

2020 March

DIN-rail Power Supply

UDP Series



UDP-240 SERIES

Avoid/mitigate the risk of lightning damage with enhanced resistance to lightning surges

Compact unit with a large power capacity and high efficiency

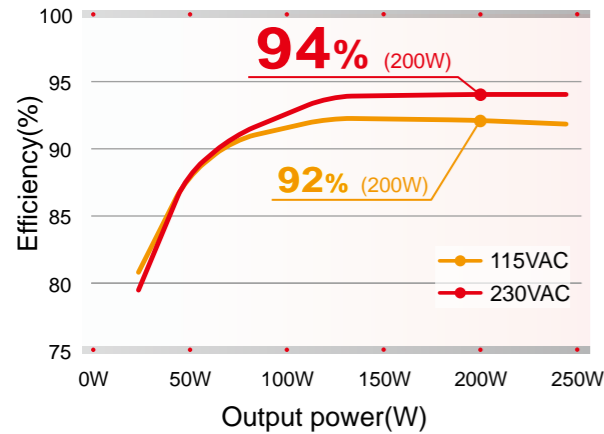
Continuous: **240W** Output voltage: **24V**
 Peak: **400W** Max. efficiency: **94%typ** (230VAC)
 Size (WxHxD): **41x124x117.5 mm**



Highly efficient design

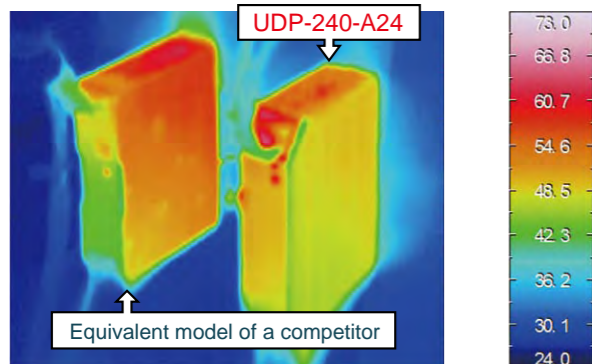
Software switching is adopted in the UDP-240 series. Compared to conventional hardware switching, it suppresses heat generation due to the switching loss significantly, enabling miniaturization of built-in components. This makes it possible to produce smaller and more efficient power supply units.

Max. efficiency of 94% typ (UDP-240-A24, at 230VAC)



Limits temperature rise in the control panel and supports miniaturization and extension of service life

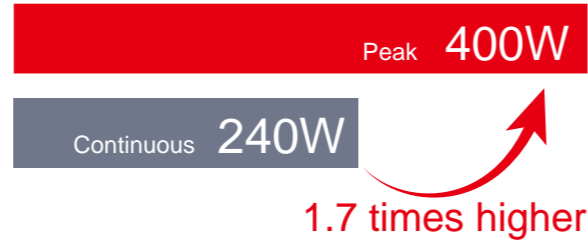
Because the heat generation due to switching loss has been reduced drastically by attaining the high efficiency, the series makes it possible to reduce the man-hour and cost in addressing the heat in control panels.



High peak power

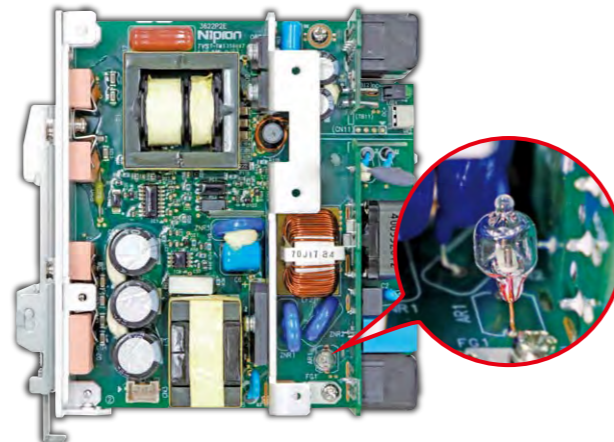
Supports approx. 1.7 times higher peak load

The product supports 10 second output of peak power, which makes it optimum for devices involving an inrush current, such as motors.



The built-in arrester enhances the resistance against lightning surges

By incorporating an arrester as a surge protector, the resistance to external surges due to lightning or other causes has been enhanced.

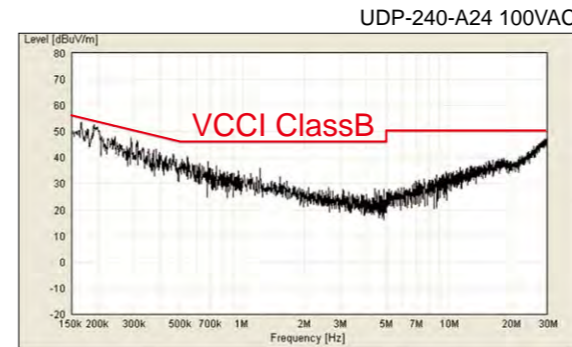


Common mode: Actual performance ±8kV

Reduction of noise filters possible

The power supply unit clears VCCI ClassB for the conducted emission. Because there is no need to install an external noise filter, it facilitates reductions in the cost and man-hour.

Conducted emission characteristics



Adoption of push-in terminals to reduce the burden of wiring and man-hour

The series adopts the push-in connection. Torque control is not required for these spring type terminals and, unlike screw type connections, there is no concern of wires becoming loose. With these terminals, it is possible to maintain the reliability while improving the workability.



* I/O terminals in the form of terminal block are also available.

Other features

- Wide operating temperature range from -20°C to 70°C (derating required)
Even if the temperature inside the control panel is high, mechanism design with high degrees of freedom is possible.
- Available to start-up at -40 deg environment
- The PCB is coated as standard specification
- Equipped with a variable resistor to adjust output voltage
- Notification of service life expiration supported (optional)
- SEMI-F47, EN62477-1 OVCIII compliant design

Selectable Input/Output connector type

The PSU comes with European terminal type or Block terminal type as I/O terminals.



European terminal type

Block terminal type

Backup features for instantaneous power failures and blackouts

The product lineup will include a model that is capable of backing up instantaneous power failures and blackouts by connecting a capacitor pack or a battery pack.



UDP-240-A24

Capacitor pack

* Image

Product outline

Output/Specifications

		UDP-240-A24
Output voltage		+24V
Continuous current		10A
Continuous power		240W
Peak current (within 10s)		16.7A
Peak power (within 10s)		400.8W
Efficiency	115VAC	92%typ
	230VAC	94%typ
Input voltage		85~264VAC (with PFC, worldwide range)
Safety standards		UL (cUL) 62368-1, UL508, CE marking approved SEMI-F47 and EN62477-1 OVCIII compatible design

Single Output Power Supply UDP-240 series

High efficiency 94%!! Output power 240W
DIN-rail compatible power supply



RoHS Directive

Single Output
Continuous Max. 240W
Peak 400.8W

Input/Output terminal type	Model	Output voltage	Output current *1	Output power *1
European terminal type	UDP-240-A24-E00-B	+24V	10A(16.7A)	240W(400.8W)
Block terminal type	UDP-240-A24-T00-B	+24V	10A(16.7A)	240W(400.8W)

■ Model name coding
UDP-240-A - **** - ***
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

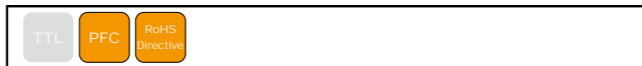
① Series Name ⑤ Input/Output terminal type ⑦ Notification of service life expiration ⑨ DIN-rail
 ② Output power E:European terminal ⑧ No notification function Blank:without DIN-rail bracket
 ③ Arrestor T:Block terminal D:Notification function equipped B:with DIN-rail bracket
 A:With Arrestor ⑥ Backup function ⑧ Modification
 ④ 24V 0:No function B:Backup function equipped

Features

- It is not necessary to provide a noise filter on the outside because of low noise and low leakage current.
- The built-in arrestor to avoid/mitigate the risk of lightning damage
- Available to start-up at -40 deg environment
- The PCB is coated as standard specification
- European terminal type and Block terminal type are available
- Equipped with a variable resistor to adjust output voltage

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

Function



Input

AC input	85~264VAC(Worldwide range)
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Dimension

WxHxD (mm)	with DIN-rail bracket	41x124x117.5
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An amazing high level of efficiency 94% has been achieved for a 24V output type*

(*At 230VAC input, 200W load)

Peak power 400W output, approx. 1.7 times higher than continuous rated

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 below.	
	Input Frequency	50-60Hz	Frequency range47-63Hz	
	Efficiency	115VAC	92% typ	At rated output
		230VAC	94% typ	*Characteristic data: Fig.4
	Power Factor	115VAC	99% typ	At rated output
		230VAC	91% typ	*Characteristic data: Fig.5
Inrush Current	20A typ(115VAC), 41A typ(230VAC)	*Characteristic data: Fig.6	Power thermistor system at cold start(25°C)	
Input Current	115VAC	2.3A typ	At rated output	
	230VAC	1.2A typ	*Characteristic data: Fig.4	
Output	Rated Voltage	+24V		
	Continuous Rated Output	10A	At rated input	
		240W	Refer to <Fig.3> output derating.	
	Peak Current/Power	16.7A	*Refer to rated input/output voltage and <Fig.2>	
		400.8W*	* Follow Peak output power condition below.	
	Factory Setting	24V±2%	At continuous rated output	
	Adjustable Voltage Range	22.8V(95%)~28.8V(120%)		
	Static Input Regulation	94mV max.		
	Static Load Regulation	150mV max.		
	Temperature Regulation	0.02%/°C max.		
Max. Ripple Voltage	0~70°C	120mVp-p max.	Connect 150mm max. lead wire to output connectors, and then connect a 10uF electrolytic capacitor with a 0.1uF ceramic capacitor in parallel to the other ends of the wires to measure by an oscilloscope with 100MHz frequency band.	
	-10~0°C	160mVp-p max.		
	-20~-10°C	240mVp-p max.		
Max. Spike Voltage	0~70°C	150mVp-p max.		
	-10~0°C	180mVp-p max.		
	-20~-10°C	300mVp-p max.		
Protection	Over Current Protection	OCP point (A)	101% min. of peak rated current	
		Method	Blocking oscillation *Characteristic data: Fig.18	
	Over Voltage Protection	OVP point (V)	30.0~36.0V	
		Method	Output shutdown(latch lock)	
Environment	Operating Temp./Humidity	-20~70°C(Available to start-up at -40°C)*20~90% *1	*Refer to <Fig.3> output derating. There shall be no condensation	
	Storage Temp./Humidity	-30~85°C/10~95%	There shall be no condensation	
Insulation	Dielectric Strength	1.5kVAC/1minute between input and output *2	Cut-off current 10mA	
		1.5kVAC/1minute between input and FG *2	Cut-off current 10mA	
	Insulation Resistance	50MΩmin. between each input/output/FG	Cut-off current 100mA	
EMC	Leakage Current	0.20mA typ(100VAC), 0.40mA typ(200VAC)	*Characteristic data: Fig.7	
		At 500VDC		
	Line Noise Immunity	±2000V(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	Apply to FG and case. There shall be no malfunction, nor failure.	
	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		
Others	Conducted Emission	VCCI-B, FCC-B, CISPR32-B, EN55032-B compliant *Characteristic data: Fig.8, 9	At rated input and rated output	
	Harmonic Current Regulations	IEC61000-3-2(edition 2.1) classA, EN61000-3-2(A14) classA compliant	At rated input/output	
Safety Standard	Safety Standard	UL62368-1, CSA62368-1(c-UL), UL508 certifications, CE Marking(LVD,EMCD) is addressed, SEMI-F47 and approved PSE(Ordinance item 2) compliant		
	Cooling System	Natural air cooling		
	Output Grounding	Capacitor grounding		
	Output Hold-up Time	Refer to <Fig.14> Output Hold-up Time vs. Output Power	*Characteristic data: Fig.14	
	Reliability Grade	FA (Industrial equipment grade to use double-sided PWBS with through holes)	To follow our standard	
	Weight	700g typ	With DIN-rail bracket	
	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 When startup is performed at -15°C or lower, it may take several seconds until output voltage becomes stable. Before using this product, evaluate it using an actual machine.

*2 The original dielectric strength between the input and output terminals is 3 kVAC for 1 minute. However, because an arrestor is mounted between the input terminal and frame ground (FG), the actual dielectric strength between them is 1.5 kVAC for 1 minute.

<Fig.1> Low input voltage derating

Follow the derating below to derate rated current/power.

Peak output power condition

- Duty ratio of peak current shall be 30% or less.
- Energized period of peak current shall be 10 seconds or less.
- Energized period of peak current shall be 5 seconds or less at natural air cooling and 50 deg. or higher of ambient temperature.
- The value resulting from the formula below shall not exceed continuous rated current, I_o, after derating specified in the output derating on the following page.

$$\sqrt{(I_p^2 \times D) + (I_m^2 \times (1-D))} \leq I_o$$

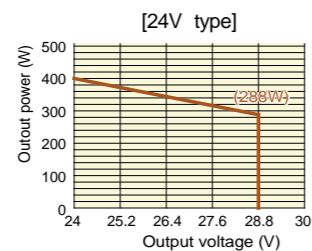
I_p=Peak current value
 I_m= Peak current value
 D= Duty cycle, t/T
 t=Pulse width of peak current
 T=Cycle
 I_o= Continuous rated current specified in output derating.

(Note) In case that temp. of power thermistor for prevention of inrush current does NOT go up enough (Resistance value is high), such as the amount of average load power is small, output power at peak power might drop for about 100ms. If thin might cause any problem, please check output voltage waveform equipping and operating the power supply with actual device.

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

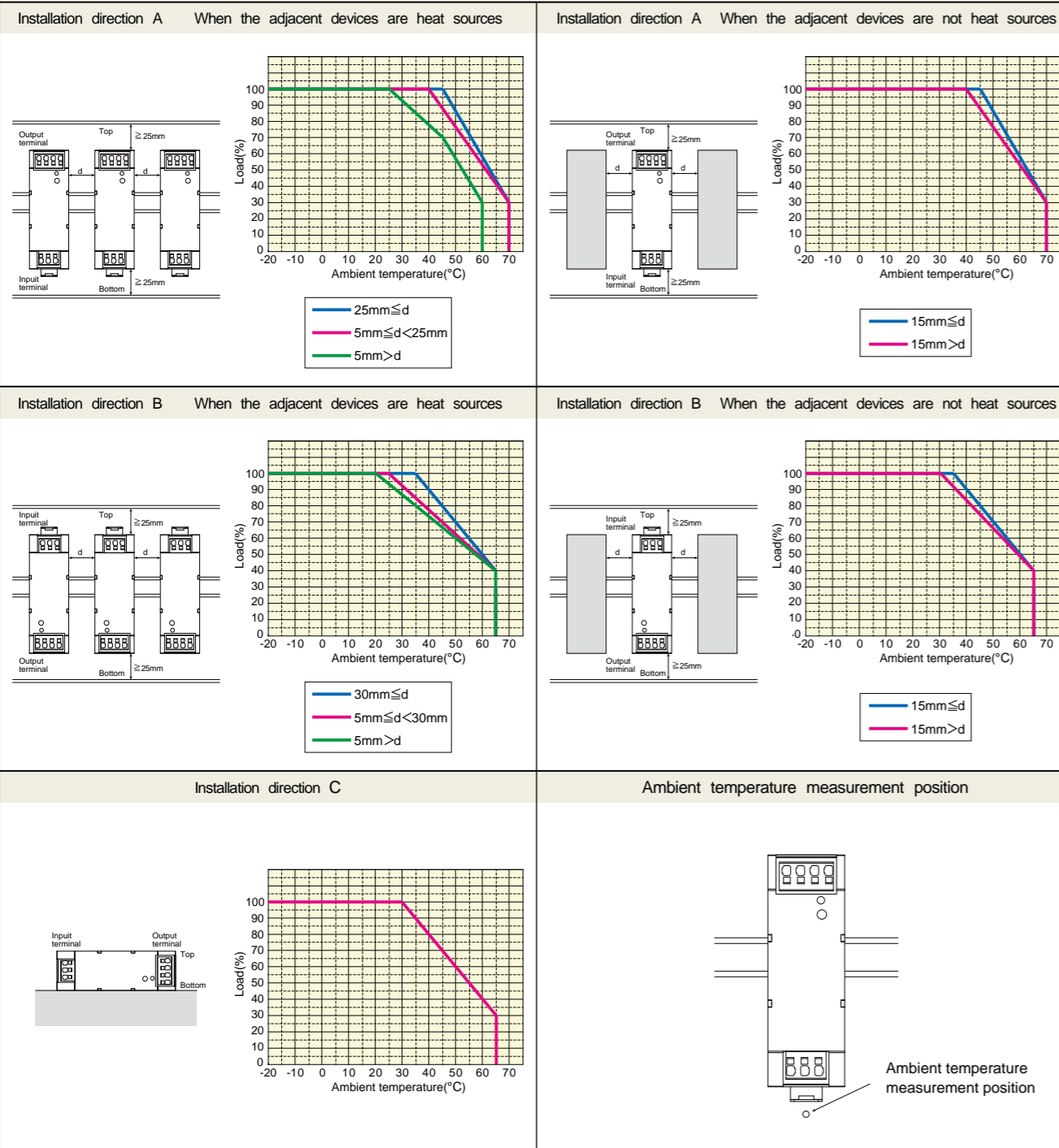
<Fig.2> Peak output derating

●Use this product by reducing the peak power according to the preset output voltage, as shown in the derating diagram shown below.

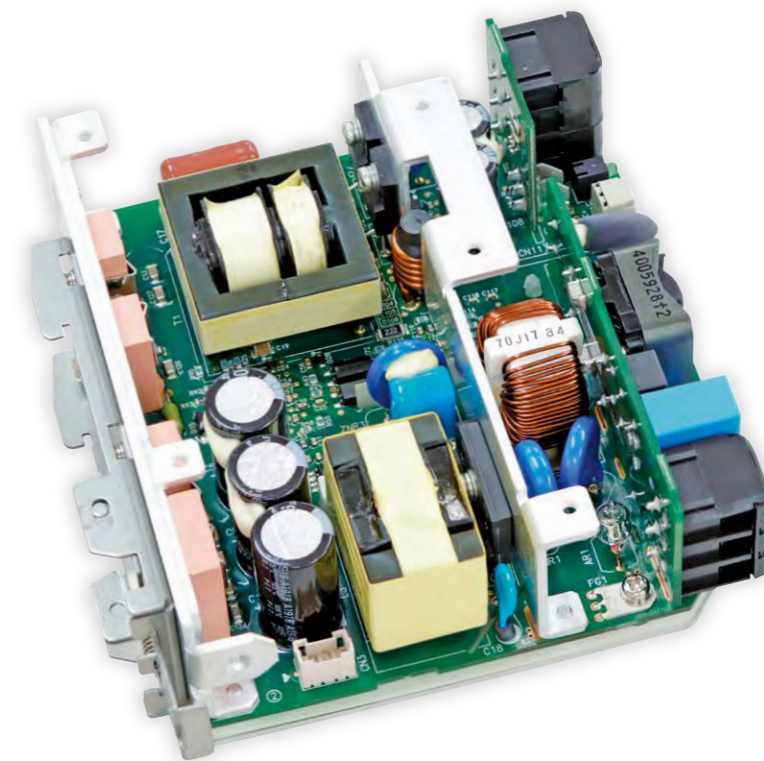


<Fig.3> Installation/Output derating

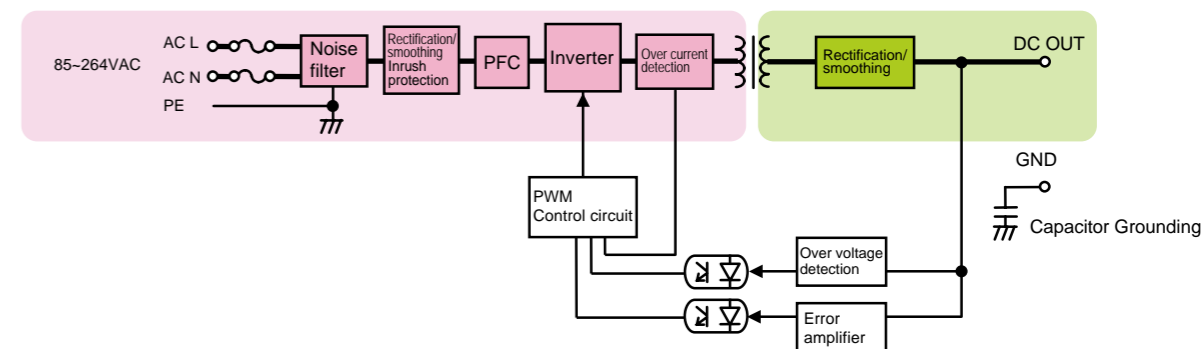
Follow the derating diagram below for output according to ambient temperature and installation direction. When installing on a DIN-rail, make sure that there is at least 25 mm space above and below the product. In addition, derate the output according to the distance between two adjacent products as shown in the derating diagram shown below. The ambient temperature during installation on a DIN-rail means the temperature at the position where convecting air enters the power supply.



Internal Structure

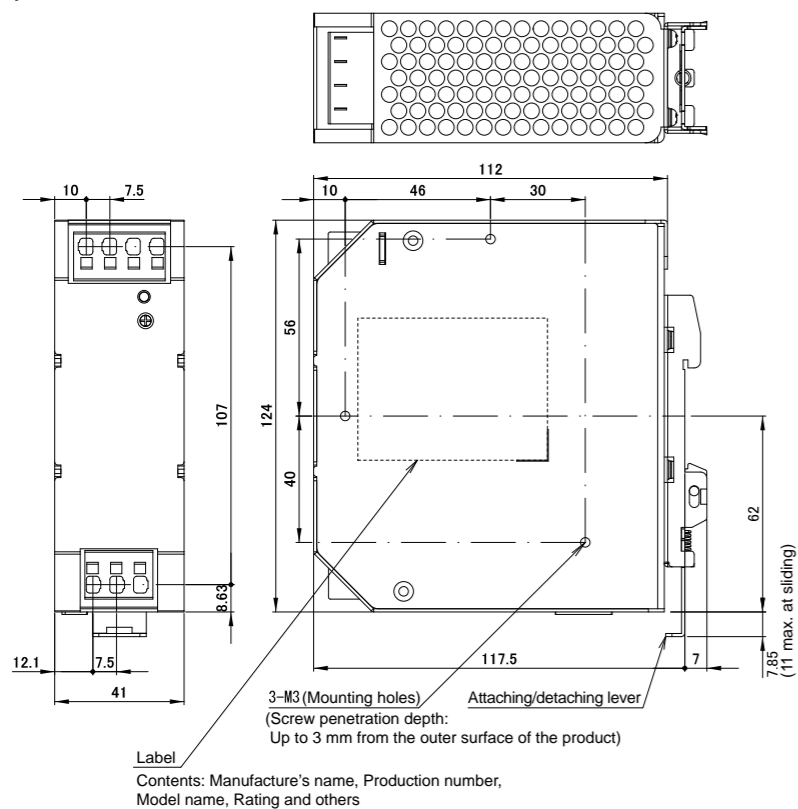


Block Diagram

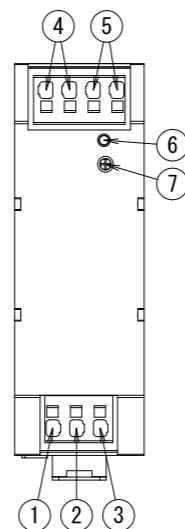


Outline Drawing

European terminal

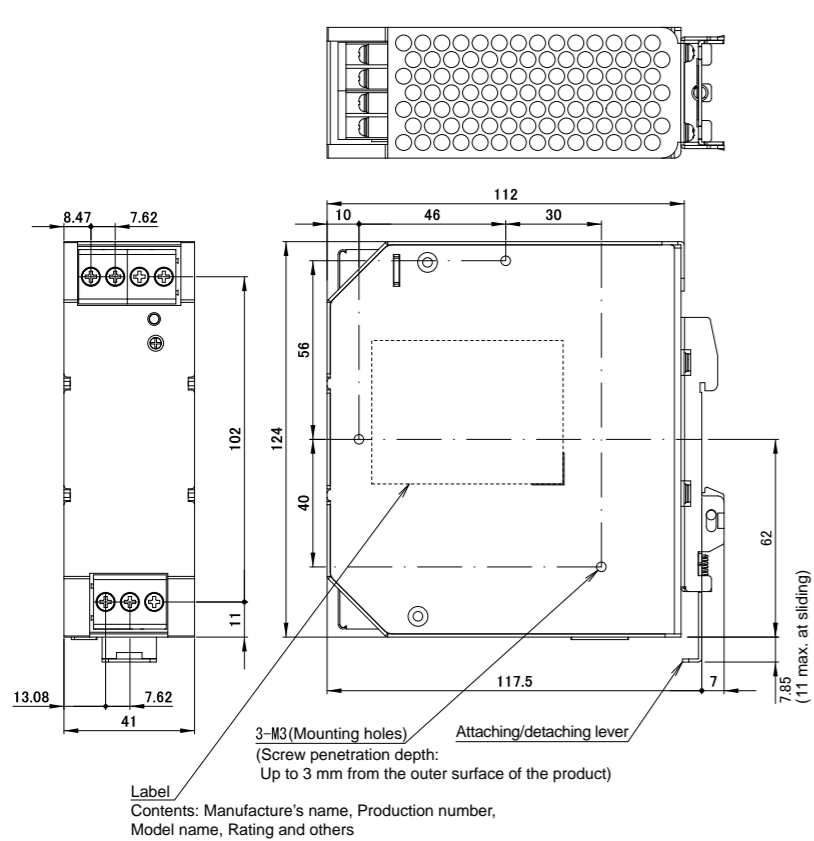


*Connector pin allocation

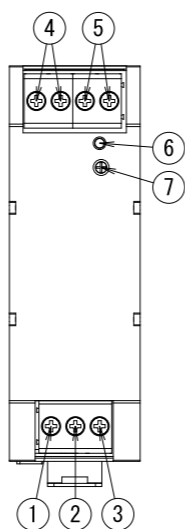


No.	Name	Function
①	AC (L)	Input terminal
②	AC (N)	
③	PE	Protective ground terminal
④	+VOUT	+ Output terminal
⑤	-VOUT	- Output terminal
⑥	PWR_OK	Output voltage confirmation LED
⑦	ADJ	Variable resistor to adjust output voltage

Block terminal



*Connector pin allocation

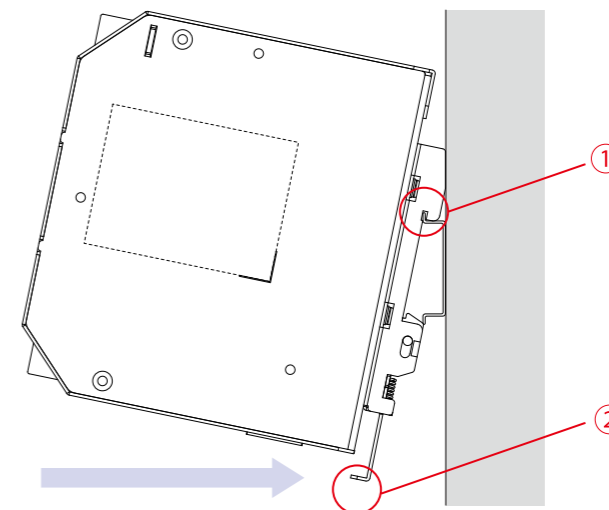


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④	+VOUT	+ Output terminal
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⑥	PWR_OK	Output voltage confirmation LED
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•Dimensional tolerance: ±1 (±0.5 for mounting dimension)

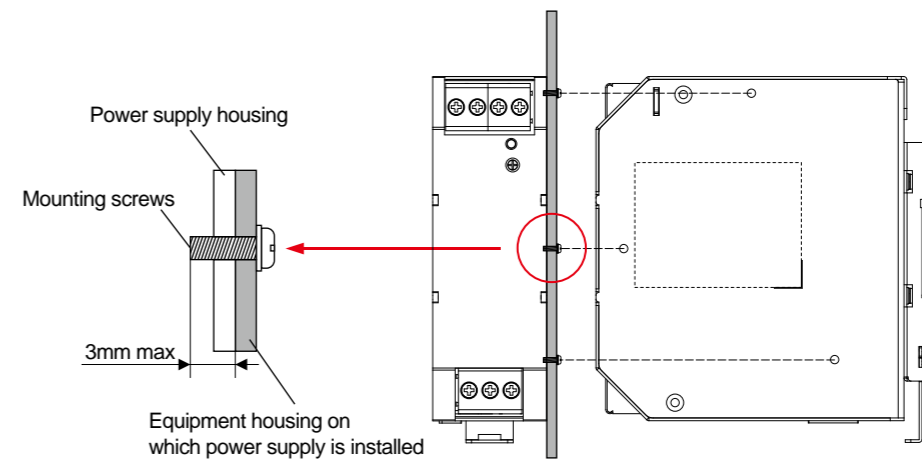
Attach to or Detaching from a DIN-Rail

To attach the product to a DIN-rail, hook part 1 (shown below) first and then push the product in the direction indicated by the arrow until it snaps in.
To detach the product from a DIN-rail, pull down part 2 first and then remove the product.



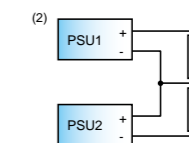
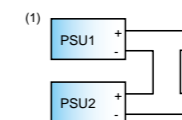
Power Supply Mounting Screws and Grounding

When using the power supply mounting holes, secure the power supply to all the three holes.
Use 3-mm-diameter screws to secure the power supply.
Be sure to connect the protective ground terminal on the input terminal block to the safety ground.



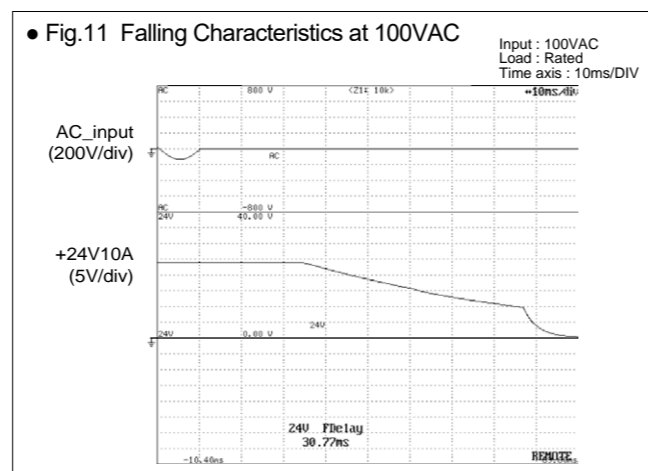
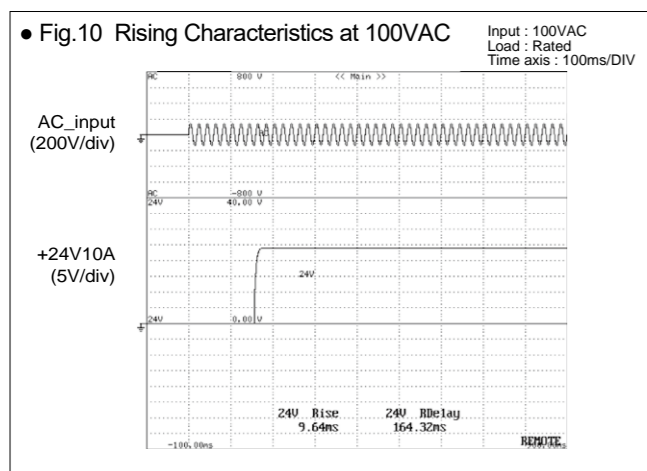
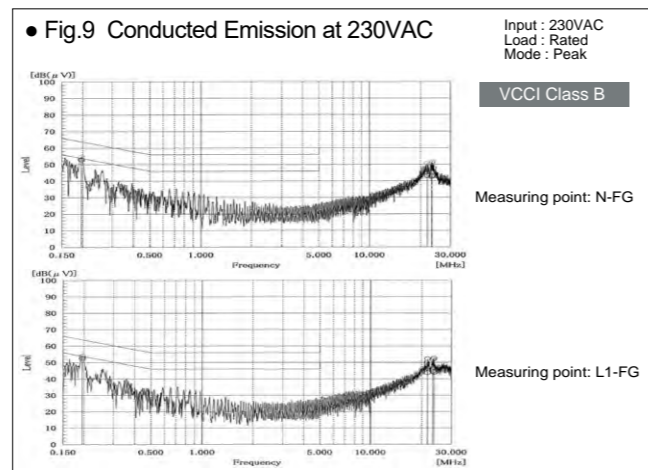
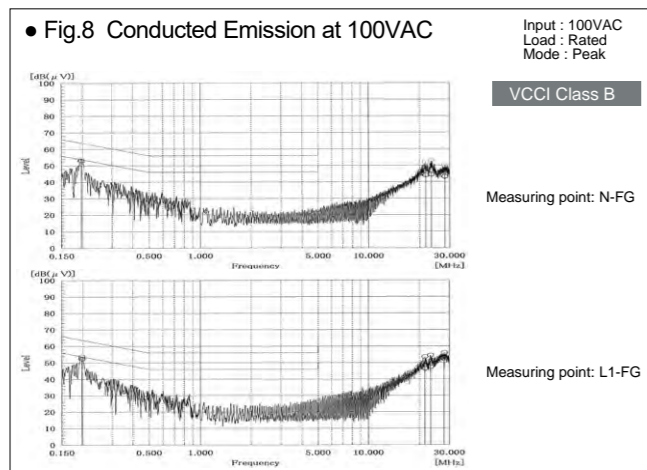
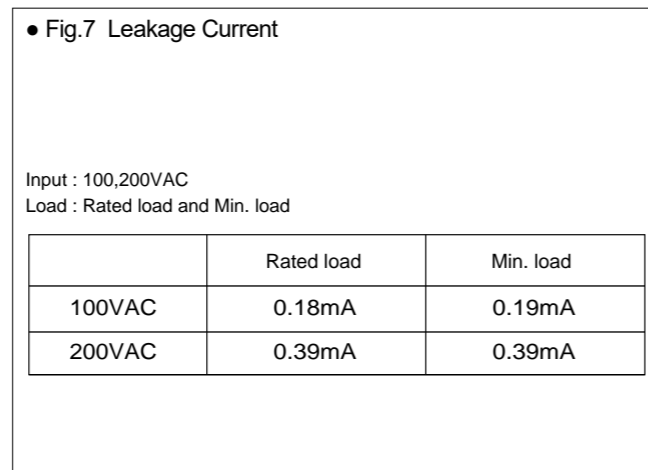
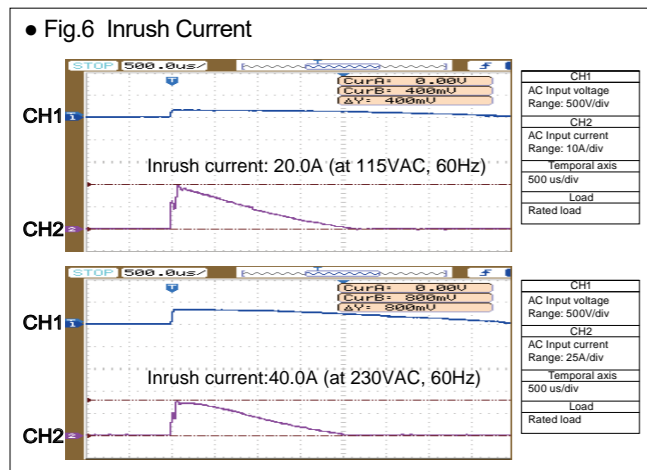
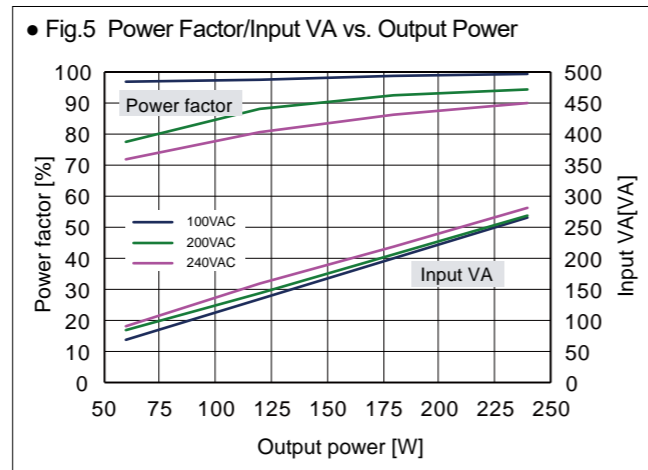
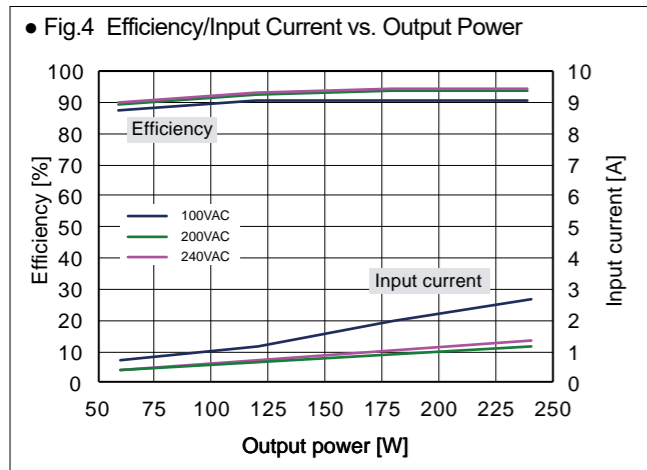
Connection in Series and Parallel

■ Series connection
Series connection shown (1), (2) on the right is available.

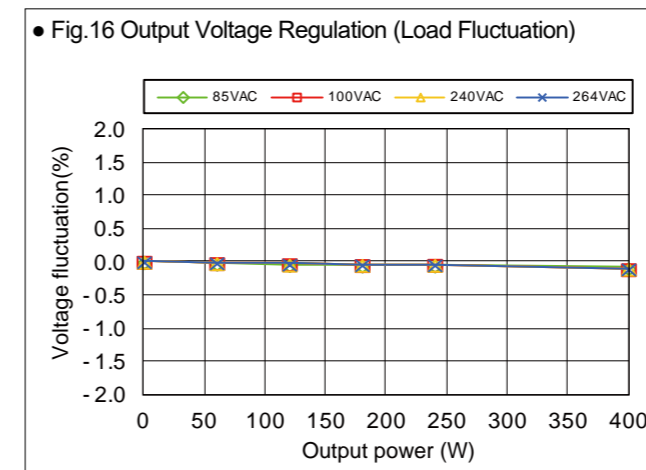
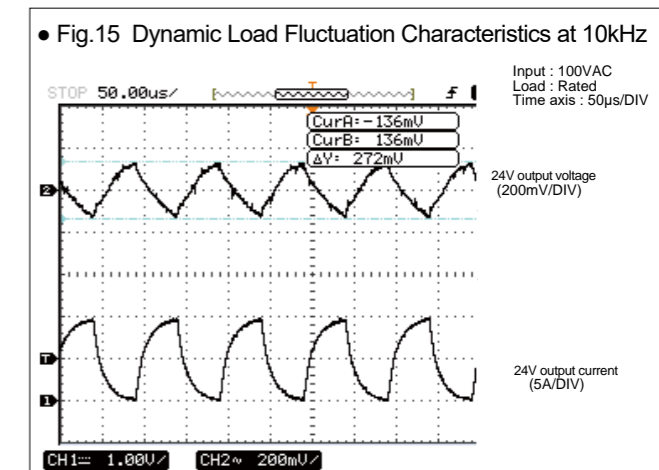
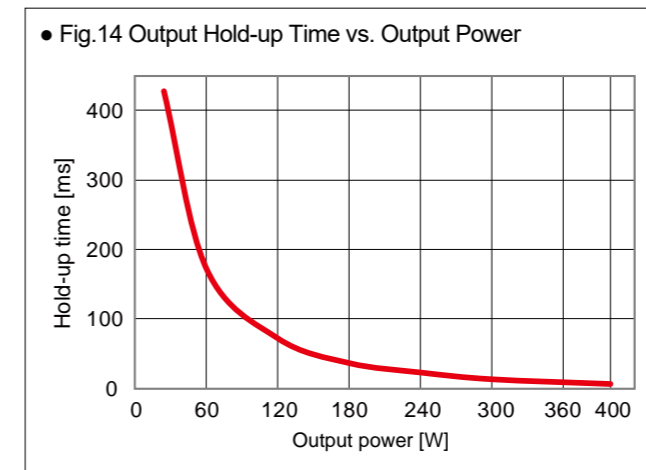
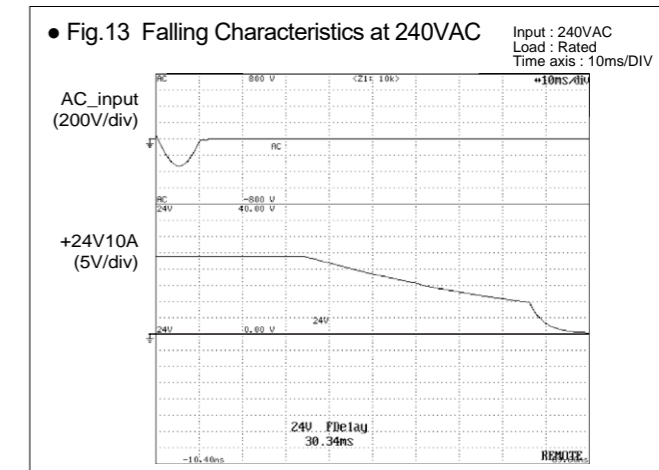
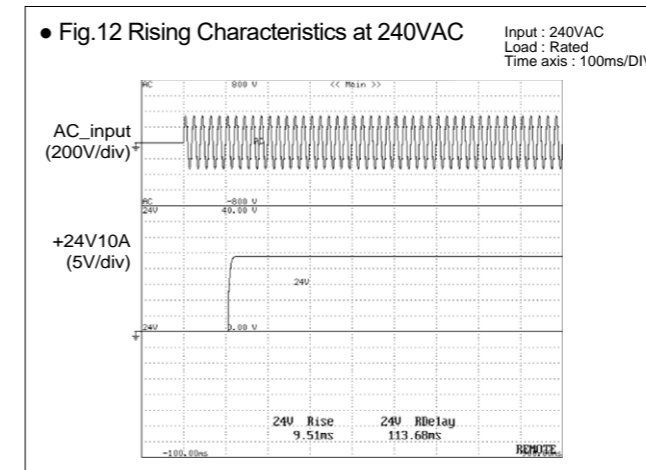


■ Parallel operation
Parallel operation is unacceptable.

Characteristics Data(Typical features of the product series) **UDP-240-A24** (Examples of actual measurement)

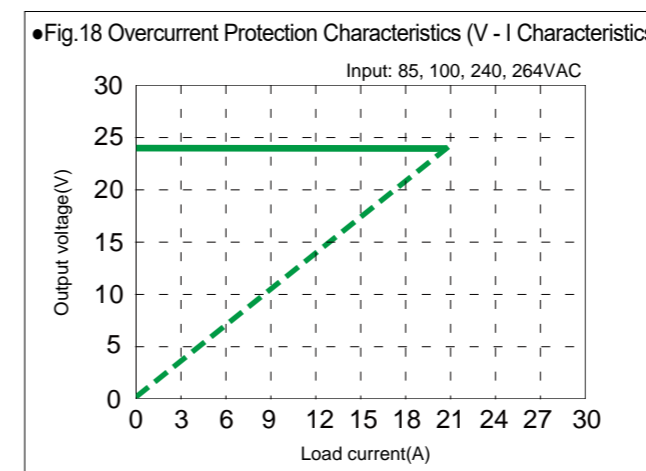


Characteristics Data(Typical features of the product series) **UDP-240-A24** (Examples of actual measurement)



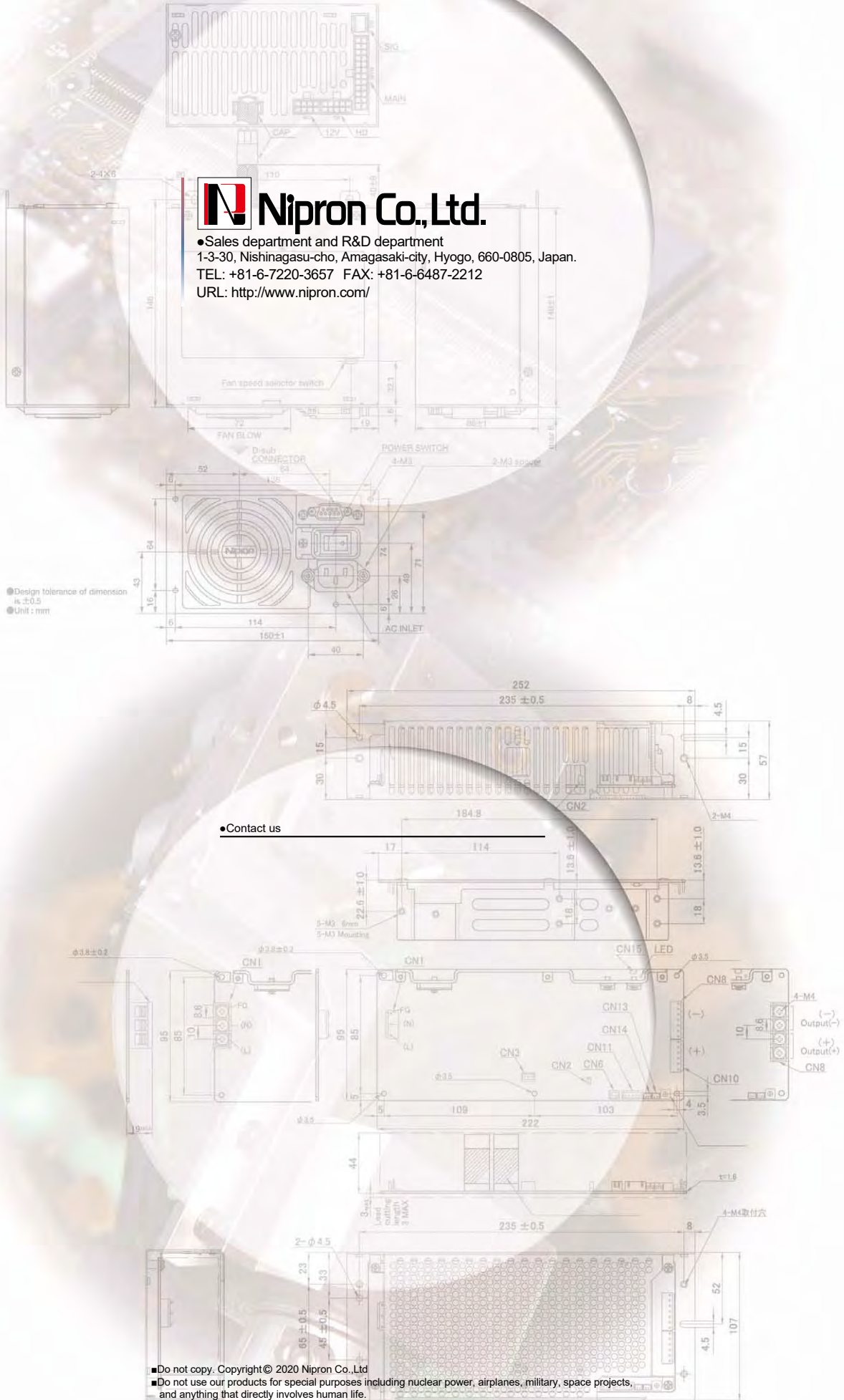
• Fig.17 Ripple and Spike Voltage

Temperature	AC Input voltage	CH1 24V					
		Minimum load		50% load		Rated load	
		Ripple(mV)	Noise(mV)	Ripple(mV)	Noise(mV)	Ripple(mV)	Noise(mV)
-25°C	85V	5.6	29.2	29.0	49.7	70.9	110.1
	100V	5.4	25.2	28.1	48.4	64.2	100.3
	240V	5.2	22.4	25.5	48.7	49.9	86.5
	264V	5.5	22.0	24.4	42.7	47.4	86.1
25°C	85V	4.3	21.8	8.1	31.0	18.7	53.4
	100V	4.4	22.7	8.1	31.2	19.2	52.5
	240V	4.0	22.4	7.8	30.7	20.3	51.4
	264V	4.0	22.2	7.8	30.9	20.3	52.8
50°C	85V	3.2	14.2	7.2	29.7	19.3	48.4
	100V	3.9	19.4	7.3	29.6	18.7	49.5
	240V	3.8	19.8	7.2	29.9	17.5	47.8
	264V	3.8	18.9	7.2	31.2	17.7	51.7
75°C	85V	1.6	4.7	2.9	4.4	3.8	5.9
	100V	1.6	4.5	2.9	4.6	3.9	6.0
	240V	1.4	3.8	3.0	4.3	3.8	5.7
	264V	1.4	4.1	2.9	4.4	3.8	5.7



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●Design tolerance of dimension
K ±0.5
●Unit: mm

●Contact us

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