
SWG Series Switch Mode Power Supply

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This paper is prepared as of December 2016 and subject to change without notice.

Safety Precautions





Be sure to observe the precautions explained below.





1. Be sure to read this complete document and the detailed specifications of the individual products in the product series before using the product.
2. The products should be handled only by persons who have competent electrical knowledge.
3. The products are DC stabilized power supplies with special structures created for mounting on devices, please implement safety design of the devices under customers' responsibility not to endanger human life, health and property due to malfunction and/or failures of the products when using.
4. Although Sanken strives to improve the quality and the reliability of the products, please implement safety designs that comply or exceed all industry standards and all of the regulatory requirements of the jurisdictions where the products will be used. Safety designs for use of the products are the responsibility of the customer or user. The customer or user has the responsibility not to endanger human life or health, or to damage property due to malfunction and/or failures of the products when using them.
5. Sanken products listed in this publication are NOT intended to use for equipment and applications where extremely high reliability is required such as aerospace equipment, nuclear power-control stations and medical equipment, for which there is enhanced risk that the products could endanger human life or health due to malfunction and/or failures of the products (Classified III or above per GHTF, Global Harmonization Task Force, Medical Equipment Class) Sanken assumes no responsibility for any damage to any customer and/or any third party due to use of Sanken products for the such use.
6. When considering use of the products for the following equipment and applications, for which there is the risk that may heavily endanger human life or affect maintenance of public function, be sure to secure sufficient fail-safe function at customers' devices by means of multiplexing of systems and other method.
 - Electric trains and other conveyances such as elevators, etc. that could result in personal injury
 - Vehicles and vessels, etc. that could be affected by vibration or shock
 - Traffic systems, etc. that could exert an important influence on society and the public
 - Any other applications and equipment similar to those mentioned above.
7. Be sure to observe the items below:
 - Do not disassemble, repair, or modify these products.
 - Do not touch inside of the products because of high voltage.
 - Use the products within the specified input voltage, frequency, output voltage, and output current ranges.
 - Be sure to observe designated ambient environment conditions, such as ambient temperature and relative humidity.
 - Each product model has a designated method for installation and mounting. Observe installation and mounting instructions.

Appearance and Meaning of Safety Warnings

In this document, the levels of safety warnings are divided into two categories, Hazard and Caution.




 Hazard	Disregarding a Hazard display and incorrectly using the product could result in death and/or serious injury.
 Caution	Disregarding a Caution display and incorrectly using the product could result in personal injury and/or physical damage.

Be sure to observe the safety precautions indicated on the product and in documentation by symbols and text. The general meaning of symbols is as follows:

	Prohibited action
	Strong warning
	Electric shock hazard
	Fire hazard

Hazard and Caution Safety Warnings

General Cautionary Notices

 Hazard	
	<ul style="list-style-type: none"> • Shock hazard • Never take off the cover. • There is a high voltage circuit inside and touching it mistakenly could result in death and/or serious injury.
	<ul style="list-style-type: none"> • Fire hazard • If any abnormal odor or abnormal noise, or smoking or ignition arises in the product, immediately turn off the product and cut the power input to the product by opening an external circuit breaker or other means. • Please contact the vendor from which the product was purchased and/or Sanken. • <u>In case of fire, use a fire extinguisher of a powder/ABC type approved for use on electrical fires.</u> <p><u>Note: Never use water.</u></p>

Other Precautions



Caution

	Each power supply model has a designated input/output range. Be sure to use the products within designated input/output range.
	Be sure that the total power consumption connecting with the load does not exceed the rated output capacity per each power supply. If a power supply is used under an overload condition, it could cause fire.
	Be sure to use thick wire for input/output wiring, and that it is appropriate for the input/output power. If thin wires are used, it could cause fire.
	Be sure not to use and/or store the products in temperature, humidity, and dew condensation conditions beyond the ambient environmental conditions specified in the catalog and/or operation manual, otherwise failure of the products could result.
	When the power supply is operated in dusty conditions, please apply dust proofing measures. The dust could interfere heat dissipation and cause failure and/or fire.
	When the power supply is installed, be sure to use designated screws (paying particular attention to screw length and diameter), otherwise electric shock and/or fire could result.
	The products are not intended for use in equipment that requires high reliability for sustaining human life. Be sure not to use the products for any particular application such as in nuclear reactor and/or power control systems, aerospace applications, special Medical equipment, and so forth.
	When installing the products, be sure to connect each input terminal and output terminal without fail, otherwise malfunction and damage to the products, personal injury, and fire could result.
	Be sure not to apply any external voltage to output terminals of the products, otherwise damage to the internal devices of the products could result.
	Be sure not to use and/or store the products in an environment with corrosive gases such as hydrogen sulfide, sulfur dioxide, and so forth, otherwise damage to the products could result.
	When operating the products in an environment with interference from radio waves, electric fields, or magnetic fields, the products may malfunction, which could lead to failures. Be sure not to use the products under such conditions.
	Although Sanken strives to improve the quality and the reliability of the products, the customer and user are responsible to be sure to apply safe design of their equipment before using the products.

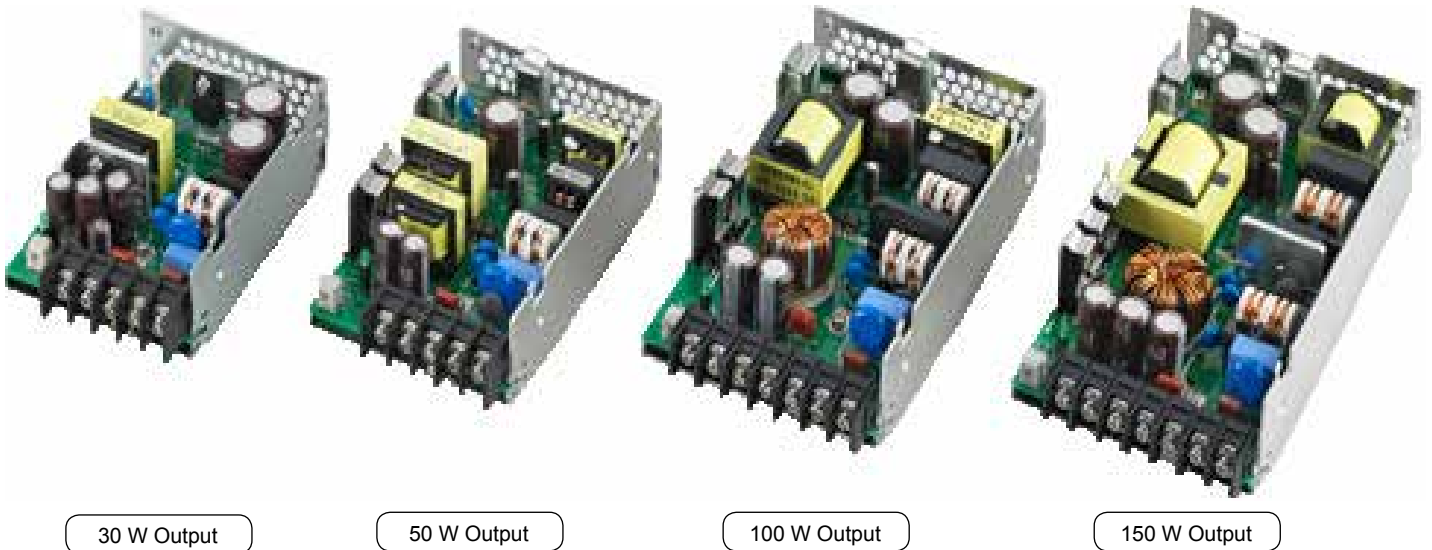
Introduction to SWG Series

General Description

The SWG series are compact, lightweight power supplies, ideal for applications with various configurations computer peripherals and industrial machinery.

Features and Benefits

- Single output with chassis
- World wide input (85 to 264 VAC)
- Each 30W, 50W, 100W, and 150W output capacity available in 5V/12V/24V
- Provides high efficiency and low noise via synchronous rectification technology
- Acquired CE marking for Low Voltage Directive
- Conductive emission class B (VCCI class B, FCC class B, EN55022 class B)
- Safety standards: UL60950-1, C-UL (CSA60950-1), DEMKO (EN60950-1)
- Options: remote on/off control, connector, cover, and clasp for DIN rail

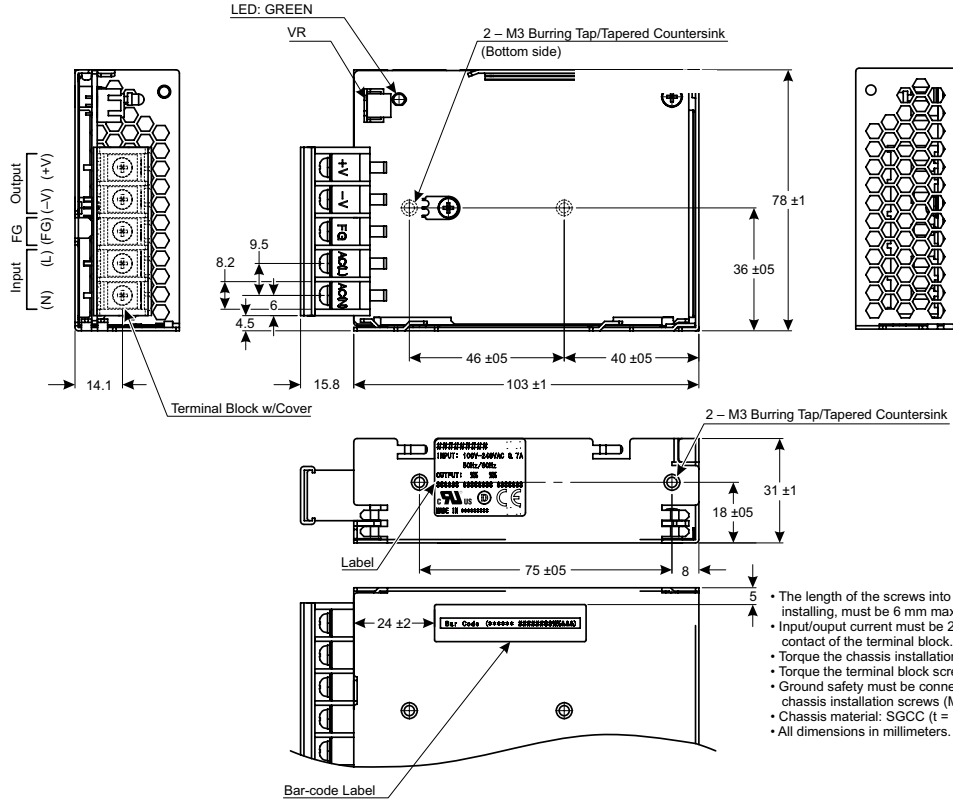


Models shown without optional chassis and cover.

Product Models

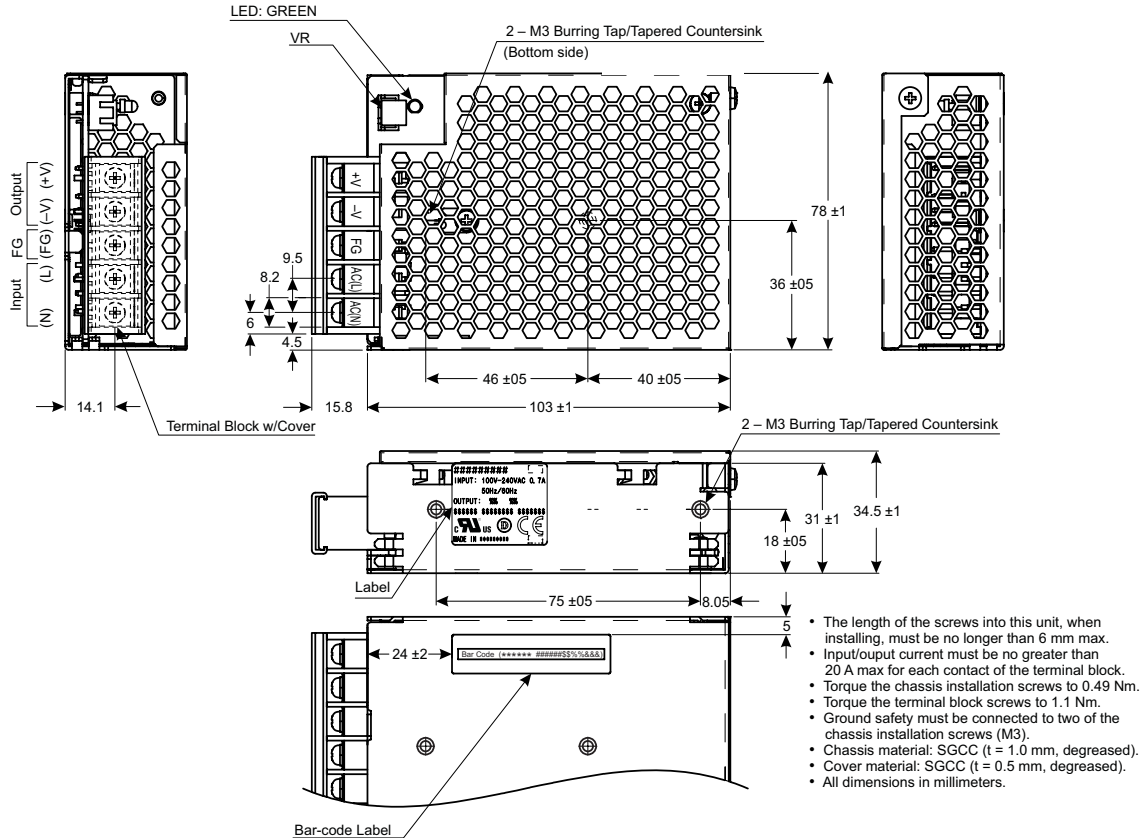
Model SWG030-XX

Output Power: 30 W, Output Voltage: 5, 12 or 24 V



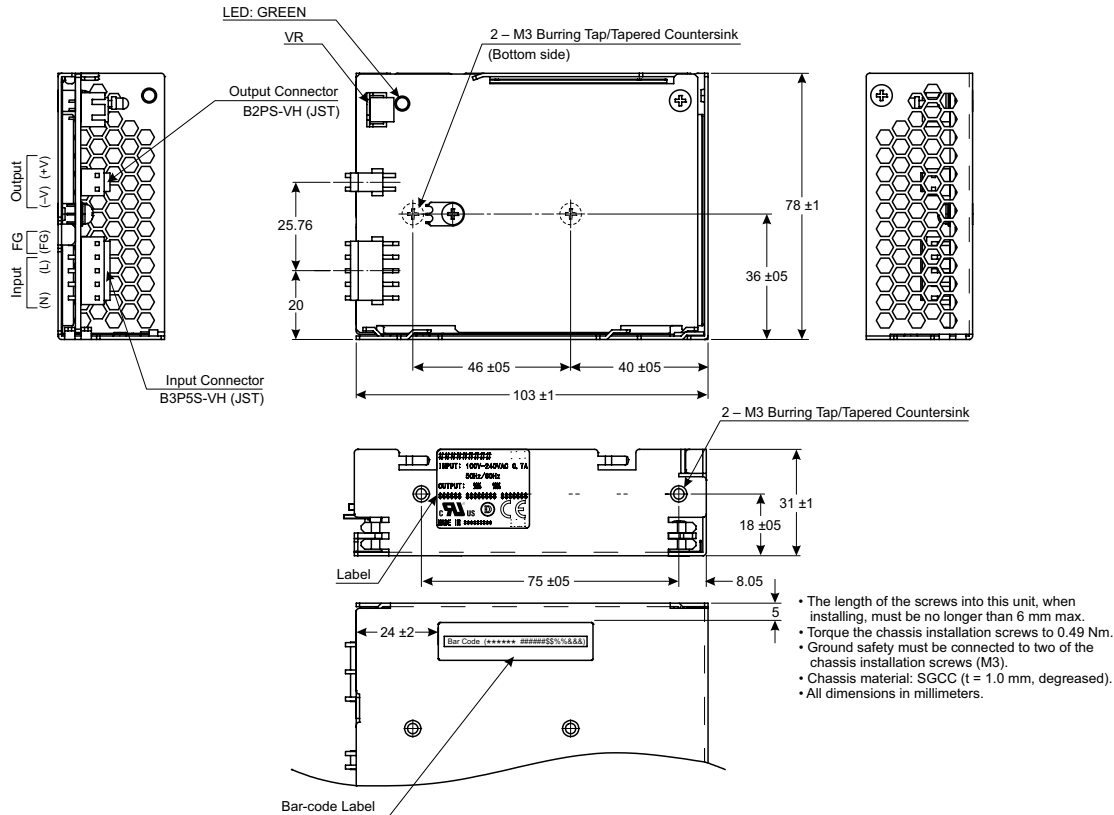
Model SWG030-XX-C

Output Power: 30 W, Output Voltage: 5, 12, and 24 V



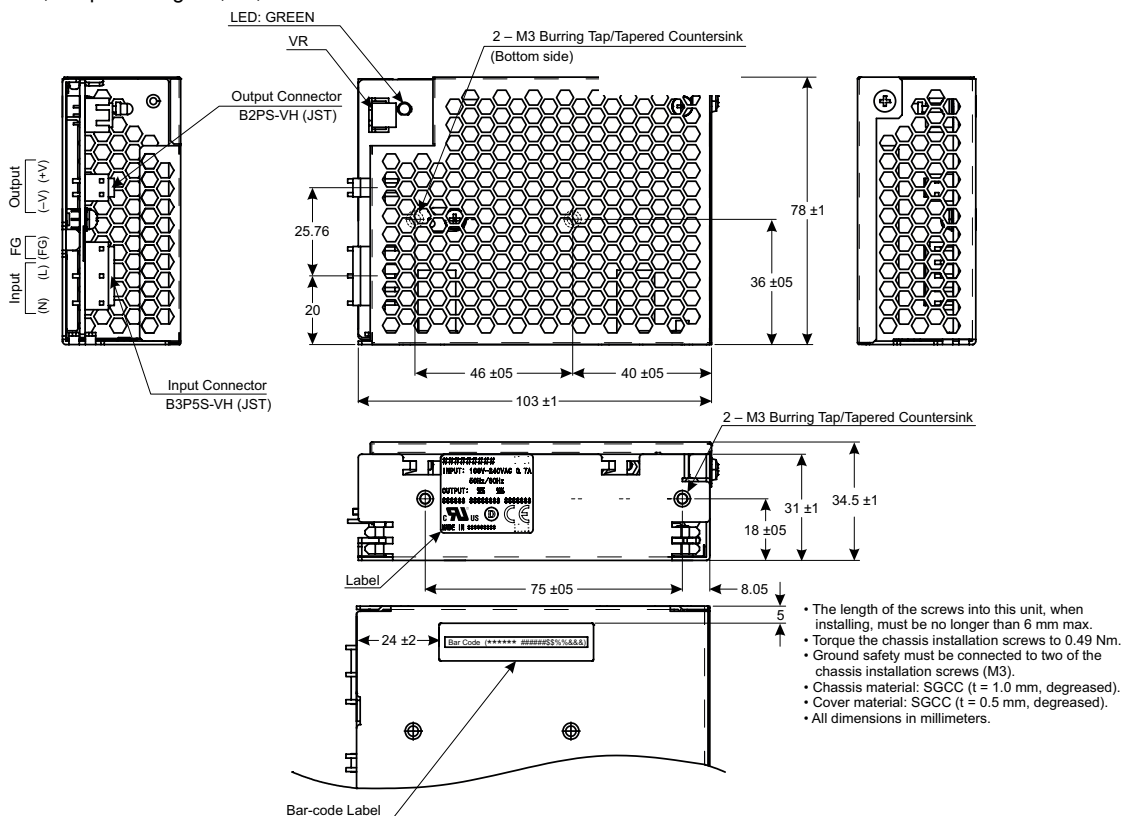
Model SWG030-XX-CN

Output Power: 30 W, Output Voltage: 5, 12, and 24 V



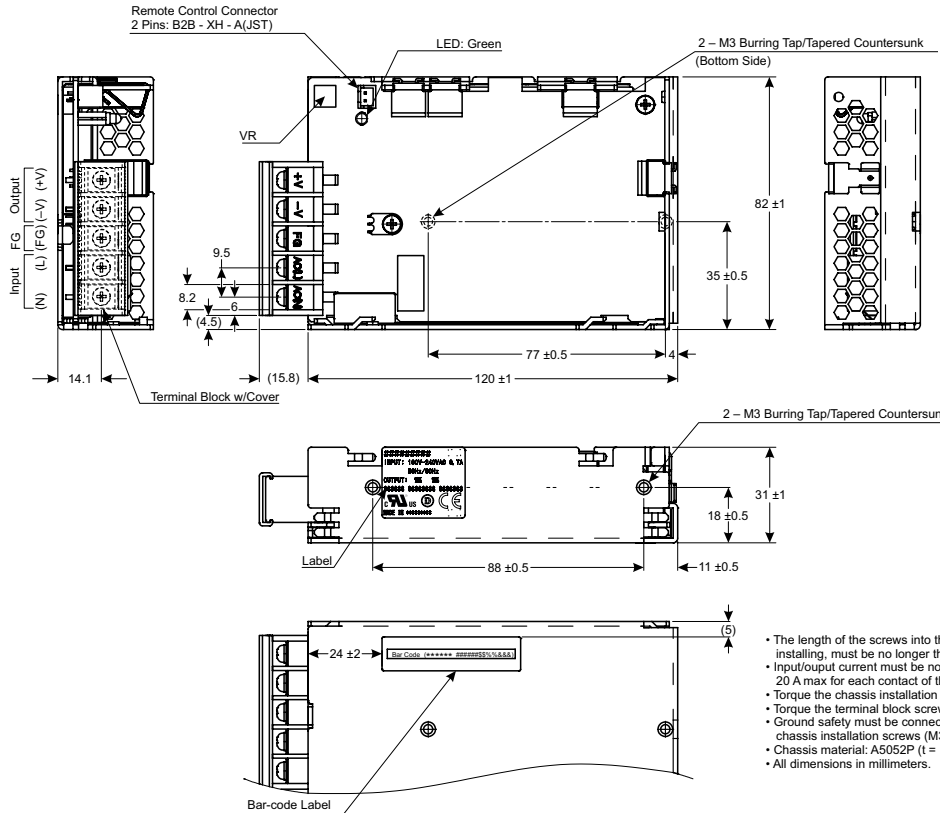
Model SWG030-XX-C-CN

Output Power: 30 W, Output Voltage: 5, 12, and 24 V



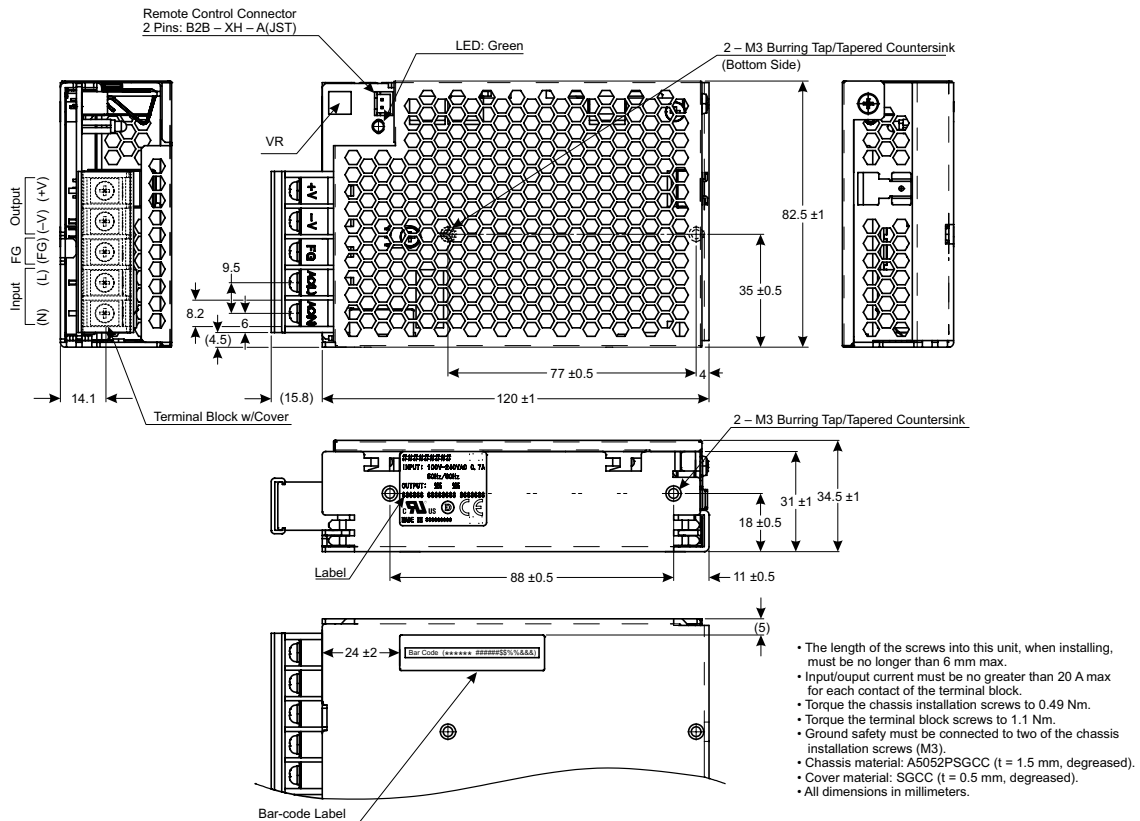
Model SWG050-XX

Output Power: 50 W, Output Voltage: 5, 12, and 24 V



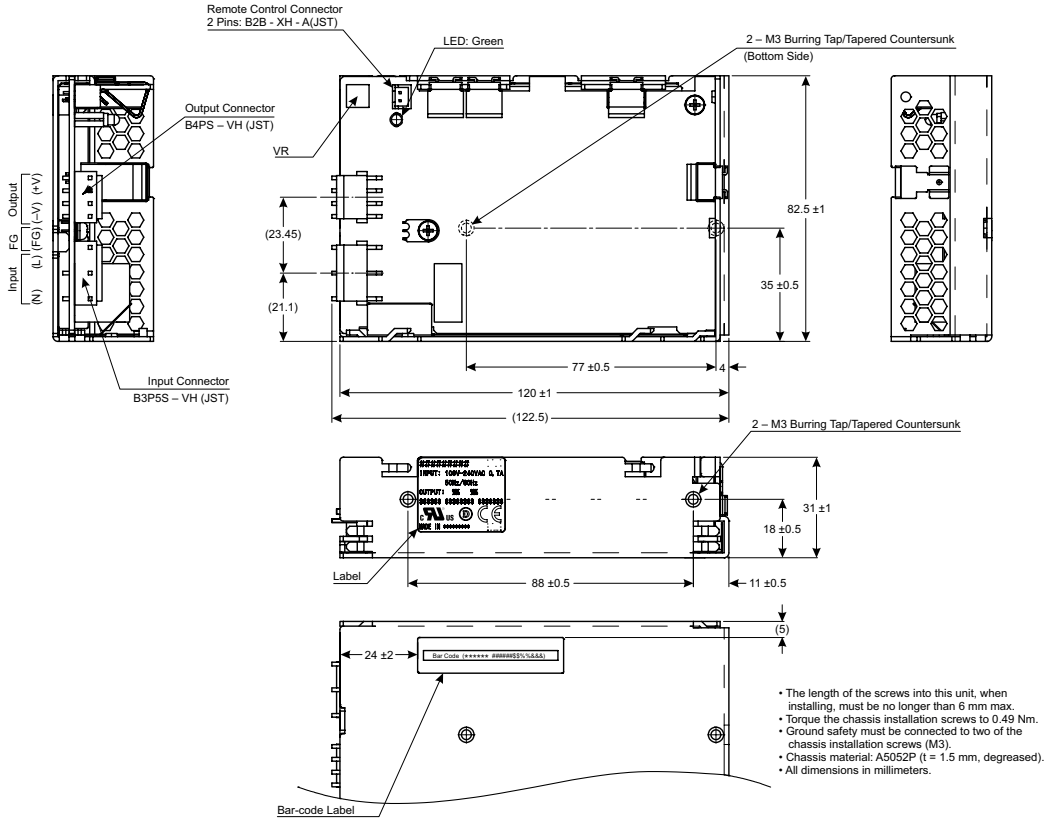
Model SWG050-XX-C

Output Power: 50 W, Output Voltage: 5, 12, and 24 V



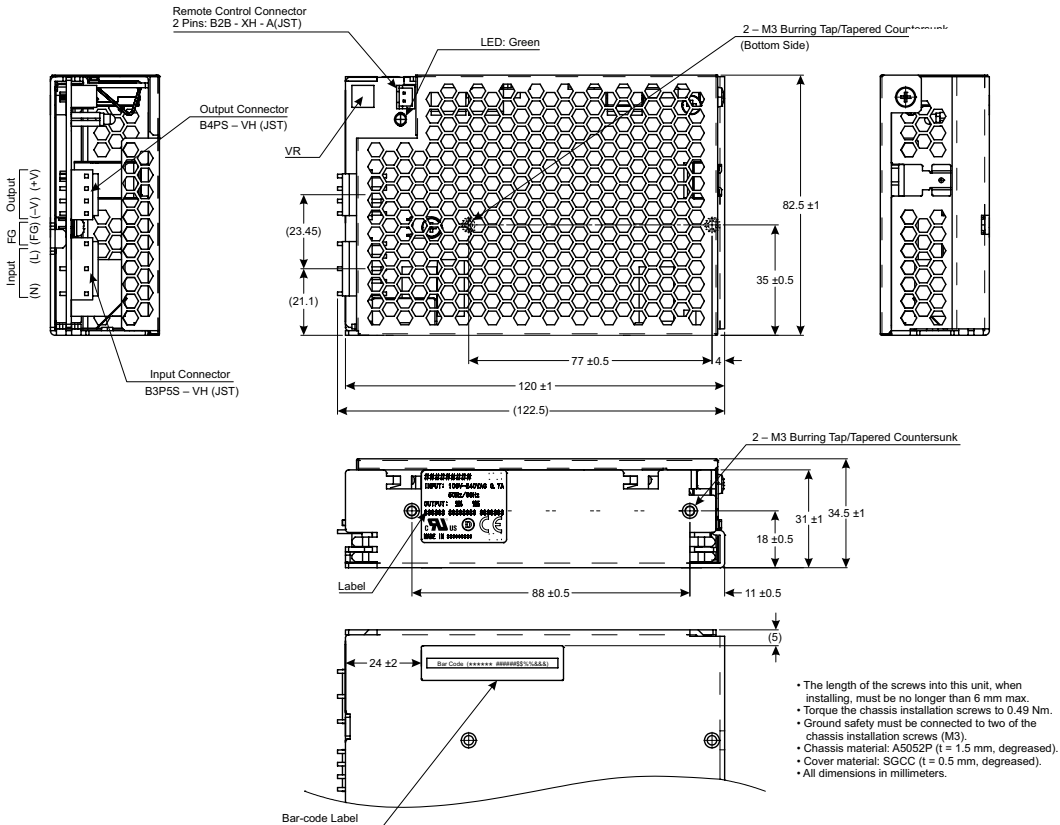
Model SWG050-XX-CN

Output Power: 50 W, Output Voltage: 5, 12, and 24 V



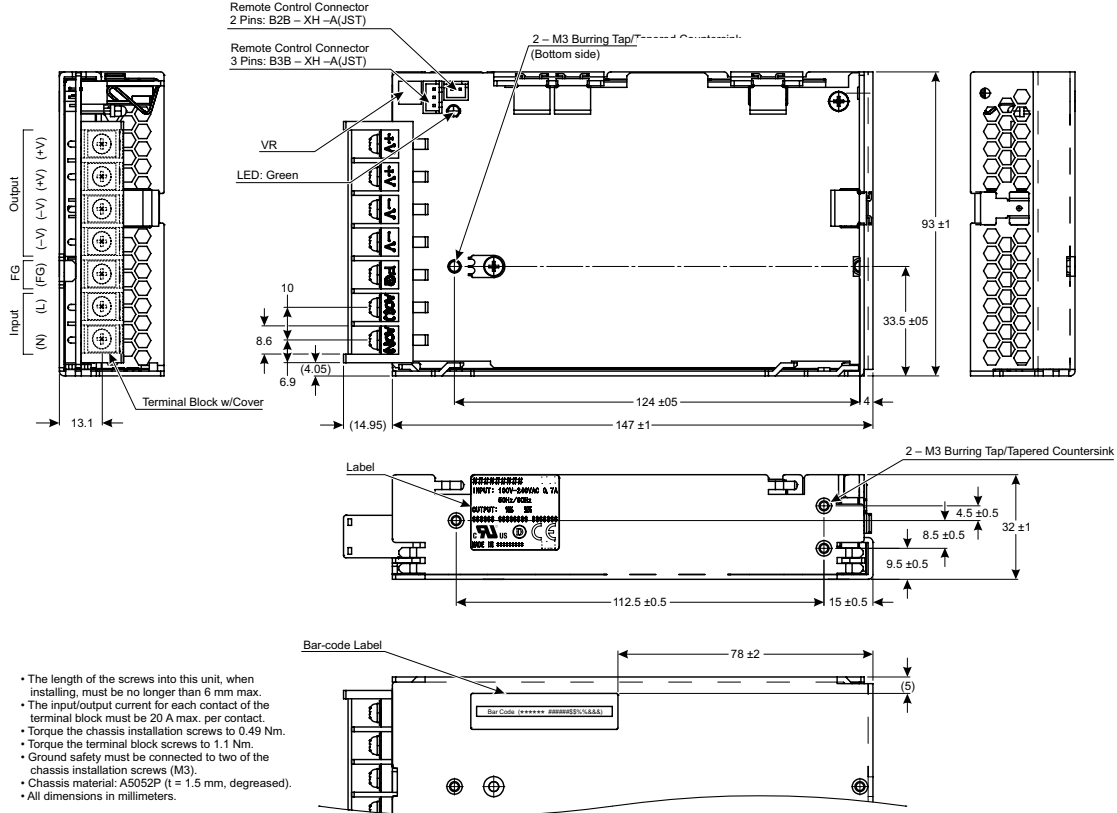
Model SWG050-XX-C-CN

Output Power: 50 W, Output Voltage: 5, 12, and 24 V



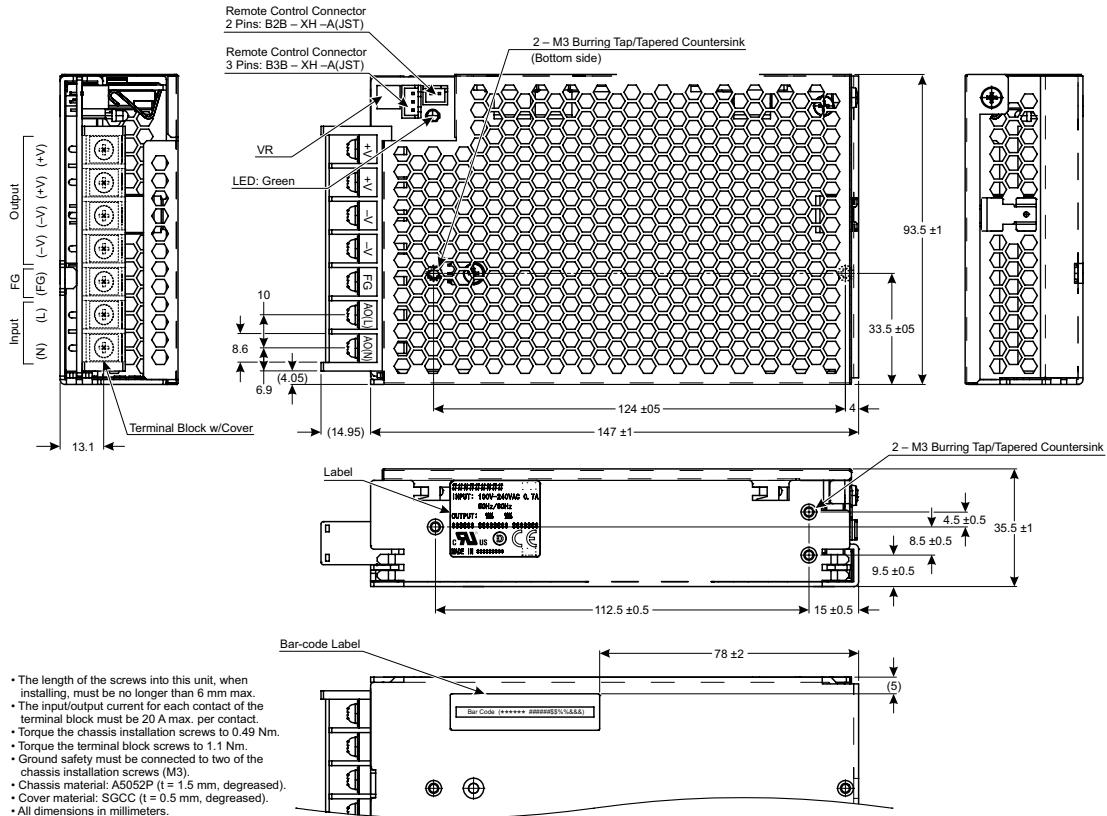
Model SWG100-XX

Output Power: 100 W, Output Voltage: 5, 12, and 24 V



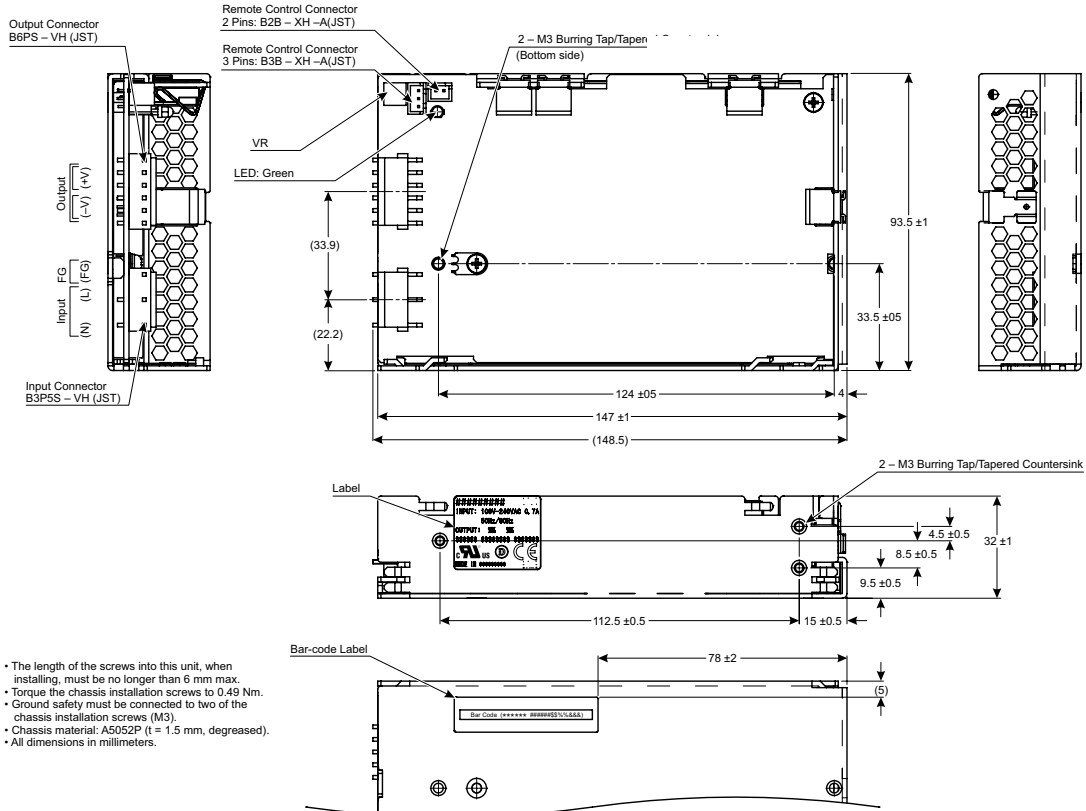
Model SWG100-XX-C

Output Power: 100 W, Output Voltage: 5, 12, and 24 V



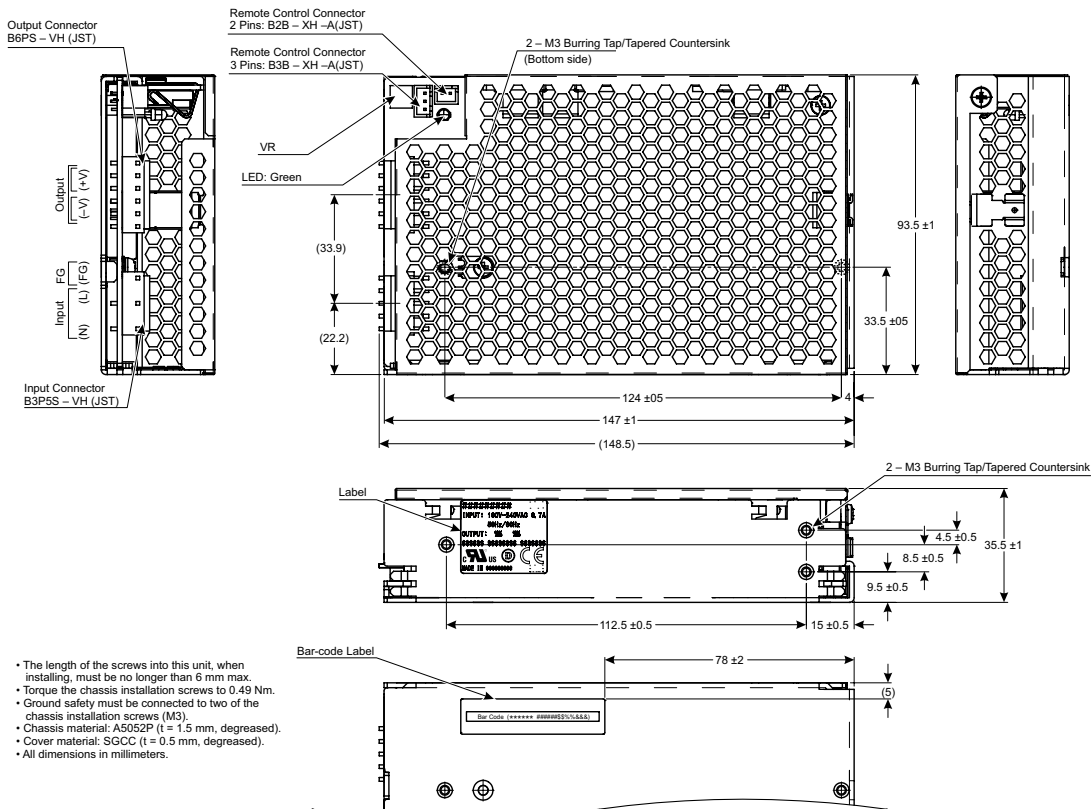
Model SWG100-XX-CN

Output Power: 100 W, Output Voltage: 5, 12, and 24 V



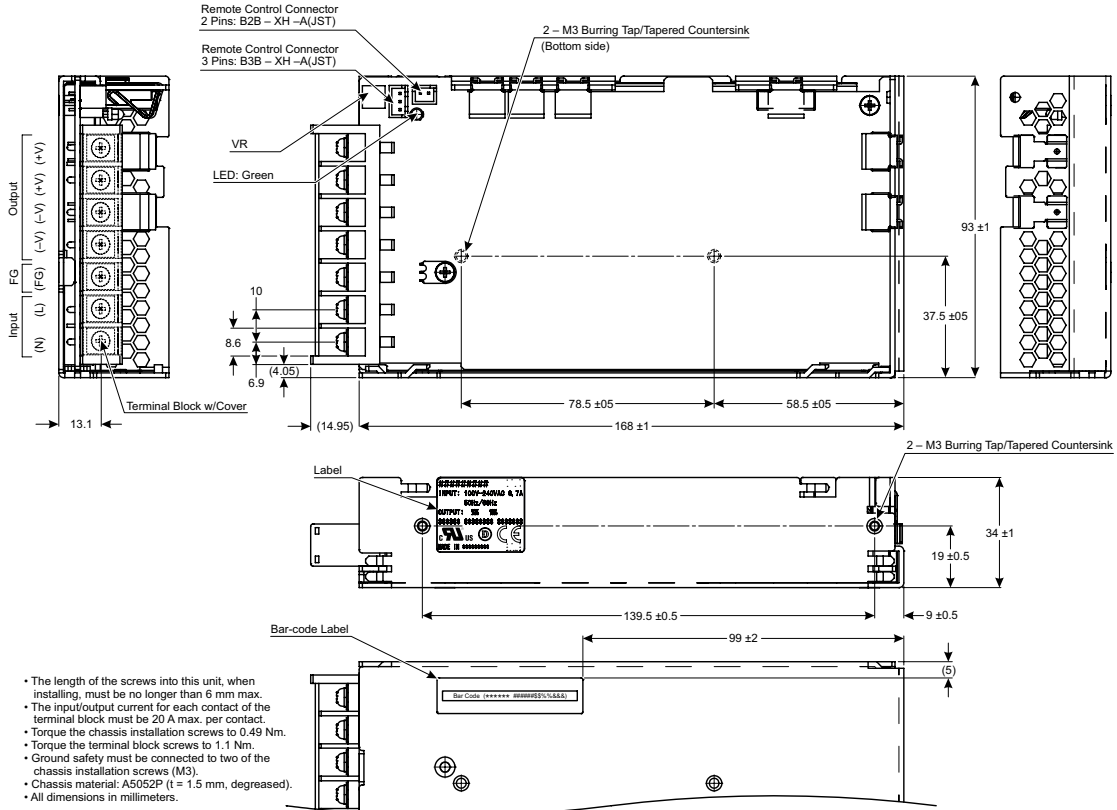
Model SWG100-XX-C-CN

Output Power: 100 W, Output Voltage: 5, 12, and 24 V



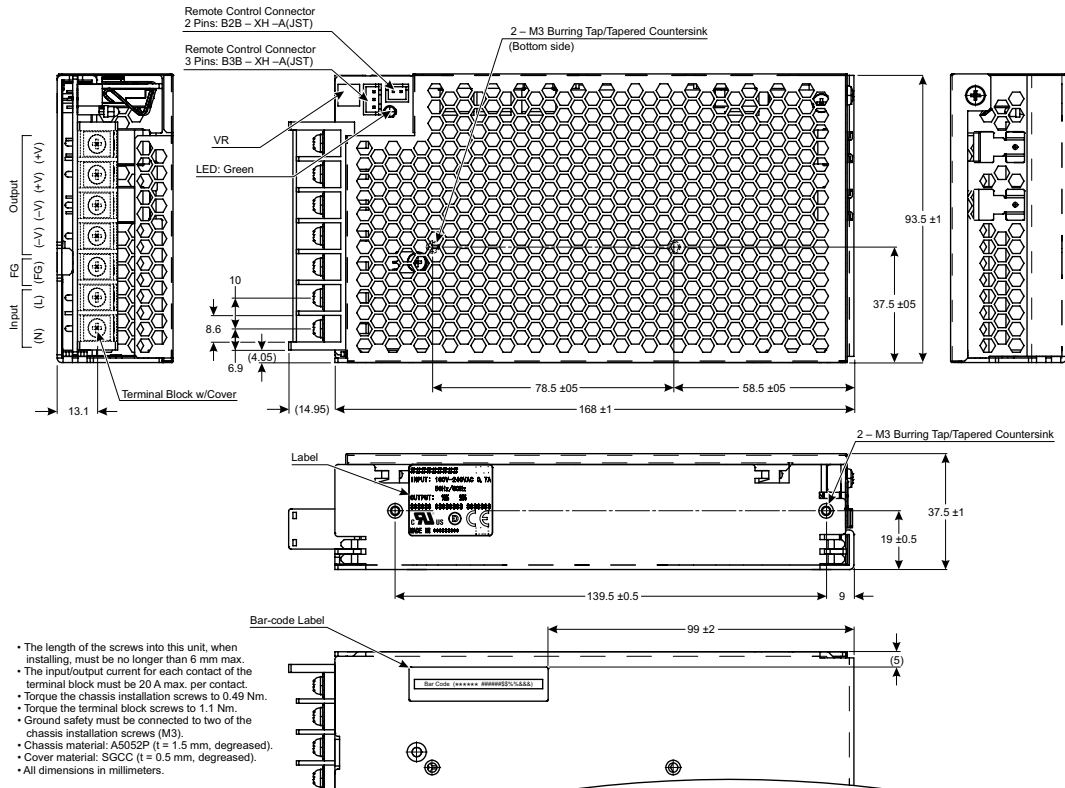
Model SWG150-XX

Output Power: 150 W, Output Voltage: 5, 12, and 24 V



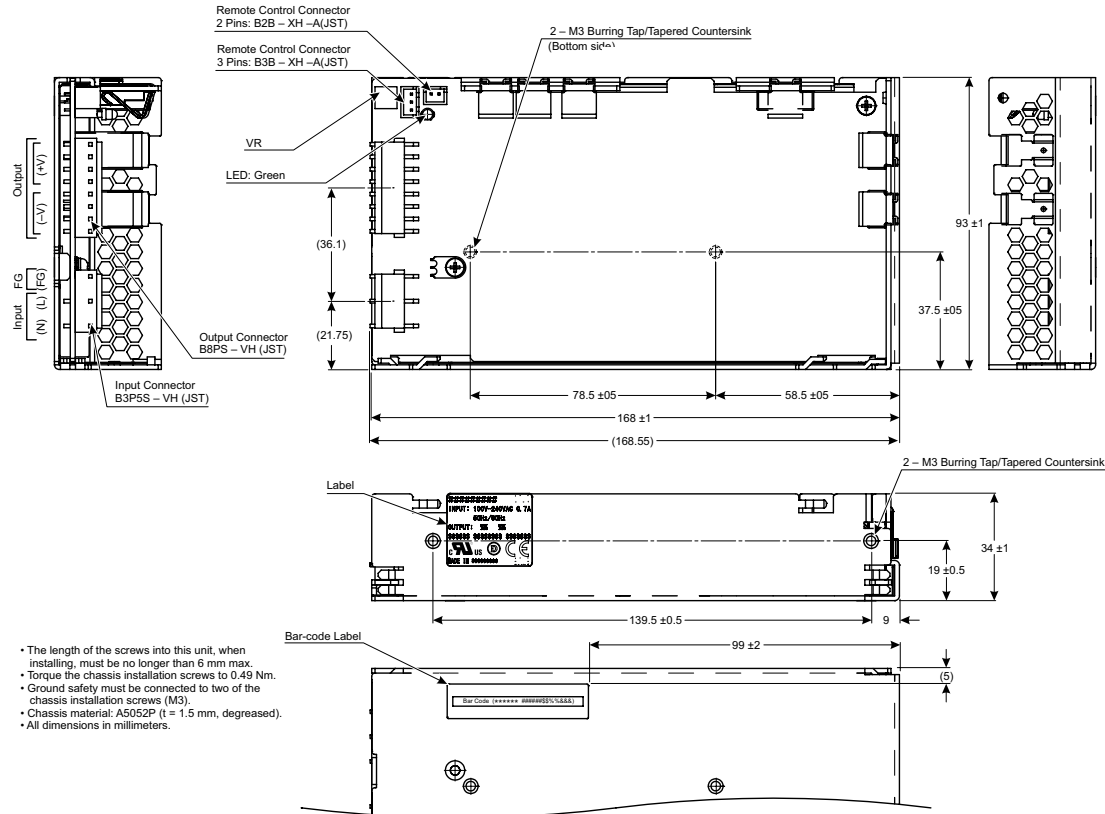
Model SWG150-XX-C

Output Power: 150 W, Output Voltage: 5, 12, and 24 V



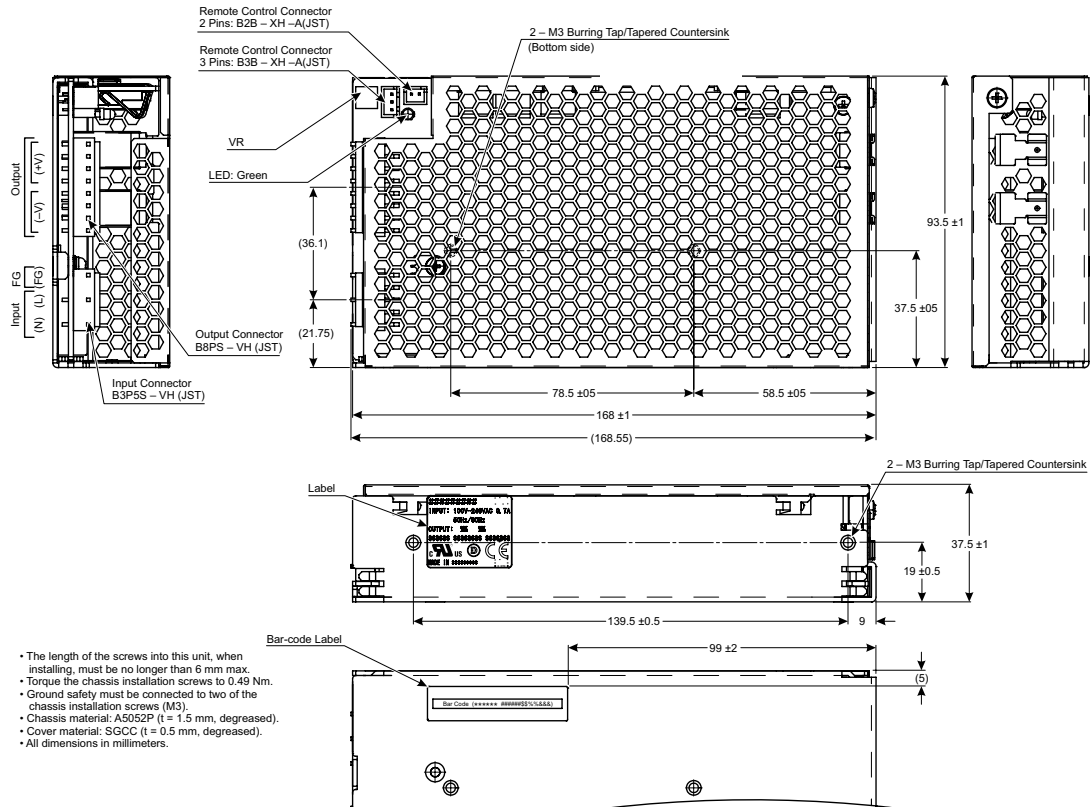
Model SWG150-XX-CN

Output Power: 150 W, Output Voltage: 5, 12, and 24 V

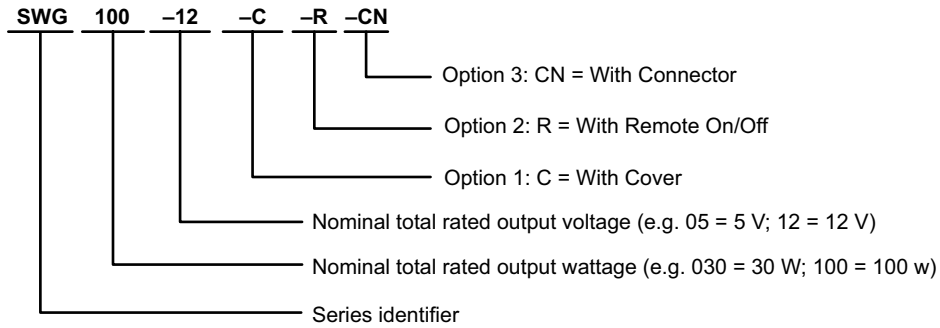


Model SWG150-XX-C-CN

Output Power: 150 W, Output Voltage: 5, 12, and 24 V



Model Number Description



Output Power	Output Voltage	Model Number	No Options	Cover	Remote On/Off	Connector	
030 W 050 W 100 W 150 W	5 V	SWGXXX-05	•				
		SWGXXX-05-C		•			
		SWGXXX-05-C-CN		•		•	
		SWGXXX-05-CN				•	
		SWGXXX-05-C-R		•	•		
		SWGXXX-05-C-R-CN		•	•	•	
		SWGXXX-05-R				•	
		SWGXXX-05-R-CN				•	•
	12 V	SWGXXX-12	•				
		SWGXXX-12-C		•			
		SWGXXX-12-C-CN		•			•
		SWGXXX-12-CN					•
		SWGXXX-12-C-R		•	•		
		SWGXXX-12-C-R-CN		•	•	•	
		SWGXXX-12-R				•	
		SWGXXX-12-R-CN				•	•
	24 V	SWGXXX-24	•				
		SWGXXX-24-C		•			
		SWGXXX-24-C-CN		•			•
		SWGXXX-24-CN					•
		SWGXXX-24-C-R		•	•		
		SWGXXX-24-C-R-CN		•	•	•	
		SWGXXX-24-R				•	
		SWGXXX-24-C-R-CN				•	•

Remote on/off option is not available on SWG030 models.

Connector option is not available on SWG100-05 and SWG150-05.

Remote sensing is available as an option on SWG100-05 and SWG150-05.

Optional exclusive clasp for DIN rail is available.

- Installation to DIN rail is made by exclusive clasp.
- Clasp for DIN rail is sold separately.
- When clasp is installed for DIN rail, vibration and shock specifications differ from that of original specification.

Please consult with Sanken for details.

Input and Output Terminals, Connectors, and Pin Assignments

SWG030-XX

Input/Output Terminal Stand

CN1 Terminal Stand: DT-4C-B14W (DINKLE)

No.	Display	Input/Output	Note
1	N	AC IN	
2	L	AC IN	
3	FG	FG	
4	-V	DC OUT	
5	+V	DC OUT	

Input/Output Connector (Optional)

Connector Socket					Mating Plug	Connector Contacts
Identifier	Number	Display	Input/Output	Manufacturer Part Number		
CN6	1	FG	FG	B3P5S-VH	VHR-5M	SVH-41T-P1.1
	2	NC	NC			
	3	L	AC IN			
	4	NC	NC			
	5	N	AC IN			
CN7	1	+V	DC OUT	B2PS-VH	VHR-2N	SVH-41T-P1.1
	2	-V	DC OUT			

SWG050-XX

Input/Output Terminal Stand

CN1 Terminal Stand: DT-4C-B14W (DINKLE)

No.	Display	Input/Output	Note
1	N	AC IN	
2	L	AC IN	
3	FG	FG	
4	-V	DC OUT	
5	+V	DC OUT	

Input/Output Connecotr (Optional)

Connector Socket					Mating Plug	Connector Contacts
Identifier	Number	Display	Input/Output	Manufacturer Part Number		
CN6	1	FG	FG	B3P5S-VH	VHR-5M	SVH-41T-P1.1
	2	NC	NC			
	3	L	AC IN			
	4	NC	NC			
	5	N	AC IN			
CN7	1	+V	DC OUT	B4PS-VH	VHR-4N	SVH-41T-P1.1
	2	+V	DC OUT			
	3	-V	DC OUT			
	4	-V	DC OUT			

Remote On/Off Connecotr (Optional)

Connector Socket				Mating Plug	Connector Contacts
Identifier	Number	Input/Output	Manufacturer Part Number		
CN2	1	ON/OFF Signal	B2B-XH-A	XHP-2	SXH-001T-P0.6
	2	COM			

SWG100-XX

Input/Output Terminal Stand

CN1 Terminal Stand: DT-51-B14W (DINKLE)

No.	Display	Input/Output	Note
1	N	AC IN	
2	L	AC IN	
3	FG	FG	
4	-V	DC OUT	
5	-V	DC OUT	
6	+V	DC OUT	
7	+V	DC OUT	

Input/Output Connector (Optional)

Connector Socket					Mating Plug	Connector Contacts
Identifier	Number	Display	Input/Output	Manufacturer Part Number		
CN6	1	FG	FG	B3P5S-VH	VHR-5M	SVH-41T-P1.1
	2	NC	NC			
	3	L	AC IN			
	4	NC	NC			
	5	N	AC IN			
CN7	1	+V	DC OUT	B6PS-VH	VHR-6N	SVH-41T-P1.1
	2	+V	DC OUT			
	3	+V	DC OUT			
	4	-V	DC OUT			
	5	-V	DC OUT			
	6	-V	DC OUT			

Note: No connector option is available for SWG100-05

Remote On/Off Connector (Optional)

Connector Socket				Mating Plug	Connector Contacts
Identifier	Number	Input/Output	Manufacturer Part Number		
CN2	1	ON/OFF Signal	B2B-XH-A	XHP-2	SXH-001T-P0.6
	2	COM			

SWG150-XX

Input/Output Terminal Stand

CN1 Terminal Stand: DT-51-B14W (DINKLE)

No.	Display	Input/Output	Note
1	N	AC IN	
2	L	AC IN	
3	FG	FG	
4	-V	DC OUT	
5	-V	DC OUT	
6	+V	DC OUT	
7	+V	DC OUT	

Input/Output Connector (Optional)

Connector Socket					Mating Plug	Connector Contacts
Identifier	Number	Display	Input/Output	Manufacturer Part Number		
CN6	1	FG	FG	B3P5S-VH	VHR-5M	SVH-41T-P1.1
	2	NC	NC			
	3	L	AC IN			
	4	NC	NC			
	5	N	AC IN			
CN7	1	+V	DC OUT	B8PS-VH	VHR-8N	SVH-41T-P1.1
	2	+V	DC OUT			
	3	+V	DC OUT			
	4	+V	DC OUT			
	5	-V	DC OUT			
	6	-V	DC OUT			
	7	-V	DC OUT			
	8	-V	DC OUT			

Note: No connector option is available for SWG150-05

Remote On/Off Connector (Optional)

Connector Socket				Mating Plug	Connector Contacts
Identifier	Number	Input/Output	Manufacturer Part Number		
CN2	1	ON/OFF Signal	B2B-XH-A	XHP-2	SXH-001T-P0.6
	2	COM			

Functional Description

Input Voltage Range, Harmonic Current and Inrush Current

Input Voltage Range

Although the power supply is designed for 85 to 264 VAC and VDC as specified in each module, rated input voltage for safety standards is defined as 100 to 240 VAC, 50/60 Hz.

Please consult with Sanken if rectangular-wave input voltage, such as from a UPS and inverter, is applied.

If dynamic voltage variation is applied, it could cause the power supply to exceed the rated voltage output accuracy.



CAUTION: If a voltage or current that is not specified is applied, it could cause malfunction and/or damage to the power supply.

Harmonic Current

A power factor correction circuit (i.e. active filter) is not incorporated into the SWG030. If multiple power supplies are used in the same device, the input harmonic could extend beyond the specifications.

Inrush Current

The SWG power supplies incorporate an inrush current protection circuit. However, when using a switch for controlling input, ensure that the switch used can withstand the expected inrush current.



CAUTION: If the power supplies are not allowed to cool completely before resuming operation after shutting down, the inrush current could exceed the specified value.

Protection Functions

Overcurrent Protection (OCP)

Although the SWG power supplies incorporate overcurrent protection (OCP), they should not be used under overcurrent conditions (i.e. overvoltage condition).



CAUTION: If the output terminals are shorted, the capacitor inside could be discharged momentarily, which could cause malfunction and/or damage to the power supply.

The SWG power supplies incorporate intermittent OCP mode. When the output voltage decreases by a specified value due to activation of the OCP circuit, the intermittent OCP mode shuts down the output and decreases mean current.

Overvoltage Protection (OVP)

The SWG power supplies are equipped with an overvoltage protection (OVP) circuit. When the OVP is activated, the input should be shut off, and the AC supply should not be reapplied for at least 3 minutes. The waiting period for the reapplication of the AC supply depends on the input voltage at activation and the product model.

Output Voltage Variation and Remote On/Off

Output Voltage Variation

Output voltage may be adjusted using an output voltage adjustment knob. Turning the knob clockwise increases the output voltage, while turning the knob counterclockwise decreases the output voltage.

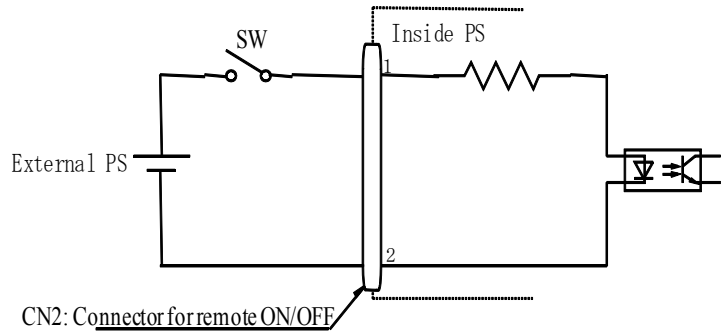
Remote On/Off

A remote On/Off option is available on the SWG050, SWG100 and SWG150.

The remote On/Off option is not available on the SWG030.

In order to use the remote On/Off option, an external AC power

supply is required to remotely control and apply voltage to connector N2.



Voltage Between Pin 1 and Pin 2 (V)		Inrush Current (mA)
When Output is ON	When Output is OFF	
4.5 to 12.5	0 to 0.5	20 max.

The remote On/Off control circuit (CN2: PIN1; PIN2) is insulated from input, output, and FG.

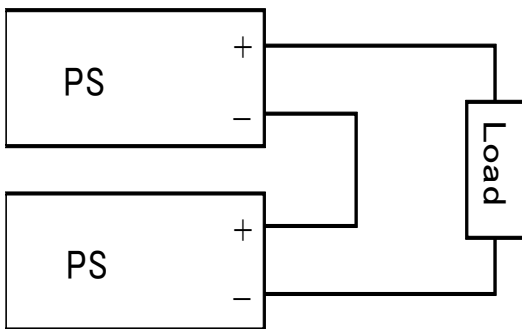
Insulation withstand voltages are as follows:

	Withstand Insulation
CN2: PIN1; PIN2 - Input	3000 VAC
CN2: PIN1; PIN2 - Output	500 VAC
CN2: PIN1; PIN2 - FG	500 VAC

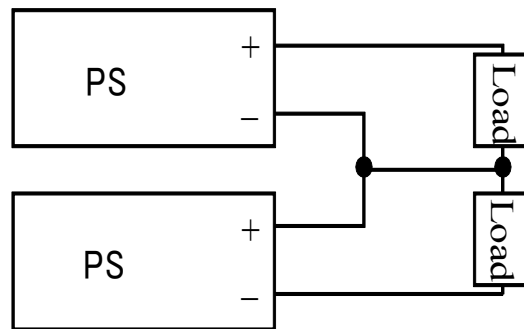
Series and Parallel Operation

Series Operation

Series operation is possible; however, the output current will be less than the rated current of either of the connected power supplies. Also, care must be taken to ensure that the current flowing into the power supplies does not exceed the rated current flow.



Connection Example 1

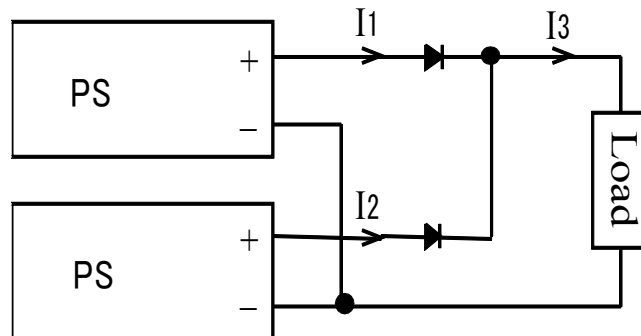


Connection Example 2

Parallel Operation/Redundancy Operation

Parallel operation is not possible.

Redundancy operation is possible by wiring as shown below.



Due to slight differences in output voltage, I_1 and I_2 can get unbalanced. Ensure that I_3 does not exceed the rated current of one power supply in redundancy operation.

Other

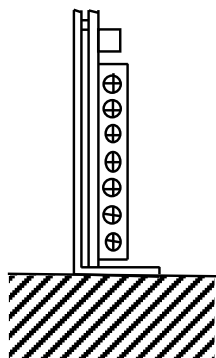
If a large capacitor is installed on the load side, it could cause the power supply to either shutoff or oscillate abnormally.

If a withstand voltage test is performed at incoming inspection, ensure that the voltage is increased gradually at the start of the test and decreased gradually when shutting off after the test.

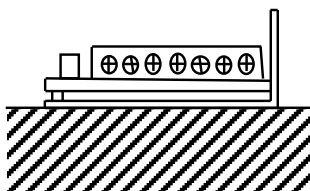
Installation

Mounting

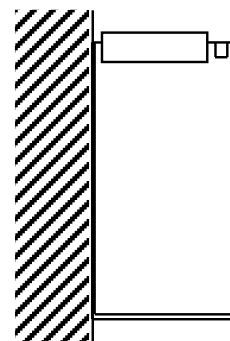
Orientation A
(Standard)



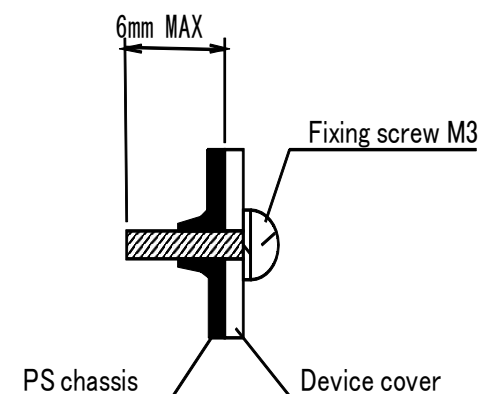
Orientation B



Orientation C



The length of the screw used to mount the power supply shall not exceed 6 mm maximum, measured from the outside of the chassis, in order to ensure safe creepage distance from the components inside.



Make sure that the ground is properly connected to the ground terminal to ensure safety.

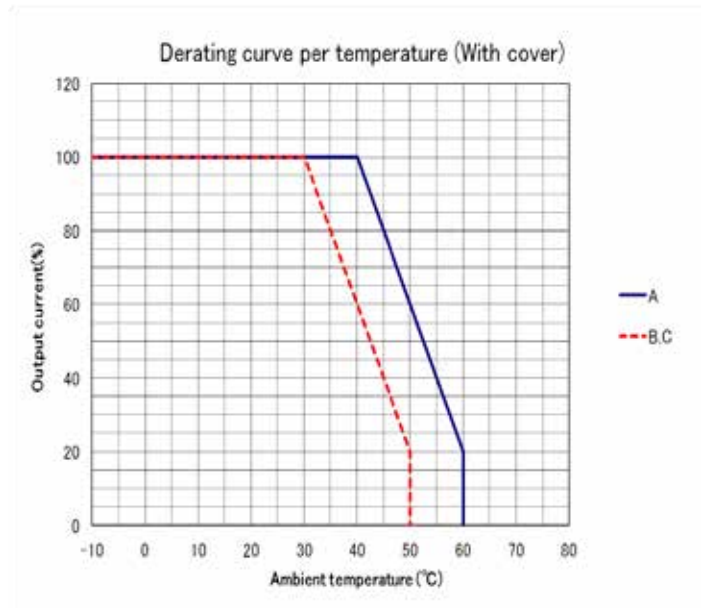
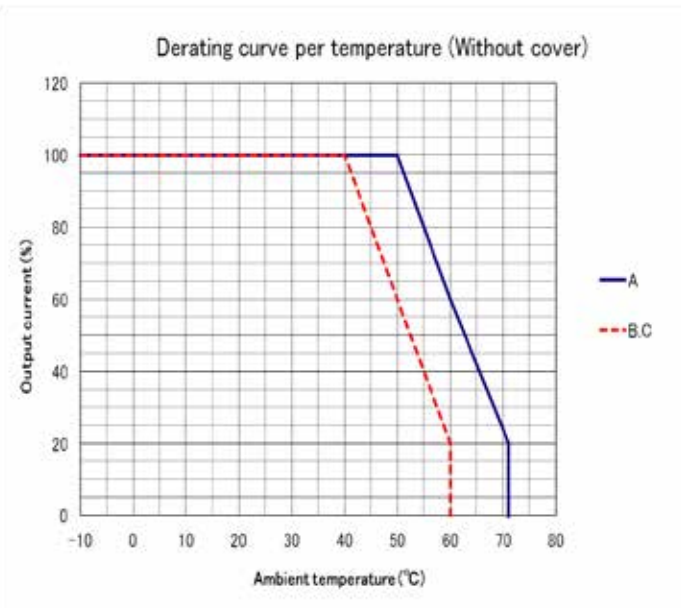
The SWG power supplies are designed and intended for use as components in general-purpose electronic equipment. Care should be taken to properly incorporate them into equipment in order to avoid the possibility of electrical shock due to the high-voltage current inside.

When installing the SWG power supply, ensure that there is adequate free air space to allow convective air flow over the upper part of the power supply.

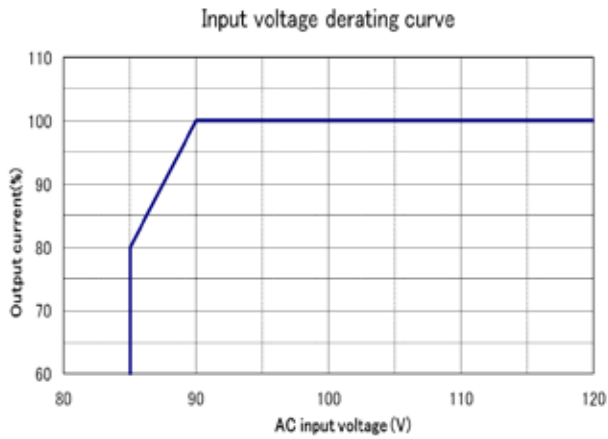
If multiple power supplies are used, care must be taken to maintain sufficient distance between the power supplies for adequate convective airflow to ensure that the ambient temperature of each power supply does not exceed the temperature range in the derating chart.

Derating

Derating curve per ambient temperature.



Derating curve per input voltage.




Derating by forced air cooling

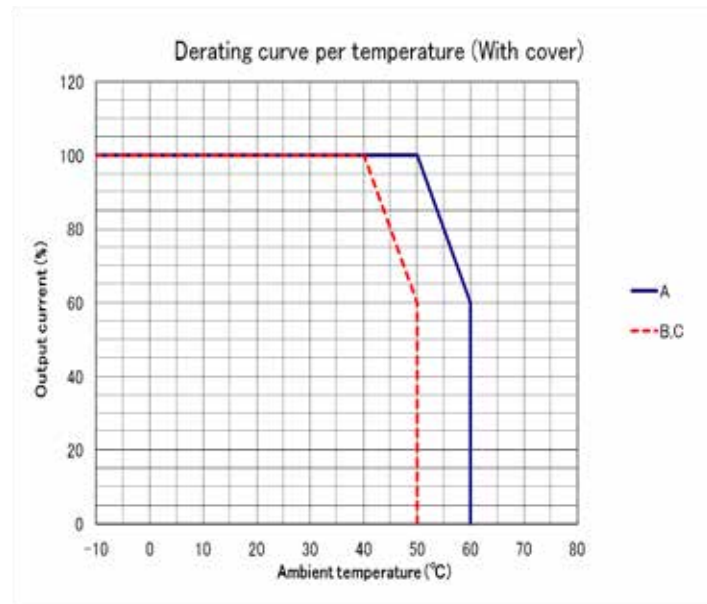
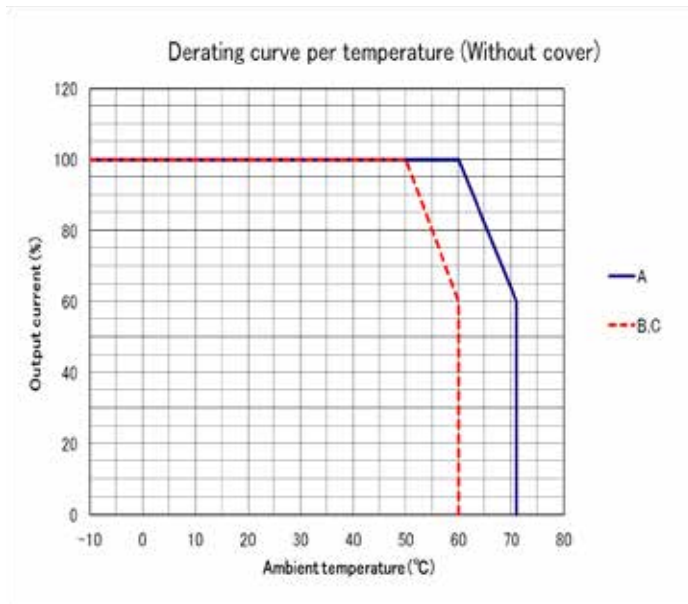
Indication of cooling.

The temperature of the measuring point of each power supply shall be kept below the designated temperature.

Model	Measuring Point	Temperature (°C)	
		Ta = 50°C	Ta = 71°C
SWG030	C6	Below 75°C	Below 80°C
SWG050	C8	Below 84°C	Below 88°C
SWG100	C8	Below 88°C	Below 92°C
SWG150	C8	Below 90°C	Below 94°C

	<p>WARNING: Electric shock hazard! Exercise caution when taking temperature measurements. Since the measuring point is at a conductive location, the possibility of electric shock exists.</p>
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Derating curve per forced air cooling.



Lifetime

Expected Lifetime

Without Cover

Orientation	Mean Ambient Temperature	Output Load Ratio	
		50%	100%
A	Ta = Below 30°C	More than 10 years	More than 10 years
	Ta = 40°C	More than 10 years	6 years
	Ta = 50°C	5 years	3 years
B, C	Ta = Below 20°C	More than 10 years	More than 10 years
	Ta = 30°C	More than 10 years	6 years
	Ta = 40°C	5 years	3 years

Specifications and Standards

Model SWG030 Series

Parameter		Model			
		SWG030-05	SWG030-12	SWG030-24	
Input Conditions	Rated Input Voltage	100 to 240 VAC (140 to 340 VDC)			
	Allowable Input Voltage	85 to 264 VAC (110 to 370 VDC)			
	Input Current (typ)	.7 A (100 VAC) / 0.4 A (200 VAC)			
	Rated Frequency	50 / 60 Hz			
	Allowable Frequency Range	47 to 440 Hz or DC			
	Efficiency (typ)	AC 100 V	74%	76%	78%
		AC 200 V	77%	78%	81%
	Inrush Current (typ) ^{1,2}	15 A (V _{IN} = 100 V) / 30 A (V _{IN} = 200 V) I _O = 100% at Cold Start			
Leakage Current (max)	0.30 mA (V _{IN} = 100 V) / 0.65 mA (V _{IN} = 240 V) 60 Hz I _O = 100% per measuring method of IEC60950-1 and PSE				
Output Conditions	Rated Output Voltage	5 V	12 V	24 V	
	Rated Output Current	6 A	2.5 A	1.3 A	
	Static Input Variation	20 mV max	48 mV max	96 mV max	
	Static Load Variation	40 mV max	100 mV max	150 mV max	
	Ripple ³	0° to 50° C	80 mVp-pmax	120 mVp-pmax	120 mVp-pmax
		-10° to 0° C	140 mVp-pmax	160 mVp-pmax	160 mVp-pmax
	Ripple Noise ³	0° to 50° C	120 mVp-pmax	150 mVp-pmax	150 mVp-pmax
		-10° to 0° C	160 mVp-pmax	180 mVp-pmax	180 mVp-pmax
	Ambient Temperature Variation	0° to 50° C	50 mV max	120 mV max	240 mV max
		-10° to 0° C	60 mV max	150 mV max	290 mV max
	Time Course Drift ⁴	20 mV max	48 mV max	96 mV max	
	Startup Time ¹	200ms typ (V _{IN} = 100 V I _O = 100%) 700ms if the interval before reapply AC is less than 1 min.			
	Output Holding Time ¹	20 ms typ (V _{IN} = 100 V I _O = 100%)			
	Voltage Variation Range ⁹	4.50 to 5.50 V	10.0 to 13.2 V	19.2 to 27.0 V	
Voltage Set Point	5.00 to 5.15 V	12.00 to 12.48 V	24.00 to 24.96 V		
Additional Functions	Overcurrent Protection	Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection ⁵	5.75 to 7.00 V	15.0 to 18.0 V	30.0 to 37.0 V	
	Operations Display	LED Display: Green			
Environmental Conditions	Operating Temperature Range	-10°C to 71°C (with derating)			
	Storage Temperature Range	-20°C to 75°C			
	Operating Humidity Range	20% to 90% RH (no condensation)			
	Storage Humidity Range	20% to 90% RH (no condensation)			
	Cooling Requirements	Natural air cooling			
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m/s ² (2 G)		
		Vibration Direction	x, y, z		
		Vibration Time	One hour in each of three directions		
Shock Resistance	196.1m/s ² (20G) 11 ms One each of three directions x, y, z				
Installation Conditions	Derating may be required due to mounting orientation				

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Model SWG030 Series

Parameter			Model		
			SWG030-05	SWG030-12	SWG030-24
Insulation ⁷	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 10 mA or less)		
		Input-FG	2000 VAC one minute (leakage current 10 mA or less)		
		Output-FG	500 VAC one minute (leakage current 25 mA or less)		
	Insulation Resistance	Input-Output	50 MΩ (measured with 500 VDC Megger)		
		Input-FG			
		Output-FG			
Others	Input/Output Type		Terminal Stand		
	Dimensions		31 mm (W) X 78 mm (H) X 103 mm (D) (without terminal stand)		
	Weight		270g maximum (without cover)		
	Safety Standards		UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, PSE		
	EMI Safety		Designed to meet FCC Class B, VCCI Class B, CISPR22 Class B, EN55011 Class B, EN55022 Class B		
	Harmonic Current		Designed to meet IEC61000-3-2 (no power factor correction circuit)		
	Electromagnetic Susceptibility		Designed to meet EN61000-4-2 (for electrostatic discharge)		
			Designed to meet EN61000-4-3 (for radiated, radio-frequency, electromagnetic field)		
			Designed to meet EN61000-4-4 (for transient burst)		
			Designed to meet EN61000-4-5 (for lightning surge)		
			Designed to meet EN61000-4-6 (for conductive radio frequency electromagnetic field)		
Designed to meet EN61000-4-8 (for power supply frequency electromagnetic field immunity)					
Environmental Response		Designed to meet RoHS directive			
Options	Remote On/Off		N/A		
	Connector		JST		
	Cover ⁸		Yes		

1. Specified under rated input/output conditions at an ambient temperature of 25°C.
2. More current above noted values may flow at restart (ambient temperature of 25°C).
3. Ripple noise is measured with a 100 MHz oscilloscope using a 1:1 probe.
4. Time-course drift is measured between 30 minutes to 8 hours after applying input voltage at rated input/output at an ambient temperature 25°C.
5. Reset is performed by reapplying input voltage.
6. Output derating may be required.
7. Insulation conditions are specified at normal temperature and humidity.
8. Derating may be required for the power supply with cover.
9. In the case where output voltage is variable, set a voltage such that Output Voltage Variation, Rated Output Current, and Rated Output Power are not exceeded.

Model SWG050 Series

Parameter		Model			
		SWG050-05	SWG050-12	SWG050-24	
Input Conditions	Rated Input Voltage	100 to 240 VAC (140 to 340 VDC)			
	Allowable Input Voltage	85 to 264 VAC (120 to 370 VDC)			
	Input Current (typ)	.74 A (100 VAC) / 0.4 A (200 VAC)			
	Rated Frequency	50 / 60 Hz			
	Allowable Frequency Range	47 to 440 Hz or DC			
	Efficiency (typ)	AC 100 V	80%	80%	82%
		AC 200 V	82%	82%	84%
	Power Factor (typ)	0.99 A (100 VAC) / 0.93 A (200 VAC)			
	Inrush Current (typ) ^{1,2}	15 A (V _{IN} = 100 V) / 30 A (V _{IN} = 200 V) I _O = 100% at Cold Start			
Leakage Current (max)	0.40 mA (V _{IN} = 100 V) / 0.75 mA (V _{IN} = 240 V) 60 Hz I _O = 100% per measuring method of IEC60950-1 and PSE				
Output Conditions	Rated Output Voltage	5 V	12 V	24 V	
	Rated Output Current	10 A	4.3 A	2.2 A	
	Static Input Variation	20 mV max	48 mV max	96 mV max	
	Static Load Variation	40 mV max	100 mV max	150 mV max	
	Ripple ³	0° to 50° C	80 mVp-pmax	120 mVp-pmax	120 mVp-pmax
		-10° to 0° C	140 mVp-pmax	160 mVp-pmax	160 mVp-pmax
	Ripple Noise ³	0° to 50° C	120 mVp-pmax	150 mVp-pmax	150 mVp-pmax
		-10° to 0° C	160 mVp-pmax	180 mVp-pmax	180 mVp-pmax
	Ambient Temperature Variation	0° to 50° C	50 mV max	120 mV max	240 mV max
		-10° to 0° C	60 mV max	150 mV max	290 mV max
	Time Course Drift ⁴	20 mV max	48 mV max	96 mV max	
	Startup Time ¹	350ms typ (V _{IN} = 100 V I _O = 100%)			
	Output Holding Time ¹	20 ms typ (V _{IN} = 100 V I _O = 100%)			
Voltage Variation Range ⁹	4.00 to 5.50 V	10.0 to 13.2 V	19.2 to 27.0 V		
Voltage Set Point	5.00 to 5.15 V	12.00 to 12.48 V	24.00 to 24.96 V		
Additional Functions	Overcurrent Protection	Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection ⁵	5.75 to 7.00 V	15.0 to 18.0 V	30.0 to 37.0 V	
	Operations Display	LED Display: Green			
Environmental Conditions	Operating Temperature Range	-10°C to 71°C (with derating)			
	Storage Temperature Range	-20°C to 75°C			
	Operating Humidity Range	20% to 90% RH (no condensation)			
	Storage Humidity Range	20% to 90% RH (no condensation)			
	Cooling Requirements	Natural air cooling			
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m/s ² (2 G)		
		Vibration Direction	x, y, z		
		Vibration Time	One hour in each of three directions		
Shock Resistance	196.1m/s ² (20G) 11 ms One each of three directions x, y, z				
Installation Conditions	Derating may be required due to mounting orientation				

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Model SWG050 Series

Parameter			Model		
			SWG050-05	SWG050-12	SWG050-24
Insulation ⁷	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 10 mA or less)		
		Input-FG	2000 VAC one minute (leakage current 10 mA or less)		
		Output-FG	500 VAC one minute (leakage current 100 mA or less)		
	Insulation Resistance	Input-Output	50 MΩ (measured with 500 VDC Megger)		
		Input-FG			
		Output-FG			
Others	Input/Output Type		Terminal Stand		
	Dimensions		31 mm (W) X 82 mm (H) X 120 mm (D) (without terminal stand)		
	Weight		280g maximum (without cover)		
	Safety Standards		UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, PSE		
	EMI Safety		Designed to meet FCC Class B, VCCI Class B, CISPR22 Class B, EN55011 Class B, EN55022 Class B		
	Harmonic Current		Designed to meet IEC61000-3-2		
	Electromagnetic Susceptibility		Designed to meet EN61000-4-2 (for electrostatic discharge)		
			Designed to meet EN61000-4-3 (for radiated, radio-frequency, electromagnetic field)		
			Designed to meet EN61000-4-4 (for transient burst)		
			Designed to meet EN61000-4-5 (for lightning surge)		
			Designed to meet EN61000-4-6 (for conductive radio frequency electromagnetic field)		
Designed to meet EN61000-4-8 (for power supply frequency electromagnetic field immunity)					
Environmental Response		Designed to meet EN61000-4-11 (for voltage dip/variation)			
Options	Remote On/Off		Yes		
	Connector		JST		
	Cover ⁸		Yes		

1. Specified under rated input/output conditions at an ambient temperature of 25°C.
2. More current above noted values may flow at restart (ambient temperature of 25°C).
3. Ripple noise is measured with a 20 MHz oscilloscope using a 1:1 probe.
4. Time-course drift is measured between 30 minutes to 8 hours after applying input voltage at rated input/output at an ambient temperature 25°C.
5. Reset is performed by reapplying input voltage.
6. Output derating may be required.
7. Insulation conditions are specified at normal temperature and humidity.
8. Derating may be required for the power supply with cover.
9. In the case where output voltage is variable, set a voltage such that Output Voltage Variation, Rated Output Current, and Rated Output Power are not exceeded.

Model SWG100 Series

Parameter		Model			
		SWG100-05	SWG100-12	SWG100-24	
Input Conditions	Rated Input Voltage	100 to 240 VAC (140 to 340 VDC)			
	Allowable Input Voltage	85 to 264 VAC (120 to 370 VDC)			
	Input Current (typ)	1.3 A (100 VAC) / 0.7 A (200 VAC)			
	Rated Frequency	50 / 60 Hz			
	Allowable Frequency Range	47 to 63 Hz			
	Efficiency (typ)	AC 100 V	82%	81%	84%
		AC 200 V	84%	83%	86%
	Power Factor (typ)	0.99 A (100 VAC) / 0.93 A (200 VAC)			
	Inrush Current (typ) ^{1,2}	20 A (V _{IN} = 100 V) / 40 A (V _{IN} = 200 V) I _O = 100% at Cold Start			
Leakage Current (max)	0.40 mA (V _{IN} = 100 V) / 0.75 mA (V _{IN} = 240 V) 60 Hz I _O = 100% per measuring method of IEC60950-1 and PSE				
Output Conditions	Rated Output Voltage	5 V	12 V	24 V	
	Rated Output Current	20 A	8.5 A	4.5 A	
	Static Input Variation	20 mV max	48 mV max	96 mV max	
	Static Load Variation	40 mV max	100 mV max	150 mV max	
	Ripple ³	0° to 50° C	80 mVp-pmax	120 mVp-pmax	120 mVp-pmax
		-10° to 0° C	140 mVp-pmax	160 mVp-pmax	160 mVp-pmax
	Ripple Noise ³	0° to 50° C	120 mVp-pmax	150 mVp-pmax	150 mVp-pmax
		-10° to 0° C	160 mVp-pmax	180 mVp-pmax	180 mVp-pmax
	Ambient Temperature Variation	0° to 50° C	50 mV max	120 mV max	240 mV max
		-10° to 0° C	60 mV max	150 mV max	290 mV max
	Time Course Drift ⁴	20 mV max	48 mV max	96 mV max	
	Startup Time ¹	350 ms typ (V _{IN} = 100 V I _O = 100%)			
	Output Holding Time ¹	20 ms typ (V _{IN} = 100 V I _O = 100%)			
Voltage Variation Range ⁹	4.00 to 5.50 V	10.0 to 13.2 V	19.2 to 27.0 V		
Voltage Set Point	5.00 to 5.15 V	12.00 to 12.48 V	24.00 to 24.96 V		
Additional Functions	Overcurrent Protection	Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection ⁵	5.75 to 7.00 V	15.0 to 18.0 V	30.0 to 37.0 V	
	Operations Display	LED Display: Green			
Environmental Conditions	Operating Temperature Range	-10°C to 71°C (with derating)			
	Storage Temperature Range	-20°C to 75°C			
	Operating Humidity Range	20% to 90% RH (no condensation)			
	Storage Humidity Range	20% to 90% RH (no condensation)			
	Cooling Requirements	Natural air cooling			
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m/s ² (2 G)		
		Vibration Direction	x, y, z		
		Vibration Time	One hour in each of three directions		
Shock Resistance	196.1m/s ² (20G) 11 ms One each of three directions x, y, z				
Installation Conditions	Derating may be required due to mounting orientation				

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Model SWG100 Series

Parameter			Model		
			SWG100-05	SWG100-12	SWG100-24
Insulation ⁷	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 10 mA or less)		
		Input-FG	2000 VAC one minute (leakage current 10 mA or less)		
		Output-FG	500 VAC one minute (leakage current 100 mA or less)		
	Insulation Resistance	Input-Output	50 MΩ (measured with 500 VDC Megger)		
		Input-FG			
		Output-FG			
Others	Input/Output Type		Terminal Stand		
	Dimensions		32 mm (W) X 93 mm (H) X 147 mm (D) (without terminal stand)		
	Weight		440g maximum (without cover)		
	Safety Standards		UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, PSE		
	EMI Safety		Designed to meet FCC Class B, VCCI Class B, CISPR22 Class B, EN55011 Class B, EN55022 Class B		
	Harmonic Current		Designed to meet IEC61000-3-2		
	Electromagnetic Susceptibility		Designed to meet EN61000-4-2 (for electrostatic discharge)		
			Designed to meet EN61000-4-3 (for radiated, radio-frequency, electromagnetic field)		
			Designed to meet EN61000-4-4 (for transient burst)		
			Designed to meet EN61000-4-5 (for lightning surge)		
			Designed to meet EN61000-4-6 (for conductive radio frequency electromagnetic field)		
Designed to meet EN61000-4-8 (for power supply frequency electromagnetic field immunity)					
Environmental Response		Designed to meet EN61000-4-11 (for voltage dip/variation)			
Options	Remote On/Off		Yes		
	Connector		JST (except 5 V output)		
	Cover ⁸		Yes		

1. Specified under rated input/output conditions at an ambient temperature of 25°C.
2. More current above noted values may flow at restart (ambient temperature of 25°C).
3. Ripple noise is measured with a 20 MHz oscilloscope using a 1:1 probe.
4. Time-course drift is measured between 30 minutes to 8 hours after applying input voltage at rated input/output at an ambient temperature 25°C.
5. Reset is performed by reapplying input voltage.
6. Output derating may be required.
7. Insulation conditions are specified at normal temperature and humidity.
8. Derating may be required for the power supply with cover.
9. In the case where output voltage is variable, set a voltage such that Output Voltage Variation, Rated Output Current, and Rated Output Power are not exceeded.

Model SWG150 Series

Parameter		Model				
		SWG150-05	SWG150-12	SWG150-24		
Input Conditions	Rated Input Voltage		100 to 240 VAC (140 to 340 VDC)			
	Allowable Input Voltage		85 to 264 VAC (120 to 370 VDC)			
	Input Current (typ)		2.0 A (100 VAC) / 1.0 A (200 VAC)			
	Rated Frequency		50 / 60 Hz			
	Allowable Frequency Range		47 to 63 Hz			
	Efficiency (typ)	AC 100 V	83%	83%	85%	
		AC 200 V	86%	86%	88%	
	Power Factor (typ)		0.99 A (100 VAC) / 0.93 A (200 VAC)			
	Inrush Current (typ) ^{1,2}		20 A (V _{IN} = 100 V) / 40 A (V _{IN} = 200 V) I _O = 100% at Cold Start			
Leakage Current (max)		0.40 mA (V _{IN} = 100 V) / 0.75 mA (V _{IN} = 240 V) 60 Hz I _O = 100% per measuring method of IEC60950-1 and PSE				
Output Conditions	Rated Output Voltage		5 V	12 V	24 V	
	Rated Output Current		30 A	13 A	6.5 A	
	Static Input Variation		20 mV max	48 mV max	96 mV max	
	Static Load Variation		40 mV max	100 mV max	150 mV max	
	Ripple ³	0° to 50° C	80 mVp-pmax	120 mVp-pmax	120 mVp-pmax	
		-10° to 0° C	140 mVp-pmax	160 mVp-pmax	160 mVp-pmax	
	Ripple Noise ³	0° to 50° C	120 mVp-pmax	150 mVp-pmax	150 mVp-pmax	
		-10° to 0° C	160 mVp-pmax	180 mVp-pmax	180 mVp-pmax	
	Ambient Temperature Variation	0° to 50° C	50 mV max	120 mV max	240 mV max	
		-10° to 0° C	60 mV max	150 mV max	290 mV max	
	Time Course Drift ⁴		20 mV max	48 mV max	96 mV max	
	Startup Time ¹		350 ms typ (V _{IN} = 100 V I _O = 100%)			
	Output Holding Time ¹		20 ms typ (V _{IN} = 100 V I _O = 100%)			
	Voltage Variation Range ⁹		4.00 to 5.50 V	10.0 to 13.2 V	19.2 to 27.0 V	
Voltage Set Point		5.00 to 5.15 V	12.00 to 12.48 V	24.00 to 24.96 V		
Additional Functions	Overcurrent Protection		Detection above 105% of rated current (automatic recovery)			
	Overvoltage Protection ⁵		5.75 to 7.00 V	15.0 to 18.0 V	30.0 to 37.0 V	
	Operations Display		LED Display: Green			
Environmental Conditions	Operating Temperature Range		-10°C to 71°C (with derating)			
	Storage Temperature Range		-20°C to 75°C			
	Operating Humidity Range		20% to 90% RH (no condensation)			
	Storage Humidity Range		20% to 90% RH (no condensation)			
	Cooling Requirements		Natural air cooling			
	Vibration Resistance	Vibration Frequency		10 to 55 Hz		
		Sweep Time		3 minutes		
		Acceleration		19.6 m/s ² (2 G)		
		Vibration Direction		x, y, z		
		Vibration Time		One hour in each of three directions		
	Shock Resistance		196.1m/s ² (20G) 11 ms One each of three directions x, y, z			
Installation Conditions		Derating may be required due to mounting orientation				

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Model SWG150 Series

Parameter			Model		
			SWG150-05	SWG150-12	SWG150-24
Insulation ⁷	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 10 mA or less)		
		Input-FG	2000 VAC one minute (leakage current 10 mA or less)		
		Output-FG	500 VAC one minute (leakage current 100 mA or less)		
	Insulation Resistance	Input-Output	50 MΩ (measured with 500 VDC Megger)		
		Input-FG			
		Output-FG			
Others	Input/Output Type		Terminal Stand		
	Dimensions		34 mm (W) X 93 mm (H) X 168 mm (D) (without terminal stand)		
	Weight		560g maximum (without cover)		
	Safety Standards		UL60950-1, C-UL (CSA60950-1), EN60950-1, EN50178, PSE		
	EMI Safety		Designed to meet FCC Class B, VCCI Class B, CISPR22 Class B, EN55011 Class B, EN55022 Class B		
	Harmonic Current		Designed to meet IEC61000-3-2		
	Electromagnetic Susceptibility		Designed to meet EN61000-4-2 (for electrostatic discharge)		
			Designed to meet EN61000-4-3 (for radiated, radio-frequency, electromagnetic field)		
			Designed to meet EN61000-4-4 (for transient burst)		
			Designed to meet EN61000-4-5 (for lightning surge)		
Designed to meet EN61000-4-6 (for conductive radio frequency electromagnetic field)					
Designed to meet EN61000-4-8 (for power supply frequency electromagnetic field immunity)					
Environmental Response		Designed to meet EN61000-4-11 (for voltage dip/variation)			
Options	Remote On/Off		Yes		
	Connector		JST (except 5 V output)		
	Cover ⁸		Yes		

1. Specified under rated input/output conditions at an ambient temperature of 25°C.
2. More current above noted values may flow at restart (ambient temperature of 25°C).
3. Ripple noise is measured with a 20 MHz oscilloscope using a 1:1 probe.
4. Time-course drift is measured between 30 minutes to 8 hours after applying input voltage at rated input/output at an ambient temperature 25°C.
5. Reset is performed by reapplying input voltage.
6. Output derating may be required.
7. Insulation conditions are specified at normal temperature and humidity.
8. Derating may be required for the power supply with cover.
9. In the case where output voltage is variable, set a voltage such that Output Voltage Variation, Rated Output Current, and Rated Output Power are not exceeded.

Sanken reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the performance, reliability, or manufacturability of its products. Therefore, the user is cautioned to verify that the information in this publication is current before placing any order.

When using the products described herein, the applicability and suitability of such products for the intended purpose shall be reviewed at the users' responsibility.

Although Sanken undertakes to enhance the quality and reliability of its products, the occurrence of failure and defect of semiconductor products at a certain rate is inevitable.

Users of Sanken products are requested to take, at their own risk, preventative measures including safety design of the equipment or systems against any possible injury, death, fires or damages to society due to device failure or malfunction.

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