

Product Specification

Model: HPC1U-400P-X2S	Created: March 13 th , 2017
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Scope
 This specification applies to built-in DC stabilized power supply, HPC1U-400P-X2S*.
 All items in this specification shall be provided at normal temperature and humidity unless otherwise specified.

General Specification

	Items	Specification and Standard	Measurement conditions, etc.
Input Specification	Rated voltage	100 - 240V AC	Worldwide range
	Permitted range	85 - 264V AC	(Note 1)
	Input current	3.8A typ. at 100V input and 1.6A typ. at 240V input	
	Rated frequency	50/60 Hz	Permitted range: 47Hz - 63Hz
	Inrush current (Note 2)	31A peak or less at 100V input 75A peak or less at 240V input	Input reclosing interval shall be 10 sec minimum at rated output. Cold start (25 °C)
	Power factor	96% min. at 100V input/90% min. at 240V input.	At rated output.
	Efficiency	82% typ. at 100V input/85% typ. at 240V input.	
Environment	Standby power	0.1 W max.	(Note 3)
	Operating temp./humidity	0 to 60°C / 10 to 90%RH	No condensation (Note 4)
	Storage temp./humidity	-20 to 70°C / 10 to 95%RH	No condensation
	Vibration	It is to endure an acceleration of 2G with a vibration frequency of 10 - 55Hz for 10 sweep cycles in the X-, Y-, and Z-directions.	JIS-C-60068-2-6 At no operation.
Insulation	Impact (surface dropping)	Lift one bottom edge of the unit up to 50mm high with the opposite edge placed on the test bench, and let it fall. Repeat 3 times for each of four bottom edges, and no malfunction shall be observed.	JIS-C-60068-2-31 At no operation.
	Insulation resistance	50MΩ or more between Input and FG/Output.	At 500 VDC
	Dielectric strength	1.5k VAC for one minute between Input and FG/Output.	Cut-off current: 10mA
EMS/EMI	Leakage current	0.5mA or less at 100V input, 1.0mA or less at 200V input, and 1.2mA or less at 240V input.	IEC60950 compliant
	Line noise immunity	Impulse of ±2,000V (10 minutes each for pulse width of 100ns and 1000ns, cycle period of 30 to 100Hz, and normal/common mode with positive/negative polarity)	Measured with INS-410. There shall be no fluctuation or malfunction of output.
	Surge immunity	IEC 61000-4-5 Installation Environment Class 3 compliant. Apply 5 times each of ±2kV common mode and ±1kV normal mode.	There shall be no malfunction or breakdown at 100V and 240 VAC input.
	Electrostatic discharge immunity	IEC 61000-4-2 Test level 3 compliant Contact discharge: with ±6kV for 10 times	There shall be no malfunction or breakdown at 100V and 240 VAC input.
	Conducted emission	VCCI/FCC/CISPR22-B/EN55022 Class B compliant	Measured with power supply single body
Others	Harmonic current regulation	IEC 61000-3-2 Class D compliant	At rated input and output
	Safety standard	UL60950, CSA60950 (c-UL), CE marking PSE, (IEC62368) compliant ⚠	Class I equipment and built-in type power supply
	Cooling system	Forced-air cooling	Rotation of fan will change depending on ambient temperature and loads conditions
	Dimensions	100 (W) × 41 (H) × 190 (D)	Except for projection. Refer to 'outline drawing'.
	Weight	1.0kg typ.	
	Reliability grade	FA	It is to follow our standard.
	Lifetime expectancy	7.0 years min. (parts with short lifetime expectancy are electrolytic capacitors: 10 years min. and fan motor: 7.0 years min.)	Life expectancy when used at 100 VAC input/rated output with 25°C ambient temperature.
	M.T.B.F.	80,000 hours min.	Based on EIAJ RCR-9102
Warranty	3 years after delivery. However, if any faults 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.	

Note 1. For the lower limit of input voltage at continuous rated load and Peak rated load, follow the 'detrating conditions' on another sheet.

Note 2. Inrush current, 100µs or less, into X-capacitors of input noise filter is not specified here.

Note 3. At rated input, PS_ON="H" and SVSB is no load

Note 4. If the ambient temperature exceeds 40°C, follow the 'detrating conditions' on another sheet.



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A	November 15, 2019	Update the safety standard	Yodo				

Drawn by	Checked by	Approved by	Drawing No.	Sheet No.
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Output Specification (Voltage is measured at output connector terminal. Voltage drop of the load side due to contact resistance is not included.)

Items		CH1	CH2	CH3	CH4	CH5 (VS5)	Measurement conditions, etc.	
Output Rating	Rated voltage [V]	+3.3	+5	+12	-12	+5		
	Minimum current [A]	0	0	0	0	0	See the 'minimum loads conditions' on another sheet.	
	Rating	Rated current [A]	8	8	19	0.5	1.0	Reference value at measurement of Input/Output characteristics.
		Rated power [W]	26.4	40	228	6	5	
	Continuous max rating	Max. current [A]	16	16	25	0.5	1.5	Continuous rating. Maximum total output power is 305W (See 'derating conditions' on another sheet)
		Max. power [W]	90		300	6	7.5	
			300			305		
	Peak rating	Peak current [A]	20	20	30	0.5	2.0	Peak rating is less than 5 seconds. Peak total output power is 400W. (See Figure 1 below and 'derating condition' on another sheet)
		Peak power [W]	120		360	6	10	
			390			400		
Output Characteristics	Total rated voltage accuracy [%]	±5	±5	±5	±5	±5	Accuracy against output voltage value including temperature and time-lapse drifts as well as Input/load regulation.	
	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 a 100MHz oscilloscope. The test board shall be separated from the load wire and placed within 150mm from the output terminal.	
	Ripple and Spikes voltage [mVp-p]	100 max.	100 max.	170 max.	170 max.	100 max.		
Protection Circuit Others	OCP	OCP point [A]	21 min.	21 min.	31 min.	Short circuit protection		At no loads except for measured CH
		Method	All outputs shutdown except for CH5			Hold-down current limiting	All outputs shutdown	When CH5 is shorted, all outputs will shut down (automatic recovery)
		Recovery method	Reclosing AC input or PS_ON#			Automatic recovery		Reclosing interval shall be 120 sec or longer.
	OVP	OVP point [V]	3.76 -4.3	5.74 -7.0	13.4 -15.6	-	(7.0)	
		Method	All outputs shutdown except for CH5			-	Zener diode clamp	
		Recovery method	Reclosing AC input or PS_ON#			-	-	Reclosing interval shall be 120 sec or longer.
	Low voltage lock-out	-						
Insulation among GND terminals	Connection is common for all outputs						Common with the power supply chassis	

Figure 1. Duty Ratio of Peak Output Current/Power

Peak output current/power shall be 5 sec max.
For repetitive peak loads, duty ration shall be 10% or less.

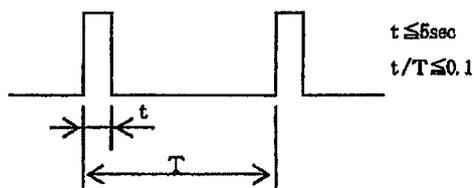
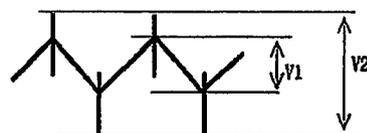


Figure 2 Definition of ripple and spike



Ripple: V1 (p-p)
Spike: V2 (p-p)



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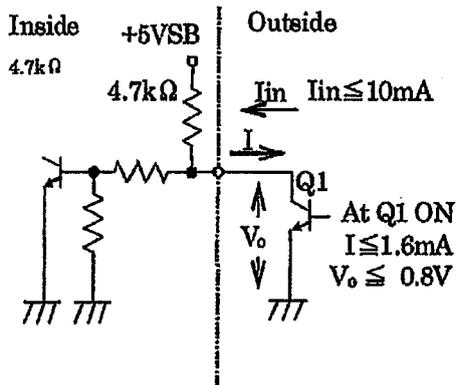
Model:	HPG1U-400P-X2S	Created: March 13 th , 2017
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Signal Input/Output Specification

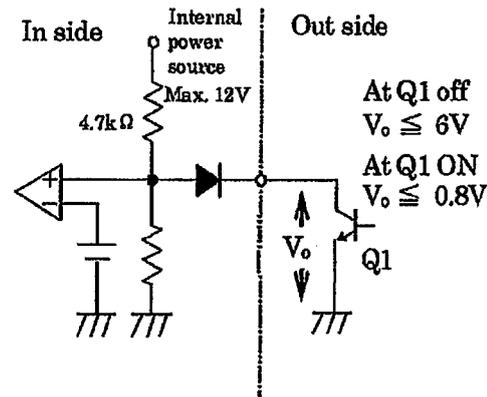
	Items	Specification
Input	PS_ON#	CH1 - 4 outputs will turn on at 'L' signal input. CH1 - 4 will shutdown with 'H' or 'OPEN' signal input.
	+3.3V SENSE	Voltage-detecting input terminal for CH1 (+3.3V) output. It compensates the voltage drop of + side cable by connecting to the + side of load end.
	FAN_C	Fan motor control terminal. Fan motor will be forced to rotate at maximum speed at 'L' signal input.
Output	PWR_OK	'H' signal is delivered when CH2 (+5V) output is ON.
	FAN_M	Two cycles of square wave are delivered per one rotation of the fan motor. Duty ratio of square wave shall be 0.5 typ. The signal stops 'L' or 'OPEN' when the fan stops operating due to malfunction.

*Make sure to connect the +3.3V SENSE to the load end of CH1(+3.3V) output before use. It may fail to fulfill the specification of CH1(+3.3V) output.

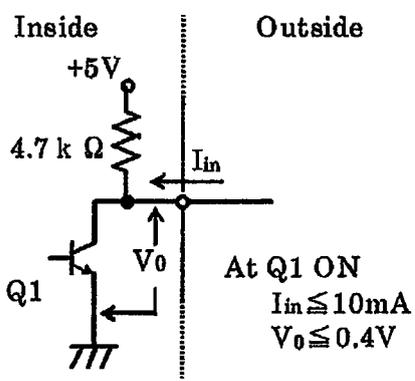
PS_ON# signal input circuit



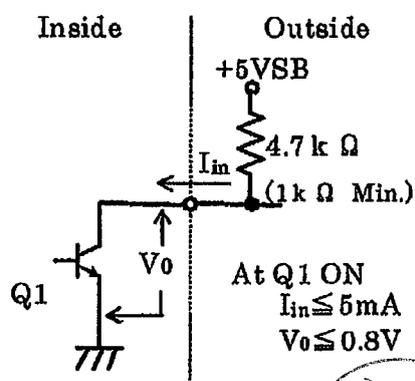
FAN_C signal input circuit



PWR_OK signal output circuit



FAN M signal output circuit



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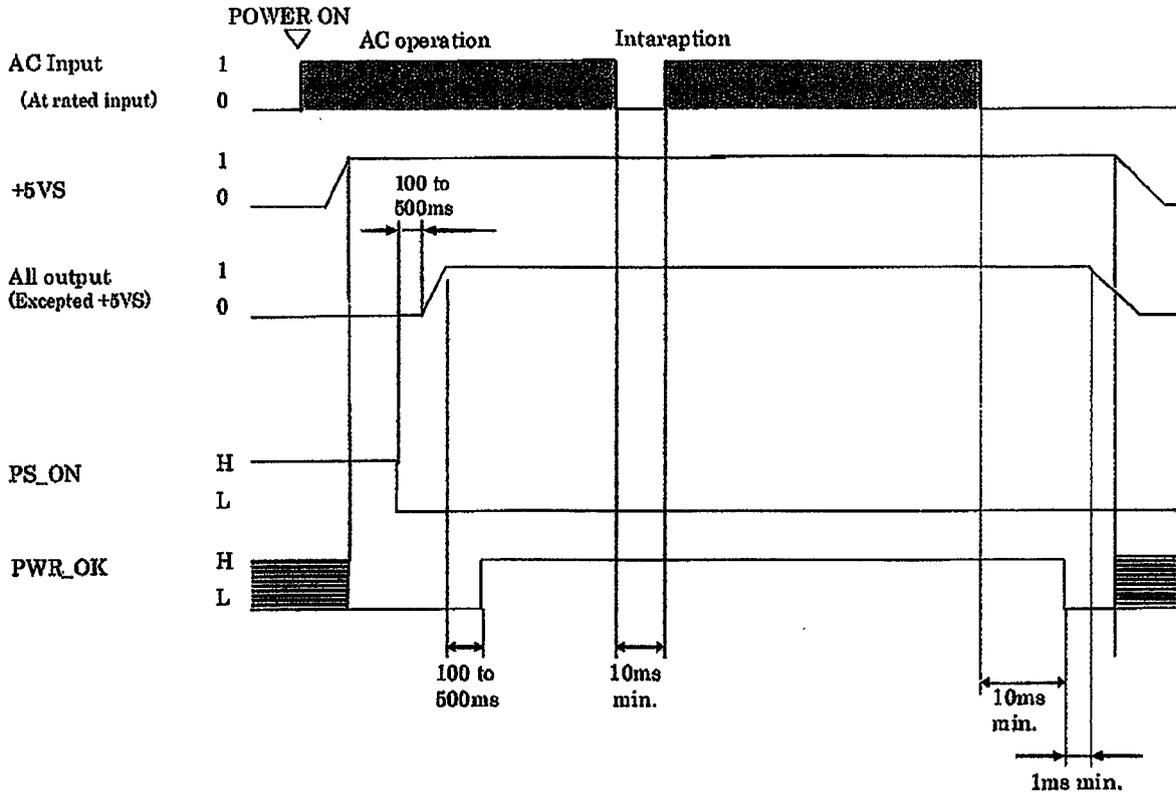
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Sequence Timing Diagram (Items are provided at rated Input and Output)



 is undefined.

Note 1. Rising time difference among outputs shall be 50ms max.

However, order and difference in level of output voltage for each output voltage at falling shall not be specified.

Note 2. Rise time of PWR_OK signal shall be 10ms or less (provided that capacitive load is not connected to PWR_OK signal output).



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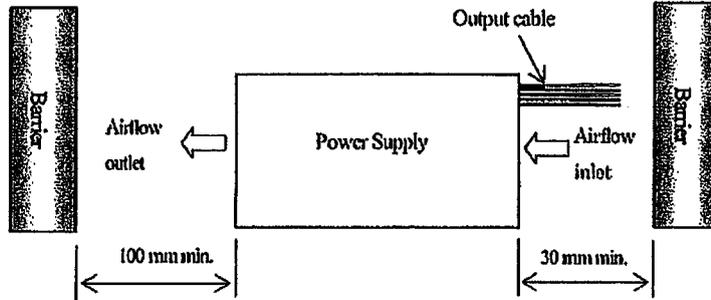
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Installation

1. When installing the power supply, make sure that the distance between airflow inlet/outlet and adjacent barriers keep the dimensions below at minimum.
2. Make sure to install the power supply in a position where temperature near the airflow inlet does not exceed the maximum operating temperature specified.



Derating Conditions

Follow the item 1 and 2 below to derate output current and power in operation at high temperature and low input voltage. For Continuous and Peak rating, max. output current of each CH specified in output specification shall be regarded as 100% of load factor. Also, when total power between channels is provided, total of those powers shall be regarded as 100% of load factor.

1. When the ambient temperature around the air flow inlet exceeds 40°C, both the continuous rating and peak rating should follow the derating curve shown in Figure 1 below.

2. When using at or below 90V input voltage, follow the derating curve in Figure 2.

In addition, when the ambient temperature exceeds 40°C, follow the load factor to multiply the load factor in Figure 2 by that in Figure 1.

Minimum loads conditions

The output voltage accuracy of CH4 (-12V) shall be defined within the range shown in Figure 3. Minimum loads condition.

Also, as the normal operation range of PWR_OK signal, the 0.5% of used peak load shall be taken as min. load power.

Figure 1. Temperature derating chart

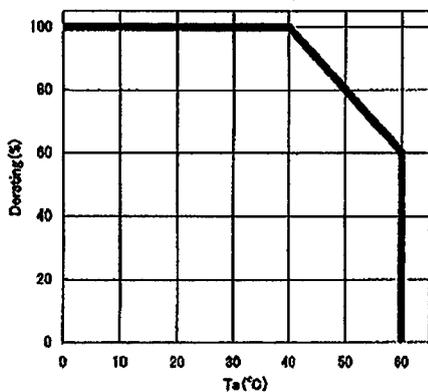


Figure 2. Low Input voltage Derating chart

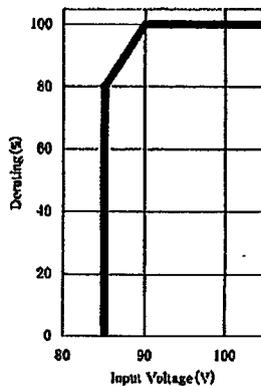
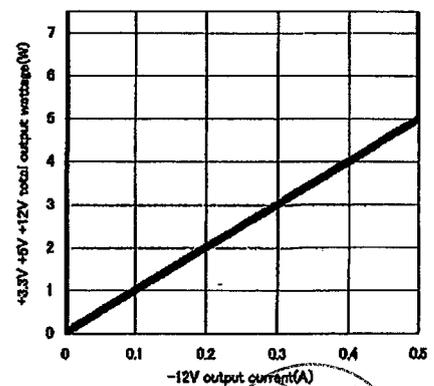


Figure 3. Minimum loads conditions



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Current Rating Table for Load Connection Pins
 The maximum current that can be drawn continuously from load connection pins is shown in the table below.
 However, the total current for each output shall not exceed the maximum output current specified in the output specification

Connector name	Pin #	Output signal name	Max. pin current	Note
MAIN 1 (Output 1)	1	+3.3V	6.0A	
	2	+3.3V SENSE	—	+3.3V sensing input
	3	+12V	6.0A	
	4	+5V	6.0A	
	5	+5V	6.0A	
	6	COM	6.0A	
	7	COM	6.0A	
	8	COM	6.0A	
	9	COM	6.0A	
	10	-12V	0.5A	
	11	+5VSB	2.0A	
	12	+3.3V	6.0A	
	13	+3.3V	6.0A	
	14	+12V	6.0A	
	15	+5V	6.0A	
	16	+5V	6.0A	
	17	COM	6.0A	
	18	COM	6.0A	
	19	COM	6.0A	
	20	COM	6.0A	
	21	PWR_OK	10 mA	Signal output
	22	PS_ON#	10 mA	Signal input
MAIN 2 (Output 2)	1	+5V	6.0A	
	2	+3.3 V	6.0A	



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Current Rating Table for Load Connection Pins

The maximum current that can be drawn continuously from load connection pins is shown in the table below.
 However, the total current for each output shall not exceed the maximum output current specified in the output specification

Connector name	Pin #	Output signal name	Max. pin current	Note
12 V (Output 3)	1	COM	6.0A	
	2	COM	6.0A	
	3	COM	6.0A	
	4	COM	6.0A	
	5	+12V	6.0A	
	6	+12V	6.0A	
	7	+12V	6.0A	
	8	+12V	6.0A	
HD (Output 4)	1	+3.3V	6.0A	
	2	+5V	6.0A	
	3	COM	6.0A	
	4	COM	6.0A	
	5	+12V	6.0A	
	6	+3.3V	6.0A	
	7	+5V	6.0A	
	8	COM	6.0A	
	9	COM	6.0A	
	10	+12V	6.0A	
SIG (Output 5)	1	NC	—	
	2	NC	—	
	3	NC	—	
	4	FAN_C	—	Signal input
	5	FAN_M	5 mA	Signal output
	6	PS_ON#	10 mA	Signal input
	7	COM	2.0A	
	8	+3.3V SENSE	—	+3.3V sensing input
	9	NC	—	
	10	+5VSB	2.0A	



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Precaution before use

1. Grounding  *Warning*

This power supply is designed and produced as Class I equipment. Make sure to properly ground the grounding terminal (chassis) for safety.

2. Electric shock  *Warning*

This power supply is designed and produced as built-in equipment, and contains a high-voltage part. Make sure to securely install the power supply into an equipment to prevent electric shock.

3. Output short circuit  *Caution*

Prevent shorting output. When the output is shorted, capacitors inside the power supply rapidly discharge and lead to fire and/or sparks, resulting in a serious accident. It also shortens the lifetime of the power supply.

4. Inrush current limit circuit  *Caution*

Inrush prevention circuit is used to limit surge current into the smoothing capacitors when AC input is turned on. If input is turned on again before the specified time interval after input failure, surge current protection may not work. As a result, excessive surge current may break the power supply. Make sure to take enough input reclosing interval as specified.

5. Acoustic noise at power-on and power-off

A low frequency sound may be observed at AC input or power-on/off by PS_ON signal; this noise is caused by low frequency vibration of chokes for preventing harmonic current. A similar low frequency noise may be observed while being energized (at operation and standby). These noises, however, do not cause any damage to the function and lifespan of the power supply.

6. Handling of the output cables

Do not grab only the output cables connected to the output connector as you move or carry the power supply.
Hold the body of the power supply when you move or carry.

7. The hold-up time of internal power supply

After the input turned-off, the internal power supply keeps outputting CH5(5VSB).

The insertion and extraction of output connectors shall be done after the confirmation of all outputs stop with the following indication time.

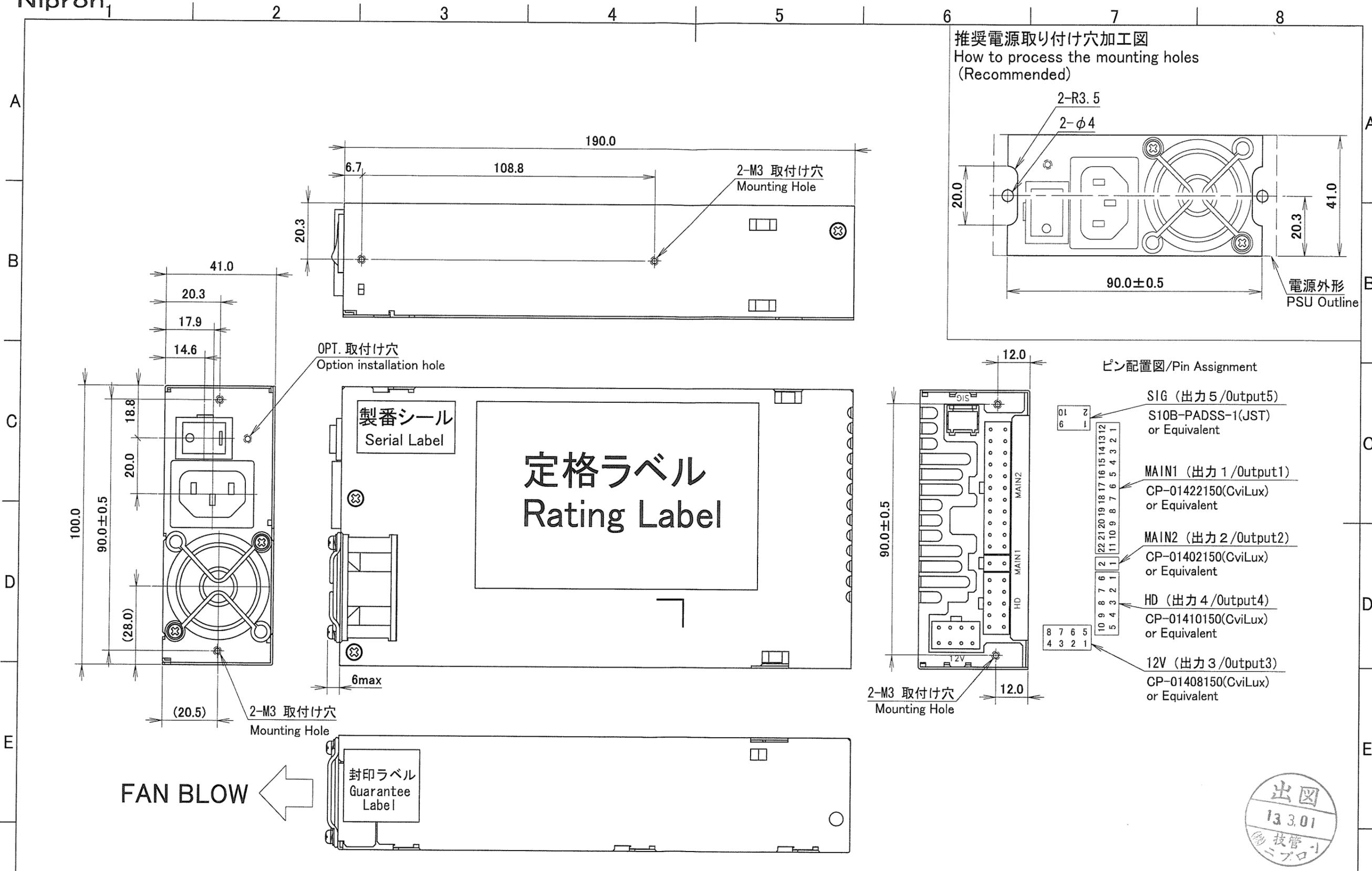
At 100VAC: 30 sec. At 200VAC: 100 sec. At 240VAC: 120 sec.



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推奨電源取り付け穴加工図
How to process the mounting holes
(Recommended)

ピン配置図/Pin Assignment

*1 特に指示がない寸法公差は ±1mm とする
Desing tolerance of dimensions is ±1mm
*2 取り付けビスの電源内部長さは 5mm MAX.
The screw depth of penetration into PSU is 5mm MAX.

図番誤記修正 20130214 石川 I-250215

DRAWN BY	CHECKED BY	CHECKED BY	APPROVED BY	SCALE	MATERIALS	TITLE	DRAWING NO.
石川	西尾	有野	有野	UNITS m/m	FINISH		
ISSUED 2013.01.19				3RD ANGLE PROJECTION		HPC1U-400P-X2S	6186-01-3-050