SANKEN SWITCHING POWER SUPPLIES

STANDARD SWITCHING POWER SUPPLIES CATALOG

SANKEN ELECTRIC CO., LTD.

http://www.sanken-ele.co.jp/en/index.html

⚠ Safety Precautions

(Be sure to observe the precautions explained below.)

1. Be sure to read “User’s Manual” and “Detailed Specifications” before using these products.
2. Be sure to observe usage conditions, environments and other requirements described in this catalog.
3. The products described in this catalog are DC stabilized power supplies with special structures created for mounting on devices. Use only for mounting on devices.
4. The products described in this catalog are designed and manufactured for general-purpose electronic equipment. Do not use these products in applications where bodily harm or death could result if malfunctioning or failures should occur (medical equipment and other critical procedures that directly affect human life such as ultrasound surgery and electric cautery). In applications where a high-level of reliability is required, take appropriate measures such as implementing safety tests as well as using protection and redundancy circuits to increase equipment safety.
5. Be sure to observe the items below
   - Do not disassemble, repair or modify these products.
   - Do not touch inside the power supplies because of high voltage.
   - Use the products within designated input voltage, frequency, output voltage and output current ranges.
   - Be sure to observe designated ambient environment conditions such as ambient temperature and humidity.]
   - Each power supply model has a designated method for installation and mounting. Observe installation and mounting directions.

Sanken Switching Power Supplies, Leading the Times with Total Technology

Confidence built with technology.

With Sanken's long history as the original domestic maker of switching power supplies and our continuing efforts to constantly improve technology, we have received tremendous support from out customers.

Three technologies have been integrated to create Sanken's total technology:

[**1**] Circuit design technology, as a base for product development strength,
[2] Manufacturing technology, with quality that is proven by our semi-conductor parts, and
[3] Assessment technology, to objectively evaluate these technologies.

Since we have a high standard of technical elements and a system that organically combines these elements, we are confident that Sanken has an undeniable position as the major domestic switching power supply maker. In that particularly power supply technology innovation came about from the technological innovation of semi-conductors, by using our own semi-conductors for power supply, Sanken continues to maintain its dominance in technology innovation.

In the future as well, Sanken will fully demonstrate this total technology and aim to create products that lead the times and satisfy our customers.

CONTENTS

Output	Input Voltage (V)	Series Name	Output Power (W)	Output Voltage 3.3V	5V	12V	15V	24V	Page
Single Output	100	CSJ	10, 15		●	●	●	●	17
	100	CSH	25, 50, 100, 150		●	●	●	●	23
	100	SSG	30, 50, 100, 150		●	●	●	●	33
	100	SSH	25, 50, 100		●	●	● Except 100 W	●	43
	100, wide input/input switching	SLS	60, 100, 150					●	53
	Wide	CWA	15, 30, 50		●	●		●	61
			75, 100, 150			●		●	66
	Wide	SWA	15, 30, 50, 100, 150		●	●	●	●	73
	Wide	SWC	50, 100	●	●	●		●	85
	Wide	SWD	60, 100, 150, 240					●	91
	Wide	HWA	50		●	●		●	101
			100, 150, 300, 600					●	104
	Wide/auto switching (60 W)	HWB	15, 30, 60		●	● 30,60W	●	● 60W	109
Multi Output (2 channels)	Wide	HWB	15, 30				● ±output		114
	Wide	SWE	100, 150		●			●	121
Multi Output 9 cells/6 cells/5 cells	Wide	PCU	400	2 V to 48 V single output, 2 channels (two models), and 4 channels (two models) are combined as necessary.					127
			600						
			900						

About Switching Power Supplies

What are switching power supplies?

Switching power supplies are a type of stabilized DC power supply that are controlled by a switching method. When a commercial power source or DC power source is input to a switching power supply unit, semiconductor-based high-speed switching is used to convert the power to an inaudible range of high-frequency power, which is controlled and rectified to yield the desired DC power.This makes for small, lightweight switching power supplies that are well-suited for use in IT hardware, communications devices, and most of other electronic equipment.

Types of Switching Power Supplies

Today, switching power supplies are used in such a wide range of devices that require a DC power supply that there are only a few types of electronic equipment left that do not use switching power supplies.

・Application fields for switching power supplies

Industrial equipment

Computer hardware	Mainframe computers, servers, workstations, personal computers, other computer devices, and computer peripheral devices such as storage devices, monitors, printers, ATMs, and POS terminals
Communications equipment	Digital electronic switching equipment, transmission equipment, land-line communications devices including premises equipment, mobile communications devices, transceivers, wireless communications devices, telemeters, and other communications devices
Controllers	Factory automation controllers, robots, NC machines, power controllers, semiconductor manufacturing equipment, and other controllers
Measuring instruments	Analyzers, oscilloscopes, chip testers, and other measuring instruments
Medical equipment	CT, MRI, ultrasound diagnostic devices, blood analysis devices, electrocardiogram equipment, and other medical equipment
Office equipment	Word processing systems, photocopiers, facsimile devices, and other office equipment
Other	Automotive devices, LED display devices, testing equipment, etc.

Consumer products

Audio-video equipment	TVs, video equipment, videogame systems, karaoke machines, digital audio equipment, disc players, and electronic musical instructions
Other	Power supplies for power adapters, household appliances, etc.

Basic Terminology of Switching Power Supplies

1. Input-Related Terms

Rated input voltage..... RMS (Root Mean Square) value of line-to-line voltage applied to input terminals

Allowable input voltage range... RMS value of line-to-line voltage in the allowed range for ensuring performance and applied to input terminals

Rated frequency..... Frequency of AC voltage applied to input terminals (commercial frequencies are 50 Hz and 60 Hz)

Allowable frequency range..... Frequency in the allowed range for ensuring performance of power supply device

Power factor..... Active input voltage divided by the apparent power

Efficiency..... Output power (total rated output power) divided by active input power

Inrush current..... Maximum instantaneous carrying current (0 to peak) that flows after input voltage has been stopped for a specified time, until normal input current has been restored

2. Output-Related Terms

Rated output voltage..... DC voltage occurring at output terminal

Output voltage variation..... Range in which output voltage can be adjusted from an external source under conditions for guaranteed constant voltage accuracy

Rated output current ..... DC current that can be supplied to a load from an output terminal

Ripple..... A component that is synchronous with the input frequency and switching frequency occurring between output terminals

Noise..... High-frequency noise components (other than ripple) that occur between output terminals

Ripple noise ..... Combined value of ripple and other noise occurring between output terminals **(see Figure 1)**

Constant voltage accuracy ..... Amount of variation in output voltage (or the amount of variation divided by the rated output voltage) when any of the following phenomena occurs. These phenomena, listed as (a) to (g) below, can also occur in combinations.

(a) Static input variation
(b) Static load variation
(c) Ambient temperature variation
(d) Initial drift
(e) Elapsed drift
(f) Dynamic input variation
(g) Dynamic load variation

3. Auxiliary Functions

Overcurrent protection ..... A protection feature of switching power supplies whereby a current limiting function is used to protect the switching power supply and power load when the current exceeds a specified setting

Overvoltage protection..... A protection feature of switching power supplies whereby a power cut-off or shorting function is used when the output voltage exceeds a specified setting in relation to an overvoltage between output terminals

Remote control ..... A function that uses an external signal to turn a switching power supply's output voltage ON or OFF

Remote sensing ..... A function that compensates for voltage drops that occur in the distance between an output terminal and a load

4. General Conditions

Operating temperature range ... Allowable ambient temperature range for switching power supplies under continuous use and within rated conditions. As ambient temperature, this temperature is measured at a location that is not affected by the switching power supply's own generated heat.

Storage temperature range ..... Allowable ambient temperature range for switching power supplies under long-term storage (non-operating) conditions, without causing loss of performance

Operating humidity range ..... Allowable ambient humidity range for switching power supplies under continuous use and within rated conditions.

Storage humidity range..... Allowable ambient humidity range for switching power supplies under long-term storage (non-operating) conditions, without causing loss of performance

Insulation withstand voltage .... The limit voltage value that must be withstood after a specified voltage has been applied for a specified time (for insulation withstand voltage) so that the insulating strength between two specified points is satisfied

Insulation resistance..... DC resistance value that indicates insulation strength between two specified points

Vibration resistance..... Vibration resistance is tested by a type of environmental test for which conditions such as vibration type, frequency range, amplitude, and vibration application method have been specified.

Shock resistance..... An impact is applied to the item to measure shock resistance as a type of stress factor in environmental testing

Leakage current..... Current that leaks from a power supply input line via the product case to the ground

Conducted emission ..... High-frequency noise voltage that occurs at a switching power supply's power input terminal

Safety standards ..... Technical standards established for various products, parts, materials, and systems to help ensure the safety of switching power supplies in terms of design and use that does not pose a risk of bodily injury or property damage **(see Figure 3)**

Figure 1. Ripple Noise Waveform

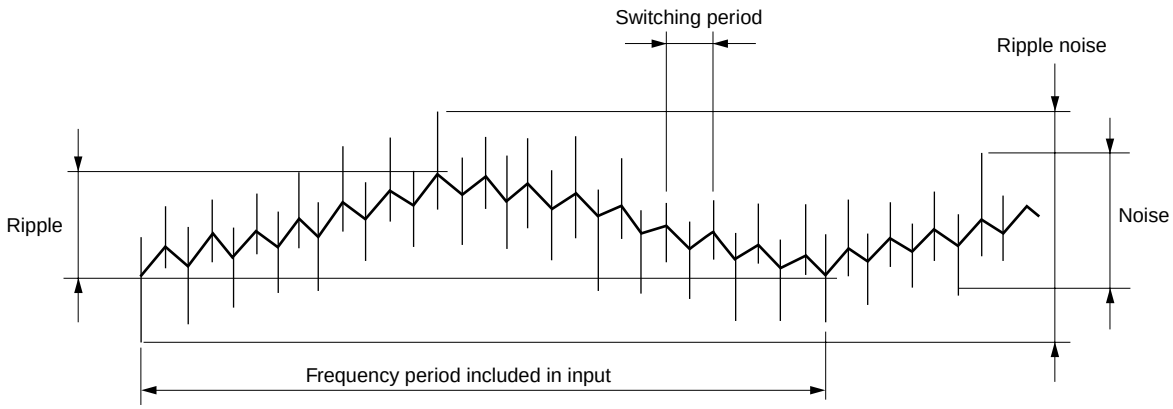
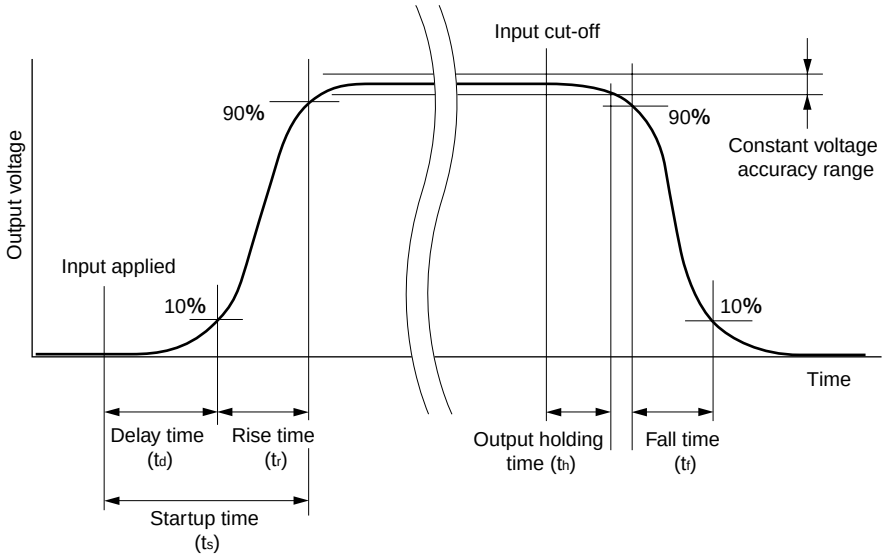


Figure 2. Rise/Fall Waveform



Startup time

- This is the time from when an input is applied until 90% of output voltage is reached. (Startup time = delay time + rise time)

Output holding time

- This is the time, after when an input is cut off, during which the output voltage is held within a specified constant voltage accuracy range and a specified voltage range.
- Stable output voltage can be supplied even when momentary power outages occur.
- The output hold function is used to save data to memory or prevent faults in mechanical operations when power outages occur.
- The output hold time is largely determined based on the following four factors.
  [1] Input voltage
  [2] Capacitance of input smoothing capacitor
  [3] Minimum regulation voltage
  [4] Output current
- Hold time cannot be lengthened by adding more output capacitors, so to do this either by increasing the minimum input voltage or perform derating of the output current. If neither of these methods works adequately, increase the input smoothing capacitor's capacitance or a minor change is required to externally add an input smoothing capacitor.

Figure 3. Safety Standards

UL certified product

C-UL certified product (complies with CSA standard)

UL and C-UL certified product

CSA certified product

TÜV certified product

CE certified product

VDE certification

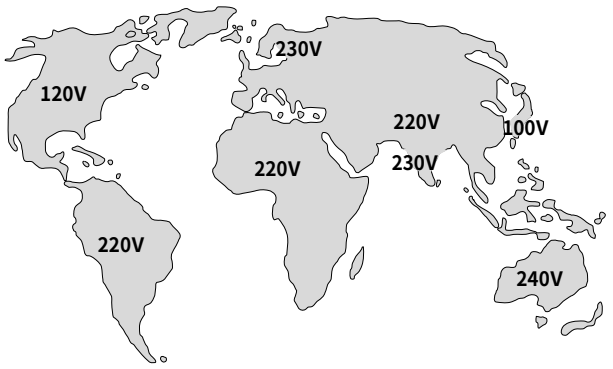
Correct Use of Switching Power Supply

1 Input

Switching power supply possesses superb small-type, lightweight and high efficiency capabilities. When used correctly, it will help you to improve the reliability of your electronic devices.

1.1 Input voltage

There are many types of switching power supplies, commonly used in every country of the world as well as in Japan, for both AC and DC applications. Check the voltage in the region where it is used, whether it is using AC or DC, the allowable voltage range, the input switching method and other conditions when using switching power supply.
Damage may occur to the power supply when power is applied that differs from the one specified.
Note that it may not operate normally even when within the specified input voltage range due to input voltage waveform distortion.



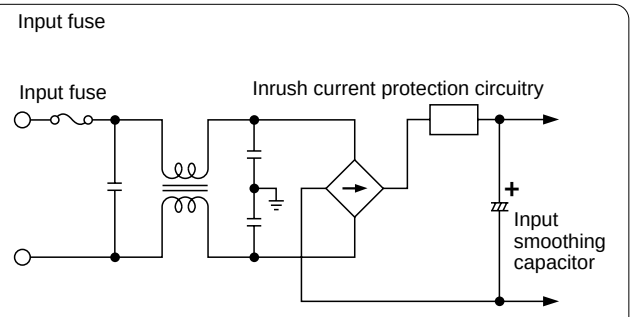
World's power supply voltage (AC)

1.2 Input current

The AC input for standard switching power supply is directly rectified. In this event, the rectification method employs a capacitor in most. Reactive current flows through the smoothing capacitor. As a result, the input current is determined by output power, input voltage, power factor and efficiency.

$$\text{Input current} = \frac{\text{Output power}}{\text{Input voltage x power factor x efficiency}}$$

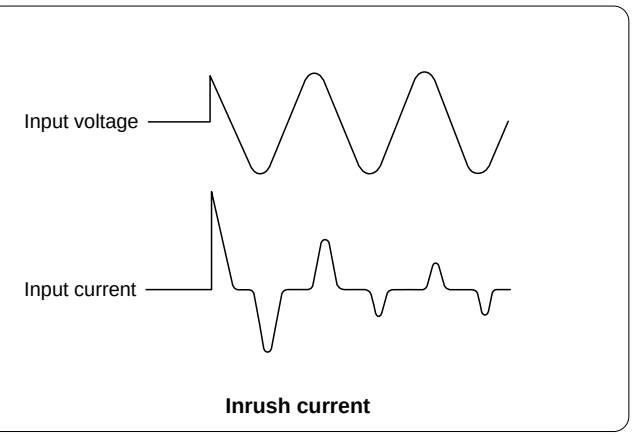
The switching power supply has a power factor of about 0.4 to 0.6 generally. One way to improve the power factor is by adding an inductance or an active filter to the input side. Increasing the inductance on the input side will raise the power factor to about 0.6 to 0.9, and adding an active filter will increase it to at least 0.9.



Input section rectification smoothing circuitry

1.3 Inrush current

A peak current flows for charging the input smoothing capacitor when power is applied to the switching power supply. This current is called inrush current. While the value for inrush current varies depending on the input timing and inrush current protection circuitry, the value increases several to many times over in comparison to stationary input current. When using multiple switching power supplies, inrush currents are totaled. Pay close attention when selecting a fuse and switches that are added to the input line.



Inrush current

1.4 Input fuse

Faults occur in the internal circuitry in the event that the fuse built-in to the switching power supply is fused. Just replacing the fuse will not repair it. At that time, consult with the manufacturer.

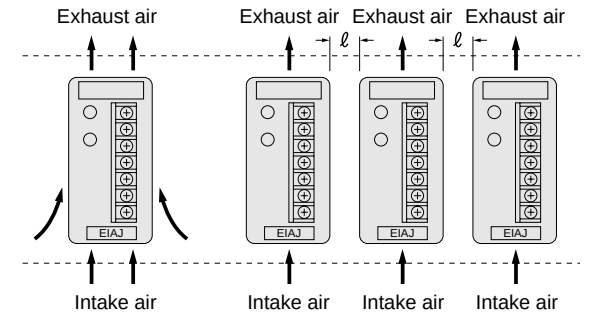
2 Mounting/Wiring/Connections

The superb features of switching power supply will not be apparent if a mistake is made in mounting, wiring or connection. Use by observing the methods specified by the manufacturer.

2.1 Mounting

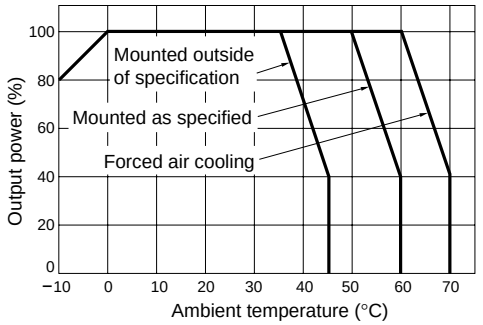
(1) Radiation

a. Consider ventilation.
b. Observe mounting direction.
c. Consider heat conduction.
d. Make a ℓ space (specified by the manufacturer) when arranging multiple units.
e. A better condition will result when conducting forced air cooling.



(2) Output derating

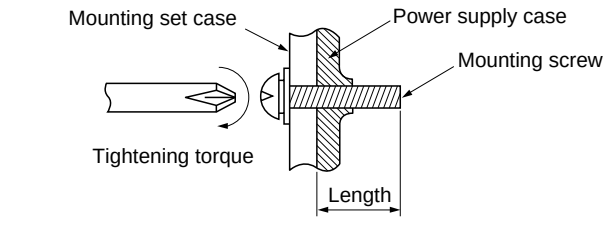
The output power is dependent on the operating temperatures. Use by referring to the derating chart.



Example of derating chart

(3) Mounting screws

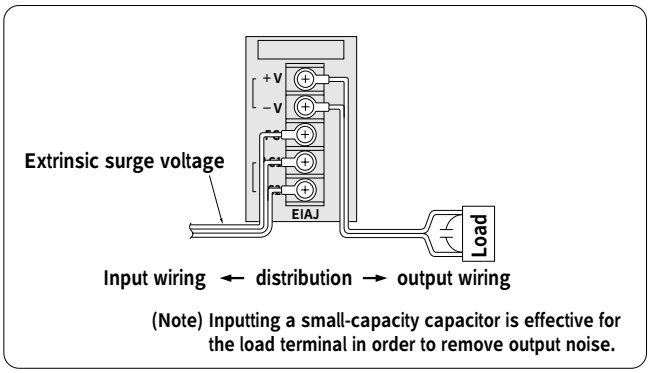
When mounting a power supply to the mounting set case, observe the specified screw length and tightening torque while considering the insulation and tightening strength.



2.2 Wiring and connections

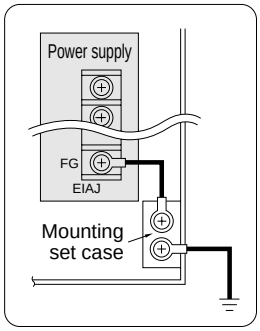
(1) Input/output wiring

a. Separate and bundle input and output wiring so as not to mix up the input line extrinsic surge voltage with the output nor add conducted emission.
b. Consider the current for output wiring and wire with “thick and short.”

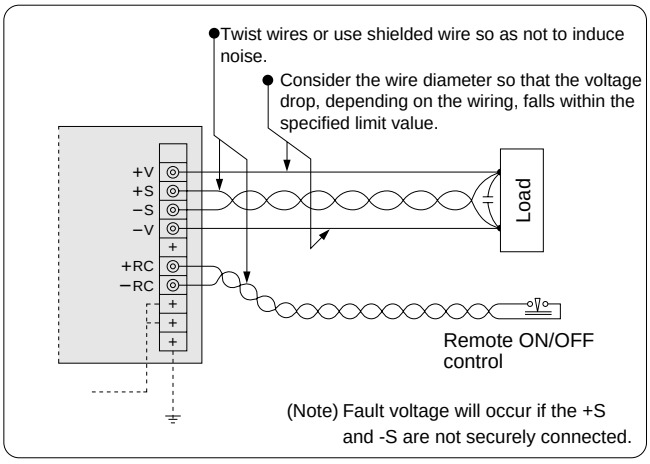


(2) Grounding connection

Ensure safety and noise prevention for the grounding terminal for the switching power supply and ensure securely connection to the mounting set case.



(3) Wiring when using remote ON/OFF control and remote sensing



(4) Correct terminals connection

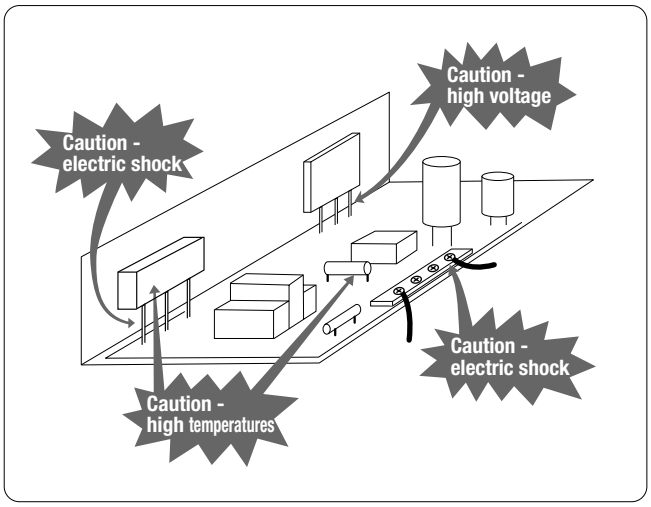
Use compatible terminal screw diameter, crimp-style terminal, electrical wiring and tools when wiring for the switching power supply.

3 Safety

Switching power supply is generally the DC stabilized power supply with a special structure created for mounting on devices. Use only for mounting on devices. Also, do not touch a switching power supply that is operating, since it can generate both high voltage and high temperature.

3.1 Input voltage

The input voltage range is set for switching power supply. There is a great danger of internal damage when voltage outside of the specified range is applied. Use within the specified input voltage range.

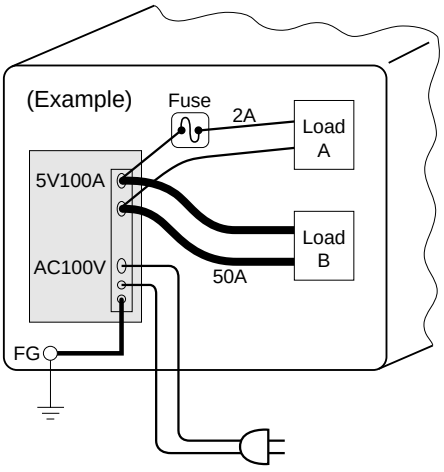


3.2 Leakage current

The switching power supply will have leakage current flowing within the value set by the safety standards of each country due to the internal noise filter. Pay close attention to electric shock as currents are totaled when using multiple units. Consider electric shock prevention due to grounding wires, etc.

3.3 Wire materials

Wire with thick wires suitable for the output current capacity of switching power supply to prevent heat and fire from being generated by the wiring materials due to an abnormal load.
Pay particular attention when distributing current to multiple loads. Over-current protection (OCP) may not operate even at a load short-circuit when the thin line is used as a branch line. Thus, it's important to consider insertion of the fuse to the wiring, etc. Also, consider rated voltage for electrical wiring used.



(Note) Check input voltage.

Request

The safety standards are set for each country depending on application of switching power supply for mounting on device. Check with the manufacturer's data when used.

4 EMI

While switching power supply is created in consideration of EMI, its performance may not be demonstrated sufficiently due to wiring for power supply and load or grounding wire, etc. Note the following items.

4.1 Wiring separation

The conducted emission increases when the distance between wiring at the input and output narrows. In addition, radiation noise from devices (noise electric field strength) generally increases when the input conducted emission increases.
Separate wiring, as an increase in conducted emission is caused when the input wiring and the device's internal wiring (especially digital circuitry) is approached while also causing device operation errors due to external noise.

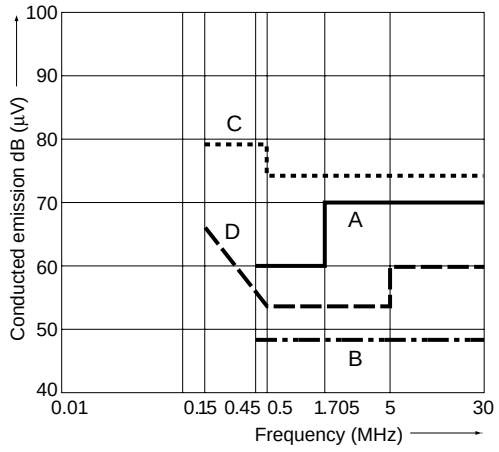
4.2 Thick and short

Wire the input wiring and output wiring within the device with "thick and short", which are also the two respective parallel wires, or with twisted wires. In addition, looping of the wiring causes degraded noise performance.

4.3 Grounding wire

Make a short connection for the wiring to the device case securely with the thick wire.

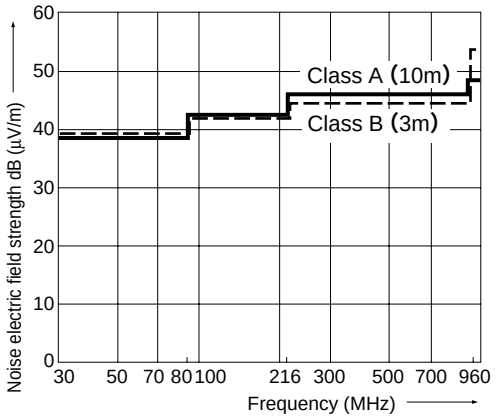
Conducted emission regulated values for respective countries



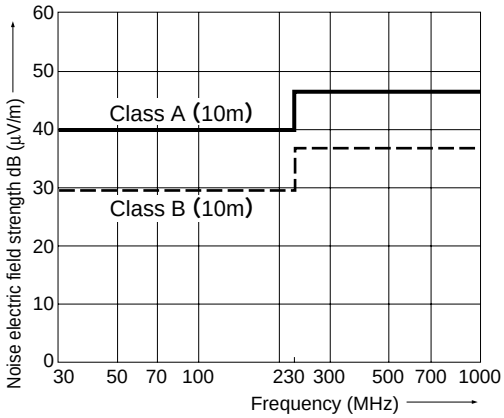
A —— FCC Part 15-B Class A
B – · – FCC Part 15-B Class B
C ····· CISPR 22 Class A
VCCI Class A
EN 55022 Class A
D – – – CISPR 22 Class B
VCCI Class B
EN 55022 Class B

In FCC Part 15, Subpart J has been replaced by Subpart B (Unintentional Radiator).
Although there are other European standards such as VDE, here the EN standard is used as a representative standard that is unified among EU countries.
CISPR 22 Classes A and B are still being studied (as of January 2001) for frequencies of 0.15 MHz or less. In the technical standards of the Electric Appliance and Material Safety Law, values are specified for certain models under "Appended Table 8, 1. Common items, (5) Noise strength", but only a limited range of models is included, so this is omitted here.

FCC noise electric field strength limit values



CISPR, VCCI, and EN55022 noise electric field strength limit values



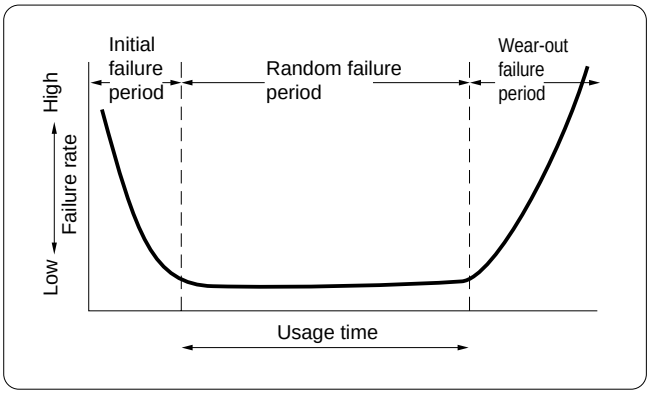
Request

Consider the above-mentioned details when manufacturing a device using EMI standards of the respective country. In addition, refer to the manufacturer's data for details.

5 Reliability

5.1 Life cycle and failures

The level of reliability for the switching power supply has already been validated in home electronic appliance products and industrial products with satisfactory results received. This fact is the reason why switching power supply has received high evaluation.
The diagram below is called a failure ratio curve (bathtub curve) and is typically used to show a product's life cycle.



(1) Initial failure period

The manufacturer performs screening at the parts stage and an aging test after product completion and then ships the product in order to eliminate initial failures. Therefore, the switching power supply is already within the random failure period once the user has received it.

(2) Random failure period

The switching power supply is operated in stable condition based on each mean time between failures (MTBF) reliability, thus the probability for failures is basically very low. However, failures that occur within this period depend greatly on mounting operating conditions by the user (ambient temperature, mounting method, derating, ventilation, vibration, shock and other conditions).

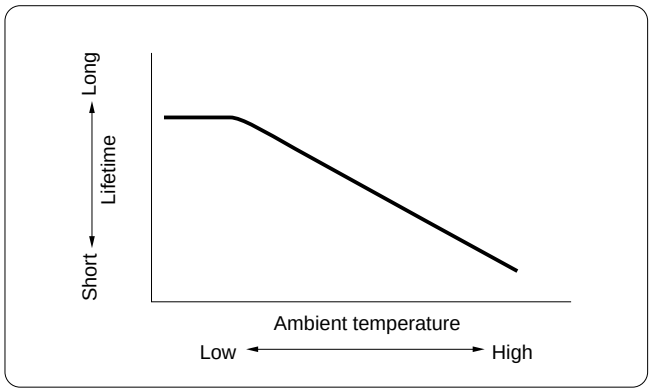
(3) Wear-out failure period

Switching power supply will also head into the wear-out failure period before long.

5.2 Ambient temperatures and lifetime

The switching power supply is made very compact through improvements in high efficiency switching at high frequencies, parts improvements and improvements in mounting technology. Thus, the mounting density is improved and parts are mounted closely together.
The lifetime of these individual parts used in the switching power supply changes extremely due to ambient temperatures.
A chemical reaction is conducted in the interior of the aluminum electrolytic capacitor used as a smoothing filter part, thus it is very sensitive to changes at ambient temperatures.

Generally, the aluminum electrolytic capacitor follows “Arrhenius’s Law”, the 2 × principal at 10**℃**, which possesses characteristics whereby the lifetime is doubled when the ambient temperature drops by 10**℃** while the lifetime is cut in half when the ambient temperature goes up by 10**℃**.



The relationship between the ambient temperatures for the switching power supply and lifetime are shown in the diagram above. The aluminum electrolytic capacitor may already plunge into the wear-out failure period even when the other parts are still within the random failure period if the switching power supply is used at high temperatures. In this case, the aluminum electrolytic capacitor must be replaced and an overhaul must be performed for long use.

5.3 Overhaul

Continuous operating systems are steadily increasing with progress in current electronics. Thus, the lifetime of switching power supply is extending. However, switching power supply is not something that can be used forever. Therefore, we recommend an overhaul in order to use this more safely.
The timing of overhaul varies greatly depending on operating conditions and operating temperatures of the product. Thus, the thing to be most careful of is continuous operations over long periods. The overhaul standard when there are continuous operations is as follows.

Ta = 40**℃** or more and less than 45**℃** … 3 years
Ta = 35**℃** or more and less than 40**℃** … 4 years
Ta = 30**℃** or more and less than 35**℃** … 5 years

(Ta is the ambient temperatures for power supply)

These values vary depending on the switching power supply. Consult with the respective manufacturer for further details on overhauls and lifetime.

Document reference: “Current Status and Trends for Switching Power Supplies”, by the Switching Power Supply Subcommittee of the JEITA (Japan Electronics and Information Technology Association).

Selection Guide

[Based on input voltage]

	Input Voltage (V)	Series Name	Output Power (W)	Output Voltage 3.3V	5V	12V	15V	24V	Main Features / Main Applications	Safety Standards	See page
Single output	100	CSJ	10, 15		●	●	●	●	**Low cost, PCB type** Office equipment, information equipment	UL and CSA certified product	17
	100	CSH	25, 50, 100, 150		●	●	●	●	**Low cost, PCB type, resonant-mode, compact, high efficiency, low noise** Office equipment, information equipment	UL and CSA certified product	23
	100	SSG	30, 50, 100, 150		●	●	●	●	**Thin, open frame, compact** Office equipment, information equipment	UL and CSA certified product	33
	100	SSH	25, 50, 100		●	●	● (Except100W)	●	**Resonant-mode, open frame, high efficiency, low noise, compact** Office equipment, information equipment	UL and CSA certified product	43
	100／wide-range switching	SLS	60, 100, 150 (switching)					●	**Peak load support, open frame** Mechatronics products (motors, solenoids, etc.), compact printer drivers	**UL, CSA, TÜV certified products**	53
	Wide	CWA	15, 30, 50		●	●		●	**Low cost, PCB type, includes power factor correction circuit (75 W to 150 W)** Computer-related equipment and office equipment	**UL, C-UL, TÜV certified products**	61
			75, 100, 150			●		●			
	Wide	SWA	15, 30, 50, 100, 150		●	●	●	●	**Power factor correction circuit (100 W and 150 W), harmonic current control** Information and communications equipment, gauge controllers	**UL, CSA, TÜV certified products**	73
	Wide	SWC	50, 100	●	●	●		●	**Ultra-compact general-purpose switching power supplies, power factor correction circuit (100 W)** Computer-related equipment and industrial equipment	**UL, C-UL, TÜV certified products**	85
	Wide	SWD	60, 100, 150, 240					●	**Peak load support, built-in power factor correction circuit, harmonic current control** Mechatronics products (motors, solenoids, etc.), compact printer drivers	**UL, C-UL, SEMKO certified products**	91
	Wide	HWA	50		●	●		●	**Compact, long life, high reliability, harmonic current control, resonant-mode, case cover included** Factory automation controllers, power and plant controllers, industrial equipment such as semiconductor manufacturing devices	**UL, CSA, VDE certified products**	101
			100, 150, 300, 600					●			
	Wide/auto switching (60 W)	HWB	15, 30, 60		●	● (30,60W)	●	● (60W)	**Resonant-mode, ultra low-noise equivalent to dropper power supply** Measuring instruments, semiconductor manufacturing and testing equipment, controllers, medical equipment, equipment with dropper power supply	**UL, C-UL, TÜV certified products**	109
Multi output (2 channels)	Wide	HWB	15, 30				● (±output)		**Resonant-mode, ultra low-noise equivalent to dropper power supply** Measuring instruments, semiconductor manufacturing and testing equipment, controllers, medical equipment, equipment with dropper power supply	**UL, C-UL, TÜV certified products**	114
	Wide	SWE	100, 150		●			●	**Peak current support, active filter (PFC) adopted** Mechatronics products adopting motors, solenoids, etc., devices applying and mounting thermal head	**UL, C-UL, SEMKO certified products**	121
Multi output 5 cells / 6 cells / 9 cells	Wide	PCU	400	Use 2 V to 48 V single output, 2 channels (two models) or 4 channels (two models) in combination as necessary					**Power factor correction circuit, complies with harmonic current control regulations, output can be configured freely when combined with a DC cell module, microprocessor-based sequence control, and various alarm functions** Semiconductor manufacturing and testing equipment, factory automation controllers, computer peripherals, photographic laboratory system, medical equipment (CT, MRI, etc.)	**UL, C-UL, TÜV certified products**	127
			600								
			900								

Selection Guide Based on Output Voltage

Single Output Power Supplies

Output Voltage (V)	Output Power (W)	Output Current (A)	Input Voltage (V)	Model	External Dimensions (W×D×H) (mm)	See page	Remarks
3.3	50.0	10.0	Wide	**SWC050-3R3**	136 × 80 × 29	86	
	100.0	20.0	Wide	**SWC100-3R3**	166 × 93 × 34	87	
5	10.0	2.0	100	**CSJ010-05**	94 × 49 × 17	18	
	15.0	3.0	100	**CSJ015-05**	115 × 50 × 17	19	
	15.0	3.0	Wide	**SWA015-05**	35 × 99 × 97	74	
	15.0	3.0	Wide	**HWB015S-05**	34 ×110 × 92	110	
	15.0	3.0	Wide	**CWA015-05**	125 × 50 × 22	62	
	25.0	5.0	100	**CSH025-05**	115 × 50 × 23	24	
	25.0	5.0	100	**SSH025-05**	90 × 68 × 25	44	
	30.0	6.0	100	**SSG030-05**	75 ×120 × 25	34	
	30.0	6.0	Wide	**SWA030-05**	35 ×116 × 97	75	
	30.0	6.0	**Wide**	**HWB030S-05**	34 ×136 × 92	111	
	30.0	6.0	Wide	**CWA030-05**	133 × 55 × 27	63	
	50.0	10.0	100	**CSH050-05**	150 × 50 × 25	25	
	50.0	10.0	100	**SSG050-05**	90 ×135 × 25	35	
	50.0	10.0	100	**SSH050-05**	110 × 75 × 29	45	
	50.0	10.0	Wide	**SWA050-05**	37 ×159 × 97	76	
	50.0	10.0	Wide	**HWA050-05-C**	40 ×127 × 85	102	
	50.0	10.0	100/200	**HWB060S-05**	38 ×170 × 92	112	**Auto switching**
	50.0	10.0	Wide	**CWA050-05**	195 × 55 × 27	64	
	50.0	10.0	Wide	**SWC050-05**	125 × 80 × 29	86	
	100.0	20.0	100	**CSH100-05**	222 × 62 × 32	26	
	100.0	20.0	100	**SSG100-05**	93 ×160 × 40	36	
	100.0	20.0	100	**SSH100-05**	135 × 93 × 33	46	**18 A when cover is included**
	100.0	20.0	Wide	**SWA100-05**	50 ×180 × 93	77	
	100.0	20.0	Wide	**SWC100-05**	150 × 93 × 34	87	
	150.0	30.0	100	**CSH150-05**	222 × 75 × 36	27	
	150.0	30.0	100	**SSG150-05**	93 ×177 × 57	37	
	150.0	30.0	Wide	**SWA150-05**	65 ×200 × 93	80	
12	10.2	0.9	100	**CSJ010-12**	94 × 49 × 17	18	
	15.0	1.3	100	**CSJ015-12**	115 × 50 × 17	19	
	15.6	1.3	Wide	**SWA015-12**	35 × 99 × 97	74	
	15.6	1.3	Wide	**CWA015-12**	125 × 50 × 22	62	
	25.2	2.1	100	**CSH025-12**	115 × 50 × 23	24	
	25.2	2.1	100	**SSH025-12**	90 × 68 × 25	44	
	30.0	2.5	100	**SSG030-12**	75 ×120 × 25	34	
	30.0	2.5	Wide	**SWA030-12**	35 ×116 × 97	75	
	30.0	2.5	Wide	**CWA030-12**	133 × 55 × 27	63	
	36.0	3.0	Wide	**HWB030S-12**	34 ×136 × 92	111	
	50.4	4.2	100	**CSH050-12**	150 × 50 × 25	25	
	50.4	4.2	100	**SSG050-12**	90 ×135 × 25	35	
	50.4	4.2	100	**SSH050-12**	110 × 75 × 29	45	
	50.4	4.2	Wide	**SWA050-12**	37 ×159 × 97	76	
	50.4	4.2	Wide	**HWA050-12-C**	40 ×127 × 85	102	
	50.4	4.2	Wide	**SWC050-12**	125 × 80 × 29	86	
	51.6	4.3	Wide	**CWA050-12**	195 × 55 × 27	64	
	62.4	5.2	100/200	**HWB060S-12**	38 ×170 × 92	112	**Auto switching**
	75.6	6.3	Wide	**CWA075-12**	222 × 55 × 37	66	**Peak: 8.1A**
	102.0	8.5	100	**CSH100-12**	222 × 62 × 32	26	
	102.0	8.5	100	**SSG100-12**	93 ×160 × 40	36	
	102.0	8.5	100	**SSH100-12**	135 × 93 × 33	46	
	102.0	8.5	Wide	**SWA100-12**	50 ×180 × 93	77	
	102.0	8.5	Wide	**CWA100-12**	222 × 62 × 37	67	**Peak: 11.0A**
	102.0	8.5	Wide	**SWC100-12**	150 × 93 × 34	87	
	150.0	12.5	100	**CSH150-12**	222 × 75 × 36	27	
	150.0	12.5	Wide	**CWA050-12**	222 × 75 × 42	68	**Peak: 16.2A**
	156.0	13.0	100	**SSG150-12**	93 ×177 × 57	37	
	156.0	13.0	Wide	**SWA050-12**	65 ×200 × 93	76	

Single Output Power Supplies

Output Voltage (V)	Output Power (W)	Output Current (A)	Input Voltage (V)	Model	External Dimensions (W×D×H) (mm)	See page	Remarks
15	10.5	0.7	100	**CSJ010-15**	94 × 49 × 17	18	
	15.0	1.0	100	**CSJ015-15**	115 × 50 × 17	19	
	15.0	1.0	Wide	**SWA015-15**	35 × 99 × 97	74	
	19.5	1.3	Wide	**HWB015S-15**	34 ×110 × 92	110	
	25.5	1.7	100	**CSH025-15**	115 × 50 × 23	24	
	25.5	1.7	100	**SSH025-15**	90 × 68 × 25	44	
	30.0	2.0	100	**SSG030-15**	75 ×120 × 25	34	
	30.0	2.0	Wide	**SWA030-15**	35 ×116 × 97	75	
	39.0	2.6	Wide	**HWB030S-15**	34 ×136 × 92	111	
	51.0	3.4	100	**CSH050-15**	150 × 50 × 25	25	
	51.0	3.4	100	**SSG050-15**	90 ×135 × 25	35	
	51.0	3.4	100	**SSH050-15**	110 × 75 × 29	45	
	51.0	3.4	Wide	**SWA050-15**	37 ×159 × 97	76	
	78.0	5.2	100/200	**HWB060S-15**	38 ×170 × 92	112	**Auto switching**
	105.0	7.0	100	**CSH100-15**	222 × 62 × 32	26	
	105.0	7.0	100	**SSG100-15**	93 ×160 × 40	36	
	105.0	7.0	Wide	**SWA100-15**	50 ×180 × 93	77	
	150.0	10.0	100	**CSH150-15**	222 × 75 × 36	27	
	150.0	10.0	100	**SSG150-15**	93 ×177 × 57	37	
	150.0	10.0	Wide	**SWA150-15**	65 ×200 × 93	80	
24	10.8	0.5	100	**CSJ010-24**	94 × 49 × 17	18	
	15.6	0.65	100	**CSJ015-24**	115 × 50 × 17	19	
	16.8	0.7	Wide	**SWA015-24**	35 × 99 × 97	74	
	16.8	0.7	Wide	**CWA015-24**	125 × 50 × 22	62	
	26.4	1.1	100	**CSH025-24**	115 × 50 × 23	24	
	26.4	1.1	100	**SSH025-24**	90 × 68 × 25	44	
	31.2	1.3	100	**SSG030-24**	75 ×120 × 25	34	
	31.2	1.3	Wide	**SWA030-24**	35 ×116 × 97	75	
	31.2	1.3	Wide	**CWA030-24**	133 × 55 × 27	63	
	50.4	2.1	100	**CSH050-24**	150 × 50 × 25	25	
	50.4	2.1	100	**SSG050-24**	90 ×135 × 25	35	
	50.4	2.1	100	**SSH050-24**	110 × 75 × 29	45	
	50.4	2.1	Wide	**SWA050-24**	37 ×159 × 97	76	
	50.4	2.1	Wide	**HWA050-24-C**	40 ×127 × 85	102	
	50.4	2.1	Wide	**CWA050-24**	195 × 55 × 27	64	
	60.0	2.5	100	**SLS060P**	160 × 80 × 40	54	**Peak: 6A**
	60.0	2.5	200	**SLS060PH**	160 × 80 × 40	54	**Peak: 6A**
	60.0	2.5	Wide	**SWD060P-24**	160 × 80 × 40	92	**Peak: 6A**
	76.8	3.2	**Wide**	**CWA075-24**	222 × 55 × 37	66	**Peak: 4.1A**
	84.0	3.5	Wide	**HWB060S-24**	38 ×170 × 92	112	**Auto switching**
	96.0	4.0	100	**SLS100P**	160 × 98 × 40	56	**Peak: 10A**
	96.0	4.0	200	**SLS100PH**	160 × 98 × 40	56	**Peak: 10A**
	96.0	4.0	Wide	**SWD100P-24**	160 × 98 × 40	93	**Peak: 10A**
	100.8	4.2	Wide	**HWA100-24-C**	50 ×145 × 92	104	
	103.2	4.3	100	**CSH100-24**	222 × 62 × 32	26	**Peak: 5.5A**
	103.2	4.3	Wide	**CWA100-24**	222 × 62 × 37	67	
	108.0	4.5	100	**SSG100-24**	93 ×160 × 40	36	
	108.0	4.5	100	**SSH100-24**	135 × 93 × 33	46	
	108.0	4.5	Wide	**SWA100-24**	50 ×180 × 93	77	**Peak: 15A**
	144.0	6.0	100/200	**SLS150PW**	220 × 98 × 52	56	**Peak: 15A**
	144.0	6.0	**Wide**	**SWD150P-24**	220 × 98 × 52	94	
	151.2	6.3	100	**CSH150-24**	222 × 75 × 36	27	**Peak: 8.1A**
	151.2	6.3	**Wide**	**CWA150-24**	222 × 75 × 42	68	
	156.0	6.5	100	**SSG150-24**	93 ×177 × 57	37	
	156.0	6.5	**Wide**	**SWA150-24**	65 ×200 × 93	80	
	156.0	6.5	**Wide**	**HWA150-24-C**	50 ×163 × 92	96	**Peak: 20.0A**
	240.0	10.0	**Wide**	**SWD240P-24**	220 ×110 × 65	95	
	336.0	14.0	**Wide**	**HWA300-24-C**	110 ×175 × 92	106	
	648.0	27.0	**Wide**	**HWA600-24-C**	170 ×179 × 92	106	

Multi Output Power Supplies

Output Voltage (V)/Output Current (A)		Output Power (W)	Input Voltage (V)	Model	External Dimensions (W×D×H) (mm)	See page	Remarks
ch1	ch2						
+15 / 0.65	+15 / 0.65	19.5	Wide	**HWB015D-15**	34 ×110 × 92	114	
+15 / 1.3	+15 / 1.3	39.0	Wide	**HWB030D-15**	34 ×136 × 92	115	
+5 / 3.0	+24 / 4.0	111.0	Wide	**SWE100P-2405**	220 × 98 × 52	122	Peak: 24V 10A
+5 / 6.0	+24 / 6.0	174.0	Wide	**SWE150P-2405**	240 ×110 × 65	123	Peak: 24V 15A

Semi-custom Power Supplies

Main Unit

Output Power (W)	No. of Mounted DC Cell Modules	Input Voltage (V)	Model	External Dimensions (W×D×H) (mm)	See page	Remarks
400	5	Wide	**PCU400-∗∗∗∗**	124 ×280 × 64	128	
600	6	Wide	**PCU600-∗∗∗∗**	148 ×280 × 64	129	
900	9	Wide	**PCU900-∗∗∗∗**	220 ×280 × 64	130	

DC Cell Modules

No. of Outputs	Output Power (W)	Output Voltage (V)	Output Current (A)	Symbol	Remarks
Single Output	48	2.0	24	H	
	79.2	3.3	24	A	
	120	5.0	24	B	
	120	6.0	20	J	
	120	12.0	10	C	
	120	15.0	8	D	
	120	24.0	5	E	
	120	36.0	36	F	
	120	48.0	2.5	G	
Double Output	40	5V / 4A, 5V / 4A		W11	
	96	12V / 4A, 12V / 4A		W22	
Quadruple Output	38	+5V / 3A, −5V / 1A +12V / 1A, −12V / 5A		Q1	
	42.5	+5V / 3A, −5V / 1A +15V / 1A, −15V / 0.5A		Q2	

Discontinued products

The series below are the products that have been discontinued.

HSA HSE SSB SSC SSD SSE SSF

SSP SSQ SSS SWB SUM SDA SSN

SSG [5W, 10W, 15W] SLS [5W] SLM

CSJ Series

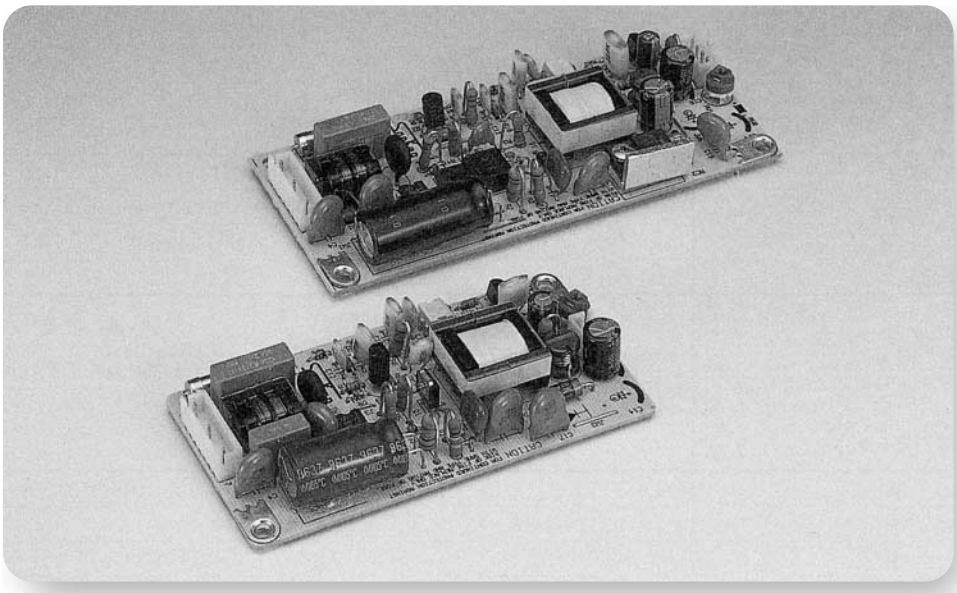
10W 15W

Single output

Single printed circuit board

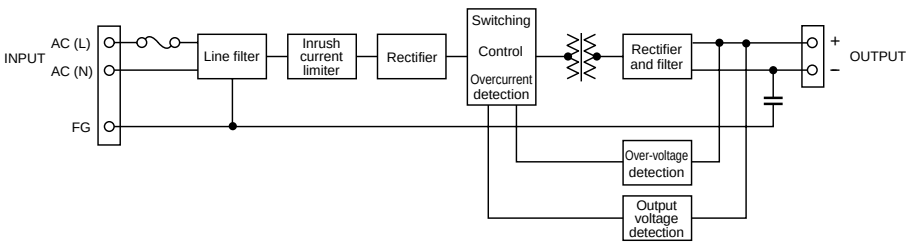
Acquired UL and CSA safety standards

- **Lower cost due to simple PCB type**
- **Small-capacity, single output, 10 or 15 W**
- **Acquired UL and CSA safety standards**



Free warrantee period: 1 year

[CSJ Series Circuit Diagram]



Specifications and Standards

Model			10W			
			CSJ010-05	CSJ010-12	CSJ010-15	CSJ010-24
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		0.3A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		72%	73%	75%	77%
	Inrush Current (max) Note1		30 A (max) (at cold start)			
	Leakage Current (max)		0.3mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	12V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		2.0A	0.85A	0.85A	0.45A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		10.0W	10.2W	10.2W	10.8W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)		17msec			
	Startup Time (typ)		20msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Not provided			
Environmental Conditions	Operating Temperature Range Note4		-10 to 60°C (70% load at 60°C)			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute or 2400 V AC for 1 second (leakage current: 15 mA)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		Single printed circuit board			
	Input Type		Connector			
	Output Type		Connector			
	External Dimensions		94^{W} x 49^{D} x 17^{H} mm			
	Weight		55g			
	Safety Standards		UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission		Designated to meet FCC Class B (100-120 V AC) and VCCI Class B			

Note1 At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.

Note4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

Specifications and Standards

	Model	15W			
		CSJ015-05	CSJ015-12	CSJ015-15	CSJ015-24
Input Conditions	Rated Input Voltage	AC100V/AC120V			
	Allowable Input Voltage Range	AC85 to 132V			
	Input Current (typ)	0.4A			
	Rated Frequency	50/60Hz			
	Allowable Frequency Range	47 to 440 Hz (rated frequency: 50/60 Hz)			
	Efficiency (typ)	72%	73%	75%	77%
	Inrush Current (max) Note1	30 A (max) (at cold start)			
	Leakage Current (max)	0.3mA			
Output Conditions Note3	Rated Output Voltage	5V	12V	15V	24V
	Output Voltage Variation	Rated output voltage ±10%			
	Rated Output Current	3.0A	1.25A	1.0A	0.65A
	Allowable Output Current Range	0 to 100%			
	Rated Output Power	15.0W	15.0W	15.0W	15.6W
	Constant Voltage Accuracy	±3%			
	Ripple Noise Note2	120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)	16msec			
	Startup Time (typ)	20msec			
Additional Functions	Overcurrent Protection	Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection	Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control	Not provided			
	Remote Sensing	Not provided			
	Operations Display	Not provided			
Environmental Conditions	Operating Temperature Range Note4	-10 to 60˚C (70% load at 60˚C)			
	Storage Temperature Range	-25 to +85˚C			
	Operating Humidity Range	30 to 90% (no condensation)			
	Storage Humidity Range	30 to 90% (no condensation)			
	Cooling Requirements	Natural air cooling			
	Vibration Resistance: No. of vibrations	10 to 55Hz			
	Vibration Resistance: Sweep time	3 minutes			
	Vibration Resistance: Acceleration rate	19.6m/s² (2G)			
	Vibration Resistance: Vibration direction	X, Y, Z			
	Vibration Resistance: Vibration time	One hour in each of three directions			
	Installation Conditions	Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage: Between input and output	2000 V AC for 1 minute or 2400 V AC for 1 second (leakage current: 15 mA)			
	Insulation Withstand Voltage: Between input and FG				
	Insulation Withstand Voltage: Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA)			
	Insulation Resistance: Between input and output	100MΩ (measured with 500 V DC Megger)			
	Insulation Resistance: Between input and FG				
	Insulation Resistance: Between output and FG				
External Structure/ Standards	External Appearance	Single printed circuit board			
	Input Type	Connector			
	Output Type	Connector			
	External Dimensions	115^{W} x 50^{D} x 17^{H} mm			
	Weight	70g			
	Safety Standards	UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission	Designated to meet FCC Class B (100-120 V AC) and VCCI Class B			

Note 1 At cold start. (More current than above noted value may flow at restart.)

Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

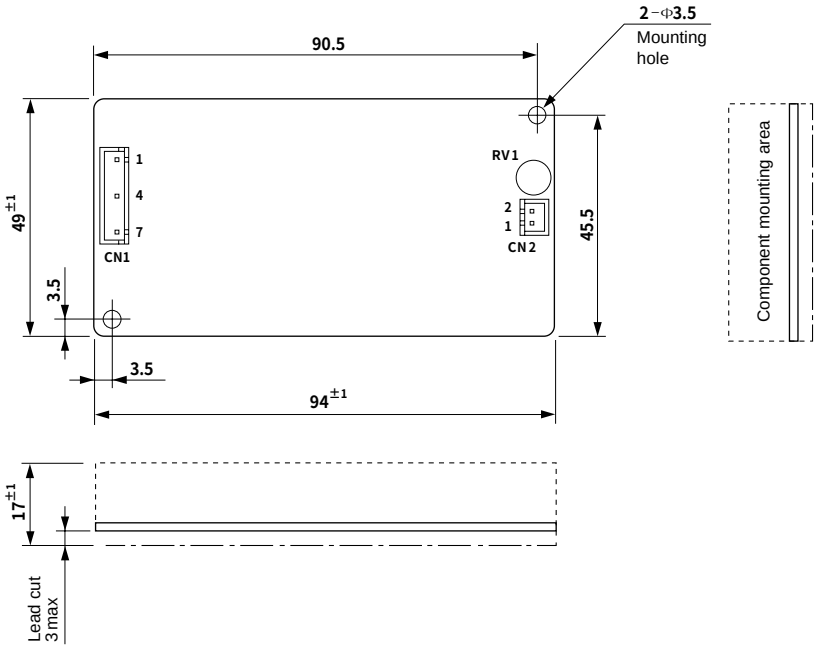
Note 4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

External Dimensions (unit: mm)

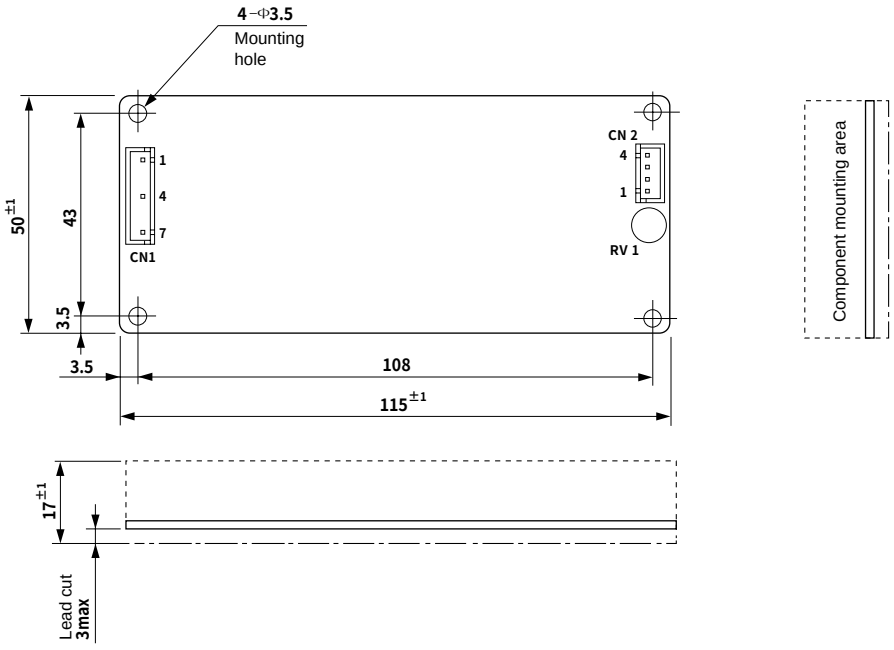
10W (weight: 55 g)

Model
CSJ010-05
CSJ010-12
CSJ010-15
CSJ010-24



15W (weight: 70 g)

Model
CSJ015-05
CSJ015-12
CSJ015-15
CSJ015-24



Operating Instruction

1 Terminal Connection

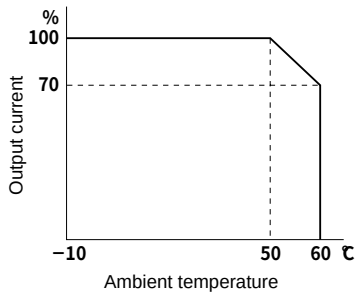
CSJ010 connector type

Symbol	Pin No.	Function	Connector	Corresponding connector	Corresponding contact
CN1	1	AC (L)	B3 (7,5) B-XH-A (JST)	XHP-7 (JST)	SXH-001T-P0.6 (JST) or BXH-001T-P0.6 (JST)
	2	NC			
	3	NC			
	4	AC (N)			
	5	NC			
	6	NC			
	7	FG			
CN2	1	−	B2B-XH-A (JST)	XHP-2 (JST)	
	2	+			

CSJ015 connector type

Symbol	Pin No.	Function	Connector	Corresponding connector	Corresponding contact
CN1	1	AC (L)	B3 (7,5) B-XH-A (JST)	XHP-7 (JST)	SXH-001T-P0.6 (JST) or BXH-001T-P0.6 (JST)
	2	NC			
	3	NC			
	4	AC (N)			
	5	NC			
	6	NC			
	7	FG			
CN2	1 to 2	−	B4B-XH-A (JST)	XHP-4 (JST)	
	3 to 4	+			

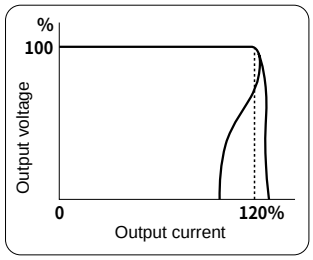
2 Derating of Output Current



3 Setting Output Voltage

Output voltage may be adjusted using the adjustment knob found near the output connector. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

4 Overcurrent Protection



When the output load becomes excessive, the output current is restricted as shown at right. After the source of the excess load is removed, the normal output voltage is recovered automatically.
The overcurrent protection function is set to operate when the output current exceeds 105% of the rated current value (120% of the standard output value).

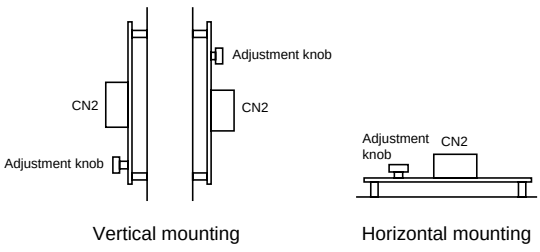
NOTE: Never operate the target equipment with an excessive load for long periods, since this can result in degradation of the power supply unit.

5 Overvoltage Protection

If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.
Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.
The power supply can be mounted in two directions as shown below. When a metal case is used, mount the power supply considering insulation distance. Please contact Sanken for more information.



For safety's sake, be sure to connect FG to the grounding terminal of the target device. Otherwise, conducted emission, radiation noise and ripple noise will increase.

Employs resonant-mode hybrid ICs. Compact, high efficiency, low noise unit realized.

CSH Series

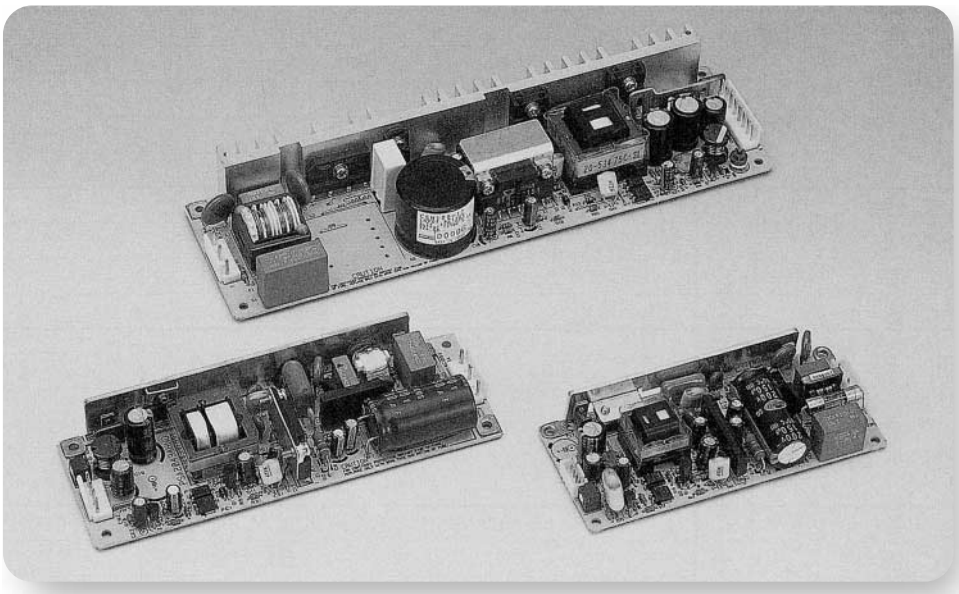
25W 50W 100W 150W

Single output

Single printed circuit board

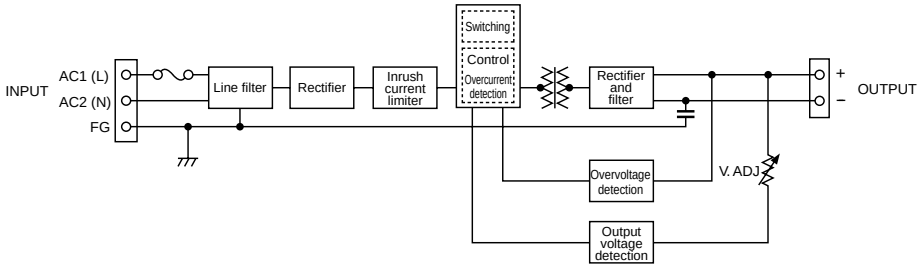
Acquired UL and CSA safety standards

- **Resonant-mode features low noise and high efficiency**
- **Low cost due to very simple printed circuit board type**
- **Wide-ranging lineup (single output: 25 W to 150 W) to meet any requirements**
- **Proprietary power hybrid IC realizes compact, light unit**
- **Acquired UL and CSA safety standards**



Free warrantee period: 1 year

[CSH Series Circuit Diagram]



Specifications and Standards

Model			25W			
			CSH025-05	CSH025-12	CSH025-15	CSH025-24
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		0.6A/0.5A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440 Hz (rated frequency: 50/60 Hz)			
	Efficiency (typ)		81%	83%	84%	86%
	Inrush Current (max) Note1		30 A (max) (at cold start)			
	Leakage Current (max)		0.5mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		5.0A	2.1A	1.7A	1.1A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		25.0W	25.2W	25.5W	26.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		80mVp-p	100mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Not provided			
Environmental Conditions	Operating Temperature Range Note4		-10 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		Single printed circuit board			
	Input Type		Connector			
	Output Type		Connector			
	External Dimensions		115^W x 50^D x 23^H mm			
	Weight		85g			
	Safety Standards		UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission		Designated to meet FCC Class B and VCCI Class B			

Note1 At cold start. (More current than above noted value may flow at restart.)
Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
Note4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

Specifications and Standards

Model			50W			
			CSH050-05	CSH050-12	CSH050-15	CSH050-24
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		1.0A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440 Hz (rated frequency: 50/60 Hz)			
	Efficiency (typ)		81%	86%	87%	90%
	Inrush Current (max) Note1		30 A (max) (at cold start)			
	Leakage Current (max)		0.5mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		10.0A	4.2A	3.4A	2.1A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		50.0W	50.4W	51.1W	50.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		80mVp-p	100mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Not provided			
Environmental Conditions	Operating Temperature Range Note4		-10 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		Single printed circuit board			
	Input Type		Connector			
	Output Type		Connector			
	External Dimensions		150^W x 50^D x 25^H mm			
	Weight		150g			
	Safety Standards		UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission		Designated to meet FCC Class B and VCCI Class B			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
Note 4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

Specifications and Standards

Model			100W			
			CSH100-05	CSH100-12	CSH100-15	CSH100-24
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		2.2A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440 Hz (rated frequency: 50/60 Hz)			
	Efficiency (typ)		82%	87%	90%	90%
	Inrush Current (max) Note1		25A (max)			
	Leakage Current (max)		0.3mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		20.0A	8.5A	7.0A	4.3A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		100.0W	102.0W	105.0W	103.2W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)		17msec			
	Startup Time (typ)		500msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Not provided			
Environmental Conditions	Operating Temperature Range Note4		-10 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		Single printed circuit board			
	Input Type		Connector			
	Output Type		Connector			
	External Dimensions		222^{W} x 62^{D} x 32^{H} mm			
	Weight		380g			
	Safety Standards		UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission		Designated to meet FCC Class B and VCCI Class B			

Note1 At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.

Note4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rrated ated output current, and rated frequency, at an ambient temperature of 25˚C with 60% humidity.

Specifications and Standards

Model			150W			
			CSH150-05	CSH150-12	CSH150-15	CSH150-24
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		3.5A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440 Hz (rated frequency: 50/60 Hz)			
	Efficiency (typ)		78%	84%	86%	87%
	Inrush Current (max) Note1		25A (max)			
	Leakage Current (max)		0.3mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		30.0A	12.5A	10.0A	6.3A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		100.0W	102.0W	105.0W	103.2W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)		17msec			
	Startup Time (typ)		600msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Not provided			
Environmental Conditions	Operating Temperature Range Note4		-10 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		Single printed circuit board			
	Input Type		Connector			
	Output Type		Connector			
	External Dimensions		222^W x 75^D x 36^H mm			
	Weight		520g			
	Safety Standards		UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law			
	Conducted Emission		Designated to meet FCC Class B and VCCI Class B			

Note 1 At cold start. (More current than above noted value may flow at restart.)

Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

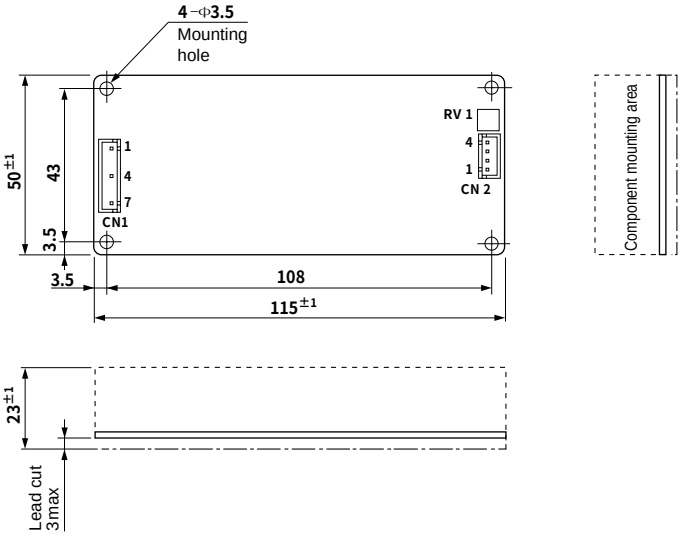
Note 4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

External Dimensions (unit: mm)

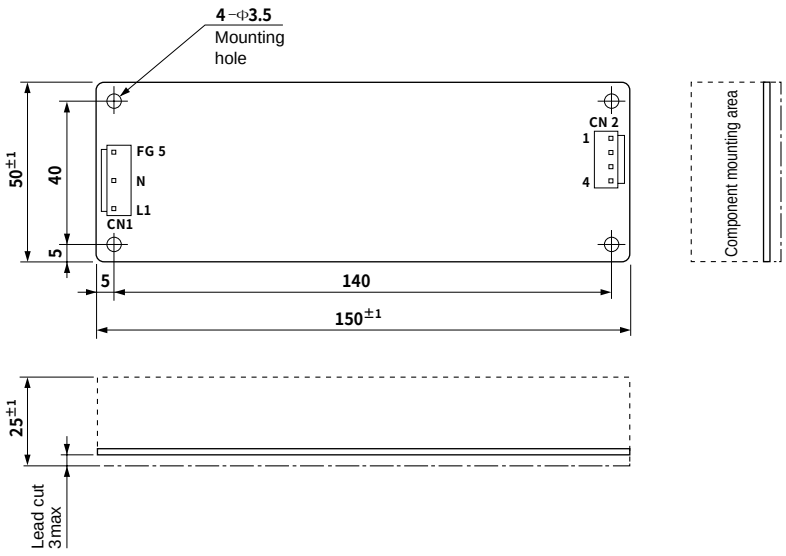
25W (weight: 85 g)

Model
CSH025-05
CSH025-12
CSH025-15
CSH025-24



50W (weight: 150 g)

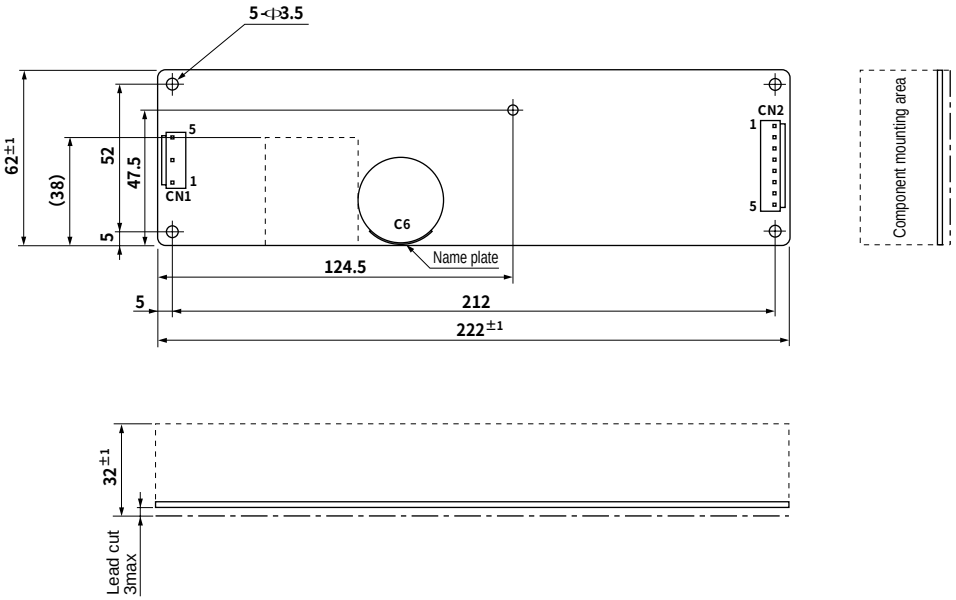
Model
CSH050-05
CSH050-12
CSH050-15
CSH050-24



External Dimensions (unit: mm)

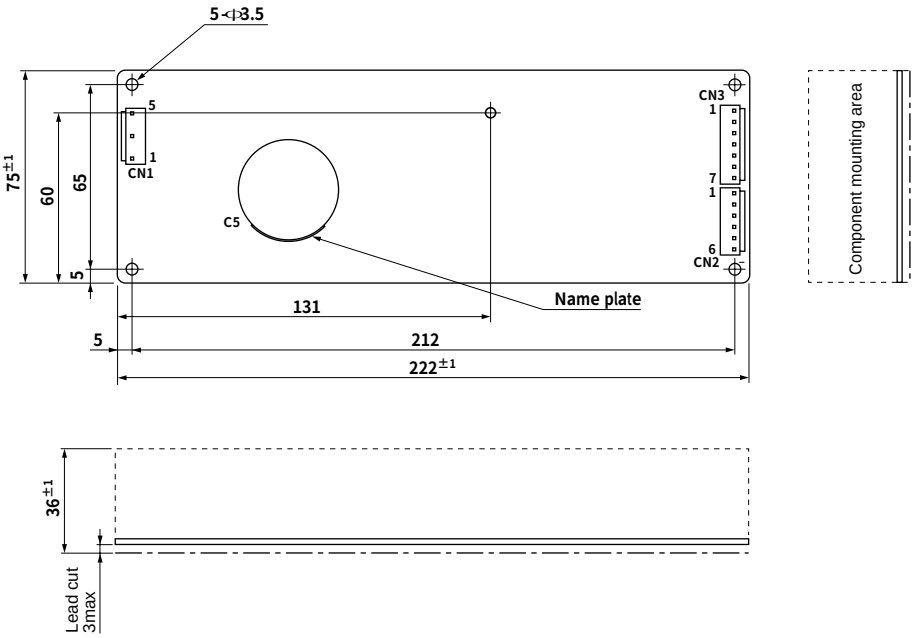
100W (weight: 380 g)

Model
CSH100-05
CSH100-12
CSH100-15
CSH100-24



150W (weight: 520 g)

Model
CSH150-05
CSH150-12
CSH150-15
CSH150-24



Operating Instruction

1 Terminal connection

CSH025 connector type

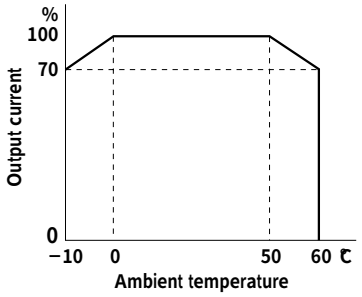
Symbol	Pin No.	Terminal name	Corresponding connector	Corresponding contact
CN1	1	AC (L)	XHP-7 (JST)	SXH-001T-P0.6 or BXT-001T-P0.6 (JST)
	2	NC		
	3	NC		
	4	AC (N)		
	5	NC		
	6	NC		
	7	FG		
CN2	1 to 2	−	XHP-4 (JST)	
	3 to 4	+		

CSH050, CSH100, CSH150 connector types

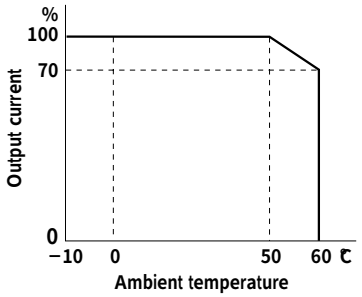
	Model	Symbol	Pin No.	Terminal name	Corresponding connector	Corresponding contact
Input	Common	CN1	1	AC (L)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
			2	NC		
			3	AC (N)		
			4	NC		
			5	FG		
Output	CSH050	CN2	1 to 2	−	VHR-4N (JST)	SVH-21T-P1.1 (JST)
			3 to 4	+		
	CSH100	CN2	1 to 4	−	VHR-8N (JST)	
			5 to 8	+		
	CSH150	CN2	1 to 6	+	VHR-6N (JST)	
		CN3	1 to 7	−	VHR-7N (JST)	

2 Installation condition and output current derating for ambient temperature

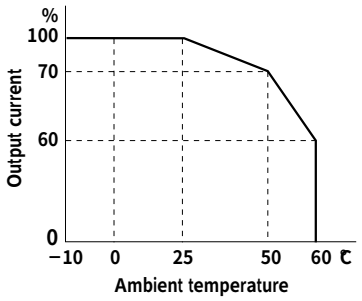
CSH025, 050



CSH100



CSH150



3 Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

4 Overcurrent protection

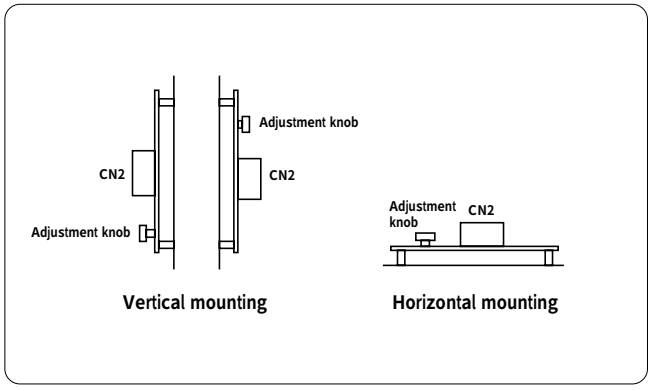
When the output is overloaded, the power supply's built-in overcurrent protection will shut off the output. The overcurrent protection is set to function when the output current exceeds 105% of the rated current value (about 130% of a standard output value).
To reset the overcurrent protection, remove the source of the overload, turn off the power, and wait about a minute before turning the power on again.

5 Overvoltage Protection

If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.
Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.
The power supply can be mounted in two directions as shown below. When a metal case is used, mount the power supply considering insulation distance. Please contact Sanken for more information.



Be sure to connect FG to the grounding terminal of the target device. Otherwise, conducted emission, radiation noise and ripple noise will increase.

A high efficiency, thin and compact unit

SSG Series

30W **50W** **100W** **150W**

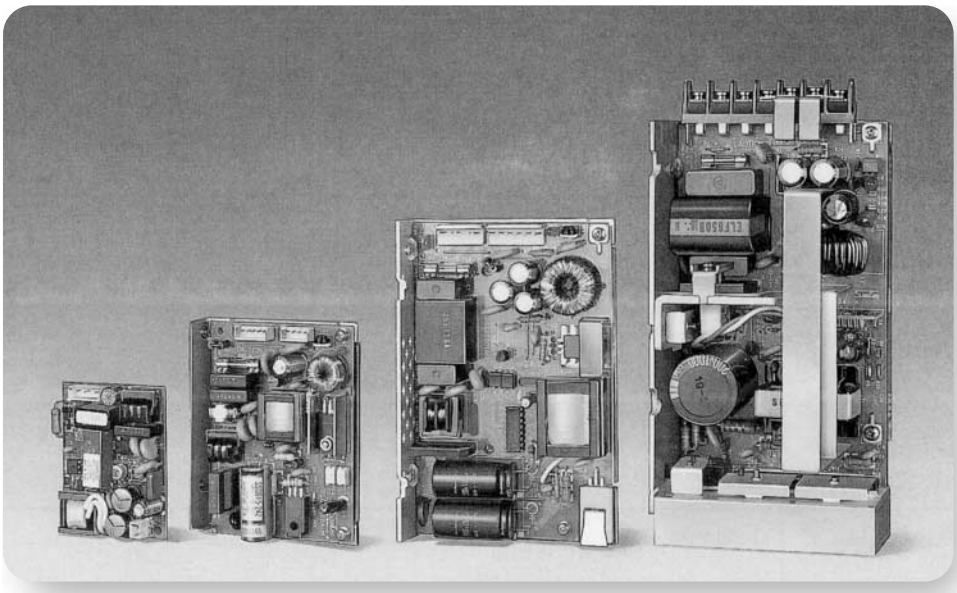
Single output

With chassis (30 to 150 W)

Acquired UL and CSA safety standards

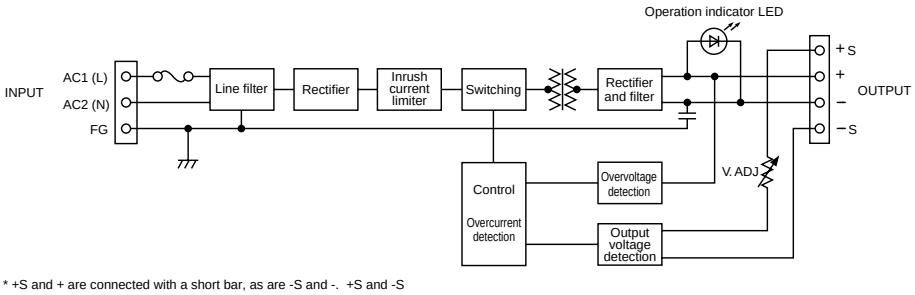
The SSG Series employs a higher switching frequency, unique mixed-mounting technology and innovative parts such as barrier-less transformers to create reliable, compact, high-performance switching power supplies through integrating Sanken's technologies. Sanken is proud to provide this product to meet the power supply needs for the next generation.

- **New barrier-less transformer**
- **Mixed-mounting technology**
- **Thin, compact models**
- **4 to 5% higher efficiency than our existing products**
- **Acquired UL and CSA safety standards**
- **Conducted emission conforms to FCC class B**



Free warrantee period: 2 years

[SSG Series Circuit Diagram]



* +S and + are connected with a short bar, as are -S and -. +S and -S are provided on 100 W and 150 W models.

◆: Please contact Sanken for delivery time in advance.

Specifications and Standards

Model			30W			
			SSG030-05◆	SSG030-12◆	SSG030-15◆	SSG030-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		0.7A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		75%	78%	78%	80%
	Inrush Current (max) Note1		30A (max)			
	Leakage Current (max)		0.4mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		6.0A	2.5A	2.0A	1.3A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		30.0W	30.0W	30.0W	31.2W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 135% of rated voltage			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50˚C (0 to +40˚C with cover)			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	1.5 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Connector (terminal stand is optional)			
	Output Type		Connector (terminal stand is optional)			
	External Dimensions		75^W x 120^D x 25^H mm			
	Weight		250g			
	Safety Standards		UL1950, CSA EB1402C certified			
	Conducted Emission		Designated to meet FCC Class B			
Options	Terminal Stand		Provided			
	Chassis		Provided as standard			
	Cover		Provided			

Note1 At cold start. (More current than above noted value may flow at restart.)
Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

◆: Please contact Sanken for delivery time in advance.

Specifications and Standards

Model			50W			
			SSG050-05◆	SSG050-12◆	SSG050-15◆	SSG050-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		1.3A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		75%	77%	79%	81%
	Inrush Current (max) Note1		30A (max)			
	Leakage Current (max)		0.4mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		10.0A	4.2A	3.4A	2.1A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		50.0W	50.4W	51.0W	50.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	150mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 135% of rated voltage			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50˚C (0 to +40˚C with cover)			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	1.5 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Connector (terminal stand is optional)			
	Output Type		Connector (terminal stand is optional)			
	External Dimensions		90^W x 135^D x 25^H mm			
	Weight		300g			
	Safety Standards		UL1950, CSA EB1402C certified			
	Conducted Emission		Designated to meet FCC Class B			
Options	Terminal Stand		Provided			
	Chassis		Provided as standard			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

◆: Please contact Sanken for delivery time in advance.

Specifications and Standards

			100W			
Model			SSG100-05◆	SSG100-12◆	SSG100-15◆	SSG100-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		2.0A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		79%	83%	84%	86%
	Inrush Current (max) Note1		20A (max)			
	Leakage Current (max)		0.4mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		20.0A	8.5A	7.0A	4.5A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		100.0W	102.0W	105.0W	108.0W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		20msec			
	Startup Time (typ)		300msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 135% of rated voltage			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Available			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C (0 to +40°C with cover)			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	1.5 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		93^{W} x 160^{D} x 40^{H} mm			
	Weight		470g			
	Safety Standards		UL1950, CSA No. 234 certified			
	Conducted Emission		Designated to meet FCC Class A			
Options	Chassis		Provided as standard			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

◆: Please contact Sanken for delivery time in advance.

Specifications and Standards

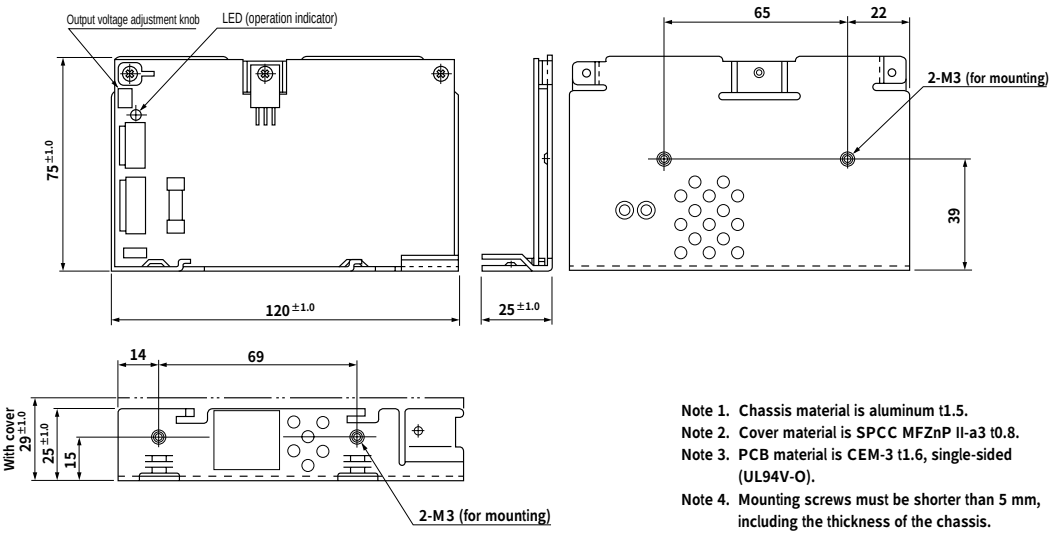
			150W			
Model			SSG150-05◆	SSG150-12◆	SSG150-15◆	SSG150-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		3.5A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		79%	83%	84%	86%
	Inrush Current (max) Note1		20A (max)			
	Leakage Current (max)		0.4mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		30.0A	13.0A	10.0A	6.5A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		150.0W	156.0W	150.0W	156.0W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		20msec			
	Startup Time (typ)		300msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 135% of rated voltage			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Available			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C (0 to +40°C with cover)			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	1.5 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		93^{W} x 177^{D} x 57^{H} mm			
	Weight		830g			
	Safety Standards		UL1950, CSA No. 234 certified			
	Conducted Emission		Designated to meet FCC Class A			
Options	Chassis		Provided as standard			
	Cover		Provided			

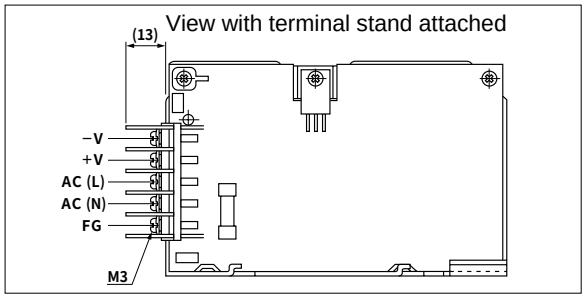
Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

External Dimensions (unit: mm)

30W (weight: 250 g)

Model
SSG030-05
SSG030-12
SSG030-15
SSG030-24

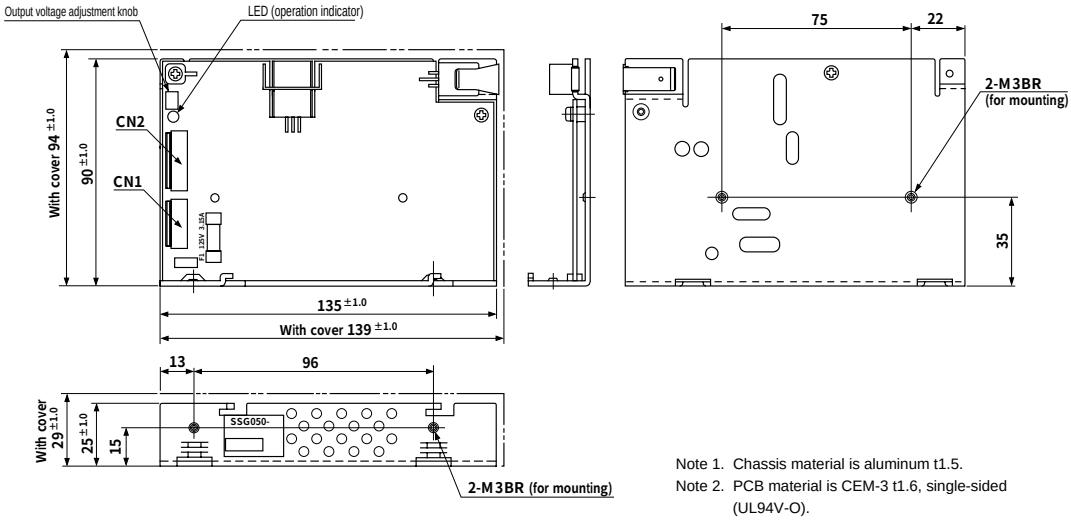


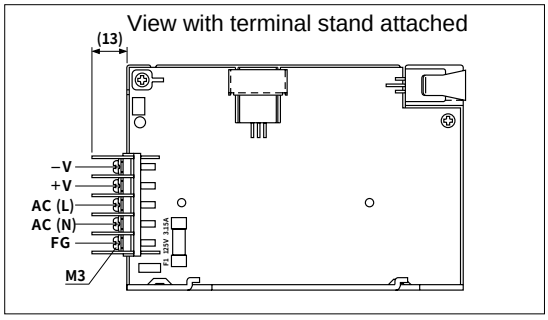


Note 1. Chassis material is aluminum t1.5.
Note 2. Cover material is SPCC MFZnP II-a3 t0.8.
Note 3. PCB material is CEM-3 t1.6, single-sided (UL94V-O).
Note 4. Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

50W (weight: 300 g)

Model
SSG050-05
SSG050-12
SSG050-15
SSG050-24



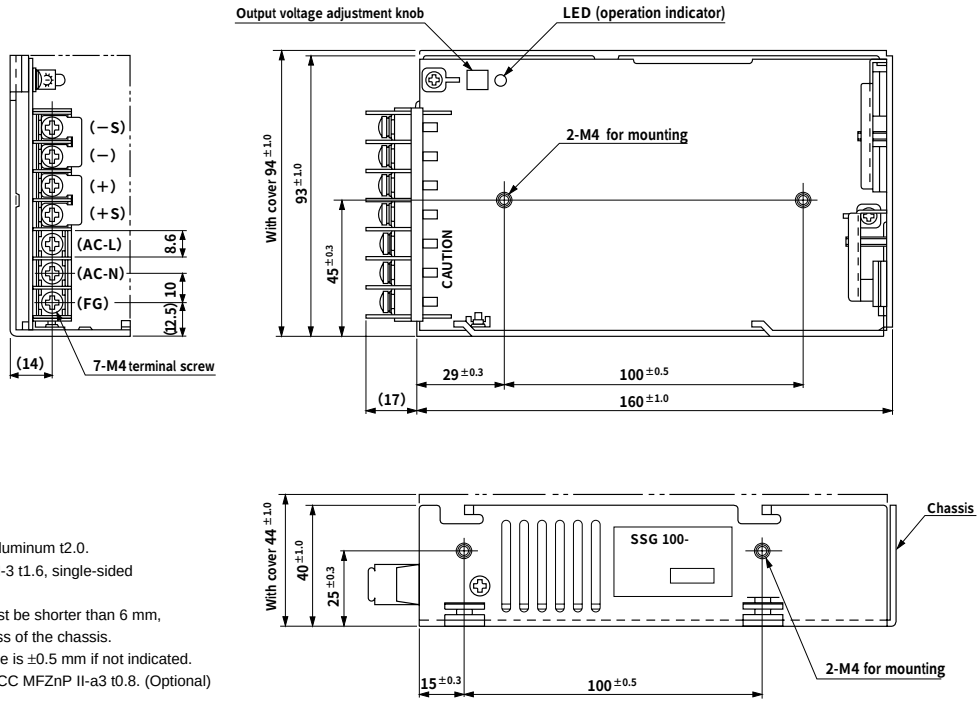


Note 1. Chassis material is aluminum t1.5.
Note 2. PCB material is CEM-3 t1.6, single-sided (UL94V-O).
Note 3. Mounting screws must be shorter than 5 mm, including the thickness of the chassis.
Note 4. Dimensional tolerance is ±0.5 mm if not indicated.
Note 5. Cover material is SPCC MFZnP II-a3 t0.8.

External Dimensions (unit: mm)

100W (weight: 470 g)

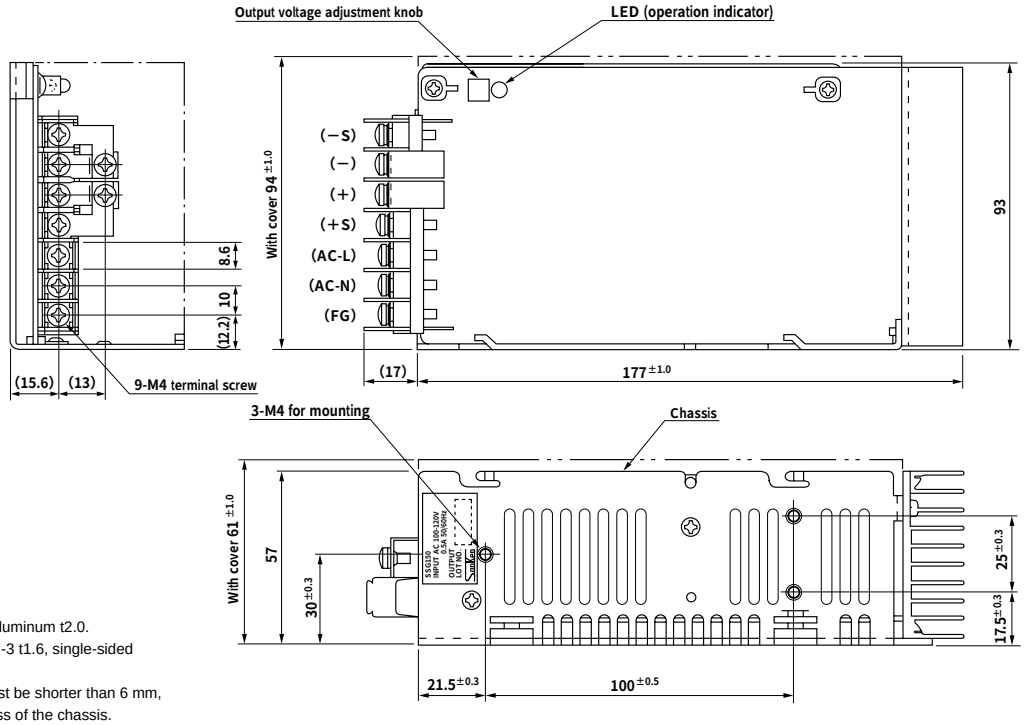
Model
SSG100-05
SSG100-12
SSG100-15
SSG100-24



Note 1. Chassis material is aluminum t2.0.
Note 2. PCB material is CEM-3 t1.6, single-sided (UL94V-O).
Note 3. Mounting screws must be shorter than 6 mm, including the thickness of the chassis.
Note 4. Dimensional tolerance is ±0.5 mm if not indicated.
Note 5. Cover material is SPCC MFZnP II-a3 t0.8. (Optional)

150W (weight: 830 g)

Model
SSG150-05
SSG150-12
SSG150-15
SSG150-24

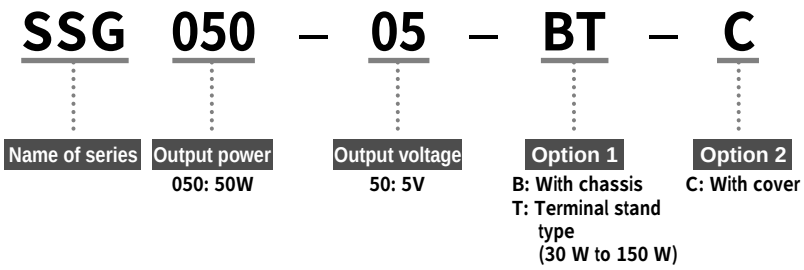


Note 1. Chassis material is aluminum t2.0.
Note 2. PCB material is CEM-3 t1.6, single-sided (UL94V-O).
Note 3. Mounting screws must be shorter than 6 mm, including the thickness of the chassis.
Note 4. Dimensional tolerance is ±0.5 mm if not indicated.
Note 5. Cover material is SPCC MFZnP II-a3 t0.8. (Optional)

Option

Symbol at end of product name	Description	Application
B	Connector type with chassis	30W, 50W
B-C	Connector type with chassis and cover	30W, 50W
BT	Terminal stand type with chassis	30W, 50W, 100W, 150W
BT-C	Terminal stand type with chassis and cover	30W, 50W, 100W, 150W

Description of model name



Operating Instruction

1 Terminal connection

Connectors (for models SSG030 and SSG050)

Model	Connector	Pin	Name	Corresponding connector	Corresponding contact
Input (for all models listed above)	CN1	1	FG	VHR-5N (JST)	SVH-21T-P1.1 (JST)
		2	NC		
		3	AC (N)		
		4	NC		
		5	AC (L)		
SSG030 type	CN2	1, 2	+V	VHR-4N (JST)	SVH-21T-P1.1 (JST)
		3, 4	0V		
	CN3	1	FG	#250 Fasten receptacle	
SSG050 type	CN2	1 to 3	+V	VHR-6N (JST)	SVH-21T-P1.1 (JST)
		4 to 6	0V		
	CN3	1	FG	#250 Fasten receptacle	

Terminal Stand (for models SSG030, 050, 100, and 150)

Model	Pin	Name	Corresponding crimp terminal
SSG030 type SSG050 type	1	FG	V1.25-3 (JST) or equivalent
	2	AC (N)	
	3	AC (L)	
	4	+V	
	5	0V	
SSG100 type SSG150 type	1	FG	V2-4 (JST) or equivalent
	2	AC (N)	
	3	AC (L)	
	4	+S	
	5	+V	
	6	0V	
	7	−S	

Note: Check the diagram for each model to verify terminal arrangement.

Terminal name and function

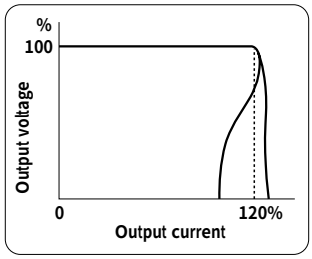
	Terminal name	Function
Input	AC (L)	AC input terminals. Connect the grounding line to AC (N). AC (L) has an input fuse.
	AC (N)	
	FG	Ground terminal (Connect it to a ground line.)
Output	+V	DC output terminal. Use these terminals for connection to the load.
	0V	
	+S	Remote sensing terminals. For remote sensing, connect these terminals to the sensing point.
	−S	

2 Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector or terminal stand. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

3 Overcurrent protection

When the output load becomes excessive, the output current is restricted as shown at right. After the source of the excess load is removed, the normal output voltage is recovered automatically.



The overcurrent protection function is set to operate when the output current exceeds 105% of the rated current value (120% of the standard output value).

Note: Never operate the target equipment with an excessive load for long periods, since this can result in degradation of the power supply unit.

4 Overvoltage protection

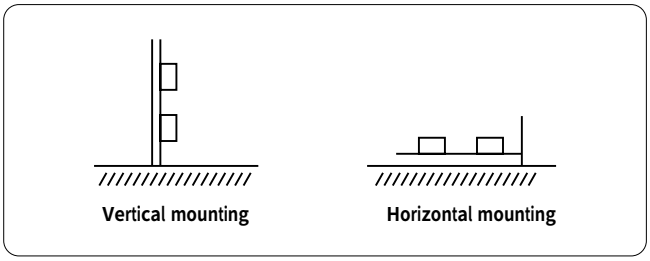
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about three minutes before turning the power on again.

Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

5 Mounting

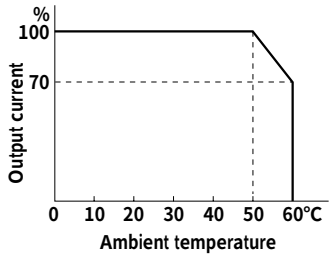
To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.

SSG series can be mounted in two directions as shown below. Output current derating is needed according to the model. Please refer to item ***6***.

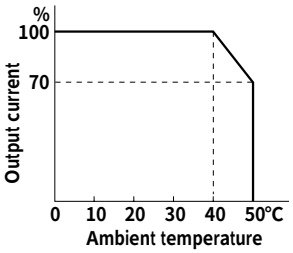


6 Output current derating

SSG30W, 50W:
(A), (B) mounting without cover
SSG100W, 150W:
(A) mounting without cover



SSG30W, 50W:
(A), (B) mounting with cover
SSG100W, 150W:
(A) mounting with cover,
(B) mounting without cover



Note: Output current of (B) mounting SSG100W and SSG150W with cover from 0°C to 40°C is 90% of rated current.

7 Leakage current

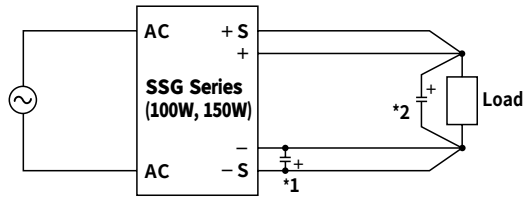
Leakage current is 0.5 mA or less (differs according to model, approx. 0.2 mA) per unit. Take care when using multiple supplies simultaneously.

8 Inrush current limiting

The power supply is equipped with an inrush current limiting circuit to restrict the amount of current that flows when the power is turned on. Since the 30 W to 50 W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. The 100 W and 150 W models may also allow more current than that listed in the specifications if restarting after a short period of time. Take adequate precautions.

9 Remote sensing

The SSG100W and 150W models are equipped with a remote sensing feature to guard against output line drop. The guaranteed output voltage range, including line drop effects, is 5% of rated output voltage. Limit line drop on the minus side to 125 mV or less



*1. Connect an electrolytic capacitor of about 10µF.
*2. Connect an electrolytic capacitor of about 100µF across the load.

10 Others

The SSG series (except 5W model) can be connected in series and used as minus output. However, they cannot be connected in parallel to increase output capacity, Please return malfanctioning units via the channel through which the unit was purchased.

11 When there is not output

- Check that all terminals are connected correctly as described in item *1*.
- Output will be cut off when over voltage protection is active. Check the supply as described in item *4*. Overvoltage protection may be activated if the output voltage is set too high. Verify that the output voltage adjustment knob is set towards the middle of its range. Overvoltage protection may be activated if the remote sensing terminals are not properly connected. Check their connections.
- The overcurrent protection will be activated and the output will decrease if there is an overload condition.

Please return malfunctioning units via the channel through which the unit was purchased.

Employs resonant-mode hybrid IC. Realizes high efficiency with low noise, small, lightweight.

SSH Series

25W **50W** **100W**

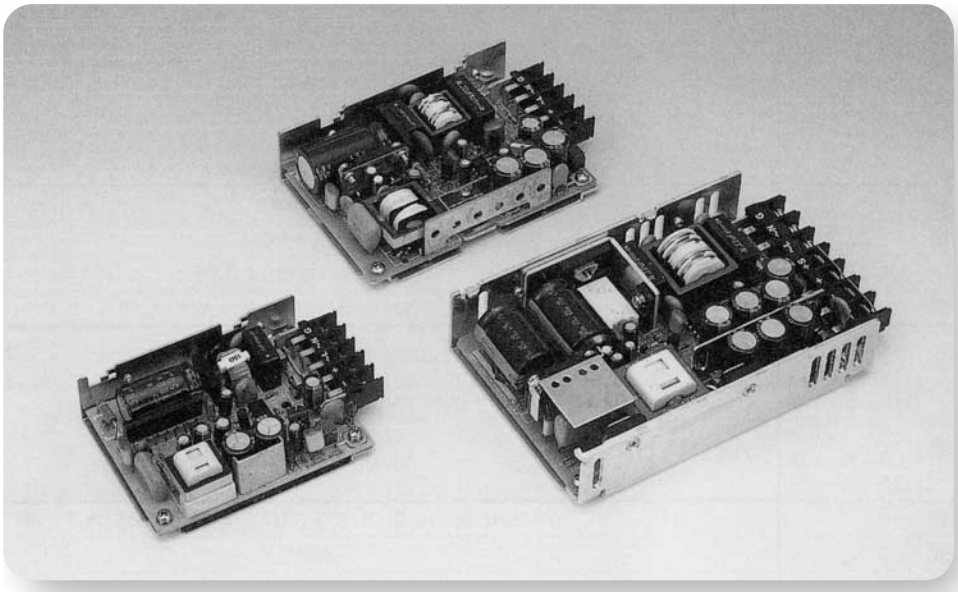
Single output

With chassis type

Acquired UL and CSA safety standards

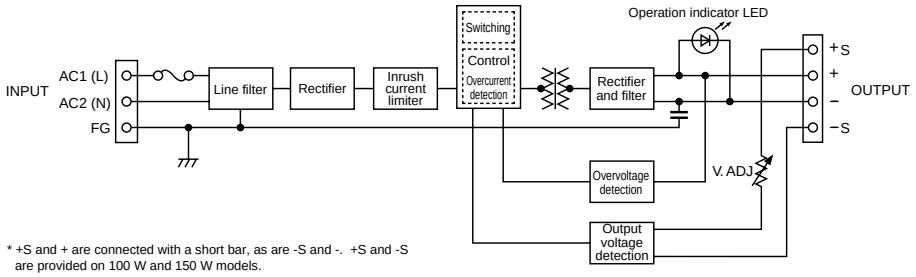
The SSH Series features Sanken's proprietary resonant-mode power hybrid IC and transformer. Along with high efficiency and low noise that can only be realized with a resonant-mode supply, these models provide a smaller size and are more economical than previously possible with conventional resonant-mode power supplies. With this series, Sanken delivers the next generation of power supplies to the market today.

- **High 81 to 90% efficiency**
- **Low noise**
- **Small and lightweight, occupying only 2/3 of the volume of Sanken's equivalent FCC power supplies.**



Free warrantee period: 2 years

[SSH Series Circuit Diagram]



* +S and + are connected with a short bar, as are -S and -. +S and -S are provided on 100 W and 150 W models.

◆: Please contact Sanken for delivery time of connector type product in advance.

Specifications and Standards

Model			25W			
			SSH025-05◆	SSH025-12◆	SSH025-15◆	SSH025-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		0.6A/0.5A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		80%	83%	84%	85%
	Inrush Current (max) Note 1		30A (max)			
	Leakage Current (max)		0.3mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		5.0A	2.1A	1.7A	1.1A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		25W	25.2W	25.5W	26.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		80mVp-p	100mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range Note 4		0 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Terminal stand (connector is optional)			
	Output Type		Terminal stand (connector is optional)			
	External Dimensions		90^W x 68^D x 25^H mm			
	Weight		170g			
	Safety Standards		UL1950, CSA No. 950 certified			
	Conducted Emission		Designated to meet FCC Class B (120 V AC)			
Options	Remote ON/OFF Control		Not provided			
	I/O Connector		Provided			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)

Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.

Note 4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

◆: Please contact Sanken for delivery time of connector type product in advance.

Specifications and Standards

Model			50W			
			SSH050-05◆	SSH050-12◆	SSH050-15◆	SSH050-24◆
Input Conditions	Rated Input Voltage		AC100V/AC120V			
	Allowable Input Voltage Range		AC85 to 132V			
	Input Current (typ)		1.0A/0.9A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		81%	86%	87%	90%
	Inrush Current (max) Note1		30A (max)			
	Leakage Current (max)		0.3mA			
Output Conditions Note3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current		10A	4.2A	3.4A	2.1A
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		50W	50.4W	51W	50.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note2		80mVp-p	100mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min)		16msec			
	Startup Time (typ)		400msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)			
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +60˚C			
	Storage Temperature Range		-25 to +85˚C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis (cover is optional)			
	Input Type		Terminal stand (connector is optional)			
	Output Type		Terminal stand (connector is optional)			
	External Dimensions		110^W x 75^D x 29^H mm			
	Weight		220g			
	Safety Standards		UL1950, CSA No. 950 certified			
	Conducted Emission		Designated to meet FCC Class B (120 V AC)			
Options	Remote ON/OFF Control		Not provided			
	I/O Connector		Provided			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
Note 4 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

Specifications and Standards

Model			100W		
			SSH100-05	SSH100-12	SSH100-24
Input Conditions	Rated Input Voltage		AC100V/AC120V		
	Allowable Input Voltage Range		AC85 to 132V		
	Input Current (typ)		2.0A/1.8A		
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 440Hz		
	Efficiency (typ)		82%	87%	90%
	Inrush Current (max) Note 1		30A (max)		
	Leakage Current (max)		0.3mA		
Output Conditions Note 3	Rated Output Voltage		5V	12V	24V
	Output Voltage Variation		Rated output voltage ±10%		
	Rated Output Current		20A (18A) Note 4	8.5A	4.5A
	Allowable Output Current Range		0 to 100%		
	Rated Output Power		100W	102W	108W
	Constant Voltage Accuracy		±3%		
	Ripple Noise Note 2		80mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min)		16msec		
	Startup Time (typ)		280msec		
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (output cutoff)		
	Overvoltage Protection		Detection above 115% of rated voltage (output cutoff)		
	Remote ON/OFF Control		Not provided		
	Remote Sensing		Provided		
	Operations Display		Red LED indicator		
Environmental Conditions	Operating Temperature Range Note 5		0 to +60˚C		
	Storage Temperature Range		-25 to +85˚C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	19.6m/s² (2G)		
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between input and FG			
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		With chassis (cover is optional)		
	Input Type		Terminal stand		
	Output Type		Terminal stand		
	External Dimensions		135^{W} x 93^{D} x 33^{H} mm		
	Weight		420g		
	Safety Standards		UL1950, CSA No. 950 certified		
	Conducted Emission		Designated to meet FCC Class B (120 V AC)		
Options	Remote ON/OFF Control		Not provided		
	I/O Connector		Not provided		
	Cover		Provided		

Note 1 At cold start. (More current than above noted value may flow at restart.)

Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note 3 Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.

Note 4 Rated output current is 18 A for models with cover.

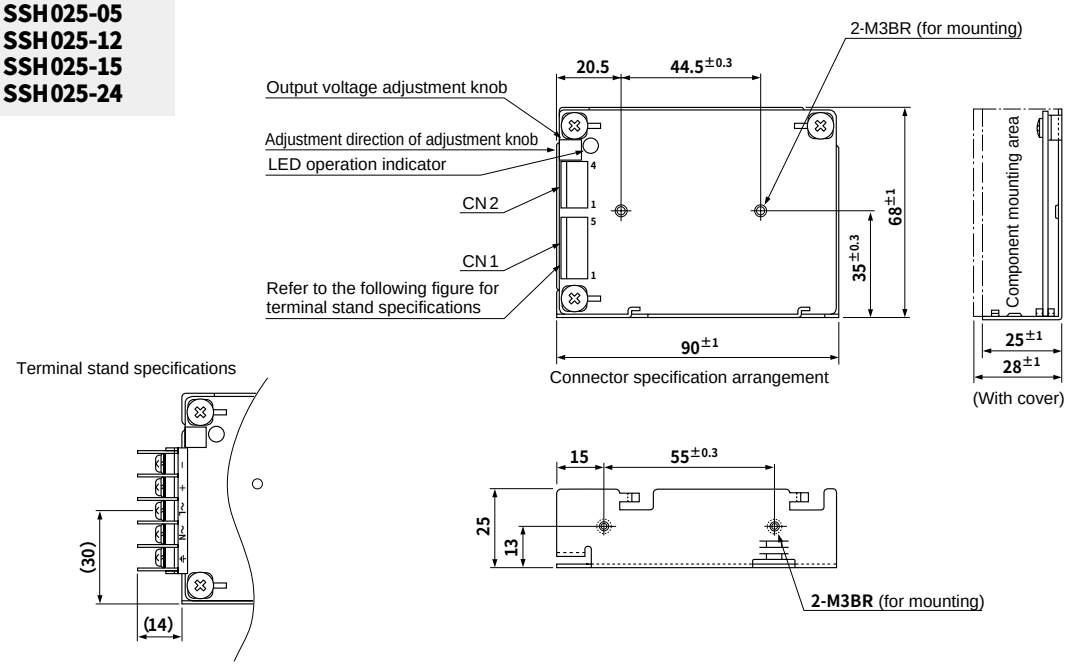
Note 5 It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

External Dimensions (unit: mm)

25W (weight: 170 g)

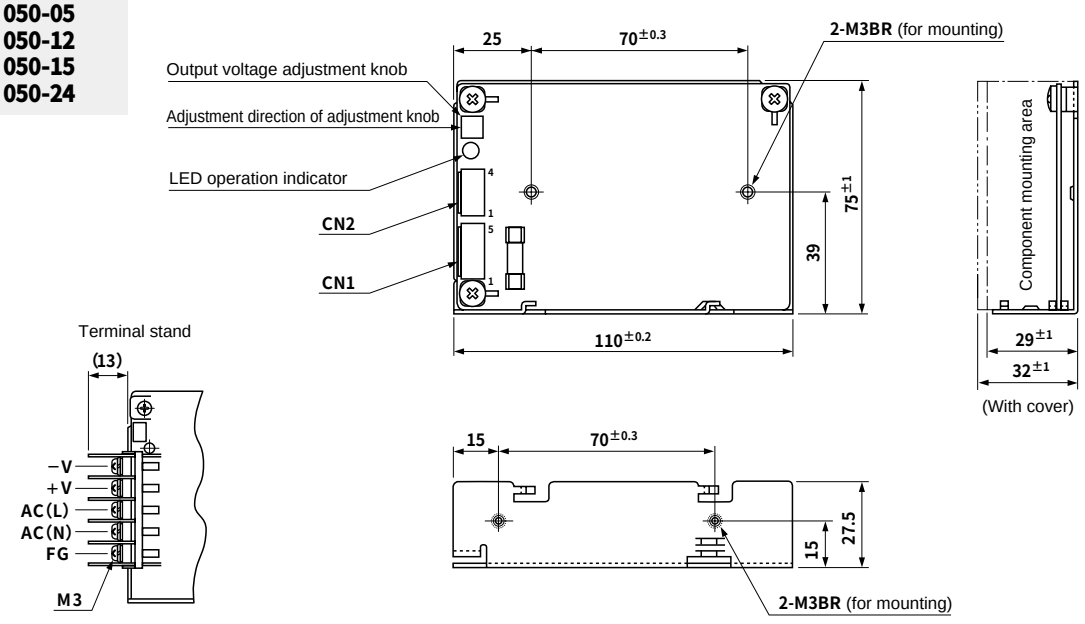
Model
SSH025-05
SSH025-12
SSH025-15
SSH025-24



*Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

50W (weight: 220 g)

Model
SSH050-05
SSH050-12
SSH050-15
SSH050-24

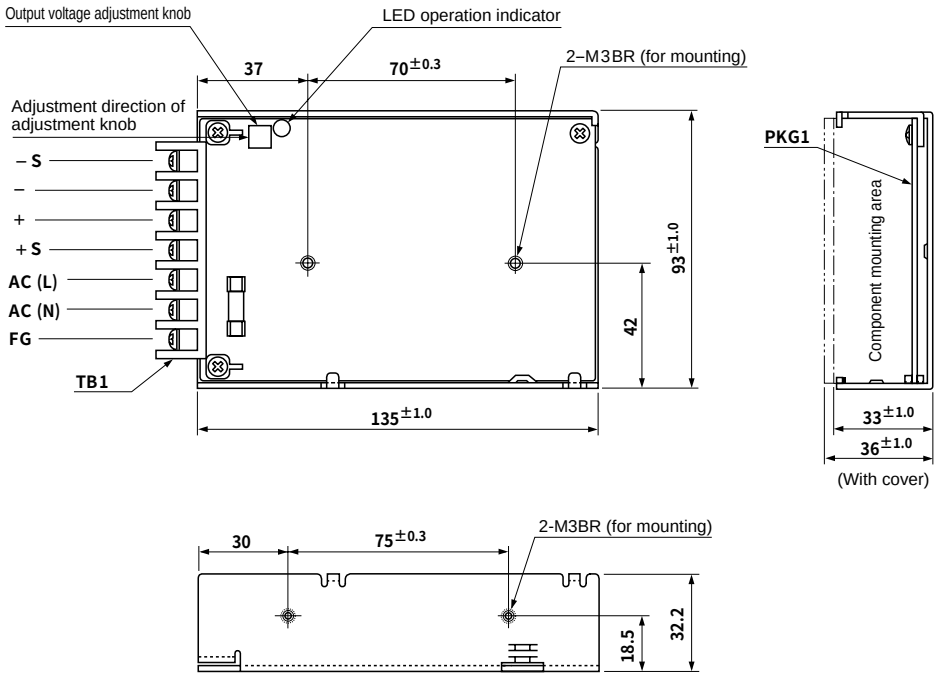


*Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

External Dimensions (unit: mm)

100W (weight: 420 g)

Model
SSH100-05
SSH100-12
SSH100-24



*Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

Option

Symbol at end of product name	Description	Application
None	Terminal stand type without cover	All models
-CN ◆	Connector type without cover	SSH025, SSH050
-C	Terminal stand type with cover	All models
-CN-C ◆	Connector type with cover	SSH025, SSH050

◆: Please contact Sanken for delivery time of connector type product in advance.

Operating Instruction

1 Terminal connection

SSH025/SSH050 connector type

Symbol	Pin No.	Terminal name	Corresponding connector	Corresponding contact
CN1	1	FG	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2	NC		
	3	AC (N)		
	4	NC		
	5	AC (L)		
CN2	1, 2	+	VHR-4N (JST)	SVH-21T-P1.1 (JST)
	3, 4	−		

SSH025/SSH050 stand type

Symbol	Terminal symbol	Terminal name	Corresponding crimp terminal
TB1	−	−	V1.25-3 (JST) or equivalent
	+	+	
	∼L	AC(L)	
	∼N	AC(N)	
	G	FG	

SSH100 stand type (terminal stand type only)

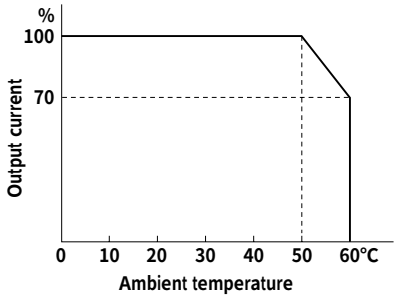
Symbol	Terminal symbol	Terminal name	Corresponding crimp terminal
TB1	−S	−S	V2-4 (JST) or equivalent
	−	−	
	+	+	
	+S	+S	
	∼L	AC (L)	
	∼N	AC (N)	
	G	FG	

Terminal name and function

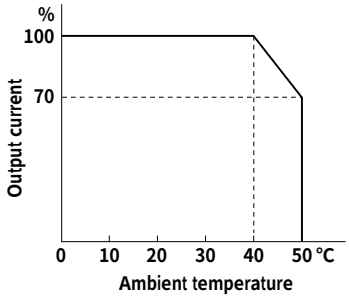
	Terminal name	Function
Input	AC (L)	AC input terminal. Fuse insertion side.
	AC (N)	AC input terminal.
	FG	Frame grounding. Grounding terminal.
Output	+	DC output terminal. + side
	−	DC output terminal. - side
	+S	Remote sensing terminal. + side (100W model only)
	−S	Remote sensing terminal. - side (100W model only)
	NC	No connection

2 Derating of output current

SSH Series (without cover)



SSH Series (with cover)



3 Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector or terminal stand. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

4 Overcurrent protection

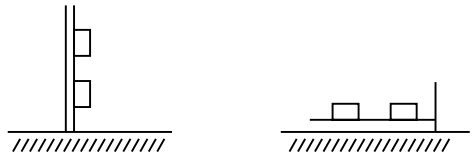
When the output is overloaded, the power supply's built-in overcurrent protection will shut off the output. The overcurrent protection is set to function when the output current exceeds 105% of the rated current value (about 130% of a standard output value).
To reset the overcurrent protection, remove the source of the overload, turn off the power, and wait about a minute before turning the power on again.

5 Overvoltage Protection

If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.
Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.
The power supply can be mounted in two directions as shown below. Use mounting screws that are 5 mm long or less, including the thickness of the chassis.



Vertical mounting　　Horizontal mounting

7 Leakage current

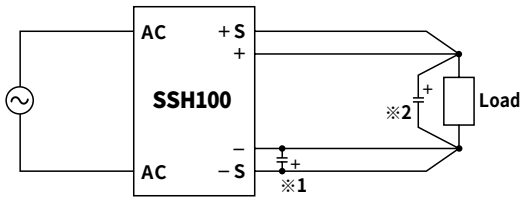
Leakage current is 0.3 mA or less per unit. Take care when using multiple supplies simultaneously.

8 Inrush current limiting

The power supply is equipped with an inrush current limiting circuit to restrict the amount of current that flows when the power is turned on. Since the 25 W and 50 W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. The 100 W model may also allow more current than that listed in the specifications if restarting after a short period of time. Take adequate precautions.

9 Remote sensing

The SSH100 model is equipped with a remote sensing feature to guard against output line drop. The guaranteed output voltage range, including line drop effects, is 5% of rated output voltage. Limit line drop on the minus side to 125 mV or less



※1. Connect an electrolytic capacitor of about 10 μF.
※2. Connect an electrolytic capacitor of about 100 μF across the load.

10 Serial and parallel connection

The SSH series cannot be connected in series or in parallel to increase output capacity.

11 When there is not output

- Check that all terminals are connected correctly as described in item ***1***.
- Output will be cut off when overcurrent protection is active. Check the supply as described in item ***5***.
  Overvoltage protection may be activated if the output voltage is set too high. Verify that the output voltage adjustment knob is set towards the middle of its range.
  Overvoltage protection may be activated if the remote sensing terminals are not properly connected. Check their connections.
- The overcurrent protection will be activated and the output will decrease if there is an overload condition.

Please return malfunctioning units via the channel through which the unit was purchased.

Supports peak power

SLS Peak Power Series

60W **100W** **150W**

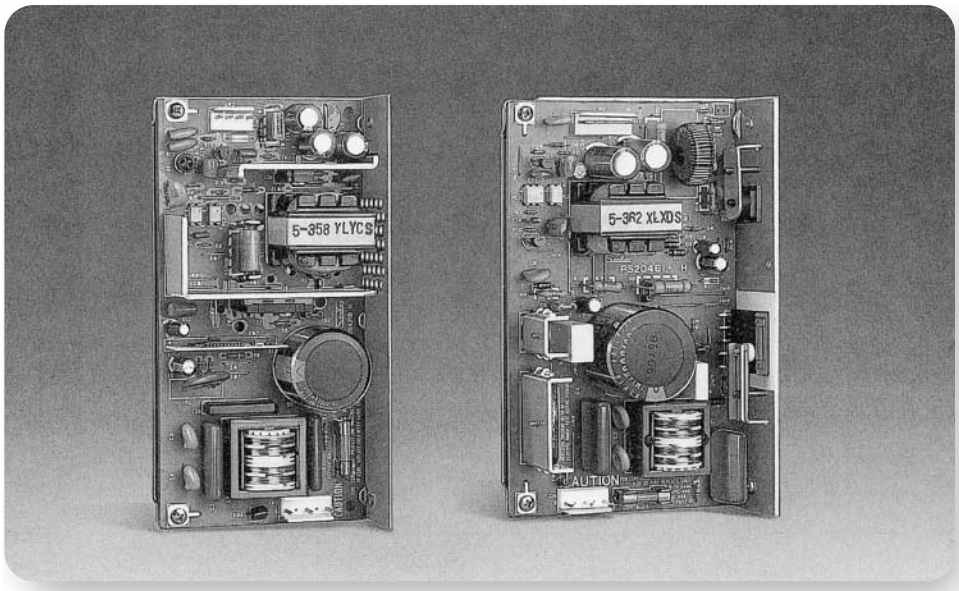
Single output, compatible with specific applications

With chassis

SLS060P, 100P, and 150P are single output switching power supplies that are designed for specific applications. They offer prompt delivery of general-purpose products and the special functions of customized products to meet a variety of customer needs. Please check the specifications when evaluating or employing this series.

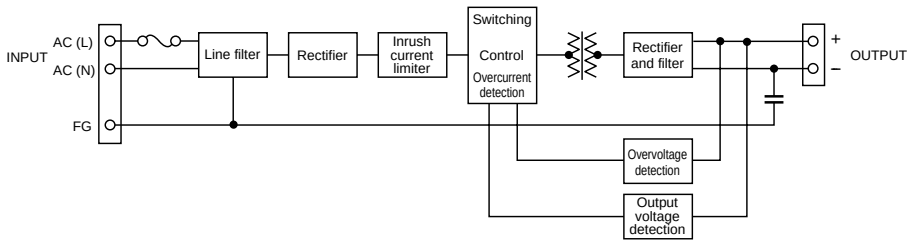
Acquired UL, CSA, and TÜV safety standards

- **Standard products for specific applications**
- **Supports peak loads: 2.5 times the rated current (within 15 seconds)**
- **Input voltage switching method (100 V/200 V) (for 150 W unit)**
  *** Different models are provided for 60 W and 100 W depending on the input voltage.**
- **Meets safety standards of each country**



Free warrantee period: 2 years

[SLS Series Circuit Diagram]



◆Please contact Sanken for delivery time in advance.

Specifications and Standards

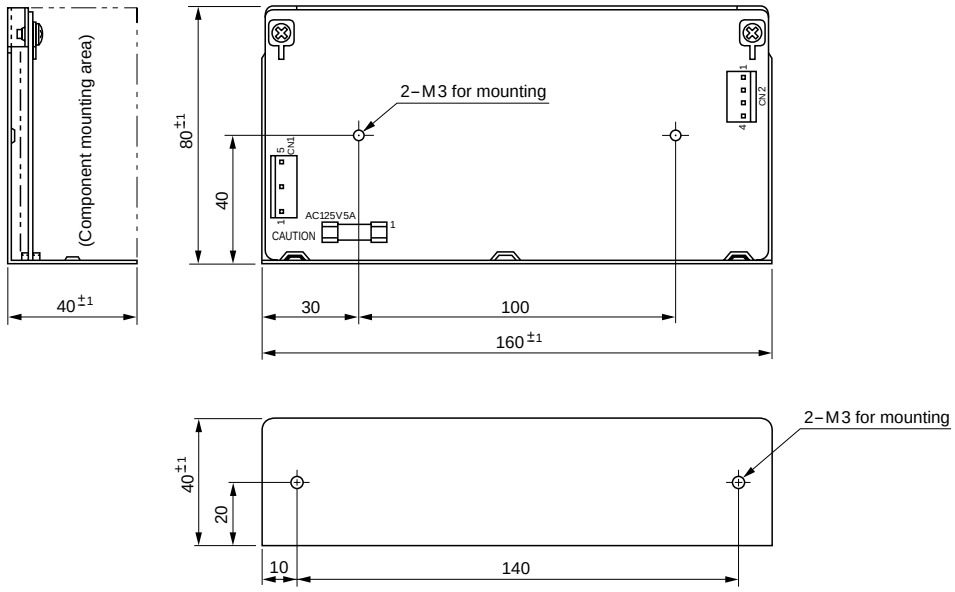
Model			60W	
			SLS060P	SLS060PH
Input Conditions	Rated Input Voltage		AC100V/AC120V	AC200V/AC240V
	Allowable Input Voltage Range		AC85 to 132V	AC170 to 264V
	Input Current (typ)		1.2A	0.8A
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Efficiency (typ)		73%	
	Inrush Current (max) Note1		30A	40A
	Leakage Current (max)		0.5mA	0.75mA
Output Conditions Note3	Rated Output Voltage		5V	24V
	Output Voltage Variation		Fixed	
	Rated Output Current		2.5A	
	Maximum Peak Current		6A (within 15 sec)	
	Allowable Output Current Range		0 to 2.5A	
	Rated Output Power		60W	
	Constant Voltage Accuracy Note2		±5%	
	Ripple Noise		300mVp-p	
	Output Holding Time (min)		20msec	
Additional Functions	Overcurrent Protection		Detection above 105% of peak current (automatic recovery)	
	Overvoltage Protection		115 to 145% (output cutoff)	110 to 145% (output cutoff)
	Overheating Protection		Not provided	
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Not provided	
Environmental Conditions	Operating Temperature Range Note4		0 to +50°C	
	Storage Temperature Range		-25 to +80°C	
	Operating Humidity Range		30 to 90% (no condensation)	
	Storage Humidity Range		30 to 90% (no condensation)	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	5 to 100Hz	10 to 55Hz
		Sweep time	3 minutes	1.5 minutes
		Acceleration rate	14.7m/s² (1.5G)	19.6m/s² (2G)
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Installation Conditions		10 G (3 times each in the X, Y, Z directions)	
	Installation Conditions		Derating may be required due to mounting direction	
Insulation	Insulation Withstand Voltage	Between input and output	1500 V AC for 1 minute	
		Between input and FG		
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		With chassis	
	Input Type		Connector	
	Output Type		Connector	
	External Dimensions		160^{W} x 80^{D} x 40^{H} mm	
	Weight		400g	
	Safety Standards		Designated to meet UL1950 D3, CSA EB 1402C	TÜV (EN60950) certified
	Conducted Emission		Designated to meet FCC Class B and VCCI Class B	Designated to meet CISPR22 Class B
Options	Remote ON/OFF Control		Not provided	
	Cover		Not provided	

Note 1 At cold start. (More inrush current than above noted value may flow at restart.)
Note 2 The constant voltage accuracy is measured within the input voltage variable range of 85 to 132 V AC, within the output current variable range, with a time drift of 10 minutes to eight hours and an ambient temperature range from 0 to +50°C.
Note 3 Although the SLS060P has a thermal shutdown function to prevent overheating (SLS100P does not have this function), because it is a simple system, the device must not be continuously operated when the output current exceeds the rated current.
Note 4 The maximum rated values for the remote ON/OFF control pins (pins 1 & 2 of CN2) are 15 V and 15 mA.
* Measurements are made at a point 5 cm from the output connector for all output characteristics, with a 63-V, 47-μF electrolytic capacitor connected to that point. (Use a 1:1 probe.)
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

External Dimensions (unit: mm)

60W (weight: 400 g)

Model
SLS060P SLS060PH



* Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

Specifications and Standards

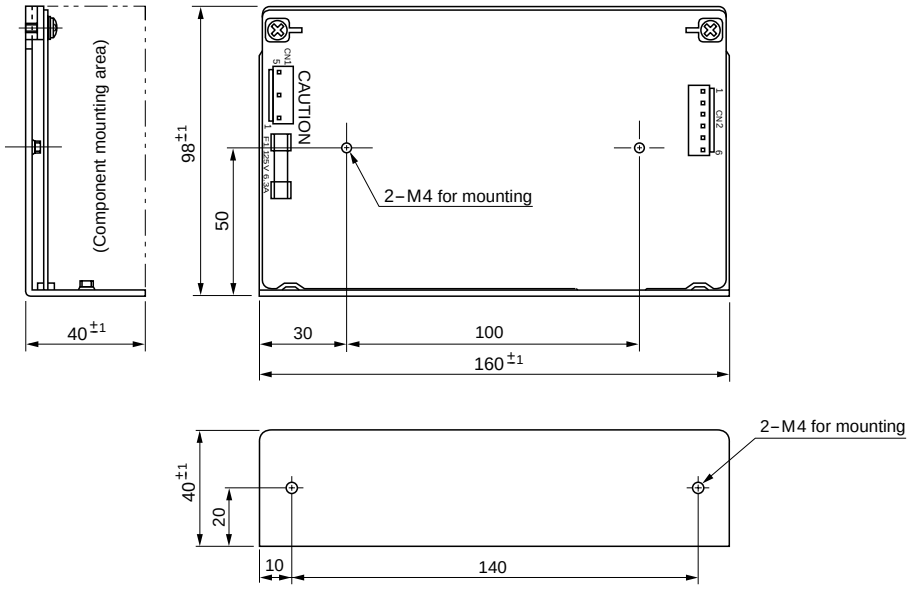
Model			100W		150W
			SLS100P	SLS100PH	SLS150PW
Input Conditions	Rated Input Voltage		AC100V/AC120V	AC200V/AC240V	AC100V/AC200V
	Allowable Input Voltage Range		AC85 to 132V	AC170 to 264V	AC85 to 132V/AC170 to 265V
	Input Current (typ)		2.3A	1.2A	4.2A
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 63Hz		
	Efficiency (typ)		80%		
	Inrush Current (max) Note 1		30A	40A	20A/50A
	Leakage Current (max)		0.5mA	0.75mA	0.5mA/0.75mA
Output Conditions Note 3	Rated Output Voltage		24V		
	Output Voltage Variation		Fixed		
	Rated Output Current		4A		6A
	Maximum Peak Current		10 A (within 15 sec)		15 A (within 15 sec)
	Allowable Output Current Range		0.1 to 4A		0.1 to 15A
	Rated Output Power		96W		144W
	Constant Voltage Accuracy Note 2		±5%		
	Ripple Noise		250mVp-p	400mVp-p	
	Output Holding Time (min)		20msec		
Additional Functions	Overcurrent Protection		Detection above 105% of peak current (automatic recovery)		
	Overvoltage Protection		115 to 145% (output cutoff)	110 to 145% (output cutoff)	110 to 145% (output cutoff)
	Overheating Protection		Not provided		
	Remote ON/OFF Control		Not provided		Provided Note 4
	Remote Sensing		Not provided		
	Operations Display		Not provided		
Environmental Conditions	Operating Temperature Range		0 to +50°C		
	Storage Temperature Range		-25 to +80°C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	5 to 100Hz	10 to 55Hz	5 to 100Hz
		Sweep time	3 minutes	1.5 minutes	
		Acceleration rate	14.7m/s² (1.5G)	19.6m/s (2G)	
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Installation Conditions		10 G (3 times each in the X, Y, Z directions)		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation	Insulation Withstand Voltage	Between input and output	1500 V AC for 1 minute		2000 V AC for 1 minute or 2400 V AC for 1 second
		Between input and FG			
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		With chassis		
	Input Type		Connector		Terminal stand
	Output Type		Connector		
	External Dimensions		160W x 98D x 40H mm		220W x 98D x 52H mm
	Weight		500g		850g
	Safety Standards		UL1950 D3, CSA EB 1402C certified	TÜV (EN60950) certified	UL1950, CSA No. 950, TÜV (EN60950) certified
	Conducted Emission		Designated to meet FCC (Part 15-J) Class A and VCCI Class A	Designated to meet CISPR22 Class A	Designated to meet FCC (Part 15-J) Class A and VCCI Class A
Options	Remote ON/OFF Control		Not provided		Provided as standard
	Cover		Not provided		

Note 1 At cold start. (More inrush current than above noted value may flow at restart.)
Note 2 The constant voltage accuracy is measured within the input voltage variable range of 85 to 132 V AC, within the output current variable range, with a time drift of 10 minutes to eight hours and an ambient temperature range from 0 to +50°C.
Note 3 Although the SLS060P has a thermal shutdown function to prevent overheating (SLS100P does not have this function), because it is a simple system, the device must not be continuously operated when the output current exceeds the rated current.
Note 4 The maximum rated values for the remote ON/OFF control pins (pins 1 & 2 of CN2) are 15 V and 15 mA.
* Measurements are made at a point 5 cm from the output connector for all output characteristics, with a 63-V, 47-μF electrolytic capacitor connected to that point. (Use a 1:1 probe.)
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

External Dimensions (unit: mm)

100W (weight: 500 g)

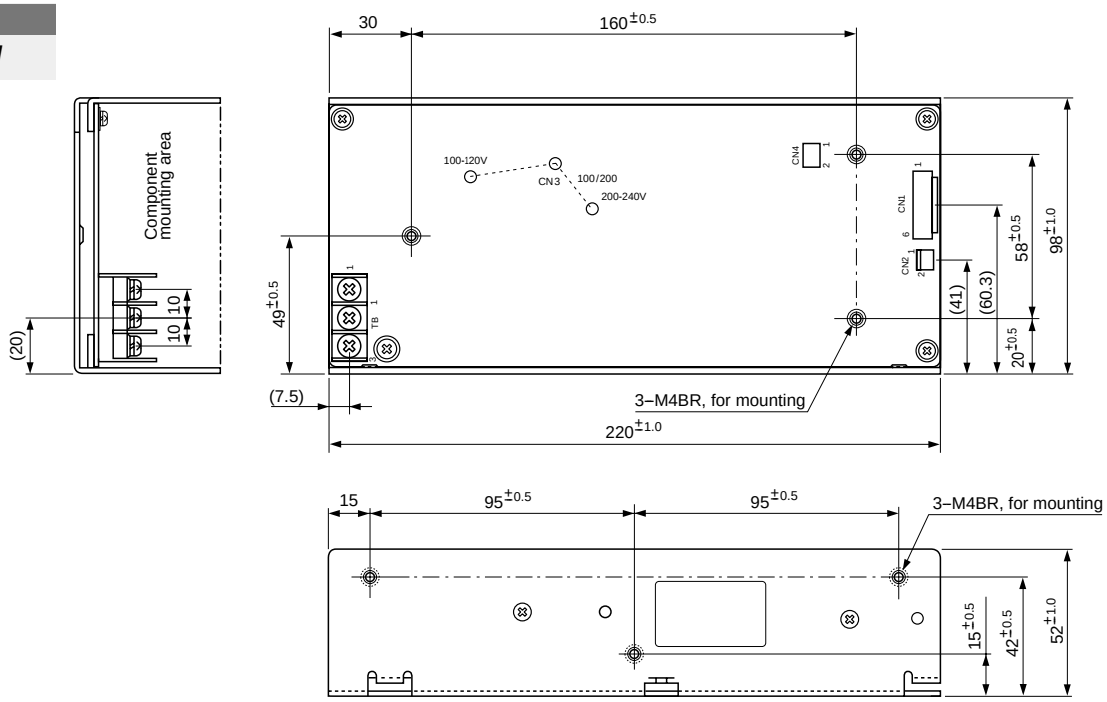
Model
SLS100P
SLS100PH



* Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

150W (weight: 850 g)

Model
SLS150PW



* Mounting screws must be shorter than 5 mm, including the thickness of the chassis.

Operating Instruction

1 Terminal connection

SLS060P(H), SLS100P(H)

	Model	Connector	Pin arrangement		Corresponding housing	Corresponding contact
Input	SLS 060P 060PH 100P 100PH	CN1	1	AC (L)	VHR-5N (JST)	SHV-21T-P1.1 (JST)
			2	(NC)		
			3	AC (N)		
			4	(NC)		
			5	FG		
Output	SLS 060P 060PH	CN2	1	+24V	VHR-4N (JST)	
			2			
			3	0V		
			4			
	SLS 100P 100PH	CN2	1 to 3	+24V	VHR-6N (JST)	
			4 to 6	0V		

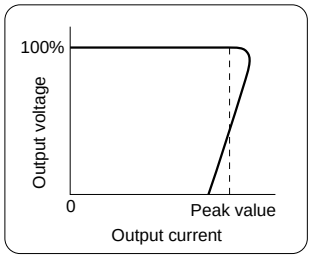
SLS150PW

Symbol	Pin No.	Terminal name	Corresponding connector
TB1	1	AC (N)	M4 terminal
	2	AC (L)	
	3	FG	
CN1	1 to 3	+24V	VHR-6N SVH-21T-P1.1 (JST)
	4 to 6	SG	
CN2	1	RC+	H2P-SHF-AA SHF-001T-0.8SS (JST)
	2	RC−	

2 Setting output voltage

The output voltage is preset at factory shipping, and cannot be adjusted.

3 Overcurrent protection



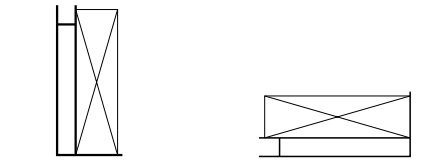
When the output is overloaded, the output current will be limited, which characteristics as shown in the graph. When the cause of the overload is removed, the output will automatically return to its normal voltage. The overcurrent detection is set to function when the output current exceeds 105% of the peak current. This product cannot be used over the specified time with overload of more than the rated current value.

4 Overvoltage protection

If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off until the input supply is cut off.
To apply power again, turn off the power and wait about three minutes before turning the power on again.
Check that the output voltage is normal without load for protection.

5 Mounting

The power supply can be mounted in two directions, without any output derating.

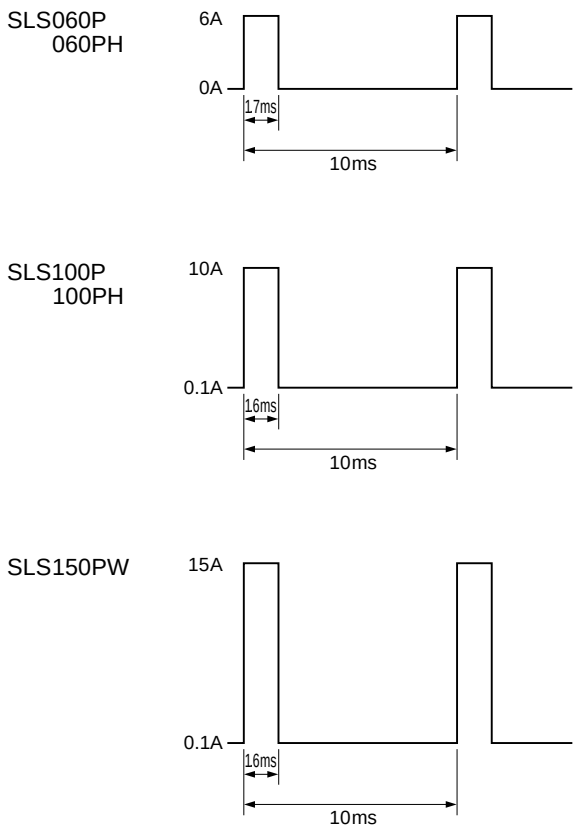


Mount the supply so that both sides and the top are open, to obtain sufficient air flow.

6 Dynamic load

This series can be used with dynamic load. In this case, use the supply with an effective value less than the rated output current.

(Example)



7 Inrush current

SLS060P/PH use a power thermistor to limit inrush current. Therefore, current higher than the specifications may flow due to the ambient temperature conditions and reinput after energizing (momentary input cutoff, etc.). Take proper precautions.

SLS100P/PH and SLS150PW use a resistor and thyristor to limit inrush current. Current higher than the specifications may flow due to the short reinput time.

8 Remote ON/OFF control (SLS150PW)

SLS150PW can perform remote ON/OFF control. When 3.5 to 5.5 V (current 5 mA recommend) is applied to between RC+ and RC- (pins 1 and 2 of connector CN2), the output goes ON. When 0.8 V or less is applied or open between RC+ and RC-, the output goes OFF.

When remote ON/OFF control is not used, the output can go ON regardless of CN2 by short-circuiting pins 1 and 2 of CN4.

9 Switching input voltage (SLS150PW)

SLS150PW can use 100 V AC power supply or 200 V AC power by switching the connector. For 100-120 V AC input, connect CN3 to the 100-120 V side. For 200 V-240 V AC input, connect CN3 to 200-240 V side.

At factory shipping, the connector is set to the 100-120 V side. When using SLS150PW with 200-240 V AC, be sure to switch CN3.

10 Precautions along with safety standards (SLS150PW)

SLS150PW acquired UL, CSA and TÜV safety standards.

A built-in fuse may need to be replaced according to applicable safety standards. Replace the built-in fuse with attached fuse for TÜV.

	Rating	Standards	Manufacturer	At factory shipping
UL, CSA	250V 12A	No. 31412	Retail fuse	Built-in
TÜV	250V 6.3A	No. 215 6.3	Retail fuse	Attached

Please return malfunctioning units via the channel through which the unit was purchased.

Single output, open frame PCB type, low-cost, general-purpose switching power supply

CWA Series

15W 30W 50W 75W 100W 150W

Single output

Single printed circuit board

Acquired UL, CSA, and TÜV safety standards

- **Wide input range for world-wide support**
  Input voltages from 85 V to 264 V AC can be continuously input in this model that is ready for use in all markets world-wide.

Lineup

Model	Output power	Output voltage			Circuit type
		5V	12V	24V	
CWA015	15W	●	●	●	RCC type
CWA030	30W	●	●	●	Flyback type
CWA050	50W	●	●	●	Flyback type
CWA075	75W		●	●	Resonant-mode (active PFC)
CWA100	100W		●	●	Resonant-mode (active PFC)
CWA150	150W		●	●	Resonant-mode (active PFC)

* Circuit type information noted in parentheses indicates PFC type

- **Employs the circuit type that suited to the output power**
  Employs the circuit type that suits the output capacity regarding load and target application
- **Compact size meets standards and does not require design changes**
- **Uses harmonic current control (PFC)**
  Active filter type PFC (Power Factor Correction) is used in 75 to 150 W and 12 V or 24 V models
- **Supports peak current suited to L load**
  Supports approximately 130% of rated peak current for 12 V or 24 V output when output power is 75 W or above.
- **Includes CE mark for LVD (Low Voltage Directive). Meets safety standards of each country.**
- **Reduced conducted emission**
  Class B compliant (VCCI, FCC, and CISPR)

Applications

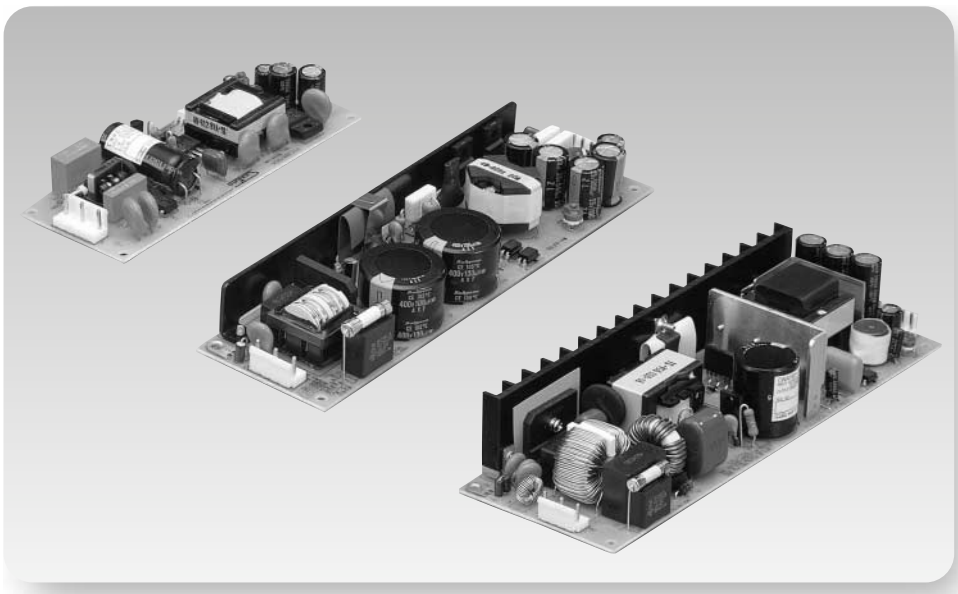
■ **Computer-related equipment**
Printers and other peripherals, ATMs, POS equipment, MO devices, etc.

■ **Communications terminal equipment**
Routers, hubs, modems, game devices, factory automation and controllers

Description of model name

CWA 015 - 05

- CWA: Series name
- 015: Output power (015 : 15W)
- 05: Output voltage (05 : 5V)



Free warrantee period: 1 year

Specifications and Standards

Model			15W		
			CWA015-05	CWA015-12	CWA015-24
Input Conditions	Rated Input Voltage		AC100V/AC240V		
	Allowable Input Voltage Range		AC85 to 264V		
	Input Current (typ) Note 1		0.4A (V_{IN} = 100V)		
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 440Hz		
	Efficiency (typ) Note 1		72%	76%	79%
	Inrush Current (max) Note 2		15A (V_{IN} = 100V) / 30A (V_{IN} = 240V) (at cold start)		
	Leakage Current (max) Note 1		0.75mA		
Output Conditions Note 3	Rated Output Voltage		5V	12V	24V
	Output Voltage Variation		Rated output voltage ±10%		
	Rated Output Current		3.0A	1.3A	0.7A
	Allowable Output Current Range		0 to 100%		
	Rated Output Power		15W	15.6W	16.8W
	Constant Voltage Accuracy Note 5 Note 6		±3%		
	Ripple Noise Note 1 Note 4		100mVp-p	120mVp-p	150mVp-p
	Output Holding Time (min) Note 1		20msec		
	Startup time Note 1		20msec (V_{IN} = 100V)		
Additional Functions	Overcurrent Protection		Detection above approx. 105% of rated current (drooping automatic recovery)		
	Overvoltage Protection Note 7		Detection above 115% of rated voltage (output cutoff)		
	Overheating Protection		Not provided		
	Remote ON/OFF Control		Not provided		
	Remote Sensing		Not provided		
	Operations Display		Not provided		
Environmental Conditions	Operating Temperature Range		-10 to +60°C		
	Storage Temperature Range		-25 to +85°C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	19.6m/s² (2G)		
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation Note 8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		Single printed circuit board		
	Input Type		Connector		
	Output Type		Connector		
	External Dimensions		125^{W} x 50^{D} x 22^{H} mm		
	Weight		95g		
	Safety Standards		UL60950, CSA No. 60950-00, and **TÜV** (EN60950) certified, designated to meet Electrical Appliance and Material Control Law		
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC), and VCCI Class B (100 V AC)		
Options	Remote ON/OFF Control		Not provided		
	Cover		Not provided		

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Insulation conditions are specified at normal temperature and humidity.

Specifications and Standards

Model			30W		
			CWA030-05	CWA030-12	CWA030-24
Input Conditions	Rated Input Voltage		AC100V to AC240V		
	Allowable Input Voltage Range		AC85 to 264V		
	Input Current (typ) Note1		0.8A (V_{IN} = 100V)		
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 440Hz		
	Efficiency (typ) Note1		70%	77%	79%
	Inrush Current (max) Note2		30A (V_{IN} = 100V)/60A (V_{IN} = 240V) (at cold start)		
	Leakage Current (max) Note1		0.75mA		
Output Conditions Note3	Rated Output Voltage		5V	12V	24V
	Output Voltage Variation		Rated output voltage ±10%		
	Rated Output Current		6.0A	2.5A	1.3A
	Allowable Output Current Range		0 to 100%		
	Rated Output Power		30W	30W	31.2W
	Constant Voltage Accuracy Note5 Note6		±3%		
	Ripple Noise Note1 Note4		120mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min) Note1		20msec		
	Startup time Note1		800msec (V_{IN} = 100V)		
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (drooping automatic recovery)		
	Overvoltage Protection Note7		Detection above 115% of rated voltage (output cutoff)		
	Overheating Protection		Not provided		
	Remote ON/OFF Control		Not provided		
	Remote Sensing		Not provided		
	Operations Display		Not provided		
Environmental Conditions	Operating Temperature Range		-10 to +60°C		
	Storage Temperature Range		-25 to +85°C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	19.6m/s² (2G)		
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation Note8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		Single printed circuit board		
	Input Type		Connector		
	Output Type		Connector		
	External Dimensions		133^{W} x 55^{D} x 27^{H} mm		
	Weight		170g		
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law		
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)		
Options	Remote ON/OFF Control		Not provided		
	Cover		Not provided		

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Insulation conditions are specified at normal temperature and humidity.

Specifications and Standards

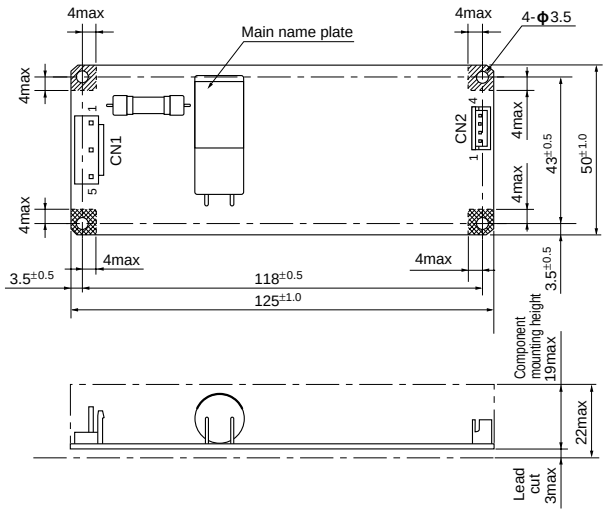
Model			50W		
			CWA050-05	CWA050-12	CWA050-24
Input Conditions	Rated Input Voltage		AC100V to AC240V		
	Allowable Input Voltage Range		AC85 to 264V		
	Input Current (typ) Note 1		1.2A (V_{IN} = 100V)		
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 440Hz		
	Efficiency (typ) Note 1		74%	83%	83%
	Inrush Current (max) Note 2		30A (V_{IN} = 100V) /60A (V_{IN} = 240V) (at cold start)		
	Leakage Current (max) Note 1		0.75mA		
Output Conditions Note 3	Rated Output Voltage		5V	12V	24V
	Output Voltage Variation		Rated output voltage ±10%		
	Rated Output Current		10.0A	4.3A	2.1A
	Allowable Output Current Range		0 to 100%		
	Rated Output Power		50W	51.6W	50.4W
	Constant Voltage Accuracy Note 5 Note 6		±3%		
	Ripple Noise Note 1 Note 4		120mVp-p	150mVp-p	200mVp-p
	Output Holding Time (min) Note 1		20msec		
	Startup time Note 1		700msec (V_{IN} = 100V)		
Additional Functions	Overcurrent Protection		Detection above approx. 105% of rated current (drooping automatic recovery)		
	Overvoltage Protection Note 7		Detection above 115% of rated voltage (output cutoff)		
	Overheating Protection		Not provided		
	Remote ON/OFF Control		Not provided		
	Remote Sensing		Not provided		
	Operations Display		Not provided		
Environmental Conditions	Operating Temperature Range		-10 to +60°C		
	Storage Temperature Range		-25 to +85°C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	19.6m/s² (2G)		
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.		
	Installation Conditions		Derating may be required due to mounting direction. See page 71.		
Insulation Note 8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)		
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		Single printed circuit board		
	Input Type		Connector		
	Output Type		Connector		
	External Dimensions		195^{W} x 55^{D} x 27^{H} mm		
	Weight		170g		
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law		
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)		
Options	Remote ON/OFF Control		Not provided		
	Cover		Not provided		

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Insulation conditions are specified at normal temperature and humidity.

External Dimensions (unit: mm)

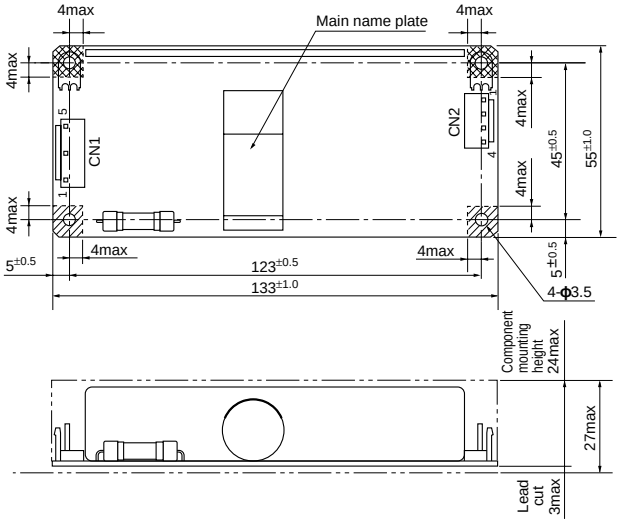
15W (weight: 95 g max)

Model
CWA015-05
CWA015-12
CWA015-24



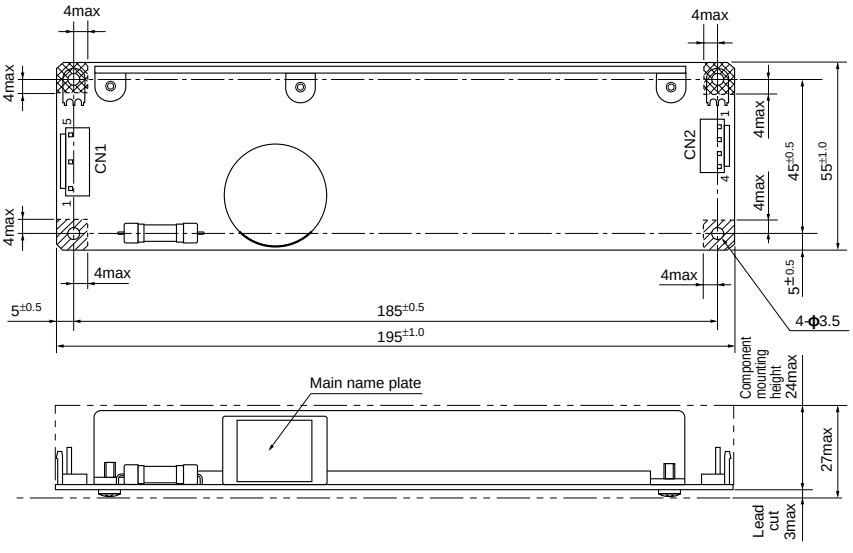
30W (weight: 170 g max)

Model
CWA030-05
CWA030-12
CWA030-24



50W (weight: 220 g max)

Model
CWA050-05
CWA050-12
CWA050-24



Specifications and Standards

Model			75W	
			CWA075-12	CWA075-24
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note1		1.1A (V_{IN} = 100V)	
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ)		0.99A (V_{IN} = 100V)/0.90A (V_{IN} = 240V)	
	Efficiency (typ) Note1		80%	82%
	Inrush Current (max) Note2		30A (V_{IN} = 100V)/60A (V_{IN} = 240V) (at cold start)	
	Leakage Current (max) Note1		0.75mA	
Output Conditions Note3	Rated Output Voltage		12V	24V
	Output Voltage Variation		Rated output voltage ±10%	
	Rated Output Current		6.3A	3.2A
	Maximum Peak Current		8.1 A (10 sec)	4.1 A (10 sec)
	Allowable Output Current Range		0 to 100%	
	Rated Output Power		75.6W	76.8W
	Constant Voltage Accuracy Note5 Note6		±3%	
	Ripple Noise Note1 Note4		150mVp-p	200mVp-p
	Output Holding Time (min) Note1		20msec	
	Startup time Note1		1500msec (V_{IN} = 100V)	
Additional Functions	Overcurrent Protection		Detection above approx. 105% of peak current (drooping automatic recovery)	
	Overvoltage Protection Note7		Detection above 115% of rated voltage (output cutoff)	
	Overheating Protection		Not provided	
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Not provided	
Environmental Conditions	Operating Temperature Range		-10 to +60°C	
	Storage Temperature Range		-25 to +85°C	
	Operating Humidity Range		30 to 90% (no condensation)	
	Storage Humidity Range		30 to 90% (no condensation)	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	19.6m/s² (2G)	
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.	
	Installation Conditions		Derating may be required due to mounting direction	
Insulation Note8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		Single printed circuit board	
	Input Type		Connector	
	Output Type		Connector	
	External Dimensions		222^{W} x 55^{D} x 37^{H} mm	
	Weight		330g	
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law	
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)	
	Harmonic Current		Designated to meet IEC61000-3-2 (active filter method)	
Options	Remote ON/OFF Control		Not provided	
	Cover		Not provided	

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Insulation conditions are specified at normal temperature and humidity.

Specifications and Standards

Model			100W	
			CWA100-12	CWA100-24
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note 1		1.4A (V_{IN} = 100V)	
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ)		0.99A (V_{IN} = 100V)/0.90A (V_{IN} = 240V)	
	Efficiency (typ) Note 1		81%	84%
	Inrush Current (max) Note 2		30A (V_{IN} = 100V)/60A (V_{IN} = 240V) (at cold start)	
	Leakage Current (max) Note 1		0.75mA	
Output Conditions Note 3	Rated Output Voltage		12V	24V
	Output Voltage Variation		Rated output voltage ±10%	
	Rated Output Current		8.5A	4.3A
	Maximum Peak Current		11.0 A (10 sec)	5.5 A (10 sec)
	Allowable Output Current Range		0 to 100%	
	Rated Output Power		102W	103.2W
	Constant Voltage Accuracy Note 5 Note 6		±3%	
	Ripple Noise Note 3 Note 4		150mVp-p	200mVp-p
	Output Holding Time (min) Note 1		20msec	
	Startup time Note 1		1500msec (V_{IN} = 100V)	
Additional Functions	Overcurrent Protection		Detection above approx. 105% of peak current (drooping automatic recovery)	
	Overvoltage Protection Note 7		Detection above 115% of rated voltage (output cutoff)	
	Overheating Protection		Not provided	
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Not provided	
Environmental Conditions	Operating Temperature Range		-10 to +60°C	
	Storage Temperature Range		-25 to +85°C	
	Operating Humidity Range		30 to 90% (no condensation)	
	Storage Humidity Range		30 to 90% (no condensation)	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	19.6m/s^2 (2G)	
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Shock Resistance		98m/s^2 (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.	
	Installation Conditions		Derating may be required due to mounting direction. See page 71.	
Insulation Note 8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		Single printed circuit board	
	Input Type		Connector	
	Output Type		Connector	
	External Dimensions		222^W x 62^D x 37^H mm	
	Weight		400g	
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law	
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)	
	Harmonic Current		Designated to meet IEC61000-3-2 (active filter method)	
Options	Remote ON/OFF Control		Not provided	
	Cover		Not provided	

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Insulation conditions are specified at normal temperature and humidity.

Specifications and Standards

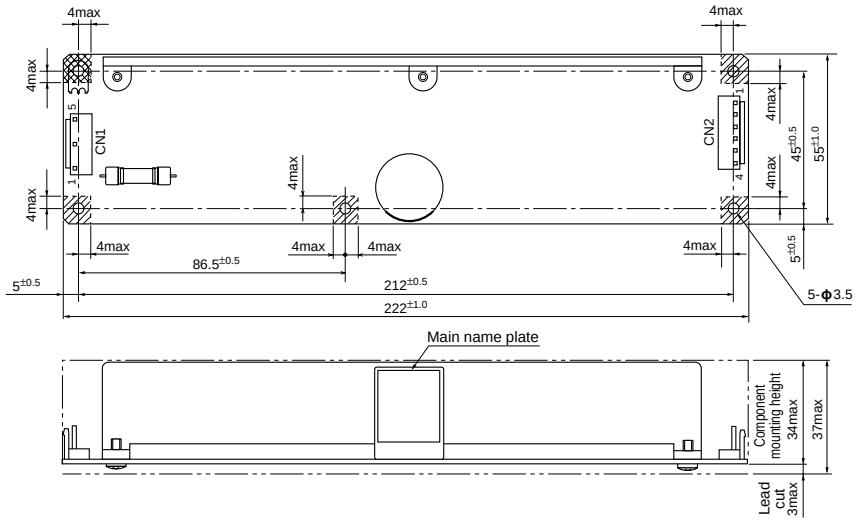
Model			150W	
			CWA150-12	CWA150-24
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note1		2.0A (V_{IN} = 100V)	
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ)		0.99A (V_{IN} = 100V)/0.90A (V_{IN} = 240V)	
	Efficiency (typ) Note1		80%	82%
	Inrush Current (max) Note2		30A (V_{IN} = 100V)/60A (V_{IN} = 240V) (at cold start)	
	Leakage Current (max) Note1		0.75mA	
Output Conditions Note3	Rated Output Voltage		12V	24V
	Output Voltage Variation		Rated output voltage ±10%	
	Rated Output Current		12.5A	6.3A
	Maximum Peak Current		16.2 A (10 sec)	8.1 A (10 sec)
	Allowable Output Current Range		0 to 100%	
	Rated Output Power		150W	151.2W
	Constant Voltage Accuracy Note5 Note6		±3%	
	Ripple Noise Note1 Note4		150mVp-p	200mVp-p
	Output Holding Time (min) Note1		20msec	
	Startup time Note1		1500msec (V_{IN} = 100V)	
Additional Functions	Overcurrent Protection		Detection above approx. 105% of peak current (drooping automatic recovery)	
	Overvoltage Protection Note7		Detection above 115% of rated voltage (output cutoff)	
	Overheating Protection		Not provided	
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Not provided	
Environmental Conditions	Operating Temperature Range		-10 to +60°C	
	Storage Temperature Range		-25 to +85°C	
	Operating Humidity Range		30 to 90% (no condensation)	
	Storage Humidity Range		30 to 90% (no condensation)	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	19.6m/s² (2G)	
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.	
	Installation Conditions		Derating may be required due to mounting direction. See page 71.	
Insulation Note8	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		Single printed circuit board	
	Input Type		Connector	
	Output Type		Connector	
	External Dimensions		222^{W} x 75^{D} x 42^{H} mm	
	Weight		540g	
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law	
	Conducted Emission		Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)	
	Harmonic Current		Designated to meet IEC61000-3-2 (active filter method)	
Options	Remote ON/OFF Control		Not provided	
	Cover		Not provided	

Note1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note2 More current above noted values may flow at restart (power thermistor used).
Note3 Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
Note4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note5 Output voltage can be changed within the maximum output power and rated output current.
Note6 The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.
Note7 Reset is performed by reapplying input voltage.
Note8 Insulation conditions are specified at normal temperature and humidity.

External Dimensions (unit: mm)

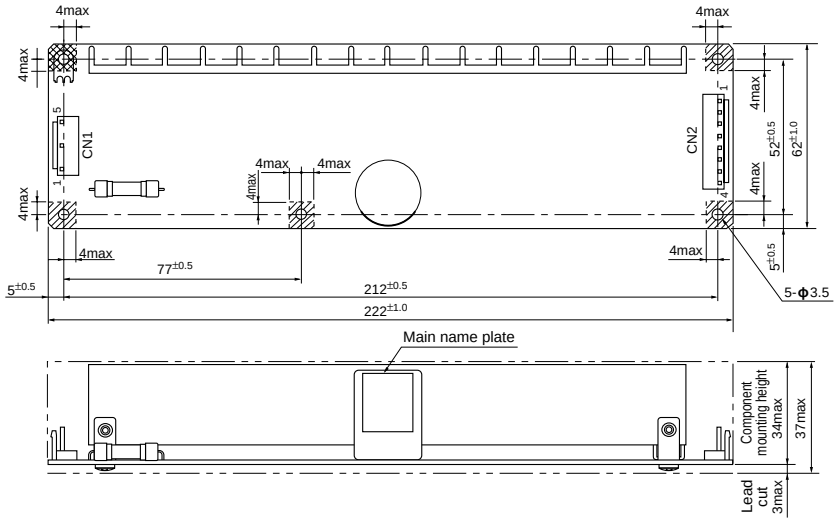
75W (weight: 330 g max)

Model
CWA075-12
CWA075-24



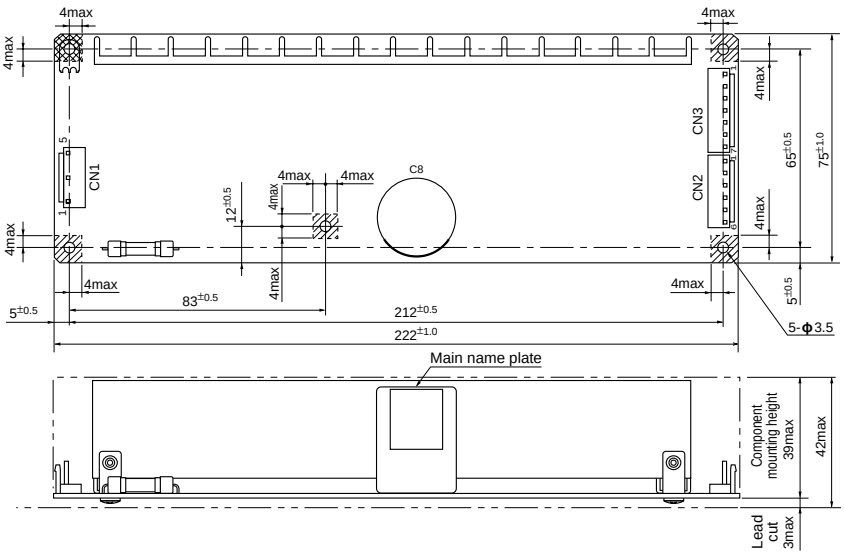
100W (weight: 400 g max)

Model
CWA100-12
CWA100-24



150W (weight: 540 g max)

Model
CWA150-12
CWA150-24



Operating Instruction

1 Terminal connection

CWA015 series

	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 2 : −V	B4B-XH-A (JST)	XHP-4 (JST)	SXH-001T-P0.6 (JST)
	3 to 4 : +V			

CWA030 series

	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 2 : −V	B4P-VH (JST)	XHR-4N (JST)	
	3 to 4 : +V			

CWA050 series

	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 2 : −V	B4P-VH (JST)	XHR-4N (JST)	
	3 to 4 : +V			

CWA075 series

	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 3 : −V	B6P-VH (JST)	XHR-6N (JST)	
	4 to 6 : +V			

CWA100 series

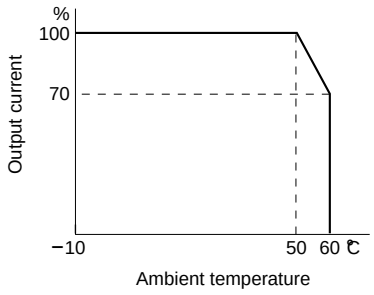
	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 4 : −V	B8P-VH (JST)	XHR-6N (JST)	
	5 to 8 : +V			

CWA150 series

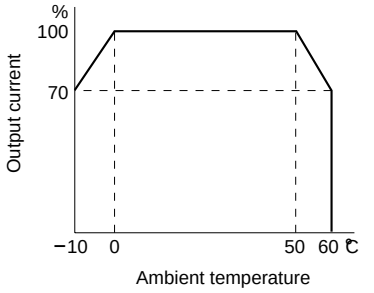
	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1 : AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	3 : AC (NEUTRAL)			
	5 : FG			
CN2	1 to 6 : +V	B4B-XH-A (JST)	XHR-4 (JST)	
	1 to 7 : −V			

2 Derating of output current

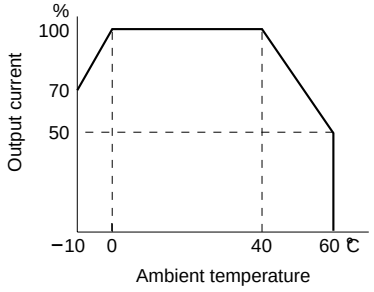
CWA015
CWA030
CWA050



CWA075
CWA100



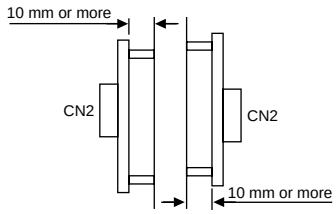
CWA150



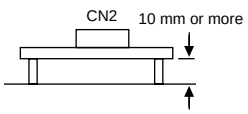
3 Mounting

For safety's sake, be sure to connect the FG (frame ground) terminal to the target equipment's grounding terminal. Failure to make this ground connection may result in greater conducted emission, radiant noise, and ripple noise.
To use the power supply with natural air cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.
When using a metal case, take insulation distance into account when mounting.
Please contact Sanken if there are any questions about this.

CWA015

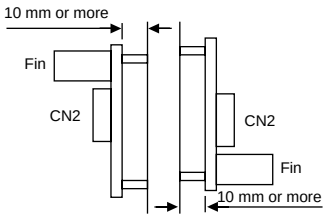


Vertical mounting

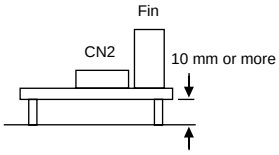


Horizontal mounting

CWA030
CWA050

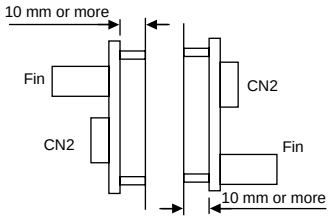


Vertical mounting

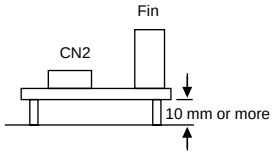


Horizontal mounting

CWA075

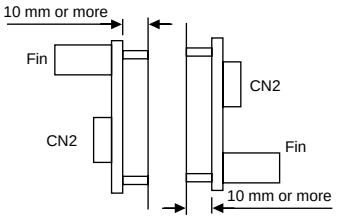


Vertical mounting

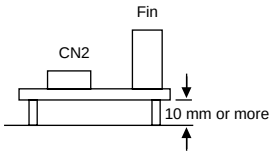


Horizontal mounting

CWA100

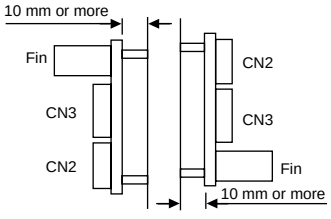


Vertical mounting

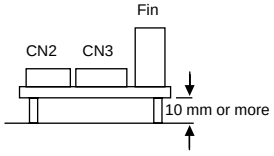


Horizontal mounting

CWA150



Vertical mounting



Horizontal mounting

World-wide continuous input range. Advanced design with power factor correction.

SWA Series

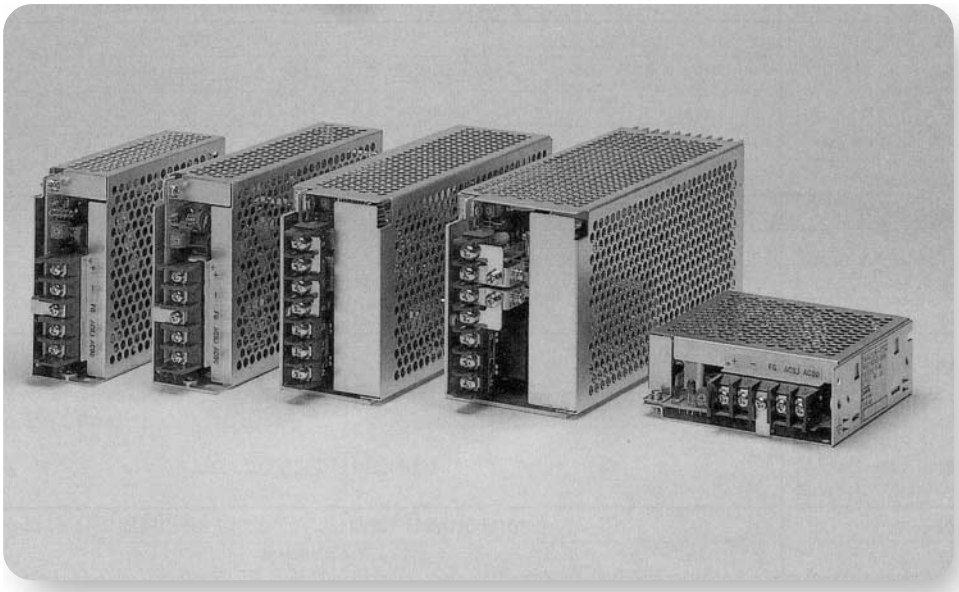
15W 30W 50W 100W 150W

Single output
With chassis

Acquired UL, CSA, and TÜV safety standards

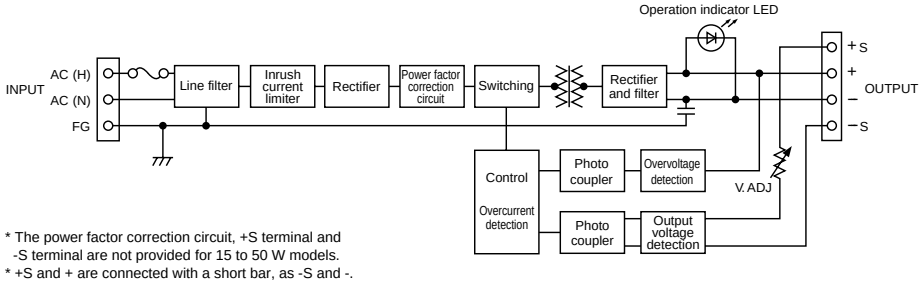
The SWA series employs a continuous input method so that input voltages from 85 V to 264 V can be supported without the need for manual switching. This series has been designed to be easily used anywhere in the world. This series has five single-output models ranging from 15 to 150 W. The 100 and 150 W models are equipped with power-factor-correction circuits for realizing harmonic current control. These are advance power supplies which take into account international regulations on harmonic currents.

- **World-wide, continuous input system (85 to 264 V)**
- **DC input possible (90 to 165 V)**
- **Conforms to harmonic current regulations IEC61000-3-2 (100 W/150 W models)**
- **Attains a high power factor of 0.95 with dedicated power factor correction IC (100 W/150 W models)**
- **Compact unit due to employing proprietary barrierless transformer**
- **Employs MOS FET-based main switching circuit for achieving high efficiency**



Free warrantee period: 2 years

[SWA Series Circuit Diagram]



* The power factor correction circuit, +S terminal and -S terminal are not provided for 15 to 50 W models.
* +S and + are connected with a short bar, as -S and -.

◆Please contact Sanken for delivery time of connector type product in advance.

Specifications and Standards

			15W			
Model			SWA015-05◆	SWA015-12◆	SWA015-15◆	SWA015-24◆
Input Conditions	Rated Input Voltage		100 V AC to 240 V AC or 110 V DC Note 4			
	Allowable Input Voltage Range		85 V AC to 264 V AC or 90 V DC to 165 V DC Note 4			
	Input Current (typ)		0.4A/0.23A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		72%	75%	75%	77%
	Inrush Current (max) Note 1		25A/50A			
	Leakage Current (max)		0.5mA/0.75mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current Note 4		3.0A (2.4A)	1.3A (1.0A)	1.0A (0.8A)	0.7A (0.5A)
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		15W	15.6W	15W	16.8W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		10msec			
	Startup time (typ)		20msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 145% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		35^{W} x 99^{D} x 97^{H} mm			
	Weight		270g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified			
	Conducted Emission		Designated to meet CISPR22 Class A and FCC Class B			
Options	Remote ON/OFF Control		Not provided			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 All output characteristics are measured at the output connector.
Note 4 Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

◆Please contact Sanken for delivery time of connector type product in advance.

Specifications and Standards

	Model		30W			
			SWA030-05◆	SWA030-12◆	SWA030-15◆	SWA030-24◆
Input Conditions	Rated Input Voltage		100 V AC to 240 V AC or 110 V DC Note 4			
	Allowable Input Voltage Range		85 V AC to 264 V AC or 90 V DC to 165 V DC Note 4			
	Input Current (typ)		0.7A/0.46A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		72%	75%	75%	77%
	Inrush Current (max) Note 1		25A/50A			
	Leakage Current (max)		0.5mA/0.75mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current Note 4		6.0A (4.8A)	2.5A (2.0A)	2.0A (1.6A)	1.3A (1.0A)
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		30W	30W	30W	31.2W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		10msec			
	Startup time (typ)		20msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 145% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s^2 (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		35^W x 116^D x 97^H mm			
	Weight		370g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified			
	Conducted Emission		Designated to meet CISPR22 Class A and FCC Class B			
Options	Remote ON/OFF Control		Not provided			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 All output characteristics are measured at the output connector.
Note 4 Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

◆Please contact Sanken for delivery time of connector type product in advance.

Specifications and Standards

	Model		50W			
			SWA050-05◆	SWA050-12◆	SWA050-15◆	SWA050-24◆
Input Conditions	Rated Input Voltage		100 V AC to 240 V AC or 110 V DC Note 4			
	Allowable Input Voltage Range		85 V AC to 264 V AC or 90 V DC to 165 V DC Note 4			
	Input Current (typ)		1.2A/0.7A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ)		72%	75%	75%	77%
	Inrush Current (max) Note 1		25A/50A			
	Leakage Current (max)		0.5mA/0.75mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current Note 4		10A (8A)	4.2A (3.3A)	3.4A (2.7A)	2.1A (1.6A)
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		50W	50.4W	51W	50.4W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		10msec			
	Startup time (typ)		20msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current			
	Overvoltage Protection		Detection from 115 to 145% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		37^{W} x 159^{D} x 97^{H} mm			
	Weight		410g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified			
	Conducted Emission		Designated to meet CISPR22 Class A and FCC Class B			
Options	Remote ON/OFF Control		Not provided			
	Cover		Provided			

Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 All output characteristics are measured at the output connector.
Note 4 Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

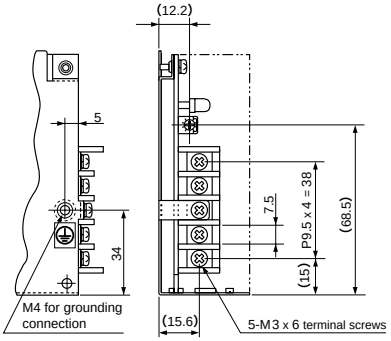
Specifications and Standards

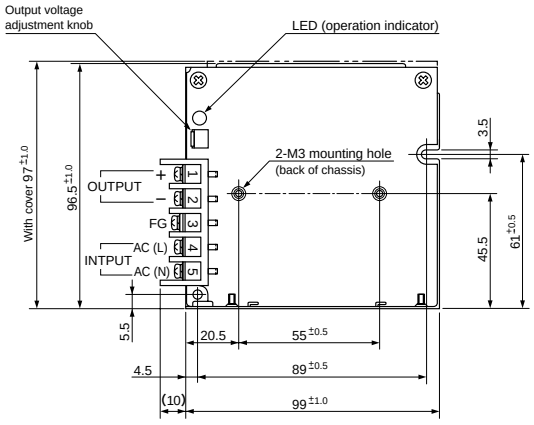
Model			100W			
			SWA100-05	SWA100-12	SWA100-15	SWA100-24
Input Conditions	Rated Input Voltage		100 V AC to 240 V AC or 110 V DC Note 4			
	Allowable Input Voltage Range		85 V AC to 264 V AC or 90 V DC to 165 V DC Note 4			
	Input Current (typ)		1.6A/0.7A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 63Hz			
	Power Factor (typ)		0.99/0.92			
	Efficiency (typ)		74%	76%	76%	77%
	Inrush Current (max) Note 1		20A/40A			
	Leakage Current (max)		0.5mA/0.75mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current Note 4		20A (16A)	8.5A (6.8A)	7.0A (5.6A)	4.5A (3.6A)
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		100W	102W	105W	108W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		20msec			
	Startup time (typ)		1000/600msec			
Additional Functions	Overcurrent Protection		Detection approx. 120% of rated current			
	Overvoltage Protection		Detection from 115 to 145% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		50^{W} x 180^{D} x 93^{H} mm			
	Weight		650g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified			
	Conducted Emission		Designated to meet CISPR22 Class A (200-240 V AC) and FCC Class A (100-120 V AC)			
Options	Remote ON/OFF Control		Not provided			
	Cover		Provided			

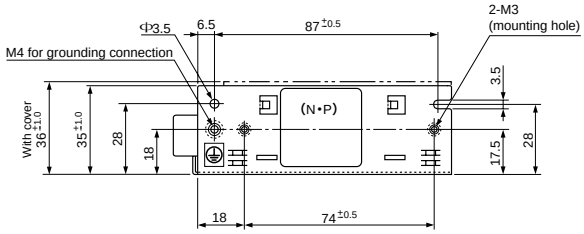
Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 All output characteristics are measured at the output connector.
Note 4 Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

15W (weight: 270 g)

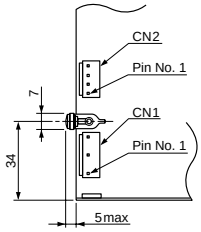
Model
SWA015-05
SWA015-12
SWA015-15
SWA015-24







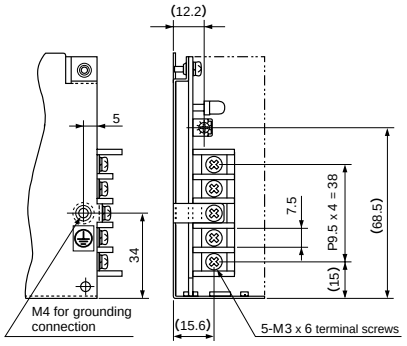
(1) Chassis material is SPCC MFZnPII-a3, t1.0.
(2) PCB material is CEM-3, t1.6 single-sided (UL94V-O).
(3) Mounting screw length must be shorter than 6 mm, including the thickness of the chassis. If the input/output terminal is connector type, the screw for grounding connection only must be less than 4 mm, including the thickness of the chassis.
(4) Dimensional tolerance is ±0.5 mm if not indicated.
(5) Cover material is SPCC MFZnPII-a3, t0.5. Cover can only be attached when the input/output terminal has screw terminal stand specification (cover is optional).
(6) Refer to the following figure when the input/output terminal is connector type.
(7) Refer to the following table for pin connections when the input/output terminal is connector type.

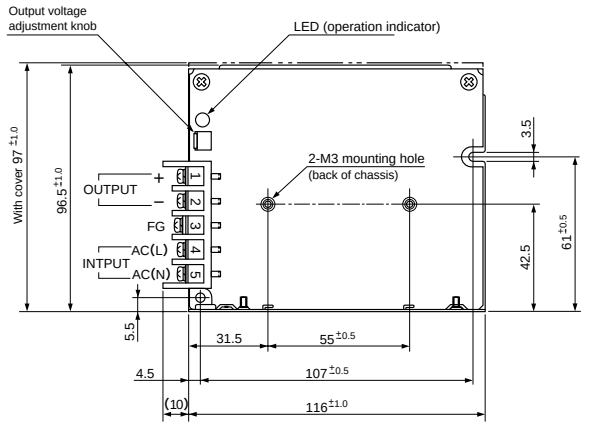


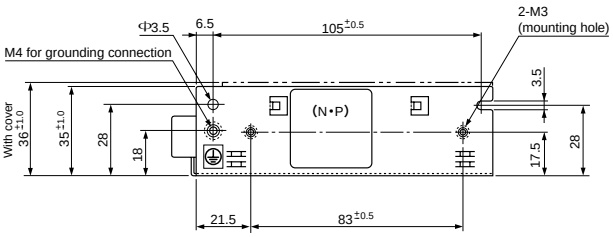
CN No.	Pin No.	Connection	Corresponding housing	Corresponding contact
CN1	1	AC (N)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2	N.C.		
	3	AC (L)		
	4	N.C.		
	5	FG		
CN2	1, 2	OUTPUT −	VHR-4N (JST)	
	3, 4	OUTPUT +		

30W (weight: 370 g)

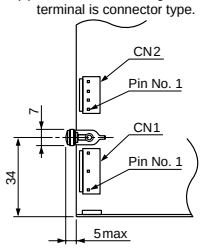
Model
SWA030-05
SWA030-12
SWA030-15
SWA030-24







(1) Chassis material is SPCC MFZnPII-a3, t1.0.
(2) PCB material is CEM-3, t1.6 single-sided (UL94V-O).
(3) Mounting screw length must be shorter than 6 mm, including the thickness of the chassis. If the input/output terminal is connector type, the screw for grounding connection only must be less than 4 mm, including the thickness of the chassis.
(4) Dimensional tolerance is ±0.5 mm if not indicated.
(5) Cover material is SPCC MFZnPII-a3, t0.5. Cover can only be attached when the input/output terminal has screw terminal stand specification (cover is optional).
(6) Refer to the following figure when the input/output terminal is connector type.
(7) Refer to the following table for pin connections when the input/output terminal is connector type.

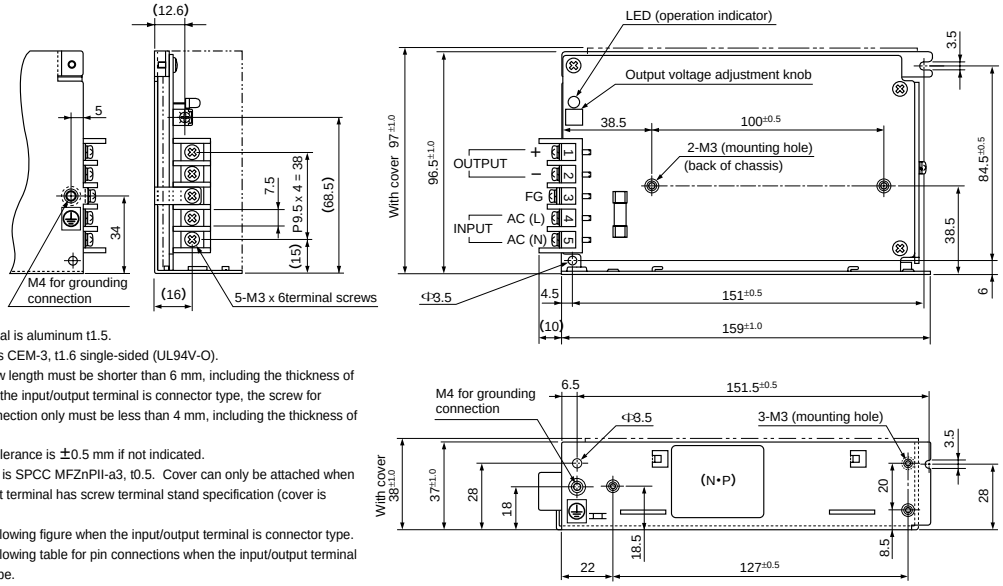


CN No.	Pin No.	Connection	Corresponding housing	Corresponding contact
CN1	1	AC (N)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2	N.C.		
	3	AC (L)		
	4	N.C.		
	5	FG		
CN2	1, 2	OUTPUT −	VHR-4N (JST)	
	3, 4	OUTPUT +		

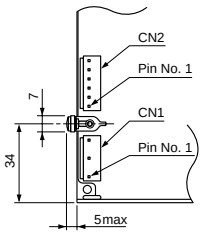
External Dimensions (unit: mm)

50W (weight: 410 g)

Model
SWA050-05
SWA050-12
SWA050-15
SWA050-24



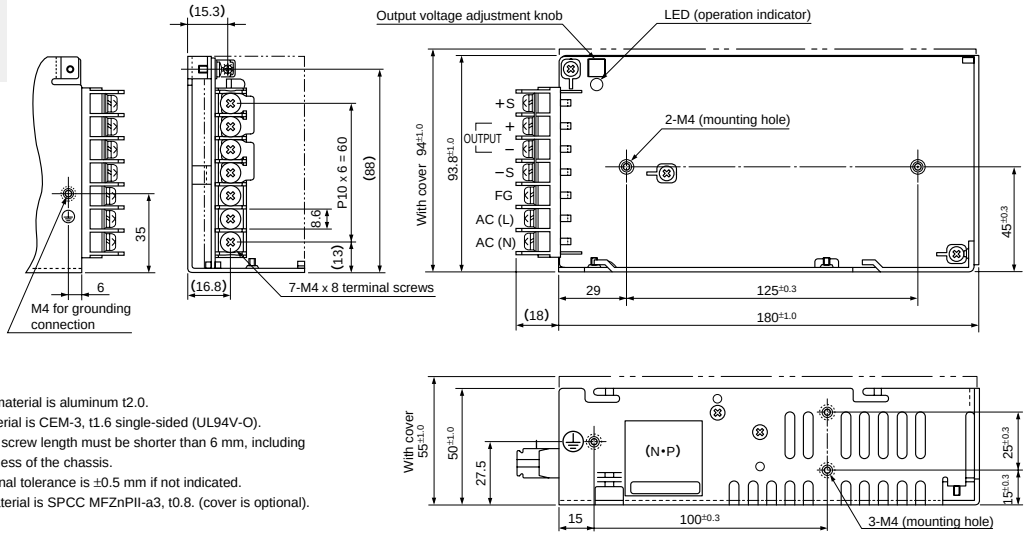
(1) Chassis material is aluminum t1.5.
(2) PCB material is CEM-3, t1.6 single-sided (UL94V-O).
(3) Mounting screw length must be shorter than 6 mm, including the thickness of the chassis. If the input/output terminal is connector type, the screw for grounding connection only must be less than 4 mm, including the thickness of the chassis.
(4) Dimensional tolerance is ±0.5 mm if not indicated.
(5) Cover material is SPCC MFZnPII-a3, t0.5. Cover can only be attached when the input/output terminal has screw terminal stand specification (cover is optional).
(6) Refer to the following figure when the input/output terminal is connector type.
(7) Refer to the following table for pin connections when the input/output terminal is connector type.



CN No.	Pin No.	Connection	Corresponding housing	Corresponding contact
CN1	1	AC (N)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2	N.C.		
	3	AC (L)		
	4	N.C.		
	5	FG		
CN2	1, 2, 3	OUTPUT −	VHR-6N (JST)	
	4, 5, 6	OUTPUT +		

100W (weight: 700 g)

Model
SWA100-05
SWA100-12
SWA100-15
SWA100-24



(1) Chassis material is aluminum t2.0.
(2) PCB material is CEM-3, t1.6 single-sided (UL94V-O).
(3) Mounting screw length must be shorter than 6 mm, including the thickness of the chassis.
(4) Dimensional tolerance is ±0.5 mm if not indicated.
(5) Cover material is SPCC MFZnPII-a3, t0.8. (cover is optional).

Specifications and Standards

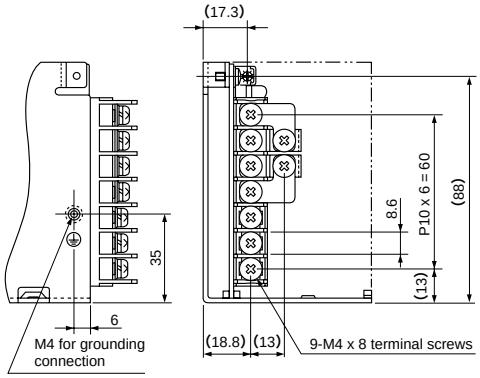
Model			150W			
			SWA150-05	SWA150-12	SWA150-15	SWA150-24
Input Conditions	Rated Input Voltage		100 V AC to 240 V AC or 110 V DC Note 4			
	Allowable Input Voltage Range		85 V AC to 264 V AC or 90 V DC to 165 V DC Note 4			
	Input Current (typ)		2.4A/1.7A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 63Hz			
	Power Factor (typ)		0.99/0.95			
	Efficiency (typ)		75%	77%	78%	79%
	Inrush Current (max) Note 1		20A/40A			
	Leakage Current (max)		0.5mA/0.75mA			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage ±10%			
	Rated Output Current Note 4		30A (24A)	13A (10A)	10A (8A)	6.5A (5.2A)
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		150W	156W	150W	156W
	Constant Voltage Accuracy		±3%			
	Ripple Noise Note 2		120mVp-p	180mVp-p	180mVp-p	240mVp-p
	Output Holding Time (min)		20msec			
	Startup time (typ)		1000/600msec			
Additional Functions	Overcurrent Protection		Detection approx. 120% of rated current			
	Overvoltage Protection		Detection from 115 to 145% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		provided			
	Operations Display		Red LED indicator			
Environmental Conditions	Operating Temperature Range		0 to +50°C			
	Storage Temperature Range		-25 to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation	Insulation Withstand Voltage	Between input and output	2000 V AC for 1 minute			
		Between input and FG				
		Between output and FG	500 V AC for 1 minute			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		65^{W} x 200^{D} x 93^{H} mm			
	Weight		950g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified			
	Conducted Emission		Designated to meet CISPR22 Class A and FCC Class B			
Options	Remote ON/OFF Control		Not provided			
	Cover		provided			

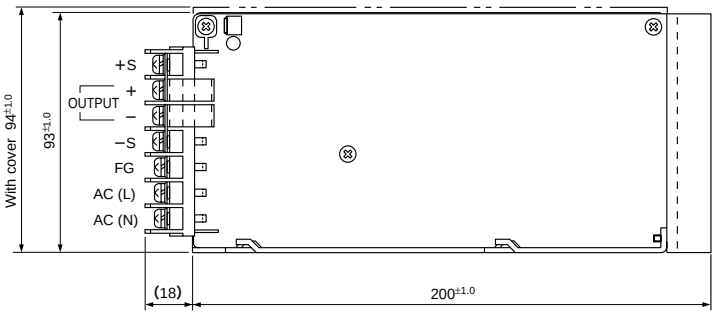
Note 1 At cold start. (More current than above noted value may flow at restart.)
Note 2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 3 All output characteristics are measured at the output connector.
Note 4 Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.
* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

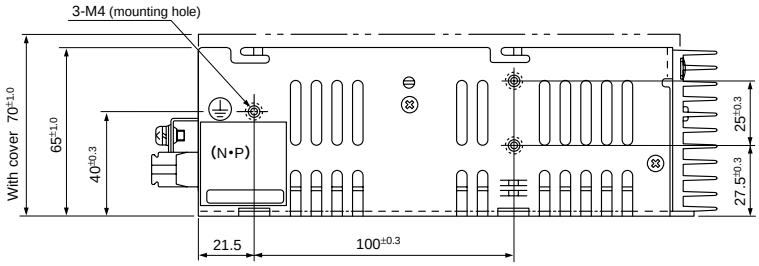
External Dimensions (unit: mm)

150W (weight: 900 g)

Model
SWA150-05
SWA150-12
SWA150-15
SWA150-24







(1) Chassis material is aluminum t2.0.
(2) PCB material is CEM-3, t1.6 single-sided (UL94V-O).
(3) Mounting screw length must be shorter than 6 mm, including the thickness of the chassis.
(4) Dimensional tolerance is ±0.5 mm if not indicated.
(5) Cover material is SPCC MFZnPII-a3, t0.8 (cover is optional).

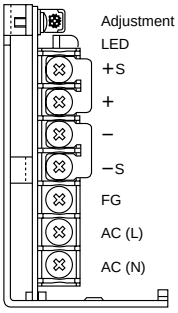
Option

Symbol at end of product name	Description	Application
None	Terminal stand type, without cover	All models
-C	Terminal stand type, with cover	All models
-CN ◆	Connector type, without cover	15W, 30W, 50W, 100W, 150W

◆Please contact Sanken for delivery time of connector type product in advance.

Operating Instruction

1 Terminal connection



Adjustment knob	**Output voltage adjustment knob**	Knob for changing output voltage
LED	**Operation indicator LED (red)**	Lights when output voltage is ON
+S	**+ side output sensing terminal**	Remove short bar and connect to + side of load when remote sensing
+	**+ side output terminal**	Connect to + side of load
−	**− side output terminal**	Connect to − side of load
−S	**− side output sensing terminal**	Remove short bar and connect to − side of load when remote sensing
FG	**Frame grounding**	Connect to grounding
~ L	**AC input terminal**	Connect to AC input (built-in fuse side)
~ N	**Connect to AC input**	Connect to AC input

(Note)
- There is a built-in fuse at the ~L side. Take care when connecting.
- +S and + are connected with a short bar, as are -S and -. Use as they are when not performing remote sensing.
- Output voltage at factory shipping is set to rated voltage. Use as they are when voltage readjustment is not needed.
- +S and -S terminals are not provided for 15-50 W models.
- Refer to the external diagram for terminal arrangement.

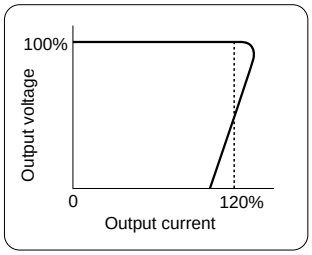
2 Input

You can use this power supply with input voltage of from 85 to 264 V without switching because of the wide input.
The 100W and 150W models are also equipped with a power-factor-correction circuit for wide input and small input current.
Avoid using this power supply in environments where large input changes occur frequently.

3 Setting output voltage

Output voltage may be adjusted using the output voltage adjustment knob. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

4 Overcurrent protection



The SWA series has an overcurrent protection function with drooping back characteristics. When the cause of the overload is removed, the output will automatically return to its normal voltage. Overcurrent is detected when the output current exceeds 105% of the rated current value (120% of the standard output value).
Avoid continuous operation with overload because it deteriorates the power supply and causes failure.

5 Overvoltage protection

If the output voltage increases for some reason, the output is shut off. To reset the overvoltage protection, turn off the power and wait about five minutes before turning the power on again.
This function may be activated when the voltage adjustment knob has turned clockwise up to the limit or sensing terminal are not connected securely (100W and 150W models). Take adequate precautions.

6 Mounting

Mount the power supply with space around so that there is sufficient air flow.
Derating is needed according to whether there is a cover or not as well as installation direction. Check before use.

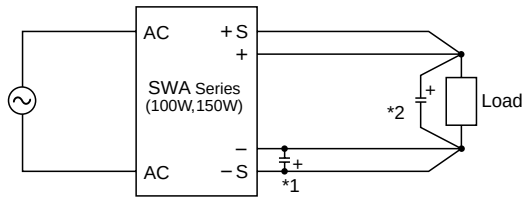
(1) Vertical mounting without cover:
Ambient temperature 0 to +50°C
/Output 100% (15 to 150 W)
(2) Vertical mounting with cover:
Ambient temperature 0 to +40°C
/Output 100% (15 to 150 W)
(3) Horizontal mounting without cover:
Ambient temperature 0 to +50°C
/Output 100% (15 to 150 W)
(4) Horizontal mounting with cover:
Ambient temperature 0 to +40°C
/Output 100% (15 to 150 W)

7 Inrush current limiting

The power supply is equipped with an inrush current limiting circuit. Since the 15W to 50W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. Take adequate precautions.
The 100W and 150W models are equipped with a limit resistor and a triac. They may also allow more current than that listed in the specifications at ON/OFF for a short period of time such as momentary power failure. Take adequate precautions.

8 Remote sensing

The SWA100W and 150W models are equipped with a remote sensing feature to guard against output load line drop. Use them with a line drop of 250 mV or less.



*1. Connect an electrolytic capacitor of about 10 μF.
*2. Connect an electrolytic capacitor of about 100 μF across the load.

9 Dynamic load variation

When using the supply with dynamic load variation, keep the minimum current about 1% of rated current.

10 Others

When an abnormality such as no output occurs, remove the load and check if screws are tight at the sensing part for turning adjustment knob. Then restart the power supply.

Please return malfunctioning units via the channel through which the unit was purchased.

Features world-wide input and active filter (PFC)

Ultra-compact general-purpose switching power supplies

SWC Series

50W 100W

Single output

With chassis

Acquired UL, CSA, and TÜV safety standards

SWC series are general-purpose switching power supplies that include Sanken Electric's original transformer and feature an optimum layout of heat sources to achieve an ultra-compact and ultra-light product.
As such, SWC Series switching power supplies contribute to the further miniaturization of computers and various other equipment.

Main applications

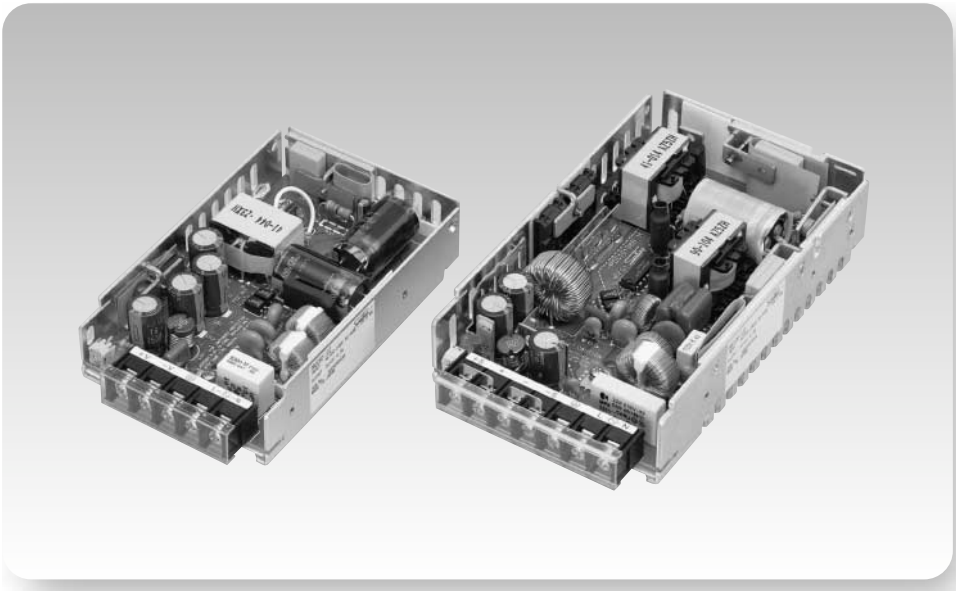
- **Computer-related equipment**
  Printer peripherals, terminals, ATMs, POS equipment, filing systems
- **Industrial equipment**
  Semiconductor manufacturing equipment, measuring instruments, test equipment, analytical tools, broadcasting equipment

Description of model name

SWC 050 - 24 - C

- SWC: Series name
- 050: Output power (050 : 50 W)
- 24: Output voltage (24 : 24 V)
- C: Option (C: Cover)

- **The industry's top ultra-compact series**
  This is the industry's smallest and lightest series - roughly half the size of Sanken's existing models. You can now get 100 W of power from units as small as conventional 50-W models.
- **World-wide input**
  Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- **Features active filter (PFC)** 100W model
  The 100 W model features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC61000-3-2).
- **Conducted emission**
  Complies with Class B standards under VCCI, FCC and EN55022.
- **Acquired CE mark for LVD (Low Voltage Directive)**
  Complies with CE mark standards set by the EU.
- **Acquired safety standards of a variety of countries**
  Complies with safety standards of a variety of countries, including UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000).



Free warrantee period: 2 years

Specifications and Standards

Model			50W			
			SWC050-3R3	SWC050-05	SWC050-12	SWC050-24
Input Conditions	Rated Input Voltage		AC100V to AC240V			
	Allowable Input Voltage Range		AC85 to 264V			
	Input Current (typ) Note 1		1.2A – 0.6A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Power Factor (typ)					
	Efficiency (typ) Note 1		73%	76%	80%	83%
	Inrush Current (max) Note 1 Note 2		30A/60A (at cold start)			
	Leakage Current (max) Note 1		0.5mA (V_{IN} = 120V)/0.75mA (V_{IN} = 240V)			
Output Conditions Note 3	Rated Output Voltage		3.3V	5V	12V	24V
	Output Voltage Variation Note 5		Rated output voltage ±10%			
	Rated Output Current		10A	10A	4.2A	2.1A
	Maximum Peak Current		——			
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		33W	50W	50.4W	50.4W
	Constant Voltage Accuracy Note 6		±3%			
	Ripple Noise Note 3 Note 4		80mVp-p	100mVp-p	100mVp-p	150mVp-p
	Output Holding Time (min) Note 1		16msec			
	Startup time (typ) Note 1		200msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (drooping automatic recovery)			
	Overvoltage Protection Note 7		Detection above 115% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		Not provided			
	Operations Display		Green LED indicator			
Environmental Conditions	Operating Temperature Range Note 8		-10°C to +60°C			
	Storage Temperature Range		-20°C to +85°C			
	Operating Humidity Range		30 to 90%			
	Storage Humidity Range		30 to 90%			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation Note 9	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand (connector is optional)			
	Output Type		Terminal stand (connector is optional)			
	External Dimensions		125^{W} x 80^{D} x 29^{H} mm			
	Weight		270g (typ)			
	Safety Standards		UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000) certified, designated to meet Electrical Appliance and Material Control Law			
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)			
	Harmonic Current		Immunity: Designated to meet IEC61000-4-2, 5			
Options	Remote ON/OFF Control		Not provided			
	Chassis		Provided as standard			
	Cover		Provided			
	Input/Output Connection	Terminal stand	Provided as standard			
		Connector	Provided			

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe. Specified under rated input/output conditions.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Derating for ambient temperature applies.
Note 9 Insulation conditions are specified at normal temperature and humidity.

Specifications and Standards

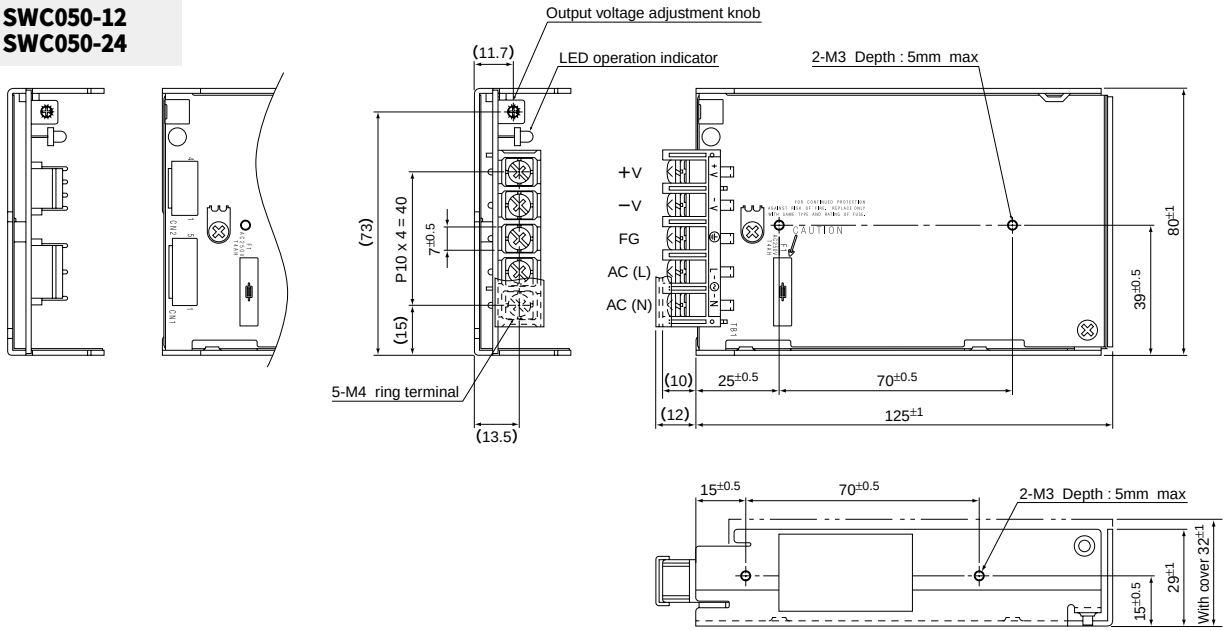
Model			100W			
			SWC100-3R3	SWC100-05	SWC100-12	SWC100-24
Input Conditions	Rated Input Voltage		AC100V to AC240V			
	Allowable Input Voltage Range		AC85 to 264V			
	Input Current (typ) Note1		1.6A – 0.6A			
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 63Hz			
	Power Factor (typ)		0.99/0.95			
	Efficiency (typ) Note1		72%	77%	81%	82%
	Inrush Current (max) Note1 Note2		30A/60A (at cold start)			
	Leakage Current (max) Note1		0.5mA (V_{IN} = 120V)/0.75mA (V_{IN} = 240V)			
Output Conditions Note3	Rated Output Voltage		3.3V	5V	12V	24V
	Output Voltage Variation Note5		Rated output voltage ±10%			
	Rated Output Current		20A	20A	8.5A	4.5A
	Maximum Peak Current		100%max			
	Allowable Output Current Range		0 to 100%			
	Rated Output Power		66W	100W	102W	108W
	Constant Voltage Accuracy Note6		±3%			
	Ripple Noise Note3 Note4		80mVp-p	100mVp-p	100mVp-p	100mVp-p
	Output Holding Time (min) Note1		20msec			
	Startup time (typ) Note1		500msec			
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (drooping automatic recovery)			
	Overvoltage Protection Note7		Detection above 115% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control		Not provided			
	Remote Sensing		provided			
	Operations Display		Green LED indicator			
Environmental Conditions	Operating Temperature Range Note8		-10°C to +60°C			
	Storage Temperature Range		-20°C to +85°C			
	Operating Humidity Range		30 to 90%			
	Storage Humidity Range		30 to 90%			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation Note9	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)			
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		150^{W} x 93^{D} x 34^{H} mm			
	Weight		500g (typ)			
	Safety Standards		UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000) certified, designated to meet Electrical Appliance and Material Control Law			
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)			
	Harmonic Current		Harmonic current: Designated to meet IEC61000-3-2			
			Immunity: Designated to meet IEC61000-4-2, 5			
Options	Remote ON/OFF Control		Not provided			
	Chassis		Provided as standard			
	Cover		provided			
	Input/Output Connection	Terminal stand	Provided as standard			
		Connector	Not provided			

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe. Specified under rated input/output conditions.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 7 Reset is performed by reapplying input voltage.
Note 8 Derating for ambient temperature applies.
Note 9 Insulation conditions are specified at normal temperature and humidity.

External Dimensions (unit: mm)

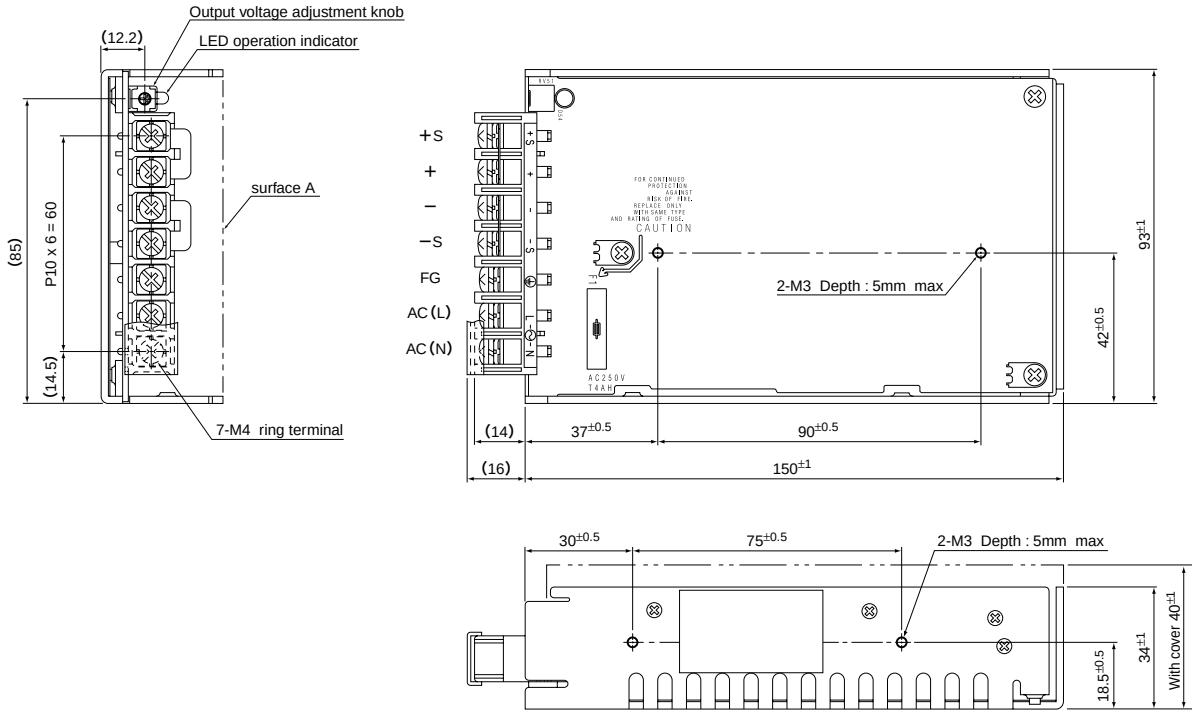
50W (weight: 270 g)

Model
SWC050-3R3
SWC050-05
SWC050-12
SWC050-24



100W (weight: 500 g)

Model
SWC100-3R3
SWC100-05
SWC100-12
SWC100-24



Operating Instruction

1 Terminal connection

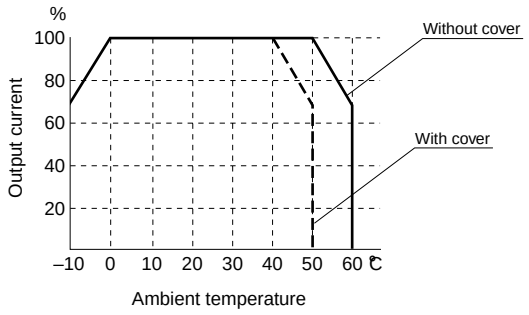
SWC050

Symbol		Pin No.	Function	Connector	Corresponding connector	Corresponding contact
Connector	CN1	1	AC (N)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
		2	NC			
		3	AC (L)			
		4	NC			
		5	FG			
	CN2	1 to 2	−	B4P-VH (JST)	VHR-4N (JST)	SVH-21T-P1.1 (JST)
		3 to 4	+			
Terminal stand	TB1	AC (N)	AC (N)			
		AC (L)	AC (L)			
		⏚ or G	FG			
		−	−			
		+	+			

SWC100

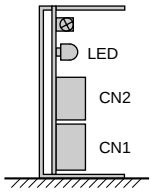
Symbol		Pin	Function
Terminal stand	TB1	+S	+S side output sensing (+ remote sensing)
		+	+output
		−	−output
		−S	−S side output sensing (− remote sensing)
		FG	⏚
		AC (L)	AC (L)
		AC (N)	AC (N)

2 Derating of output current

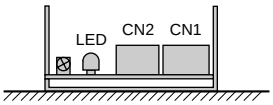


3 Mounting

SWC050

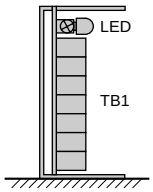


Vertical mounting

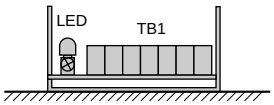


Horizontal mounting

SWC100



Vertical mounting



Horizontal mounting

Features world-wide input and active filter (PFC)

Supports peak current

SWD Series

60W 100W 150W 240W

Single output

With chassis

Acquired UL, CSA (C-UL), and SEMKO safety standards

- **Supports 2.5x peak current**
  Supports top-class peak current: 2.5 times the rated current (within 15 seconds)*.
  This helps save space and lower costs for power supplies in equipment sets.
  * (2.0 times in 240 W model).
- **World-wide input**
  Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- **Full-fledged lineup**
  With four models for up to 240 W of output power, the SWD Series provides a full lineup to meet a wide range of needs.
- **Features active filter (PFC)**
  SWD series features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC-61000-3-2).
- **Conducted emission**
  Complies with Class B standards under VCCI, FCC, and EN55022.
- **Acquired CE mark for LVD (Low Voltage Directive)**
  Complies with CE mark standards set by the EU.
- **Acquired safety standards of a variety of countries**
  Complies with safety standards of a variety of countries, including UL1950, CSA950 (C-UL), and EN60950.

applications

- **Mechatronics products (motors, solenoids, etc.)**
- **Equipment that uses thermal heads**

Examples: Ticket dispensers, card readers, POS terminals, ATMs, change machines, bill and coin counters, scales, printers, printing press, and other industrial equipment

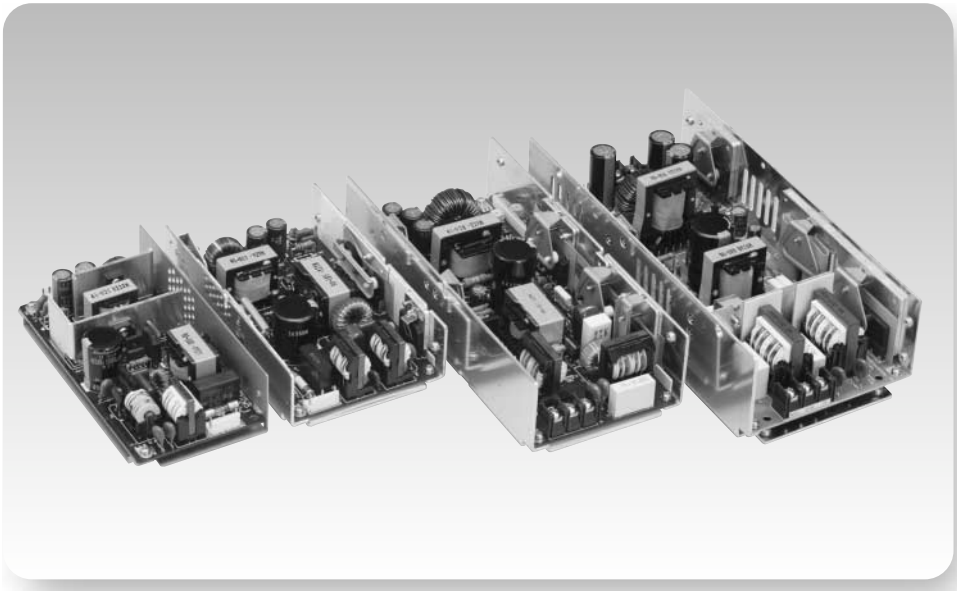
Options

- **Cover (with derating)**
- **Remote ON/OFF control (available for 150 and 240 W models)**

Description of model name

SWD 150P - 24 - R- C

- SWD: Series name
- 150P: Output power (150: 150 W)
- 24: Output voltage (24: 24 V)
- R: Option (R: With remote ON/OFF control)
- C: Option (C: With cover)



Free warrantee period: 2 years

Specifications and Standards

Model			60W
			SWD060P-24
Input Conditions	Rated Input Voltage		AC100V to AC240V
	Allowable Input Voltage Range		AC85 to 264V
	Input Current (typ) Note 1		0.9A (V_{IN} = 100V)
	Rated Frequency		50/60Hz
	Allowable Frequency Range		47 to 63Hz
	Power Factor (typ) Note 1		0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)
	Efficiency (typ) Note 1		80%
	Inrush Current (max) Note 2		15A (V_{IN} = 100V)/30A (V_{IN} = 240V)
	Leakage Current (max) Note 1		0.75mA (V_{IN} = 240V)
Output Conditions Note 3	Rated Output Voltage		24V
	Output Voltage Variation		Fixed
	Rated Output Current		2.5A
	Maximum Peak Current Note 8		6.0 A (within 15 sec)
	Allowable Output Current Range		0 to 6.0A
	Rated Output Power		60W
	Constant Voltage Accuracy Note 5		±5%
	Ripple Noise Note 1 Note 4		240mVp-p
	Output Holding Time (min) Note 1		60msec
	Startup time (typ)		1000msec
Additional Functions	Overcurrent Protection		Detection above 105% of maximum peak current (drooping automatic recovery)
	Overvoltage Protection Note 6		Detection above 115% of rated voltage (output cutoff)
	Overheating Protection		Not provided
	Remote Sensing		Not provided
	Operations Display		Not provided
Environmental Conditions	Operating Temperature Range		-10°C to +60°C
	Storage Temperature Range		-25°C to +85°C
	Operating Humidity Range		30 to 90%
	Storage Humidity Range		30 to 90%
	Cooling Requirements		Natural air cooling
	Vibration Resistance	No. of vibrations	10 to 55Hz
		Sweep time	3 minutes
		Acceleration rate	19.6m/s² (2G)
		Vibration direction	X, Y, Z
		Vibration time	One hour in each of three directions
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
	Installation Conditions		Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)
Insulation Note 7	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)
		Between input and FG	
		Between output and FG	
External Structure/ Standards	External Appearance		With chassis
	Input Type		Connector
	Output Type		Connector
	External Dimensions		160^{W} x 80^{D} x 40^{H} mm
	Weight		500g
	Safety Standards		UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)
	Harmonic Current		Harmonic current: Designated to meet IEC61000-3-2
			Immunity: Designated to meet IEC61000-4-2, 5
Options	Remote ON/OFF Control		Not provided
	Cover		Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.

Specifications and Standards

Model			100W SWD100P-24
Input Conditions	Rated Input Voltage		AC100V to AC240V
	Allowable Input Voltage Range		AC85 to 264V
	Input Current (typ) Note 1		1.5A (V_{IN} = 100V)
	Rated Frequency		50/60Hz
	Allowable Frequency Range		47 to 63Hz
	Power Factor (typ) Note 1		0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)
	Efficiency (typ) Note 1		80%
	Inrush Current (max) Note 2		15A (V_{IN} = 100V)/30A (V_{IN} = 240V)
	Leakage Current (max) Note 1		0.75mA (V_{IN} = 240V)
Output Conditions Note 3	Rated Output Voltage		24V
	Output Voltage Variation		Fixed
	Rated Output Current		4.0A
	Maximum Peak Current Note 8		10.0 A (within 15 sec)
	Allowable Output Current Range		0 to 10.0A
	Rated Output Power		96W
	Constant Voltage Accuracy Note 5		±5%
	Ripple Noise Note 1 Note 4		240mVp-p
	Output Holding Time (min) Note 1		60msec
	Startup time (typ)		1000msec
Additional Functions	Overcurrent Protection		Detection above 105% of maximum peak current (drooping automatic recovery)
	Overvoltage Protection Note 6		Detection above 115% of rated voltage (output cutoff)
	Overheating Protection		Not provided
	Remote Sensing		Not provided
	Operations Display		Not provided
Environmental Conditions	Operating Temperature Range		-10°C to +60°C
	Storage Temperature Range		-25°C to +85°C
	Operating Humidity Range		30 to 90%
	Storage Humidity Range		30 to 90%
	Cooling Requirements		Natural air cooling
	Vibration Resistance	No. of vibrations Note 9	10 to 55Hz
		Sweep time	3 minutes
		Acceleration rate	19.6m/s² (2G)
		Vibration direction	X, Y, Z
		Vibration time	One hour in each of three directions
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
	Installation Conditions		Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)
Insulation Note 7	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)
		Between input and FG	
		Between output and FG	
External Structure/ Standards	External Appearance		With chassis
	Input Type		Connector
	Output Type		Connector
	External Dimensions		160^{W} x 98^{D} x 40^{H} mm
	Weight		650g
	Safety Standards		UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)
	Harmonic Current		Harmonic current: Designated to meet IEC61000-3-2
			Immunity: Designated to meet IEC61000-4-2, 5
Options	Remote ON/OFF Control		Not provided
	Cover		Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.
Note 9 When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).

Specifications and Standards

Model	150W
	SWD150P-24
Input Conditions	
Rated Input Voltage	AC100V to AC240V
Allowable Input Voltage Range	AC85 to AC264V
Input Current (typ) Note 1	1.9A (V_{IN} = 100V)
Rated Frequency	50/60Hz
Allowable Frequency Range	47 to 63Hz
Power Factor (typ) Note 1	0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)
Efficiency (typ) Note 1	80%
Inrush Current (max) Note 2	20A (V_{IN} = 100V)/40A (V_{IN} = 240V)
Leakage Current (max) Note 1	0.75mA (V_{IN} = 240V)
Output Conditions Note 3	
Rated Output Voltage	24V
Output Voltage Variation	Fixed
Rated Output Current	6.0A
Maximum Peak Current Note 8	15.0 A (within 15 sec)
Allowable Output Current Range	0 to 15.0A
Rated Output Power	144W
Constant Voltage Accuracy Note 5	±5%
Ripple Noise Note 1 Note 4	400mVp-p
Output Holding Time (min) Note 1	60msec
Startup time (typ)	1000msec
Additional Functions	
Overcurrent Protection	Detection above 105% of maximum peak current (drooping automatic recovery)
Overvoltage Protection Note 6	Detection above 115% of rated voltage (output cutoff)
Overheating Protection	Not provided
Remote Sensing	Not provided
Operations Display	Not provided
Environmental Conditions	
Operating Temperature Range	-10°C to +60°C
Storage Temperature Range	-25°C to +85°C
Operating Humidity Range	30 to 90%
Storage Humidity Range	30 to 90%
Cooling Requirements	Natural air cooling
Vibration Resistance — No. of vibrations	10 to 55Hz
Vibration Resistance — Sweep time	3 minutes
Vibration Resistance — Acceleration rate	19.6m/s² (2G)
Vibration Resistance — Vibration direction	X, Y, Z
Vibration Resistance — Vibration time	One hour in each of three directions
Shock Resistance	98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
Installation Conditions	Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)
Insulation Note 7	
Insulation Withstand Voltage — Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)
Insulation Resistance — Between input and output	100 MΩ (measured with 500 V DC Megger)
Insulation Resistance — Between input and FG	
Insulation Resistance — Between output and FG	
External Structure/ Standards	
External Appearance	With chassis
Input Type	Terminal stand
Output Type	Connector
External Dimensions	220^{W} x 98^{D} x 52^{H} mm
Weight	950g
Safety Standards	UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law
Conducted Emission	Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)
Harmonic Current	Harmonic current: Designated to meet IEC61000-3-2
	Immunity: Designated to meet IEC61000-4-2, 5
Options	
Remote ON/OFF Control	Provided
Cover	Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.

Specifications and Standards

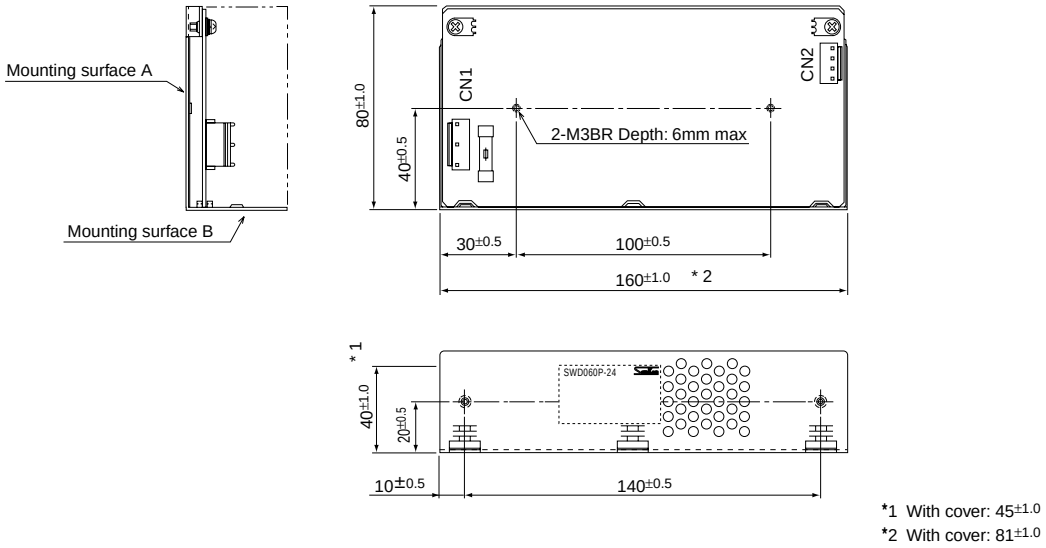
Model			240W
			SWD240P-24
Input Conditions	Rated Input Voltage		AC100V to AC240V
	Allowable Input Voltage Range		AC85 to 264V
	Input Current (typ) Note 1		4.0A (V_{IN} = 100V)
	Rated Frequency		50/60Hz
	Allowable Frequency Range		47 to 63Hz
	Power Factor (typ) Note 1		0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)
	Efficiency (typ) Note 1		80%
	Inrush Current (max) Note 2		20A (V_{IN} = 100V)/40A (V_{IN} = 240V)
	Leakage Current (max) Note 1		0.75mA (V_{IN} = 240V)
Output Conditions Note 3	Rated Output Voltage		24V
	Output Voltage Variation		Fixed
	Rated Output Current		10.0A
	Maximum Peak Current Note 8		20.0 A (within 15 sec)
	Allowable Output Current Range		0 to 20.0A
	Rated Output Power		240W
	Constant Voltage Accuracy Note 5		±5%
	Ripple Noise Note 1 Note 4		400mVp-p
	Output Holding Time (min) Note 1		60msec
	Startup time (typ)		1000msec
Additional Functions	Overcurrent Protection		Detection above 105% of maximum peak current (drooping automatic recovery)
	Overvoltage Protection Note 6		Detection above 115% of rated voltage (output cutoff)
	Overheating Protection		Not provided
	Remote Sensing		Not provided
	Operations Display		Not provided
Environmental Conditions	Operating Temperature Range		-10°C to +60°C
	Storage Temperature Range		-25°C to +85°C
	Operating Humidity Range		30 to 90%
	Storage Humidity Range		30 to 90%
	Cooling Requirements		Natural air cooling
	Vibration Resistance	No. of vibrations	10 to 55Hz
		Sweep time	3 minutes
		Acceleration rate	19.6m/s² (2G)
		Vibration direction	X, Y, Z
		Vibration time	One hour in each of three directions
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
	Installation Conditions		Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)
Insulation Note 7	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)
		Between output and FG	500 V AC for 1 minute (leakage current: 15 mA or less)
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)
		Between input and FG	
		Between output and FG	
External Structure/ Standards	External Appearance		With chassis
	Input Type		Terminal stand
	Output Type		Terminal stand
	External Dimensions		240^{W} x 110^{D} x 65^{H} mm
	Weight		1200g
	Safety Standards		UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)
	Harmonic Current		Harmonic current: Designated to meet IEC61000-3-2
			Immunity: Designated to meet IEC61000-4-2, 5
Options	Remote ON/OFF Control		Provided
	Cover		Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.

External Dimensions (unit: mm)

60W (weight: 500 g)

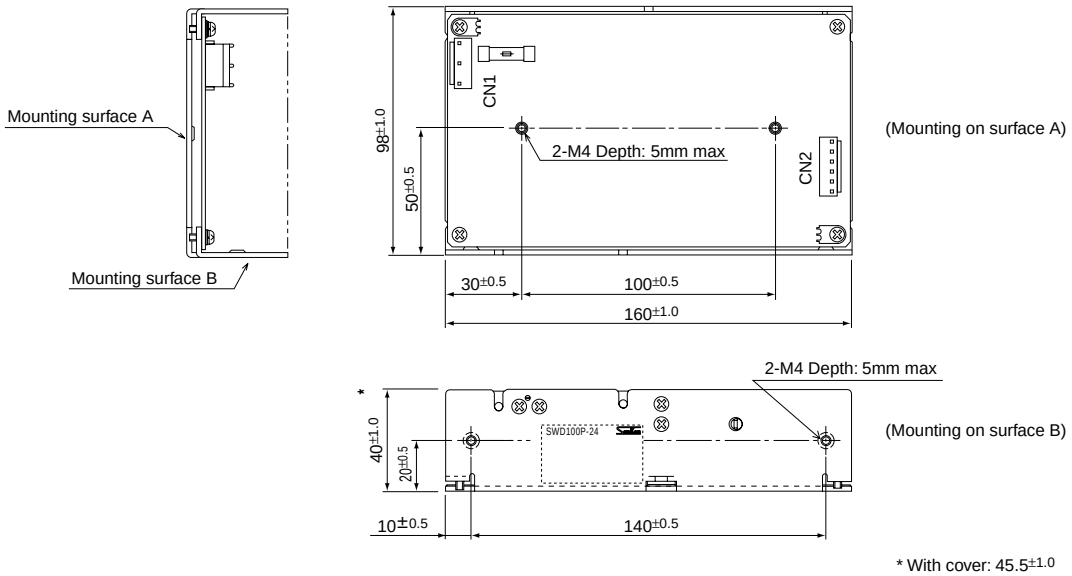
Model
SWD060P-24



*1 With cover: 45±1.0
*2 With cover: 81±1.0

100W (weight: 650 g)

Model
SWD100P-24

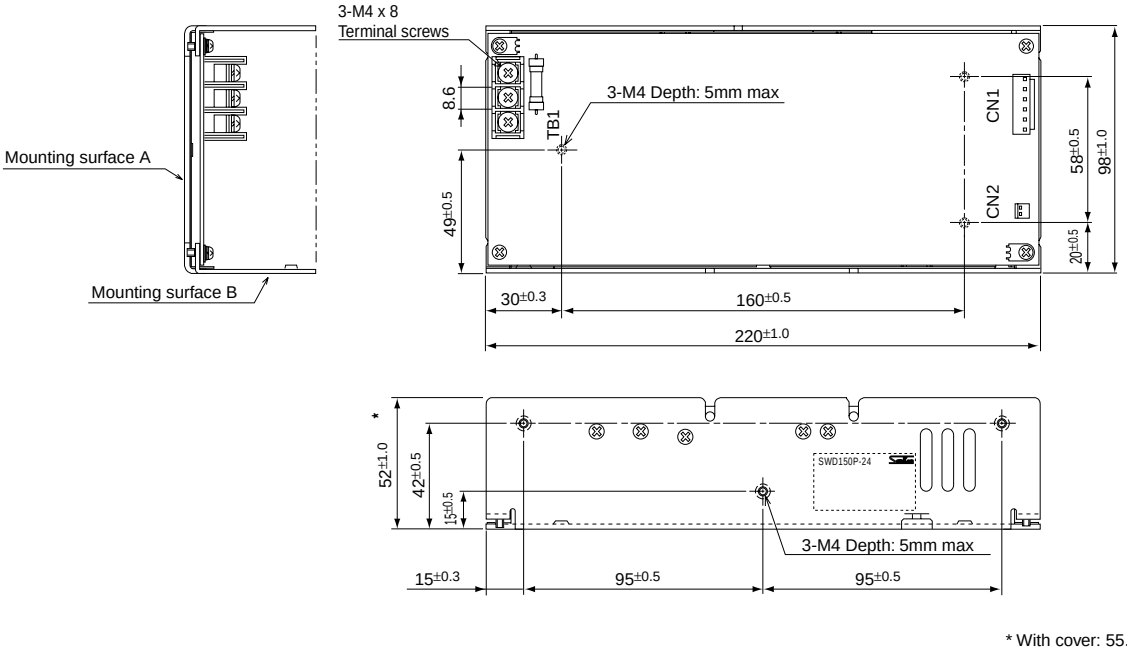


* With cover: 45.5±1.0

External Dimensions (unit: mm)

150W (weight: 950 g)

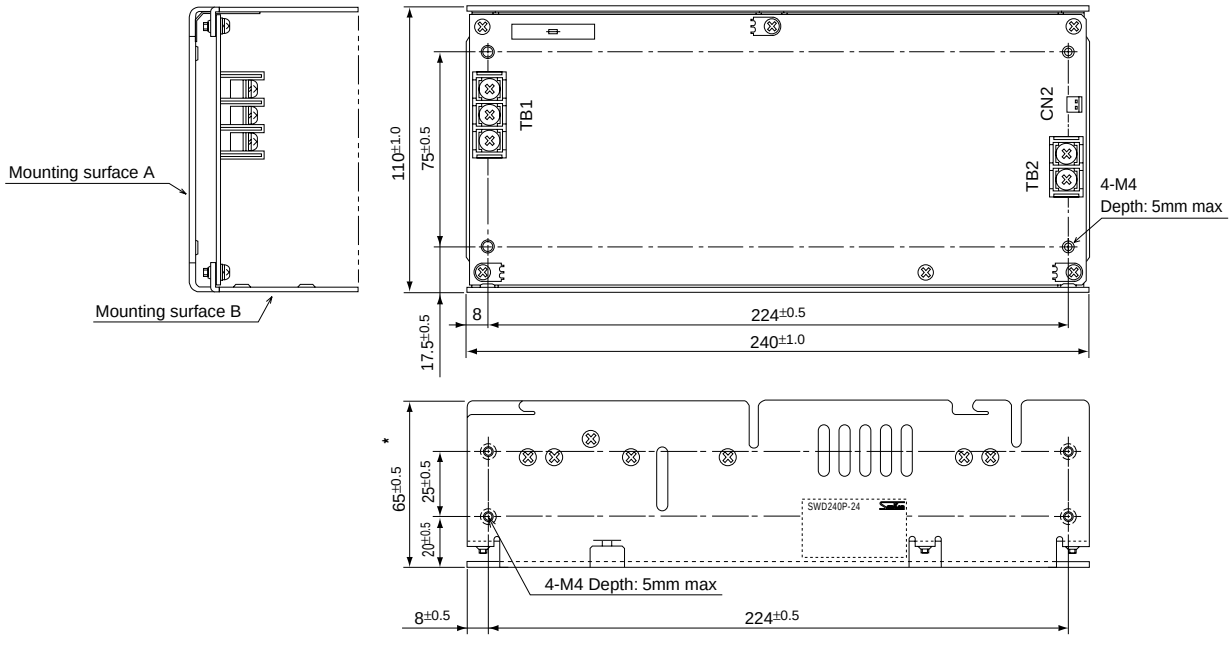
Model
SWD150P-24



* With cover: 55.0±1.0

240W (weight: 1200 g)

Model
SWD240P-24



* With cover: 65.8±1.0

Operating Instruction

1 Terminal connection

Input/output connectors

SWD060P-24

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1: AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2: NC			
	3: AC (NEUTRAL)			
	4: NC			
	5: FG			
CN2	1: +	B4P-VH (JST)	VHR-4N (JST)	SVH-21T-P1.1 (JST)
	2: +			
	3: −			
	4: −			

SWD100P-24

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1: AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2: NC			
	3: AC (NEUTRAL)			
	4: NC			
	5: FG			
CN2	1: +	B6P-VH (JST)	VHR-6N (JST)	SVH-21T-P1.1 (JST)
	2: +			
	3: +			
	4: −			
	5: −			
	6: −			

SWD150P-24

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
TB1	1: AC (LIVE)	M110D-3C (Morimatsu) or equivalent	M4 terminals	
	2: AC (NEUTRAL)			
	3: FG			
CN1	1: +	B6P-VH (JST)	VHR-6N (JST)	SVH-21T-P1.1 (JST)
	2: +			
	3: +			
	4: −			
	5: −			
	6: −			
CN2	1: RC+	B2P-SHF-1AA (JST)	H2P-SHF-AA (JST)	SHF-001T-0.8SS (JST)
	2: RC−			

CN2 is open on standard model

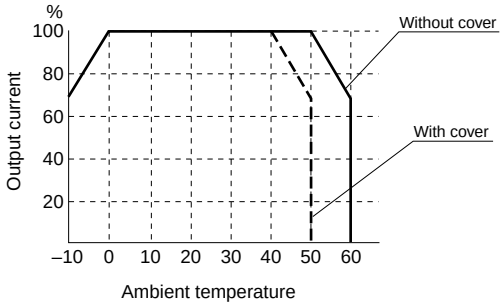
SWD060P-24

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
TB1	1: AC (LIVE)	M110D-3C (Morimatsu) or equivalent	M4 terminals	
	2: AC (NEUTRAL)			
	3: FG			
TB2	1: +	M110D-2C (Morimatsu) or equivalent	M4 terminals	
	2: −			
CN2	1: RC+	B2P-SHF-1AA (JST)	H2P-SHF-AA (JST)	SHF-001T-0.8SS (JST)
	2: RC−			

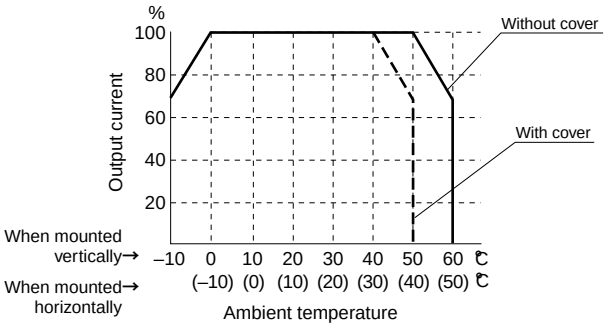
CN2 is open on standard model

2 Derating of output current

SWD060P-24
SWD100P-24
SWD150P-24



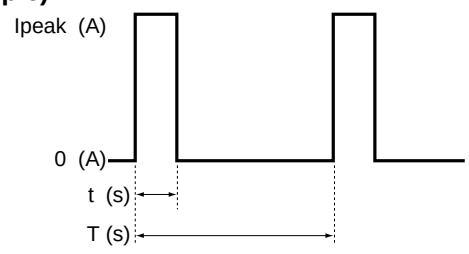
SWD240P-24



3 Dynamic load

The peak current load occurs within 15 seconds. This series can also be used with dynamic (pulse) load. During dynamic operation, use the supply with the output current's RMS value equal to or less than the rated current.

(Example)

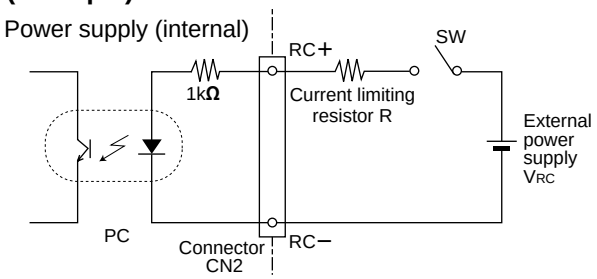


$$\text{RMS value } I_{rms} = \sqrt{\frac{\text{Peak current time } t}{\text{Cycle time } T}} \times \text{Peak current value } I_{peak}$$

4 Remote ON/OFF control (optional) SWD150P SWD240P

The SWD150P and SWD240P models enable remote ON/OFF control. However, this function requires the use of a DC power supply external to the SWD series power supply. Output goes ON when a voltage from 4.5 to 5.5 V (recommended current is 5 mA) is applied between the RC+ and RC- connectors (connector CN2's pins 1 and 2) for remote ON/OFF control. Output goes OFF when the voltage drops below 0.8 V or is discharged. If the external power supply's voltage is too high, insert a current limiting resistor.

(Example)



$$\text{Current limiting resistor } R = \frac{V_{RC} - 1V - 1k\Omega \times 5mA}{5mA}$$

(PC's forward drop = 1 V)

* Use twisted or shielded wires to prevent noise induction.
* The remote ON/OFF control circuit is insulated from the input, output, and FG.

Ultra-compact, long life, high reliability, harmonic current control, resonant-mode switching power supply

HWA Series

50W 100W 150W 300W 600W

Single output

With chassis and cover

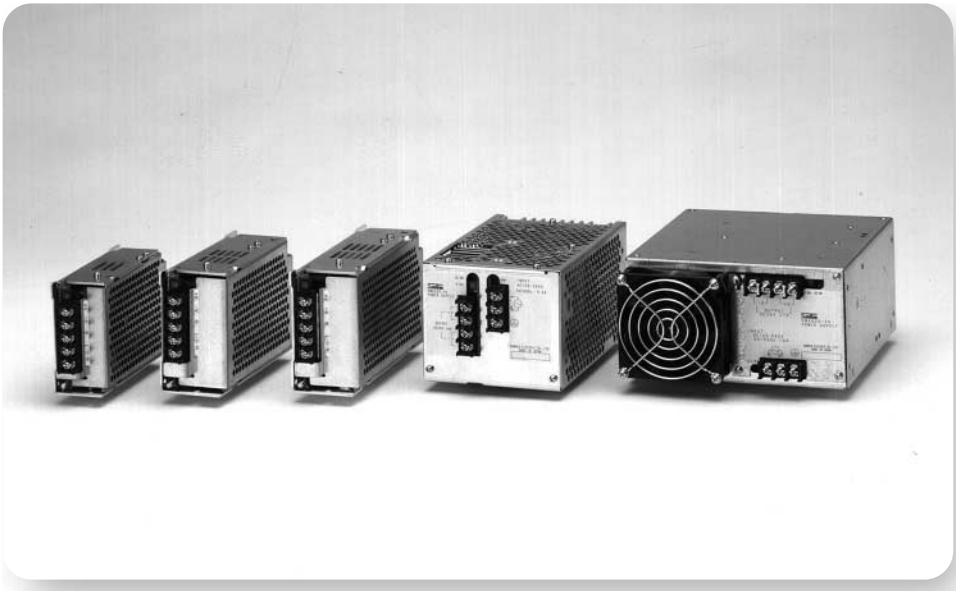
Acquired UL, CSA, and VDE safety standards

The HWA Series is an ultra-compact and reliable power supply with high efficiency, low noise and long life using proprietary Soft-switching Multi-resonant Zero-cross (SMZ) type resonant-mode circuits; resonant-mode power IC and resonant-mode transformer.

Applications

Industrial equipment such as factory automation controllers, power/plant controllers and semiconductor manufacturing equipment

- **World-wide input range**
  (85 to 264 V AC)
- **Long life and high reliability**
- **CE mark compatible**
- **Conforms to harmonic current regulations (EN61000-3-2)**
- **Conforms to EMI regulations**
  (electrical field emissions, conducted emission EN5081-1, FCC Class B)
- **Complies with immunity regulations**
  (EN61000-4 related)
- **Complies with Machinery Directive**
  (VDE0160, UL508)
- **Natural air cooling**
  (50 W to 300 W models)
- **Ultra-compact model**
  (Up to 42% smaller than our existing products)
- **Parallel operation**
  Possible by adjusting overcurrent protection (OCP) setting knob (HWA300W, 600W)
- **DIN rail**



Free warrantee period: 3 years

HWA Series

50W,100W,150W,300W,600W

Specifications and Standards

Model			50W		
			HWA050-05-C	HWA050-12-C	HWA050-24-C
Input Conditions	Rated Input Voltage		AC100V to AC240V		
	Allowable Input Voltage Range		AC85 to 264V		
	Input Current (typ) Note 1		0.9A/0.45A		
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 63Hz		
	Power Factor (typ)		0.95 (V_{IN} = 100V, Load = 100%)		
	Efficiency (typ) Note 1		83%	84%	84%
	Inrush Current (max) Note 1		25A/50A (at 25°C cold start)		
	Leakage Current (max) Note 1		0.5mA/1.0mA		
Output Conditions	Rated Output Voltage		5V	12V	24V
	Output Voltage Variation		-5% to +10%		
	Rated Output Current		10A	4.2A	2.1A
	Allowable Output Current Range		0 to 100%		
	Rated Output Power		50W	50.4W	50.4W
	Ripple Noise		100mVp-p	240mVp-p	480mVp-p
	Output Holding Time (min)		20msec		
	Startup Time (max)		1000msec		
Additional Functions	Overcurrent Protection Note 2		Provided		
	Overvoltage Protection		Provided		
	Overheating Protection		Not provided		
	Remote ON/OFF Control		Not provided		
	Remote Sensing		Not provided		
	Operations Display		Green LED indicator		
Environmental Conditions	Operating Temperature Range		-10 to +55°C		
	Storage Temperature Range		-25 to +65°C		
	Operating Humidity Range		25 to 85%		
	Storage Humidity Range		25 to 85%		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	Single-sided amplitude: 0.75 mm		
		Vibration direction	X, Y, Z		
		Vibration time	Eight minutes in each of three directions		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute		
		Between input and FG	2200 V AC for 1 minute		
		Between output and FG	1000 V AC for 1 minute		
	Insulation Resistance	Between input and output	10 MΩ or above		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		With chassis and cover		
	Input Type		Terminal stand		
	Output Type		Terminal stand		
	External Dimensions		40^{W} x 127^{D} x 85^{H} mm		
	Weight		420g		
	Safety Standards Note 3		UL1950, UL1012, UL508, CSA No. 950, VDE (EN60950), and VDE0160 certified		
	Conducted Emission		Designated to meet FCC Class B and EN50081-1		
	EMC		Designated to meet EN55022, EN61000-4 and EN61000-3-2		
Options	Remote ON/OFF Control		Not provided		
	Cover		Provided as standard		

Note 1 Regulated at rated input voltage (100/200 V AC), 100% load.

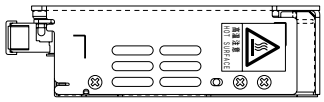
Note 2 Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

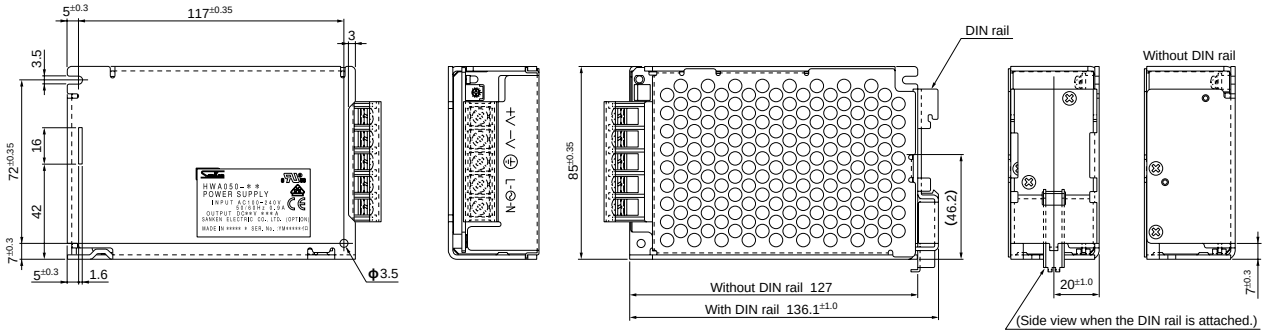
Note 3 CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

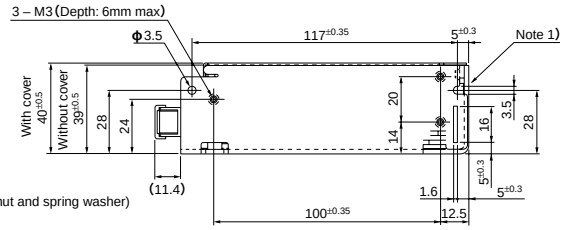
External Dimensions (unit: mm)

50W (weight: 420g)

Model
HWA050-05-C
HWA050-12-C
HWA050-24-C







Note
1) The height of a screw head for installation should be 4.5 mm max.
2) The screw head for connecting I/O pin is M4 x 8 (with square screw nut and spring washer)
3) The figures in parentheses show reference sizes.

Specifications and Standards

Model			100W	150W
			HWA100-24-C	HWA150-24-C
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note 1		1.8A/0.9A	2.7A/1.4A
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ)		0.95 (V_{IN} = 100V, Load = 100%)	
	Efficiency (typ) Note 1		84%	
	Inrush Current (max) Note 1		25A/50A (at 25°C cold start)	
	Leakage Current (max) Note 1		0.5mA/1.0mA	
Output Conditions	Rated Output Voltage		24V	
	Output Voltage Variation		-5% to +10%	
	Rated Output Current		4.2A	6.5A
	Allowable Output Current Range		0 to 100%	
	Rated Output Power		100.8W	156W
	Ripple Noise		480mVp-p	
	Output Holding Time (min)		20msec	
	Startup Time (max)		1000msec	
Additional Functions	Overcurrent Protection Note 2		Provided	
	Overvoltage Protection		Provided	
	Overheating Protection		Not provided	
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Green LED indicator	
Environmental Conditions	Operating Temperature Range		-10 to +55°C	
	Storage Temperature Range		-25 to +65°C	
	Operating Humidity Range		25 to 85%	
	Storage Humidity Range		25 to 85%	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	Single-sided amplitude: 0.75 mm	
		Vibration direction	X, Y, Z	
		Vibration time	Eight minutes in each of three directions	
	Installation Conditions		Derating may be required due to mounting direction	
Insulation	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute	
		Between input and FG	2200 V AC for 1 minute	
		Between output and FG	1000 V AC for 1 minute	
	Insulation Resistance	Between input and output	10 MΩ or above	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		With chassis and cover	
	Input Type		Terminal stand	
	Output Type		Terminal stand	
	External Dimensions		50^{W} x 145^{D} x 92^{H} mm	50^{W} x 163^{D} x 92^{H} mm
	Weight		600g	900g
	Safety Standards Note 3		UL1950, UL1012, UL508, CSA No. 950, VDE (EN60950), and VDE0160 certified	
	Conducted Emission		Designated to meet FCC Class B and EN50081-1	
	EMC		Designated to meet EN55022, EN61000-4 and EN61000-3-2	
Options	Remote ON/OFF Control		Not provided	
	Cover		Provided as standard	

Note 1 Regulated at rated input voltage (100/200 V AC), 100% load.

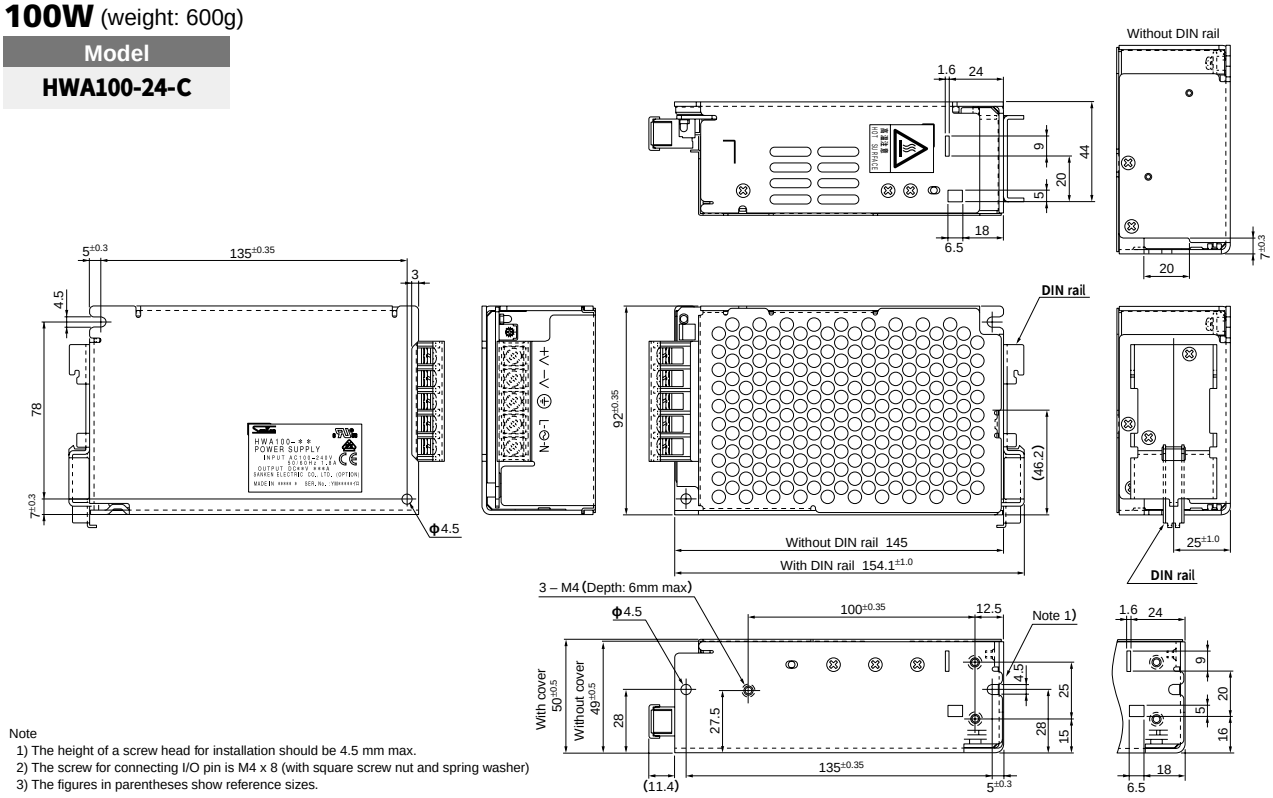
Note 2 Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

Note 3 CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

External Dimensions (unit: mm)

100W (weight: 600g)

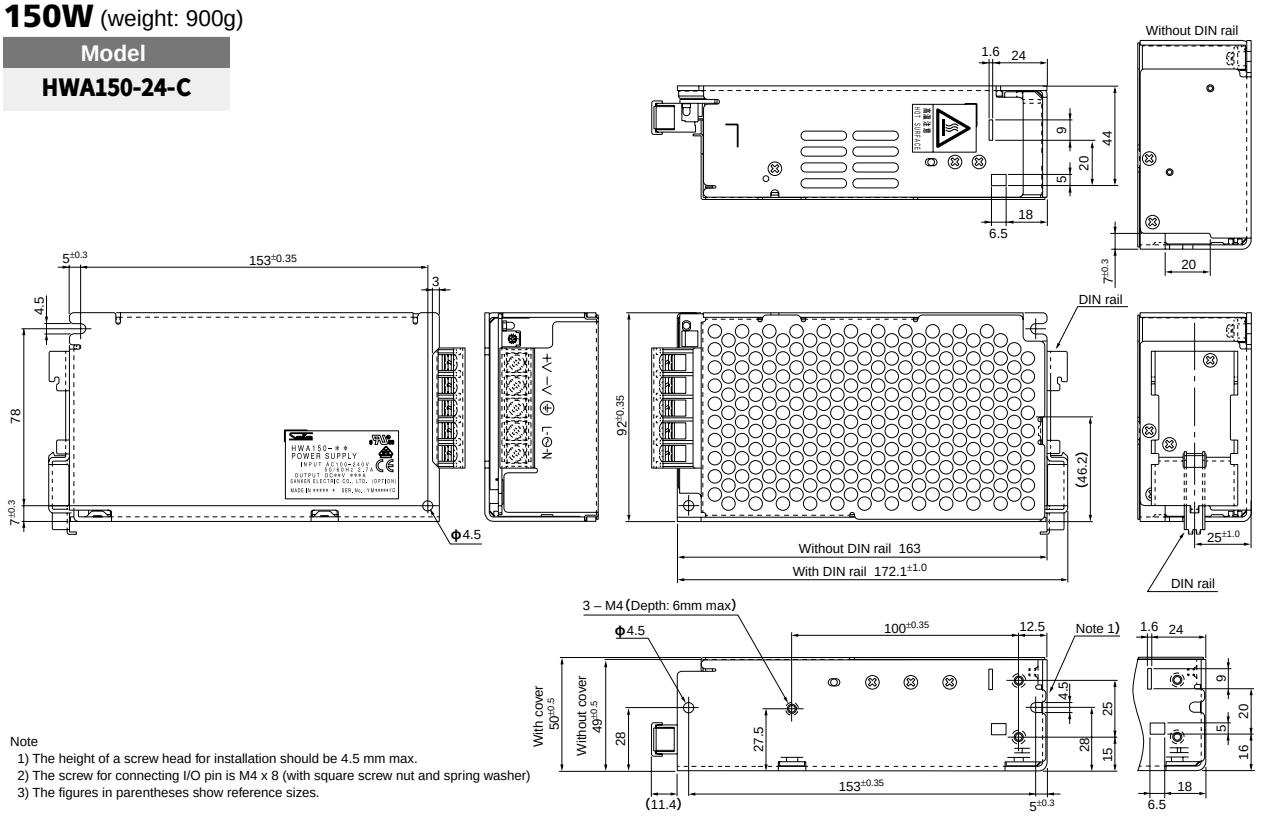
Model
HWA100-24-C



Note
1) The height of a screw head for installation should be 4.5 mm max.
2) The screw for connecting I/O pin is M4 x 8 (with square screw nut and spring washer)
3) The figures in parentheses show reference sizes.

150W (weight: 900g)

Model
HWA150-24-C



Note
1) The height of a screw head for installation should be 4.5 mm max.
2) The screw for connecting I/O pin is M4 x 8 (with square screw nut and spring washer)
3) The figures in parentheses show reference sizes.

Specifications and Standards

Model			300W	600W
			HWA300-24-C	HWA600-24-C
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note 1		5.4A/2.7A	10A/5A
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ)		0.95 (V_{IN} = 100V, Load = 100%)	
	Efficiency (typ) Note 1		83%	83%
	Inrush Current (max) Note 1		25A/50A (at 25°C cold start)	
	Leakage Current (max) Note 1		0.5mA/1.0mA	
Output Conditions	Rated Output Voltage		24V	
	Output Voltage Variation		-5% to +10%	
	Rated Output Current		14A	27A
	Allowable Output Current Range		0 to 100%	
	Rated Output Power		336W	648W
	Ripple Noise		480mVp-p	
	Output Holding Time (min)		20msec	
	Startup Time (typ)		1500msec	
Additional Functions	Overcurrent Protection Note 2		Provided	
	Overvoltage Protection		Provided	
	Overheating Protection		Not provided	Provided
	Remote ON/OFF Control		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Green LED indicator	
Environmental Conditions	Operating Temperature Range		-10 to +55°C	
	Storage Temperature Range		-25 to +65°C	
	Operating Humidity Range		25 to 85%	
	Storage Humidity Range		25 to 85%	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	Single-sided amplitude: 0.75 mm	
		Vibration direction	X, Y, Z	
		Vibration time	Eight minutes in each of three directions	
	Installation Conditions		Derating may be required due to mounting direction	
Insulation	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute	
		Between input and FG	2200 V AC for 1 minute	
		Between output and FG	1000 V AC for 1 minute	
	Insulation Resistance	Between input and output	10 MΩ or above	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		With chassis and cover	
	Input Type		Terminal stand	
	Output Type		Terminal stand	
	External Dimensions		110^{W} x 175^{D} x 92^{H} mm	170^{W} x 179^{D} x 92^{H} mm
	Weight		2200g	3500g
	Safety Standards Note 3		UL1950, UL1012, UL508, CSA No. 950, VDE (EN60950), and VDE0160 certified	
	Conducted Emission		Designated to meet FCC Class B and EN50081-1	
	EMC		Designated to meet EN55022, EN61000-4 and EN61000-3-2	
Options	Remote ON/OFF Control		Not provided	
	Cover		Provided as standard	

Note 1 Regulated at rated input voltage (100/200 V AC), 100% load.

Note 2 Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

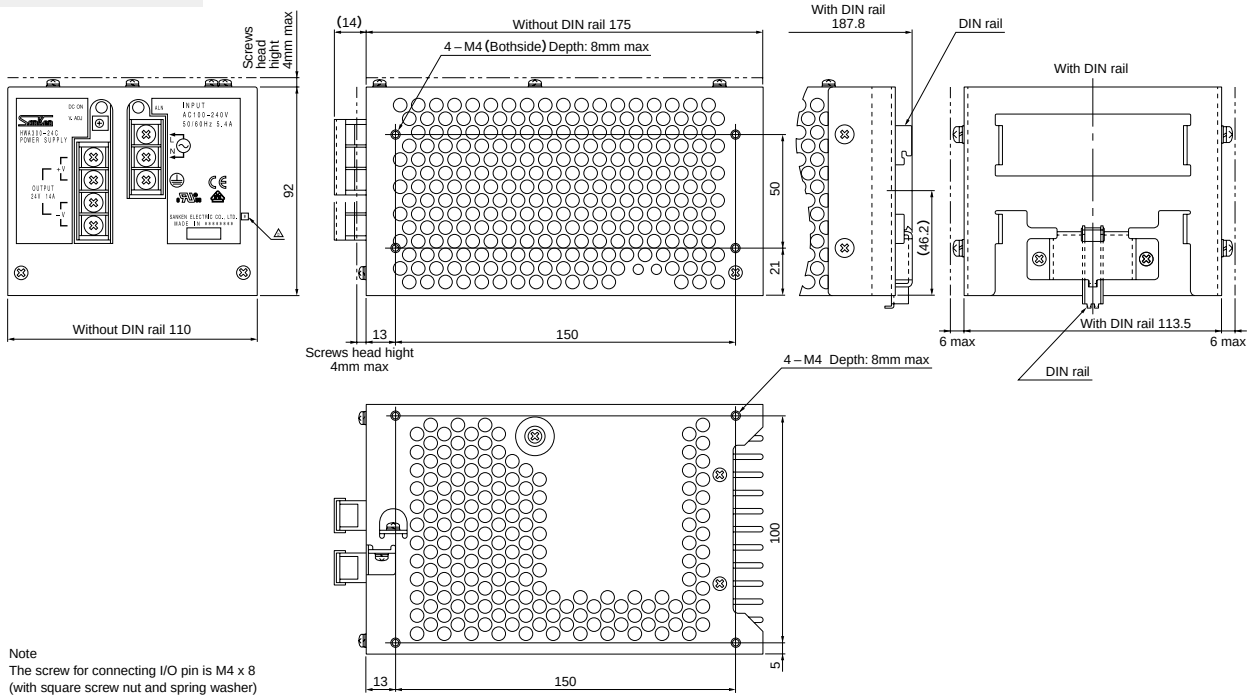
Note 3 CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

External Dimensions (unit: mm)

300W (weight: 2,200g)

Model

HWA300-24-C

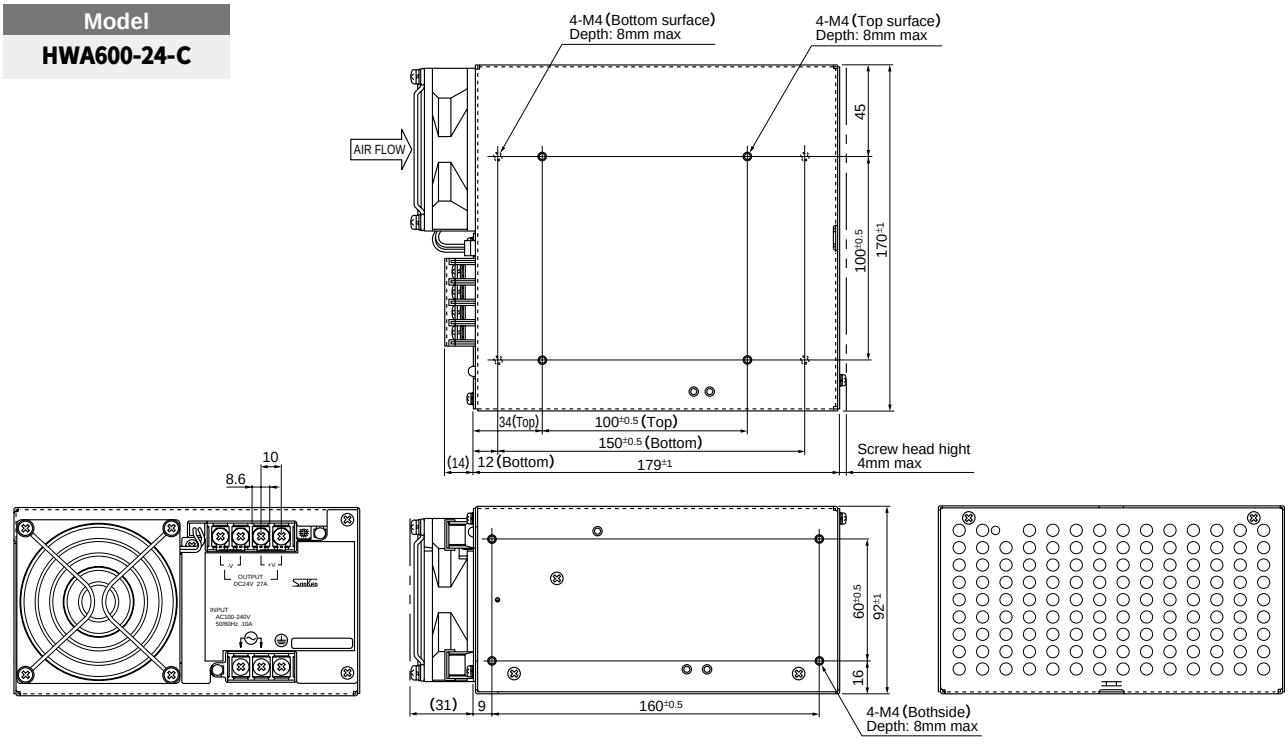


Note
The screw for connecting I/O pin is M4 x 8
(with square screw nut and spring washer)

600W (weight: 3,500g)

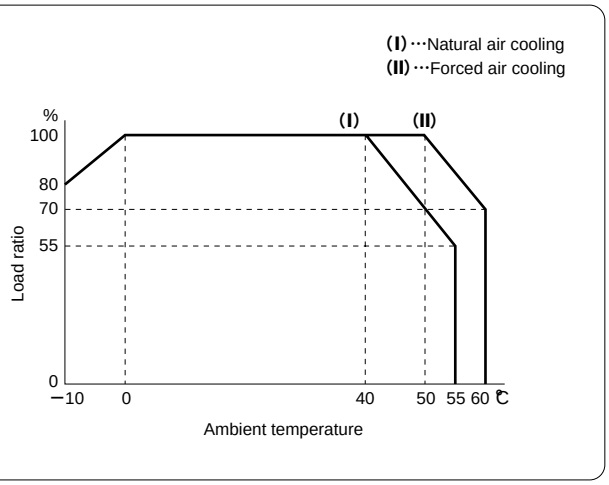
Model

HWA600-24-C



Operating Instruction

1 Derating curve



2 Parallel operation

Parallel operation can be performed only with the HWA300W and 600W models. Please contact Sanken if you intend to perform parallel operation. Sanken provides this product as optional. During parallel operation, each unit must be operated within 90% of rated current.

Employs proprietary SMZ type resonant-mode circuits.
Realizes compact, low price, ultra-low noise like dropper power supply.

HWB Series

Single output 15W 30W 60W Double output 15W 30W

Single output
(output voltages: each 5 V, 12 V (30 W or 60 W), 15 V, 24 V (60 W))

Double output
(output voltage: Å}15 V)

Acquired UL, CSA (C-UL), and TÜV safety standards

The HWB Series uses proprietary Softswitched Multiresonant Zerocross (SMZ) type resonant-mode circuits to achieve large noise reduction of the inverter unit. Moreover, this is a switching power supply which has realized ultra-low noise (ripple voltage, conducted emission, noise electric field strength) like dropper power supply, employing a proprietary resonant-mode hybrid IC and transformer.

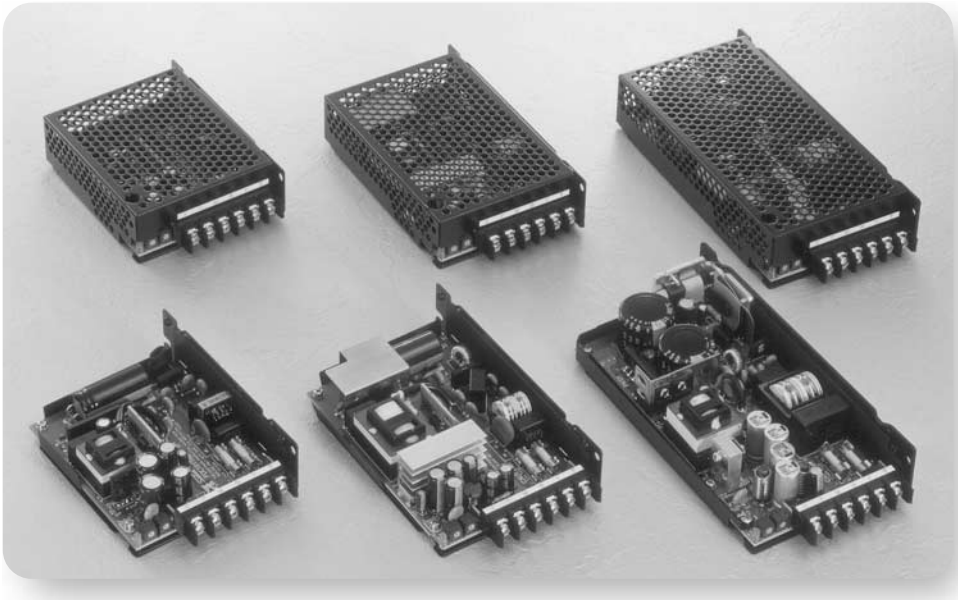
Applications

- **Measuring instruments, semiconductor manufacturing equipment, controllers, medical equipment, etc.**
- **Equipment that uses a dropper power supply (series regulator)**

Options

- **C: Cover**
- **R: Output remote ON/OFF control (external voltage control)**
- **M: Supports medical equipment ... Low leakage current: 50 μA or less (standard: 0.25 mA or less)**

- **Low ripple noise**
  5 mV (p-p) or less
  * With a 100-MHz oscilloscope. Spike element excluded.
- **Low conducted emission**
  Approx. 20 dB margin for VCCI Class B, FCC Class B, and CISPR Class B standards
- **Low noise electric field strength**
  Complies with VCCI Class B, FCC Class B, and CISPR Class B standards
- **World-wide input range**
  85 to 264 V AC continuous input or 85 to 132 V AC and 170 to 264 V AC automatic switching (HWB060S)
- **Compact, lightweight, low price**
  Volume and weight are approx. 1/4 of dropper type. Price is approx. 1/2.
- **CE marking compatible**
  Acquired CE mark for LVD
- **Safety standards**
  Acquired UL1950, CSA950, and EN60950
  Acquired EN60601-1 and UL2601-1 (HWB030S)
  (Type with M option: supports medical equipment)
- **Parallel operation**
  Possible by adjusting overcurrent protection (OCP) setting knob (HWB060S)



Free warrantee period: 3 years

HWB Series

[Single output] 15W, 30W, 60W [Double output] 15W, 30W

Specifications and Standards

Model			15W [Single output]	
			HWB015S-05	HWB015S-15
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to 264V	
	Input Current (typ) Note 1		0.4A	0.5A
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 440Hz	
	Efficiency (typ) Note 1		70%	75%
	Inrush Current (max) Note 2		30A (100VAC)/60A (240VAC)max (at cold start)	
	Leakage Current (max) Note 1		0.25mA (max) Option M : 50μA (max)	
Output Conditions Note 3	Rated Output Voltage		5V	15V
	Output Voltage Variation		Rated output voltage +10%, -5%	
	Rated Output Current		3.0A	1.3A
	Allowable Output Current Range Note 7		0 to 100%	
	Rated Output Power		15W	19.5W
	Constant Voltage Accuracy Note 5 Note 6		±3%	
	Ripple Note 4 Note 7 Note 8		5mVp-p	
	Ripple Noise Note 4 Note 7		10mVp-p	
	Output Holding Time (min) Note 1		20 ms at rated output of 15 W	
	Startup time (typ) Note 1		1sec	
Additional Functions	Overcurrent Protection		Detection above approx. 105% of rated current (drooping automatic recovery)	
	Overvoltage Protection Note 9		Detection above 115% of rated voltage (output cutoff)	
	Overheating Protection		Not provided	
	Remote ON/OFF Control Note 11		Optional support (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)	
	Remote Sensing		Not provided	
	Operations Display		Green LED indicator	
Environmental Conditions	Operating Temperature Range Note 7		-10°C to +60°C	
	Storage Temperature Range		-25°C to +85°C	
	Operating Humidity Range		30 to 90% (no condensation)	
	Storage Humidity Range		30 to 90% (no condensation)	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	19.6m/s² (2G)	
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.	
	Installation Conditions		Derating may be required due to mounting direction	
Insulation Note 10	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute	
		Between input and FG	1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)	
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		With chassis	
	Input Type		Terminal stand	
	Output Type		Terminal stand	
	External Dimensions		34^{W} x 110^{D} x 92^{H} mm (Excluding parts for installing input terminal stand and chassis)	
	Weight		350g	
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M	
	Conducted Emission		Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)	
Options	Remote ON/OFF Control		Provided	
	Cover		Provided	

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.
Note 4 Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 7 Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 8 Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).
Note 9 Reset is performed by reapplying input voltage.
Note 10 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 11 Prepare a separate power supply for remote ON/OFF control signal.

Specifications and Standards

Model			30W [Single output]		
			HWB030S-05	HWB030S-12	HWB030S-15
Input Conditions	Rated Input Voltage		AC100V to AC240V		
	Allowable Input Voltage Range		AC85 to 264V		
	Input Current (typ) Note 1		0.7A	0.8A	0.9A
	Rated Frequency		50/60Hz		
	Allowable Frequency Range		47 to 440Hz		
	Efficiency (typ) Note 1		75%	77%	80%
	Inrush Current (max) Note 2		30A (100VAC)/60A (240VAC)max (at cold start)		
	Leakage Current (max) Note 1		0.25mA (max) Option M : 50μA (max)		
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V
	Output Voltage Variation		Rated output voltage +10%, -5%		
	Rated Output Current		6.0A	3.0A	2.6A
	Allowable Output Current Range Note 7		0 to 100%		
	Rated Output Power		30W	36W	39W
	Constant Voltage Accuracy Note 5 Note 6		±3%		
	Ripple Note 4 Note 7 Note 8		5mVp-p		
	Ripple Noise Note 4 Note 7		10mVp-p		
	Output Holding Time (min) Note 1		20 ms at rated output of 30 W		
	Startup time (typ) Note 1		1sec		
Additional Functions	Overcurrent Protection		Detection above approx. 105% of rated current (drooping automatic recovery)		
	Overvoltage Protection Note 9		Detection above 115% of rated voltage (output cutoff)		
	Overheating Protection		Not provided		
	Remote ON/OFF Control Note 11		Optional support (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)		
	Remote Sensing		Not provided		
	Operations Display		Green LED indicator		
Environmental Conditions	Operating Temperature Range Note 7		-10°C to +60°C		
	Storage Temperature Range		-25°C to +85°C		
	Operating Humidity Range		30 to 90% (no condensation)		
	Storage Humidity Range		30 to 90% (no condensation)		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	No. of vibrations	10 to 55Hz		
		Sweep time	3 minutes		
		Acceleration rate	19.6m/s² (2G)		
		Vibration direction	X, Y, Z		
		Vibration time	One hour in each of three directions		
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.		
	Installation Conditions		Derating may be required due to mounting direction		
Insulation Note 10	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute		
		Between input and FG	1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)		
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)		
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)		
		Between input and FG			
		Between output and FG			
External Structure/ Standards	External Appearance		With chassis		
	Input Type		Terminal stand		
	Output Type		Terminal stand		
	External Dimensions		34^{W} x 136^{D} x 92^{H} mm (Excluding parts for installing input terminal stand and chassis)		
	Weight		380g		
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M		
	Conducted Emission		Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)		
Options	Remote ON/OFF Control		Provided		
	Cover		Provided		

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.
Note 4 Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 7 Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 8 Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).
Note 9 Reset is performed by reapplying input voltage.
Note 10 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 11 Prepare a separate power supply for remote ON/OFF control signal.

HWB Series

[Single output] 15W, 30W, 60W [Double output] 15W, 30W

Specifications and Standards

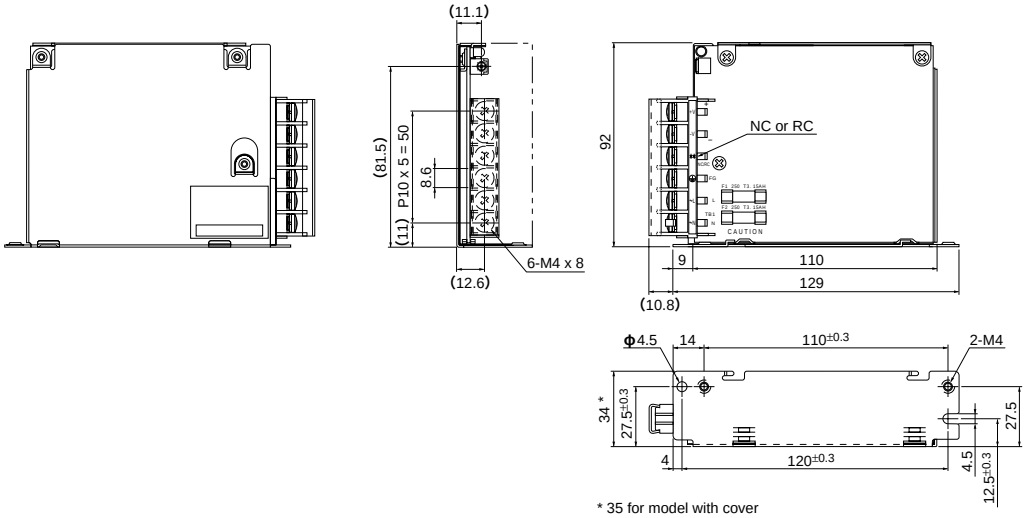
Model			60W [Single output]			
			HWB060S-05	HWB060S-12	HWB060S-15	HWB060S-24
Input Conditions	Rated Input Voltage		100 to 120/200 to 240 V AC, automatic switching			
	Allowable Input Voltage Range		85 to 132/170 to 264 V AC, automatic switching			
	Input Current (typ) Note 1		1.2A/0.7A	1.5A/0.9A	1.8A/1.0A	2.0A/1.0A
	Rated Frequency		50/60Hz			
	Allowable Frequency Range		47 to 440Hz			
	Efficiency (typ) Note 1		75%	80%	85%	85%
	Inrush Current (max) Note 2		30A (100VAC)/60A (240VAC)max (at cold start)			
	Leakage Current (max) Note 1		0.25mA (max) Option M : 50μA (max)			
Output Conditions Note 3	Rated Output Voltage		5V	12V	15V	24V
	Output Voltage Variation		Rated output voltage +10%, -5%			
	Rated Output Current		10.0A	5.2A	5.2A	3.5A
	Allowable Output Current Range Note 7		0 to 100%			
	Rated Output Power		50W	62W	78W	84W
	Constant Voltage Accuracy Note 5 Note 6		±3%			
	Ripple Note 4 Note 7 Note 8		5mVp-p			
	Ripple Noise Note 4 Note 7		10mVp-p			
	Output Holding Time (min) Note 1		20ms		20ms Note 11	
	Startup time (typ) Note 1		1sec			
Additional Functions	Overcurrent Protection		Detection above approx. 105% of rated current (drooping automatic recovery)			
	Overvoltage Protection Note 9		Detection above 115% of rated voltage (output cutoff)			
	Overheating Protection		Not provided			
	Remote ON/OFF Control Note 12		Optional support (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)			
	Remote Sensing		Not provided			
	Operations Display		Green LED indicator			
Environmental Conditions	Operating Temperature Range Note 7		-10°C to +60°C			
	Storage Temperature Range		-25°C to +85°C			
	Operating Humidity Range		30 to 90% (no condensation)			
	Storage Humidity Range		30 to 90% (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	No. of vibrations	10 to 55Hz			
		Sweep time	3 minutes			
		Acceleration rate	19.6m/s² (2G)			
		Vibration direction	X, Y, Z			
		Vibration time	One hour in each of three directions			
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.			
	Installation Conditions		Derating may be required due to mounting direction			
Insulation Note 10	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute			
		Between input and FG	1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)			
		Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)			
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)			
		Between input and FG				
		Between output and FG				
External Structure/ Standards	External Appearance		With chassis			
	Input Type		Terminal stand			
	Output Type		Terminal stand			
	External Dimensions		38^{W} x 170^{D} x 92^{H} mm (Excluding parts for installing input terminal stand and chassis)			
	Weight		550g			
	Safety Standards		UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M			
	Conducted Emission		Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)			
Options	Remote ON/OFF Control		Provided			
	Cover		Provided			

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.
Note 4 Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 7 Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 8 Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).
Note 9 Reset is performed by reapplying input voltage.
Note 10 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 11 Specified at a rated power of 60 W for HWB060S-15 and HWB060S-24.
Note 12 Prepare a separate power supply for remote ON/OFF control signal.

External Dimensions (unit: mm)

15W (weight: 350 g)

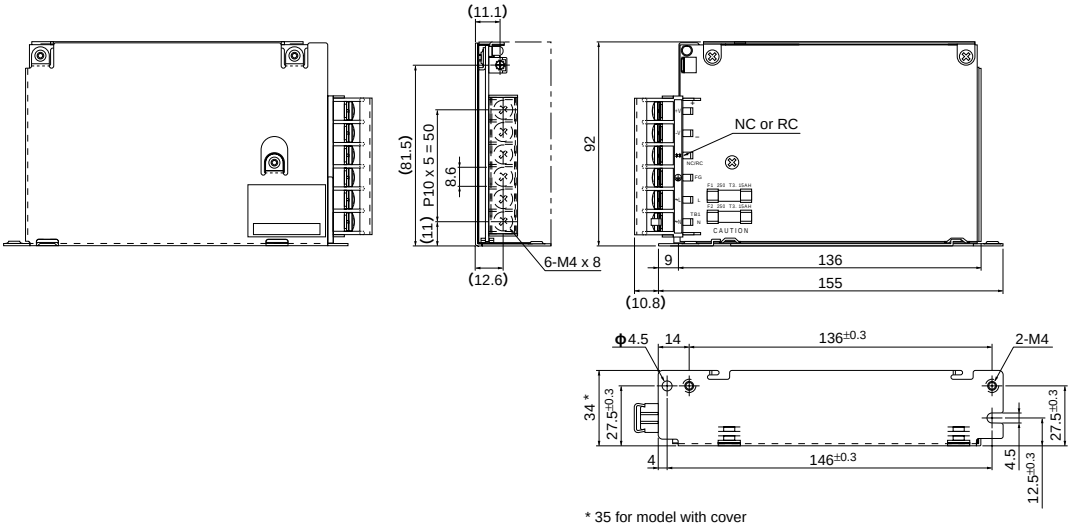
Model
HWB015S-05
HWB015S-15



* 35 for model with cover

30W (weight: 380 g)

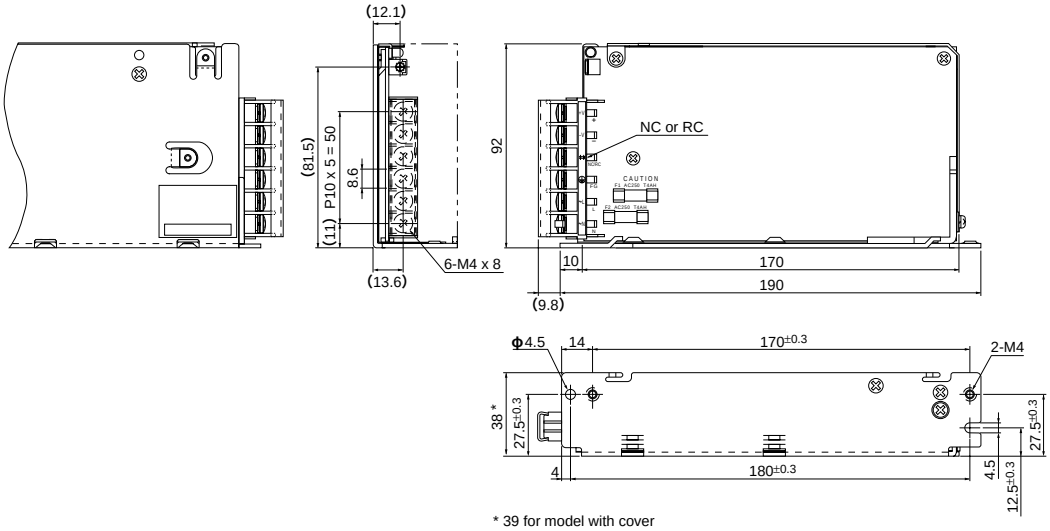
Model
HWB030S-05
HWB030S-12
HWB030S-15



* 35 for model with cover

60W (weight: 550 g)

Model
HWB060S-05
HWB060S-12
HWB060S-15
HWB060S-24



* 39 for model with cover

Specifications and Standards

Model	15W [Double output] HWB015D-15
Input Conditions	
Rated Input Voltage	100 to 240 V AC, continuous input
Allowable Input Voltage Range	85 to 264 V AC, continuous input
Input Current (typ) Note 1	0.5A
Rated Frequency	50/60Hz
Allowable Frequency Range	47 to 440Hz
Efficiency (typ) Note 1	75%
Inrush Current (max) Note 2	30A (100VAC)/60A (240VAC)max (at cold start)
Leakage Current (max) Note 1	0.25mA (max) Option M : 50μA (max)
Output Conditions Note 3	
Rated Output Voltage	±15V
Output Voltage Variation	Rated output voltage +10%, -5% (Double output model: Interlocked (voltage variation)
Rated Output Current	0.65A
Allowable Output Current Range Note 7	0 to 100%
Rated Output Power	19.5W
Constant Voltage Accuracy Note 5 Note 6 Note 12	±5%
Ripple Note 4 Note 7 Note 8	5mVp-p
Ripple Noise Note 4 Note 7	10mVp-p
Output Holding Time (min) Note 1	20 ms at rated output of 15 W
Startup time (typ) Note 1	1sec
Additional Functions	
Overcurrent Protection	Detection above approx. 105% of rated current (drooping automatic recovery)
Overvoltage Protection Note 9	Detection above 115% of rated voltage (output cutoff)
Overheating Protection	
Remote ON/OFF Control Note 11	Optional support (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)
Remote Sensing	Not provided
Operations Display	Green LED indicator
Environmental Conditions	
Operating Temperature Range Note 7	-10°C to +60°C
Storage Temperature Range	-25°C to +85°C
Operating Humidity Range	30 to 90% (no condensation)
Storage Humidity Range	30 to 90% (no condensation)
Cooling Requirements	Natural air cooling
Vibration Resistance — No. of vibrations	10 to 55Hz
Vibration Resistance — Sweep time	3 minutes
Vibration Resistance — Acceleration rate	19.6m/s² (2G)
Vibration Resistance — Vibration direction	X, Y, Z
Vibration Resistance — Vibration time	One hour in each of three directions
Shock Resistance	98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
Installation Conditions	Derating may be required due to mounting direction
Insulation Note 10	
Insulation Withstand Voltage — Between input and output	3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute
Insulation Withstand Voltage — Between input and FG	1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)
Insulation Resistance — Between input and output / Between input and FG / Between output and FG	100 MΩ (measured with 500 V DC Megger)
External Structure/ Standards	
External Appearance	With chassis
Input Type	Terminal stand
Output Type	Terminal stand
External Dimensions	34^{W} x 110^{D} x 92^{H} mm (Excluding parts for installing input terminal stand and chassis)
Weight	350g
Safety Standards	UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M
Conducted Emission	Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)
Options	
Remote ON/OFF Control	Provided
Cover	Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.
Note 4 Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 7 Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 8 Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).
Note 9 Reset is performed by reapplying input voltage.
Note 10 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 11 Prepare a separate power supply for remote ON/OFF control signal.
Note 12 Cross-regulation has an accuracy of ±7% under the condition where load current of one side is less than 10%.

Specifications and Standards

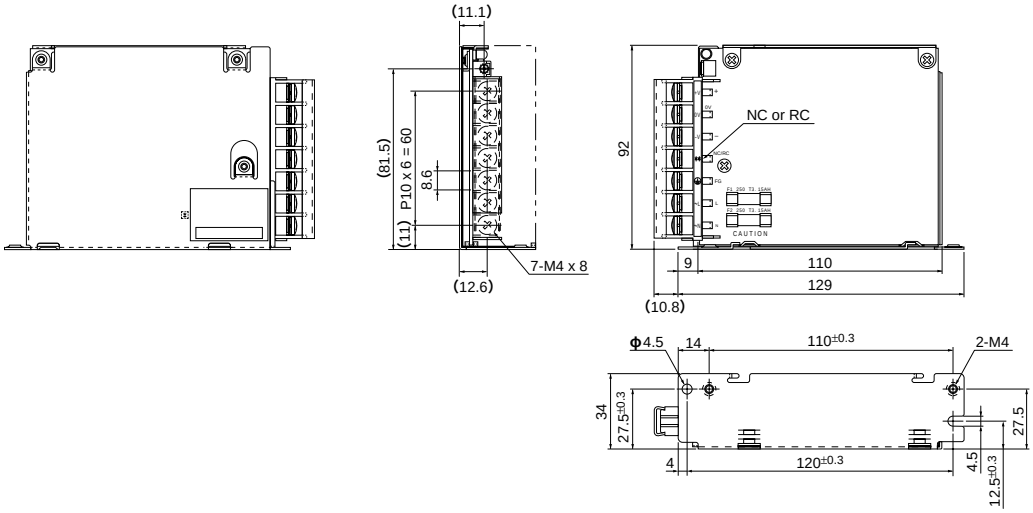
Model	30W [Double output] HWB030D-15
Input Conditions	
Rated Input Voltage	100 to 240 V AC, continuous input
Allowable Input Voltage Range	85 to 264 V AC, continuous input
Input Current (typ) Note 1	0.9A
Rated Frequency	50/60Hz
Allowable Frequency Range	47 to 440Hz
Efficiency (typ) Note 1	80%
Inrush Current (max) Note 2	30A (100VAC)/60A (240VAC)max (at cold start)
Leakage Current (max) Note 1	0.25mA (max) Option M : 50μA (max)
Output Conditions Note 3	
Rated Output Voltage	±15V
Output Voltage Variation	Rated output voltage +10%, -5% (Double output model: Interlocked (voltage variation)
Rated Output Current	1.3A
Allowable Output Current Range Note 7	0 to 100%
Rated Output Power	39W
Constant Voltage Accuracy Note 5 Note 6 Note 12	±5%
Ripple Note 4 Note 7 Note 8	5mVp-p
Ripple Noise Note 4 Note 7	10mVp-p
Output Holding Time (min) Note 1	20 ms at rated output of 30 W
Startup time (typ) Note 1	1sec
Additional Functions	
Overcurrent Protection	Detection above approx. 105% of rated current (drooping automatic recovery)
Overvoltage Protection Note 9	Detection above 115% of rated voltage (output cutoff)
Overheating Protection	
Remote ON/OFF Control Note 11	Optional support (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)
Remote Sensing	Not provided
Operations Display	Green LED indicator
Environmental Conditions	
Operating Temperature Range Note 7	-10°C to +60°C
Storage Temperature Range	-25°C to +85°C
Operating Humidity Range	30 to 90% (no condensation)
Storage Humidity Range	30 to 90% (no condensation)
Cooling Requirements	Natural air cooling
Vibration Resistance — No. of vibrations	10 to 55Hz
Vibration Resistance — Sweep time	3 minutes
Vibration Resistance — Acceleration rate	19.6m/s² (2G)
Vibration Resistance — Vibration direction	X, Y, Z
Vibration Resistance — Vibration time	One hour in each of three directions
Shock Resistance	98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
Installation Conditions	Derating may be required due to mounting direction
Insulation Note 10	
Insulation Withstand Voltage — Between input and output	3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute
Insulation Withstand Voltage — Between input and FG	1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between output and FG	500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)
Insulation Resistance — Between input and output	100 MΩ (measured with 500 V DC Megger)
Insulation Resistance — Between input and FG	
Insulation Resistance — Between output and FG	
External Structure/ Standards	
External Appearance	With chassis
Input Type	Terminal stand
Output Type	Terminal stand
External Dimensions	34^{W} x 136^{D} x 92^{H} mm (Excluding parts for installing input terminal stand and chassis)
Weight	410g
Safety Standards	UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M
Conducted Emission	Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)
Options	
Remote ON/OFF Control	Provided
Cover	Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart (power thermistor used).
Note 3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.
Note 4 Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 Output voltage can be changed within the maximum output power and rated output current.
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 7 Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.
Note 8 Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).
Note 9 Reset is performed by reapplying input voltage.
Note 10 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 11 Prepare a separate power supply for remote ON/OFF control signal.
Note 12 Cross-regulation has an accuracy of ±7% under the condition where load current of one side is less than 10%.

External Dimensions (unit: mm)

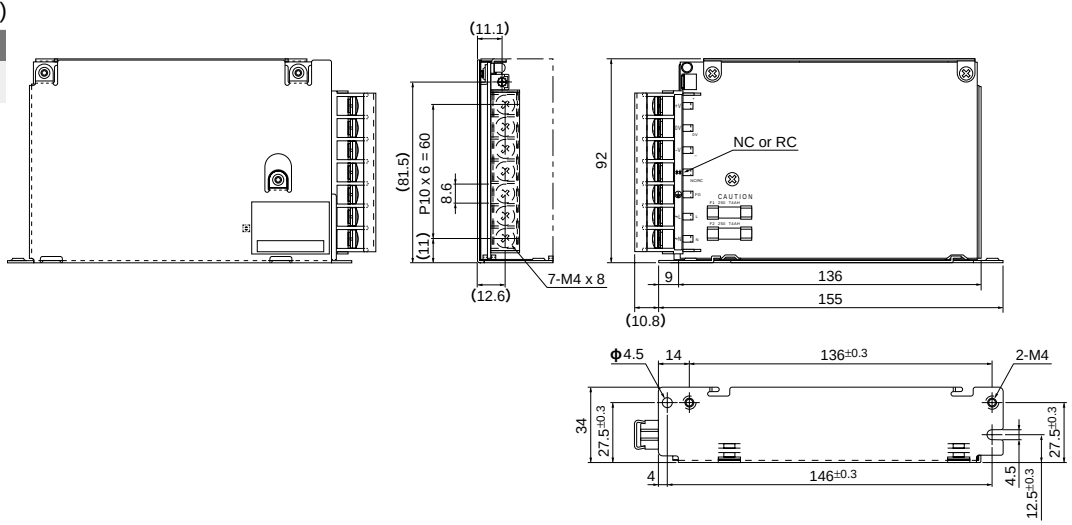
15W (weight: 350 g)

Model
HWB015D-15



30W (weight: 410 g)

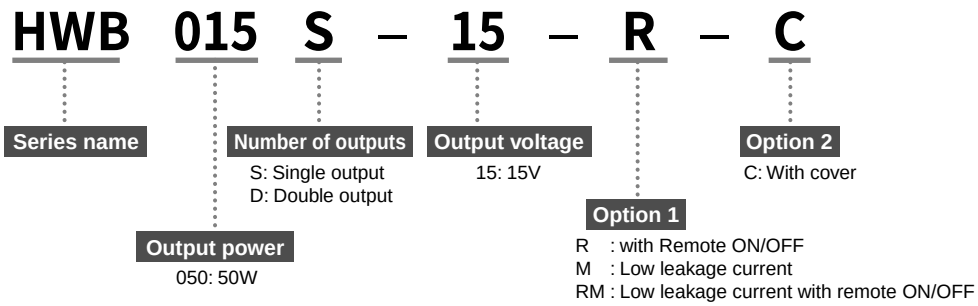
Model
HWB030D-15



Option

Symbol at end of product name	R: Remote ON/OFF	M: Medical equipment-support, low leakage current	C: With cover
None	–	–	–
-C	–	–	●
-R	●	–	–
-R-C	●	–	●
-M	–	●	–
-M-C	–	●	●
-RM	●	●	–
-RM-C	●	●	●

Example of model name



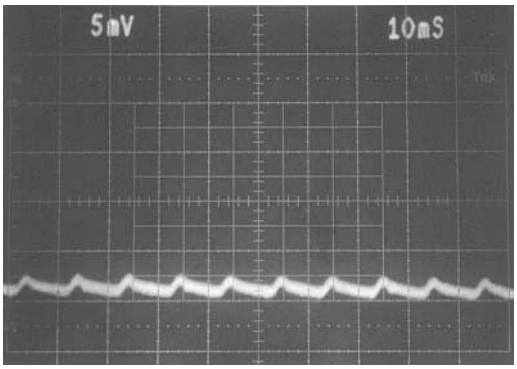
Operating Instruction

1 Terminal connection

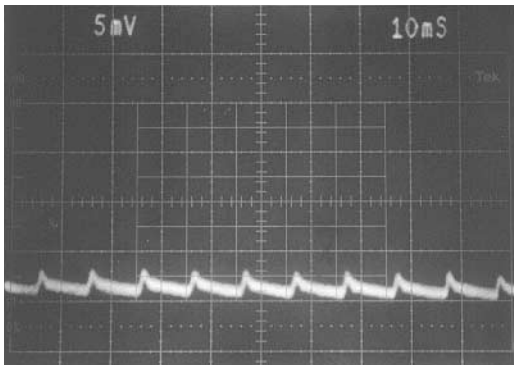
Symbol		Pin No.	
		Single output	Double output
Terminal stand	TB1	1: AC (NEUTRAL)	1: AC (NEUTRAL)
		2: AC	2: AC
		3: FG	3: FG
		4: NC (R: option)	4: NC (R: option)
		5: −V	5: −V
		6: +V	6: 0 V
			7: +V

2 Noise characteristics HWB060S-15C

• Output ripple noise data

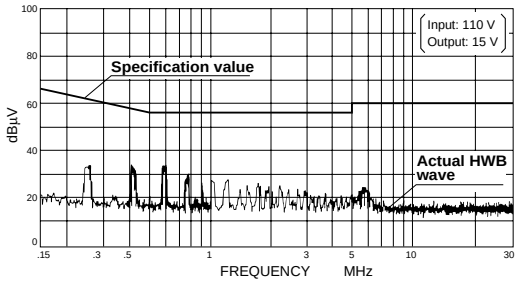


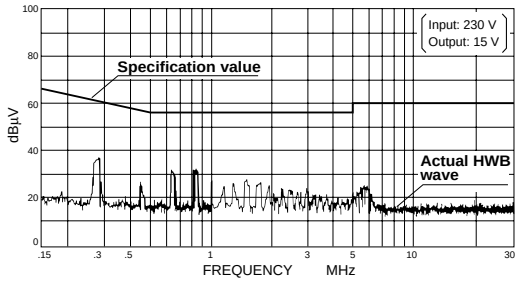
Output conditions: Input 100 V, output 15 V 5.2 A
Ambient temperature: normal temperature
Vertical axis: 5 mV/div, Horizontal axis: 10 msec/div



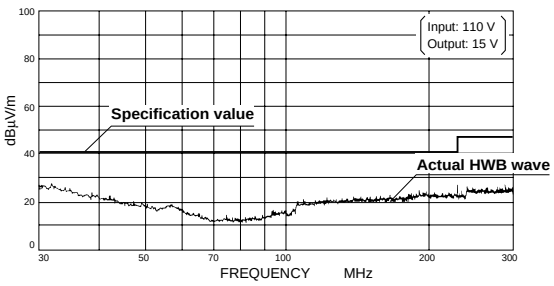
Output conditions: Input 200 V, output 15 V 5.2 A
Ambient temperature: normal temperature
Vertical axis: 5 mV/div, Horizontal axis: 10 msec/div

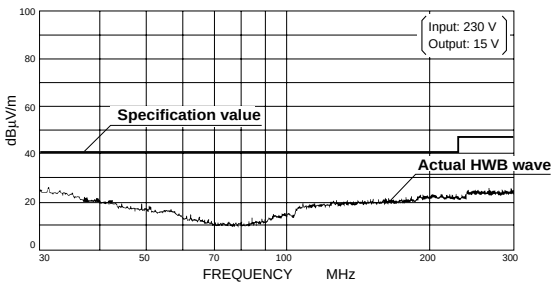
• Conducted emission



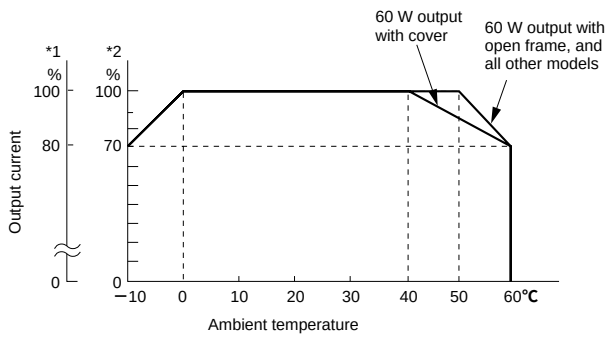


• Noise electric field strength



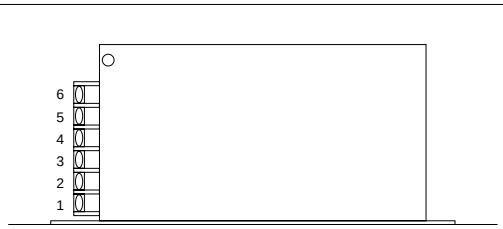


3 Derating of output current



*1 ..... 060S-05
*2 ..... Other models

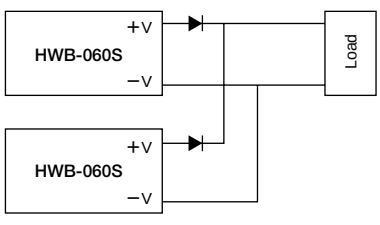
4 Mounting



Vertical mounting only

5 Parallel operation

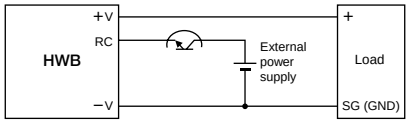
Parallel operation can be performed only with the HWB060S model. Please contact Sanken if you intend to perform parallel operation. Sanken provides this product as optional. During parallel operation, each unit must be operated within 90% of rated current.
Connect schottky-barrier diodes to the units as shown in the diagram to balance output current of each unit during parallel operation (Sanken FMJ-2303, 30 V 30 A recommended). Select diodes whose withstand voltage is more than the rated output voltage and current is more than output current. Note that diodes need to release heat because they generate heat. This requirement should be thoroughly considered. Adjust and check output voltage of each power supply to ensure that the same voltage is reached. Use load wires with the same thicknesses and lengths to balance output power of each power supply.



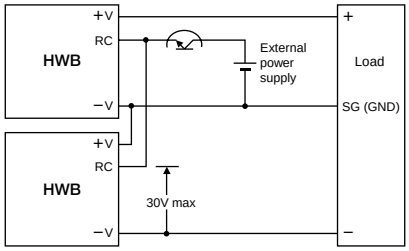
6 Remote control

An external power supply (5 to 24 V) is needed for remote control. For remote control of single output power supply, connect RC terminal and -V terminal (GND) to + of the external power supply and SG (GND) of load, respectively. For double output power supply, connect the RC terminal and the 0 V terminal (GND) to the + of the external power supply and the SG (GND) of load, respectively. The remote control goes on by applying voltage. It goes off by releasing between RC terminal and -V terminal. The range of external voltage which can be applied on the RC terminal for remote control is from 4.5 to 30 V DC. The range of inflow current from the external power supply is from 1.5 to 5 mA (typ).
Connection examples are as shown in the diagrams below. However, the voltage between RC terminal and -V terminal must be 30 V or less.

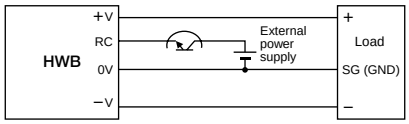
• Connection example for single output power supply



• Connection example for two power supplies combined with ±power supply



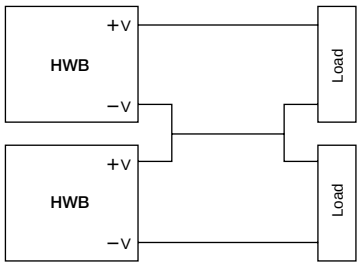
• Connection example for double output power supply



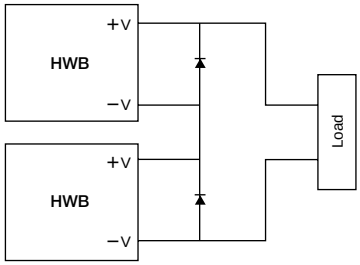
7 Series operation

Connect diodes as shown in the diagram according to the way loads are connected for series operation. Select diodes through which rated output current can flow at rise of output voltage. Although current flows through diodes only at rise of output voltage, it does not flow at steady state.

• Connection example where diodes are unnecessary

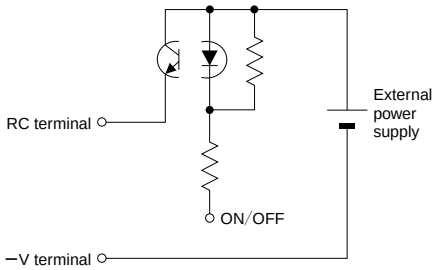


• Connection example where diodes are necessary

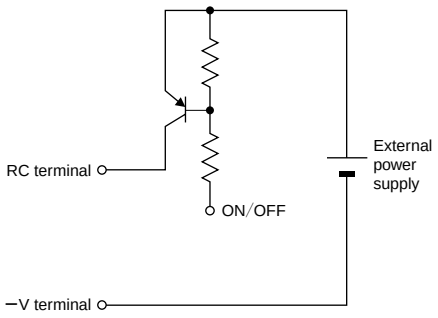


8 Example of interface circuit for remote control signal

• When photo coupler is used



• When transistor is used



Features world-wide input and active filter (PFC)

Double output supports peak current

SWE Series

100W 150W

Double output

With chassis

Acquired UL, CSA (C-UL), and SEMKO safety standards

- **Supports 2.5x peak current**
  Supports top-class peak current: 2.5 times the rated current (within 15 seconds)*.
  This helps save space and lower costs for power supplies in equipment sets.
- **World-wide input**
  Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- **Features active filter (PFC)**
  SWD series features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC-61000-3-2).
- **Conducted emission**
  Complies with Class B standards under VCCI, FCC, and EN55022.
- **Acquired CE mark for LVD (Low Voltage Directive)**
  Complies with CE mark standards set by the EU.
- **Acquired safety standards of a variety of countries**
  Complies with safety standards of a variety of countries, including UL1950, CSA950 (C-UL), and EN60950.
- **Remote ON/OFF control**
  Features remote ON/OFF control with 24 V output as standard.

Applications

- **Mechatronics products (motors, solenoids, etc.)**
- **Equipment that uses thermal heads**

Examples: Ticket dispensers, card readers, POS terminals, ATMs, change machines, bill and coin counters, scales, printers, printing press, semiconductor manufacturing equipment, and other industrial equipment

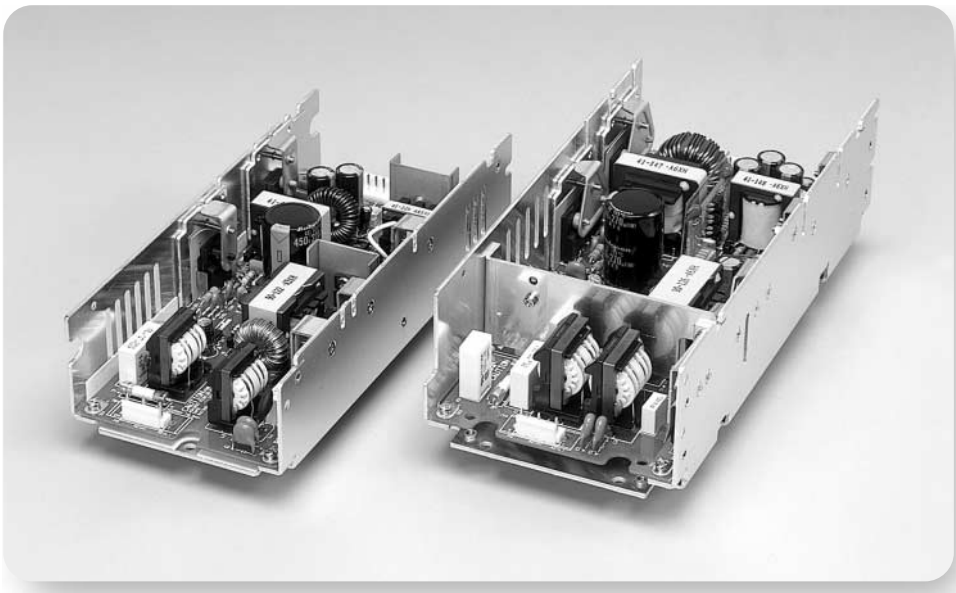
Options

- **Cover (with derating)**
- **Terminal stand**

Description of model name

SWE 150P - 2405 - C

- SWE: Series name
- 150P: Output power (150:150W)
- 2405: Output voltage (24:24V, 05: 5V)
- C: Option (C: With cover)



Free warrantee period: 2 years

Specifications and Standards

Model	100W
	SWE100P-2405
Input Conditions	
Rated Input Voltage	AC100V to AC240V
Allowable Input Voltage Range	AC85 to 264V
Input Current (typ) Note1	1.5A (V_{IN} = 100V)
Rated Frequency	50/60Hz
Allowable Frequency Range	47 to 63Hz
Power Factor (typ) Note1	0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)
Efficiency (typ) Note1	79%
Inrush Current (max) Note2	20A (V_{IN} = 100V)/40A (V_{IN} = 240V)
Leakage Current (max) Note1	0.75mA (V_{IN} = 240V)
Output Conditions Note3	
Rated Output Voltage	5V / 24V
Output Voltage Variation	±10% / ±10%
Rated Output Current	3.0A / 4.0A
Maximum Peak Current Note8	— / 10.0 A (within 15 sec)
Allowable Output Current Range	0 to 30.0A / 0 to 10.0A
Rated Output Power	15W / 96W
Constant Voltage Accuracy Note5	±3% / ±5%
Ripple Noise Note1 Note4	100mVp-p / 240mVp-p
Output Holding Time (min) Note1	60msec
Startup time (typ)	300msec
Additional Functions	
Overcurrent Protection	3.15 A or more (drooping automatic recovery) / 10.5 A or more (drooping automatic recovery)
Overvoltage Protection Note6	Detection above 115% of rated voltage (output cutoff)
Overheating Protection	Not provided
Remote Sensing	Not provided
Operations Display	Not provided
Remote ON/OFF Control	Not provided / Provided
Environmental Conditions	
Operating Temperature Range	-10°C to +60°C
Storage Temperature Range	-25°C to +85°C
Operating Humidity Range	30 to 90%
Storage Humidity Range	30 to 90%
Cooling Requirements	Natural air cooling
Vibration Resistance — No. of vibrations Note9	10 to 55Hz
Vibration Resistance — Sweep time	3 minutes
Vibration Resistance — Acceleration rate	19.6m/s² (2G)
Vibration Resistance — Vibration direction	X, Y, Z
Vibration Resistance — Vibration time	One hour in each of three directions
Shock Resistance	98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.
Installation Conditions	Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)
Insulation Note7	
Insulation Withstand Voltage — Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)
Insulation Withstand Voltage — Between output and FG	500 V AC for 1 minute (leakage current: 30 mA or less)
Insulation Resistance — Between input and output / Between input and FG / Between output and FG	100 MΩ (measured with 500 V DC Megger)
External Structure/ Standards	
External Appearance	With chassis
Input Type	Connector
Output Type	Connector
External Dimensions	220^{W} x 98^{D} x 52^{H} mm
Weight	770g
Safety Standards	UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law
Conducted Emission	Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)
EMC	Harmonic current: Designated to meet IEC61000-3-2
	Immunity: Designated to meet IEC61000-4-2, 5
Options	
I/O Terminal Stand	Provided
Cover	Provided

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.
Note 9 When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).

Specifications and Standards

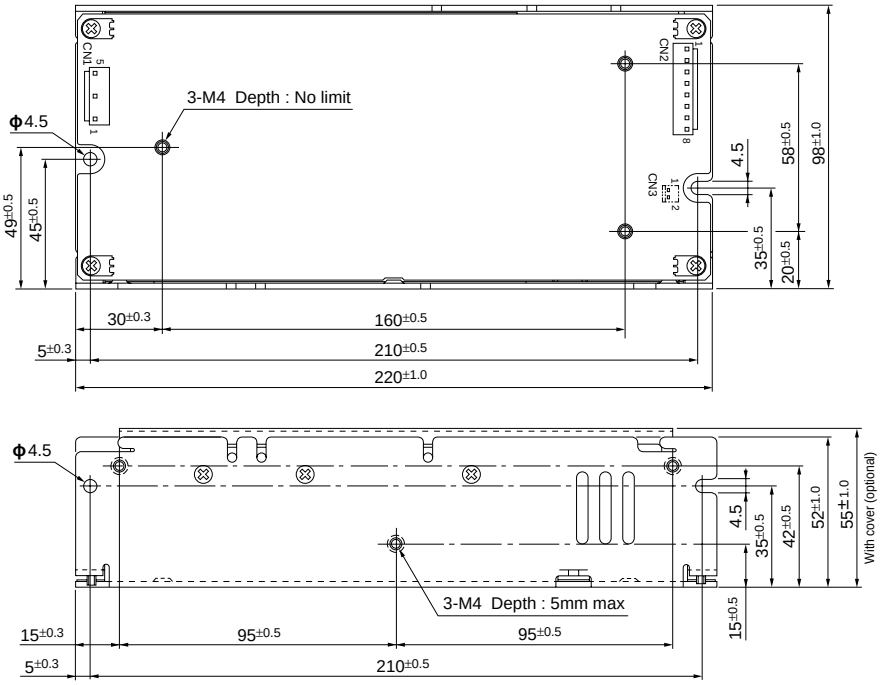
Model			150W	
			SWE150P-2405	
Input Conditions	Rated Input Voltage		AC100V to AC240V	
	Allowable Input Voltage Range		AC85 to AC264V	
	Input Current (typ) Note 1		2.4A (V_{IN} = 100V)	
	Rated Frequency		50/60Hz	
	Allowable Frequency Range		47 to 63Hz	
	Power Factor (typ) Note 1		0.98 (V_{IN} = 100V)/0.95 (V_{IN} = 240V)	
	Efficiency (typ) Note 1		79%	
	Inrush Current (max) Note 2		20A (V_{IN} = 100V)/40A (V_{IN} = 240V)	
	Leakage Current (max) Note 1		0.75mA (V_{IN} = 240V)	
Output Conditions Note 3	Rated Output Voltage		5V	24V
	Output Voltage Variation		±10%	±10%
	Rated Output Current		6.0A	6.0A
	Maximum Peak Current Note 8		—	10.0 A (within 15 sec)
	Allowable Output Current Range		0 to 6.0A	0 to 15.0A
	Rated Output Power		30W	144W
	Constant Voltage Accuracy Note 5		±3%	±5%
	Ripple Noise Note 1 Note 4		100mVp-p	240mVp-p
	Output Holding Time (min) Note 1		60msec	
	Startup time (typ)		800msec	
Additional Functions	Overcurrent Protection		6.3 A or more (drooping automatic recovery)	15.75 A or more (drooping automatic recovery)
	Overvoltage Protection Note 6		Detection above 115% of rated voltage (output cutoff)	
	Overheating Protection		Not provided	
	Remote Sensing		Not provided	
	Operations Display		Not provided	
	Remote ON/OFF Control		Not provided	Provided
Environmental Conditions	Operating Temperature Range		-10°C to +60°C	
	Storage Temperature Range		-25°C to +85°C	
	Operating Humidity Range		30 to 90%	
	Storage Humidity Range		30 to 90%	
	Cooling Requirements		Natural air cooling	
	Vibration Resistance	No. of vibrations	10 to 55Hz	
		Sweep time	3 minutes	
		Acceleration rate	19.6m/s² (2G)	
		Vibration direction	X, Y, Z	
		Vibration time	One hour in each of three directions	
	Shock Resistance		98m/s² (10G) Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.	
	Installation Conditions		Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down)	
Insulation Note 7	Insulation Withstand Voltage	Between input and output	3000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between input and FG	2000 V AC for 1 minute (leakage current: 15 mA or less)	
		Between output and FG	500 V AC for 1 minute (leakage current: 30 mA or less)	
	Insulation Resistance	Between input and output	100 MΩ (measured with 500 V DC Megger)	
		Between input and FG		
		Between output and FG		
External Structure/ Standards	External Appearance		With chassis	
	Input Type		Connector	
	Output Type		Connector	
	External Dimensions		240^{W} x 110^{D} x 65^{H} mm	
	Weight		1100g	
	Safety Standards		UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law	
	Conducted Emission		Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)	
	EMC		Harmonic current: Designated to meet IEC61000-3-2	
			Immunity: Designated to meet IEC61000-4-2, 5	
Options	I/O Terminal Stand		Provided	
	Cover		Provided	

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 2 More current above noted values may flow at restart.
Note 3 Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.
Note 4 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.
Note 5 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.
Note 6 Reset is performed by reapplying input voltage.
Note 7 Insulation conditions are specified at normal temperature and humidity.
Note 8 Up to rated output current at startup.
Note 9 When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).

External Dimensions (unit: mm)

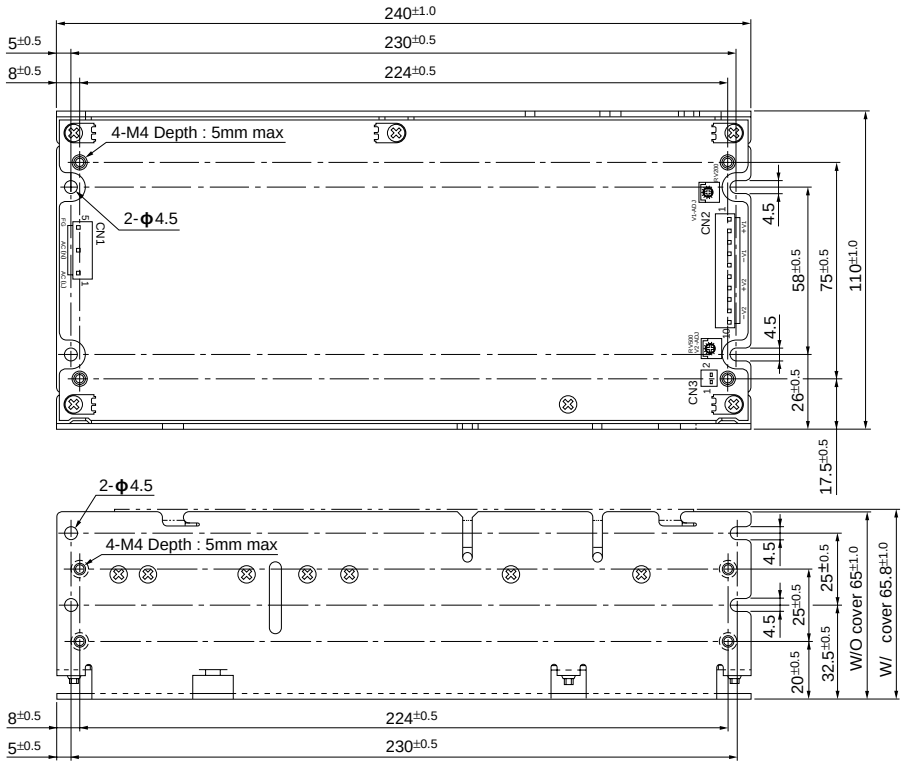
100W (weight: 770 g)

Model
SWE100P-2405



150W (weight: 1100 g)

Model
SWE150P-2405



Operating Instruction

1 Terminal connection

Input/output connectors

SWE100P-2405

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1: AC (LIVE)	B3P5-VH (JST)	VHR-5N (JST)	SVH-21T-P1.1 (JST)
	2: NC			
	3: AC (NEUTRAL)			
	4: NC			
	5: FG			
CN2	1 to 3: +24V	B8P-VH (JST)	VHR-8N (JST)	SVH-21T-P1.1 (JST)
	4 to 6: GND1			
	7: +5V			
	8: GND2			
CN3	1: RC+	B2P-SHF-1AA	H2P-SHF-AA	SHF-001T-0.8SS
	2: RC−			

SWE150P-2405

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
CN1	1: AC (LIVE)	B3P5-VH	VHR-5N	SVH-21T-P1.1
	2: NC			
	3: AC (NEUTRAL)			
	4: NC			
	5: FG			
CN2	1 to 3: +24V	B10P-VH	VHR-10N	SVH-21T-P1.1
	4 to 6: GND1			
	7, 8: +5V			
	9, 10: GND2			
CN3	1: RC+	B2P-SHF-1AA	H2P-SHF-AA	SHF-001T-0.8SS
	2: RC−			

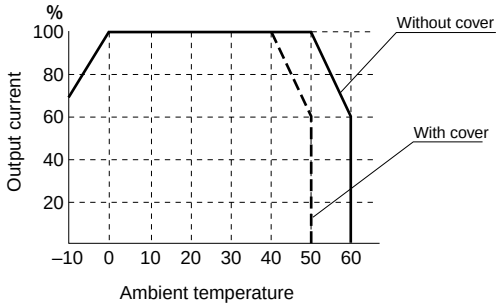
Terminal stands

SWE100P-2405 **SWE150P-2405**

Symbol	Pin No.	Connector	Corresponding connector	Corresponding contact
TB1	1: AC (LIVE)	M110D-3C (Morimatsu) or equivalent	M4 terminals	
	2: AC (NEUTRAL)			
	3: FG			
TB2	1: +24V	M110D-3C (Morimatsu) or equivalent	M4 terminals	
	2: GND1			
	3: +5V			
	4: GND2			
CN3	1: RC+	B2P-SHF-1AA	H2P-SHF-AA	SHF-001T-0.8SS
	2: RC−			

2 Derating of output current

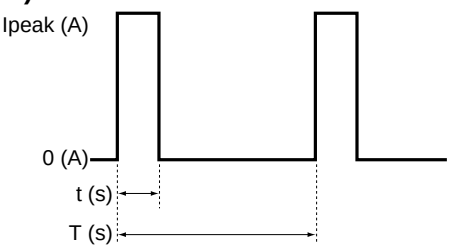
SWE100P-2405
SWE150P-2405



3 Dynamic load

The peak current load occurs within 15 seconds. This series can also be used with dynamic (pulse) load. During dynamic operation, use the supply with the output current's RMS value equal to or less than the rated current.

(Example)

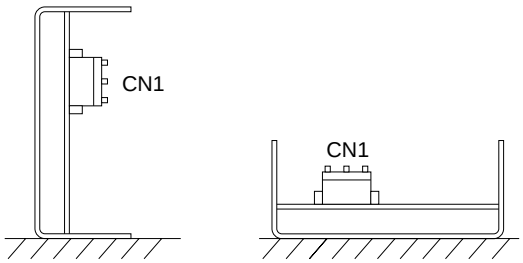


$$\text{RMS value } I_{rms} = \sqrt{\frac{\text{Peak current time t}}{\text{Cycle time T}}} \times \text{Peak current value } I_{peak}$$

4 Remote ON/OFF control

The 24 V output models enable remote ON/OFF control. Output goes ON when the RC+ and RC- connectors (connector CN3's pins 1 and 2) for remote ON/OFF control are open. When they are shorted, the output goes OFF.

5 Mounting



Vertical mounting

Horizontal mounting

Semi-custom power supply

PCU Series

400W **600W** **900W**

Acquired UL, CSA, and TÜV safety standards

Flexible multi-output power supply enables various combinations of DC cell modules
Prototype power supply units that meet the customer's specifications can be delivered 10 days after the customer's order is received.
Keep costs low by eliminating the need for design, evaluation, and safety standards certification.
Microprocessor-equipped cell control module provides versatile power management.
Certified under medical standards (PCU400M/600M)

- **World-wide input range <85 to 264 V AC continuous input>**
- **Three types based on total output power: 400 W, 600 W, and 900 W**
- **Extensive lineup of DC cell modules* can be freely combined in multi-power supply configurations**
  * 120-W single output DC cell, output voltages: nine types (2, 3.3, 5, 6, 12, 15, 24, 36, and 48 V)
  ① 40-W and ② 96-W double output DC cell, output voltages: two types (① 5/5 V, ② 12/12 V)
  40-W four output DC cell, output voltages: two types (+5/-5/+12/-12, +5/-5/+15/-15 V)
  Configuration example: PCU900 (nine-cell configuration) ... 15 channels = single output x 7 + multi-output x 2)
- **All module types are kept in stock to enable prototype power supply delivery within 10 days.**
- **Harmonic current control <complies with EN61000-3-2 standard>**
- **Complies with safety standards**
  <certified under EN60950, UL1950, CSA950 (C-UL). CE marking compatible>
- **Complies with noise standards**
  <complies with EMS: IE61000-4, EMI: FCC Class B, EN55022 Class B, and VCCI Class B>
- **Alarm signal output and AC power fail signal output are standard feature**
- **Versatile power management using optional functions**
  ◦ Versatile power management is realized by microprocessor-based control in cell control module
  Software processing controls management of operations when an alarm occurs, allocation of operations among cells, sequence operations, external remote operations, etc.
  ◦ Supports low power consumption
  <Option E: When using economy mode, all internal circuits are stopped. Equipped with internal +5 V STB power supply>
  Power consumption during economy mode: approximately 3.9 W (during 100 V AC input)
  ◦ Complies with medical standards
  Certified under EN60601-1 (PCU400M/600M)

Applications

- **Semiconductor manufacturing and inspection equipment**
- **Factory automation controllers and robots**
- **Line printers, disks, ATMs, and computer peripherals**
- **Medical equipment such as CT machines, MRI machines, and ultrasonic diagnostic equipment**
- **Photographic laboratory system, ETCs, and other induastrial equipment**

Options

- **Alarm sequence** (signal transmission and shutdown)
- **AC power failure** (extension of output hold time)
- **Cell output sequence** (startup sequence, etc.)
- **External remote ON/OFF** (up to three separate ON/OFF controls)
- **Cell group control** (up to three separate ON/OFF controls)
- **Economy mode** (standby mode for low power consumption)
- **Support for medical equipment** (low leakage current)

Free warrantee period: 3 years

Specifications and Standards

Item	Model	PCU400
	Total Output Power	400W
	No. of DC Cell Modules	5 cells
Input Conditions	Rated Input Voltage	AC100 to 240V
	Allowable Input Voltage Range	AC85 to 264V
	Input Current Note1	6.5A/3A max (AC100V/AC240V)
	Rated Frequency	50/60Hz
	Allowable Frequency Range	47 to 63Hz
	Efficiency Note1	70% (typ)
	Inrush Current Note2	15A/35A max (AC100V/AC240V)
	Power Factor Note1	0.9 (min)
Others	Leakage Current Note1	0.75 mA (max) Option M: 0.5 mA (max)
	Output Holding Time Note1	20ms (min)
Environmental Conditions	Operating Temperature Range Note3	-10 to +60°C
	Storage Temperature Range	-20 to +85°C
	Operating Humidity Range	30 to 90% (no condensation)
	Storage Humidity Range	30 to 90% (no condensation)
	Cooling Requirements	Forced air cooling by internal fan
	Vibration Resistance	10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions
	Shock Resistance	98m/s^2 (10G)
	Installation Conditions	Horizontal or vertical mounting direction
Insulation	Insulation Withstand Voltage Note4	Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each)
	Insulation Resistance Note4	Input - output, input - FG and output - FG: 100 MΩ or above (measured with 500 V DC Megger)
External Structure /Standards	External Dimensions Note5	124^W x 280^D x 64^H mm
	Weight Note6	2300g
Standards	Safety Standards	UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible TÜV (EN60601) certified with option M
	Conducted Emission Note7	Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B

Note1 Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules.
Note2 More inrush current than above noted value may flow for approximately one second after restart.
Note3 When the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.
Note4 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note5 For details, refer to the external view diagrams.
Note6 The weight is the estimated weight when single output type DC cell module has been fully mounted.
Note7 When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

仕様・規格

Item	Model	PCU600
	Total Output Power	600W
	No. of DC Cell Modules	6 cells
Input Conditions	Rated Input Voltage	AC100 to 240V
	Allowable Input Voltage Range	AC85 to 264V
	Input Current Note1	10A/5A max (AC100V/AC240V)
	Rated Frequency	50/60Hz
	Allowable Frequency Range	47 to 63Hz
	Efficiency Note1	70% (typ)
	Inrush Current Note2	15A/35A max (AC100V/AC240V)
	Power Factor Note1	0.9 (min)
Others	Leakage Current Note1	0.75 mA (max)　Option M: 0.5 mA (max)
	Output Holding Time Note1	20ms (min)
Environmental Conditions	Operating Temperature Range Note3	-10 to +60°C
	Storage Temperature Range	-20 to +85°C
	Operating Humidity Range	30 to 90% (no condensation)
	Storage Humidity Range	30 to 90% (no condensation)
	Cooling Requirements	Forced air cooling by internal fan
	Vibration Resistance	10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions
	Shock Resistance	98m/s^2 (10G)
	Installation Conditions	Horizontal or vertical mounting direction
Insulation	Insulation Withstand Voltage Note4	Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each)
	Insulation Resistance Note4	Input - output, input - FG and output - FG: 100 MΩ or above (measured with 500 V DC Megger)
External Structure /Standards	External Dimensions Note5	148^W x 280^D x 64^H mm
	Weight Note6	2600g
Standards	Safety Standards	UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible　TÜV (EN60601) certified　with option M
	Conducted Emission Note7	Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B

Note 1 Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules.
Note 2 More inrush current than above noted value may flow for approximately one second after restart.
Note 3 When the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.
Note 4 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note 5 For details, refer to the external view diagrams.
Note 6 The weight is the estimated weight when single output type DC cell module has been fully mounted.
Note 7 When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

Specifications and Standards

Item	Model	PCU900
	Total Output Power	900W
	No. of DC Cell Modules	9 cells
Input Conditions	Rated Input Voltage	AC100 to 240V
	Allowable Input Voltage Range	AC85 to 264V
	Input Current Note1	15A/7.5A max (AC100V/AC240V)
	Rated Frequency	50/60Hz
	Allowable Frequency Range	47 to 63Hz
	Efficiency Note1	70% (typ)
	Inrush Current Note2	15A/35A max (AC100V/AC240V)
	Power Factor Note1	0.9 (min)
Others	Leakage Current Note1	0.9mA (max)
	Output Holding Time Note1	20ms (min)
Environmental Conditions	Operating Temperature Range Note3	-10 to +60°C
	Storage Temperature Range	-20 to +85°C
	Operating Humidity Range	30 to 90% (no condensation)
	Storage Humidity Range	30 to 90% (no condensation)
	Cooling Requirements	Forced air cooling by internal fan
	Vibration Resistance	10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions
	Shock Resistance	98m/s^2 (10G)
	Installation Conditions	Horizontal or vertical mounting direction
Insulation	Insulation Withstand Voltage Note4	Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each)
	Insulation Resistance Note4	Input - output, input - FG and output - FG: 100 MΩ or above (measured with 500 V DC Megger)
External Structure /Standards	External Dimensions Note5	220^W x 280^D x 64^H mm
	Weight Note6	3900g
Standards	Safety Standards	UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible TÜV (EN60601) certified with option M
	Conducted Emission Note7	Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B

Note1 Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules.
Note2 More inrush current than above noted value may flow for approximately one second after restart.
Note3 When the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.
Note4 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.
Note5 For details, refer to the external view diagrams.
Note6 The weight is the estimated weight when single output type DC cell module has been fully mounted.
Note7 When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

Output Specifications (DC cell module)

Single output type

DC Cell Module Symbol	A	B	C	D	E	F	G	H	J
Rated Output Voltage	3.3V	5V	12V	15V	24V	36V	48V	2V	6V
Output Voltage Variation Note 1	Rated output voltage ±10%							1.8 to 2.4V	Rated output voltage ±10%
Rated Output Current	24A	24A	10A	8A	5A	3.3A	2.5A	24A	20A
Allowable Output Current Range	0 to 100% (without exceeding maximum output power and current)								
Rated Output Power	79.2W	120W	120W	120W	120W	118.8W	120W	48W	120W
Ripple Noise Note 2 Note 3	100mV	100mV	200mV	200mV	300mV	350mV	400mV	100mV	100mV
Constant Voltage Accuracy Note 4	±3%								
Overcurrent Protection (min) Note 5	26.4A	26.4A	11.0A	8.8A	5.5A	3.7A	2.8A	26.4A	22A
Overvoltage Protection Note 6	3.7 to 4.7V	5.6 to 7.0V	13.3 to 16.8V	16.6 to 22.5V	26.5 to 33.6V	39.7 to 50.4V	52.9 to 60.0V	2.6 to 3.2V	6.7 to 8.4V
Remote Sensing Note 7	Provided								
Overheating Protection Note 8	Provided								
Series Operation Note 9	Enabled								
Parallel Operation Note 9	Enabled								
Orations Display	Provided								
Output Terminal Type Note 10	Terminal stand								
Required Number of Cells	1 cell								

Multi-output type

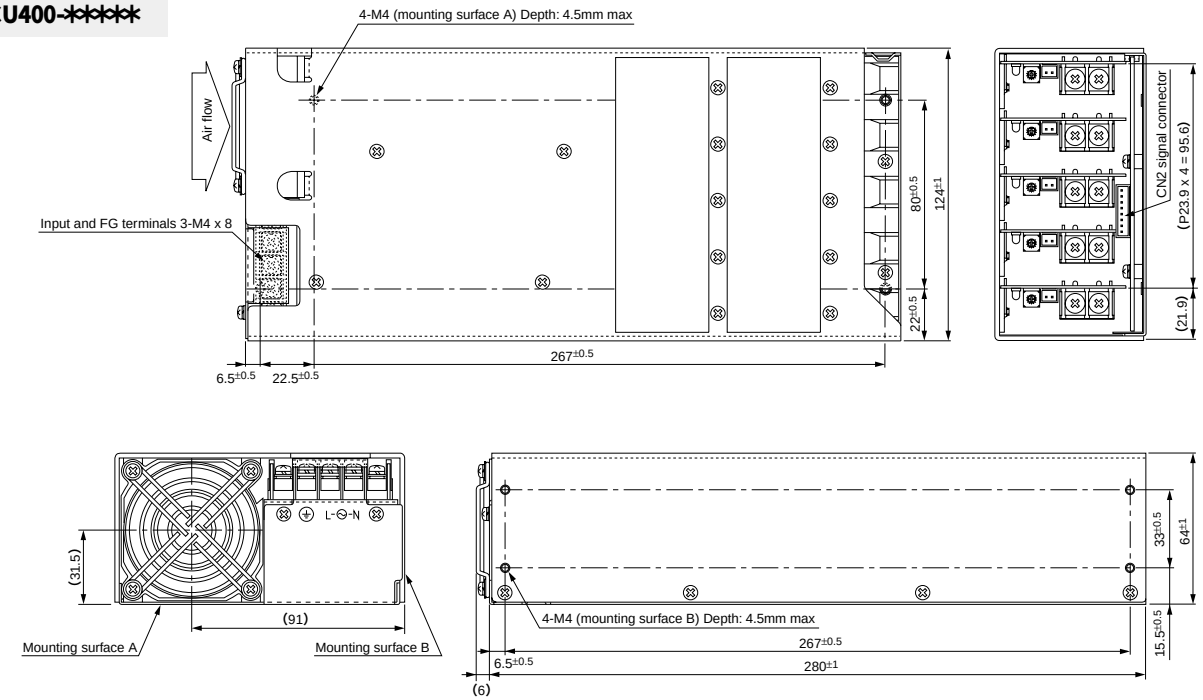
DC Cell Module Symbol	Q1(4ch)				Q2(4ch)				W11(2ch)		W22(2ch)	
Rated Output Voltage	+5V	-5V	+12V	-12V	+5V	-5V	+15V	-15V	5V	5V	12V	12V
Output Voltage Variation Note 1	Fixed				Fixed				Rated output voltage ±5%		Rated output voltage ±5%	
Rated Output Current	3A	1A	1A	0.5A	3A	1A	1A	0.5A	4A	4A	4A	4A
Allowable Output Current Range	0 to 100%				0 to 100%				0 to 100%		0 to 100%	
Rated Output Power	38W				42.5W				40W		96W	
Ripple Noise Note 2 Note 3	100mV		150mV		100mV		150mV		100mV	100mV	200mV	200mV
Constant Voltage Accuracy Note 4	±5%			±5%	±5%			±5%	±3%		±3%	
Overcurrent Protection (min) Note 5	3.3A	1.1A	1.1A	0.6A	3.3A	1.1A	1.1A	0.6A	4.4A	4.4A	4.4A	4.4A
Overvoltage Protection Note 6	5.6 to 7.0V	–	13.3 to 16.8V	–	5.6 to 7.0V	–	16.6 to 22.5V	–	5.6 to 7.0V	5.6 to 7.0V	13.3 to 16.8V	13.3 to 16.8V
Remote Sensing Note 7	–				–				–		–	
Overheating Protection Note 8	–			Provided	–			Provided	Provided		Provided	
Series Operation Note 9	Disabled				Disabled				Enabled		Enabled	
Parallel Operation Note 9	Disabled				Disabled				Disabled		Disabled	
Orations Display	Provided				Provided				Provided		Provided	
Output Terminal Type Note 10	Connector				Connector				Connector		Connector	
Required Number of Cells	1 cell				1 cell				1 cell		1 cell	

Note 1 The rated output current and maximum output power are both specified even when the output voltage is variable.
Note 2 Specified under rated input/output conditions at an ambient temperature of 25°C.
Note 3 Ripple noise value was measured using a 1:1 probe and a 100-MHz oscilloscope, with measurements taken 5 cm from an output connector and with a connected 63-V, 47-μF electrolytic capacitor. Ripple noise is measured by a 100-MHz oscilloscope using a 1:1 probe at a point 5 cm from the output connector, with a 47-μF electrolytic capacitor connected to that point.
Note 4 The constant voltage accuracy is measured with a static input range of 300 to 410 V DC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of 0 to +50°C.
(When the ambient temperature is in the range from -10 to 0°C or 50 to 60°C, the rating is based on 80% derating of the rated output current.)
The constant voltage accuracy for multi-output type with output voltage of either -12 V or -15 V is specified when total output power of either 6 or 7 W for other channel output.
(When a -15 V output current is in the range from 0 to 0.1 A, the total output power for other channel output must be at least 1.5 W.)
Note 5 Overcurrent protection uses the constant current drooping method (delayed shutdown method).
Note 6 When the overvoltage protection function kicks in, output is shut down. This output shutdown remains active for as long as the control voltage (+VCC) is being supplied.
Note 7 The remote sensing function should be set to correct for line drops of up to 250 mV. Use twisted pair or shielded wires as the sensing lines, and if the lines are long, insert capacitors between +S and +V and between -S and -V. The maximum output power is specified for the power supply's output voltage.
Note 8 Overheating protection operates when an abnormal ambient temperature is detected.
Note 9 Please contact Sanken when using DC cell modules for series operation or parallel operation.
Note 10 Terminal stand type is also supported for multi-output types W11, W22, Q1, and Q2. (Their DC cell module symbols are W11T, W22T, Q1T, and Q2T.)

External Dimensions (unit: mm)

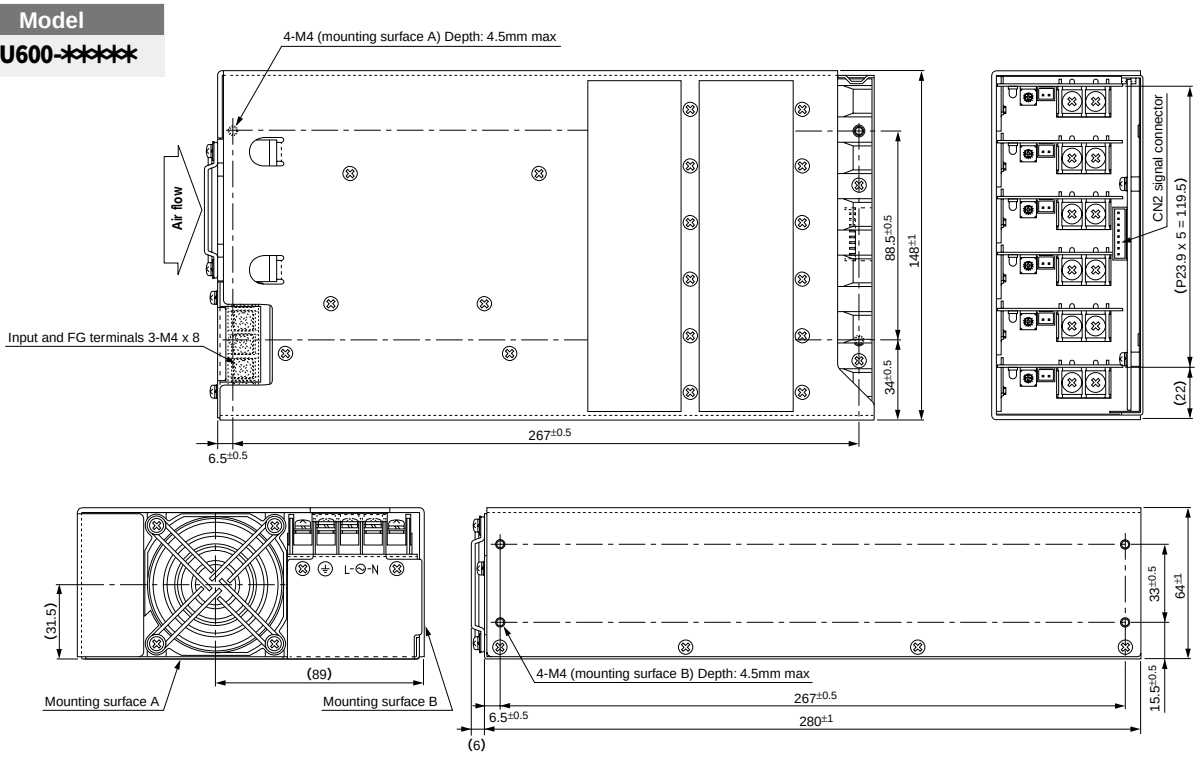
400W (weight: 2300 g)

Model
PCU400-✱✱✱✱✱



600W (weight: 2600 g)

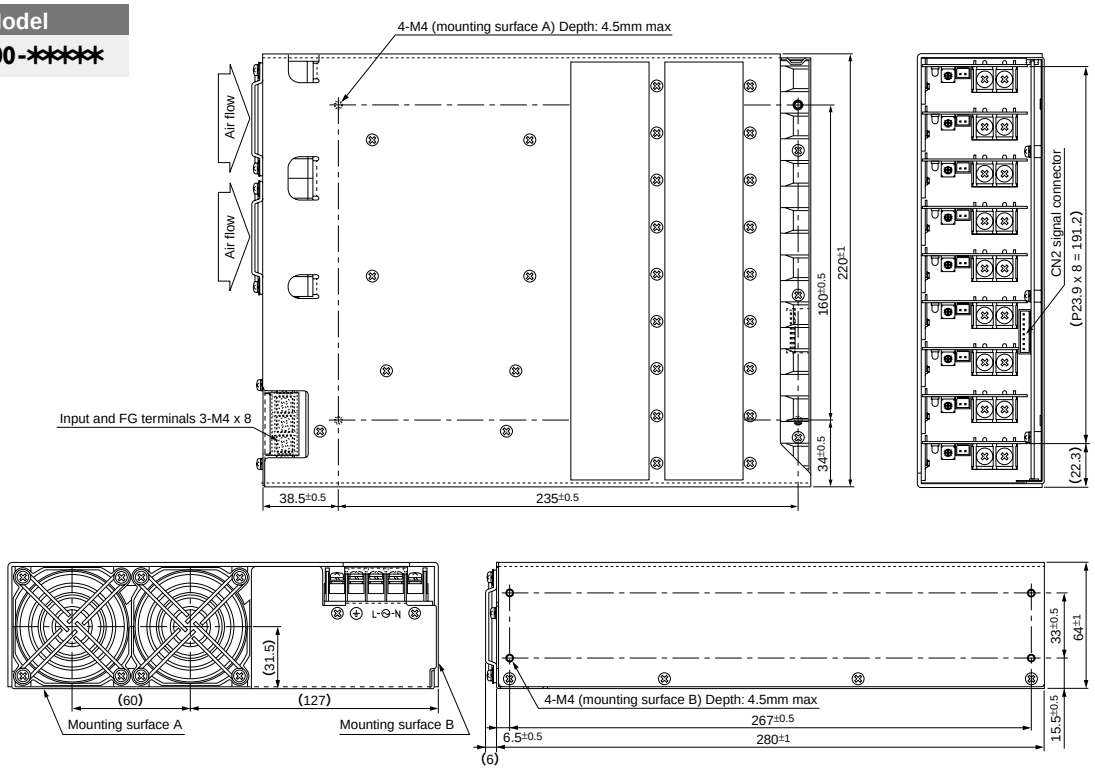
Model
PCU600-✱✱✱✱✱



External Dimensions (unit: mm)

900W (weight: 3900 g)

Model
PCU900-*****



Description of Functions (main functions)

1 Signal output (standard equipped)

The PCU series includes standard-equipped signal output, which can be used as needed.

◎Alarm signals ... For undervoltage, overvoltage, fan malfunction, DC output fault, overheating protection, etc.

◎AC power fail signal ... For reduction or setup of AC input voltage

* The fan alarm signal can be transmitted as an independent signal. For details, please contact Sanken.
* When an alarm status continues for a certain amount of time, the DC cell module's output is turned off.
* The timing for transmitting signals and turning off the DC cell module output is set based on standard values set by Sanken.

2 Protection functions

Each of the PCU Series DC cell modules contains independent protection circuitry (for overcurrent protection, overvoltage protection, and overheating protection).

3 Output voltage variation

The output voltage can be changed in each of the PCU Series DC cell modules (variation range: ±10% of rated voltage).

However, there is no output variation function for multi-output DC cell modules Q1 and Q2.

4 Remote sensing

Each of the PCU Series DC cell modules has a remote sensing function. The voltage correction value should be within 0.25 V.

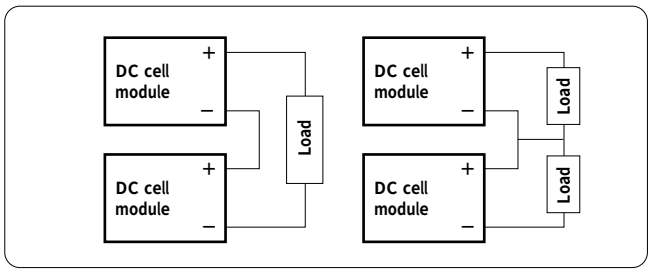
However, there is no remote sensing function for multi-output DC cell modules W11, W22, Q1, and Q2.

5 Series operation

The PCU Series DC cell modules can be used for series operation. When performing series operation, the specification for the DC cell module with the lower rated current applies.

However, multi-output DC cell modules Q1 and Q2 cannot be used for series operation.

For details, please contact Sanken.



6 Parallel operation

The PCU Series DC cell modules can be used for parallel operation. When DC cell modules are used for parallel operation, Sanken changes their internal settings and connects the output terminals of the parallel DC cell modules using a short bar.

The parallel DC cell modules operate using a load balancing function.

However, multi-output DC cell modules W11, W22, Q1, and Q2 cannot be used for parallel operation.

For details, please contact Sanken.

Example: When using a 24-V load at 10 A (240 W)
Two DC cell E modules (rated at 24 V, 5 A, 120 W) are used for parallel operation, and their output is 10 A (240 W).

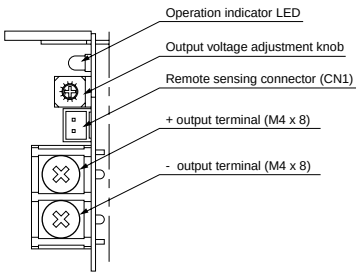
7 Negative power supply

Due to the structure of the PCU Series DC cell modules, the polarity (+ or -) of the DC output terminals cannot be changed.

When using them as a negative output power supply, use positive (+) terminals as SG and negative (-) terminals as negative output.

8 Output terminals and connectors

• Single output DC cell module

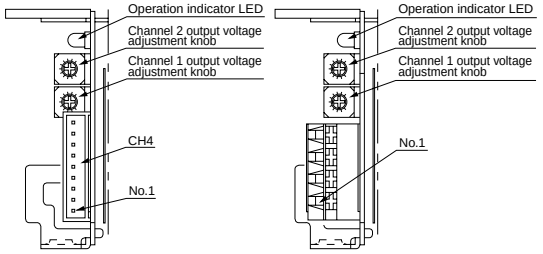


CN No.	Pin No.	Function	Compatible housing	Corresponding contact
CN1	1	Remote sensing −	XHP-2 (JST)	SXH-001T-P0.6 (JST)
	2	Remote sensing +		
CN2	1	+5V STB	XHP-8 (JST)	SXH-001T-P0.6 (JST)
	2	SG		
	3	RMT2 ON/OFF		
	4	RMT3 ON/OFF		
	5	RMT4 ON/OFF		
	6	RMT1 ON/OFF		
	7	Alarm		
	8	AC power fail		

* Recommended screw fastening torque:
(1) Terminal screws: 118 N·cm
(2) Mounting holes: 142 N·cm

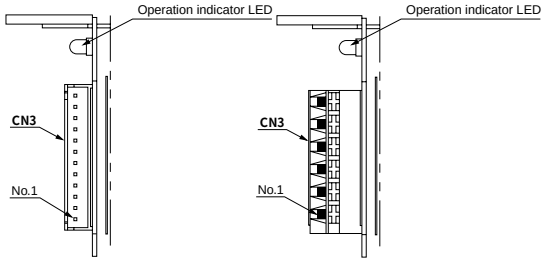
• Multi-output DC cell module

W11, W22 (connector type) / W11T, W22T (terminal stand type)



CN4 Pin No.		Function	W11, W22 (connector type)		W11T, W22T (terminal stand type) Corresponding wiring
W11, W22 (connector type)	W11T, W22T (terminal stand type)		Corresponding housing	Corresponding contact	
8, 9	4	5V or 12V (CH1)	XHP-9 (JST)	SXH-001T-P0.6 (JST)	Single wire AWG16 to 26 (UL, C-UL, TÜV) Stranded wire AWG16 to 22 (UL, C-UL) Stranded wire AWG16 to 24 (TÜV) Sheath stripping length: 7 to 10 mm
6, 7	3	GND (CH1)			
5		NC			
3, 4	2	GND (CH2)			
1, 2	1	5V or 12V (CH2)			

Q1, Q2 (connector type) / Q1T, Q2T (terminal stand type)

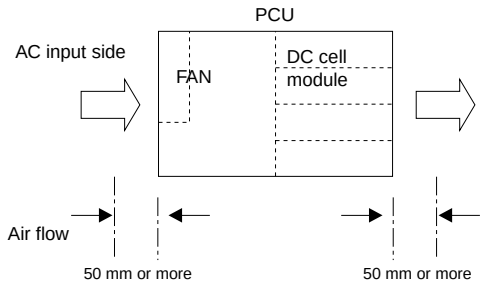


CN3 Pin No.		Function	Q1, Q2 (connector type)		Q1T, Q2T (terminal stand type) Corresponding wiring
Q1, Q2 (connector type)	Q1T, Q2T (terminal stand type)		Corresponding housing	Corresponding contact	
11, 12	6	+5V	XHP-12 (JST)	SXH-001T-P0.6 (JST)	Single wire AWG16 to 26 (UL, C-UL, TÜV) Stranded wire AWG16 to 22 (UL, C-UL, TÜV) Stranded wire AWG24 only (TÜV) Sheath stripping length: 7 to 10 mm
9 & 10	5	GND			
7 & 8	4	−5V			
5 & 6	3	+12V or +15V			
3 & 4	2	GND			
1 & 2	1	−12V or −15V			

9 Cooling method

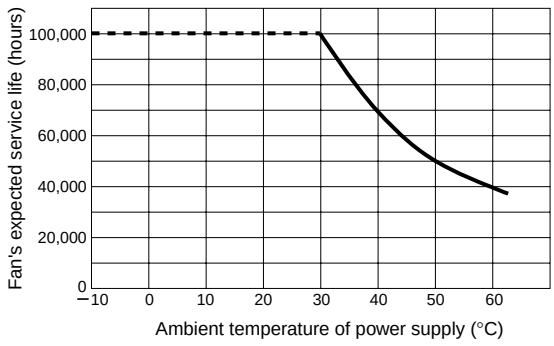
The PCU Series uses an internal fan for forced air cooling. The fan is an intake fan mounted on the input terminal side.
Leave at least 50 mm of space on the AC input terminal side or DC cell module output terminal side, where the fan is mounted.
If the internal fan has stopped, output may be shut off by the overheating protection circuit.

The fan's expected service life span may be affected by the power supply's use conditions, so the fan should be checked regularly. The fan must be replaced periodically because its service life is limited.



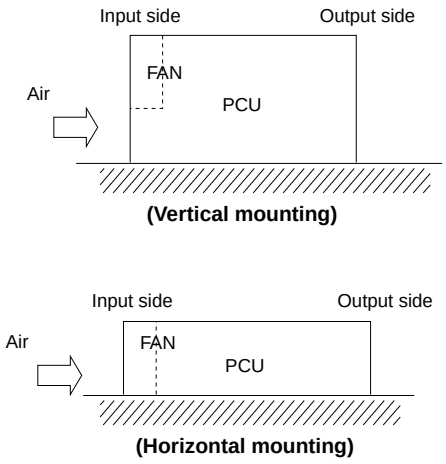
■ Fan's expected service life

* The fan unit's expected service life is based on a 10% failure rate.



10 Mounting

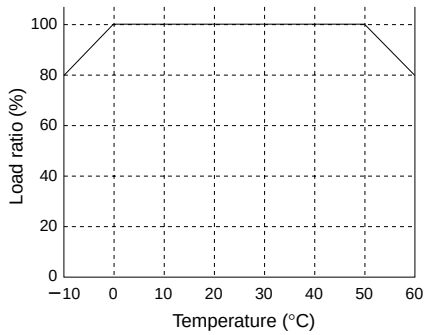
Sanken recommends using the standard mounting method for its power supplies. This standard mounting method is illustrated below.



The length of the screws should take into account the insulation distance from the internal parts. Adjust the length so that the depth from the PCU case's surface is not greater than 4.5 mm.
The recommended mounting screw fastening torque is 142 N•cm.
Please contact Sanken if you intend to use any non-standard mounting method.

11 Derating for ambient temperature

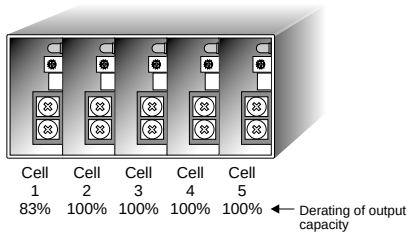
Sanken recommends using the standard mounting method to mount its power supplies.
Use the output derating values shown below, based on the power supply's ambient temperature.



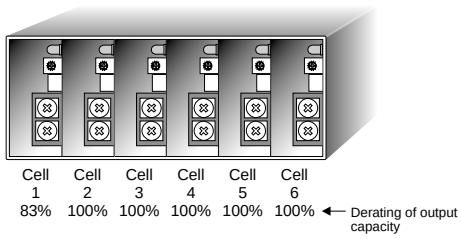
12 Derating based on mounting positions of DC cell modules

Derating based on the mounting positions of the DC cell modules is required for PCU Series power supply.
Derating values based on DC cell module position of various capacities are shown below. Refer to this when determining a configuration of DC cell modules for PCU Series power supplies.

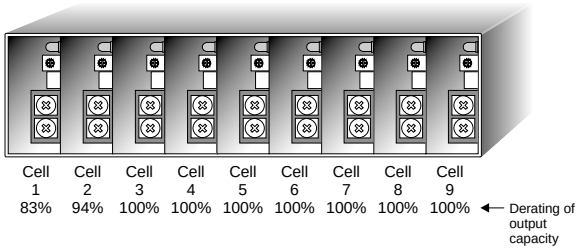
PCU400



PCU600



PCU900



Options

1 **What are the optional functions in PCU Series devices?**

The cell control module provides a wealth of optional functions using microprocessor control.
Microprocessor control means that various types of processing that had previously been handled by hardware (operation of relay circuits, delay circuits, etc.) are now performed as software processing.
The desired operation mode can be easily selected via program settings.
If specification changes are required during the customer's evaluation process, these can also be supported via simple changes in program settings, thus minimizing time loss.

• Alarm sequence
Option **A**

When a fan malfunction or DC output fault is detected, the unit can be switched off at any specified time following transmission of the alarm signal.

* The standard-equipped alarm signal turns off the DC cell module's output at a time (following transmission of the alarm signal) based on standard values set by Sanken.
* If a DC output fault occurs, the corresponding output is shut off immediately. Shut-off times can be set for other output.

• AC power failure
Option **P**

The AC input voltage is monitored, and an AC power fail signal is transmitted when the AC input voltage is set up or reduced. If a power failure (AC power failure) is detected, output can be shut off at any specified time following transmission of the power fail signal (varies depending on the load capacity and DC cell module used). The DC cell module's output hold time can be extended by stopping unnecessary DC output.

* When a longer time setting is entered for the power supply's output hold time (which differs according to the specifications and setup conditions), the DC cell module's output is reduced before the set time has elapsed. For details, please contact Sanken.
* The time for transmission of the standard-equipped AC power fail signal is fixed.

• Cell output sequence
Option **S**

The startup sequence can be set for each DC cell module. Up to nine levels can be set in the startup sequence (when the PCU900-9 cells are used).

* The shut-off sequence can also be set in combination with other options.

• External remote ON/OFF
Option **R**

An external signal can be used to remotely turn the PCU Series DC cell modules ON or OFF (select among turning ON or OFF all DC cell modules at once, half of the cells, or one third of the cells).

• Cell group control
Option **C**

DC cell modules can be grouped (and divided into three groups) and a separate startup sequence can be set for each group.

* When this is done during economy mode (Option E), the shut-down sequence can also be set.
* When this cell group control function (Option C) is selected, the external remote ON/OFF function (Option R) is included. However, it is not possible to use a group sequence after using the external remote ON/OFF function (Option R).

• Economy mode
Option **E**

Power consumption can be reduced during standby by shutting down the PCU Series cell models (PFC cells and DC cells) and stopping the internal fan (power consumption in economy mode is approximately 3.9 W during 100 V AC input). In this case as well, a +5 V STB power supply (CN2's pin 1, 5 V 50 mA, standard equipped) can be used.

• Medical equipment support
Option **M**

Medical equipment standard EN60601-1 (TÜV) certified (PCU400M/600M).
The leakage current is 0.5 mA or less.

Options

2 Combining optional functions

Any combination of PCU Series device options can be used. The following are some examples for reference. For details, please contact Sanken.

• Example of combining cell output sequence Option S with external remote ON/OFF Option R

Operation mode ▶
① External remote ON/OFF function (PCU ON) is used to enable operation of DC cell modules.
② Cell output sequence function is used to sequentially start DC cell modules.
③ Similarly, shut-down operations also can be set.

• Example of combining cell output sequence Option S with economy mode Option E

Operation mode ▶
① Economy mode function (PCU ON) is used to enable operation of PCU Series power supply.
② Cell output sequence function is used to sequentially start DC cell modules.
③ Similarly, shut-down operations also can be set.

• Example of combining cell output sequence Option S with cell group control Option C

Operation mode ▶
① Cell group control function (PCU 1G ON) is used to set up group No. 1 and enable operation of the group.
② Cell output sequence function is used to sequentially start DC cell modules in group No. 1.
③ Operation modes ① and ② are repeated to sequentially start group Nos. 2 and 3.
④ Similarly, shut-down operations also can be set.

3 Examples of parameter setting ranges for optional functions

When optional functions have been selected for a PCU Series power supply, parameters can be set for each function. The setting ranges for some of these parameters are listed below for reference.
Unless otherwise specified by the customer, Sanken's standard value is set.
*** Please contact Sanken concerning use of any other operation mode.**

• Alarm signals

Item	Description	Setting range	Standard setting
Fan alarm	Sets time between fan stoppage and alarm signal output	2s to 25s	10s
DC output fault alarm	Sets time between DC output fault and alarm signal output	0s to 25s	3s
AC power fail signal	Sets time between AC power failure and AC power fail signal output	Within 25 ms (fixed)	Within 25 ms (fixed)
DC output OFF	Sets time between alarm signal output and shut-off of DC power	0s to 25s	0s
	Sets time between AC power fail signal output and shut-off of DC power	0 to 250ms	250ms

• Sequences

Item	Description	Setting range	Standard setting
Enable operation of DC cells when AC power is ON	Sets time between AC power ON and setting of operation enabled status for DC cells	Within 500 ms	—
Cell output sequence	Sets startup sequence for each DC cell	0 to 2500ms	0ms
	Sets the shut-down sequence for each DC cell		
External remote ON/OFF	**Sets time between external remote ON and setting of operation enabled status for DC cells**	60±10ms	—
	Sets time between external remote OFF and stopping of DC cell operation		
	Sets time between external remote ON and DC cell startup sequence	0 to 2500ms	0ms
	Sets time between external remote OFF and DC cell shut-down sequence		
Cell group control	**Sets time between external remote ON and setting of operation enabled status for DC cells**	Within 500 ms	—
	Sets each group's startup sequence	0 to 60s	0s
	Sets each group's shut-down sequence		
	Sets startup sequence of DC cells in each group	0 to 2500ms	0ms
	Sets shut-down sequence of DC cells in each group		
Economy mode	**Sets time between economy mode ON and setting of operation enabled status for DC cells**	260±10ms	—
	Sets time between economy mode OFF and stopping of DC cell operation	60±10ms	

Settings for standard-equipped alarm signals

Sanken's standard settings for alarm signals are listed below.

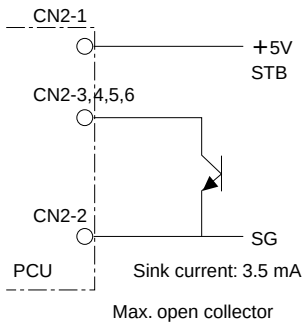
Item	Description	Standard setting
Fan alarm	Sets time between fan stoppage and alarm signal output	10s
DC output fault alarm	Sets time between DC output fault and alarm signal output	3s
DC output OFF	Sets time between alarm signal output and shut-off of DC power	3s

Note: When a DC output fault occurs for any output, the output is shut off immediately.
Other output is shut off after a specified amount of time for "DC output OFF".

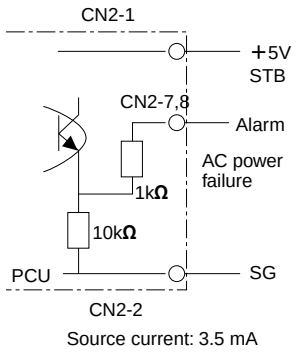
Interface

The logic and interface for the external remote control and alarm signals are described below.

• Remote control <configured by four channels consist of CN2's pins 3 to 6>

CN2 Pin No.	Item	Logic (TTL level)	Interface
3	RMT2 ON/OFF Turns all DC cell modules ON or OFF	L: ON H: OFF	
3, 4, 5	RMT2, 3, 4 ON/OFF Divides DC cell modules into three groups and turns grouped cells ON or OFF	L: ON H: OFF	
6	RMT1 ON/OFF Turns OFF PFC cell modules to set economy mode	L: ON H: OFF	

• Alarm signals <configured by two channels consist of CN2's pins 7 and 8>

CN2 Pin No.	Item	Logic (TTL level)	Interface
7	Alarm Alarm signal is output when specified time has elapsed following alarm detection	L: Normal H: Abnormal	
8 *	AC power failure Signal is output when input voltage reduction or setup occur	L: AC voltage is abnormal (60 to 75 V AC or below) H: AC voltage is normal (70 to 80 V AC or above)	

* The fan alarm signal can be transmitted separately instead of the AC power fail signal.
For details, please contact Sanken.

Product Names

• **Product names:** The name is set as shown below for PCU Series products.

Model name — ✱✱✱✱✱ **Example** PCU600-10001

Registration number (five-digit numerical value)
Registration number is assigned to at Sanken for each of your ordering specifications.

• **Product configuration names:** The product configuration name is set as shown below to designate DC cell configurations and option configurations for PCU Series products.

P [Output capacity] [ ] — [Output voltage] [DC cell module symbol] [Option Symbol] * ... Maximum number of DC cell modules

Output capacity:
4···400W
6···600W
9···900W

Option symbol
M ... Low leakage current for medical equipment support
("M" is entered here only when option M is selected)

Output voltage:
The indicated output voltage is based on the customer's specification.

DC cell module symbol:
A···3.3V
B··· 5V
C···12V
D···15V
E···24V
F···36V
G···48V
H··· 2V
J··· 6V
W11···5V & 5V
W22···12V & 12V
Q1···±5V & ±12V
Q2···±5V & ±15V

Option Symbol:
A ... Alarm sequence
P ... AC power failure
S ... Cell output sequence
R ... External remote ON/OFF
C ... Cell group control
E ... Economy mode

Example 1 **Basic example**

P6 – 5.2B–5B–0–12C–24E–24E APSRE

Number: Output voltage
Letter: DC cell module symbol
This indicates the insertion sequence for Cell 1 to Cell 6, starting from the left.
0 indicates a blank (dummy insertion).

This indicates the selected optional function.

Example 2 **Parallel connection among DC cell modules in unit**

P6 – 5.2B–5B–0–12C–24E2P–E APSRE

This indicates two E modules (cell 5 and cell 6) with 24-V output are connected in parallel
(Parallel block's DC cell symbol + number of parallel connections + parallel symbol "P")
* If three 5-V cells are linked in parallel: 5B3P-B-B.

Example 3 **Series connection among DC cell modules in unit**

P6 – 5.2B–5B–0–12C–100G2S-G APSRE

This indicates two G modules (cell 5 and cell 6) are connected in series to configure a 100-V output
(Series block's DC cell symbol + number of series connections + series symbol "S")

Sample Order Sheet

From your company to Sanken

Your company		
	Company name:	Address:
	Division/Department:	
	Contact person:	
	Telephone number:	Email address:
	Fax number:	Name of device or equipment used:
	Application or purpose:	
	Other:	

Request specifications										
	Input voltage	AC V (V ~ V)								
	Output specifications	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6	Cell 7	Cell 8	Cell 9
	Output voltage (V)									
	Output current (A)									
	Output capacity (W)									
	Total output capacity (W)									
	Optional functions	Alarm sequence	Yes	No	External remote ON/OFF	Yes	No			
		AC power failure	Yes	No	Cell group control	Yes	No			
		Cell output sequence	Yes	No	Economy mode	Yes	No			
	Number of samples and requested delivery date									
	Other									

From Sanken to your company

Proposal specifications										
	Product name									
	Product configuration name									
	Output specifications	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6	Cell 7	Cell 8	Cell 9
	Output voltage (V)									
	Output current (A)									
	Output capacity (W)									
	Total output capacity (W)									
	Other									

MEMO

MEMO

MEMO

● http://www.sanken-ele.co.jp/en/index.html

SANKEN ELECTRIC CO., LTD.

ISO9001/14001 certified
Sanken Electric products are brought to you only through our stringent quality control and environment control based on the ISO9001 and ISO14001 authentication standards.

■Business product line-up: Switching power supplies,uninterruptible power supplies,motor control inverters, DC power units,high-intensity obstacle lights system,various types of power supply equipment,hybrid ICs,monolithic ICs,Hall ICs,transistors,MOS-FETs,thyristors, rectification diodes,Schottky barrier diodes,light-emitting diodes,and cold-cathode dischage tubes

Sanken Electric Co., Ltd.
1-11-1 Nishi-Ikebukuro, Toshima-ku, Tokyo
Tel: 81-3-3986-6164 Fax: 81-3-3986-8637

Overseas Sales Offices

●Asia

Singapore
Sanken Electric Singapore Pte. Ltd.
150 Beach Road,#14-03 The Gateway West Singapore 189720, Singapore
Tel: 65-6291-4755 Fax: 65-6297-1744

China
Sanken Electric Hong Kong Co., Ltd.
Suite 1026 Ocean Centre, Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: 852-2735-5262 Fax: 852-2735-5494

Sanken Electric (Shanghai) Co., Ltd.
Room 3202, Maxdo Centre, Xingyi Road 8 Changning district, Shanghai, China
Tel: 86-21-5208-1177 Fax: 86-21-5208-1757

Korea
Sanken Electric Korea Co., Ltd.
MIRAE ASSET LIFE BLDG., 6F 168, Kongduk-dong, Mapo-ku, Seoul, 121-705, Korea
Tel: 82-2-714-3700 Fax: 82-2-3272-2145

Taiwan
Taiwan Sanken Electric Co., Ltd.
Room 1801, 18th Floor, 88 Jung Shiau East Road, Sec. 2, Taipei 100, Taiwan R.O.C.
Tel: 886-2-2356-8161 Fax: 886-2-2356-8261

●North America

Allegro MicroSystems, Inc.
115 Northeast Cutoff, Worcester, MA 01615 General Information
Tel: (508)853-5000 Fax: (508)853-3353

●Europe

Allegro MicroSystems Europe Limited
Balfour House, Churchfield Road Walton-on-Thames, Surrey KT12 2TD, U.K.
Tel: 44-1932-253355 Fax: 44-1932-246622

Sanken Power Systems (UK) Limited
Abercynon, Mountain Ash, Mid Glamorgan, CF45 4XA, U.K.
Tel: (0)1443-742333 Fax: (0)1443-742100

•New publication, effective Oct., 2005.
•Specifications are subject to change without notice.
•For typographical reasons, the color tones of the products featured in this brochure may vary from those of the actual products.

k1-S11EA0-0510030ND