G-ENERGY

**Non-Isolated DC/DC Converter Specification**

RW-989-24-12V-720W

| Input voltage | Output voltage | Output current | Output power | Efficiency | Size |
|---|---|---|---|---|---|
| 18-36V DC | 12V DC | 60 Amps | 720 Watts | 96.5% | 100*80*36mm |

The RW-989-24-12V-720W is a Non-isolated DC-DC converter that uses a synchronous rectification technology, and features high efficiency and power density. It has the dimensions of 100*80*36mm(3.94 in. x 3.15 in. x 1.42 in in) and provides the rated output voltage of 12 V and the maximum output current of 60A.

## Features

- Design meeting RoHS / CE
- High efficiency: 91.8% (@ 24Vin, 25℃)
- Import capacitors, high reliability
- Output transient absorption protection
- Support -40 °C environment
- 100% full load burn-in test
- 3 month warranty
- Remote ON/OFF control (optional)
- Waterproof level IP68

## Applications

- Industrial
- Alternative Energy
- Golf Cart
- Forklift
- Electromotor
- Telecommunications
- Boat & Yacht
- Medical
- LED Marketplaces and so on.

Model naming method

RW-989-24-12V-720W

RW:989 SKU NAME
24V:Input Voltage
12V:Output Voltage
720W:Output Power

## Electrical Specifications

Conditions: TA = 25 °C (77°F), Airflow = 1 m/s (200LFM), Vin =24V, Vout =12V, unless otherwise specified

| Parameter | Min. | Typ | Max. | Units | Remarks |
|---|---|---|---|---|---|
| Absolute maximum ratings | | | | | |
| Operating ambient temperature | -40 | - | +50 | °C | |
| Shell ambient temperature | -40 | - | 80 | °C | |
| Storage temperature | -55 | - | 100 | °C | |
| Operating humidity | 5 | - | 95 | % | Non-condensing |
| Atmospheric pressure | 62 | - | 106 | Kpa | |
| Altitude | - | - | 4000 | m | |
| Cooling way | - | - | - | | Natural cooling |

## Input characteristics

| | | | | | |
|---|---|---|---|---|---|
| Input voltage | 18 | 24 | 36 | V | - |
| Max. input voltage | - | - | 40 | V | Continuous |
| Undervoltage shutdown | 17.4 | 17.6 | 17.8 | V | Automatic recovery |
| Undervoltage recovery | 17.8 | 18 | 18.2 | V | Automatic recovery |
| Max. input current | - | - | 44.2 | A | Vin =17.8V; Iout =60A |
| No load current | - | 56 | 100 | mA | Vin =24V |

| | | | | | |
|---|---|---|---|---|---|
| Positive electrode cable | 10 | - | - | AWG | If the wire length is greater than 50cm, it is recommended to use a thicker wire diameter. |
| Negative electrode cable | 10 | - | - | AWG | |
| Enable PIN cable | - | - | - | AWG | If the product has this feature |
| Fuse | - | 60 | - | A | Input positive has built-in fuse |

## Output characteristics

| | | | | | |
|---|---|---|---|---|---|
| Efficiency | - | 96.5 | - | % | Vin =24V; Iout =60A |
| Output voltage | 11.9 | 12 | 12.3 | V | Vin =24V; Iout =60A |
| Regulator accuracy | - | ±2 | - | % | |
| Voltage regulation | - | ±2 | - | % | |
| Load Regulation | - | ±2 | - | % | |
| Overvoltage protection | - | - | - | V | |
| Output current | 0 | - | 60 | A | Vin =18-36V |
| Overcurrent protection | | 70 | 75 | A | Vin=24V |
| External capacitance | - | NA | - | μF | Don't need |
| Output ripple and noise | - | 50 | 200 | mVp-p | Vin =18-36V; Iout=60A, Oscilloscope bandwidth: 20 MHz |
| Output voltage rise time | - | 70.8 | 100 | mS | |
| Boot delay time | - | 85.2 | 200 | mS | |
| Out voltage overshoot | - | 1 | 2 | % | Vin =24V, 50%-75% Load step |
| Over temperature protection | - | - | 90 | °C | Shell |
| Short circuit protection | - | Yes | - | - | Long-term (4 hours) short circuit is not damaged, Hiccup mode |
| Positive electrode cable | 8 | - | - | AWG | If the wire length is greater than 50cm, it is recommended to use a thicker wire diameter. |
| Negative electrode cable | 8 | - | - | AWG | |

## Feature Description

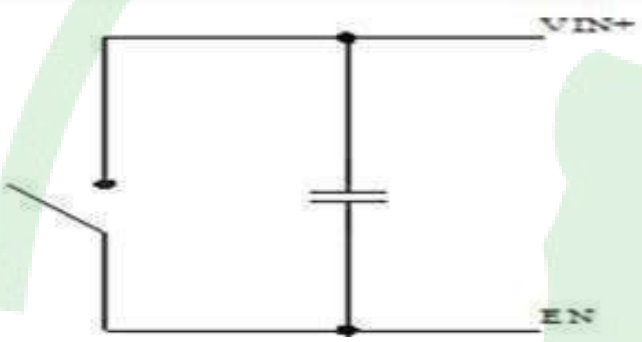
### Remote On/Off (EN) (Optional)

| Logic Enable | Low level (0 - 18Vdc) | High level (18-36Vdc) | Left open |
|---|---|---|---|
| Positive logic | Off | On | Off |

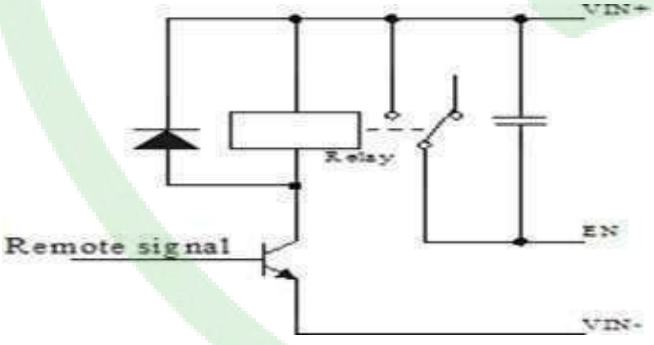
## Input Undervoltage Protection

The converter will shut down after the input voltage drops below the under-voltage protection threshold for shutdown. The converter will start to work again after the input voltage reaches the input under voltage protection threshold for startup. For the Hysteresis, see

## Various circuits for driving the EN




Simple control




Transistor control

## Output Overcurrent Protection

The converter equipped with current limiting circuitry can provide protection from an output overload or short circuit condition. If the output current exceeds the output overcurrent protection set point, the converter enters hiccup mode. When the fault condition is removed, the converter will automatically restart.

## Wiring Instructions

The input and output of this product is terminals. The user should ensure that the input and output wires and terminals are connected reliably, and pay attention to the wire diameter to meet the requirements of the power supply current. If the cable to be used is long, it needs Considering the voltage drop of the wire, if the voltage drop is too large, the voltage output at the load end may not meet the load demand. In this case, consider using a thicker wire diameter or reducing the length of the wire. Generally, if long wiring is required. Long line should be used on the side where the current is relatively small. For example, this product is a step-down product, so long lines should be used on the input side.

## DIAGRAM WIRING

INPUT+ TO BATTERY+

INPUT- TO BATTERY-

OUTPUT+ TO LOAD+

OUTPUT- TO LOAD-

Notes: Never reverse the input polarity, or it burns the converter.

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | April 2022 |
| 2.0 | revision | Nov 2024 |

## Safety and EMC features

| | | | | |
|---|---|---|---|---|
| Anti-electric Strength | Input to Output | | V | Leakage current ≤ 3.5mA, 1min, no breakdown, no arcing |
| | Input to Shell | ≥500 | V | |
| | Output to Shell | ≥500 | V | |
| Insulation resistance | Input to Output | ≥50 | MΩ | Test voltage = 500V |
| | Input to Shell | | | |
| | Output to Shell | | | |

## Other characteristics

| | | | |
|---|---|---|---|
| Weight | ≤ 580 | g | |
| Package | White box | | |
| MTBF | ≥200,000 | H | Vin= 24V; Iout= 60A |
| Switching frequency | 100±10 | KHz | |

## Characteristic Curves

Conditions: TA = 25°C (77°F), Vin = 24 V, Vout = 12 V , unless otherwise specified.

Figure 1, Efficiency

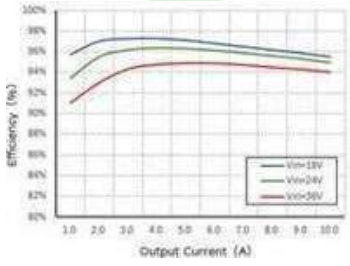



Figure 2, Power dissipation

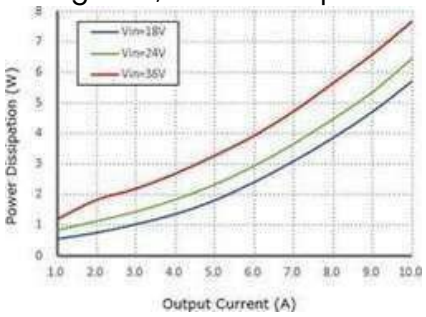
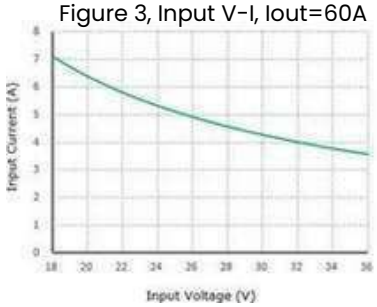



Figure 3, Input V-I, Iout=60A



## Typical Waveforms

**Conditions: TA = 25°C (77°F), Vin = 24V, unless otherwise specified..**

Figure 4, 25% - 50% load dynamic


Figure 5, 50% - 75% load dynamic

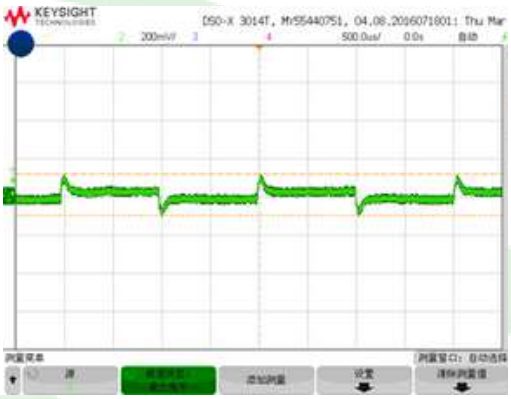



Figure 6, Output voltage established (Iout = 60A)

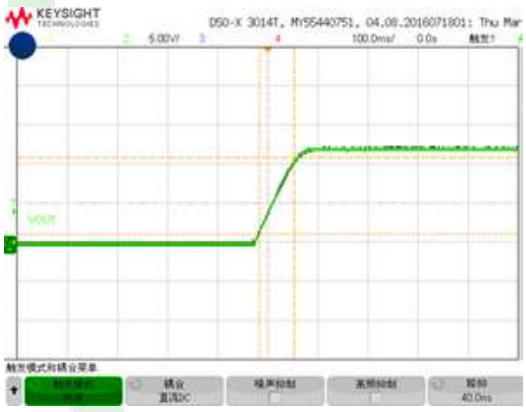



Figure 7, Output ripple & noise (Iout = 60A)

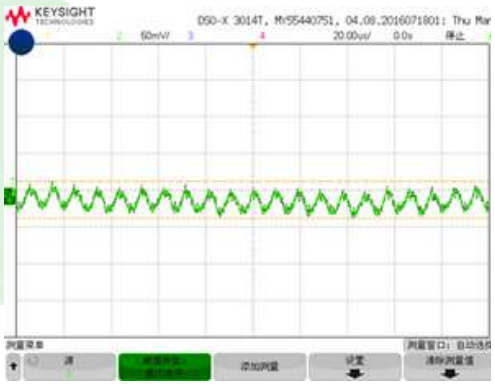



Figure 8, Boot delay time (Iout = 60A)

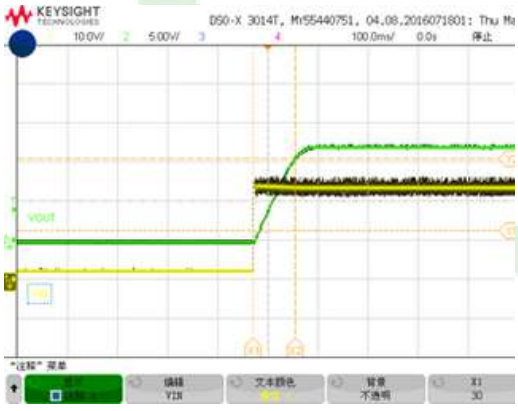
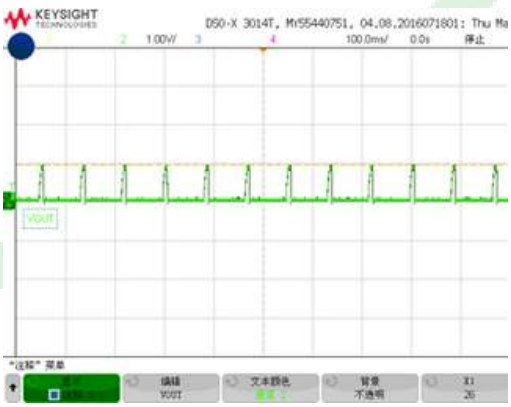



Figure 9, Short-circuit & Output voltage (Iout = 60A)



## Thermal Consideration

Sufficient airflow should be provided to help ensure reliable operating of the RW-989-24-12V-720W Therefore, thermal components are mounted on the top surface of theRW-989-24-12V-720W to dissipate heat to the surrounding environment by conduction, convection, and radiation. Proper airflow can be verified by measuring the temperature at the middle of the base plate.