Product Manual

# P_ES-2W

Data Sheet

**Constant voltage input,isolated no-regulated dual positive and negative output**




## Product Series

| Product Series | Temperature Range | Isolated Voltage | Package |
|---|---|---|---|
| P_ES-2W | -40℃～+105℃ | 3000VDC | SIP |

c UL us UL 62368-1 CE EN 62368-1 CB IEC 62368-1 RoHS

## Features

- Efficiency up to 89%
- Isolated voltage 3000VDC
- Sustainable short circuit
- The shell meet the UL94 V-0 standard
- Package is pin-to-pin compatible with international and domestic similar product
- Unsuitable for the occasion where the fluctuation range of input voltage is greater than ±10%

## Applications

- Communication bus isolation
- Digital and analog signal isolation
- IO signal power supply isolation
- General low frequency analog circuit
- DCS systems,instruments and meters
- ……

## Product Model

| Part Number | Certification | Input Nominal Voltage (Voltage Range) (VDC) | Output | | | Full Load Efficiency (%,Min/Typ) | Maximum Capacitive Load (μF) |
|---|---|---|---|---|---|---|---|
| | | | Nominal Voltage (VDC) | Min Current (mA) | Max Current (mA) | | |
| P0505ES-2W | -- | 5 (4.5-5.5) | ±5 | ±20 | ±200 | 80/83 | 1000 |
| P0512ES-2W | UL/EN/IEC | | ±12 | ±8 | ±83 | 84/86 | 330 |
| P0515ES-2W | UL/EN/IEC | | ±15 | ±7 | ±67 | 85/88 | 220 |
| P0524ES-2W | --- | | ±24 | ±4 | ±41 | 85/88 | 100 |
| P1212ES-2W | UL/EN/IEC | 12 (10.8-13.2) | ±12 | ±8 | ±83 | 85/88 | 220 |
| P1515ES-2W | UL/EN/IEC | 15 (13.5-16.5) | ±15 | ±7 | ±67 | 87/89 | 220 |
| P2405ES-2W | -- | 24 (21.6-26.4) | ±5 | ±20 | ±200 | 80/83 | 1000 |
| P2409ES-2W | UL/EN/IEC | | ±9 | ±11 | ±111 | 86/89 | 470 |
| P2412ES-2W | UL/EN/IEC | | ±12 | ±8 | ±83 | 85/88 | 330 |
| P2415ES-2W | UL/EN/IEC | | ±15 | ±7 | ±67 | 87/89 | 220 |

Note: The maximum capacitive load of each channel in the dual-output circuit is identical.

## Limit Characteristics

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Input Surge Voltage (1s，max) | 5VDC input | -0.7 | -- | 9 | VDC |
| | 12VDC input | -0.7 | -- | 18 | |
| | 15VDC input | -0.7 | -- | 21 | |
| | 24VDC input | -0.7 | -- | 30 | |
| Lead Soldering Temperature | 1.5mm from case,10s | -- | -- | 300 | ℃ |
| Hot Plug | | Unavailable | | | |

## Input Characteristics

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| No Load/Full Load Input Current | 5VDC input | -- | 10/465 | 35/477 | mA |
| | 12VDC input | -- | 10/190 | 20/208 | |
| | 15VDC input | -- | 6/150 | 17/155 | |
| | 24VDC input | -- | 6/100 | 12/105 | |
| Input Filter | | Capacitor filter | | | |

## Output Characteristics

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Line Regulation | Input voltage changes within ±1% | -- | ±1.1 | ±1.3 | -- |
| Load Regulation | Load is from 10% to 100% | -- | 7 | 15 | % |
| Temperature Drift Coefficient | 100% load | -- | -- | ±0.03 | %/℃ |
| Output Ripple& Noise | 20MHz bandwidth | -- | 75 | 200 | mVp-p |
| Output Voltage Accuracy | | See output voltage and load curve | | | |
| Output Short-Circuit Protection | | Sustainable short circuit, self-recovery | | | |

## General Characteristics

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Isolation Voltage | Input-output, time 1 minute, leakage current less than 1mA | 3000 | -- | -- | VDC |
| Isolation Resistance | Input-output,isolation voltage 500VDC | 1 | -- | -- | GΩ |
| Isolation Capacitance | Input-output,100kHz,0.1V | -- | 20 | 60 | pF |
| Switching Frequency | 5V input voltage, 100% load | -- | 220 | 350 | kHz |
| MTBF | MIL-HDBK-217F@25℃ | 3500 | -- | -- | k hours |
| Package Size | -- | 19.65×7.05×10.10 | | | mm |
| Package Material | -- | Black flame retardant plastic shell, comply with UL94V-0 standard | | | |

## Environmental Characteristics

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | See the ambient temperature derating curve for details | -40 | -- | +105 | ℃ |
| Storage Temperature | -- | -55 | -- | +125 | |
| Casing Temperature Rise | Ta=25℃ | -- | 25 | 35 | |
| Storage Humidity | No condensation | -- | -- | 95 | % |
| Cooling Method | | Natural air cooling | | | |
| Vibration | | 10-150Hz, 5G, 0.75mm. along X, Y and Z | | | |

## EMC Characteristics

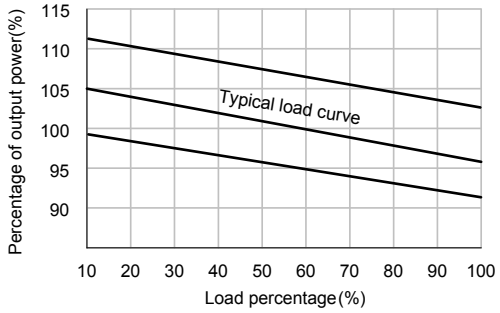
| | | | |
|---|---|---|---|
| EMI | CE | CISPR32/EN55032 CLASS B (See Figure 2) | |
| | RE | CISPR32/EN55032 CLASS B (See Figure 2) | |
| EMS | ESD | IEC/EN61000-4-2 Contact±6kV Air±8kV | Perf.Criteria B |

Notes:(1) The input voltage cannot exceed the specified range, otherwise it may cause permanent and irreversible damage.

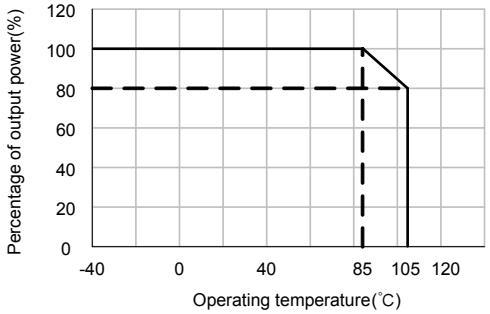
(2)Unless specified specially, parameters in this manual are measured under the conditions of 25℃, 40%~75% humidity, input nominal voltage and rated output load.

(3)Output ripple & noise tested by direct-probe method.

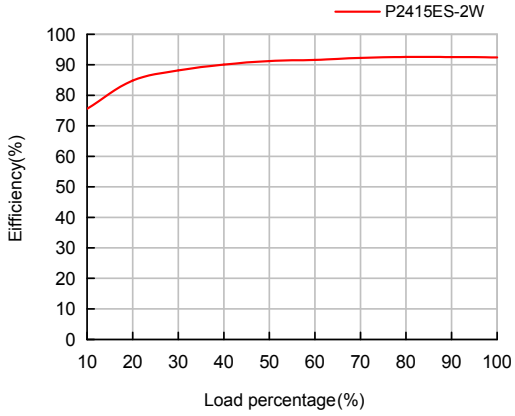
## Product Characteristic Graph



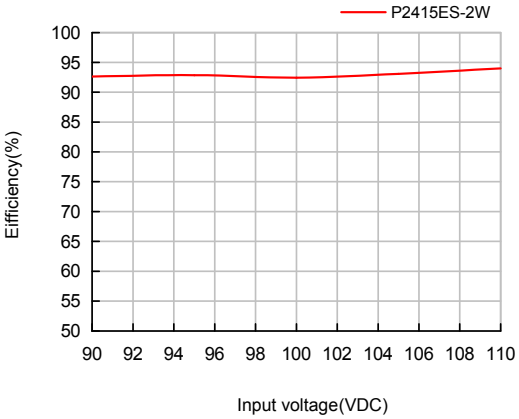

Output voltage VS load graph
(nominal input voltage)




Curve of relationship between output power and working temperature

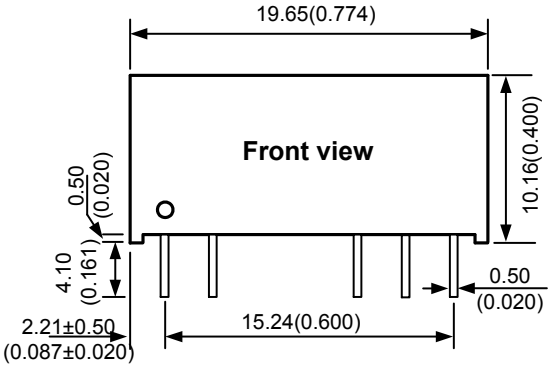



Efficiency VS load(Nominal input voltage)

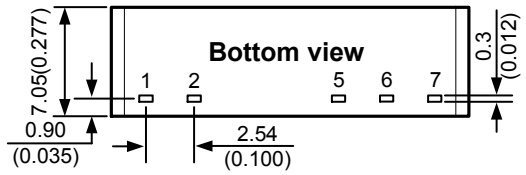



Eifficiency VS input voltage(Full load)

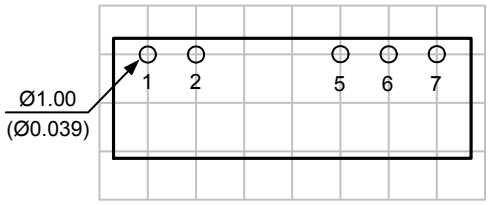
## Outline and Footprint Dimensions



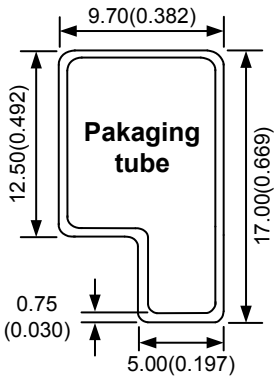

| Pin | Function |
|---|---|
| 1 | Vin |
| 2 | GND |
| 5 | -Vo |
| 6 | 0V |
| 7 | +Vo |




PCB Silkscreen Diagram
(Top View)




Notes：
Unit：mm(inch)
Unlabeled tolerance：±0.25(±0.010)
Grid distance：2.54×2.54mm




Notes：
Size：mm(inch)
Unlabeled tolerance:±0.50(±0.020)
L=282(11.102)，13pieces/pallet
Carton Size：304×120×40mm
286pieces/carton

## Circuit Design and Application

1. Recommended circuit

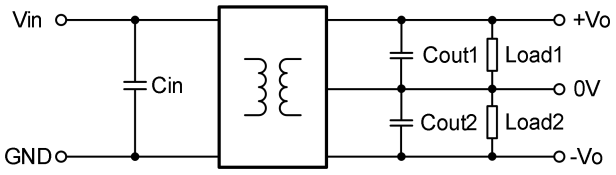



Figure 1　Recommended circuit

2. Filter capacitor

For the selection of filter capacitor, please refer to values in Table 1. If the ESR is less than 1Ω (when the frequency is 100KHz), the ceramic or electrolytic capacitor is recommended to use, and the tantalum capacitor is not recommended to use. The value of input and output filter capacitor can not be too large, otherwise it may cause startup problem.

Table 1 The reference value of the external capacitor

| Vin(VDC) | Cin(μF) | Vo(VDC) | Cout1/ Cout2(μF) |
|---|---|---|---|
| 5/12/15 | 10 | ±5/±9 | 4.7 |
| | | ±12/±15 | 2.2 |
| 24 | 1 | ±24 | 1 |

## 3. EMC typical recommended circuit(CLASS B)

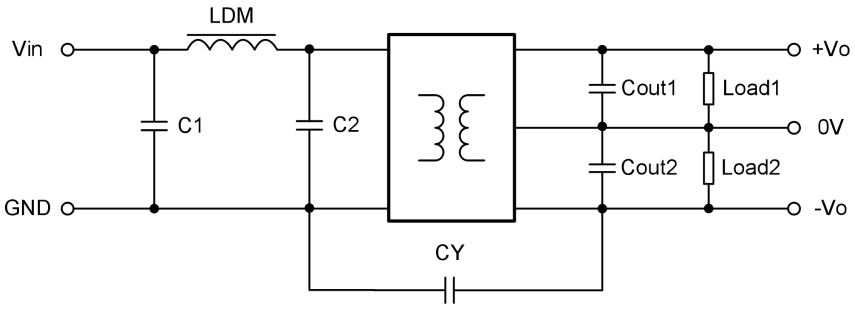



Figure 2 EMC recommended circuit diagram

Table 2 EMC recommended circuit external parameter values

| EMC | Vin(VDC) | C1/C2(μF) | CY | LDM(μH) | Cout(μF) |
|---|---|---|---|---|---|
| EMI | 5/12/15/24 | 4.7 | 1nF/3KVDC | 6.8 | Refer to table 1 |

Note：
1.The withstand voltage values of capacitors C1 and C2 are selected according to "input impulse voltage".
2.The maximum current of inductance LDM is selected according to the actual input current, and it is recommended to select 1.5 times the actual current.
3.It is recommended that the circuit wiring should not be long and be as close as possible to the module.

## 4. Load requirements

In order to ensure efficient and reliable operation of the module, it is recommended that the output load should be between 10% and 100% of the rated power. It is not recommended to run for a long time in the case of the load is less than 10%, otherwise part of the product performance can't conform to the performance index of this manual. If the output load is too light, place a dummy load resistance on output terminal in parallel. The sum of the fake load resistance power plus the actual load power is greater than 10% of the load.

## 5. Protection function

Under normal conditions, this series of power modules have no over-current protection function.An overcurrent protector can be added at the input terminal. The simplest way to protect the output from over voltage and over current is to connect a linear regulator with over current protection at the output.

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