Rack Mount Power Supply HPC1U-400P-X2S

Model	Description	Stock
HPC1U-400P-X2S	———	Standard stock

■Model Name Coding

HPC1U - 400 P - X 2 S
① ② ③ ④ ⑤ ⑥

1. Series name
2. Output power
3. Peak output compliant
4. ATX output
5. +3.3V output equipped
6. Standard

Features

- 80 PLUS BRONZE approved 1U power supply.
- High efficiency with synchronous rectification circuit
- Less than 1W standby power complying with ErP directive
- Min. load current is 0A for all outputs.
- Safety standard certified (IEC/UL/CSA/CE)
- By building in the thermal-sensing variable speed fan, noise reduction can be realised.

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

Input

AC input	85 - 264V (worldwide range, PFC mounted)

Output

Output voltage	*+3.3V*	*+5V*	*+12V*	*-12V*	*+5VSB*
Max. current / max. power (continuous)	16A	16A	25A	0.5A	1.5A
	Total 90W		300W	6W	7.5W
	Total 300W				
	Total 305W				
Peak current / peak power (5 sec max.)	20A	20A	30A	0.5A	2A
	Total 120W		360W	6W	10W
	Total 390W				
	Total 400W				
Min. current	0A	0A	0A	0A	0A

Dimensions

W×H×D (mm)	100×41×190 (1U size)

Output connector (optional component)

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 p.169 “Detachable Output Harness” for details

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

	Items		Specification					Measurement conditions, etc.
AC Input	Rated Voltage		100 - 240 VAC (85* - 264 VAC)					Worldwide range, *Refer to Fig.1
	Input Frequency		50 / 60Hz					47 - 63Hz
	Efficiency		82% typ. (100 VAC), 85% typ. (240 VAC) *Characteristic data: Fig.5					At rated input/output, 80PLUS BRONZE approved
	Power Factor		96% min. (100 VAC), 90% min. (240 VAC)					At rated input/output
	Inrush Current		31A peak (100 VAC), 75A peak (240 VAC) *Characteristic data: Fig.6					Input reclosing interval shall be 10 sec min. At rated input/outputat cold start (25°C).
	Input Current		3.8A typ.(100 VAC), 1.6A typ. (240 VAC)					
Output	Rated Voltage		+3.3V	+5V	+12V	-12V	+5VSB	
	Rated Current		8A	8A	19A	0.5A	1.0A	Reference value during the measurement of input/output characteristics
	Max. Current / Power		16A	16A	25A	0.5A	1.5A	Max. output power: 305W
			90W max.		300W	6W	7.5W	
			300W max.					
			305W max.					
	Peak Current / Power		20A	20A	30A	0.5A	2.0A	Peak output power: 400W Time: 5 sec or less Duty ratio of repetitive load: 10% or less *Refer to Fig.2
			120W max.		360W	6W	10W	
			390W max.					
			400W max.					
	Min. Current		0A	0A	0A	0A	0A	
	Total Voltage Accuracy (%)		±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	Total accuracy of temperature, input, and load fluctuations *Refer to Fig.4
	Max. Ripple Voltage (mVp-p)		50 max.	50 max.	120 max.	120 max.	50 max.	Measured on a test board connected with a 47µF electrolytic capacitor and 0.1µF ceramic capacitor by 100MHz oscilloscope. The test board shall be away from load wire and within 150mm from output terminals.
	Max. Spike Voltage (mVp-p)		100 max.	100 max.	170 max.	170 max.	100 max.	
Protection	Overcurrent Protection	OCP Point (A)	21 min.	21 min.	31 min.	Short protection		All other outputs are at rated loads and input voltage. All outputs shutdown when +5VSB is shorted (Automatic recovery)
		Method	All outputs except for +5VSB shutdown			Hold down current limiting	All outputs shutdown	
		Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			Automatic recovery		Reclosing AC input (10 sec min. interval)
	Overvoltage Protection	OVP Point (V)	3.76～4.3	5.74～7.0	13.4～15.6	-	(7.0)	
		Method	All outputs except for +5VSB shutdown			-	Zener clamp	
		Recovery	Reclosing AC input, or switching PS_ON# signal from 'H' to 'L'			-	-	Reclosing AC input (10 sec min. interval)
Environment	Operating Temp. / Humidity		0 to 60°C* / 10 to 90%					No condensation *Refer to Fig.3
	Storage Temp. / Humidity		-20 to 70°C / 10 to 95%					No condensation
	Vibration		Acceleration amplitude: 2g (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 input - FG/DC output: 1500 VAC for 1 minute					Cut-off current: 10mA
	Insulation Resistance		AC input - FG/DC output: 50MΩ min.					At 500 VDC
	Leakage Current		0.5mA max. (100 VAC) / 1.0mA max. (200 VAC) / 1.2mA max. (240 VAC) *Characteristic data: Fig.7					IEC60950 compliant
EMC	Line Noise Immunity		±2000V (pulse width: 100/1000ns, repetitive cycle: 30-100Hz, normal/common mode with pos./neg. polarity for 10 minutes each)					Measured by INS-410 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-B, FCC-B, CISPR22-B, EN55022-B compliant *Characteristic data: Fig.8 and 9					Measured by single unit
	Harmonic Current Regulation		IEC61000-3-2 (Ver 2.1) Class D compliant					At rated input/output
Others	Safety Standards		UL60950, CSA60950(c-UL), CCC certified, CEMarking (IEC62368), PSE compliant					
	Cooling System		Forced air cooling: thermal-sensing variable speed fan embedded					Fan speed changes by temperature and load.
	Output Grounding		Connected chassis (FG)					
	Output Hold-up Time		PWR_OK holds up 16ms min. after AC failure *Characteristic data: Fig.14					At 200W output
	Reliability Grade		FA (industrial equipment grade, double-sided PCB with plated through hole)					Follow our standard
	MTBF		80,000H min.					Based on EIAJ RCR-9102
	Weight		1.0kg 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

Fig.1 Derating for Low Input Voltage

When the input voltage is 90 VAC or less, follow the derating curve to derate rated current/power, max. current/power, and peak current/power.

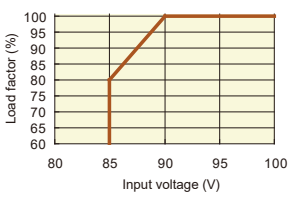


Fig.2 Duty Ratio

Peak current/power shall be 5 sec or less continuously. For repetitive loads, duty ratio shall be 10% or less.

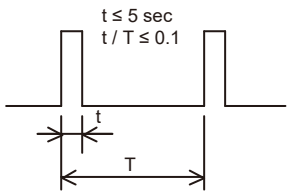


Fig.3 Temperature Derating

When the ambient temperature (near the airflow inlet) exceeds 40°C, follow the derating curve to derate rated current/power, max. current/power, and peak current/power.

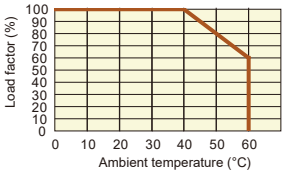
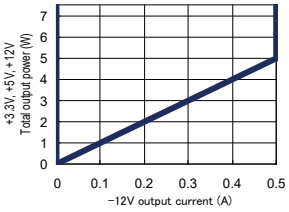
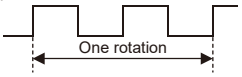


Fig.4 Min. Load Condition

The accuracy of output voltage -12V is defined by the range shown in the Min. Load Condition below.



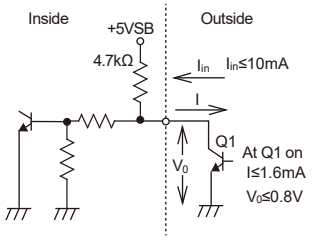
Signal Input / Output Specification Condition: at normal temperature and humidity unless otherwise specified

	Items	Specification	Note
Input Signal	Output ON / OFF Control Signal (PS_ON#)	+3.3V, +5V, +12V, and -12V outputs are delivered with 'L' input. +3.3V, +5V, +12V, and -12V outputs shutdown with 'H' or 'OPEN' input.	The pin 22 of MAIN1 connector
	+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 2 of MAIN1 connector and The pin 8 of SIG connector
	FAN Control Signal (FAN_C)	The control terminal of fan motor; the fan motor is forcibly rotated at full speed at 'L' input.	The pin 4 of SIG connector
Output Signal	Normal Output Signal (PWR_OK)	'H' signal is delivered when the +5V output is normal	The pin 21 of MAIN1 connector
	Fan Monitor Signal (FAN M)	Two cycle pulses per one rotation of the fan motor are delivered (open collector output). Duty ratio of the pulse shall be 0.5 typ. (Interval between the signals becomes longer at low speed and shorter at high speed.) The signal remains 'L' or 'OPEN' when the fan stops caused by any failure or malfunction.	The pin 5 of SIG connector 

Signal Circuit

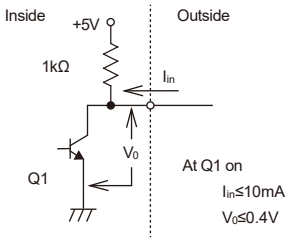
Input Signal Circuit

(PS_ON#)

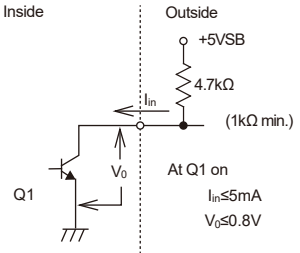


Output Signal Circuit

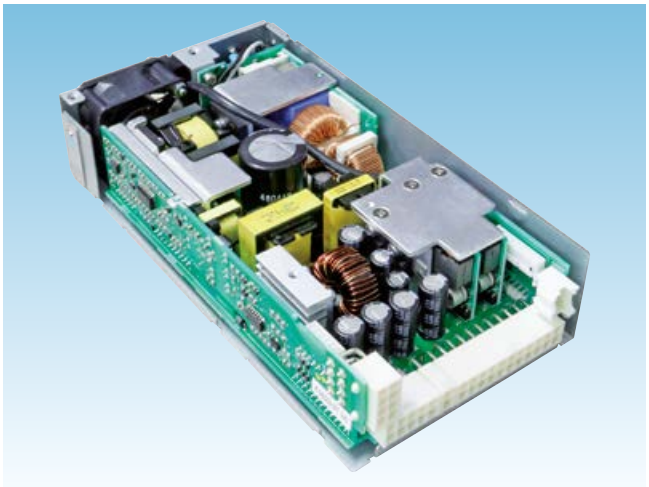
(PWR_OK)

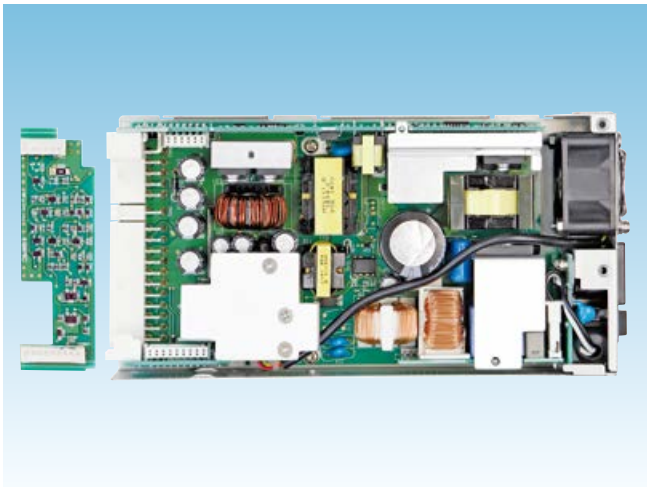


(FAN_M)

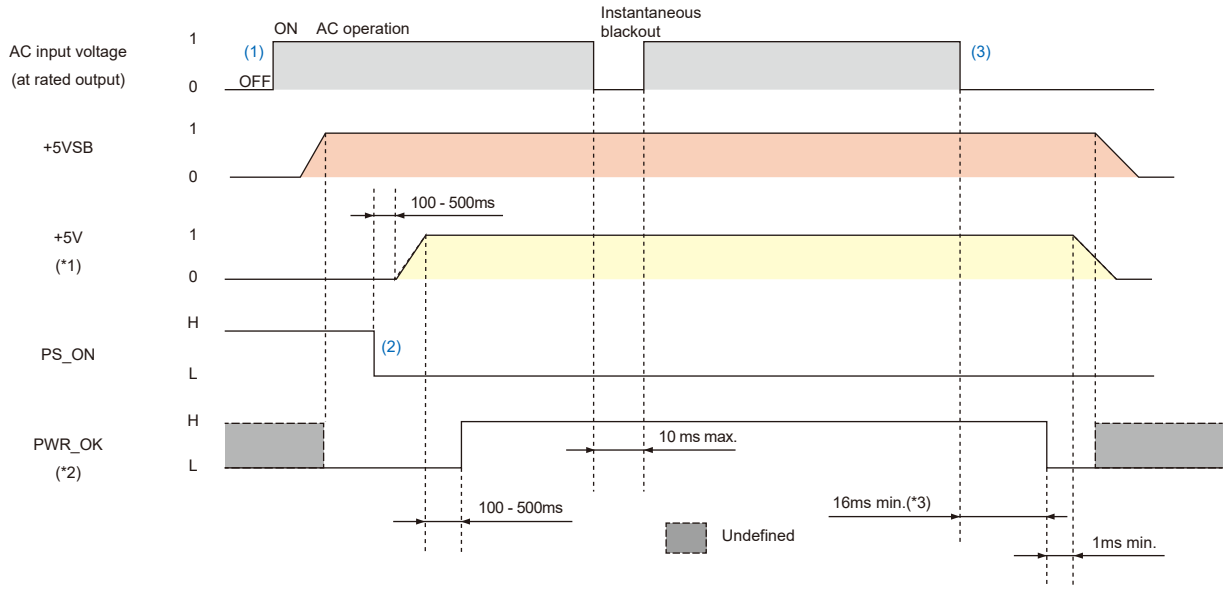


Internal Structure





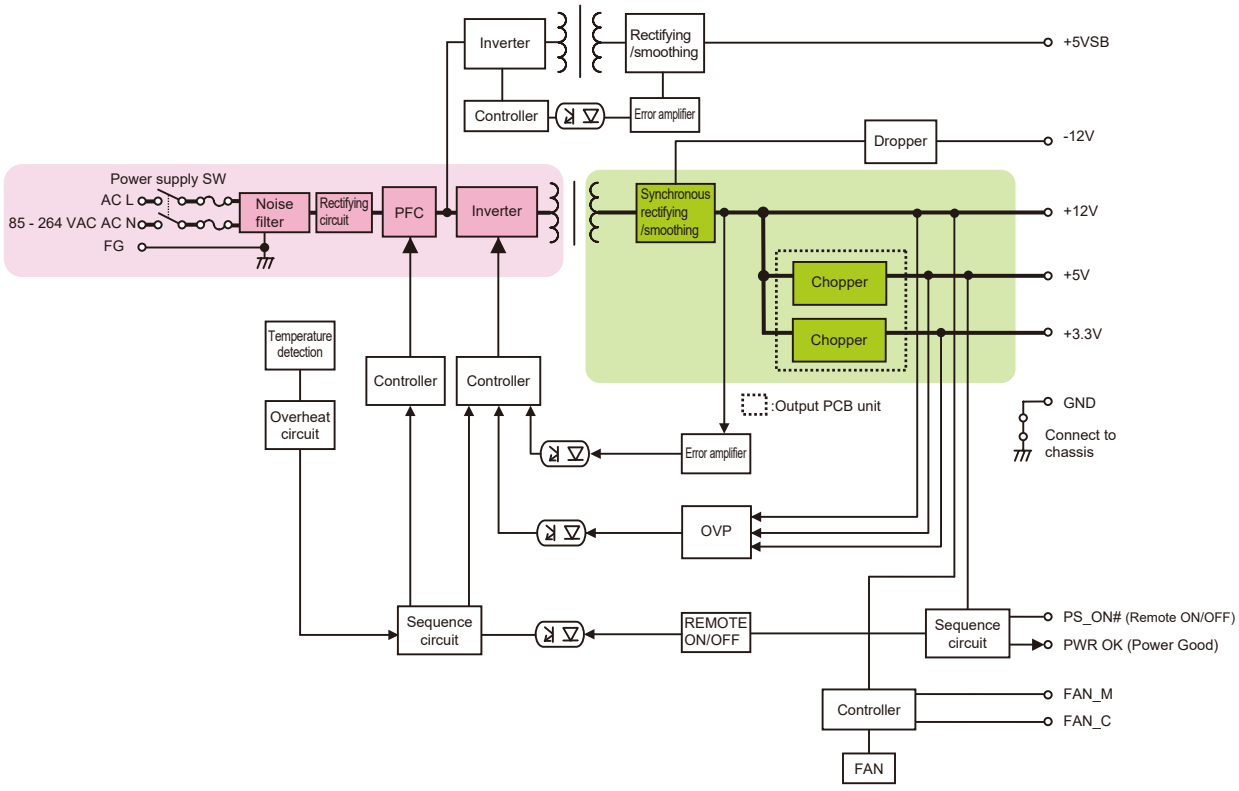
Sequence Diagram



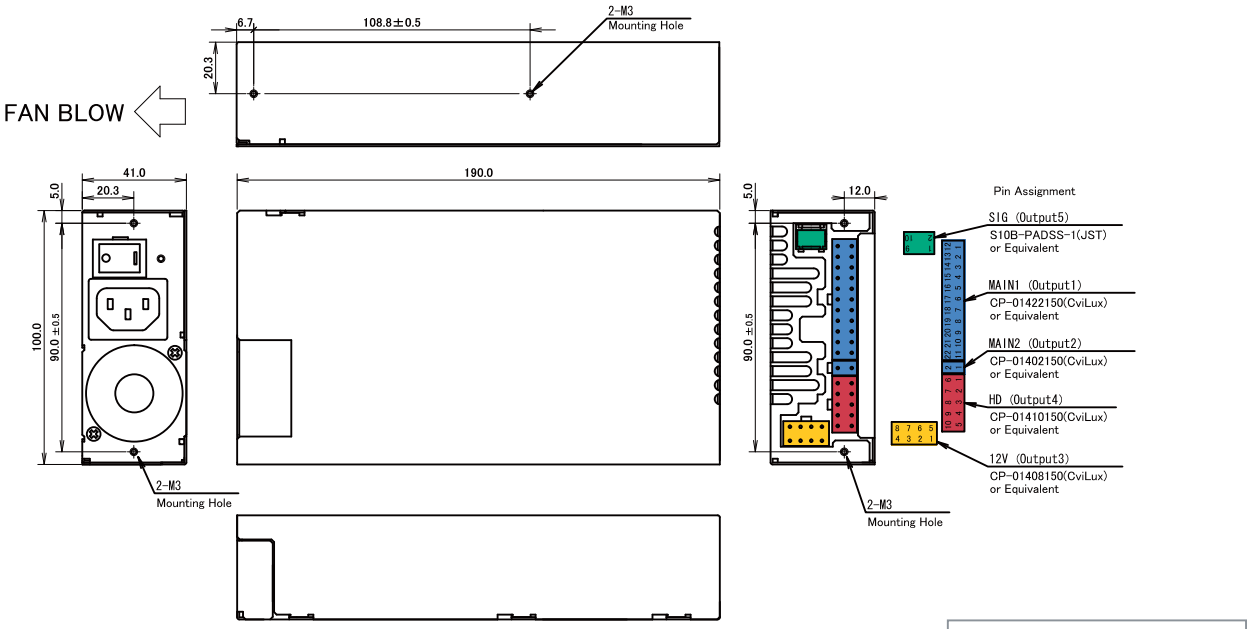
(*1) All other outputs except for CH2(+5V) shall follow this timing and the rising time difference from CH2(+5V) shall be 50ms or less.
In addition, output voltage level of CH3(+12V) at rising shall be more than the voltage level of CH1(+3.3V). The difference of output voltage level of CH2(+5V) and CH1(+3.3V) should be between -0.6V and +2.25V. Each output voltage at the time of trailing rank or level differences are unregulated.
(*2) A rise and a fall time of PWR_OK signal shall be less than 100μs at the time of the capacitive load is not connected to signal output.
(*3) At 200W output

(1) With PS_ON# 'H', only +5VSB output starts up at AC input.
(2) All outputs start up at PS_ON# 'L' input. Also, PWR_OK goes to 'H' at 100 - 500ms after the +5V output has risen.
(3) PWR_OK turns to 'L' after 16ms or longer from blackout. 1ms later than this event, the +5V output shuts down.

Block Diagram



Outline Drawing



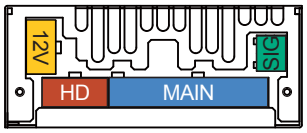
∗1 Desing tolerance of dimensions is ±1mm
∗2 The screw depth of penetration into PSU is 5mm max.

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

Optional Components Sold Separately

Detachable Output Harness

Model	Length and Type of Connector	Output Port Allocation
Main power cable MAIN		
WH-M2022-500	MAIN 500±10 → 20-pin	
WH-M2022-300	MAIN 300±10 → 20-pin	
WH-M2422-500	MAIN 500±15 → 24-pin	
12V power cable 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	
HD power cable 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, 150±15, 150±15, 850±15 → S-ATA	
SIG cable 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	



Acceptable cable(s)

MAIN	12V	HD	SIG
1 model	1 model	1 model	1 model

Optional Components Sold Separately

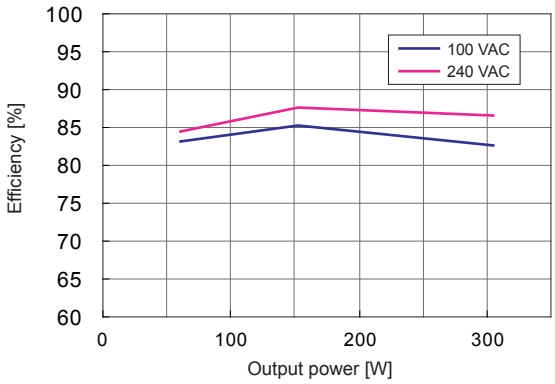
Cable			
Picture	*Model*	*Type*	*Description*
	WH2753	AC power cord	125 VAC 12A [PSE]
	WH2753-02	AC power cord	125 VAC 12A (tracking resistance type) [PSE]

Other Optional Components			
Model	*Description*	*Model*	*Description*
ACC2637	Automatic startup unit	WH5105	12V 4-pin connector conversion harness (80mm)
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

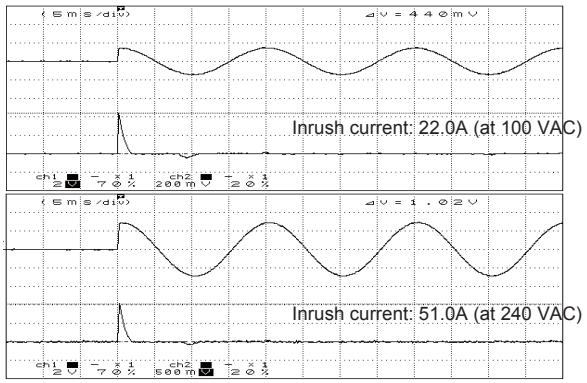
Characteristics Data (Reference only)

* Specification is subject to change due to proposed product

● Fig.5 Efficiency / Input Current vs. Output Power



● Fig.6 Inrush Current



● Fig.7 Leakage Current

Input: 100 / 200 / 240 VAC
Load: Rated and min. load
Measurement conditions: IEC60950 compliant

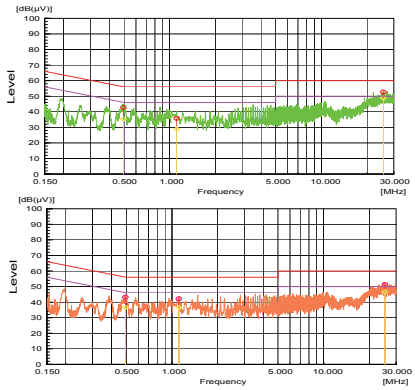
	Rated load	Min. load
100 VAC	0.17mA	0.17mA
200 VAC	0.34mA	0.35mA
240 VAC	0.40mA	0.40mA

* Contact us if a lower leakage current model is required.

● Fig.8 Conducted Emission at 100 VAC

Input: 100 VAC
Load: Rated
Mode: Peak

VCCI Class B



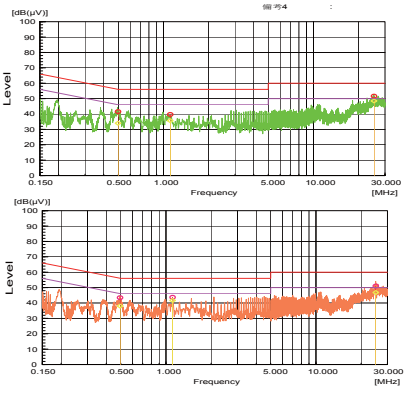
Measuring point: N-FG

Measuring point: L1-FG

● Fig.9 Conducted Emission at 230 VAC

Input: 230 VAC
Load: Rated
Mode: Peak

VCCI Class B

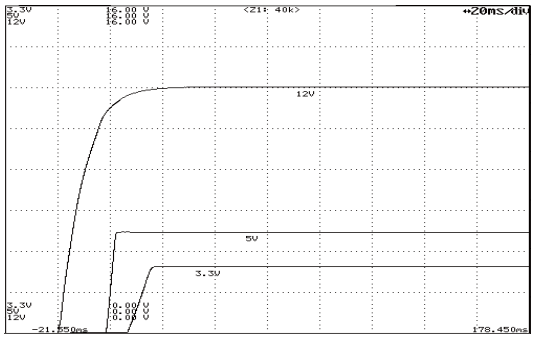


Measuring point: N-FG

Measuring point: L1-FG

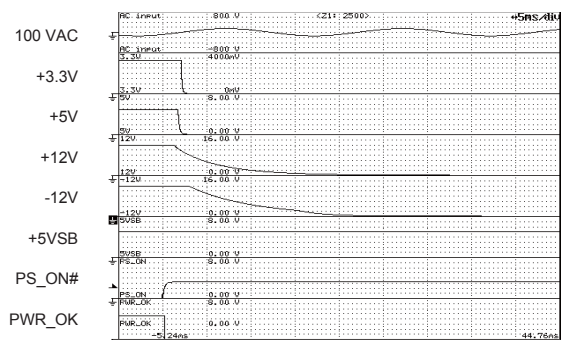
● Fig.10 Rising Characteristics at 100 VAC

Input: 100 VAC
Load: Rated
Time axis: 20ms/DIV



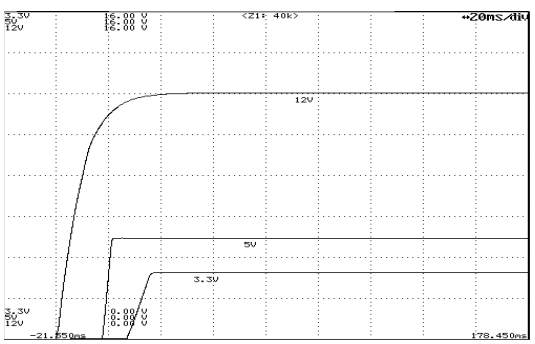
● Fig.11 Falling Characteristics at 100 VAC when REMOTE goes Off

Input: 100 VAC
Load: Rated
Time axis: 5ms/DIV



● Fig.12 Rising Characteristics at 240 VAC

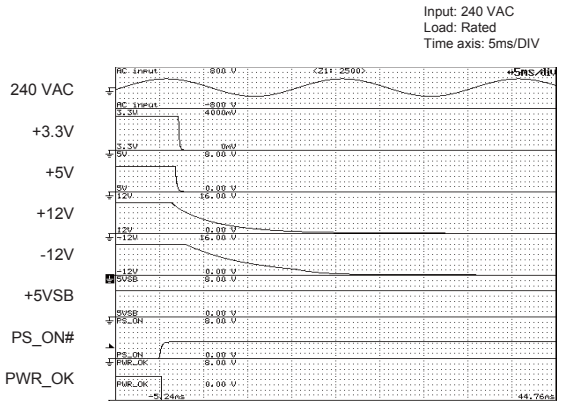
Input: 240 VAC
Load: Rated
Time axis: 20ms/DIV



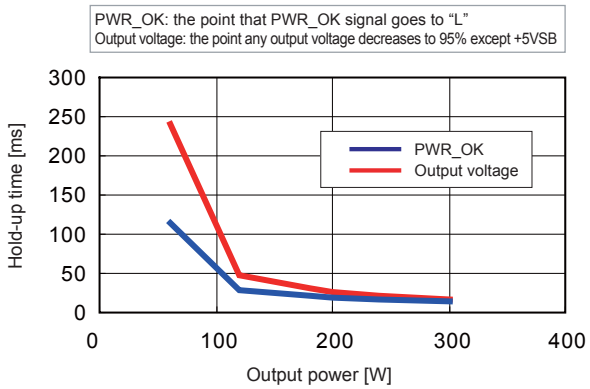
Characteristics Data (Reference only)

* Specification is subject to change due to proposed product

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



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



● Fig.15 Output Voltage Regulation

Output	Min. load	Rated load
+12V output	0A	19A
+5V output	0A	8A
+3.3V output	0A	8A

AC input voltage	100 VAC	115 VAC	240 VAC
+12V output (min. load)	12.155 V	12.154 V	12.155 V
+12V output (rated load)	12.101 V	12.101 V	12.101 V
+5V output (min. load)	5.011 V	5.013 V	5.015 V
+5V output (rated load)	4.961 V	4.961 V	4.961 V
+3.3V output (min. load)	3.318 V	3.318 V	3.319 V
+3.3V output (rated load)	3.279 V	3.279 V	3.279 V

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