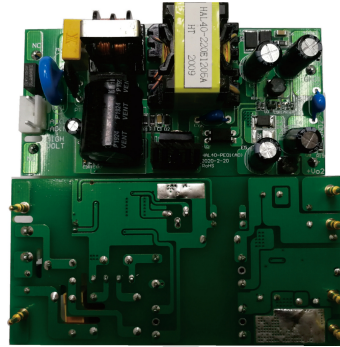


## Typical Characteristics

- Wide input range: 85–305VAC/100–432VDC
- No-load power:  $\leq 0.3\text{W}$
- Conversion efficiency (typ. 86%)
- Switching frequency: 65KHz
- Protection types: Short circuit, overcurrent, overvoltage, overtemperature
- Isolation voltage: 3750Vac
- Open-frame type, plug-in terminals
- Installation method: Through-hole mounting on a PCB
- Standards: Complies with CE and RoHS requirements

40W, Wide-Voltage Input, Isolated  
Single-Output AC-DC Open-Frame Power Supply



RoHS

*HAL40\_S-A Series is a compact, high-efficiency open-frame power supply offered by Huizhi Electronics.*

*This series of power supplies offers a wide range of input voltages, AC/DC compatibility, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, high-level safety isolation, and excellent EMC performance. These products are widely used in various fields, including power, industrial, instrumentation, and smart home applications. When using these products in environments with poor electromagnetic compatibility, please refer to the EMC application circuits provided by our company.*

## Model Number Description



## Product selection table

| Certification | Model number  | Output specifications |         |          |         |          | Maximum capacity sexual load | ripple and noise 20MHz (Max) | Efficiency @ full load, 220Vac (Typical) |
|---------------|---------------|-----------------------|---------|----------|---------|----------|------------------------------|------------------------------|--|
|               |               | Power                 | Vol. 1  | Io 1     | Vol. 2  | Io 2     |                              |                              |  |
|               |               | (W)                   | Vo1 (V) | Io1 (mA) | Vo2 (V) | Io2 (mA) |                              |                              |  |
|               | HAL40-220S12A | 40                    | 12      | 3333     | -       | -        | 1000                         | 80                           | 88                                       |

Note 1: Due to space limitations, the above is only a partial list of products. For products not included in the list, please contact our Sales Department.

Note 2: “\*” indicates models currently under development.

Note 3: Typical output efficiency values are based on measurements taken after the product has been aged under full load for 30 minutes.

Note 4: The full-load efficiency (% TYP) in the table has a tolerance of  $\pm 2\%$ . Full-load efficiency is calculated as the total output power divided by the module's input power.

### Input characteristics

| Items  | Working conditions | Minimum                      | Typical | Maximum | Unit |
|--|--------------------|------------------------------|---------|---------|------|
| Input voltage range                                | AC input           | 85                           | 220     | 305     | VAC  |
|  | DC input           | 100                          | 310     | 432     | VDC  |
| Input frequency range                              | -                  | 47                           | 50      | 63      | Hz   |
| Input current                                      | 115VAC             | /                            | /       | 1.0     | A    |
|  | 220VAC             | /                            | /       | 0.5     |      |
| Surge current                                      | 115VAC             | /                            | /       | 10      |      |
|  | 220VAC             | /                            | /       | 20      |      |
| Leakage current                                    | -                  | 0.5mA TYP/230VAC/50Hz        |         |         |      |
| External insurance management recommendation value | -                  | 3A-6A/250VAC slow-break fuse |         |         |      |
| Hot-swappable                                      | -                  | Not supported                |         |         |      |
| Remote control                                     | -                  | There is no remote control   |         |         |      |

### Output characteristics

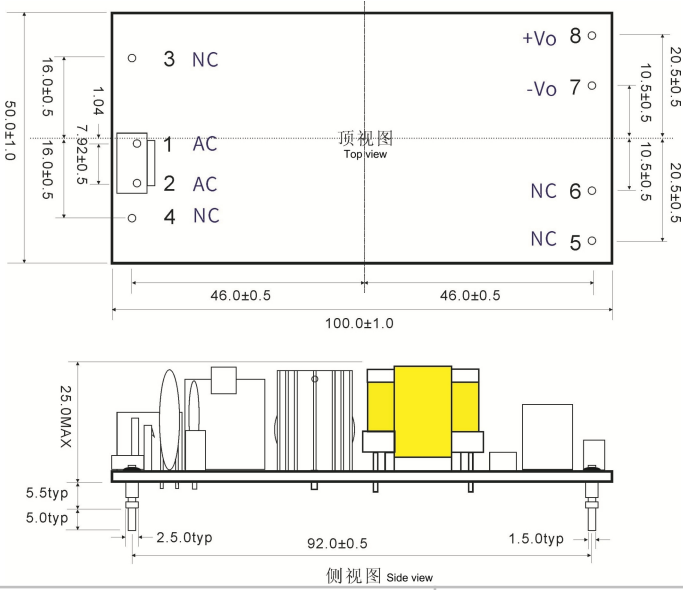
| Items                     | Working conditions                          | Minimum |     | Typical      | Maximum | Unit |
|---------------------------|---|---------|-----|--------------|---------|------|
|                           |   | Vo1     | Vo2 |              |         |      |
| Voltage accuracy          | Input full voltage range                    | Vo1     | -   | ±1.0         | ±2.0    | %    |
|                           | Any load (balance load)                     | Vo2     | -   | ±3.0         | ±5.0    | %    |
| Linear regulation rate    | Rated load                                  | Vo1     | -   | -            | ±0.5    | %    |
|                           |   | Vo2     | -   | balance load | ±1.5    | %    |
| Load regulation rate      | Input rated voltage 20%~100% load           | Vo1     | -   | -            | ±1.0    | %    |
|                           |   | Vo2     | -   | balance load | ±3.0    | %    |
| No-load power consumption | Input 115VAC                                | -       | -   | -            | 0.3     | W    |
|                           | Input 220VAC                                | -       | -   | -            |         |      |
| Minimum load              | Single output                               | 0       | -   | -            | -       | %    |
|                           | Positive and negative dual co-ground output | -       | -   | -            | 10      | %    |
|                           | Positive and negative dual isolated outputs | -       | -   | -            | 10      |      |
| Startup delay time        | Input rated Voltage                         | -       | -   | 1000         | -       | mS   |
| Power down hold time      | Input 115VAC                                | -       | -   | 10           | -       | mS   |
|                           | Input 220VAC                                | --      | -   | 60           | -       |      |

|                          |  |   |              |     |              |
|--------------------------|--|---|--------------|-----|--------------|
| Dynamic response         | 25%~50%~25%<br>50%~75%~50%   | Overshoot amplitude (%): $\leq \pm 5.0$                       |              |     | %            |
|                          |  | Recovery time (mS): $\leq 5.0$                                |              |     | mS           |
| Output overshoot         | Input full voltage range   | $\leq 10\%V_o$  |              |     | %            |
| Short-circuit protection |  | It can be short-circuited for a long time and self-recovering |              |     | Barrier type |
| Drift coefficient        | -  | -   | $\pm 0.03\%$ | -   | %/°C         |
| Overcurrent protection   | Input full voltage range   | $\geq 150\% I_o$ is self-recoverable                          |              |     | Barrier type |
| Ripple Noise             | -  | -   | 80           | 100 | mV           |
|                          | Note: The test method for ripple and noise uses the twisted-pair test method. For specific test procedures and equipment requirements, please refer to the section below (Ripple & Noise Test Instructions). |   |              |     |              |

### General characteristics

| Items                           | Working conditions   | Minimum                            | Typical | Maximum | Unit |
|---------------------------------|--|------------------------------------|---------|---------|------|
| Switching frequency             | -  | -                                  | 65      | -       | KHz  |
| Operating temperature           | -  | -25                                | -       | +65     | °C   |
| Storage temperature             | -  | -40                                | -       | +85     |      |
| Soldering temperature           | Wave soldering   | 260±4°C, time: 5-10S               |         |         |      |
|                                 | Hand soldering   | 360±8°C, interval 4-7S             |         |         |      |
| Relative humidity               | -  | 10                                 | -       | 90      | %RH  |
| Isolation voltage               | Input-output, test for 1 minute, leakage current $\leq 5\text{mA}$ | 3750                               | -       |         | VAC  |
| Insulation resistance           | Input-output @ apply DC500V  | 100                                | -       |         | MΩ   |
| Safety standards                | -  | EN60950、IEC60950                   |         |         |      |
| Vibration                       | -  | 10-55Hz, 10G, 30Min, along X, Y, Z |         |         |      |
| Safety level                    | -  | CLASS II                           |         |         |      |
| Enclosure grade                 | -  | UL94V-0                            |         |         |      |
| Mean time between failures MTBF | -  | MIL-HDBK-217F@25°C > 300,000H      |         |         |      |

Package Dimensions



|              |                                      |
|--------------|--------------------------------------|
| Package code | L x W x H                            |
| A            | 100x50x25mm<br>3.937x1.969x0.984inch |

Pin Definition

| Pin        | 1                    | 2                            | 3                     | 4                     | 5                     | 6                     | 7                               | 8                               |
|------------|----------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------------|---------------------------------|
| Single (S) | AC (L)<br>Input wire | AC (N)<br>Input neutral wire | NC<br>No electricit y | NC<br>No electricit y | NC<br>No electricit y | NC<br>No electricit y | -Vo<br>Output negative terminal | +Vo<br>Output positive terminal |

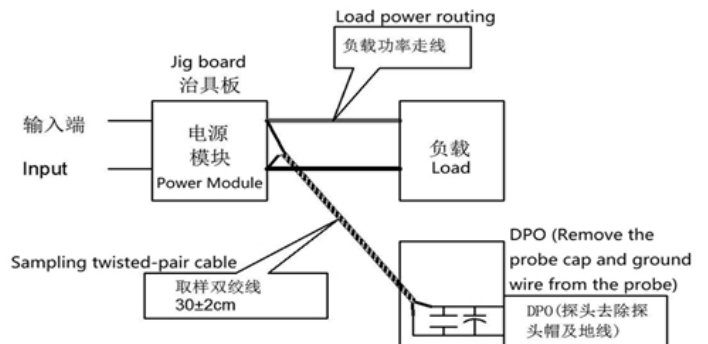
Note: If the pin assignments of the power module differ from those in the selection guide, refer to the labels on the actual unit.

Ripple & Noise Test Instructions (Twisted Pair Method 20MHz Bandwidth)

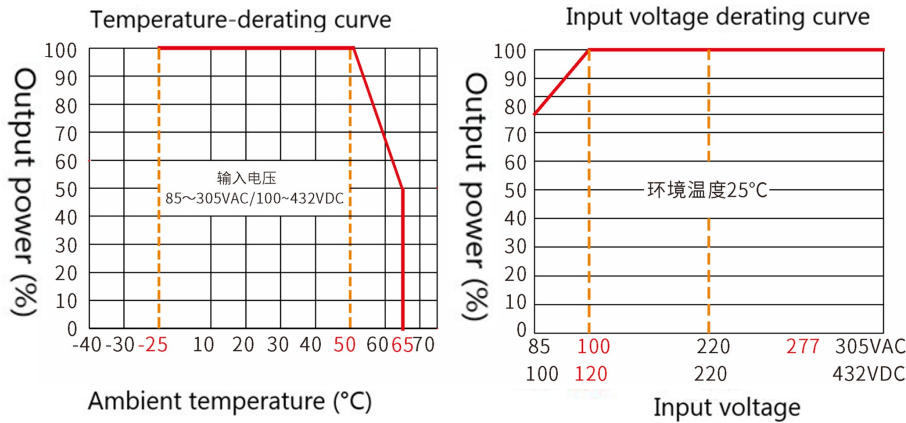
Test Method:

- Ripple noise is connected by 12# twisted pair wire, the oscilloscope bandwidth is set to 20MHz, the 100M bandwidth probe is set, and the 0.1uF polypropylene capacitor and 10uF high-frequency low-resistance electrolytic capacitor are connected in parallel on the probe end, & the oscilloscope sampling uses the Sample sampling mode
- Schematic diagram for output ripple and noise testing:

Connect the power supply input to the input power source. Connect the power supply output to the electronic load via the fixture board. For testing, use a 30 cm ± 2 cm test lead to take a direct sample from the power supply output port. Select insulated wires with an appropriate gauge based on the magnitude of the output current.



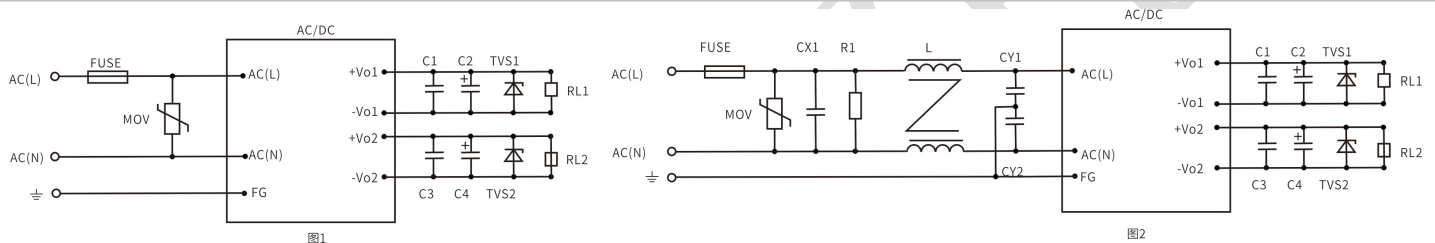
Product characteristic curve



Note 1: The input voltage is 85 - 100 VAC. Voltage derating must be performed based on the input voltage derating curve.

Note 2: This product is designed for use in naturally ventilated environments. Please contact us if you intend to use it in an enclosed environment.

Typical application circuit diagram and recommended parameters



Note:

- The output filter capacitors C1 and C3 are used to eliminate high-frequency noise. We recommend using 1  $\mu$ F ceramic capacitors with a voltage rating derated by more than 80%.
- The output filter capacitors C2 and C4 are electrolytic capacitors. We recommend using high-frequency, low-impedance electrolytic capacitors with a rating of 100  $\mu$ F and 1A output current. The capacitors should have a voltage rating derated by more than 80%.
- TVS diodes are recommended to protect the downstream circuitry (in case of module malfunction). Recommended 600W models: For 5V output, use SMBJ7.0A; for 9V output, use SMBJ12.0A; for 12V output, use SMBJ20A; for 15V output, use SMBJ20.0A; for 24V output, use SMBJ30.0A; for 48V output, use SMBJ64A
- MOV stands for Metal Oxide Varistor. Recommended models: 10D561K (1000V surge) or 14D561K (2000V surge). Its function is to protect the module from damage during lightning surges.
- For general application requirements, use the circuit recommended in Figure 1. If higher EMC requirements are needed, use the circuit recommended in Figure 2. The specific recommended values for Figure 2 are as follows:
  - Varistor (MOV): Recommended model: 14D-561K. Its function is to protect the module from damage during lightning surges.
  - Safety capacitors CY1 and CY2: 1000 pF/400 VAC;
  - Safety capacitors CX: 0.1  $\mu$ F/275 VAC;
  - Common-mode choke LCM: 20 mH - 30 mH;
  - FUSE (fuse): Mandatory; recommended rating is 3.15 A/250 V, slow-blow (if the fuse current is too low, it is prone to damage during surges; if too high, it loses its protective function).

## Notes

1. The product must be used within the specified parameters; otherwise, it may be permanently damaged.
2. A fuse must be installed at the product's input terminal.
3. If the product operates below the minimum required load, we cannot guarantee that all performance specifications listed in this manual will be met;
4. If the product operates outside its rated load range, we cannot guarantee that all performance specifications listed in this manual will be met;
5. Unless otherwise specified, all data above was measured at  $T_a=25^{\circ}\text{C}$ , humidity  $<75\%$ , with nominal input voltage and rated output load (pure resistive load);
6. All test methods for the above specifications are based on our company's standards;
7. The specifications listed above apply to the product models specified in this manual. Certain specifications for non-standard models may exceed the requirements stated above; please contact our technical staff directly for details;
8. We offer product customization;
9. Product specifications are subject to change without notice; please refer to the latest version of the manual published on our official website.

## Contact

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