

# Features

## Regulated Converters

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

### 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 RS 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.

### Selection Guide 5V, 12V, 24V and 48V Input Types

| Part Number        | Input Voltage Range (VDC)   | Rated Output Voltage (VDC) | Output Current at Full Load (mA) | Efficiency typ. (%) | Max Capacitive Load |
|--------------------|-----------------------------|----------------------------|----------------------------------|---------------------|---------------------|
| <b>SIP8</b>        |                             |                            |                                  |                     |                     |
| RS-xx3.3S (H2/H3)  | 4.5-9, 9-18<br>18-36, 36-72 | 3.3                        | 500                              | 68-69<br>70-73      | 4700µF              |
| RS-xx05S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 5                          | 400                              | 73-75<br>78         | 1000µF              |
| RS-xx09S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 9                          | 222                              | 74-78<br>81         | 1000µF              |
| RS-xx12S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 12                         | 166                              | 75-80<br>83         | 1000µF              |
| RS-xx15S (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | 15                         | 134                              | 75-80<br>83         | 1000µF              |
| RS-xx3.3D (H2/H3)  | 4.5-9, 9-18<br>18-36, 36-72 | ±3.3                       | ±250                             | 68-69<br>70-73      | ±2200µF             |
| RS-xx05D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±5                         | ±200                             | 73-75<br>78         | ±680µF              |
| RS-xx09D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±9                         | ±111                             | 74-78<br>81         | ±680µF              |
| RS-xx12D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±12                        | ±83                              | 75-80<br>83         | ±680µF              |
| RS-xx15D (H2/H3)   | 4.5-9, 9-18<br>18-36, 36-72 | ±15                        | ±67                              | 75-80<br>83         | ±680µF              |
| RS-xx3.3SZ (H2/H3) | 9-36<br>18-72               | 3.3                        | 500                              | 75<br>75            | 4700µF              |
| RS-xx05SZ (H2/H3)  | 9-36<br>18-72               | 5                          | 400                              | 80<br>80            | 1000µF              |
| RS-xx09SZ (H2/H3)  | 9-36<br>18-72               | 9                          | 222                              | 80<br>80            | 1000µF              |
| RS-xx12SZ (H2/H3)  | 9-36<br>18-72               | 12                         | 166                              | 83<br>83            | 1000µF              |
| RS-xx15SZ (H2/H3)  | 9-36<br>18-72               | 15                         | 134                              | 84<br>84            | 1000µF              |
| RS-xx3.3DZ (H2/H3) | 9-36<br>18-72               | ±3.3                       | ±250                             | 73<br>73            | ±2200µF             |
| RS-xx05DZ (H2/H3)  | 9-36<br>18-72               | ±5                         | ±200                             | 77<br>77            | ±680µF              |
| RS-xx09DZ (H2/H3)  | 9-36<br>18-72               | ±9                         | ±111                             | 80<br>80            | ±680µF              |
| RS-xx12DZ (H2/H3)  | 9-36<br>18-72               | ±12                        | ±83                              | 81<br>81            | ±680µF              |
| RS-xx15DZ (H2/H3)  | 9-36<br>18-72               | ±15                        | ±67                              | 83<br>83            | ±680µF              |

No suffix is standard isolation (1kVDC) e.g., RS-0505S

\*add suffix /H2 or /H3 for 2kVDC or 3kVDC isolation, e.g., RS-0505S/H2, RS-0505DZ/H3

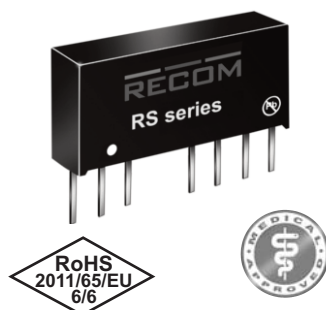
# ECONOLINE

## DC/DC-Converter

with 3 year Warranty

# RECOM

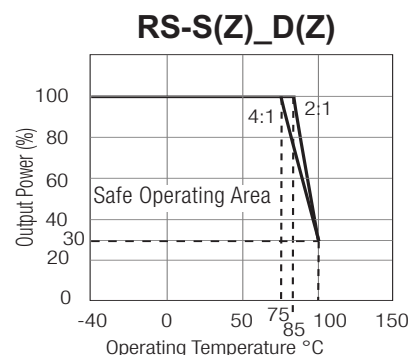
## 2 Watt SIP8 Isolated Single & Dual Output



**EN-60950-1 Certified**  
**EN-60601-1 Certified\***  
(\* /H suffix )

# RS

## Derating-Graph (Ambient Temperature)



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

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

**Refer to Application Notes**

**Specifications** (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 Accuracy                              |                                                              |                                    | $\pm 2\%$ typ.                                                          |
| Line Voltage Regulation                      |                                                              |                                    | $\pm 0.5\%$ max.                                                        |
| Load Voltage Regulation                      |                                                              | 20%-100% Load                      | $\pm 0.5\%$ max.                                                        |
| Minimum Load                                 |                                                              |                                    | 10% <sup>(2)</sup>                                                      |
| Output Ripple and Noise (20MHz limited)      |                                                              |                                    | 50mVp-p max.                                                            |
| Switching Frequency                          |                                                              | Full Load                          | 100kHz min. / 300kHz max.                                               |
| Efficiency at Full Load                      |                                                              |                                    | See Selection Guide                                                     |
| Quiescent Current                            |                                                              | RS-05xxS_D                         | 40mA typ.                                                               |
| Nominal input Voltage                        |                                                              | RS-12xxS_D                         | 32mA typ.                                                               |
| (Standard, /H2 and /H3)                      |                                                              | RS-24xxS_D, SZ_DZ                  | 25mA typ.                                                               |
|                                              |                                                              | RS-48xxS_D, SZ_DZ                  | 15mA typ.                                                               |
| Isolation Voltage                            | Standard                                                     | (tested for 1 second)              | 1000VDC                                                                 |
|                                              |                                                              | (rated for 1 minute**)             | 500VAC / 60Hz                                                           |
|                                              | /H2 Version                                                  | (tested for 1 second)              | 2000VDC                                                                 |
|                                              |                                                              | (rated for 1 minute**)             | 1000VAC / 60Hz                                                          |
|                                              | /H3 Version                                                  | (tested for 1 second)              | 3000VDC                                                                 |
|                                              |                                                              | (rated for 1 minute**)             | 1500VAC / 60Hz                                                          |
| Isolation Capacitance                        | Standard                                                     | 2:1 Single                         | 10pF min. / 40pF typ. / 60pF max.                                       |
|                                              | /H2 and /H3                                                  | 2:1 Single                         | 5pF min. / 30pF typ. / 60pF max.                                        |
|                                              | Standard                                                     | 2:1 Dual                           | 120pF min. / 170pF typ. / 250pF max.                                    |
|                                              | /H2 and /H3                                                  | 2:1 Dual                           | 5pF min. / 30pF typ. / 60pF max.                                        |
|                                              | Standard                                                     | 4:1 Single/Dual                    | 200pF max.                                                              |
|                                              | /H2 and /H3                                                  | 4:1 Single/Dual                    | 30pF max                                                                |
| Isolation Resistance                         |                                                              |                                    | 1G $\Omega$ min.                                                        |
| Short Circuit Protection                     |                                                              |                                    | Continuous                                                              |
| Operating Temperature Range<br>(No Derating) |                                                              | 2:1                                | -40°C to +85°C                                                          |
|                                              |                                                              | 4:1                                | -40°C to +75°C                                                          |
| Storage Temperature Range                    |                                                              |                                    | -55°C to +125°C                                                         |
| Relative Humidity                            |                                                              |                                    | 95% RH                                                                  |
| Package Weight                               |                                                              |                                    | 4.7g                                                                    |
| Packing Quantity                             |                                                              |                                    | 22 pcs per Tube                                                         |
| MTBF (+25°C)<br>(+85°C)                      | Detailed Information see<br>Application Notes chapter "MTBF" | using MIL-HDBK 217F                | 1398 x 10 <sup>3</sup> hours                                            |
|                                              |                                                              | using MIL-HDBK 217F                | 210 x 10 <sup>3</sup> hours                                             |
| Certifications                               | EN General Safety                                            | Report: SPCLVD1212007              | EN60950-1:2006 + 11:2009+A1:2010+A12:2011                               |
|                                              | EN Medical Safety                                            | Report: MDD1205098-3 + RM1205098-3 | IEC/EN 60601-1 3rd Edition<br>Medical Report + ISO14971 Risk Assessment |

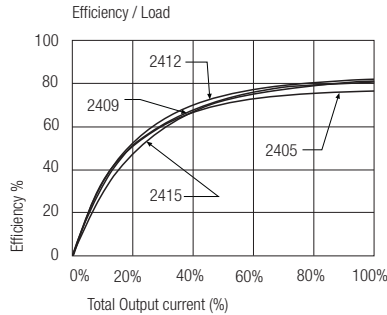
\*\*Any data referred to in this datasheet are of indicative nature and based on our practical experience only. For further details, please refer to our Application Notes.

**Notes**

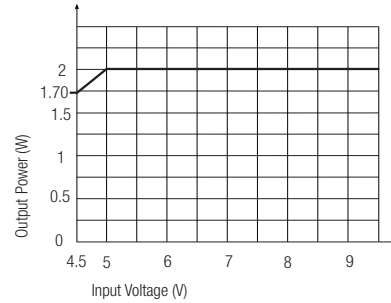
|         |                                                                                                                                                                                                                      |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                                                                 |
| Note 2: | The RS series requires a minimum of 10% load on the output to maintain specified regulation. Operating under no-load conditions will not damage these devices; however, they may not meet all listed specifications. |

## Typical Characteristics

### RS-24xx

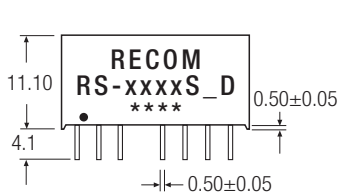


### RS-05xx types

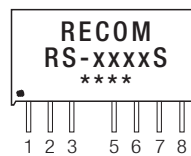


## Package Style and Pinning (mm)

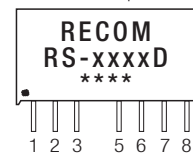
### 8 PIN SIP Package



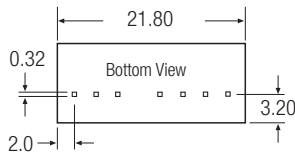
### Single Output



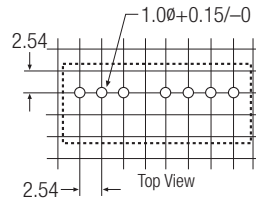
### Dual Output



XX.X ± 0.5 mm  
XX.XX ± 0.25 mm



### Recommended Footprint Details



### 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.

**Pin 8 (NC\*)** This pin is used internally and must have no external connection.

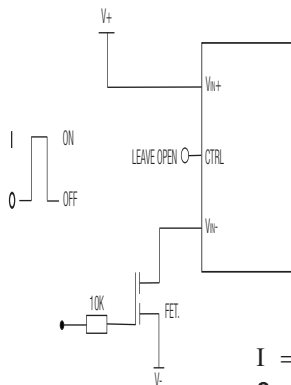
**Pin 5 (NC)** Not connected internally.

### Pin 3 (CTRL)

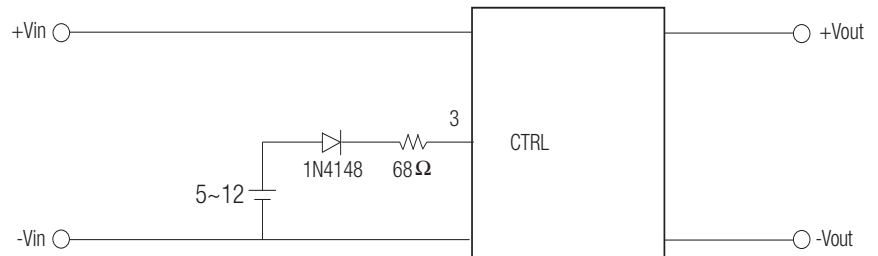
This pin provides an Off function which puts the converter into a low power mode. When the pin is 'high' the converter is OFF and when the pin is high 'Z' the converter is ON. There is no allowed low state for this pin.

## Application Examples

### ON/OFF CONTROL



I = 3V  
0 = 0.5V or GND



Remote ON/OFF

ON: open or high impedance

OFF: external 5~12 Vdc and 1N4148+ 68Ω resistor