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1 Connection for Standard Use

In order to use the power supply, it is necessary to wire as shown in Fig.1.1.

When remote ON / OFF function is not used, please open RC pin or short between RC and -Vin pin.

When alarm function is not used, please open ALM pin.

In parallel and series operation, connect each PO pin mutually.

When PO function is not used, please open PO pin.

The SFLS series handles only the DC input.
Avoid applying AC input directly.
!! It will damage the power supply. !!
Operate with the natural convection.
[ Reference : “Derating” ]

2 Wiring Input/Output Pin

2.1 Wiring input pin

(1) External fuse
The SFLS series is not internally fused. To ensure safe operation and to receive each Safety Standards approvals, please install an external fuse (fast-blow type).

When the input voltage from a front end unit is supplied to multiple units, install a fast-blow type fuse in each unit.

Fuse must be connected to the +Vin side if to -Vin side is used as ground, or fuse must be connected to -Vin side if +Vin side is used as a ground.

Table 2.1 Recommended fuse (fast-blow type)

<table>
<thead>
<tr>
<th>Model</th>
<th>SFLS10</th>
<th>SFLS15</th>
<th>SFLS30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>1A</td>
<td>1A</td>
<td>2A</td>
</tr>
</tbody>
</table>

(2) External capacitor on the input side
When the distance from the DC line to the unit is greatly extended, it makes the input feedback noise much higher and the input voltage several times higher than the normal level when turned ON. If this happens, the output power also becomes unstable. In order to prevent the unit from failing in this way, please connect Ci to the input pin. In addition, when the filter with “L” is used, please Ci to the input pin.

The unit is powered from high impedance source

Fig.2.1 Connection method of capacitor at input pin

Table 2.2 Recommended capacitance Ci

<table>
<thead>
<tr>
<th>Model</th>
<th>SFLS10</th>
<th>SFLS15</th>
<th>SFLS30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ci</td>
<td>10μF</td>
<td>10μF</td>
<td>22μF</td>
</tr>
</tbody>
</table>

Note:
When input line inductance becomes excessively high due to insertion of choke coil, operation of the unit could become unstable. In this case, increase Ci value more than the value indicated above.

(3) Conducted noise
Install an external input filter as shown in Fig.2.2 in order to reduce conducted noise.

Fig.2.2 Recommended external input filter
Reverse input voltage protection
Avoid the reverse polarity input voltage. It will damage the unit. It is possible to protect the unit from the reverse input voltage by installing an external diode as shown in Fig.2.3.

Wiring output pin
When SFLS series supplies the pulse current for the pulse load, please install capacitor Co between +Vout and -Vout pins.

Recommended capacitance (Co)
1.2 - 5.2Vout : 22 - 4700μF
12Vout : 22 - 2200μF

Output ripple and start-up waveform may be influenced by ESR : ESL of capacitor and the wiring impedance.
Ripple and ripple noise are measured, as shown in the Fig.2.5, by connecting Co and JEITA attachment.

Overcurrent protection (OCP) and Low voltage protection (LVP)
OCP and LVP circuits is built-in. LVP will trigger after 200ms typ delay when OCP activates and output voltage drops down 93% max of the rated output voltage.
When LVP is activated, ALM signal will becomes low impedance.
Recovery from the protection is accomplished by applying 5VDC or less input for at least 0.3 second, or toggling remote ON / OFF signal for at least 0.3 second.

Overvoltage protection (OVP)
The overvoltage protection circuit is built-in and comes into effect at 115% to 150% (1.2V, 1.5Vout : 115% to 160%) of the rated output voltage.
Normal or abnormal operation of the unit can be monitored by using the ALM pin. When OVP is activated, ALM signal will become low level.
The DC input should be shut down if overvoltage protection is in operation.
Please note that devices inside the power supply might fail when voltage more than rated output voltage is applied to output pin of the power supply. This could happen when the customer tests the overvoltage performance of the unit.

Remote ON / OFF (RC pin)
Remote ON / OFF circuits is built-in on input side.
When remote ON / OFF function is not use, please open-circuit between RC and +Vin or short-circuit between RC and -Vin.
Recovery from the protection is accomplished by applying 5VDC or less input for at least 0.3 second, or toggling remote ON / OFF signal for at least 0.3 second.
Remote ON / OFF connection and specification refer to below.

Table 3.1 Specification of example 1 (connection method Fig.3.1 (a), (b))

<table>
<thead>
<tr>
<th>Between RC and +Vin (VRC1)</th>
<th>Output voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>ON</td>
</tr>
<tr>
<td>0V ≤ VRC1 ≤ 1.2V or Short</td>
<td>OFF</td>
</tr>
</tbody>
</table>
3.4 Alarm (ALM pin)

- Normal or abnormal operation of the unit can be monitored by using the ALM pin.
- When OVP or LVP are activated, ALM pin becomes same level as -Vin pin.
- The sink current of ALM pin is 10mA max.

3.6 Power ready / Sequence control (PR pin)

- When output voltage rise up more than 75 ± 20%(output voltage 2.5V - 12V) or 65 ± 30%(output voltage 1.2V - 1.8V) of rated output voltage, the level is set to “H”(open collector).
- Maximum applicable voltage of PR pin is 15V and maximum sink current of PR pin is 3mA.

3.7 Ramp-rate control (RAMP pin)

- By connecting external capacitor \( C_{\text{RAMP}} \) between RAMP and -Vin pin, ramp-rate can be controlled. Maximum applicable voltage of RAMP pin is 2.5V.
- If the function is used, install \( C_{\text{RAMP}} \) of less than 2.2\( \mu F \) (output voltage 1.2V - 1.8V) or 1\( \mu F \) (output voltage 2.5V - 12V).
- When the function is used with 3.3 to 12Vout, minimum load requirement will be asked according with \( C_{\text{RAMP}} \) capacitor size.
- When the function is not used, please open RAMP pin.
3.8 Sequence
The sequence time chart of Vin, Vout, PO, PR, ALM and RC pins is shown in Fig.3.7.

3.9 Isolation
For a receiving inspection, such as Hi-Pot test, gradually increase (decrease) the voltage for a start (shut down). Avoid using Hi-Pot tester with the timer because it may generate voltage a few times higher than the applied voltage, at ON / OFF of a timer.

4 Series and Parallel Operation

4.1 Series operation
In series operation, connect each PO and ALM pin mutually, wiring as Fig.4.1.

4.2 Parallel operation
In parallel operation, connect each PO and ALM pin mutually, wiring as Fig.4.2.
To improve the load sharing of each unit, please use the same length from each unit to the load.
Total number of units should be no more than 20 pieces.
5 Cleaning

- When cleaning is necessary, follow the undermentioned condition.
  Method: Immersion, ultrasonic wave and vapor
  Cleaning agents: IPA (Solvent type)
  Total time: 2 minutes or less
- After cleaning, dry them enough.

6 Storage method

- To stock unpacked products in your inventory, it is recommended to be kept under controlled condition, 5-30°C, 60%RH and be used within a year.
- 24-hours-baking is recommended at 125°C, if unpacked products was kept under uncontrol condition, in which 30°C, 60%RH or higher.
  Original tray is not heat-resistant, please move them to heat-resistant tray preparing to bake them.
  To check moisture condition in the pack, silica gel packet has some moisture condition indicator particle.
  Indicated blue means good. Pink means alarm to bake it.
- Notification. the tray will be deformed and the power supply might be damaged, if the vacuum pressure is too much to reseal.

7 Safety Considerations

- To apply for safety standard approval using this power supply, the following conditions must be met.
  - This unit must be used as a component of the end-use equipment.
  - The equipment does neither contain any basic nor double / reinforced insulation between input and output.
    If the input voltage is greater than 60VDC, this has to be provided by the end-use equipment according to the final build in condition.
  - Safety approved fuse must be externally installed on input side.

8 Delivery Package Information

- These are packed in a tray (Fig.8.1, 8.2).
- Do not cut or deform the tray.

Table 8.1 Capacity of the tray (pcs/tray)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFLS10/SFLS15</td>
<td>15 max</td>
</tr>
<tr>
<td>SFLS30</td>
<td>12 max</td>
</tr>
</tbody>
</table>

In case of fractions, the units are stored in numerical order.

Fig.8.1 Delivery package information (SFLS10/SFLS15)

Fig.8.2 Delivery package information (SFLS30)