

# Features

## Regulated Converters

- 2:1 and 4:1 Wide Input Voltage Ranges
- 1kVDC, 2kVD or 3kVDC Isolation
- UL94V-0 Package Material
- Certified for Medical Applications
- Continuous Short Circuit Protection
- Low Noise
- No External Capacitor needed
- Efficiency to 83 %

**ECONOLINE**

DC/DC-Converter

**RECOM**

### Description

High-power-density, an industrial temperature range of -40°C to +85°C and extra features like Remote-On-Off-control are just some of the characteristics of this converter, ideal for highly sophisticated industrial-designs. The RSO series is available with isolation of 2kV or 3kV by choosing option "/H2" or "/H3" in which case it is also ideal for medical applications which additionally require EN-60601-1 certification. The "Z" version features 4:1 input voltage range, while the standard version offers 2:1 input voltage range and includes a low voltage input range down to 4.5V.

### Selection Guide

| Part Number         | Input Voltage Range (VDC)   | Rated Output Voltage (VDC) | Output Current (mA) | Efficiency typ. (%) | Capacitive Load max. |
|---------------------|-----------------------------|----------------------------|---------------------|---------------------|----------------------|
| <b>SIP8</b>         |                             |                            |                     |                     |                      |
| RSO-xx3.3S (H2/H3)  | 4.5-9, 9-18<br>18-36, 36-72 | 3.3                        | 300                 | 68-72<br>70         | 470µF                |
| RSO-xx05S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 5                          | 200                 | 73-75<br>75-78      | 470µF                |
| RSO-xx09S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 9                          | 111                 | 74-78<br>78-81      | 220µF                |
| RSO-xx12S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 12                         | 83                  | 75-80<br>80-83      | 100µF                |
| RSO-xx15S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 15                         | 67                  | 75-80<br>80-83      | 47µF                 |
| RSO-xx3.3D (H2/H3)  | 4.5-9, 9-18<br>18-36, 36-72 | ±3.3                       | ±150                | 68-72<br>70         | ±220µF               |
| RSO-xx05D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±5                         | ±100                | 73-75<br>75-76      | ±220µF               |
| RSO-xx09D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±9                         | ±56                 | 74-78<br>78         | ±100µF               |
| RSO-xx12D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±12                        | ±42                 | 75-79<br>79-80      | ±47µF                |
| RSO-xx15D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±15                        | ±34                 | 75-79<br>79-80      | ±22µF                |
| RSO-xx3.3SZ (H2/H3) | 9-36<br>18-72               | 3.3                        | 300                 | 70<br>70            | 470µF                |
| RSO-xx05SZ (H2/H3)  | 9-36<br>18-72               | 5                          | 200                 | 78<br>75            | 470µF                |
| RSO-xx09SZ (H2/H3)  | 9-36<br>18-72               | 9                          | 111                 | 81<br>78            | 220µF                |
| RSO-xx12SZ (H2/H3)  | 9-36<br>18-72               | 12                         | 83                  | 83<br>80            | 100µF                |
| RSO-xx15SZ (H2/H3)  | 9-36<br>18-72               | 15                         | 67                  | 83<br>80            | 47µF                 |
| RSO-xx3.3DZ (H2/H3) | 9-36<br>18-72               | ±3.3                       | ±150                | 74<br>70            | ±220µF               |
| RSO-xx05DZ (H2/H3)  | 9-36<br>18-72               | ±5                         | ±100                | 77<br>75            | ±220µF               |
| RSO-xx09DZ (H2/H3)  | 9-36<br>18-72               | ±9                         | ±56                 | 78<br>78            | ±100µF               |
| RSO-xx12DZ (H2/H3)  | 9-36<br>18-72               | ±12                        | ±42                 | 80<br>80            | ±47µF                |
| RSO-xx15DZ (H2/H3)  | 9-36<br>18-72               | ±15                        | ±34                 | 80<br>80            | ±22µF                |

## 1 Watt SIP8 Isolated Single & Dual Output



**EN-60950-1 Certified**  
**EN-60601-1 Certified**  
**(Suffix H2/H3)**

**RSO**

**2:1 Input**  
(RSO-S/D)  
xx = 4.5-9Vin = 05  
xx = 9-18Vin = 12  
xx = 18-36Vin = 24  
xx = 36-72Vin = 48

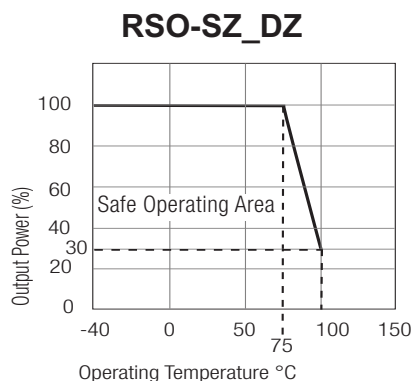
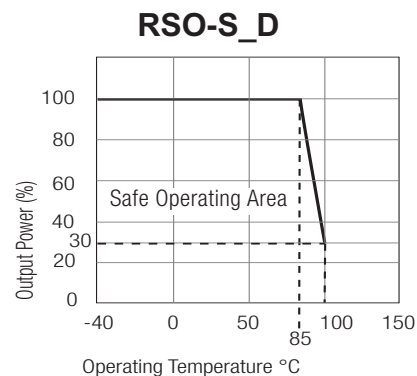
**4:1 Input**  
(RSO-SZ/DZ)  
xx = 9-36Vin = 24  
xx = 18-72Vin = 48

**Refer to Application Notes**

**Specifications** (Core Operating Area) measured at  $T_A = 25^\circ\text{C}$ , nominal input voltage, full load and after warm-up time unless otherwise specified

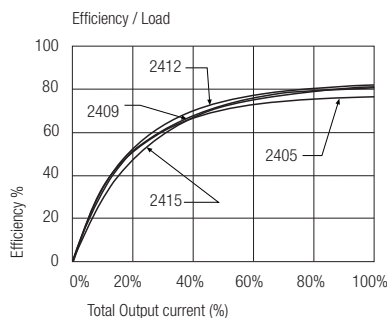
|                                                         |                                                              |                                         |
|---------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------|
| Input Voltage Range                                     | 2:1 and 4:1                                                  |                                         |
| Output Voltage Accuracy                                 | $\pm 2\%$ typ.                                               |                                         |
| Line Voltage Regulation                                 | 2:1                                                          | $\pm 0.2\%$ max.                        |
|                                                         | 4:1                                                          | $\pm 0.5\%$ max.                        |
| Load Voltage Regulation<br>(10% to 100% full load)      | 2:1                                                          | $\pm 0.4\%$ max.                        |
|                                                         | 4:1                                                          | $\pm 0.5\%$ typ.                        |
| Output Ripple and Noise (20MHz limited)                 | 50mVp-p max.                                                 |                                         |
| Operating Frequency                                     | 2:1                                                          | 200kHz min. / 500kHz max.               |
|                                                         | 4:1                                                          | 100kHz min. / 300kHz max.               |
| Efficiency at Full Load                                 | See Selection Guide                                          |                                         |
| Quiescent Current                                       | RS-05xxS_D                                                   | 40mA typ.                               |
| Nominal input Voltage<br>(Standard, /H2 and /H3)        | RS-12xxS_D                                                   | 32mA typ.                               |
|                                                         | RS-24xxS_D, SZ_DZ                                            | 25mA typ.                               |
|                                                         | RS-48xxS_D, SZ_DZ                                            | 15mA typ.                               |
| CTRL Pin drive current (/see Notes)                     | 3mA typ, 6mA max.                                            |                                         |
| Quiescent Input Current when Converter is OFF           | 10mA max.                                                    |                                         |
| Isolation Voltage<br>(tested for 1 second)              | H2                                                           | 1000VDC min.                            |
|                                                         | H3                                                           | 2000VDC min.                            |
|                                                         | H3                                                           | 3000VDC min.                            |
| Rated Working Voltage<br>(long term isolation)          | see Application Notes                                        |                                         |
| Isolation Capacitance (1kV version)                     | 2:1 Single                                                   | 10pF min. / 40pF typ. / 60pF max.       |
| Isolation Capacitance (H2 and H3)                       | 2:1 Single                                                   | 5pF min. / 30pF typ. / 60pF max.        |
| Isolation Capacitance (1kV version)                     | 2:1 Dual                                                     | 120pF min. / 170pF typ. / 250pF max.    |
| Isolation Capacitance (H2 and H3)                       | 2:1 Dual                                                     | 5pF min. / 30pF typ. / 60pF max.        |
| Isolation Capacitance (1kV version)                     | 4:1 Single/Dual                                              | 200pF max.                              |
| Isolation Capacitance (H2 and H3)                       | 4:1 Single/Dual                                              | 30pF max.                               |
| Isolation Resistance                                    | $> 1\text{G}\Omega$ min.                                     |                                         |
| Short Circuit Protection                                | Continuous                                                   |                                         |
| Operating Temperature Range (free air convection)       | $-40^\circ\text{C}$ to $+85^\circ\text{C}$ (see Graph)       |                                         |
| Storage Temperature Range                               | $-55^\circ\text{C}$ to $+125^\circ\text{C}$                  |                                         |
| Relative Humidity                                       | 95% RH                                                       |                                         |
| Package Weight                                          | 4.7g                                                         |                                         |
| Packing Quantity                                        | 22 pcs per Tube                                              |                                         |
| MTBF ( $+25^\circ\text{C}$ )<br>( $+85^\circ\text{C}$ ) | Detailed Information see<br>Application Notes chapter "MTBF" | using MIL-HDBK 217F 1685 x $10^3$ hours |
|                                                         |                                                              | using MIL-HDBK 217F 254 x $10^3$ hours  |

## Derating-Graph (Ambient Temperature)

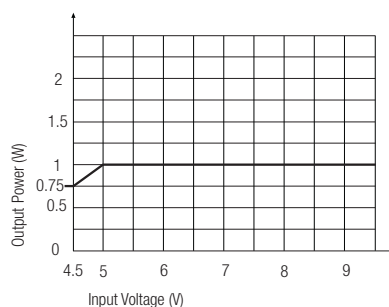


## Typical Characteristics

### RSO-24xxS

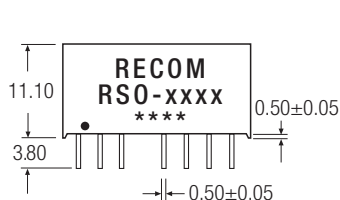


### RSO-all types



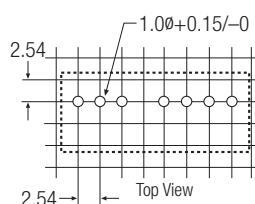
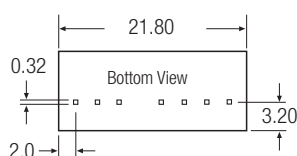
## Package Style and Pinning (mm)

### 8 PIN SIP Package



XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

### Recommended Footprint Details



### Single Output



### Dual Output



### Pin Connections

| Pin # | Single | Dual  |
|-------|--------|-------|
| 1     | -Vin   | -Vin  |
| 2     | +Vin   | +Vin  |
| 3     | CTRL   | CTRL  |
| 5     | NC     | NC    |
| 6     | +Vout  | +Vout |
| 7     | -Vout  | Com   |
| 8     | NC*    | -Vout |

NC = No Connection

NC\* = NC, but no external Connection allowed.

## Notes

### Pin 8 (NC\*)

This pin is used internally and must have no external connection.

### Pin 5 (NC) Not connected internally.

### Pin 3 (CTRL)

This pin provides an Off function which puts the converter into a low power mode. When the pin is 'high' the converter is OFF and when the pin is high 'Z' the converter is ON. There is no allowed low state for this pin.

## Application Examples

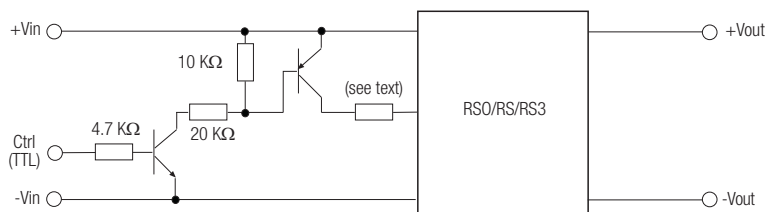
RSO

### TTL Remote CTRL Circuit

Control Pin Input Current: 10mA

Voltage Set Point Accuracy  
with external input/output  
capacitors refer to  
recommended test circuit: typ. ± 1%  
max. ± 2%

Control Pin (CTRL) Input  
Current, control voltage  
applied via 1K resistor,  
output voltage must  
reduce to 0V: typ. 3mA  
max. 6mA



Voltage to be applied via a limiting resistor with a recommended value of 1K for RSO-05xx; 3.3K for RSO-12xx; RSO-24xx and 10K for RSO-48xx.

### Isolated Remote CTRL Circuit

