Product Specification

Created: July 22th,2013

Scope

This specification applies to embedded type DC stabilized power supply HPCFL-400P-X2S.
Items in the specification shall be provided at normal temperature and humidity unless otherwise specified.

General specification

	Items	Specifications	Measurement conditions, etc.
AC Input	Rated voltage	100 – 240 VAC	Worldwide range
	Voltage range	85 – 264 VAC	(Note 1)
	Current	3.8A typ. (100 VAC) / 1.6A typ. (240 VAC)	At rated load 305W
	Rated frequency	50 / 60 Hz	Frequency range: 47 to 63Hz
	Inrush current	31A peak max. (100 VAC) 75A peak max. (240 VAC)	At rated load 305W、AC input re-entry time interval 10sec At rated output at cold start (25°C) (Note2)
	Power factor Efficiency	96% min. (100 VAC) / 90% min. (240 VAC) 85% typ. (100 VAC) / 88% typ. (240 VAC)	At rated load 305W
	Standby energy	0.1 W max.	(Note3)
Environment	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	To endure the vibration acceleration of 2G with vibration frequency of 10 to 55 Hz for 10 sweep cycles in each X-Y-Z direction.	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 With the chassis fixed
Insulation	Insulation resistance	AC input – FG/DC output: 50MΩ min.	At 500 VDC
	Dielectric strength	AC/DC input – FG/DC output:1.5k VAC for one minute	Cut-off current 10mA
	Leakage current	0.2mA max. (100 VAC), 0.4mA max. (200 VAC), 0.5mA max. (240 VAC)	IEC60950 compliant
EMS/EMI	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)	To be measure with INS-410. There shall be no fluctuation in DC-component of output or no malfunction
	Surge immunity	IEC 61000-4-5 Installation Environment Class 3 compliant Common mode: ±2kV, Normal mode: ±1kV 5times for each	There shall be no malfunction or no failure at 100V/240VAC
	Electrostatic Discharge immunity	IEC 61000-4-2 test level 3 compliant Contact discharge: 10 times at ±6kV	There shall be no malfunction or no failure at 100V/240VAC
	Conducted emission	VCCI / FCC / CISPR22-B / EN55022 Class B compliant	To be measured on the single power supply
	Harmonic current	IEC61000-3-2 Class D compliant	At rated input and load
Others	Safety standard	UL60950, CSA60950 (c-UL) acquired, CE marking ,EN60950, PSE compliant	Class I equipment: Embedded type power supply Normal installation A at natural air cooling.
	Cooling system	Natural air cooling (170W), Forced air cooling (305W)	Refer to the load condition in another sheet.
	Dimensions	106 (W) × 37(H) × 225(D)	Except protrusions; Refer to the outline drawing in another page
	Weight	0.65 kg typ.	
	Reliability grade	FA	To follow our standard
	Lifetime expectancy	10 years or longer (Limited lifetime Component: Electrolytic capacitors)	Expected lifetime with continuous operation at 100 VAC input, 170W rated load, ambient temperature 25°C and normal installation.
	M.T.B.F.	100,000h min.	Based on EIAJ RCR-9102
	Warranty	Three years after delivery: If defects belong to us, the defective unit shall be repaired or replaced at our cost	Except the operation out of the specification

Note 1. Follow the derating condition in another page regarding the lower limit of input voltage at Continuous max and Peak rating.
Note 2. Charging current equal to or less than 100μs into X-capacitor in input filter circuit shall not be defined as Inrush current.
Note 3. At no load of 5VSB with rated input and PS_ON = 'H'.
Note 4. Follow the derating condition in another page when the ambient temperature exceeds 35°C.

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Product Specification

Created: July 22th,2013

Output specification (Voltage shall be measured at output connector terminal. Voltage drop of the load side connector due to contact resistance is not included)

Items			CH1	CH2	CH3	CH4	CH5 (5VSB)	Measurement conditions, etc.
Rated voltage			+3.3V	+5V	+12V	-12V	+5V	
Min. current			0A	0A	0A	0A	0A	See the minimum load condition.
Natural air cooling.	Rating	Rated current	8A	8A	8A	0.2A	1.0A	Standard value at measuring of input/output characteristics
		Rated power	26.4W	40W	96W	2.4W	5W	
	Continuous max	Max. current	10A	10A	14A	0.2A	1.0A	Continuous rating at natural air cooling. Maximum total output power is 170W. (See the derating conditions in another page)
		Max. power	83W		168W	2.4W	5.0W	
			168W					
			170W					
Forced air cooling	Rating	Rated current	8A	8A	19A	0.5A	1.0A	Standard value at measuring of input/output characteristics
		Rated power	26.4W	40W	228W	6W	5W	
	Continuous max	Max. current	16A	16A	25A	0.5A	1.5A	Continuous rating at forced air cooling. Maximum total output power is 305W. (See the derating conditions in another page)
		Max. power	90W		300W	6W	7.5W	
			300W			6W	7.5W	
			305W					
Peak rating		Peak current	20A	20A	30A	0.5A	2.0A	Momentary rating is within 5 seconds. Momentary total output power is 400W. (See Figure.1 and the derating conditions in another page)
		Peak power	120W		360W	6W	10W	
			390W					
			400W					
Output characteristics	Total voltage regulation		±5%	±5%	±5%	±5%	±5%	Accuracy against output voltage value including temperature and time-lapse drifts as well as input/load regulation
	Max. ripple voltage(mV_{p-p})		50max.	50max.	120max.	120max.	50max.	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
	Max. spike voltage (mV_{p-p})		100max.	100max.	170max.	170max.	100max.	
Protection	OCP	OCP point(A)	21min.	21min.	31min.	Short circuit protection		At without loads except measured output
		Method	All outputs except CH5 shut down.			Hold-down current limiting	All outputs shut down	All outputs shut down if CH5 is short (Automatic recovery)
		Recovery	Reclosing of AC input or PS_ON#			Automatic recovery		AC input re-entry time interval≧120sec after previous shut off.
	OVP	OVP point (V)	3.76 - 4.3	5.74 - 7.0	13.4 - 15.6	-	(7.0)	
		Method	All outputs except CH5 shut down.			-	Zener clamp	
		Recovery	Reclosing of AC input or PS_ON#			-	-	AC input re-entry time interval≧120sec after previous shut off.
	Low voltage lock-out		-					
	Insulation between GNDs of each Output		All GNDs of each output are connected.					Common with the power supply case.

Figure 1. Duty ratio of Peak current/Power

Peak current/Power shall be 5 seconds max.
and its duty ratio shall be 10% max.

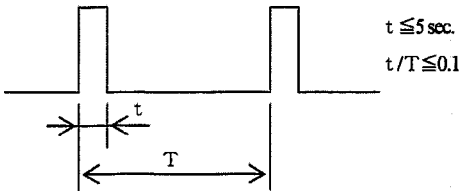
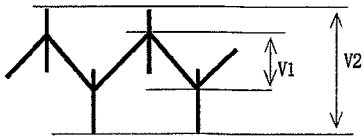


Figure2. The definition of ripple and spike



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

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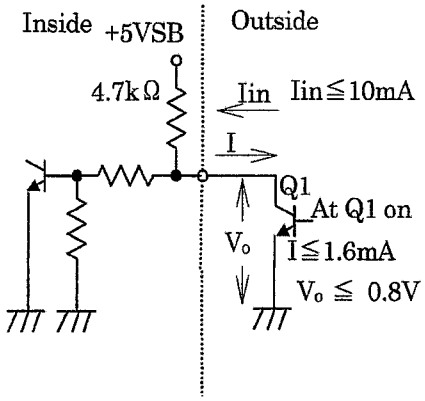
Nipron co.,Ltd.

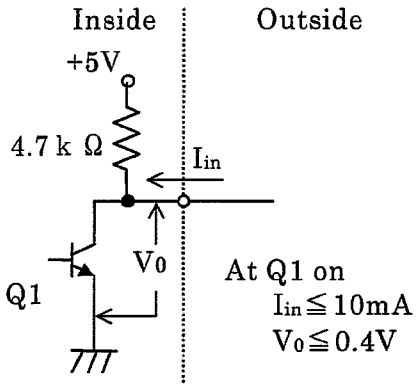
Input/Output signal specification

	Items	specification
Input signal	PS_ON	CH1 to CH4 are output at 'L' input CH1 to CH4 shut down at 'H' or 'OPEN' input
	+3.3V SENSE	Input terminal for voltage detection of CH1 (+3.3V); voltage drop of +side output cable is compensated when connected to load end
Output signal	PWR_OK	'H'is delivered when CH2 (+5V) output is ON.
	FAN_C	PWM signal for the external fan control. According to the temperature rise, it outputs by 10 steps from 0% to 100%.

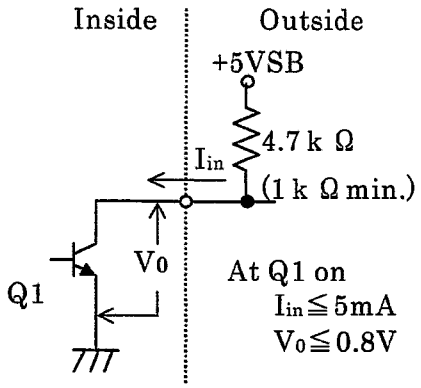
PS_ON signal input circuit



PWR_OK signal output circuit



FAN_C signal output circuit



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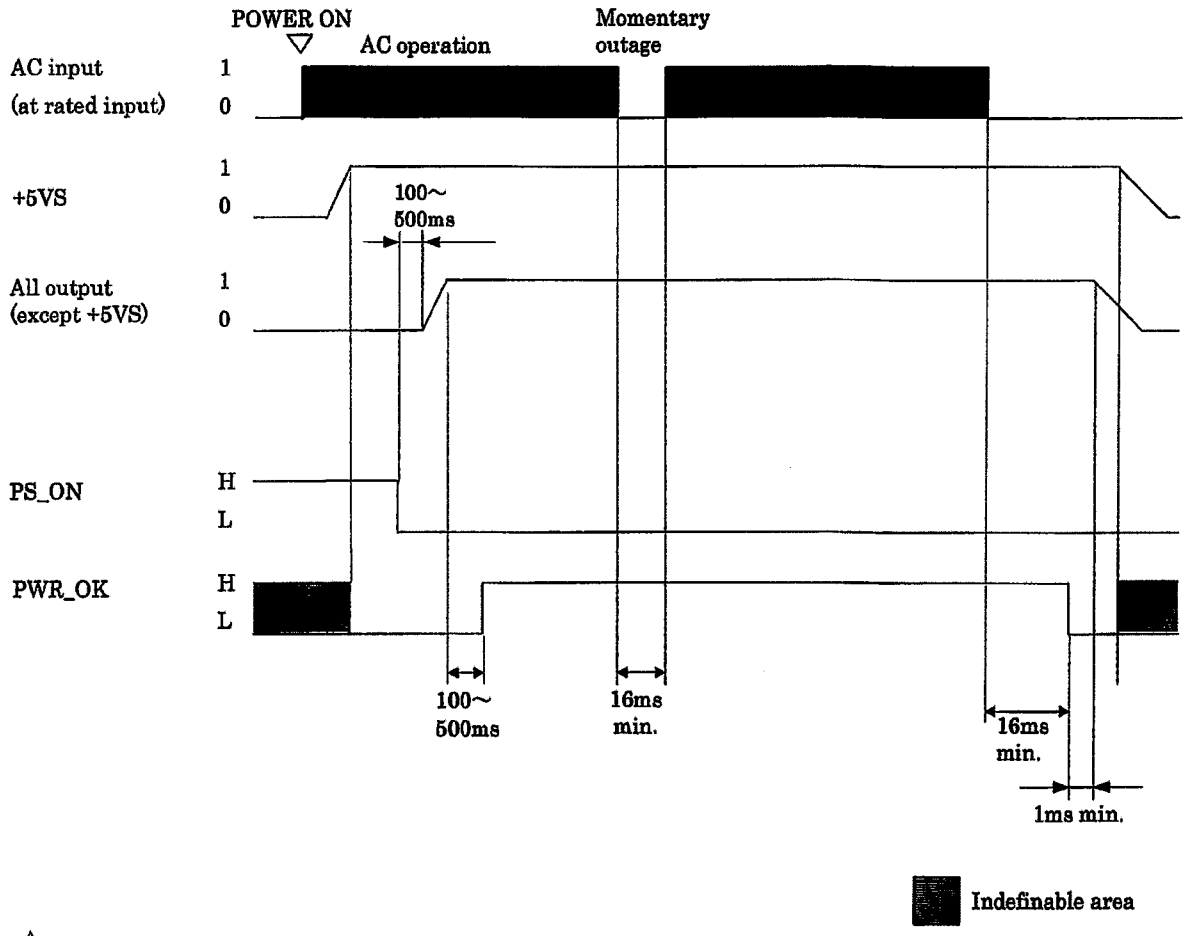
Signal input/output timing diagram (At rated input, rated load 305W)



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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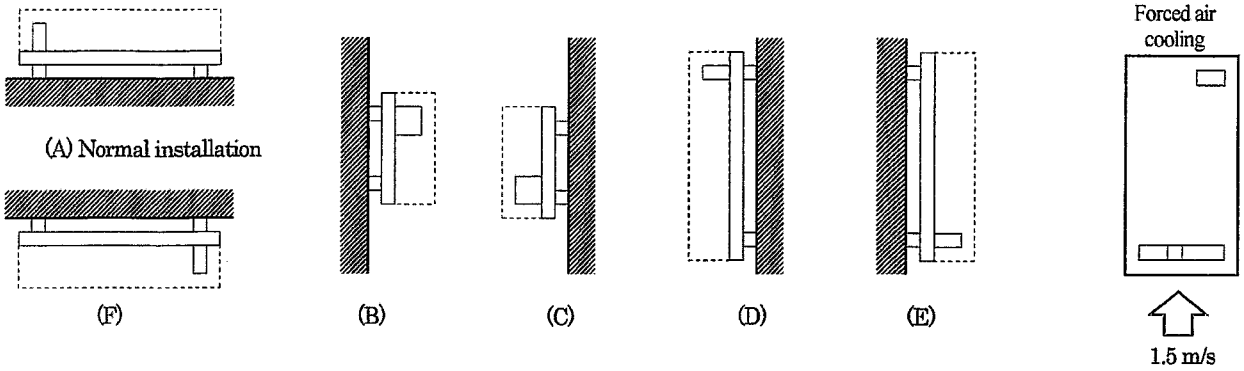
Installation / Derating conditions

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. Follow the output derating curve for each installation condition (Fig. 1) and the load factor of the continuous and peak rating.
2. When input voltage is 90V or less, follow the load factor shown in Fig. 2.

In the case that both Fig. 1 and Fig. 2 load derating conditions are applied, use by multiplying both derating rates.



Minimum load condition

The output voltage accuracy of CH4 (-12V) shall be defined within the range shown in Figure 3.Minimum load condition.
Also, as the normal operation range of PWR_OK signal, the 1.0% of used peak load shall be taken as min. load power.

Figure1. Derating curve for temperature

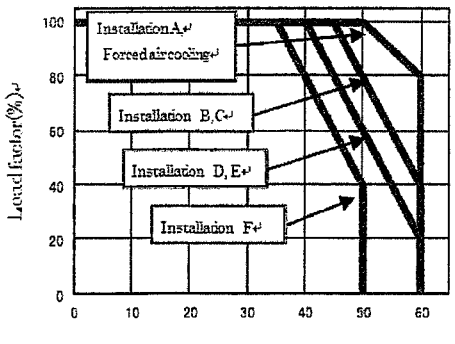


Figure2. Derating curve for low input voltage

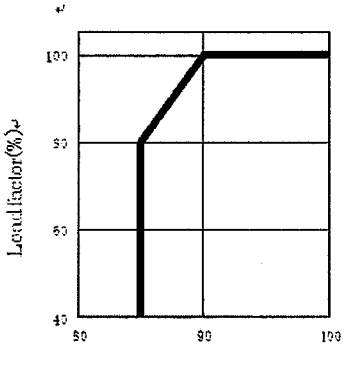
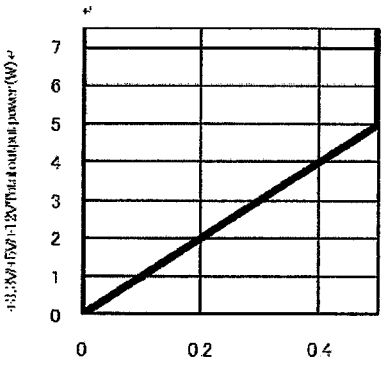


Figure3. Minimum load condition



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Current ratings of output connector pins

The maximum allowable continuous current for each of output connector pins is shown in Table below.
The sum of the shared currents for the same output must be less than the maximum current specified for each output.

Connector	Pin	Output	Max. current	Note
MAIN1 (Output 1)	1	+3.3 V	6.0 A	
	2	+3.3V SENSE	-	+3.3V Sensing input
	3	+12V	6.0 A	
	4	+5V	6.0 A	
	5	+5V	6.0 A	
	6	COM	6.0 A	
	7	COM	6.0 A	
	8	COM	6.0 A	
	9	COM	6.0 A	
	10	-12V	0.5 A	
	11	+5VSB	2.0 A	
	12	+3.3 V	6.0 A	
	13	+3.3 V	6.0 A	
	14	+12V	6.0 A	
	15	+5V	6.0 A	
	16	+5V	6.0 A	
	17	COM	6.0 A	
	18	COM	6.0 A	
	19	COM	6.0 A	
	20	COM	6.0 A	
	21	PWR_OK	10 mA	Signal output
	22	PS_ON	10 mA	Signal output
MAIN2 (Output 2)	1	+5V	6.0 A	
	2	+3.3 V	6.0 A	

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Current ratings of output connector pins

The maximum allowable continuous current for each of output connector pins is shown in Table below.
The sum of the shared currents for the same output must be less than the maximum current specified for each output.

Connector	Pin	Output	Max. current	Note
12V (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	
FAN (Output 5)	1	+12V	0.5A	
	2	FAN_C	5mA	
	3	COM	0.5A	

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Warnings and Cautions on operation

WARNING: ⚠ Grounding

This power supply is designed as safety class I apparatus. For operator safety, be sure to ground the power supply by connecting the Earth terminal to earth ground.

WARNING: ⚠ Electrical shock hazards

This power supply is designed for integrating. High potentials exist inside the power supply. When integrating the power supply into an instrument or system, use appropriate safe procedure to avoid electrical shock hazards.

CAUTION: ⚠ Output shortage

Do not get output terminals shorted. When shorted, internal capacitors discharge at once to cause serious accident due to spark, etc. resulting in shortening lifetime of this unit.

CAUTION: ⚠ Inrush current limiting circuit

Power thermistor is used to limit surge current to smoothing capacitors when AC input is turned on. When AC input is turned on shortly after AC input is turned off, excess surge current may flow as the power thermistor is still hot Make sure to turn on AC input 60 seconds or longer after AC input is turned off.

Acoustic noise at power-on

Low frequency acoustic noise may be heard at turn-on of input or power-on by REMOTE ON/OFF signal. This noise is caused by low frequency transient vibration of choke coils for harmonic measures. This will not affect performance or lifetime at all.

Output cable handling

Do not grab only output cables to move or carry this unit. Make sure to hold the main body while moving or carrying.

The hold-up time of internal power supply

After the input is 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 100 VAC: 30 sec. At 200 VAC: 100 sec. At 240 VAC: 120 sec.

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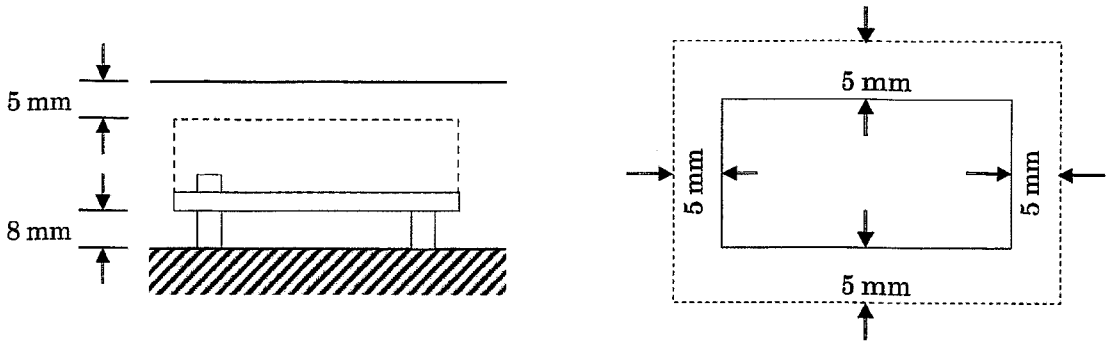
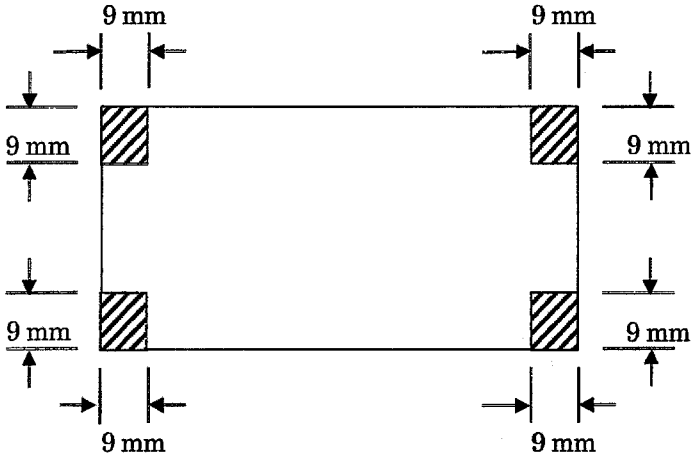
The precaution of installation

In order to meet the insulation and the dielectric strength standard, follow this dimensions below.



To suppress temperature rise around power supply, keep enough clearance to avoid poor convection.

The unit shall be installed with all 4 mounting holes on PCB and within the diagonal range below.



The installation shall be done with the condition that can have enough conduction to the same metal plate.

If it does not have the conduction, some noise characteristics might not have enough performance.

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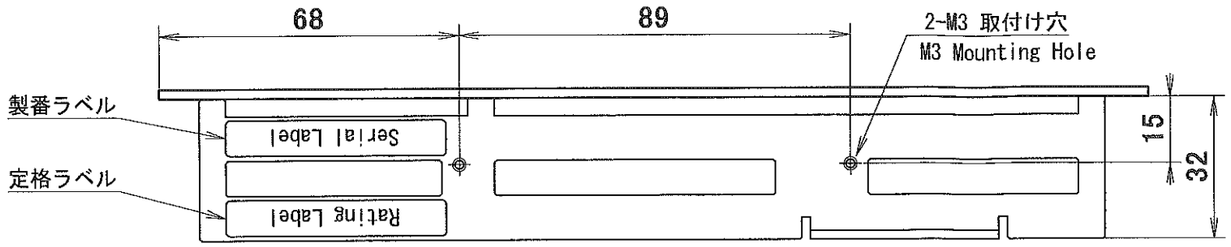
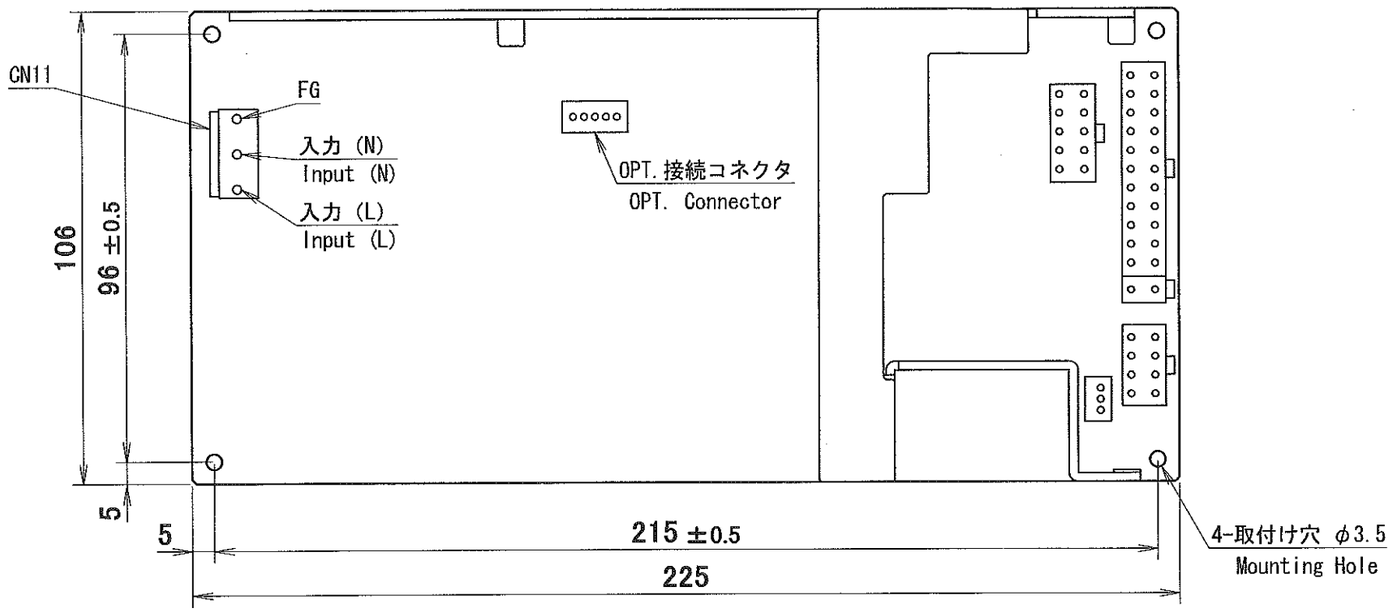
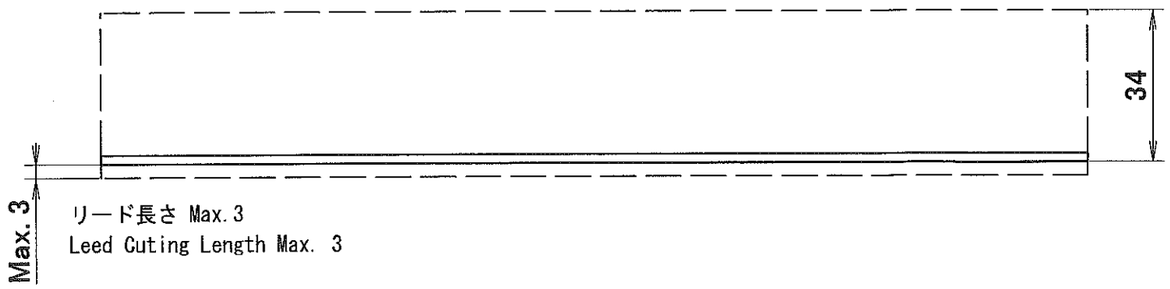
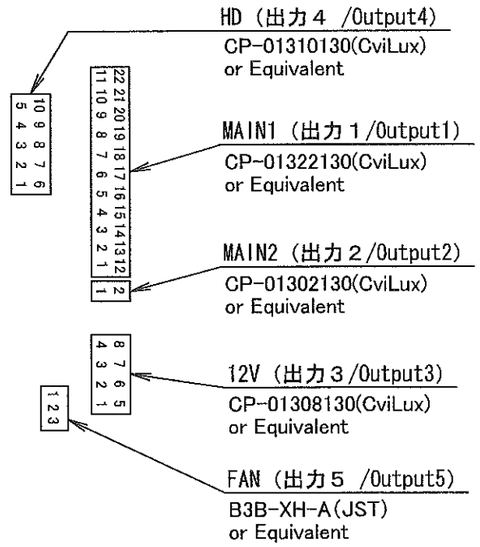
Nipron







ピン配置図/Pin Assignment



*1 特に指示がない寸法公差は ±1mm とする
Dimensional tolerance shall be ±1mm
unless otherwise specified.

*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.

出図 13.8.27 ニプロ

DRAWN BY	CHECKED BY	CHECKED BY	APPROVED BY	SCALE		MATERIALS		
有野	石川	—	有野	UNITS	m/m	—	TITLE	HPCFL-400P-X2S
ISSUED	2013.08.01			3RD ANGLE PROJECTION		FINISH —		外形図/Outline Drawing
							DRAWING NO.	6196-01-3-050

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