RED	
	5	+5V	RED	
	6	+5V	RED	
P3,P4 P5,P7	1	+12V	YELLOW	Housing:LCP-04(JST) Terminal:SLC22T 2.0(JST) or equivalent
	2	GND	BLACK	
	3	GND	BLACK	
	4	+5V	RED	
P6,P8	1	+5V	RED	Housing:171822-4(AMP) Terminal:170204-1(AMP) or equivalent
	2	GND	BLACK	
	3	GND	BLACK	
	4	+12V	YELLOW	
P9	1	+5VSB	YELLOW	Housing:51030-0330(Molex) Terminal:50084-8114(Molex) or equivalent
	2	PS_ON#	PURPLE	
	3	GND	BLACK	
P10	1	GND	BLACK	Housing:ELP-02V(JST) Terminal:SLF-01T-1.3E(JST) or equivalent
	2	+12V	YELLOW	
P11	1	+24V	BROWN	Housing:VHR-4N(JST) Terminal:SVH-21T-P1.1(JST) or equivalent
	2	+24V	BROWN	
	3	GND	BLACK	
	4	GND	BLACK	
P12	1	GND	BLACK	Housing:51030-0630(Molex) Terminal:50539-8000(Molex) or equivalent
	2	SHUT DOWN	YELLOW	
	3	AC FAIL	BLUE	
	4	BATT LOW	WHITE	
	5	BATT CHECK	ORANGE	
	6	FAN ALARM	PURPLE	
BATT	1	BATT +	RED	Housing:VLR-02V(JST) Terminal:SVM-61T-P2.0(JST) or equivalent
	2	BATT -	BLACK	

Optional Components Sold Separately

Battery Package

Page	Picture	Model	Type	Shape (size)	Backup Time
P.401		BS05A-P24/2.2L	Lead	5-inch bay fixed type (W×D×H=146×190×37mm)	
P.403		RBS01A-P24/2.2L	Lead	5-inch bay fixed, removable type (W×D×H=146×245×42mm)	
P.407		BS06A-H24/2.5L (for standby use) BS06B-H24/2.5L (with fan, for cycle use)	Ni-MH	5-inch bay fixed type (W×D×H=146×181×38mm)	

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

Cable

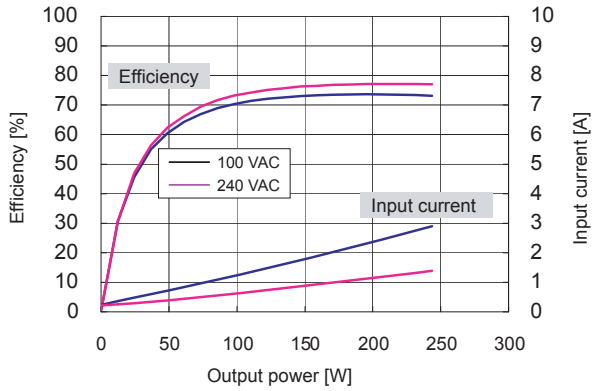
Picture	Model	Type	Description
	WH2753	AC power cord	125 VAC 12A [PSE]
	WH2753-02	AC power cord	125 VAC 12A (tracking resistance type) [PSE]

Other Optional Components

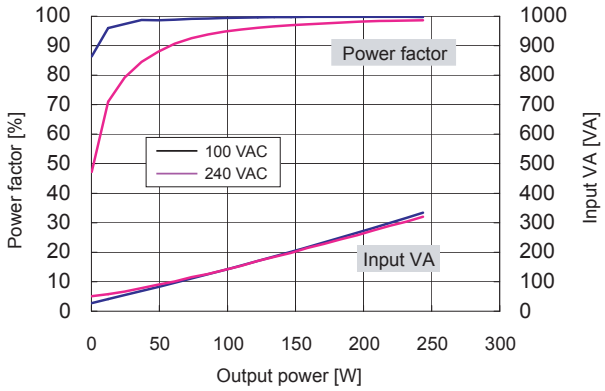
Model	Description	Model	Description
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
WH2812	PCI-E 6-pin connector conversion harness	WH5105-02	12V 4-pin connector conversion harness (320mm)
		ACC5046	Harness with PS_ON switch
		ACC5077	PS_ON terminal short connector

Characteristics Data (Examples of actual measurement)

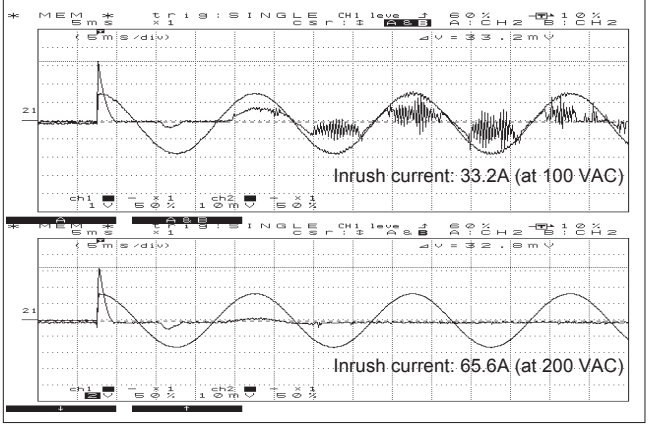
● Fig.1 Efficiency / Input Current vs. Output Power



● Fig.2 Power Factor / Input VA vs. Output Power



● Fig.3 Inrush Current



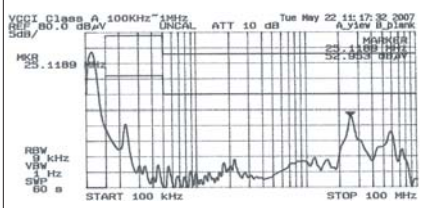
● Fig.4 Leakage Current

Input: 115 / 230 VAC
Load: Rated and min. load

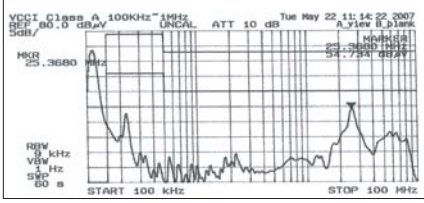
	Rated load	Min. load
115 VAC	0.28mA	0.26mA
230 VAC	0.59mA	0.55mA

● Fig.5 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: AV



Measuring point: L-FG

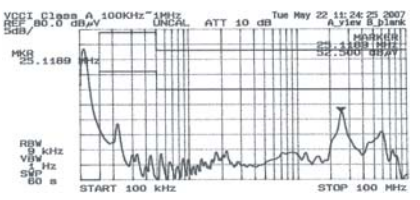


Measuring point: N-FG

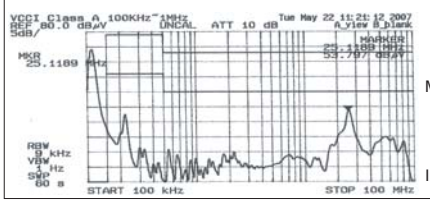
In-house measurement data

● Fig.6 Conducted Emission at 240 VAC

Input: 240 VAC
Load: Rated
Mode: AV



Measuring point: L-FG

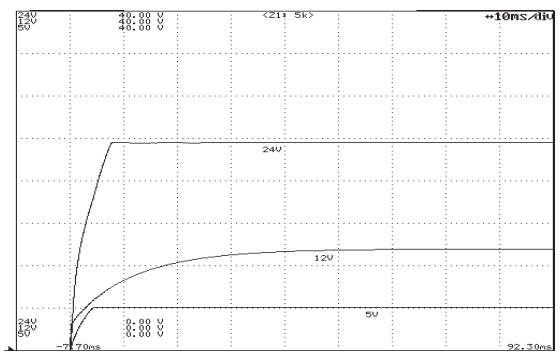


Measuring point: N-FG

In-house measurement data

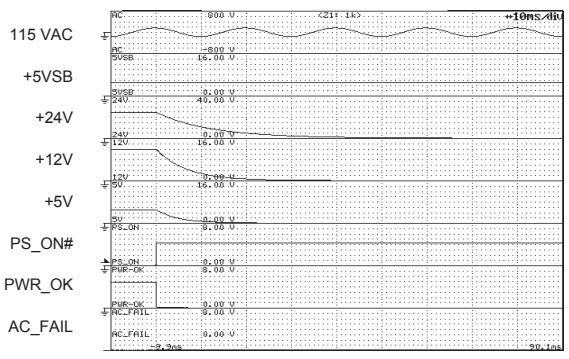
● Fig.7 Rising Characteristics at 115 VAC

Input: 115 VAC
Load: Rated
Time axis: 10ms/DIV



● Fig.8 Falling Characteristics at 115 VAC when REMOTE goes Off

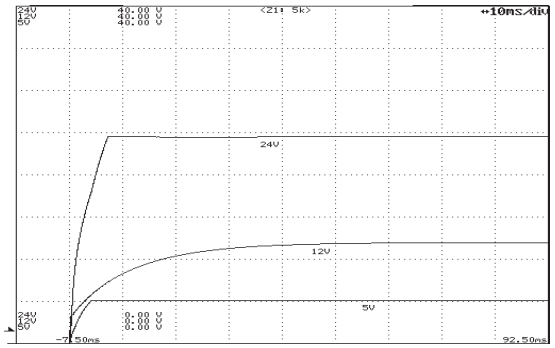
Input: 115 VAC
Load: Rated
Time axis: 10ms/DIV



Characteristics Data (Examples of actual measurement)

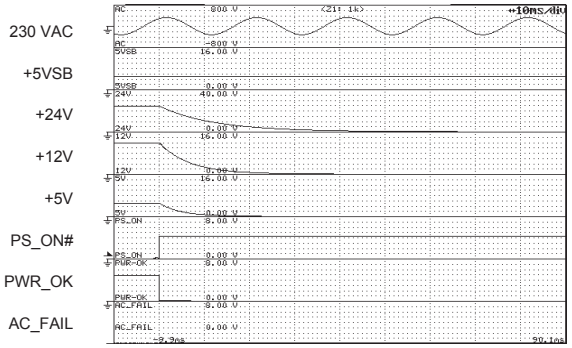
● Fig.9 Rising Characteristics at 230 VAC

Input: 230 VAC
Load: Rated
Time axis: 10ms/DIV



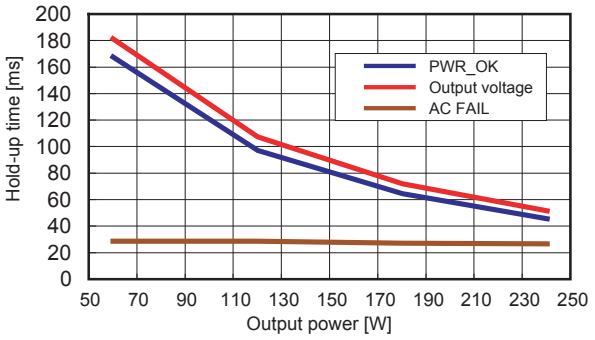
● Fig.10 Falling Characteristics at 230 VAC when REMOTE goes Off

Input: 230 VAC
Load: Rated
Time axis: 10ms/DIV



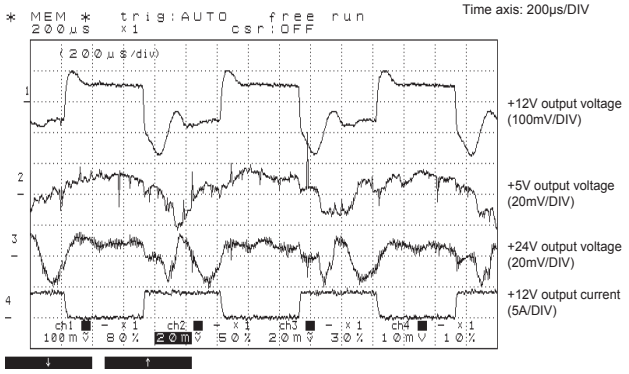
● Fig.11 Output Hold-up Time vs. Output Power

PWR_OK: the point that PWR_OK signal goes to "L"
Output voltage: the point any output voltage decreases to 95% except +5VSB
AC FAIL: the point that AC FAIL signal is delivered



● Fig.12 Dynamic Load Fluctuation Characteristics at 1kHz

Input: 115 VAC
Load: Rated
Time axis: 200μs/DIV



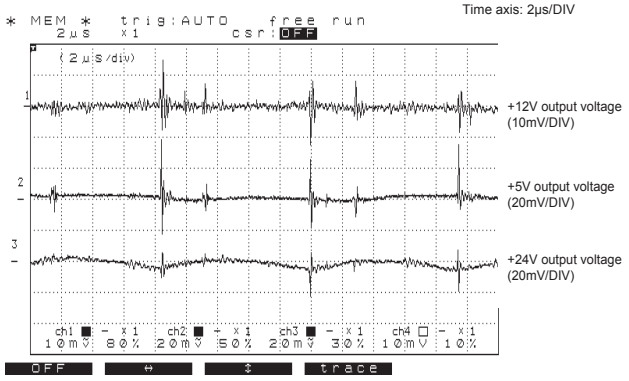
● Fig.13 Output Voltage Regulation

Output	Min. load	Rated load	Peak load
+12V output	0A	4A	6A
+5V output	0.5A	8A	10A
+24V output	0A	6A	8A

AC input voltage	90 VAC	115 VAC	132 VAC	176 VAC	230 VAC	264 VAC
+12V output (min. load)	12.004 V	12.006 V	12.006 V	12.007 V	12.006 V	12.006 V
+12V output (rated load)	11.960 V	11.959 V	11.960 V	11.960 V	11.960 V	11.961 V
+12V output (peak load)	11.946 V	11.945 V	11.945 V	11.944 V	11.944 V	11.945 V
+5V output (min. load)	5.077 V	5.077 V	5.077 V	5.077 V	5.077 V	5.077 V
+5V output (rated load)	5.034 V	5.034 V	5.034 V	5.033 V	5.034 V	5.034 V
+5V output (peak load)	5.017 V	5.015 V	5.016 V	5.015 V	5.015 V	5.015 V
+24V output (min. load)	24.759 V	24.735 V	24.737 V	24.740 V	24.748 V	24.746 V
+24V output (rated load)	24.558 V	24.553 V	24.551 V	24.551 V	24.548 V	24.545 V
+24V output (peak load)	24.511 V	24.509 V	24.507 V	24.507 V	24.506 V	24.504 V

● Fig.14 Ripple and Spike Voltage

Input: 115 VAC
Load: Rated
Time axis: 2μs/DIV



● Fig.15 Ambient Temperature vs. Expected Service Life

■ Electrolytic capacitors

Input: 100 VAC
Load: Rated
Operating time: 24 consecutive hours

Intake air temp.	20°C	30°C	40°C	50°C
Expected service life (yr)	approx. 70	approx. 35	approx. 18	approx. 8.8

※ Lifetime shall be 15 years at longest due to deterioration of sealing plates.

■ Fan

Ambient temp.	20°C	30°C	40°C	50°C
Expected service life (yr)	approx. 8.1	approx. 8.1	approx. 8.1	approx. 8.1

● Fig.16 Over Current Protection (V-I Characteristic)