# RT9-R30D1WR

## SMD - DIP 16 Package

- Wide range of input voltage (2:1)
- Ultra-small size, SMD package
- 1.5KVDC isolation
- Short circuit protection(automatic recovery)
- Operating temperature range:-40°C ~ +85°C
- High power density
- Meet UL94-V0
- EN60950 Approval


RoHS

The RT9-R30D1WR series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board. These products apply to where:
1) These products apply to where: Input voltage range≤2:1;
2) 1.5KV input and output isolation;
3) Regulated and low ripple noise is required.

### SELECTION GUIDE

| Certification | Part No. | Input Voltage (VDC) | | Output | | Efficiency (%,Min/Typ.) @ Full Load | Max. Capacitive Load② (μF) |
|---|---|---|---|---|---|---|---|
| | | Nominal (Range) | Max.① | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | |
| CE | RT9-1203R30D1WR | 12 (9-18) | 22 | 3.3 | 909/46 | 72/74 | 3700 |
| | RT9-1205R30D1WR | | | 5 | 600/30 | 73/75 | 3300 |
| | RT9-1212R30D1WR | | | 12 | 250/12 | 75/77 | 1800 |
| | RT9-1215R30D1WR | | | 15 | 200/10 | 77/79 | 1000 |
| | RT9-2403R30D1WR | 24 (18-36) | 40 | 3.3 | 909/46 | 72/74 | 3700 |
| | RT9-2405R30D1WR | | | 5 | 600/30 | 74/76 | 3300 |
| | RT9-2412R30D1WR | | | 12 | 250/12 | 79/81 | 1800 |
| | RT9-2415R30D1WR | | | 15 | 200/10 | 78/80 | 1000 |
| | RT9-4805R30D1WR | 48 (36-75) | 80 | 5 | 600/30 | 75/77 | 3300 |
| | RT9-4812R30D1WR | | | 12 | 250/12 | 78/80 | 1800 |
| | RT9-4815R30D1WR | | | 15 | 200/10 | 78/80 | 1000 |

Note:
①. Absolute maximum rating without damage on the converter, but it isn't recommended;
②. For dual output converter, the given value is the same for each output.

### INPUT SPECIFICATIONS

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input current | 12VDC input | -- | 334/18 | 343/25 | mA |
| | 24VDC input | -- | 165/10 | 169/14 | |
| | 48VDC input | -- | 82/5 | 84/18 | |
| Input Surge Voltage (1sec. max.) | 12VDC input | -0.7 | -- | 25 | VDC |
| | 24VDC input | -0.7 | -- | 50 | |
| | 48VDC input | -0.7 | -- | 100 | |
| Starting Voltage | 12VDC input | 4.5 | 8 | 9 | |
| | 24VDC input | 11 | 16 | 18 | |
| | 48VDC input | 24 | 33 | 36 | |
| Input Filter | | Pi filter | | | |
| Hot Plug | | Unavailable | | | |

### OUTPUT SPECIFICATIONS

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Output Voltage Accuracy | 5% to 100% load | -- | ±1 | ±3 | % |

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| | | | | | |
|---|---|---|---|---|---|
| No load output Voltage Accuracy | Vo≤5V | -- | ±1.5 | ±5 | |
| | Vo>5V | -- | ±1.5 | ±3 | |
| Linear Regulation | Full load, the input voltage is from low voltage to high voltage | -- | ±0.2 | ±0.4 | |
| Load Regulation | 5%-100% load | -- | ±0.2 | ±0.75 | |
| Transient Recovery Time | 25% load step change | -- | 0.5 | 1 | ms |
| Transient Response Deviation | | -- | ±2 | ±5 | % |
| Temperature Coefficient | Full load | -- | ±0.02 | ±0.03 | %/℃ |
| Ripple & Noise* | 20MHz bandwidth | -- | 45 | 60 | mV p-p |
| Short circuit Protection | | Continuous, self-recovery | | | |

*Note:*Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.*

## GENERAL SPECIFICATIONS

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Insulation Voltage | Input-output, with the test time of 1 minute and the leak current lower than 1mA | 1500 | -- | -- | VDC |
| Insulation Resistance | Input-output, isolation voltage 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 1 | -- | nF |
| Operating Temperature | Derating if the temperature is e85℃ (see Fig. 1) | -40 | -- | +85 | ℃ |
| Storage Temperature | | -55 | -- | +125 | |
| Casing Temperature Rise | Ta=25℃ | -- | +25 | -- | |
| Hand Soldering | Welding spot is 1.5mm away from the casing, 10 seconds | -- | -- | +300 | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Switching Frequency(PFM mode) | 100% load, nominal input voltage | -- | 350 | -- | KHz |
| MTBF | MIL-HDBK-217F@25℃ | 1000 | -- | -- | K hours |
| Reflow Soldering Temperature | | Peak temp.≤240℃, maximum duration time≤60s at 217℃. For actual application, please refer to IPC/JEDEC J-STD-020D.1. | | | |

## PHYSICAL SPECIFICATIONS

| | |
|---|---|
| Casing Material | Black flame-retardant and heat-proof epoxy resin (UL94-V0) |
| Dimensions | 23.86*13.70*7.50 mm |
| Weight | 5.2g(Typ.) |
| Cooling | Free convection |

## EMC SPECIFICATIONS

| | | | |
|---|---|---|---|
| EMI | CE | CISPR22/EN55022 CLASS B/CLASS B (see Fig.3 for recommended circuit) | |
| | RE | CISPR22/EN55022 CLASS B/CLASS B (see Fig.3 for recommended circuit) | |
| EMS | ESD | IEC/EN61000-4-2 Contact ±4KV | perf. Criteria B |
| | RS | IEC/EN61000-4-3 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 ±2KV (see Fig.3 for recommended circuit) | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 ±2KV (see Fig.3for recommended circuit) | perf. Criteria B |
| | CS | IEC/EN61000-4-6 3 Vr.m.s | perf. Criteria A |
| | Immunities of voltage dip, drop and short interruption | IEC/EN61000-4-29 0-70% | perf. Criteria B |

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## PRODUCT CHARACTERISTIC CURVE

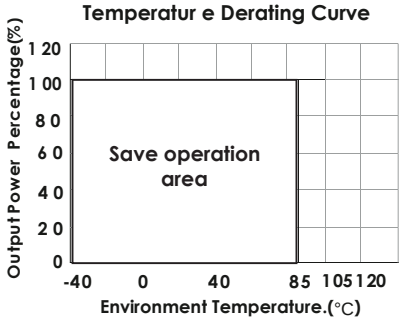
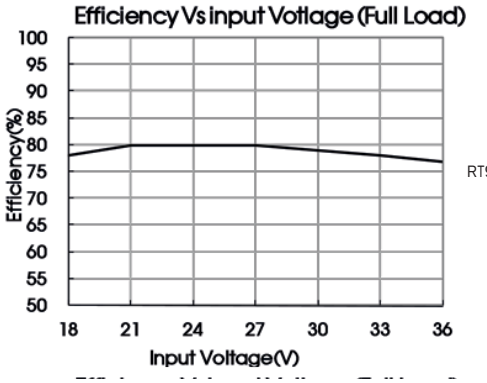



Fig. 1

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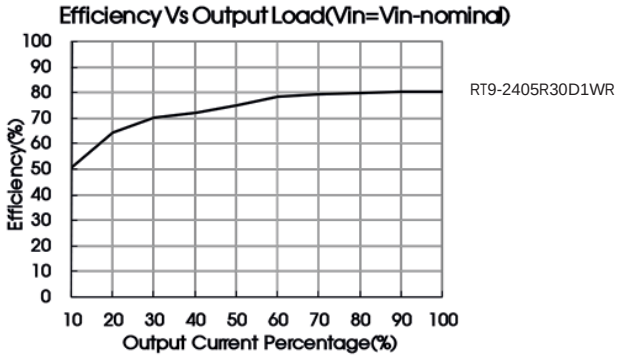


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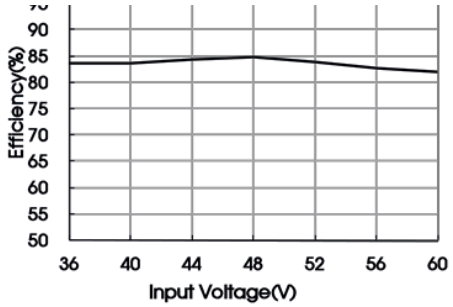


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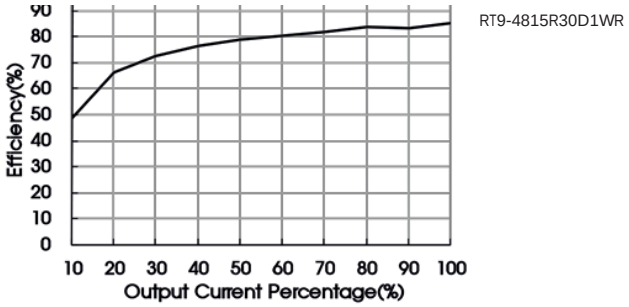


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## DESIGN REFERENCE

### 1. Output load requirements

To ensure that the module can work efficiently and reliably, its output min. load shall be no lower than 5% of the rated load when using, or the output ripple may increase rapidly. Ensure that the product working load must be higher than 5% of the rated load.

### 2. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

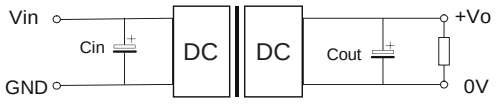


Fig. 2

| Vin | 12V | 24V&48V |
|---|---|---|
| Cin | 100μF | 10μF~47μF |
| Cout | 10μF | |

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### 3. EMC solution-recommended circuit

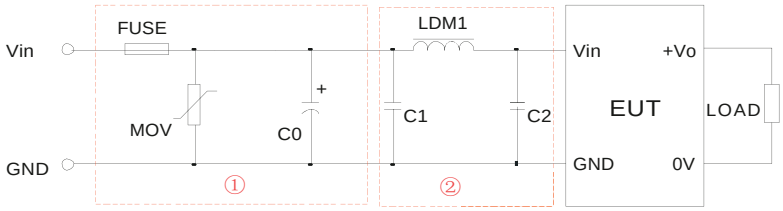


Fig. 3

Parameter description:

| Model | Vin:12V | Vin:24V | Vin:48V |
|---|---|---|---|
| FUSE | Choose according to practical input current | | |
| MOV | -- | S14K35 | S14K60 |
| LDM1 | 12 μ H | | |
| C0 | 680 μ F/25V | 120 μ F/50V | 120 μ F/100V |
| C1 | 4.7uF/50V | | 4.7uF/100V |
| C2 | 4.7uF/50V | | 4.7uF/100V |

Note: ①.Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.
②.If there is no recommended parameters, the model no require the external component.

### EMC solution-recommended circuit PCB layout

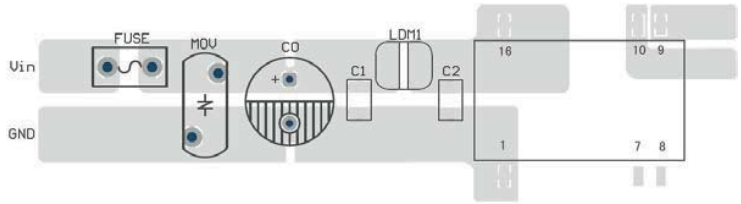


Fig. 4

## 4. Input current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do no exceed the module standard. Input current of power supply should afford the flash startup average current of this kind of DC/DC module (Figure 2).

General: Vin:12V Iave =640mA
Vin:24V Iave =316mA
Vin:24V Iave =156mA

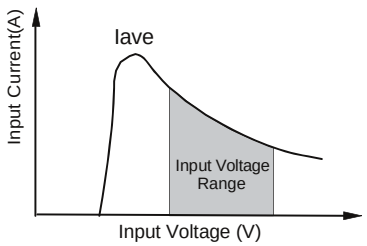


Fig. 5

## 5. It is not recommended to increase the output power capability by connecting two or more converters in parallel.

*The models listed here are just standard type. If you need a product with special specification or you have questions regarding packing standards (Tube oder Tape/Reel) as well as application support, please contact our specialists: sales@rsg-electronic.de or +49 69-984047-41/-28*

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