## Basic Characteristics Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Circuit method</th>
<th>Switching frequency [kHz]</th>
<th>Input current [A]</th>
<th>Rated input fuse</th>
<th>Inrush current protection</th>
<th>Material</th>
<th>PCB/Pattern</th>
<th>Series/Parallel operation availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZUS1R5</td>
<td>Flyback converter</td>
<td>310 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUS3</td>
<td>Flyback converter</td>
<td>200 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUS6</td>
<td>Flyback converter</td>
<td>150 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUS10</td>
<td>Flyback converter</td>
<td>130 - 200</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUS15</td>
<td>Single ended forward converter</td>
<td>330 - 400</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUS25</td>
<td>Single ended forward converter</td>
<td>330 - 400</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZTS1R5</td>
<td>Flyback converter</td>
<td>310 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZTS3</td>
<td>Flyback converter</td>
<td>200 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW1R5</td>
<td>Flyback converter</td>
<td>310 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW3</td>
<td>Flyback converter</td>
<td>200 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW6</td>
<td>Flyback converter</td>
<td>150 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW10</td>
<td>Flyback converter</td>
<td>130 - 200</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW15</td>
<td>Single ended forward converter</td>
<td>330 - 400</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZUW25</td>
<td>Single ended forward converter</td>
<td>330 - 400</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZTW1R5</td>
<td>Flyback converter</td>
<td>310 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
<tr>
<td>ZTW3</td>
<td>Flyback converter</td>
<td>200 - 1600</td>
<td>*1</td>
<td>Refer to table No.1</td>
<td>-</td>
<td>glass fabric base, epoxy resin</td>
<td>Yes</td>
<td>*2 *2</td>
</tr>
</tbody>
</table>

*1 Refer to Specification.
*2 Refer to Instruction Manual.

### Table1. Rated input fuse

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Input Voltage</th>
<th>Input Voltage</th>
<th>Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5V</td>
<td>12V</td>
<td>24V</td>
</tr>
<tr>
<td>1.5W</td>
<td>72V 1.2A</td>
<td>72V 0.8A</td>
<td>72V 0.8A</td>
</tr>
<tr>
<td>3W</td>
<td>72V 2.0A</td>
<td>72V 1.2A</td>
<td>72V 1.2A</td>
</tr>
<tr>
<td>6W</td>
<td>72V 4.0A</td>
<td>72V 2.0A</td>
<td>72V 2.0A</td>
</tr>
<tr>
<td>10W</td>
<td>125V 6.3A</td>
<td>125V 3.5A</td>
<td>125V 2.0A</td>
</tr>
<tr>
<td>15W</td>
<td>125V 8.0A</td>
<td>125V 5.0A</td>
<td>72V 4.0A</td>
</tr>
<tr>
<td>25W</td>
<td>125V 10.0A</td>
<td>125V 6.3A</td>
<td>125V 3.15A</td>
</tr>
</tbody>
</table>
1 Pin Connection
2 Function
   2.1 Input voltage
   2.2 Overcurrent protection
   2.3 Isolation
3 Wiring to Input/Output Pin
4 Series Operation and Parallel Operation
   4.1 Series operation
   4.2 Redundancy operation
5 Assembling and Installation Method
   5.1 Installation method
   5.2 Derating
6 Input Voltage/Current Range
7 Cleaning
8 Soldering
9 Input/Output Pin
10 Peak Current (Pulse Load)
1 Pin Connection

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+DC INPUT</td>
<td>+Side of input voltage</td>
</tr>
<tr>
<td>2</td>
<td>-DC INPUT</td>
<td>-Side of input voltage</td>
</tr>
<tr>
<td>3</td>
<td>+DC OUTPUT</td>
<td>+Side of output voltage</td>
</tr>
<tr>
<td>4</td>
<td>COMMON</td>
<td>GND of output voltage (Only applicable for Dual output)</td>
</tr>
<tr>
<td>5</td>
<td>-DC OUTPUT</td>
<td>-Side of output voltage</td>
</tr>
<tr>
<td>6</td>
<td>Case connecting pin</td>
<td>If connected to -side of input, the case potential can be fixed and the value of radiation noise can be reduced.</td>
</tr>
</tbody>
</table>

- Single Output
- Dual(±)Output

Case connecting pin is available. By connecting this pin to -side of input, the radiation noise from main body can be reduced.

2 Function

2.1 Input voltage
If the wrong input is applied, the unit will not operate properly and/or may be damaged.

2.2 Overcurrent protection
Overcurrent protection circuit is built-in and comes into effect at over 105% of the rated current. Overcurrent protection prevents the unit from short circuit and over current condition of less than 20 sec. The unit automatically recovers when the fault condition is cleared.

3 Wiring to Input/Output Pin

- The power supply which has a current foldback characteristics may not start up when connected to nonlinear load such as lamp, motor or constant current load. See the characteristics below.

![Fig.2.1 Current foldback characteristics](image)

Note: In case of nonlinear load, the output is locked out at A point.

- Input filter is built-in. A capacitor Ci, if installed near the input terminal, will lower the input conducted noise from converter due to the formation of the π type filter.

- 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 form failing in this way; please connect Ci to the input terminal. In addition, when the filter with “L” is used, please Ci to the input terminal.

![Fig.3.1 Connecting method of capacitor at input terminal](image)

Capacity of external capacitor at input terminal: Ci [µF]
To lower the output ripple voltage further, install an external capacitor Co at output terminal as shown below.

![Fig.3.2 Connecting method of external capacitor at output terminal](image)

Capacity of external capacitor at output terminal: Co [µF]

<table>
<thead>
<tr>
<th>Model</th>
<th>ZUS1R5</th>
<th>ZUS3</th>
<th>ZUS6</th>
<th>ZUS10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage (V)</td>
<td>ZUW1R5</td>
<td>ZUW3</td>
<td>ZUW6</td>
<td>ZUW10</td>
</tr>
<tr>
<td>3.5</td>
<td>100</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>12</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>15</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

When the distance between load and DC output is long, please install capacitor at load as shown below.

![Fig.3.3 Connection method of capacitor at load](image)

Reverse input voltage protection
- Avoid the reverse polarity input voltage. It will damage the power supply.
- It is possible to protect the unit from the reverse input voltage by installing an external diode as shown in Fig.3.4.

(a) When the output voltage is less than 5V.

![Diagram](image)

D1 - D4: Please use Schottky Barrier Diode.

(b) When the output voltage is more than 12V.

![Diagram](image)

D1 • D2: Please use Schottky Barrier Diode.

Series operation is available by connecting the outputs of two or more power supplies as shown below. Output currents in series connection should be lower than the lowest rated current in each unit.

But at series operation with same output voltage, diode is not required to attach even if at (a).

4. Series Operation and Parallel Operation

4.1 Series operation

- ZUS1R5/ZUW1R5 • ZUS3/ZUW3 • ZUS6/ZUW6

Series operation is available by connecting the outputs of two or more power supplies, as shown below. Output currents in series connection should be lower than the lowest rated current in each unit.

(a) When the output voltage is less than 5V.

![Diagram](image)

D1 - D4: Please use Schottky Barrier Diode.

(b) When the output voltage is more than 12V.

![Diagram](image)

D1 • D2: Please use Schottky Barrier Diode.

- ZUS10/ZUW10

Series operation is available by connecting the outputs of two or more power supplies as shown below. Output currents in series connection should be lower than the lowest rated current in each unit.

(c)
5.1 Installation method
The unit can be mounted in any direction. Position them with proper intervals to allow enough air ventilation. Ambient temperature around each power supply should not exceed the temperature range shown in derating curve.

Avoid placing the DC input line pattern lay out underneath the unit because it will increase the line conducted noise. Make sure to leave an ample distance between the line pattern lay out and the unit. Also, avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.

5.2 Derating
By derating the output current, it is possible to operate the unit from -20°C to +71°C (-20°C to +85°C at forced air cooling).

When unit mounted any way other than in drawings below, it is required to consider ventilated environments by forced air cooling or temperature/load derating. For details, please consult our sales or engineering department.

It is necessary to note thermal fatigue life by power cycle. Please reduce the temperature fluctuation range as much as possible when the up and down of temperature are frequently generated.
6 Input Voltage/Current Range

- When a non-regulated source is used as a front end, make sure that the voltage fluctuation together with the ripple voltage will not exceed the input voltage range.
- Select the converter that is able to handle the start-up current (Ip).

![Input Voltage/Current Range Diagram](image)

7 Cleaning

- Cleaning is possible by below listed conditions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Water type</th>
<th>Solvent type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pine Alpha ST–100S (ARAKAWA CHEMICAL CO.)</td>
<td>IPA</td>
</tr>
<tr>
<td>2</td>
<td>Clean Through 750H (KAO Corporation)</td>
<td>Asahiklin AK–225AES (ASAHI GLASS CO.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Cleaning method</th>
<th>Liquid Temp.</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Varnishing or Ultra sonic wave</td>
<td>Less than 60°C</td>
<td>Within 5 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Varnishing, Ultra sonic wave, Vapor</td>
<td>-</td>
<td>Within 2 minutes</td>
</tr>
</tbody>
</table>

- During cleaning to drying (the condition that cleaning liquid is soaked into the ink of name plate), do not touch on the surface of name plate.
- After cleaning, dry them enough.

8 Soldering

- Flow soldering: 260°C less than 15 seconds.
- Soldering iron: 450°C less than 5 seconds.

9 Input/Output Pin

- When too much stress is applied on the input/output pins of the unit, the internal connection may be weakened. As below Fig. 9.1, avoid applying stress of more than 19.6N (2kgf) on the pins horizontally and more than 39.2N (4kgf) vertically.
- The input/output pins are soldered on PCB internally, therefore, do not pull or bend them with abnormal forces.
- When additional stress is expected to be put on the input/output pins because of vibration or impacts, fix the unit on PCB (using silicone rubber or fixing fittings) to reduce the stress onto the input/output pins.

![Stress onto the pins Diagram](image)

10 Peak Current (Pulse Load)

- It is possible to supply the pulse current for the pulse load by connecting the capacitor externally at the output side.
1 Pin Connection

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin connection</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+DC INPUT</td>
<td>+Side of input voltage</td>
</tr>
<tr>
<td>2</td>
<td>-DC INPUT</td>
<td>-Side of input voltage</td>
</tr>
<tr>
<td>3</td>
<td>RC</td>
<td>Remote ON/OFF</td>
</tr>
<tr>
<td>4</td>
<td>+DC OUTPUT</td>
<td>+Side of output voltage</td>
</tr>
<tr>
<td>5</td>
<td>COMMON</td>
<td>GND of output voltage (Only applicable for Dual output)</td>
</tr>
<tr>
<td>6</td>
<td>-DC OUTPUT</td>
<td>-Side of output voltage</td>
</tr>
<tr>
<td>7</td>
<td>TRM</td>
<td>Adjustment voltage range</td>
</tr>
</tbody>
</table>

The average current lav of output is shown in below formula.

\[ \text{lav} = I_s + \frac{\text{lop} - I_s}{T} \]

The required electrolytic capacitor C is found by below formula.

\[ C = \frac{\text{(lop} - \text{lav}) \cdot t}{\Delta V_o} \]

2 Function

2.1 Input voltage

If the wrong input is applied, the unit will not operate properly and/or may be damaged.

2.2 Overcurrent protection

Overcurrent protection circuit is built-in and comes into effect at over 105% of the rated current. Overcurrent protection prevents the unit from short circuit and over current condition of less than 20 sec. The unit automatically recovers when the fault condition is cleared.
2.3 Overvoltage protection

**Single Output**
- The overvoltage protection circuit is built-in and comes into effect at 115 - 140% of the rated voltage. The DC input voltage should be shut down if overvoltage protection is in operation. The minimum interval of DC recycling for recovery 2 to 3 minutes (★).
- The recovery time depends on input voltage.

**Multiple Output**
- By detecting overvoltage condition between +V and -V, overvoltage protection circuit comes into effect at 115 - 140% of the rated voltage. The DC input voltage should be shut down if overvoltage protection is in operation. The minimum interval of DC recycling for recovery 2 to 3 minutes (★).
- The recovery time depends on input voltage.

Remarks:
Please note that unit’s internal components may be damaged if excessive voltage (over rated voltage) is applied to output terminal of power supply. This could happen when the customer tests the overvoltage protection of the unit.

2.4 Adjustable voltage range

- The output voltage is adjustable by external potentiometer.
- When the output voltage adjustment is not used, open the TRM pin.
- The over voltage protection circuit comes into effect when the output voltage is set too high.
- Output voltage is increased by turning potentiometer clockwise and is decreased by turning potentiometer counterclockwise.
- The wiring to the potentiometer should be as short as possible and connected to the remote sensing pins (+S and -S).
- The temperature coefficient varies depending on the type of resistor and potentiometer.
- It is recommended that the following types be used.
  - Resistor: Metal film type, coefficient of less than ±100ppm/°C
  - Potentiometer: Cermet type, coefficient of less than ±300ppm/°C

2.5 Remote ON/OFF

- The ground terminal of remote ON/OFF circuit is connected with -V input terminal.
- Between RC and -V input: Output voltage is ON at “Low” level or short circuit (0 - 1.2V)
- Between RC and -V input: Output voltage is OFF at “High” level or open circuit (2.4 - 5.5V)

( Connection example )

- When RC terminal is “Low” level, fan out current is 1mA typ.
- When Vcc is applied, use 5V ≤ Vcc ≤ 24V. When remote ON/OFF function is not used, please short between RC and -V input.

2.6 Isolation

- For a receiving inspection, such as Hi-Pot test, gradually increase (decrease) the voltage for the 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.
3 Wiring to Input/Output Pin

- The input filter is built-in. A capacitor (Ci), if installed near the input terminal, will lower the input conducted noise from converter due to the formation of the π type filter.
- When the distance from the DC line to the unit is greatly extended, it makes the input 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 terminal. In addition, when the filter with "L" is used, please connect Ci to the input terminal.

![Fig.3.1 Connection method of capacitor at input terminal](image)

Capacity of external capacitor at input terminal: Ci [µF]

<table>
<thead>
<tr>
<th>Model</th>
<th>Input voltage (V)</th>
<th>ZUS15</th>
<th>ZUW15</th>
<th>ZUS25</th>
<th>ZUW25</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZUS</td>
<td>3, 5</td>
<td>330</td>
<td>12</td>
<td>220</td>
<td>100</td>
</tr>
<tr>
<td>ZUS</td>
<td>12</td>
<td>150</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>ZUS</td>
<td>24</td>
<td>68</td>
<td>100</td>
<td>100</td>
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<tr>
<td>ZUS</td>
<td>48</td>
<td>33</td>
<td>47</td>
<td>47</td>
<td></td>
</tr>
</tbody>
</table>

To decrease the ripple voltage further, install an external capacitor Co at output terminal as shown below.

![Fig.3.2 Connecting method of external capacitor at output terminal](image)

Capacity of external capacitor at output terminal: Co [µF]

<table>
<thead>
<tr>
<th>Model</th>
<th>Output voltage (V)</th>
<th>ZUS15</th>
<th>ZUW15</th>
<th>ZUS25</th>
<th>ZUW25</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZUS</td>
<td>3, 5</td>
<td>220</td>
<td>220</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>ZUS</td>
<td>12</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

4 Series Operation and Parallel Operation

4.1 Series operation
- Series operation is available by connecting the outputs of two or more power supplies, as shown below. Output currents in series connection should be lower than the lowest rated current in each unit.

![Figurable diagram showing series connection](image)

4.2 Redundancy operation
- Redundancy operation is possible.
- Even a slight difference in output voltage can affect the balance between the values of I₁ and I₂.
- Please make sure that the value of I₃ does not exceed the rated current of a power supply.
  \[ I₃ ≤ \text{the rated current value} \]
5 Assembling and Installation Method

5.1 Installation method

- The unit can be mounted in any direction. Position them with proper intervals to allow enough air ventilation. Ambient temperature around each power supply should not exceed the temperature range shown in derating curve.
- Avoid placing the DC input line pattern lay out underneath the unit because it will increase the line conducted noise. Make sure to leave an ample distance between the line pattern lay out and the unit. Also, avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.

5.2 Derating

- By derating the output current, it is possible to operate the unit from -20°C to +71°C (-20°C to +85°C at forced air cooling).
- When unit mounted any way other than in drawings below, it is required to consider ventilated environments by forced air cooling or temperature/load derating. For details, please consult our sales or engineering departments.
- It is necessary to note thermal fatigue life by power cycle. Please reduce the temperature fluctuation range as much as possible when the up and down of temperature are frequently generated.
Flow soldering: 260°C less than 15 seconds.
Soldering iron: 450°C less than 5 seconds.

Cleaning period: The total time of varnishing, ultrasonic wave and vaper should be within 2 minutes. In case of ultrasonic wave cleaning, the ultrasonic should be less than 15kw/m². During cleaning to drying, (the condition that cleaning liquid is soaked into the ink of name plate), do not touch on the surface of name plate.

After cleaning, dry them enough.

8 Soldering

Flow soldering: 260°C less than 15 seconds.
Soldering iron: 450°C less than 5 seconds.

9 Input/Output Pin

When too much stress is applied on the input/output pins of the unit, the internal connection may be weakened. As below Fig. 9.1, avoid applying stress of more than 19.6N (2kgf) on the pins horizontally and more than 39.2N (4kgf) vertically.

The input/output pins are soldered on PCB internally, therefore, do not pull or bend them with abnormal forces.

When additional stress is expected to be put on the input/output pins because of vibration or impacts, fix the unit on PCB (using silicone rubber or fixing fittings) to reduce the stress onto the input/output pins.

When a non-regulated source is used as a front end, make sure that the voltage fluctuation together with the ripple voltage will not exceed the input voltage range.

Select the converter that is able to handle the start-up current (Ip).

![Fig.6.1 Input current characteristics](image)

When a non-regulated source is used as a front end, make sure that the voltage fluctuation together with the ripple voltage will not exceed the input voltage range.

Select the converter that is able to handle the start-up current (Ip).

![Fig.6.1 Input current characteristics](image)

7 Cleaning

Cleaning agents:

<table>
<thead>
<tr>
<th>No.</th>
<th>Classification</th>
<th>Cleaning agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water type</td>
<td>Pine Alpha ST-100S (ARAKAWA CHEMICAL CO.)</td>
</tr>
<tr>
<td>2</td>
<td>Solvent type</td>
<td>Clean Through 750H (KAO Corporation)</td>
</tr>
<tr>
<td>3</td>
<td>IPA</td>
<td>Pine Alpha ST-100S (ARAKAWA CHEMICAL CO.)</td>
</tr>
<tr>
<td>4</td>
<td>Asahiklin AK-225AES (ASAHI GLASS CO.)</td>
<td></td>
</tr>
</tbody>
</table>

Temperature increase on surface of case (ZU series) (Unit: deg)

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Output Voltage</th>
<th>15W</th>
<th>25W</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V</td>
<td>5V</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>±12V</td>
<td>39</td>
<td>39</td>
<td>42</td>
</tr>
<tr>
<td>±15V</td>
<td>38</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>12V</td>
<td>28</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>±12V</td>
<td>34</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>±15V</td>
<td>35</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>24V</td>
<td>38</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>±12V</td>
<td>34</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>±15V</td>
<td>27</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>48V</td>
<td>21</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>±12V</td>
<td>23</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>±15V</td>
<td>24</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

Instruction Manual
10 Peak Current (Pulse Load)

It is possible to supply the pulse current for the pulse load by connecting the capacitor externally at the output side.

The average current $I_{av}$ of output is shown in the following formula.

$$I_{av} = I_s + \frac{(l_{op} - I_s) \cdot t}{T}$$

The required electrolytic capacitor $C$ is found by the following formula.

$$C = \frac{(l_{op} - I_{av}) \cdot t}{\Delta V_o}$$

---

1 Pin Connection

- **Single Output**

- **Dual (±) Output**

- **Case Connection Pin**

Case connecting pin is available. By connecting the pin to -side of input, the radiation noise from main body can be reduced.

2 Function

2.1 Input voltage

If the wrong input is applied, the unit will not operate properly and/or may be damaged.
2.2 Overcurrent protection

Overcurrent protection circuit is built-in and comes into effect at over 105% of the rated current.

Overcurrent protection prevents the unit from short circuit and over current condition of less than 20 sec. The unit automatically recovers when the fault condition is cleared.

The power supply which has a current foldback characteristics may not start up when connected to nonlinear load such as lamp, motor or constant current load. See the characteristics below.

![Fig.2.1 Current foldback characteristics](image1)

Overcurrent protection circuit is built-in and comes into effect at over 105% of the rated current.

2.3 Isolation

For a receiving inspection, such as Hi-Pot test, gradually increase (decrease) the voltage for the 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.

![Fig.3.1 Connecting method of capacitor at input terminal](image2)

3 Wiring to Input/Output Pin

Input filter is built-in. A capacitor Ci, if installed near the input terminal, will lower the input conducted noise from converter due to the formation of the \( \pi \) type filter.

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 form failure in this way; please connect Ci to the input terminal. In addition, when the filter with "L" is used, please Ci to the input terminal.

![Fig.3.2 Connecting method of external capacitor at output terminal](image3)

Reverse input voltage protection

Avoid the reverse polarity input voltage. It will damage the power supply.

It is possible to protect the unit from the reverse input voltage by installing an external diode as shown in Fig.3.4.

![Fig.3.4 Reverse input voltage protection](image4)
4 Series Operation and Parallel Operation

4.1 Series operation

Series operation is available by connecting the outputs of two or more power supplies, as shown below. Output currents in series connection should be lower than the lowest rated current in each unit.

But at series operation with same output voltage, diode is not required to attach even if at (a).

(a) When the output voltage is less than 5V.

(b) When the output voltage is more than 12V.

4.2 Redundancy operation

Redundancy operation is available by connecting the units as shown below.

5 Assembling and Installation Method

5.1 Installation method

The unit can be mounted in any direction. Install the device, with proper intervals to allow enough air ventilation.

5.2 Derating

- Ambient temperature around each power supply should not exceed the temperature range shown in derating curve.
- It is necessary to note thermal fatigue life by power cycle.
  Please reduce the temperature fluctuation range as much as possible when the up and down of temperature are frequently generated.

6 Input Voltage/Current Range

When a non-regulated source is used as a front end, make sure that the voltage fluctuation together with the ripple voltage will not exceed the input voltage range.

Select the converter that is able to handle the start-up current ($I_p$).

![Graph showing derating curve]

![Graph showing input voltage characteristics]

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October 08, 2013
7 Cleaning

Cleaning is possible by below listed conditions.

During cleaning to drying (the condition that cleaning liquid is soaked into the ink of name plate), do not touch on the surface of name plate.

After cleaning, dry them enough.

8 Soldering

Flow soldering : 260°C less than 15 seconds.
Soldering iron : 450°C less than 5 seconds.

9 Input/Output Pin

When too much stress is applied on the input/output pins of the unit, the internal connection may be weakened. As below Fig.9.1, avoid applying stress of more than 9.8N (1kgf) on the pins horizontally and more than 19.6N (2kgf) vertically.

When additional stress is expected to be put on the input/output pins because of vibration or impacts, fix the unit on PCB (using silicone rubber or fixing fittings) to reduce the stress onto the input/output pins.

10 Peak Current (Pulse Load)

It is possible to supply the pulse current for the pulse load by connecting the capacitor externally at the output side.

The required electrolytic capacitor C is found by below formula:

$$C = \frac{(I_{op} - I_{av}) \cdot t}{\Delta V_o}$$