Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

Sanken
SWF150P-36

For any questions, you can email us directly:
sales@integrated-circuit.com

Operation Manual

SWF Series Switch Mode Power Supply

Table of Contents

This paper is prepared as of April 2015 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 inside of protective electrical device enclosures. Use only when properly mounted in protected device enclosures.

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. When considering use of the products for the following equipment and applications, for which there is enhanced risk that the products could endanger human life or affect property maintenance or public functions, be sure to secure sufficient fail-safe functionality of the customer or user devices by means of system redundancies and other methods:

- Medical equipment, etc. that could directly endanger human life
- 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.

6. 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	
	• 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.
	• 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. • In case of fire, use a fire extinguisher of a powder/ABC type approved for use on electrical fires. Note: Never use water.

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 SWF Series

General Description

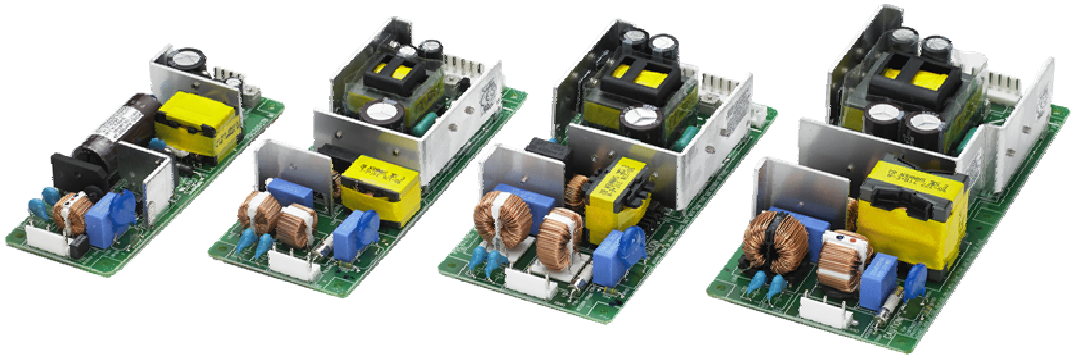
The SWF series are compact, wide ranging power supplies, providing peak power capability that supports twice the rated output, making them ideal for motorized applications. They offer low noise and high efficiency by current resonant circuitry.

Features and Benefits

- Supports peak loading, two times the rated current (maximum of 10 seconds)
- World wide input (85 to 264VAC)
- Provides high efficiency and low noise via current switching technology
- Acquired CE marking for Low Voltage Differential
- Conductive emission class B (VCCI class B, FCC class B, EN55022 class B)
- Safety standards: UL60950-1, C-UL (CSA60950-1), SEMKO (EN60950-1)
- Options: remote on / off control, chassis, cover, terminal stand (SWF240P only)

Model shown with optional chassis and cover, screw terminals option available for 240W unit

Models shown without optional chassis and cover



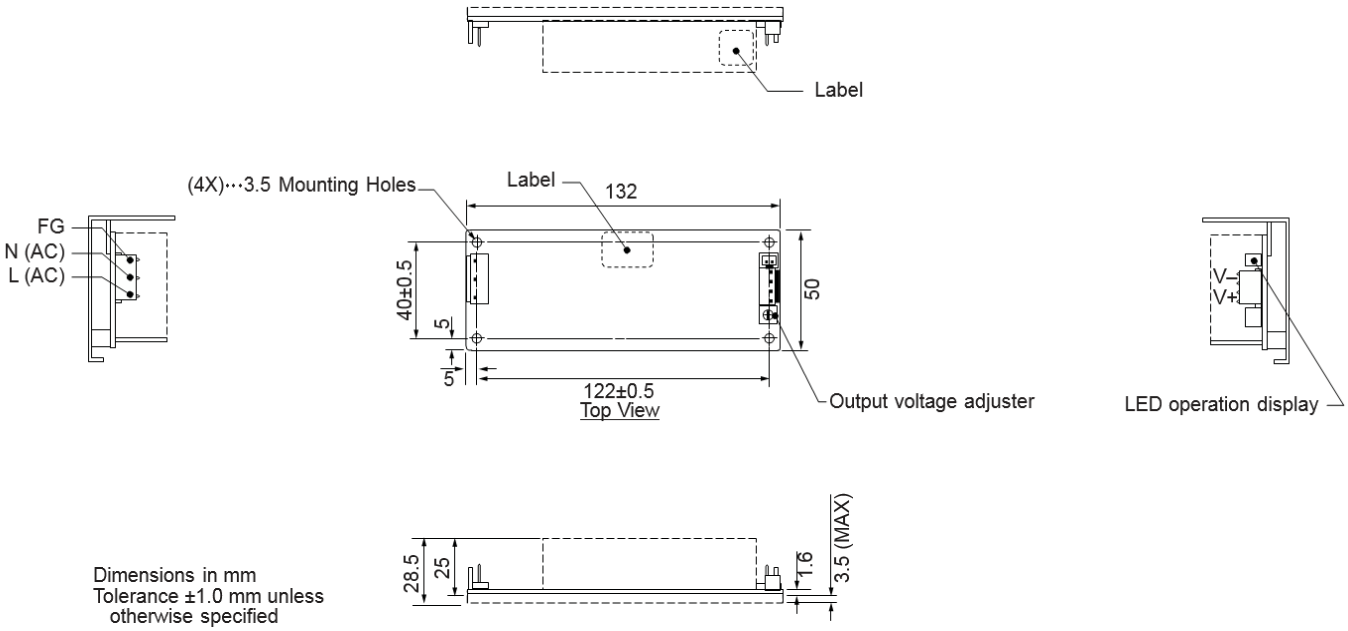
50W Output | 100W Output | 150W Output | 240W Output

Product Models

Model SWF050P-24

Output Power: 50W, Output Voltage: 24V

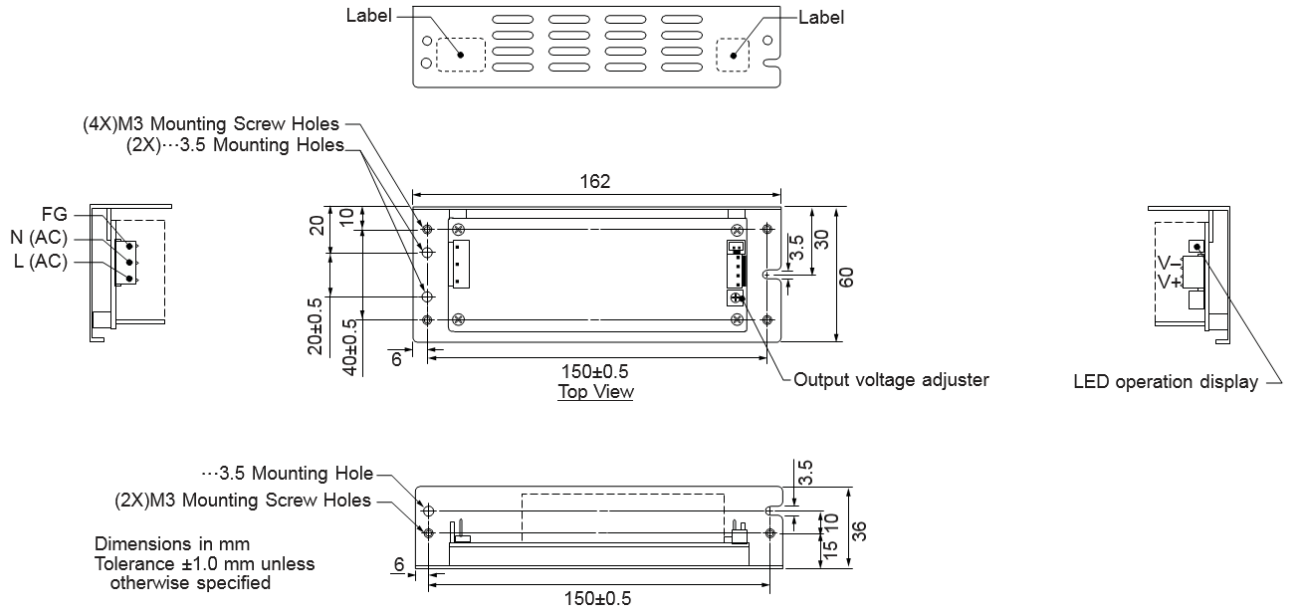
Circuit Assembly Only
Weight: 160 g



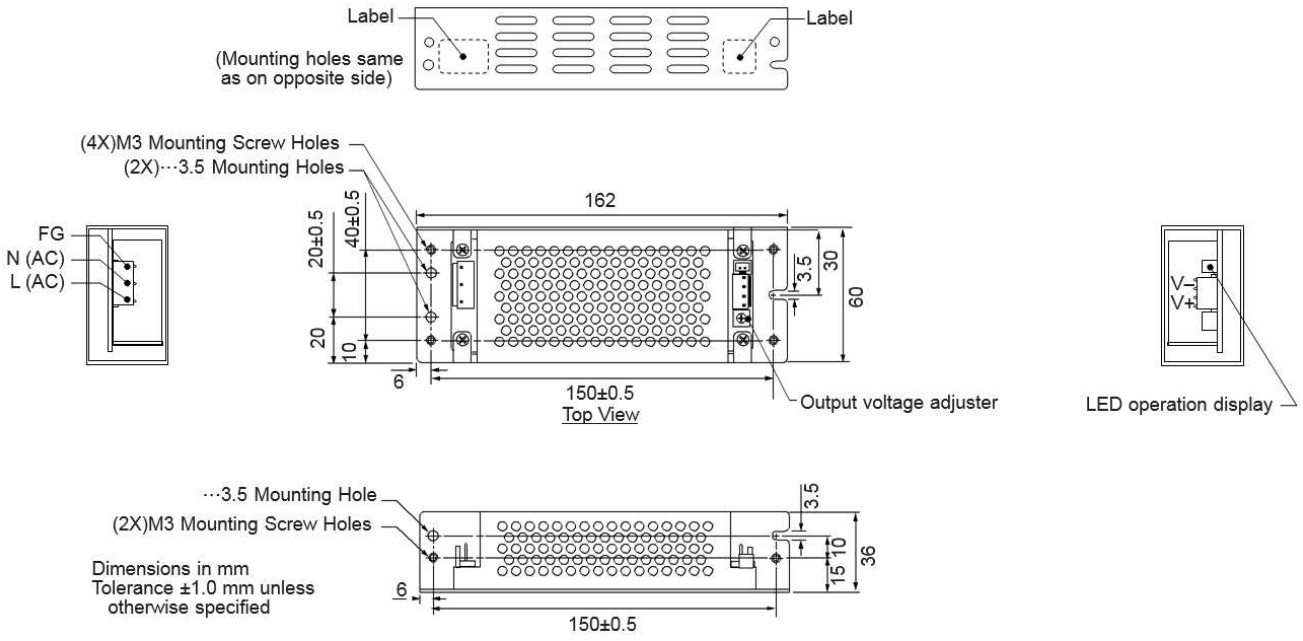
Model SWF050P-24 (continued)

Output Power: 50W, Output Voltage: 24 V

Circuit Assembly with Chassis (L option)



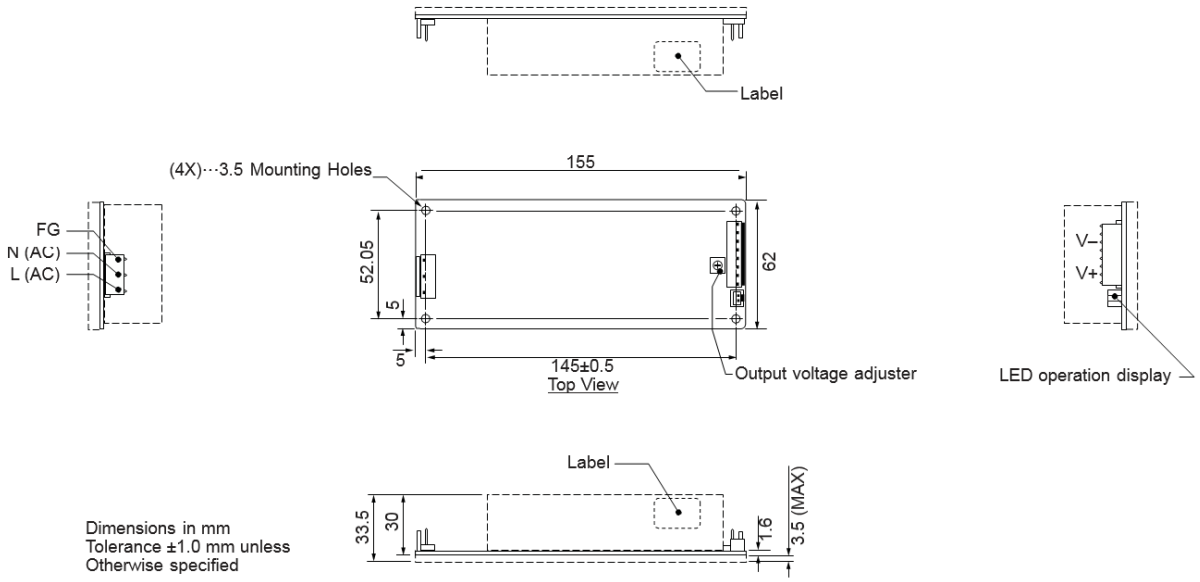
Circuit Assembly with Chassis and Cover (LC option)



Model SWF100P-24/-36/-48

Output Power: 100W, Output Voltage: 24V / 36V / 48V

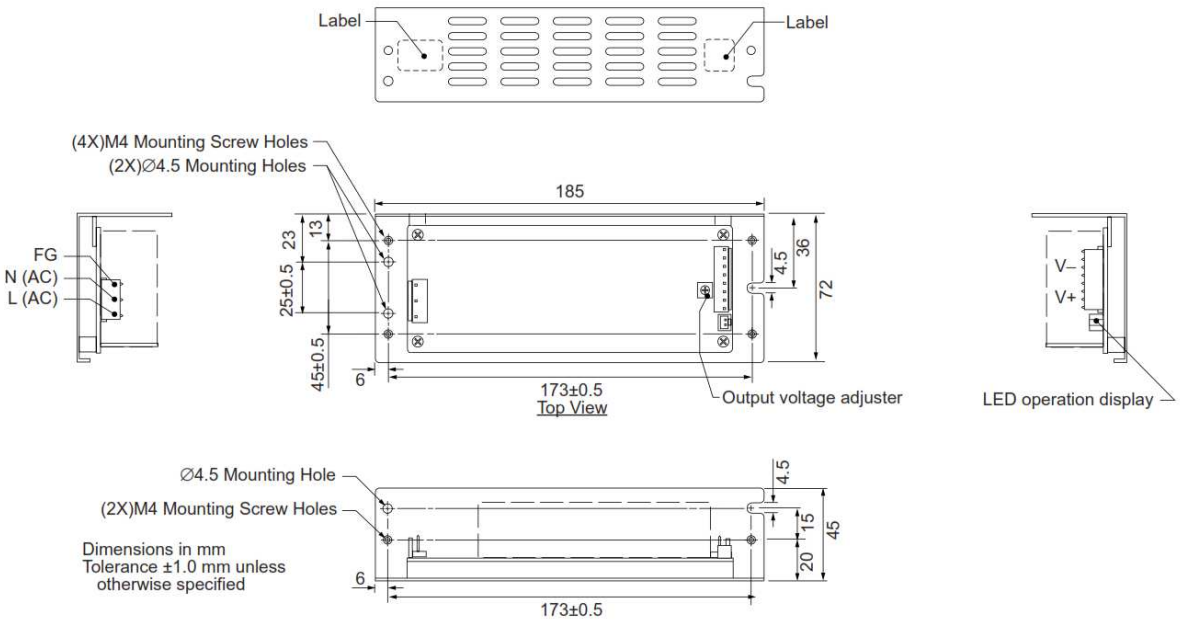
Circuit Assembly Only
Weight: 300 g



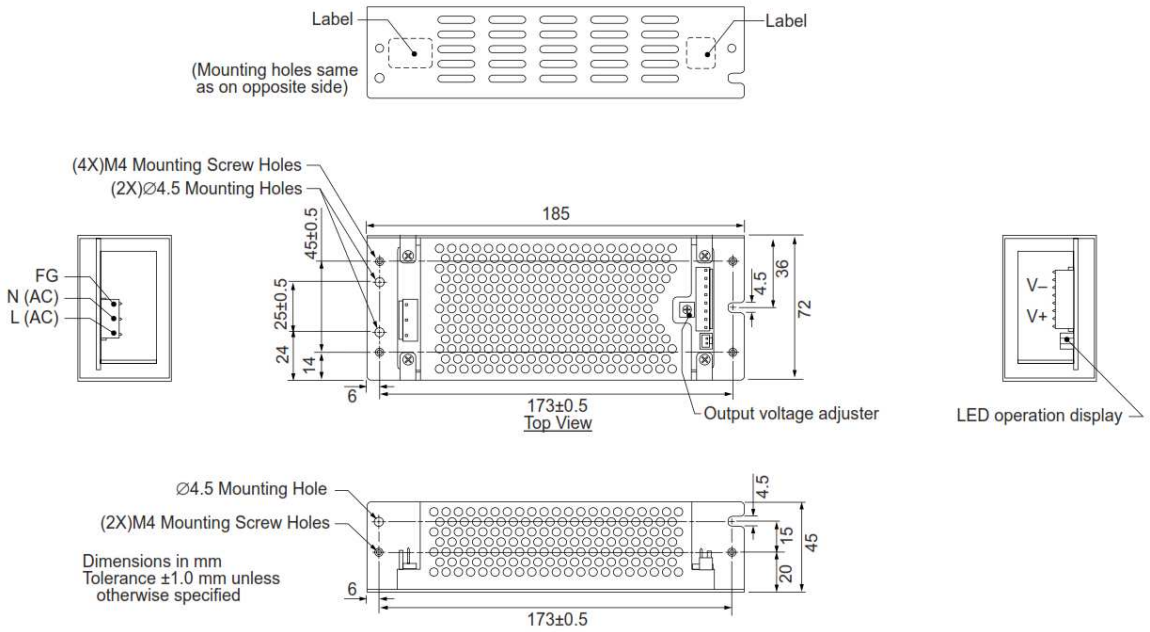
Model SWF100P-24/-36/-48 (continued)

Output Power: 100W, Output Voltage: 24V / 36V / 48V

Circuit Assembly with Chassis (L option)



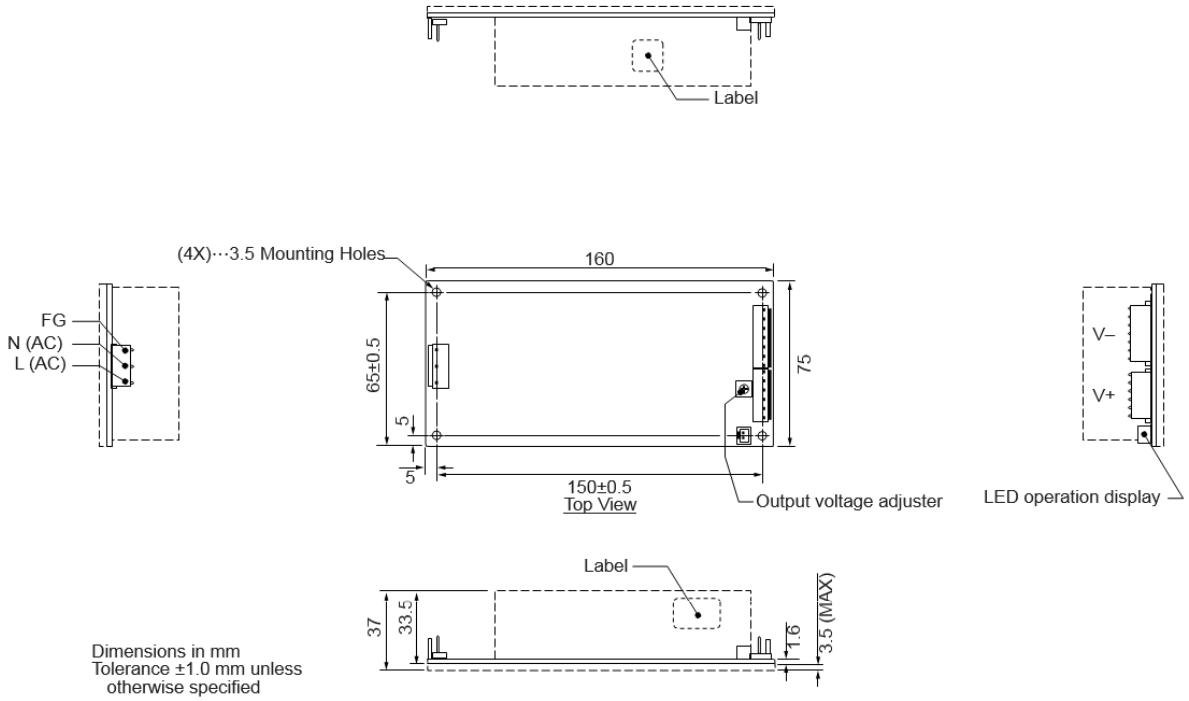
Circuit Assembly with Chassis and Cover (LC option)



Model SWF150P-24/-36/-48

Output Power: 150W, Output Voltage: 24V / 36V / 48V

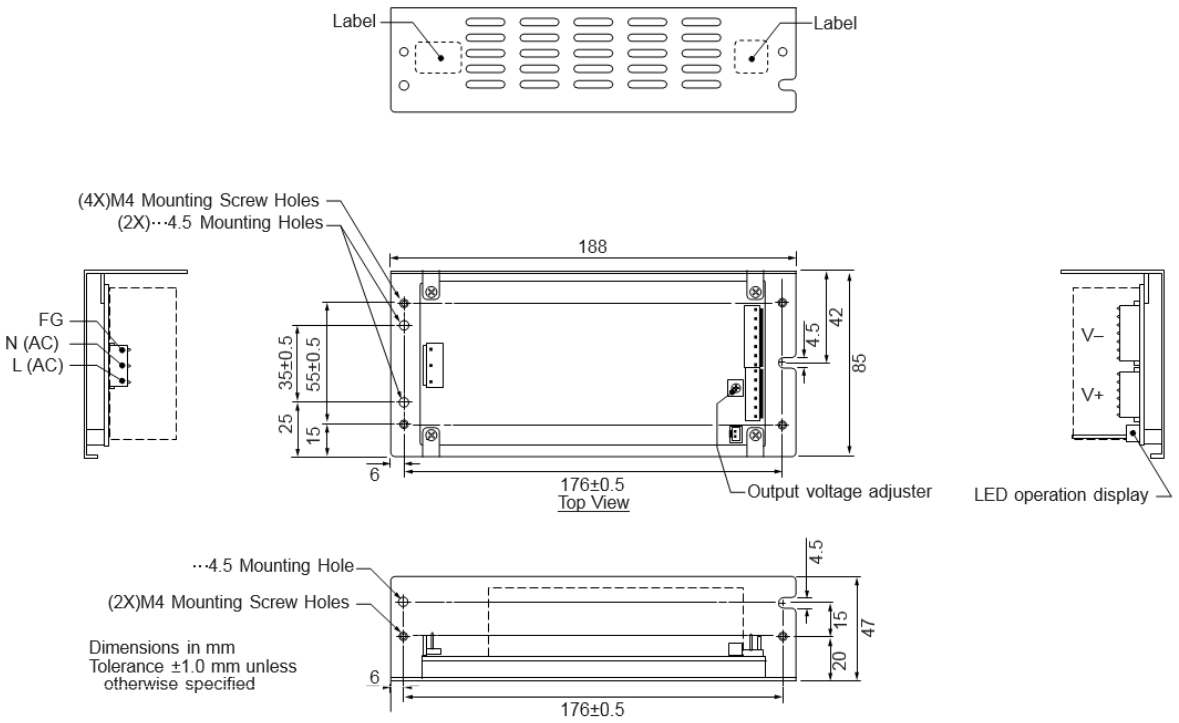
Circuit Assembly Only
Weight: 400 g



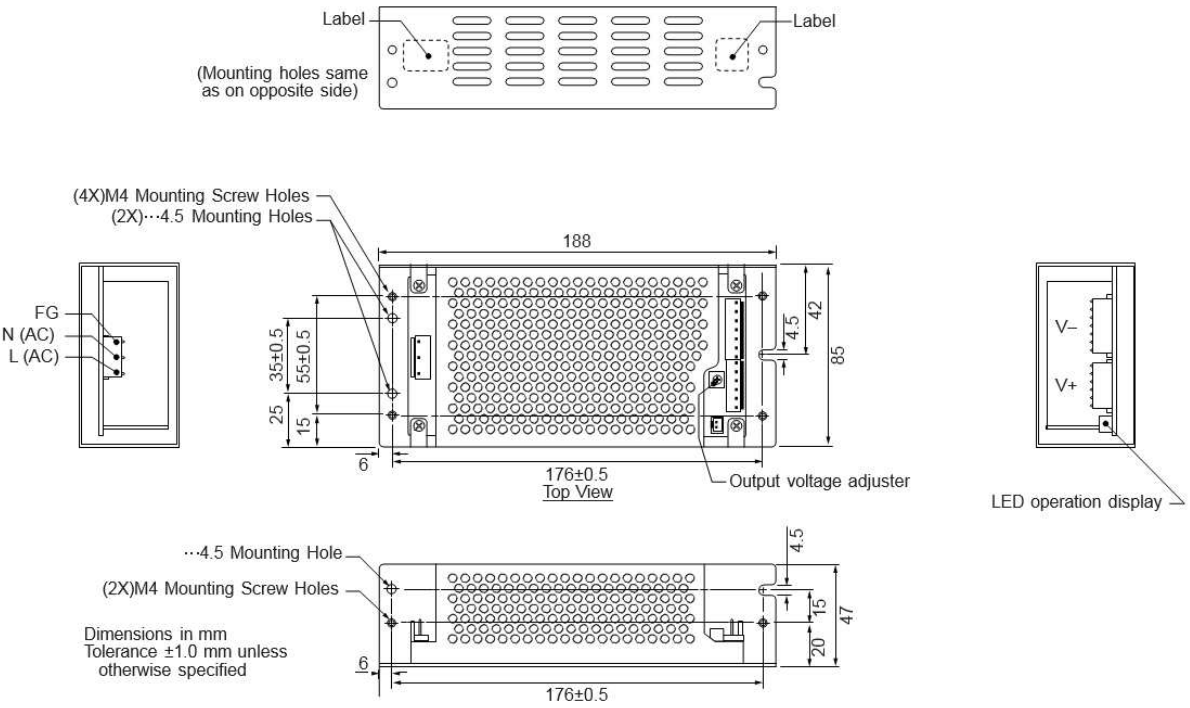
Model SWF150P-24/-36/-48 (continued)

Output Power: 150W, Output Voltage: 24V / 36V / 48V

Circuit Assembly with Chassis (L option)



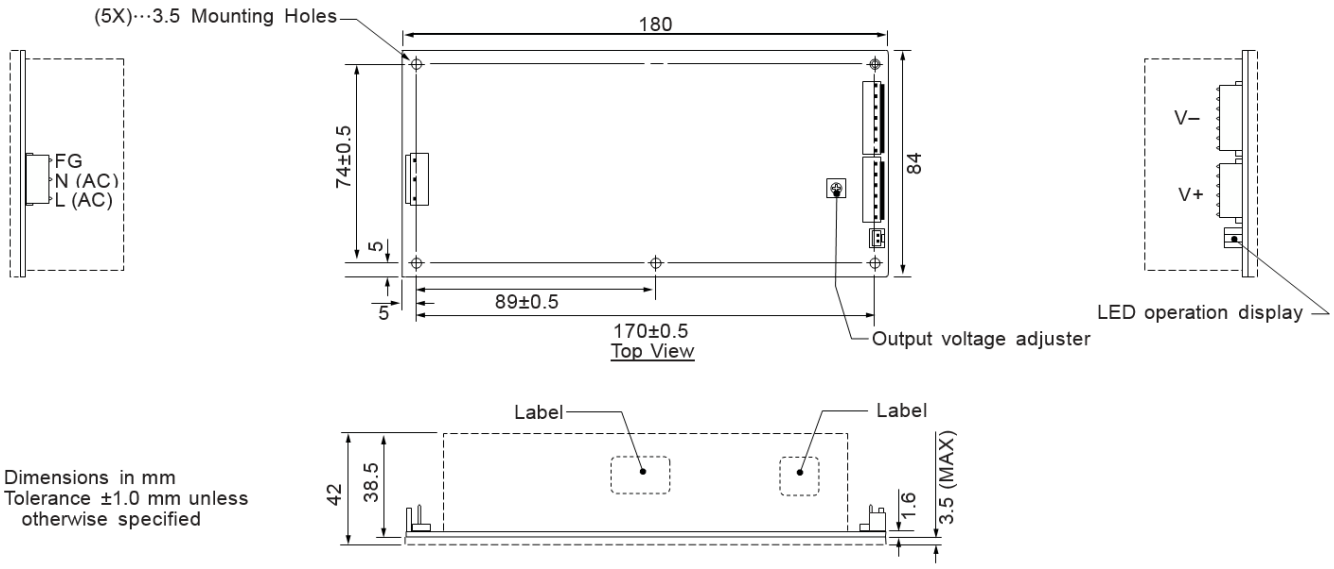
Circuit Assembly with Chassis and Cover (LC option)



Model SWF240P-24/-36/-48

Output Power: 240W, Output Voltage: 24V / 36V / 48V

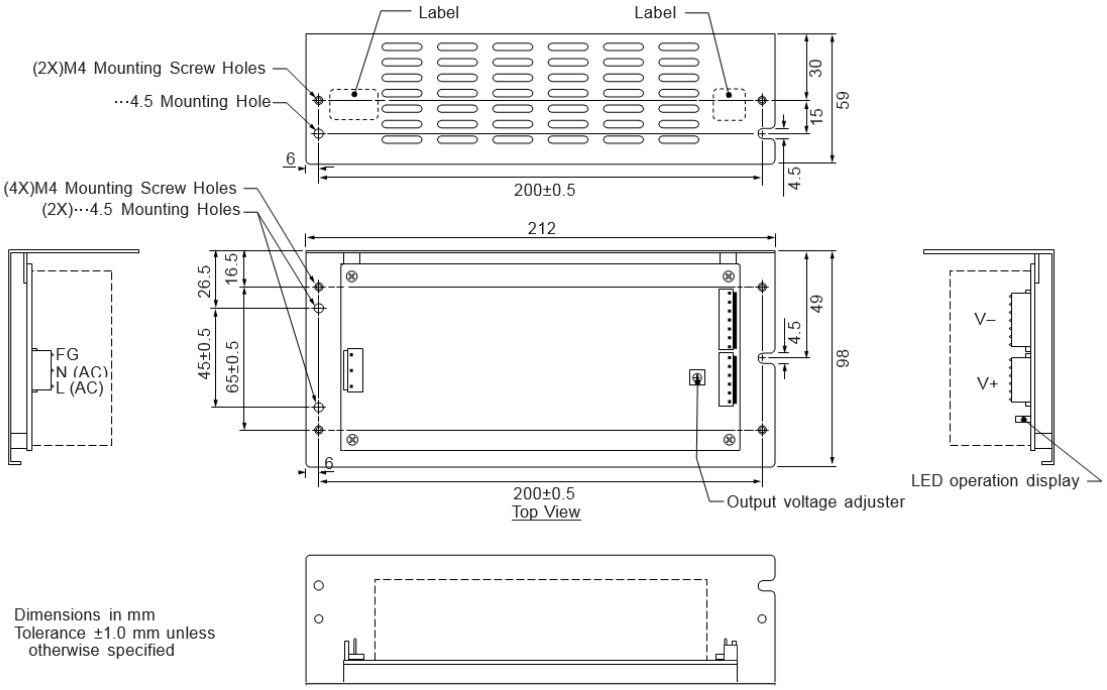
Circuit Assembly Only
Weight: 700 g



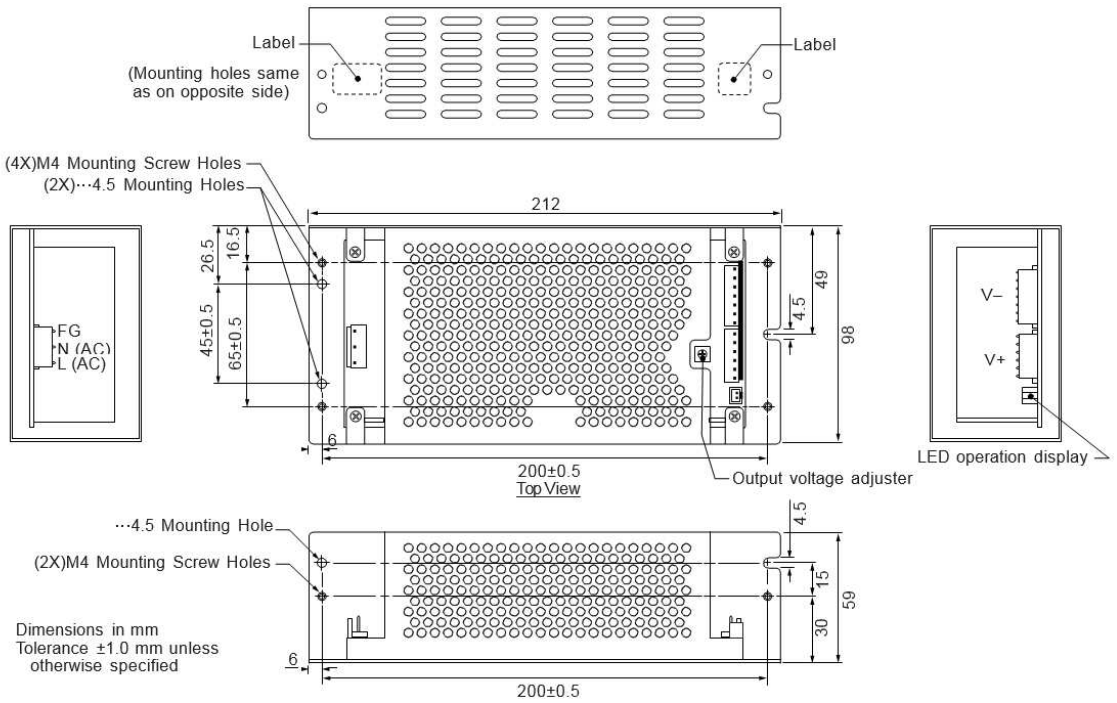
Model SWF240P-24/-36/-48 (Continued)

Output Power: 240W, Output Voltage: 24V / 36V / 48V

Circuit Assembly with Chassis (L option)



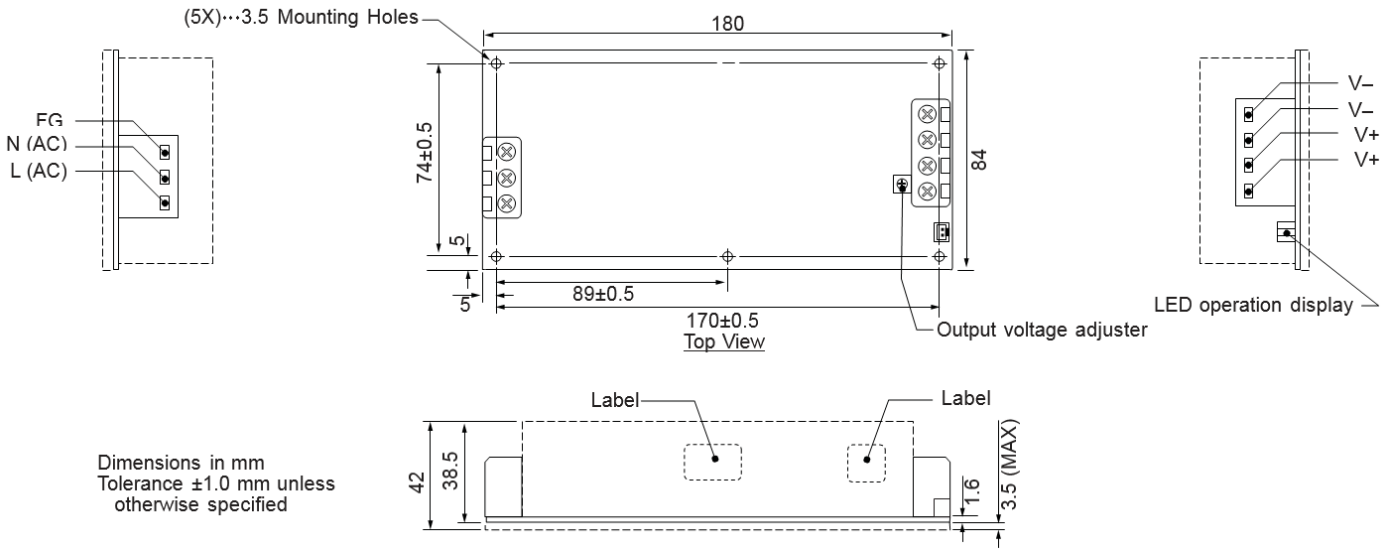
Circuit Assembly with Chassis and Cover (LC option)



Model SWF240P-24/-36/-48 with Terminal Block

Output Power: 240W, Output Voltage: 24V / 36V / 48V

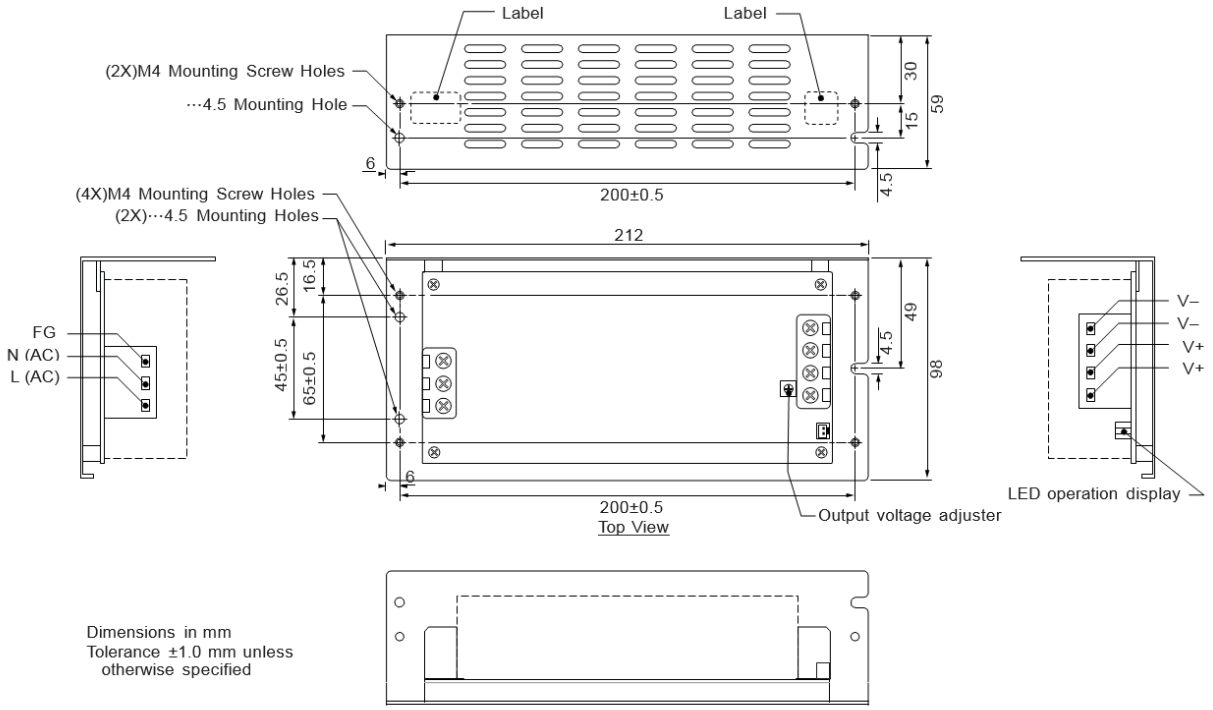
Circuit Assembly Only with Screw Terminals (T option)



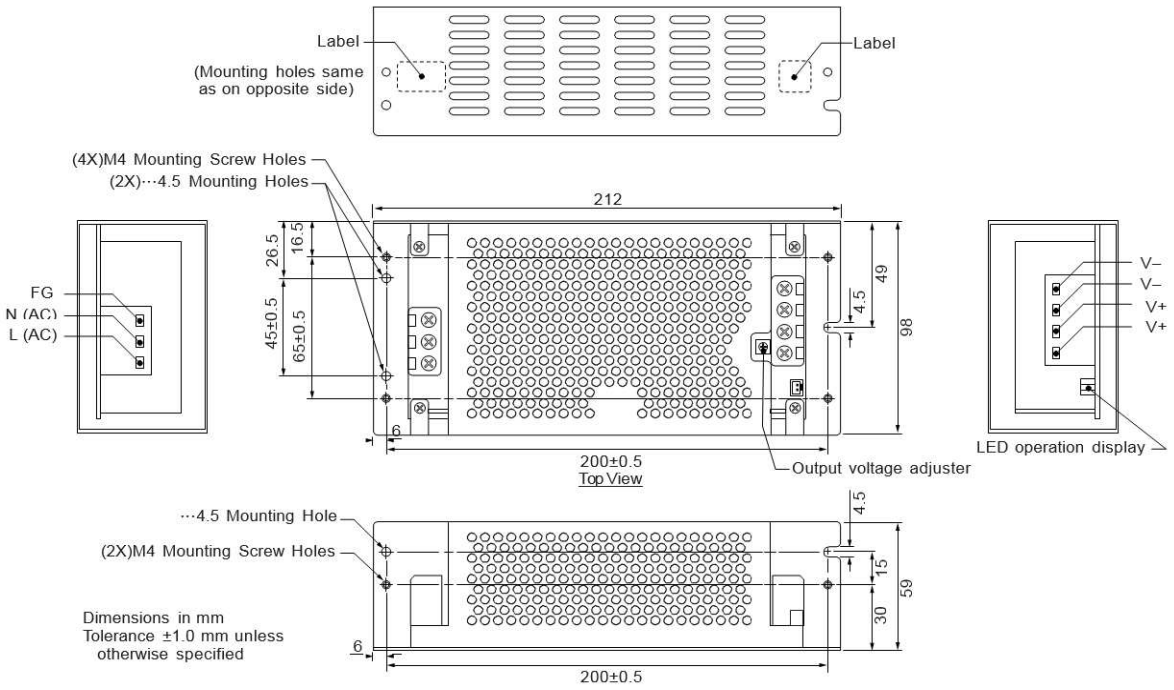
Model SWF240P-24/-36/-48 with Terminal Block (continued)

Output Power: 240W, Output Voltage: 24V / 36V / 48V

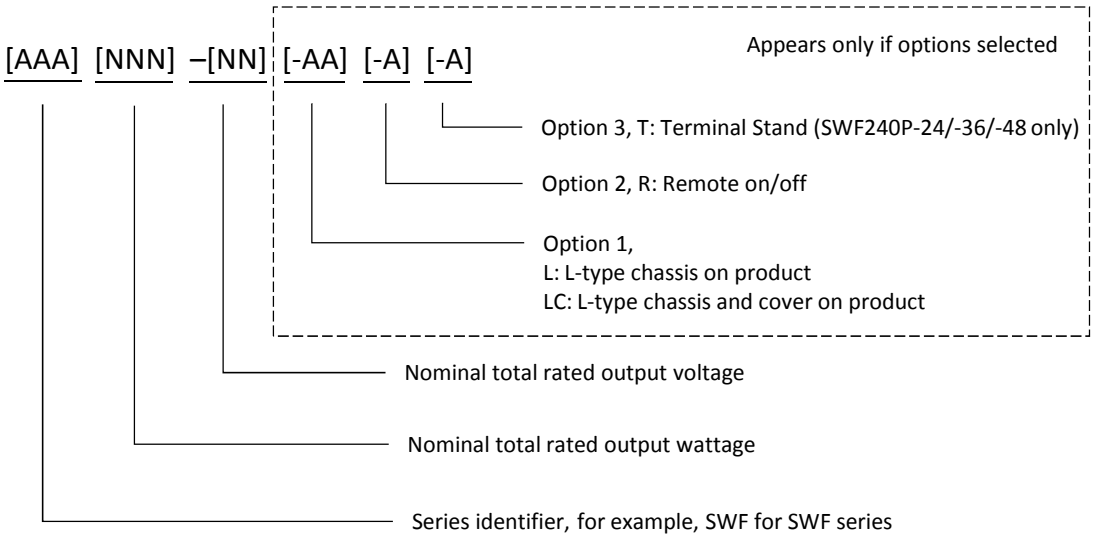
Circuit Assembly with Chassis (L option) and Screw Terminals (T option)



Circuit Assembly with Chassis and Cover (LC option) and Screw Terminals (T option)



Model Number Description



Suffixes	Options Selected				
	L: L-type chassis on product	C: Cover on product	R: Remote On/Off	T: Terminal Stand	Availability
None	–	–	–	–	All products
-L	O	–	–	–	
-LC	O	O	–	–	
-R	–	–	O	–	
-L-R	O	–	O	–	
-LC-R	O	O	O	–	
-L-T	O	–	–	O	SWF240P-24/-36/-48
-LC-T	O	O	–	O	
-R-T	–	–	O	O	
-L-R-T	O	–	O	O	
-LC-R-T	O	O	O	O	

O denotes available

Input and Output Terminals, Connections and Pin Assignments

Input / Output electrical connector manufacturer: JST Mfg. Co., Ltd.
Terminal stand manufacturer: Emuden Corporation

Model: SWF050P-24

Connector Socket			Mating Plug	Connector Contacts
Identifier	**Pins**	**Manufacturer Part Number**		
CN101	1: AC(L) 2: AC(N) 3: FG	B3P5-VH	VHR-5N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN601	1: -V 2: -V 3: +V 4: +V	B4P-VH	VHR-4N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN602 (R option only)	1: R/C + 2: R/C-	B02B-XH-A	XHP-2	SXH-001T-P0.6 (strip) BXH-001T-P0.6 (reel)

Model: SWF100P-24/-36/-48

Connector Socket			Mating Plug	Connector Contacts
Identifier	**Pins**	**Manufacturer Part Number**		
CN101	1: AC(L) 2: AC(N) 3: FG	B3P5-VH	VHR-5N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN601	1: -V 2: -V 3: -V 4: -V 5: +V 6: +V 7: +V 8: +V	B4P-VH	VHR-4N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN602 (R option only)	1: R/C + 2: R/C-	B02B-XH-A	XHP-2	SXH-001T-P0.6 (strip) BXH-001T-P0.6 (reel)

Model: SWF150P-24/-36/-48

Connector Socket			Mating Plug	Connector Contacts
Identifier	Pins	Manufacturer Part Number		
CN101	1: AC(L) 2: AC(N) 3: FG	B3P5-VH	VHR-5N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN601	1: +V 2: +V 3: +V 4: +V 5: +V 6: +V	B6P-VH	VHR-6N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN602	1: -V 2: -V 3: -V 4: -V 5: -V 6: -V	B7P-VH	VHR-7N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN603 (R option only)	1: R/C + 2: R/C-	B02B-XH-A	XHP-2	SXH-001T-P0.6 (strip) BXH-001T-P0.6 (reel)

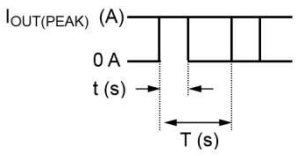
Model: SWF240P-24/-36/-48

Connector Socket			Mating Plug	Connector Contacts
Identifier	Pins	Manufacturer Part Number		
CN101	1: AC(L) 2: AC(N) 3: FG	B3P5-VH	VHR-5N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN601	1: +V 2: +V 3: +V 4: +V 5: +V 6: +V	B6P-VH	VHR-6N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN602	1: -V 2: -V 3: -V 4: -V 5: -V 6: -V	B7P-VH	VHR-7N	SVH-21T-P1.1 (strip) BVH-21T-P1.1 (reel)
CN603 (R option only)	1: R/C + 2: R/C-	B02B-XH-A	XHP-2	SXH-001T-P0.6 (strip) BXH-001T-P0.6 (reel)
TB101 (T option only)	1: AC(L) 2: AC(N) 3: FG	T7201-A-X	(Screw terminals)	M4 screw
TB601 (T option only)	1: +V 2: +V 3: -V 4: -V	T7202-A-X	(Screw terminals)	M4 screw

Functional Description

Dynamic load

The peak current load occurs within 10 seconds (duty cycle of 35% or less). The SWF series can also be used with dynamic (pulse) load.



!	CAUTION: For dynamic operation, use a supply with an output current rms value equal to or less than the rated current of the SWF product selected.

Output Current rms Value, Irms = $\sqrt{\frac{t\,(s)}{T\,(s)}} \times I_{OUT(PEAK)}\ (A)$

t is peak current time
T is current period

IOUT(PEAK) is peak output current amplitude

Remote on/off control

The SWF series supports remote on/off control (R option required). This function requires the use of a DC power supply external to the SWF series power supply.

With remote on/off, the SWF product output goes on when a voltage from 4.5 to 5.5 V (recommended current is 5 mA) is applied between the R/C+ and R/C– terminals. The output goes off when the voltage drops below 0.8 V or is open.

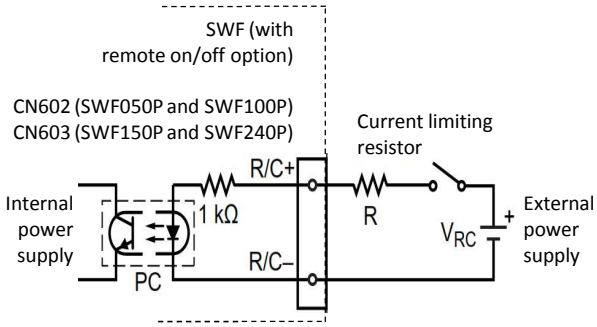
The following should be included in the application design:

• If the external power supply voltage is too high, insert a current limiting resistor (R).

• Use twisted or shielded wire to prevent noise induction.

• Isolate the remote on/off control circuit from the SWF input, output, and FG circuits.

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



Current limiting resistor, R = $\frac{VRC - 1\,(V) - 1\,(k\Omega) \times 5\,(mA)\ 5\,(mA)}{5\,(mA)}$

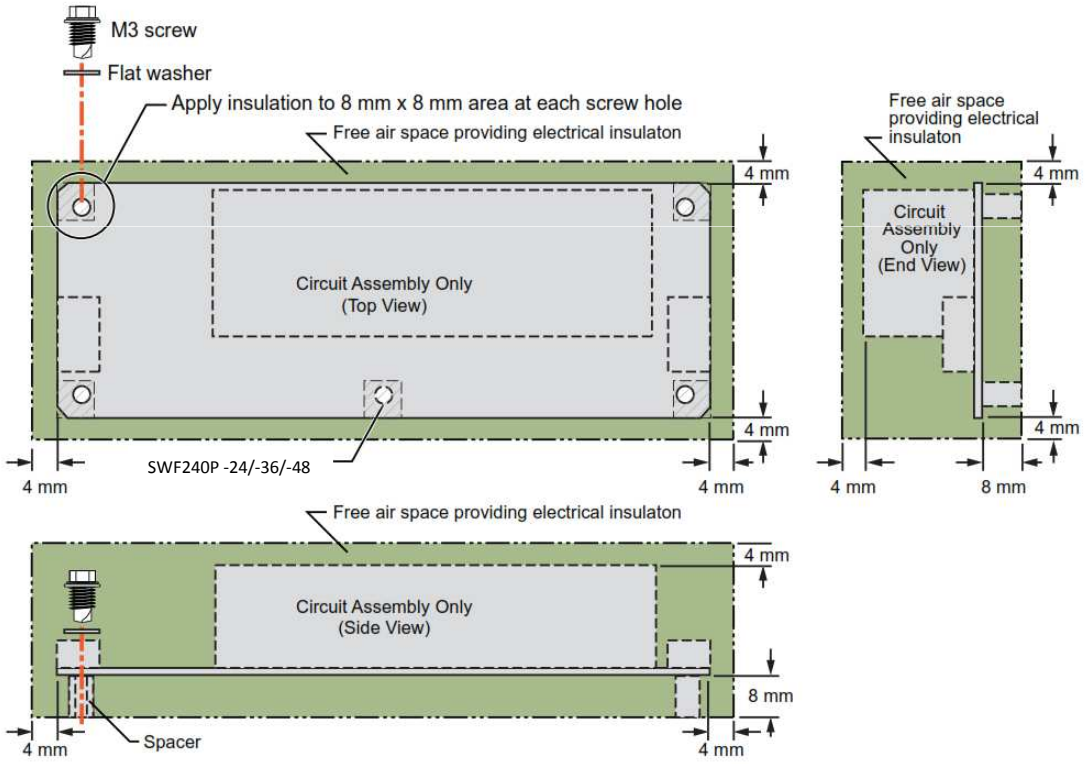
Installation

Electrical clearance air space

When the products are used without the L-type chassis (L option) or the cover (C option), ensure adequate free air space is left around the circuit assembly for clearance to allow adequate electrical insulation from an metal enclosure or mounting surface.

The minimum clearance distances are shown in the diagram.
Please contact Sanken for other mounting options.

Note: Additional free air space is recommended for cooling of the products while operating.



Mounting

Adequate free air space is mandatory to allow convective airflow to cool the unit. If the cooling effect is insufficient, output could stop.

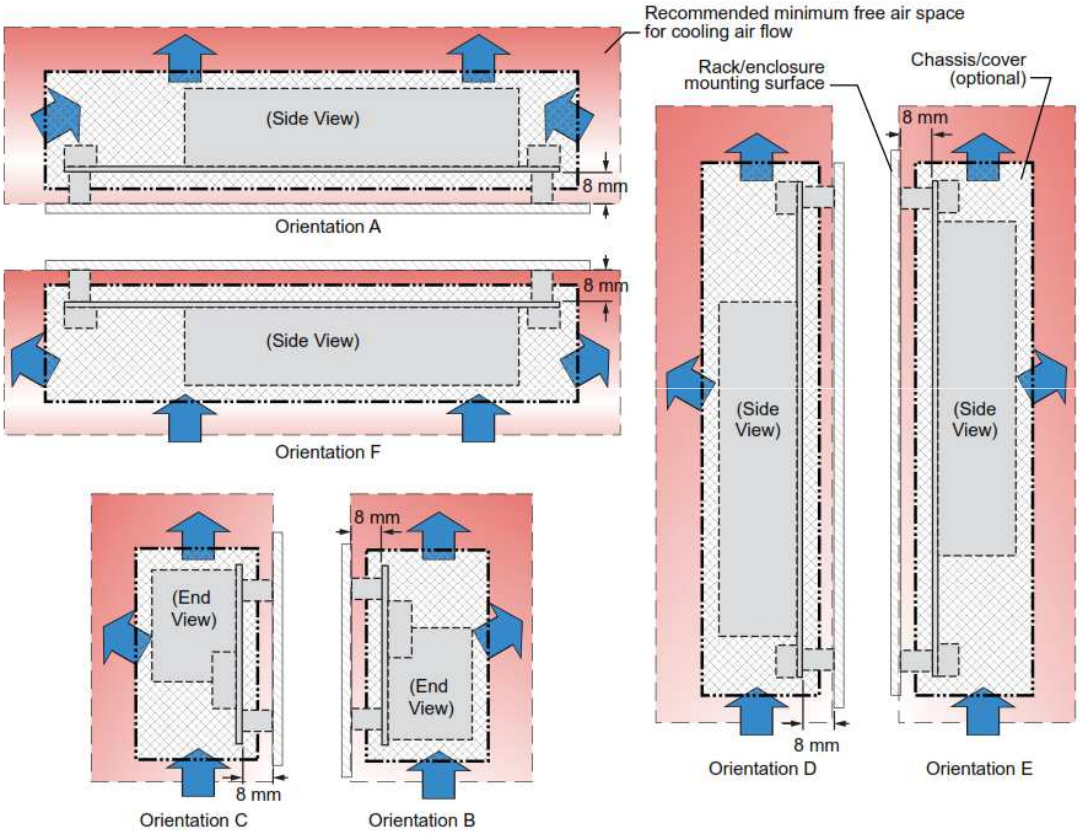
• Ensure there is free airspace clearance on all sides of the unit. A minimum of 8 mm is required between the circuit assembly and any metallic mounting surface, and spacers should be used between the product and the mounting surface.

• The unit can be mounted in many orientations, with surrounding free air space. See illustration below. Please consult with Sanken for other orientations.

• Each orientation results in a different airflow and a different derating characteristic, as shown in the Derating section.

• Mounting flanges are provided at the front and rear of the circuit assembly (an additional hole for a mounting screw is provided on the side of the SWF240P circuit assembly board), and screw holes and slots are provided in the chassis and covers.

• If the product is used in a dusty environment, an air filter may be required and the filter may affect ventilation efficiency. In such situations, additional derating could be required.

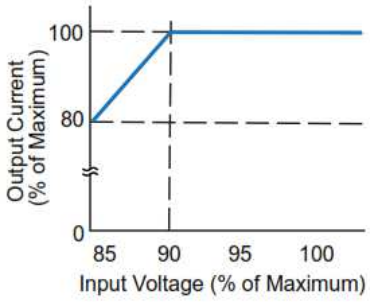


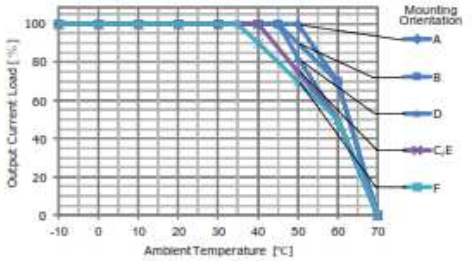
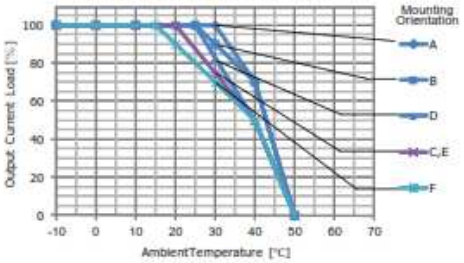
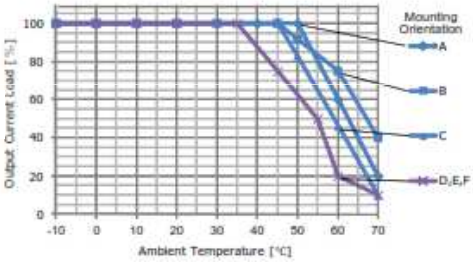
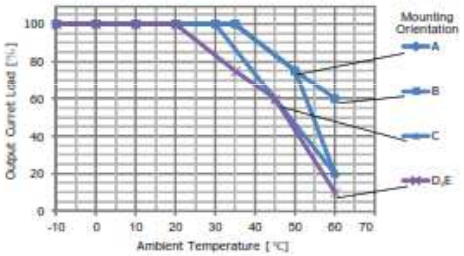
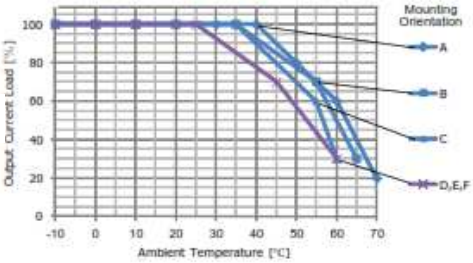
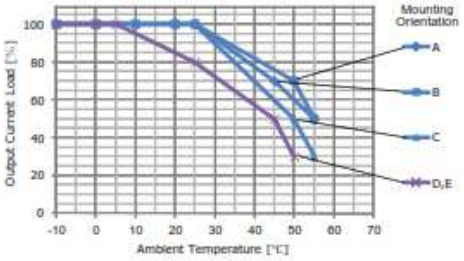
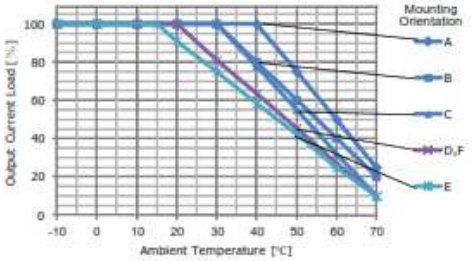
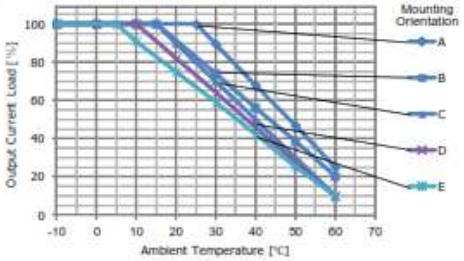
!	CAUTION: Do not touch inside the product because high voltage and high temperature can be present.
!	CAUTION: Do not insert screws into unit case; insert through mounting flanges only

!	CAUTION: The product is designed with surface mount components and should not be exposed to strong vibration.

Derating

Derating is applied to each power unit independently. To prevent the load factor from being truncated due to the derating, make sure the power unit is used within specification, considering both derating of total rated power of the unit and adjacent sources of heat or interference with cooling air flow.
The derating characteristics of the products at various ambient temperatures are shown below. Each mounting orientation results in a different airflow and a different derating characteristic. The individual traces are labelled according to the recommended mounting orientations shown in the Mounting section.



	Without Chassis or Cover	With Chassis or Cover
SWF050P-24		
SWF100P-24/-36/-48		
SWF150P-24/-36/-48		
SWF240P-24/-36/-48		

Specification and Standards

Model SWF050P-24

Parameter			Value
Input Condition	Rated Input Voltage		100 to 240VAC
	Allowable Input Voltage		85 to 264VAC
	Input Current (typ) 1		1.0A (VIN = 100V)
	Rated Frequency		50 / 60 Hz
	Allowable Frequency Range		47 to 63 Hz
	Power Factor (typ) 1		0.5
	Efficiency (typ) 1		84% (VIN = 100V) / 85% (VIN = 240V)
	Inrush Current (typ) 2		15A (VIN = 100V) / 30A (VIN = 200V)
	Leakage Current (max) 1		0.75 mA (VIN = 240V)
Output Conditions 3	Rated Output Voltage		24V
	Output Voltage Variation 9		21.6 to 26.4V
	Rated Output Current		2.1A
	Maximum Peak Current 8		4.2A (within 10 s, duty cycle 35% or less)
	Allowable Output Current Range		0 to 4.2A
	Rated Output Power		50W
	Constant Voltage Accuracy 5		±3%
	Ripple Noise 1,4		300mVP-P
	Output Holding Time (min) 1		20ms
	Start-up Time (typ) 1		500ms
Additional Functions	Over current Protection		Detection above 101% of maximum peak current (automatic recovery)
	Over voltage Protection6		Detection above 115% of maximum output voltage (output cut-off)
	Over temperature Protection		Not Provided
	Remote Sensing		Not Provided
	Operations Display		Not Provided
Environmental Conditions	Operating Temperature Range		–10°C to 70°C
	Storage Temperature Range		–25°C to 85°C
	Operating Humidity Range		30% to 90%
	Storage Humidity Range		20% to 90%
	Cooling Requirements		Natural air cooling
	Vibration Resistance	Vibration Frequency	10 to 55 Hz
		Sweep Time	3 minutes
		Acceleration	19.6 m / s² (2 G)
		Vibration Detection	x, y, z
		Vibration Time	One hour in each of three directions
	Shock Resistance		98 m / s² (10 G); conduct this test on an oak board with a flat surface and a thickness of 10 mm or more; lift one edge of the bottom side of the unit 50 mm and drop it on the board; drop 3 times on each of the 4 edges
	Installation Conditions		Derating may be required due to mounting orientation

Continued on next page

Continued from the previous page ….

Model SWF050P-24

Parameter			Value
Insulation [7]	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 15 mA or less)
		Input-FG	2000 VAC one minute (leakage current 15 mA or less)
		Output-FG	500 VAC one minute (leakage current 15 mA or less)
	Insulation Resistance	Input-Output	100 MΩ (measured with 500 VDC)
		Input-FG	
		Output-FG	
Applicable Standards	Safety Standards		UL60950-1, C-UL(CSA60950-1)
			SEMKO (EN60950-1) certified
			Designed to meet Electrical Appliance and Safety law
	Conducted Emissions		Designed to meet FCC Class B
			Designed to meet EN55022
			Designed to meet VCCI Class B
	EMC		Designated to meet harmonic current IEC61000-3-2

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. Output conditions are measured at a point 15 cm from the output connector, with a 63V / 100µF electrolytic capacitor and a 0.1µF film capacitor connected to that point.
4. Ripple noise is measured with a 100 MHz oscilloscope using a 1:1 probe.
5. The constant voltage accuracy is measured with a static input variation, a static load variation, a time drift, and an ambient temperature variation.
6. Reset is performed by reapplying input voltage.
7. Insulation conditions are specified at normal temperature and humidity.
8. Start-up is to be performed at less than the rated output current.
The maximum Peak current shall be within 10s, duty cycle 35% or less.
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.

Specification and Standards

Model SWF100P-24/-36/-48

Parameter			SWF100P-24	SWF100P-36	SWF100P-48V
Input Condition	Rated Input Voltage		100 to 240VAC		
	Allowable Input Voltage		85 to 264VAC		
	Input Current (typ) 1		1.4A (VIN = 100V)		
	Rated Frequency		50 / 60 Hz		
	Allowable Frequency Range		47 to 63 Hz		
	Power Factor (typ) 1		0.9		
	Efficiency (typ) 1		86% (VIN = 100V) / 89% (VIN = 240V)		
	Inrush Current (typ) 2		15A (VIN = 100V) / 30A (VIN = 200V)		
	Leakage Current (max) 1		0.75 mA (VIN = 240V)		
Output Conditions 3	Rated Output Voltage		24V	36V	48V
	Output Voltage Variation 9		21.6 to 26.4V	32.4 to 39.6V	43.2 to 52.8V
	Rated Output Current		4.2A	2.8A	2.1A
	Maximum Peak Current 8		8.4A	5.6A	4.2A
	Allowable Output Current Range		0 to 8.4A	0 to 5.6A	0 to 4.2A
	Rated Output Power		100W		
	Constant Voltage Accuracy 5		±3%		
	Ripple Noise 1,4		150mVP-P	150mVP-P	250mVP-P
	Output Holding Time (min) 1		20ms		
	Start-up Time (typ) 1		500ms		
Additional Functions	Over current Protection		Detection above 101% of maximum peak current (automatic recovery)		
	Over voltage Protection6		Detection above 115% of maximum output voltage (output cut-off)		
	Over temperature Protection		Not Provided		
	Remote Sensing		Not Provided		
	Operations Display		Not Provided		
Environmental Conditions	Operating Temperature Range		–10°C to 70°C		
	Storage Temperature Range		–25°C to 85°C		
	Operating Humidity Range		30% to 90%		
	Storage Humidity Range		20% to 90%		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m / s² (2 G)		
		Vibration Detection	x, y, z		
		Vibration Time	One hour in each of three directions		
	Shock Resistance		98 m / s² (10 G); conduct this test on an oak board with a flat surface and a thickness of 10 mm or more; lift one edge of the bottom side of the unit 50 mm and drop it on the board; drop 3 times on each of the 4 edges		
	Installation Conditions		Derating may be required due to mounting orientation		

Continued on next page

Continued from the previous page ….

Model SWF100P-24/-36/-48

Parameter			Value
Insulation [7]	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 15 mA or less)
		Input-FG	2000 VAC one minute (leakage current 15 mA or less)
		Output-FG	500 VAC one minute (leakage current 15 mA or less)
	Insulation Resistance	Input-Output	100 MΩ (measured with 500 VDC)
		Input-FG	
		Output-FG	
Applicable Standards	Safety Standards		UL60950-1, C-UL(CSA60950-1)
			SEMKO (EN60950-1) certified
			Designed to meet Electrical Appliance and Safety law
	Conducted Emissions		Designed to meet FCC Class B
			Designed to meet EN55022
			Designed to meet VCCI Class B
	EMC		Designated to meet harmonic current IEC61000-3-2

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. Output conditions are measured at a point 15 cm from the output connector, with a 63V / 100µF electrolytic capacitor and a 0.1µF film capacitor connected to that point.
4. Ripple noise is measured with a 100 MHz oscilloscope using a 1:1 probe.
5. The constant voltage accuracy is measured with a static input variation, a static load variation, a time drift, and an ambient temperature variation.
6. Reset is performed by reapplying input voltage.
7. Insulation conditions are specified at normal temperature and humidity.
8. Start-up is to be performed at less than the rated output current.
The maximum Peak current shall be within 10s, duty cycle 35% or less.
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.

Specification and Standards

Model SWF150P-24/-36/-48

Parameter			SWF150P-24	SWF150P-36	SWF150P-48V
Input Condition	Rated Input Voltage		100 to 240VAC		
	Allowable Input Voltage		85 to 264VAC		
	Input Current (typ) 1		1.9A (VIN = 100V)		
	Rated Frequency		50 / 60 Hz		
	Allowable Frequency Range		47 to 63 Hz		
	Power Factor (typ) 1		0.9		
	Efficiency (typ) 1		87% (VIN = 100V) / 91% (VIN = 240V)		
	Inrush Current (typ) 2		15A (VIN = 100V) / 30A (VIN = 200V)		
	Leakage Current (max) 1		0.75 mA (VIN = 240V)		
Output Conditions 3	Rated Output Voltage		24V	36V	48V
	Output Voltage Variation 9		21.6 to 26.4V	32.4 to 39.6V	43.2 to 52.8V
	Rated Output Current		6.3A	4.2A	3.2A
	Maximum Peak Current 8		12.6A	8.4A	6.4A
	Allowable Output Current Range		0 to 12.6A	0 to 8.4A	0 to 6.4A
	Rated Output Power		150W		
	Constant Voltage Accuracy 5		±3%		
	Ripple Noise 1,4		150mVP-P	150mVP-P	250mVP-P
	Output Holding Time (min) 1		20ms		
	Start-up Time (typ) 1		500ms		
Additional Functions	Over current Protection		Detection above 101% of maximum peak current (automatic recovery)		
	Over voltage Protection6		Detection above 115% of maximum output voltage (output cut-off)		
	Over temperature Protection		Not Provided		
	Remote Sensing		Not Provided		
	Operations Display		Not Provided		
Environmental Conditions	Operating Temperature Range		–10°C to 70°C		
	Storage Temperature Range		–25°C to 85°C		
	Operating Humidity Range		30% to 90%		
	Storage Humidity Range		20% to 90%		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m / s² (2 G)		
		Vibration Detection	x, y, z		
		Vibration Time	One hour in each of three directions		
	Shock Resistance		98 m / s² (10 G); conduct this test on an oak board with a flat surface and a thickness of 10 mm or more; lift one edge of the bottom side of the unit 50 mm and drop it on the board; drop 3 times on each of the 4 edges		
	Installation Conditions		Derating may be required due to mounting orientation		

Continued on next page

Continued from the previous page ….

Model SWF150P-24/-36/-48

Parameter			Value
Insulation [7]	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 15 mA or less)
		Input-FG	2000 VAC one minute (leakage current 15 mA or less)
		Output-FG	500 VAC one minute (leakage current 15 mA or less)
	Insulation Resistance	Input-Output	100 MΩ (measured with 500 VDC)
		Input-FG	
		Output-FG	
Applicable Standards	Safety Standards		UL60950-1, C-UL(CSA60950-1)
			SEMKO (EN60950-1) certified
			Designed to meet Electrical Appliance and Safety law
	Conducted Emissions		Designed to meet FCC Class B
			Designed to meet EN55022
			Designed to meet VCCI Class B
	EMC		Designated to meet harmonic current IEC61000-3-2

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. Output conditions are measured at a point 15 cm from the output connector, with a 63V / 100µF electrolytic capacitor and a 0.1µF film capacitor connected to that point.
4. Ripple noise is measured with a 100 MHz oscilloscope using a 1:1 probe.
5. The constant voltage accuracy is measured with a static input variation, a static load variation, a time drift, and an ambient temperature variation.
6. Reset is performed by reapplying input voltage.
7. Insulation conditions are specified at normal temperature and humidity.
8. Start-up is to be performed at less than the rated output current.
The maximum Peak current shall be within 10s, duty cycle 35% or less.
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.

Specification and Standards

Model SWF240P-24/-36/-48

Parameter			SWF240P-24	SWF240P-36	SWF240P-48V
Input Condition	Rated Input Voltage		100 to 240VAC		
	Allowable Input Voltage		85 to 264VAC		
	Input Current (typ) 1		2.9A (VIN = 100V)		
	Rated Frequency		50 / 60 Hz		
	Allowable Frequency Range		47 to 63 Hz		
	Power Factor (typ) 1		0.9		
	Efficiency (typ) 1		88% (VIN = 100V) / 92% (VIN = 240V)		
	Inrush Current (typ) 2		15A (VIN = 100V) / 30A (VIN = 200V)		
	Leakage Current (max) 1		0.75 mA (VIN = 240V)		
Output Conditions 3	Rated Output Voltage		24V	36V	48V
	Output Voltage Variation 9		21.6 to 26.4V	32.4 to 39.6V	43.2 to 52.8V
	Rated Output Current		10.0A	6.7A	5.0A
	Maximum Peak Current 8		20.0A	13.4A	10.0A
	Allowable Output Current Range		0 to 20.0A	0 to 13.4A	0 to 10.0A
	Rated Output Power		240W		
	Constant Voltage Accuracy 5		±3%		
	Ripple Noise 1,4		300mVP-P	300mVP-P	400mVP-P
	Output Holding Time (min) 1		20ms		
	Start-up Time (typ) 1		500ms		
Additional Functions	Over current Protection		Detection above 101% of maximum peak current (automatic recovery)		
	Over voltage Protection6		Detection above 115% of maximum output voltage (output cut-off)		
	Over temperature Protection		Not Provided		
	Remote Sensing		Not Provided		
	Operations Display		Not Provided		
Environmental Conditions	Operating Temperature Range		–10°C to 70°C		
	Storage Temperature Range		–25°C to 85°C		
	Operating Humidity Range		30% to 90%		
	Storage Humidity Range		20% to 90%		
	Cooling Requirements		Natural air cooling		
	Vibration Resistance	Vibration Frequency	10 to 55 Hz		
		Sweep Time	3 minutes		
		Acceleration	19.6 m / s² (2 G)		
		Vibration Detection	x, y, z		
		Vibration Time	One hour in each of three directions		
	Shock Resistance		98 m / s² (10 G); conduct this test on an oak board with a flat surface and a thickness of 10 mm or more; lift one edge of the bottom side of the unit 50 mm and drop it on the board; drop 3 times on each of the 4 edges		
	Installation Conditions		Derating may be required due to mounting orientation		

Continued on next page

Continued from the previous page ….

Model SWF240P-24/-36/-48

Parameter			Value
Insulation [7]	Insulation Withstand Voltage	Input-Output	3000 VAC one minute (leakage current 15 mA or less)
		Input-FG	2000 VAC one minute (leakage current 15 mA or less)
		Output-FG	500 VAC one minute (leakage current 15 mA or less)
	Insulation Resistance	Input-Output	100 MΩ (measured with 500 VDC)
		Input-FG	
		Output-FG	
Applicable Standards	Safety Standards		UL60950-1, C-UL(CSA60950-1)
			SEMKO (EN60950-1) certified
			Designed to meet Electrical Appliance and Safety law
	Conducted Emissions		Designed to meet FCC Class B
			Designed to meet EN55022
			Designed to meet VCCI Class B
	EMC		Designated to meet harmonic current IEC61000-3-2

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. Output conditions are measured at a point 15 cm from the output connector, with a 63V / 100µF electrolytic capacitor and a 0.1µF film capacitor connected to that point.
4. Ripple noise is measured with a 100 MHz oscilloscope using a 1:1 probe.
5. The constant voltage accuracy is measured with a static input variation, a static load variation, a time drift, and an ambient temperature variation.
6. Reset is performed by reapplying input voltage.
7. Insulation conditions are specified at normal temperature and humidity.
8. Start-up is to be performed at less than the rated output current.
The maximum Peak current shall be within 10s, duty cycle 35% or less.
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.
Sanken products listed in this publication are designed and intended for use as components in general-purpose electronic equipment or apparatus (home appliances, office equipment, telecommunication equipment, measuring equipment, etc.). Their use in any application requiring radiation hardness assurance (e.g., aerospace equipment) is not supported.
When considering the use of Sanken products in applications where higher reliability is required (transportation equipment and its control systems or equipment, fire- or burglar-alarm systems, various safety devices, etc.), contact a company sales representative to discuss and obtain written confirmation of your specifications.
The use of Sanken products without the written consent of Sanken in applications where extremely high reliability is required (aero- space equipment, nuclear power-control stations, life-support systems, etc.) is strictly prohibited.
The information included herein is believed to be accurate and reliable. Application and operation examples described in this publication are given for reference only and Sanken assumes no responsibility for any infringement of industrial property rights, intellectual property rights, or any other rights of Sanken or any third party that may result from its use.
The contents in this document must not be transcribed or copied without Sanken’s written consent.