



samlexpower®

**Switch Mode
DC Power
Supplies**

SEC-1212
SEC-1223

**Owner's
Manual**

Please read this
manual BEFORE
installing your
Power Supply.

OWNER'S MANUAL | Index

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SECTION 1 | Important Safety Instructions

1.1 CAUTION: RISK OF ELECTRIC SHOCK! DO NOT OPEN!

WARNING—TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. THERE ARE NO USER SERVICEABLE PARTS INSIDE — REFER TO QUALIFIED SERVICE PERSONNEL.

1.2 SYMBOLS

The following safety symbols will be used in this manual to highlight safety and information:



WARNING!

Indicates possibility of physical harm to the user in case of non-compliance.



MISE EN GARDE!

L'utilisateur pourrait se blesser lorsque les consignes de sécurité ne sont pas suivies.



CAUTION!

Indicates possibility of damage to the equipment in case of non-compliance.



ATTENTION!

Il y a un risque d'endommager l'équipement lorsque l'utilisateur ne suit pas les instructions.



INFO

Indicates useful supplemental information.

1.3 GENERAL

Please read before using your power supply:

1. It is recommended that you return your power supply to a qualified Samlex dealer for any service or repair. Incorrect assembly may result in electric shock or fire.
2. To reduce the risk of electric shock, unplug the power supply from the outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
3. An extension cord should not be used unless absolutely necessary. **If an extension cord must be used make sure that the pins on the plug are the same number, size and shape as those of the original power supply plug.**
4. Place the unit in an area that will allow air to flow freely around the unit. **DO NOT BLOCK OR OBSTRUCT** vent openings on the side/bottom of the unit.
5. Keep the unit away from moisture and water.
6. **NEVER operate the units in parallel.**

SECTION 1 | Important Safety Instructions

1.4 GROUNDING



WARNING!

Your power supply should be grounded to reduce the risk of electric shock. The power supply is equipped with grounding conductor and grounding plug.

The cord must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. Never alter the AC cord of plug provided. If the cord will not fit the outlet, have a proper outlet installed by qualified electrician. Improper connection can result in risk of electric shock.



MISE EN GARDE!

Votre alimentation doit être mis à la terre pour réduire le risque de choc électrique. L'alimentation est équipé d'un conducteur de mise à la terre et de mise à la terre.

Le cordon doit être branché dans une prise de courant correctement installée et mise à la terre conformément à tous les codes et règlements locaux. Ne modifiez jamais le cordon secteur de la prise fournie. Si le cordon ne s'adapte pas la prise, faites installer une prise adéquate par un électricien qualifié. Une connexion incorrecte peut entraîner un risque de choc électrique.

1.5 CONNECTION TO A BATTERY

DO NOT USE THE POWER SUPPLY FOR DIRECT CHARGING OF BATTERY OR DIRECT CONNECTION TO A BATTERY FOR BATTERY BACK-UP. (Please read Section 3.5).

SECTION 3 | Description & Overview

3.1 DESCRIPTION

SEC-1212 / SEC-1223 are switched mode power supplies which convert 120 VAC, 50/60 Hz (or 230 VAC, 50/60 Hz*) to regulated 13.8 VDC based on pulse width modulation (PWM) control.

***NOTE:** The units are factory preset to operate from input voltage of 120 VAC, 50/60 Hz. These may be set to operate from input voltage of 230 VAC, 50/60 Hz by changing internal setting described at Section 4.5.2.



CAUTION!

UL listing is not valid for 230 VAC input option.



ATTENTION!

Inscription UL n'est pas valide pour l'option d'entrée 230 VAC.

3.2 FEATURES

- Based on switched mode technology and PWM control. Switching frequency:
 - SEC-1212 : 20 KHz
 - SEC-1223 : 25 KHz
- Compact and lightweight.
- High efficiency and less heat dissipation.
- Protected against short circuit, over current and over voltage (through PWM controller).
- SEC-1212 is convection cooled. SEC-1223 has forced air cooling and over temperature shut down.
- UL listed and approved.
- Complies with FCC part 15(B) for radiated & conducted noises for Class-B digital devices.

3.3 SEC-1212: COOLING

SEC-1212 is cooled by convection. **PLACE SEC-1212 UNIT IN A WELL VENTILATED OPEN AND COOL AREA. DO NOT BLOCK THE VENTILATION OPENINGS ON THE SIDES.**

3.4 SEC-1223: COOLING AND OVER TEMPERATURE PROTECTION

SEC-1223 is cooled by convection and by forced air. A temperature controlled fan has been provided to improve cooling at higher loads. The fan is controlled by a sensor mounted on the power transformer. **THE FAN WILL BE OFF AT LOWER LOADS.** It will come on only when the temperature of the power transformer is $\geq 60^{\circ}\text{C} \pm 5^{\circ}\text{C}$ / $140^{\circ}\text{F} \pm 9^{\circ}\text{F}$ due to higher loads or higher ambient temperature or poor cool air circulation

SECTION 3 | Description & Overview

around the unit. The fan will switch off automatically at $\leq 40^{\circ}\text{C} \pm 5^{\circ}\text{C} / 104^{\circ}\text{F} \pm 9^{\circ}\text{F}$. In case the fan fails or the air flow is blocked, a second temperature sensor mounted on the power transformer will activate over temperature shut down at $\geq 105^{\circ}\text{C} \pm 5^{\circ}\text{C} / 221^{\circ}\text{F} \pm 9^{\circ}\text{F}$. The output voltage will be automatically resumed once the unit cools down to $\leq 75^{\circ}\text{C} \pm 5^{\circ}\text{C} / 167^{\circ}\text{F} \pm 9^{\circ}\text{F}$. **PLACE SEC-1223 IN A WELL VENTILATED OPEN AND COOL AREA. DO NOT BLOCK THE OPENINGS AT THE FAN DISCHARGE ON THE BOTTOM AND THE SUCTION OPENINGS ON THE SIDES.**

3.5 BATTERY CHARGING & BATTERY BACK-UP



WARNING!

These units are power supplies and not battery chargers. Do not connect these units directly to a battery.



MISE EN GARDE!

Ces unités sont des unités d'alimentation et non pas les chargeurs de batterie. Ne pas connecter ces appareils directement à une batterie.

These units should **NOT BE DIRECTLY CONNECTED TO A BATTERY** for charging or for battery back-up. Battery charging and battery back-up may be undertaken only when the battery is connected through suitable external isolating diodes and charge limiting resistor.

The isolating diode will ensure that the battery does not back power the power supply. When a battery is deeply discharged, it will initially draw a very large charging current and thus, will force the power supply into current limit mode for prolonged periods. This is harmful for the power supply. The charge limiting resistor will limit the charging current, thereby, ensuring that the maximum charging current is well below the current limit value of the power supply.



INFO

It is recommended that optional battery back-up module BBM-1225 may be used to convert SEC-1212/SEC-1223 for battery back-up application.

SECTION 4 | Installation

4.1 WARNING!

1. Before commencing installation, please read the safety instructions explained in Section 1 titled “Important Safety Instructions”.
2. It is recommended that the installation should be undertaken by a qualified, licensed / certified electrician.
3. Various recommendations made in this manual on installation will be superseded by the National / Local Electrical Codes related to the location of the unit and the specific application.



MISE EN GARDE!

1. Avant de commencer l'installation, veuillez lire les instructions de sécurité a expliqué à la section 1 intitulée “Instructions de sécurité importantes”.
2. Il est recommandé que l'installation doit être effectuée par un technicien qualifié, autorisé / électricien certifié.
3. Différentes recommandations faites dans ce manuel sur l'installation sera remplacée par la National / les codes électriques locaux liés à l'emplacement de l'unité et l'application spécifique.

4.2 INSTALLATION DIMENSIONS

Refer to Section 2, Figs 2.1 for installation dimensions for SEC-1212 and Section 2, Fig 2.2 for installation dimensions for SEC-1223 .

4.3 LOCATION OF INSTALLATION

Please ensure that the following requirements are met:

Working Environment: Indoor use.

Cool: Heat is the worst enemy of electronic equipment. Hence, please ensure that the units are installed in a cool area that is also protected against heating effects of direct exposure to the sun or to the heat generated by other adjacent heat generating devices.

Well ventilated: SEC-1212 is cooled by convection and has ventilation openings on the sides. SEC-1223 is cooled by convection and by forced air-cooling by temperature controlled fan on the bottom of the unit. The fan at the bottom of SEC-1223 draws cool air from air intake openings on the sides and discharges hot air through the exhaust openings under the fan. To avoid shut down of the units due to over temperature, do not cover or block the ventilation / suction / exhaust openings or install the units in an area with limited airflow. Keep a minimum clearance of 10” around the units to provide adequate ventilation. If installed in an enclosure, openings must be provided in the enclosure, directly opposite to the air-suction and air-exhaust openings of the unit.

Dry: There should be no risk of condensation, water or any other liquid that can enter or fall on the units.

SECTION 4 | Installation

Clean: The area should be free of dust and fumes. Ensure that there are no insects or rodents. They may enter the units and block the ventilation openings or short circuit electrical circuits inside the units.

Protection against fire hazard: The units are not ignition protected and should not be located under any circumstance in an area that contains highly flammable liquids like gasoline or propane as in an engine compartment with gasoline-fueled engines. Do not keep any flammable / combustible material (i.e., paper, cloth, plastic, etc.) near the units that may be ignited by heat, sparks or flames.

Accessibility: Do not block access to the front panel. Also, allow enough room to access the AC inlet and the DC wiring terminals and connections at the back of the unit, as they will need to be checked and tightened periodically.

Preventing Radio Frequency Interference (RFI): The units use high power switching circuits that generate RFI. This RFI is limited to the required standard – FCC Part 15(B), Class B. Locate any electronic equipment susceptible to radio frequency and electromagnetic interference as far away from the unit as possible. For additional information, please read Section 6 titled “Limiting Electromagnetic Interference (EMI)”.

4.4 MOUNTING ORIENTATION

SEC-1212 has ventilation openings on the sides and SEC-1223 has air intake openings on the sides and exhaust openings at the bottom for the cooling fan. The units should be mounted in such a manner so that small objects should not be able to fall easily into the units from these openings and cause electrical / mechanical damage. Also, the mounting orientation should be such that if the internal components overheat and melt / dislodge due to a catastrophic failure, the melted / hot dislodged portions should not be able to fall out of the unit on to a combustible material and cause a fire hazard. The size of openings has been limited as per the safety requirements to prevent the above possibilities when the unit is mounted in the recommended orientations. In order to meet the regulatory safety requirements, the mounting has to satisfy the following requirements:

- Mount on a non-combustible material.
- The mounting surface should be able to support the weight of the unit
- Mount horizontally on a horizontal surface (e.g. table top or a shelf)
- Mounting horizontally on a vertical surface – The unit can be mounted on a vertical surface (like a wall) with the DC output terminals either facing up or down



WARNING!

Mounting the unit on a vertical surface with the ventilation slots on the sides facing up / down is NOT recommended. As explained above, this is to prevent (i) falling of objects into the unit through the slots causing short circuit or (ii) falling out of dislodged overheated / melted components on to a combustible material in case of catastrophic internal failure.

SECTION 4 | Installation



MISE EN GARDE!

Montage de l'appareil sur une surface verticale avec les fentes de ventilation sur les côtés vers le haut / vers le bas n'est pas recommandé. Comme expliqué ci-dessus, il s'agit d'éviter que (i) la chute d'objets dans l'unité à travers les fentes provoquant un court-circuit ou (ii) en tombant de délogé / composants surchauffés fondu sur un matériau combustible en cas de défaillance interne catastrophique.

4.5 AC SIDE CONNECTION

4.5.1 Connection for nominal AC input voltage of 120VAC (range: 100-130VAC), 50/60Hz (Factory preset condition)

The unit has been factory preset for nominal AC input voltage of 120VAC (range: 100-130VAC), 50/60Hz.

120VAC power is fed to the unit through detachable, 120 VAC power cord supplied with the unit. The power cord has the following specifications:

- Length of the cord: 6 ft
- Cable : 3 conductors (Line – black; Neutral – White; Grounding - Green), each AWG #18
- 15A Connector for power supply end: "IEC 60320 – C13" female connector. Insert this end into the AC Power Inlet on the unit (2, Figs 2.1 / 2.2)
- 15A Plug for connecting to 120 VAC outlet: NEMA5-15P

4.5.2 Connection for nominal AC input voltage of 230VAC (range: 200-260VAC), 50/60Hz (will require internal jumper setting)

The unit can also be operated from nominal AC input voltage of 230VAC (range: 200 to 260VAC), 50/60Hz by internal jumper setting, changing internal fuse size and changing AC power cord as described below:

4.5.2.1 SEC-1212

Changing internal jumper setting:

- a) Switch off the unit and unplug the AC power cord from the AC outlet supplying AC power to the unit.
- b) Remove the top cover by unscrewing 4 screws
- c) For 120VAC operation (factory preset condition), points marked "D" and "E" on the Printed Circuit Board (PCB) have been connected (shorted) with a flexible, yellow colored jumper wire that has black colored Quick Disconnect Terminal at the 2 ends. To convert to 230VAC operation, disconnect the Quick Connect Terminal of the jumper wire at point "D" by pulling it upwards. Insulate this end with insulation tape and use a cable tie to tie it securely to the nearby wire bundle.

SECTION 4 | Installation

Changing internal Fuse:

- a) For the factory preset 120 VAC operation, the internal AC input side Fuse is rated at 250VAC, 3A. For 230VAC operation, remove this Fuse and replace with a similar 250VAC, 2A Fuse (Littelfuse Part No. 0218002 or equivalent).

Changing detachable AC Power Cord:

- a) Change the supplied detachable AC power cord with detachable power cord that has "IEC 60320 – C13" female connector for the power supply end and a plug on the other end with 3 pin configuration to suit the 230V country specific outlet.

4.5.2.2 SEC-1223

Changing internal jumper setting:

- a) Switch off the unit and unplug the AC power cord from the AC outlet supplying AC power to the unit.
- b) Remove the top cover by unscrewing 4 screws
- c) For 120VAC operation (factory preset condition), points marked "C" and "E" on the Printed Circuit Board (PCB) have been connected (shorted) with a flexible, yellow colored jumper wire that has black colored Quick Disconnect Terminal at the 2 ends. To convert to 230VAC operation, disconnect the Quick Connect Terminal of the jumper wire at point "C" by pulling it upwards. Insulate this end with insulation tape and use a cable tie to tie it securely to the nearby wire bundle.

Changing internal Fuse:

- a) For the factory preset 120 VAC operation, the internal AC input side Fuse is rated at 250VAC, 6.3A. For 230VAC operation, remove this Fuse and replace with a similar 250VAC, 4A Fuse (Littelfuse Part No. 0218004 or equivalent)

Changing detachable AC Power Cord:

- a) Change the supplied detachable AC power cord with detachable power cord that has "IEC 60320 – C13" female connector for the power supply end and a plug on the other end with 3 pin configuration to suit the 230V country specific outlet.

4.6 DC OUTPUT CONNECTIONS

4.6.1 DC Output Terminals

DC output is provided as follows:

- Red Positive Terminal (4, Figs 2.1 and 2.2):
 - o Tubular Hole – Diameter 5 mm / 0.2"
 - o *Set Screw: 5/64" Hex Socket Head Screw; #10, 24 TPI, 5/16" long
- Black Negative Terminal (3, Figs 2.1 and 2.2):
 - o Tubular Hole – Diameter 5 mm / 0.2"
 - o *Set Screw: 5/64" Hex Socket Head screw; #10, 24 TPI, 5/16" long*

***NOTE:** The following have been provided for convenience:

- a) 5/64" Hex / Allen Key for the Hex Socket Head Screw.
RETAIN THE HEX / ALLEN KEY FOR FUTURE USE
- b) 2 spare Hex socket head screws

SECTION 4 | Installation

4.6.2 Pin Type of Terminal Lugs for Wiring to be Connected to DC Output Terminals

The DC output terminals have a tubular hole with a set screw (See Section 4.6.1 above for specifications). As the DC terminals have been provided with a set screw, do not connect bare stranded wire end directly to the DC output terminal as the strands will spread out when the set screw is tightened and all the strands may not be pinched firmly under the set screw. This will result in (i) reduction in effective area of cross section for current conduction leading to increased voltage drop and overheating along output wiring and (ii) Sparking / loose connection under the set screw leading to overheating / melting of the plastic material of the terminals. The ends of stranded wiring to be connected to the DC output terminals should be crimped to Pin Type of Terminal Lugs that have been provided with the unit (see Fig 4.1). After crimping the Terminal Lugs, use insulating heat shrink tubing or tape to insulate the bare cylindrical portion of the lugs.



Fig 4.1 Pin type of terminal lugs provided for termination of stranded wiring to be connected to the DC input terminals.

SECTION 5 | Operation



5.1 WARNING!

1. Before commencing operation, please read the safety instructions explained in Section 1 titled "Important Safety Instructions".
2. Ensure that the unit has been installed as per guidelines given in Section 4 titled "Installation".
3. The unit has been factory preset for operation from nominal AC input voltage of 120VAC, 50/60Hz. If the unit is to be operated from nominal AC voltage of 230 VAC, 50/60 Hz, please change internal input jumper setting, internal fuse and AC power cord as per instruction given at Section 4 titled "Installation".

NOTE: If the unit is operated from 230VAC without making the above changes, the input section of the unit will be damaged and warranty will be voided.

SECTION 5 | Operation



MISE EN GARDE!

1. Avant de commencer, veuillez lire les instructions de sécurité a expliqué à la section 1 intitulée "Instructions de sécurité importantes".
2. S'assurer que l'unité a été installée selon les directives données dans la section 4 intitulée "Installation"
3. The unit has been factory preset for operation from nominal AC input voltage of 120VAC, 50/60Hz. If the unit is to be operated from nominal AC voltage of 230 VAC, 50/60 Hz, please change internal input jumper setting, internal fuse and AC power cord as per instruction given at Section 4 titled "Installation".

NOTE: Si l'appareil est utilisé à partir de 230 VCA sans faire les changements ci-dessus, la section d'entrée de l'appareil sera endommagé et la garantie sera annulée.

5.2 SWITCHING ON PROCEDURE

- a) Plug the supplied AC Power Cord to the AC Power Cord Inlet on the unit (2, Fig 2.1)
- b) Ensure that the power supply's On/Off Switch (1, Fig 2.1) is in off position (edge of the switch with marking "o" will be in pressed down condition).
- c) Switch off the 12V DC load that is required to be powered from the power supply.
- d) Ensure that the ends of the Positive and Negative wires of the DC load to be connected to the power supply have been properly terminated with Pin Type Terminal Lugs as explained at Section 4.6.2.
- e) Connect the Positive wire from the DC load to the Red Positive DC Input Terminal (4, Fig 2.1) of the power supply and the Negative wire from the DC load to the Black Negative DC Input Terminal (3, Fig 2.1) of the power supply. Use 5/64" Hex Key provided with the unit to tighten the Hex Socket Head set screws to ensure that the connections are secure and tight
- f) Plug the AC Power Cord to the AC outlet. Ensure that AC power is available in the outlet
- g) Switch on the unit by pressing down on the edge of the switch marked " - ". Neon light inside the switch will be lighted
- h) 13.8 VDC will now be available at the DC output terminals (4, 3 in Fig 2.1)
- i) Now switch on the DC load

5.3 SWITCHING OFF PROCEDURE

- a) Switch off the DC load first
- b) Switch off the power supply by pressing down on the edge of the switch marked "o"
- c) Unplug the AC power cord from the AC outlet

5.4 TROUBLESHOOTING

Refer to the Troubleshooting Guide at Section 7 in case of any abnormal operation.

SECTION 6 | Limiting Electro-Magnetic Interference (EMI)

6.1 CAUTION!

Conducted and radiated noises in this unit are limited as per the applicable National / International Standards as detailed under Compliance: EMC in Section 8.

This unit generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, this does not guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures recommended in the following paragraphs.



ATTENTION!

Bruits et rayonnement dans cette unité sont limitées que par la législation nationale / normes internationales comme détaillé dans le cadre de conformité : EMC dans la section 8.

Cet appareil génère, utilise et peut émettre une énergie de fréquence radio et, s'il n'est pas installé et utilisé conformément aux instructions, peut causer des interférences nuisibles aux communications radio. Cependant, cela ne garantit pas qu'aucune interférence ne se produira dans une installation particulière. Si cet équipement provoque des interférences nuisibles à la réception radio ou télévision, ce qui peut être déterminé en éteignant l'équipement, l'utilisateur est encouragé à essayer de corriger les interférences en prenant une ou plusieurs des mesures recommandées dans les paragraphes suivants.

6.2 UN-INTENTIONAL RF NOISE GENERATED BY SWITCHED MODE POWER SUPPLIES (SMPS)

Switched Mode Power Supplies (SMPS) employ high frequency switching (20 to 30.5 KHz in these units) and thus, are a source of radio interference, a recipient of radio interference and a conduit of radio interference. (Older Linear Type, low frequency 50 / 60 Hz transformer based power supplies do not employ high frequency switching voltages and will be quieter as compared to SMPS).

The emission sources originate in the switching devices due to their fast switching current transitions: harmonics of the switching frequency and broadband noise created by under-damped oscillations in the switching circuit. The noise is both conducted and radiated through the input power cord and the DC output wiring to the radio.

SECTION 6 | Limiting Electro-Magnetic Interference (EMI)

6.3 FILTRATION OF CONDUCTED NOISE

The conducted RF noise from this SMPS unit is limited to the maximum allowable levels by internal filtration. The filtered RF noise currents (< few hundred micro Amps) are bypassed to the chassis of the power supply. The chassis is, in turn, connected to the Earth Ground pin of the AC input power cord (for Class 1 units). Thus, the filtered noise currents are intentionally leaked to the Earth Ground. This is termed as the “Earth Leakage Current”.

6.4 EXCESSIVE RF OUTPUT INTERFERENCE BY SMPS DUE TO INCOMING RF INTERFERENCE WHEN POWERING RADIO TX / RX

SMPS are also recipients of radio interference. The normal operation of the power supply can be disturbed due to RF noise getting coupled into the power supply. Thus, the power supply may generate excessive RF noise and lose output voltage regulation due to excessive transmitter energy being coupled through the AC / DC lines to the power supply's regulator feedback path. This may be due to antenna being too close or due to the antenna or feed system not radiating properly. First, check the antenna system SWR. Then, if necessary, relocate either the antenna or the power supply farther apart. The receiver may “hear” the power supply. A slowly moving, slightly buzzing carrier heard in the receiver may be caused by the antenna being too close. As with the transmitter related noise pick up, a loose coaxial connector or a broken or a missing ground may aggravate this problem. Normally, this noise will be below the background or “band” noise. Increase the separation between the power supply and the receiving antenna. Use an outdoor antenna. This will reduce the amount of signal picked up from the power supply and also increase the amount of the desired signal.

6.5 ADDITIONAL GUIDELINES FOR REDUCING RF NOISE

- Use additional appropriate AC Radio Frequency Interference (RFI) Power Line Filter rated for minimum 10A immediately before the AC input of the power supply. Filtered, Ferrite Coated Cord Set is another choice. These cord sets, with integral line interference filters, reduce Common and Differential Mode Interferences over a wide frequency range. Because they are shielded, they are also effective against radiated interferences. In addition to the built-in filter networks, the cable conductors are coated with an RF absorbing ferrite compound. This provides additional attenuation at high frequencies that is lacking in most regular LC filters. The RF absorption of the ferrite-coated cable avoids resonances at high frequencies, reducing the conducted and radiated RF noises even further.
- Use additional appropriate DC radio frequency interference (RFI) power line filter rated for minimum 30 A immediately after the DC output of the power supply.
- Twist the Positive and Negative wires from the output of the power supply to the radio.

SECTION 6 | Limiting Electro-Magnetic Interference (EMI)

- The DC side Positive and Negative outputs of these power supplies are isolated from the chassis. As explained earlier, the noise currents are filtered to the chassis of the unit and the chassis is connected to the Earth Ground through the Earth Ground Pin of the AC power outlet receptacle. Avoid connecting (referencing) the DC Negative output terminal of the power supply to the Earth Ground.
- Connect a ¼" wavelength of wire on the Negative terminal of the power supply. Connect one end of the wire to the Negative terminal and leave the other end free. The wavelength corresponds to the wavelength of the interfering frequency. (May not be practical for long wave lengths).

[Formula: Wave length (Meters) = 300 / frequency in MHz]

6.6 COMBINED FILTERED NOISE CURRENTS FROM MULTIPLE SMPS ON A BRANCH CIRCUIT MAY TRIP GROUND FAULT CIRCUIT INTERRUPTER (GFCI)

During malfunction or an accident, the metal chassis of a device may get energized to unsafe voltage due to internal high voltage section coming in contact with the chassis. If a person standing on Earth touches this energized chassis, a leakage current proportional to the person's skin resistance will flow through the person's body to Earth Ground. The leakage current through the body is higher when the skin contact resistance is lower i.e. if the skin is wet or wounded. This leakage current does not return to the power source but is dissipated in Earth Ground. A leakage current of > 4 to 6mA could produce lethal electrical shock. Ground Fault Circuit Interrupter (GFCI) is used for safety against electrical shock due to leakage. GFCI measures the difference between the current sent to the load and returned from the load and will trip and disconnect the power circuit if the difference is > 4 to 6mA. GFCIs are normally installed in AC Branch Circuits feeding power outlets in wet areas like marine craft, RVs, spas, hot-tubs, kitchens, washrooms, etc.

As explained earlier, RF noise filtration circuits in SMPS generate intentional Earth Leakage Current. SMPS are used extensively as DC power sources in modern day electrical / electronic devices e.g. Audio / Video / Computing devices, power supplies, battery chargers etc. A single GFCI outlet / GFCI breaker may be serving multiple SMPS loads and therefore, will be sensing the sum of all the Earth Leakage Currents and, if the sum is > 4 to 6mA after connecting this unit, the GFCI will trip. In such a case, disconnect other SMPS based device(s) being served by this GFCI one by one till the net leakage current is reduced to < 4mA and the GFCI does not trip. **Other solution is to power this unit from a GFCI outlet / GFCI breaker that does not have any SMPS load or power from an outlet that is not protected by GFCI.**

SECTION 7 | Troubleshooting Guide

7.1 TROUBLESHOOTING GUIDE IS GIVEN AT TABLE 7.1 BELOW

NOTE: This guide is based on operation as a power supply (only DC load is connected - no external battery or battery backup).

TABLE 7.1 TROUBLESHOOTING GUIDE		
Symptom	Possible Cause	Remedy
ON / OFF Switch is ON • Switch is NOT lighted • No DC output	No AC power from the AC outlet Internal AC side fuse is blown	Check AC power is available at the AC outlet. Breaker feeding the AC outlet may have tripped. Open the top cover and check the AC side fuse. Replace if blown. If the fuse blows again, the input section is damaged. Please call Tech Support.
ON / OFF Switch is ON • Switch is lighted • No DC output	Unit has shut down due to over temperature – Temperature of output transformer windings is: $\geq 105^{\circ}\text{C} \pm 5^{\circ}\text{C} / 221^{\circ}\text{F} \pm 9^{\circ}\text{F}$ (For SEC-1223 only)	Check that the fan is running. If not, the fan / fan control circuit may have been damaged. Call Tech Support. Check that the fan suction vents on the sides of the unit and the discharge vents on the bottom of the unit are not blocked. The unit will reset automatically when the transformer windings cool down to $\leq 75^{\circ}\text{C} \pm 5^{\circ}\text{C} / 167^{\circ}\text{F} \pm 9^{\circ}\text{F}$
ON / OFF Switch is ON • Switch is lighted • DC Output voltage drops	If the voltage loses regulation and drops to $< 13.5\text{V}$, the unit is overloaded and is in current limit. The load is trying to draw \geq the current limit value If the voltage drop is considerable with voltage $< 2\text{V}$, the load side is seeing a short circuit and short circuit current limited to the current limit value is being driven into the short circuit	Reduce the current drawn by the load to less than the continuous rating. Switch OFF the load. Remove the short circuit on the load side.
GFCI outlet / GFCI breaker supplying AC power to the unit trips when the unit is switched ON	Additional RF noise currents from the unit that are filtered to Earth Ground increase the net Leakage Current on the GFCI outlet / GFCI breaker to > 4 to 6mA	Switch OFF other SMPS devices operating from the same GFCI outlet / GFCI breaker to reduce the net leakage current to $< 4\text{mA}$ Move the unit to another GFCI outlet / GFCI breaker that has lesser number of SMPS load(s) or no SMPS load Power the unit from normal, non GFCI outlet or from an outlet not protected by GFCI breaker

SECTION 8 | Specifications

	SEC-1212	SEC-1223
AC INPUT		
Nominal AC Input Voltage	120 VAC (100-130 VAC), 50/60 Hz : Factory Preset, or 230 VAC (200 - 260 VAC), 50/60 Hz : By internal jumper setting	
Input Current	2.5 A @ 120 VAC	5.5A @ 120 VAC
Input Current at No Load	120 mA ± 10% @120VAC	
Inrush current at Startup	20A +/- 5A for < 5 ms	30A +/- 5A for < 5 ms
DC OUTPUT		
Output Voltage	13.8VDC ± 0.1V	
Output Current	<ul style="list-style-type: none"> Continuous: 10A Current Limit: 14A, Auto recovery 	<ul style="list-style-type: none"> Continuous: 23A; Current Limit: 25A, Auto recovery
Output Noise and Ripple	< 150 mV Peak to Peak	
Peak Efficiency	85% +/-5%	
DESIGN		
Type	Switch Mode Power Supply (SMPS) with Fixed Frequency Pulse Width Modulation (PWM)	
Output Side Switching Frequency	20 KHz	25 KHz
PROTECTIONS		
Short Circuit, Overload	Constant Current Limiting at 14A; Auto Reset	Constant Current Limiting at 25A; Auto Reset
Over Voltage	Regulated by PWM Controller	
Over Temperature	Cooled by convection. No protection is necessary	Output shuts down when Power Transformer winding temperature ≥ 105°C ± 5°C / 221°F ± 9°F; Auto reset on cooling down to ≤ 75°C ± 5°C / 167°F ± 9°F
COOLING		
Type of cooling	Convection – No fan	Temperature controlled fan. ON when Power Transformer winding temperature is ≥ 60°C ± 5°C / 140°F ± 9°F; OFF when cools down to ≤ 40°C ± 5°C / 104°F ± 9°F
FUSE		
Internal AC Side Fuse, 120VAC Input	5 mm x 20 mm Glass Fuse 250V, 3A, Time Delay Type Littelfuse - "239003"	5 mm x 20 mm Glass Fuse 250V, 6.3A, Time Delay Type Littelfuse - "21806.3"

NOTE: Specifications are subject to change without notice.

SECTION 8 | Specifications

	SEC-1212	SEC-1223
COMPLIANCE		
Safety	UL safety listed as "Information Technology Equipment Power Supply" for USA (UL Standard ANSI/UL-60950-1) and for Canada (CSA Standard CAN/CSA-C22.2 No. 60950-1)	
Electro Magnetic Interference EMI – Radiated & Conducted	FCC Part 15(B), Class B	
INPUT / OUTPUT CONNECTIONS		
AC Input Connection	<ul style="list-style-type: none"> • "IEC 60320-C14" Inlet Connector on the unit • Detachable Power Cord with: <ul style="list-style-type: none"> ○ "IEC 60320-C13" Connector on one end ○ NEMA5-15P Plug on the other end 	
DC Output Connectors	Terminal with Tubular Hole - Diameter 5mm / 0.2" and set screw (5/64" Hex Socket Head, #10, 24 TPI, 5/16" long)	
ENVIRONMENTAL		
Operating Temperature Range	0°C / 32°F to 30°C / 86°F	0°C / 32°F to 40°C / 104°F
DIMENSIONS AND WEIGHT		
Dimensions (W x D x H)	185 x 208 x 59.5 mm	185 x 208 x 61 mm
	7.28 x 8.19 x 2.34 in	7.28 x 8.19 x 2.40 in
Weight	1.36 kg	1.6 kg
	3.0 lb	3.5 lb

NOTE: Specifications are subject to change without notice.

SECTION 79 | Warranty

3 YEAR LIMITED WARRANTY

SEC-1212/SEC-1223 manufactured by Samlex America Inc. (the "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service. The warranty period is 3 years for the United States and Canada, and is in effect from the date of purchase by the user (the "Purchaser").

Warranty outside of the United States and Canada is limited to 6 months. For a warranty claim, the Purchaser should contact the place of purchase to obtain a Return Authorization Number.

The defective part or unit should be returned at the Purchaser's expense to the authorized location. A written statement describing the nature of the defect, the date of purchase, the place of purchase, and the Purchaser's name, address and telephone number should also be included.

If upon the Warrantor's examination, the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense. (Contiguous US and Canada only).

No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. Warranty service shall be performed only by the Warrantor. Any attempt to remedy the defect by anyone other than the Warrantor shall render this warranty void. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion.

No other express warranty is hereby given and there are no warranties which extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.

There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any persons, or damage to person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof. The Warrantor assumes no liability for incidental or consequential damages of any kind.

Samlex America Inc. (the "Warrantor")
www.samlexamerica.com

Contact Information

Toll Free Numbers

Ph: 1 800 561 5885

Fax: 1 888 814 5210

Local Numbers

Ph: 604 525 3836

Fax: 604 525 5221

Website

www.samlexamerica.com

USA Shipping Warehouses

Kent, WA

Plymouth, MI

Canadian Shipping Warehouse

Delta, BC

Email purchase orders to

orders@samlexamerica.com



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