

## Features

## Unregulated Converters

- UL/CSA and EN-60950-1 Safety certified
- EN-60601 for Medical Applications
- 6kVDC Isolation
- Optional Continuous Short Circuit Protection
- Efficiency up to 80%
- Space Saving „Skinny DIP“ Package
- Very Low Isolation Capacitance

### Selection Guide

| Part Number SIP 7 | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency Std (%) | Max Capacitive Load <sup>(1)</sup> |
|-------------------|---------------------|----------------------|---------------------|--------------------|------------------------------------|
| RV-xx3.3S         | 3.3, 5, 12, 15, 24  | 3.3                  | 600                 | 70                 | 3300µF                             |
| RV-xx05S          | 3.3, 5, 12, 15, 24  | 5                    | 400                 | 70-75              | 1200µF                             |
| RV-xx09S          | 3.3, 5, 12, 15, 24  | 9                    | 222                 | 70-75              | 1200µF                             |
| RV-xx12S          | 3.3, 5, 12, 15, 24  | 12                   | 167                 | 70-75              | 680µF                              |
| RV-xx15S          | 3.3, 5, 12, 15, 24  | 15                   | 132                 | 75-80              | 680µF                              |
| RV-xx24S          | 3.3, 5, 12, 15, 24  | 24                   | 83                  | 75-80              | 470µF                              |
| RV-xx3.3D         | 3.3, 5, 12, 15, 24  | ±3.3                 | ±300                | 70                 | ±1500µF                            |
| RV-xx05D          | 3.3, 5, 12, 15, 24  | ±5                   | ±200                | 70-75              | ±470µF                             |
| RV-xx09D          | 3.3, 5, 12, 15, 24  | ±9                   | ±111                | 70-75              | ±470µF                             |
| RV-xx12D          | 3.3, 5, 12, 15, 24  | ±12                  | ±85                 | 70-75              | ±220µF                             |
| RV-xx15D          | 3.3, 5, 12, 15, 24  | ±15                  | ±66                 | 75-80              | ±220µF                             |
| RV-xx24D          | 3.3, 5, 12, 15, 24  | ±24                  | ±42                 | 75-80              | ±100µF                             |

xx = Input Voltage. Other input and output voltage combinations available on request.

No suffix is 6kVDC functional isolation

\* add Suffix "P" for Continuous Short Circuit Protection, e.g. RV-0505S/P, RV-0505D/P

### Specifications (measured at $T_A = 25^\circ\text{C}$ , nominal input voltage, full load and after warm-up)

|   |   |                |
|---|---|----------------|
| Input Voltage Range                               | ±10%  |                |
| Output Voltage Accuracy                           | ±5%   |                |
| Line Voltage Regulation                           | 1.2%/1% of $V_{in}$ typ.                        |                |
| Load Voltage Regulation (10% to 100% full load)   | 3.3V output types                               | 20% max.       |
|   | 5V output type                                  | 15% max.       |
|   | 9V, 12V, 15V, 24V output types                  | 10% max.       |
| Output Ripple and Noise (20MHz limited)           | 200mVp-p max.                                   |                |
| Operating Frequency                               | 20kHz min. / 50kHz typ. / 85kHz max.            |                |
| Efficiency at Full Load                           | 70% min. / 75% typ.                             |                |
| Minimum Load = 0%                                 | Specifications valid for 10% minimum load only. |                |
| Isolation Voltage                                 | (tested for 1 second)                           | 6000VDC        |
|   | (rated for 1 minute)                            | 3000VAC / 60Hz |
| Isolation Capacitance                             | 2pF min. / 12pF max.                            |                |
| Isolation Resistance                              | 15 GΩ min.                                      |                |
| Short Circuit Protection                          | 1 Second  |                |
| P-Suffix  | Continuous                                      |                |
| Operating Temperature Range (free air convection) | -40°C to +85°C (see Graph)                      |                |
| Storage Temperature Range                         | -55°C to +125°C                                 |                |
| Relative Humidity                                 | 95% RH  |                |
| Package Weight                                    | 9g  |                |
| Packing Quantity                                  | 15 pcs per Tube                                 |                |
|   | cont.   |                |

## ECONOLINE

### DC/DC-Converter

with 3 year Warranty

# RECOM

## 2 Watt DIP24 Miniature Single & Dual Output



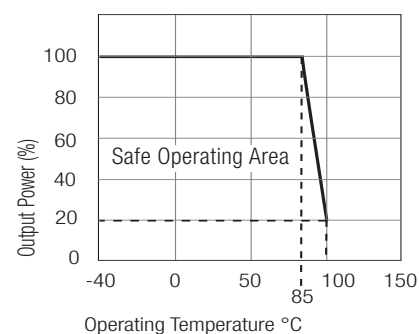
**EN-60950-1 Certified**  
**EN-60601-1 Certified**  
**UL/CSA 60950-1 Certified**  
**IEC 60601-1 CB Report**

## RV

### Description

Very high isolation in a small size are the main features of this miniature DIP24 converter, ideal for highly sophisticated industrial, test and measurement and medical designs where board space is at a premium.

## Derating-Graph (Ambient Temperature)



Refer to Application Notes

## Tolerance Envelope



## Specifications (continued)

|                |   |   |   |
|----------------|---|---|---|
| MTBF (+25°C)   | Detailed Information see Application Notes chapter "MTBF" | using MIL-HDBK 217F   | 1154 x 10 <sup>3</sup> hours              |
| (+85°C)        |   | using MIL-HDBK 217F   | 168 x 10 <sup>3</sup> hours               |
| Certifications | UL/cUL General Safety                                     | Report: E248550   | UL 60950-1 1st Ed.                        |
|                | EN General Safety   | Report: PS-R7219C1  | EN60950-1:2001 + A11: 2004                |
|                | CB/EN Medical Safety                                      | Report: MDD1205098-4 + RM1205098-4 IEC/EN 60601-1 3rd Edition | Medical Report + ISO14971 Risk Assessment |

## Notes

Note 1 Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

## Typical Characteristics

### RV-xx05S



### RV-xx12S



## RV-xx05D



## RV-xx12D



**Package Style and Pinning (mm)**



**24 PIN DIP Miniature Package Style**



**Recommended Footprint Details**



| Pin Connections    |        | Pin Connections       |       |
|--------------------|--------|-----------------------|-------|
| Pin #              | Single | Pin #                 | Dual  |
| 1                  | +Vin   | 1                     | +Vin  |
| 2                  | -Vin   | 2                     | -Vin  |
| 8, 9, 11, 14       | NC     | 8, 17                 | -Vout |
| 10, 15             | -Vout  | 9, 11, 14, 16, 23, 24 | NC    |
| 12 & 13            | +Vout  | 10 & 15               | Com   |
| 16, 17, 23, 24     | NC     | 12, 13                | +Vout |
| NC = No Connection |        | NC = No Connection    |       |

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

# Features

## Unregulated Converters

- UL/CSA and EN-60950-1 Safety certified
- EN-61010 for Test, Measurement and Lab Use
- UL/CSA and EN-60601 for Medical Applications
- 6.4kVDC or 8kV Reinforced Isolation
- Optional Continuous Short Circuit Protection
- Efficiency to 88%
- Space Saving „Skinny DIP“ Package
- Very Low Isolation Capacitance

### Selection Guide

| Part Number<br>SIP 7 | Reinforced Isolation (kVDC) | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency Std (%) | Max Capacitive Load <sup>(1)</sup> |
|----------------------|-----------------------------|---------------------|----------------------|---------------------|--------------------|------------------------------------|
| RV-xx3.3S            | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | 3.3                  | 600                 | 70-78              | 3300µF                             |
| RV-xx05S             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | 5                    | 400                 | 76-80              | 1200µF                             |
| RV-xx09S             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | 9                    | 222                 | 78-85              | 1200µF                             |
| RV-xx12S             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | 12                   | 167                 | 78-85              | 680µF                              |
| RV-xx15S             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | 15                   | 132                 | 78-88              | 680µF                              |
| RV-xx3.3D            | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | ±3.3                 | ±300                | 70-78              | ±1500µF                            |
| RV-xx05D             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | ±5                   | ±200                | 75-82              | ±470µF                             |
| RV-xx09D             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | ±9                   | ±111                | 76-84              | ±470µF                             |
| RV-xx12D             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | ±12                  | ±85                 | 78-86              | ±220µF                             |
| RV-xx15D             | /R6.4 & /R8                 | 3.3, 5, 12, 15, 24  | ±15                  | ±66                 | 78-86              | ±220µF                             |

xx = Input Voltage. Other input and output voltage combinations available on request.

No suffix is 6kVDC functional isolation

\* add Suffix "P" for Continuous Short Circuit Protection, e.g. RV-0505S/P, RV-0505D/P

\* add Suffix "/R6.4" or "/R8" for Reinforced Isolation, e.g. RV-0505S/R6.4, RV-0505D/P/R8

### Specifications (measured at T<sub>A</sub> = 25°C, nominal input voltage, full load and after warm-up)

|   |  |
|---|--|
| Input Voltage Range                               | ±10%   |
| Output Voltage Accuracy                           | ±5%  |
| Line Voltage Regulation                           | 1.2%/1% of Vin typ.  |
| Load Voltage Regulation (10% to 100% full load)   | 3.3V output types 20% max.<br>5V output type 15% max.<br>9V, 12V, 15V, 24V output types 10% max. |
| Output Ripple and Noise (20MHz limited)           | 200mVp-p max.  |
| Operating Frequency                               | 20kHz min. / 50kHz typ. / 85kHz max.   |
| Efficiency at Full Load                           | 70% min. / 75% typ.  |
| Minimum Load = 0%                                 | Specifications valid for 10% minimum load only.  |
| /R6.4   | (tested for 1 second) 6400VDC<br>(rated for 1 minute) 3200VAC / 60Hz                             |
| /R8   | (tested for 1 second) 8000VDC<br>(rated for 1 minute) 4000VAC / 60Hz                             |
| Isolation Capacitance                             | 2pF min. / 12pF max.   |
| Isolation Resistance                              | 15 GΩ min.   |
| Short Circuit Protection P-Suffix                 | 1 Second Continuous  |
| Operating Temperature Range (free air convection) | -40°C to +85°C (see Graph)   |
| Storage Temperature Range                         | -55°C to +125°C  |
| Relative Humidity                                 | 95% RH   |
| Package Weight                                    | 9g   |
| Packing Quantity                                  | 15 pcs per Tube  |

cont.

# ECONOLINE

DC/DC-Converter

with 3 year Warranty

# RECOM

## 2 Watt DIP24

## Miniature Single & Dual Output



RECOM  
E-224736



- EN-60950-1 Certified**
- EN-60601-1 Certified**
- UL/CSA 60950-1 Certified**
- UL-60601-1 Certified**
- EN-61010-1 Certified**
- IEC-60601-1 CB Report**

# RV/R

### Description

Very high isolation in a small size are the main features of this miniature DIP24 converter, ideal for highly sophisticated industrial, test and measurement and medical designs where board space is at a premium.

## Derating-Graph (Ambient Temperature)



Refer to Application Notes

## Tolerance Envelope



## Specifications (continued)

|  |   |                     |   |
|--|---|---------------------|---|
| MTBF (+25°C)                                   | Detailed Information see Application Notes chapter "MTBF" | using MIL-HDBK 217F | 1154 x 10 <sup>3</sup> hours  |
| (+85°C)  |   | using MIL-HDBK 217F | 168 x 10 <sup>3</sup> hours   |
| Reinforced Isolation                           | Transformer Creepage                                      | /R6.4 Types         | 5.5 mm min.   |
|  | Transformer Clearance                                     | /R6.4 Types         | 5.5 mm min.   |
|  | PCB Creepage & Clearance                                  | /R6.4 Types         | 4.8 mm min.   |
| Certifications                                 |   |                     |   |
| Measurement, Control and Laboratory Use Safety | Report: IL091212010M1                                     |                     | EN 61010-1 : 2001   |
| CSA General Safety                             |   |                     | UL 60950-1 1st Ed.<br>C22.2 No. 60950-1-03                              |
| UL/cUL Medical Safety                          | Report: E314885-A2-UL                                     |                     | UL60601-1 1st Edition   |
| CSA Medical Safety                             | Report: 2207629   |                     | CAN/CSA-22.2 No 601.1-M90   |
| EN General Safety                              | Report: PS-R7219C1  |                     | EN60950-1:2001 + A11: 2004  |
| EN Medical Safety                              | Report: MDD1205098-1 + RM1205098-1                        |                     | IEC/EN 60601-1 3rd Edition<br>Medical Report + ISO14971 Risk Assessment |

## Notes

Note 1 Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

## Typical Characteristics

# RV-xx05S/R6.4

# RV-xx05S/R8



## RV-xx05D/R6.4 RV-xx05D/R8



**Package Style and Pinning (mm)**



**24 PIN DIP Miniature Package Style**



**Recommended Footprint Details**



**Pin Connections**

| Pin #          | Single |
|----------------|--------|
| 1              | +Vin   |
| 2              | -Vin   |
| 8, 9, 11, 14   | NC     |
| 10, 15         | -Vout  |
| 12 & 13        | +Vout  |
| 16, 17, 23, 24 | NC     |

**Pin Connections**

| Pin #                 | Dual  |
|-----------------------|-------|
| 1                     | +Vin  |
| 2                     | -Vin  |
| 8, 17                 | -Vout |
| 9, 11, 14, 16, 23, 24 | NC    |
| 10 & 15               | Com   |
| 12, 13                | +Vout |

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm



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