

RV1-1W Series

1W 2:1 Regulated Single output

Features

- Wide 2:1 Input Range
- 1500 ~ 3000VDC Isolation
- Fully regulated output
- No minimum load required
- Continuous Short Circuit Protection
- Efficiency up to 80%
- Low Ripple and Noise
- -40°C ~ +90°C Operating Temperature Range



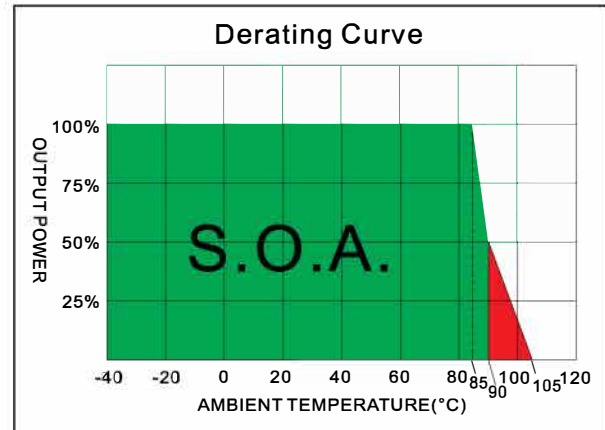
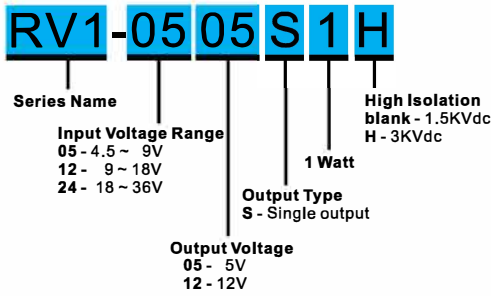
The RV1-1W series is a family of cost effective 1W single output DC-DC converters. These converters are consisted with Non-conductive Black Plastic in a 7-pin SIL package with high performance features such as 1500~3000VDC input/output isolation voltage, continuous short circuit protection with automatic restart and tight line/load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5, 12 and 24 with output voltage of 5 and 12Vdc. High performance features include high efficiency operation up to 80% and output voltage accuracy of $\pm 2\%$ maximum.

All specifications typical at $T_a=25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified.

| OUTPUT SPECIFICATIONS | | GENERAL SPECIFICATIONS | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Output Voltage Accuracy | $\pm 2\%$, max. | Efficiency | See table, typ. |
| Output Current | See table, max. | I/O Isolation Voltage (60sec) | 1500~3000Vdc |
| Line Regulation | $\pm 0.2\%$, max. | I/O Isolation Capacitance | 70pF, typ. |
| Load Regulation (0% to 100%) | $\pm 1.0\%$, max. | I/O Isolation Resistance | 1000M Ω , min. |
| Ripple & Noise (20MHz bandwidth) (1) | 50mVpk-pk, max. | Switching Frequency | 150~550KHz |
| Short Circuit Protection | Continuous(Automatic Recovery) | Humidity | 95% rel H |
| Temperature Coefficient | $\pm 0.02\%/^\circ\text{C}$ | Reliability Calculated MTBF (MIL-HDBK-217 F) | > 2.8Mhrs |
| Capacitive Load (2) | See table, max. | Safety Standard (designed to meet) | IEC/EN 60950-1 , 62368-1 UL/cUL 60950-1 , 62368-1 |
| Transient Recovery Time (3) | 500 μs , typ. | | |
| Transient Response Deviation (3) | $\pm 3\%$, max. | | |
| INPUT SPECIFICATIONS | | ABSOLUTE MAXIMUM RATINGS (6) | |
| Input Voltage Range | See table. | These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. | |
| Input Filter | Capacitors | Input Surge Voltage (1000mS) | |
| Input Current (No-Load) | See table, max. | 05 Models | 15Vdc, max. |
| Input Current (Full-Load) | See table, typ. | 12 Models | 25Vdc, max. |
| Input Reflected Ripple Current (4) | 35mA _{pk-pk} , typ. | 24 Models | 50Vdc, max. |
| | | Soldering Temperature | 260 $^\circ\text{C}$, max. |
| | | (1.5mm from case 10sec max.) | |
| PHYSICAL SPECIFICATIONS | | EMC SPECIFICATIONS | |
| Case Material | Non-conductive Black Plastic(UL94V-0 rated) | Radiated Emissions | EN55032 CLASS B |
| Pin Material | C5191R-H Solder-coated | Conducted Emissions (7) | EN55032 CLASS B |
| Potting Material | Epoxy (UL94V-0 rated) | ESD | IEC 61000-4-2 Perf. Criteria A |
| Weight | 3.1g | RS | IEC 61000-4-3 Perf. Criteria A |
| Dimensions | 0.76"x0.28"x0.39" | EFT (8) | IEC 61000-4-4 Perf. Criteria A |
| | | Surge (8) | IEC 61000-4-5 Perf. Criteria A |
| | | CS | IEC 61000-4-6 Perf. Criteria A |
| | | PFMF | IEC 61000-4-8 Perf. Criteria A |
| ENVIRONMENT SPECIFICATIONS | | | |
| Operating Ambient Temperature | -40 $^\circ\text{C}$ ~ +90 $^\circ\text{C}$ (See Derating Curve) -40 $^\circ\text{C}$ ~ +85 $^\circ\text{C}$ (For 100% load) | | |
| Maximum Case Temperature | 105 $^\circ\text{C}$ | | |
| Storage Temperature | -55 $^\circ\text{C}$ ~ 125 $^\circ\text{C}$ | | |
| Cooling (5) | Nature Convection | | |
| NOTE | | | |
| 1. Measured with a 0.1 μF ceramic disc capacitor and a 10 μF electrolytic capacitor. | | | |
| 2. Tested by minimal V_{in} and constant resistive load. | | | |
| 3. Tested by nominal V_{in} and 25% load step change (75%-50%-25% of I_o). | | | |
| 4. Measured with a simulated source inductance of 12 μH and a source capacitor C_{in} (47 μF , ESR<1.0 Ω at 100KHz). | | | |
| 5. "Nature Convection" is usually about 30-65 LFM but not equal to still air (0 LFM). | | | |
| 6. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating. | | | |
| 7. Input filter components are be required to help meet conducted emission class B, which application refer to The EMI Filter of Design & feature configuration. | | | |
| 8. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. The filter capacitor suggest: Nippon chemi-con KY series, 330 μF /100V. | | | |

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PART NUMBER STRUCTURE



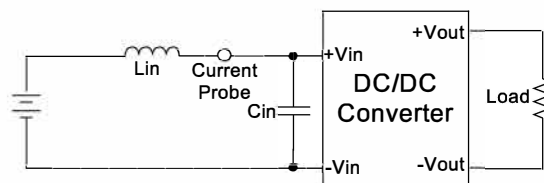
MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current | | OUTPUT Voltage (Vdc) | OUTPUT Current | | EFFICIENCY @FL (% typ.) | Capacitor Load @FL (µF, max.) |
|--------------|---------------------------|--------------------|----------------------|----------------------|----------------|----------------|-------------------------|-------------------------------|
| | | No-Load (mA, max.) | Full Load (mA, typ.) | | Min. load (mA) | Full load (mA) | | |
| RV1-0505S1 | 4.5 - 9 | 35 | 263 | 5 | 0 | 200 | 76 | 1680 |
| RV1-0512S1 | 4.5 - 9 | 35 | 253 | 12 | 0 | 83 | 79 | 820 |
| RV1-1205S1 | 9 - 18 | 20 | 107 | 5 | 0 | 200 | 78 | 1680 |
| RV1-1212S1 | 9 - 18 | 20 | 105 | 12 | 0 | 83 | 80 | 820 |
| RV1-2405S1 | 18 - 36 | 10 | 54 | 5 | 0 | 200 | 78 | 1680 |
| RV1-2412S1 | 18 - 36 | 10 | 52 | 12 | 0 | 83 | 80 | 820 |

TEST CONFIGURATIONS

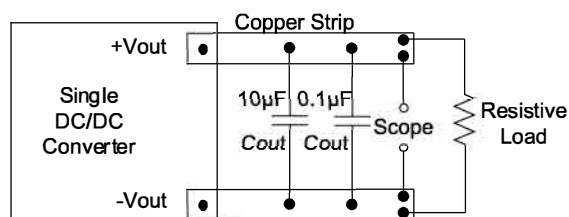
Input Reflected Ripple Current Test

Input reflected ripple current is measured with a source inductor L_{in} (12µH) and a source capacitor C_{in} (47µF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

Use a C_{out} 0.1µF ceramic capacitor and a C_{out} 10µF electrolytic capacitor. The Scope measurement bandwidth is 20MHz.

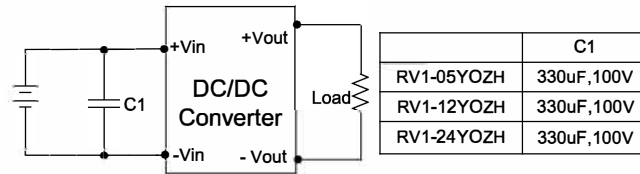


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DESIGN & FEATURE CONFIGURATIONS

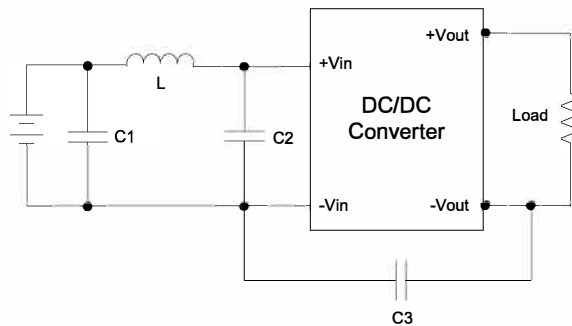
EFT & SURGE Filter

Input components (C1) are used to help meet surge test requirement for the module.



EMI Filter

Input filter components (C1~C3, L1) are used to help meet conducted emissions. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



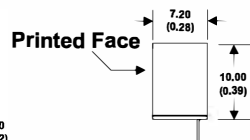
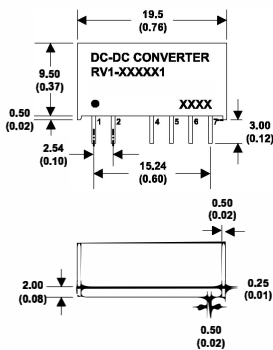
Recommended external EMI filter for class A:

| | C1 | C2 | C3 | L |
|------------|----------------|----|----------------|-------|
| RV1-05YOZH | 1206,4.7μF/50V | | 1808,220pF/3KV | 4.7μH |
| RV1-12YOZH | 1206,4.7μF/50V | | 1808,220pF/3KV | 4.7μH |
| RV1-24YOZH | 1206,4.7μF/50V | | 1808,220pF/3KV | 18μH |

Recommended external EMI filter for class B:

| | C1 | C2 | C3 | L |
|------------|----------------|----------------|----------------|------|
| RV1-05YOZH | 1206,4.7μF/50V | | 1808,220pF/3KV | 18μH |
| RV1-12YOZH | 1206,4.7μF/50V | | 1808,220pF/3KV | 18μH |
| RV1-24YOZH | 1206,4.7μF/50V | 1206,4.7μF/50V | 1808,470pF/3KV | 18μH |

MECHANICAL SPECIFICATIONS



7 Pin SIL Package

- Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Pin to case tolerance: ± 0.5 (± 0.02)
 4. Case Tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS

| PIN NUMBER | SINGLE | SINGLE-H |
|------------|-----------|-----------|
| 1 | +V Input | +V Input |
| 2 | -V Input | -V Input |
| 4 | -V Output | N.P. |
| 5 | N.P. | -V Output |
| 6 | +V Output | N.P. |
| 7 | N.P. | +V Output |

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