

## Features

## Unregulated Converters

- Low Cost 1W Converter
- Power Sharing on Dual Output Version
- Industry Standard Pinout
- 1kVDC or 2kVDC Isolation Options
- Optional Continuous Short Circuit Protected
- UL94V-0 Package Material
- Efficiency to 85 %

### Description

The RB series DC/DC converter has been designed for isolating or converting DC power rails in general purpose applications. Although low cost, it does not compromise on features and offers 1kVDC or 2kVDC isolation, a  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operating temperature range and optional continuous short circuit protection.

### Selection Guide

| Part Number |       | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency (%) | Max Capacitive Load <sup>(1)</sup> |
|-------------|-------|---------------------|----------------------|---------------------|----------------|------------------------------------|
| SIP 7       | (2kV) |                     |                      |                     |                |                                    |
| RB-xx3.3S   | (H)   | 3.3, 5, 12, 15, 24  | 3.3                  | 303                 | 75             | 2200 $\mu\text{F}$                 |
| RB-xx05S    | (H)   | 3.3, 5, 12, 15, 24  | 5                    | 200                 | 70-78          | 1000 $\mu\text{F}$                 |
| RB-xx09S    | (H)   | 3.3, 5, 12, 15, 24  | 9                    | 111                 | 70-78          | 1000 $\mu\text{F}$                 |
| RB-xx12S    | (H)   | 3.3, 5, 12, 15, 24  | 12                   | 84                  | 78-80          | 470 $\mu\text{F}$                  |
| RB-xx15S    | (H)   | 3.3, 5, 12, 15, 24  | 15                   | 66                  | 80-84          | 470 $\mu\text{F}$                  |
| RB-xx24S    | (H)   | 3.3, 5, 12, 15, 24  | 24                   | 42                  | 74-85          | 220 $\mu\text{F}$                  |
| RB-xx3.3D   | (H)   | 3.3, 5, 12, 15, 24  | $\pm 3.3$            | $\pm 152$           | 70             | $\pm 1000\mu\text{F}$              |
| RB-xx05D    | (H)   | 3.3, 5, 12, 15, 24  | $\pm 5$              | $\pm 100$           | 70-78          | $\pm 470\mu\text{F}$               |
| RB-xx09D    | (H)   | 3.3, 5, 12, 15, 24  | $\pm 9$              | $\pm 56$            | 76-79          | $\pm 470\mu\text{F}$               |
| RB-xx12D    | (H)   | 3.3, 5, 12, 15, 24  | $\pm 12$             | $\pm 42$            | 78-82          | $\pm 220\mu\text{F}$               |
| RB-xx15D    | (H)   | 3.3, 5, 12, 15, 24  | $\pm 15$             | $\pm 33$            | 80-84          | $\pm 220\mu\text{F}$               |
| RB-xx24D    | (H)   | 3.3, 5, 12, 15, 24  | $\pm 24$             | $\pm 21$            | 80-84          | $\pm 100\mu\text{F}$               |

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

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

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

|                                                   |                                                            |                           |
|---------------------------------------------------|------------------------------------------------------------|---------------------------|
| Input Voltage Range                               | $\pm 10\%$                                                 |                           |
| Output Voltage Accuracy                           | $\pm 5\%$                                                  |                           |
| Line Voltage Regulation                           | 1.2%/1% of $V_{in}$ typ.                                   |                           |
| Load Voltage Regulation                           | 3.3V output type                                           | 20% max.                  |
| (10% to 100% full load)                           | 5V output type                                             | 15% max.                  |
|                                                   | 9V, 12V, 15V, 24V output types                             | 10% max.                  |
| Output Ripple and Noise (20MHz limited)           | Single output types                                        | 100mVp-p max.             |
|                                                   | Dual output types                                          | $\pm 75\text{mVp-p}$ max. |
| Operating Frequency                               | 50kHz min. / 100kHz typ. / 105kHz max.                     |                           |
| Efficiency at Full Load                           | 70% min. / 80% typ.                                        |                           |
| Minimum Load = 0%                                 | Specifications valid for 10% minimum load only.            |                           |
| Isolation Voltage                                 | (tested for 1 second)                                      | 1000VDC                   |
|                                                   | (rated for 1 minute**)                                     | 500VAC / 60Hz             |
| Isolation Voltage                                 | H-Suffix (tested for 1 second)                             | 2000VDC                   |
|                                                   | H-Suffix (rated for 1 minute**)                            | 1000VAC / 60Hz            |
| Isolation Capacitance                             | 20pF min. / 75pF max.                                      |                           |
| Isolation Resistance                              | 10 $\text{G}\Omega$ min.                                   |                           |
| Short Circuit Protection                          | 1 Second                                                   |                           |
| P-Suffix                                          | 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                                                     |                           |

continued to next page

## ECONOLINE

## DC/DC-Converter

with 3 year Warranty

RECOM

1 Watt

SIP7

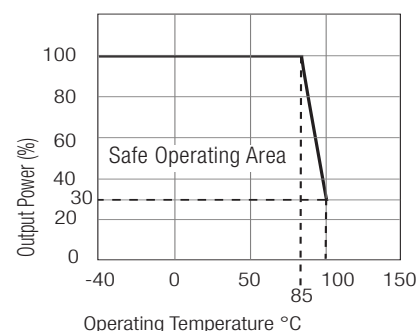
Single & Dual Output



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

RB

## Derating-Graph (Ambient Temperature)



\*\*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.

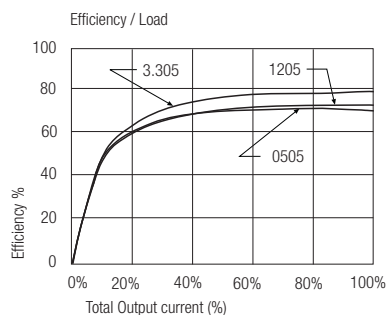
Refer to Application Notes

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

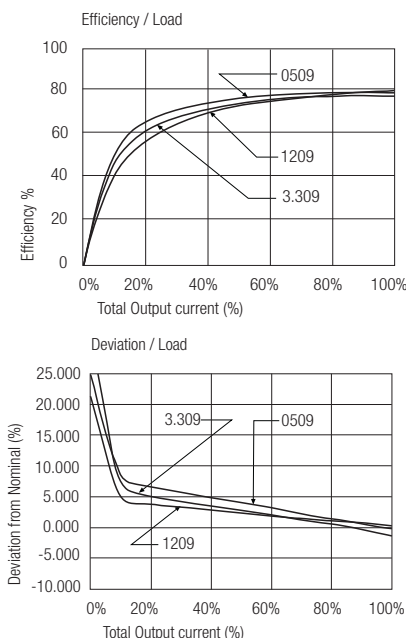
|                   |                                                   |                              |
|-------------------|---------------------------------------------------|------------------------------|
| Package Weight    |                                                   | 2.2g                         |
| Packing Quantity  |                                                   | 25 pcs per Tube              |
| MTBF (+25°C)      | } Detailed Information see using MIL-HDBK 217F    | 1012 x 10 <sup>3</sup> hours |
| (+85°C)           |                                                   | 151 x 10 <sup>3</sup> hours  |
| Certifications    |                                                   |                              |
| CB Test Report    | Report: E22406                                    | IEC 60950-1:2005 2nd Ed.     |
| UL General Safety | Report: E358085                                   | UL 60950-1 2nd Ed.           |
| EN General Safety | Report: SPCLVD1109103                             | EN60950-1:2006 + A12:2011    |
| EN Medical Safety | Report: MDD1112018 + RM1112018                    | IEC/EN 60601-1 3rd           |
|                   | Edition Medical Report + ISO14971 Risk Assessment |                              |

## Typical Characteristics - Single Output

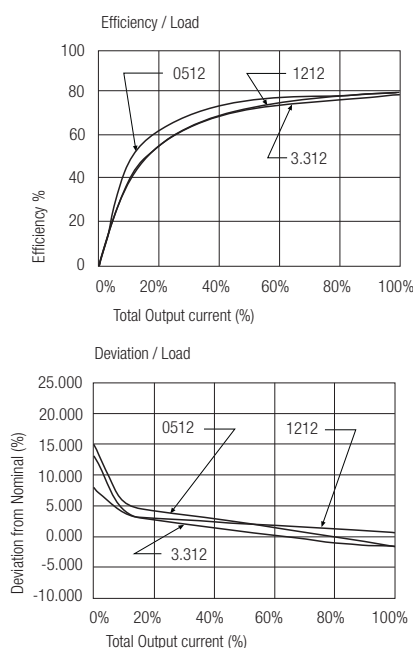
### RB-xx05S



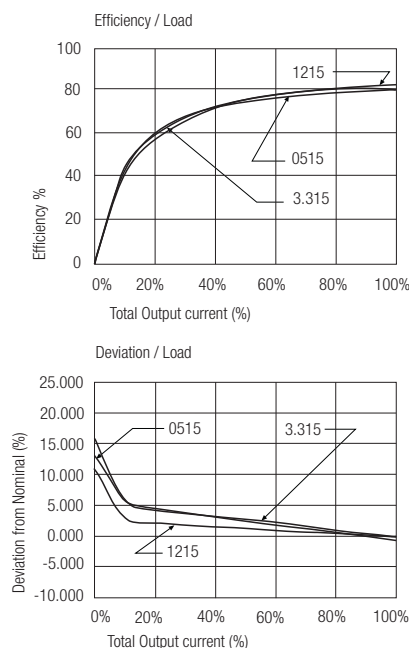
### RB-xx09S



### RB-xx12S

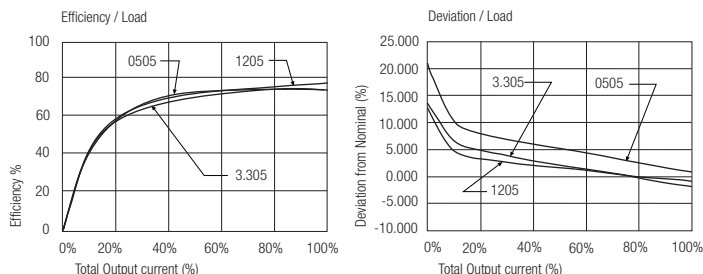


### RB-xx15S

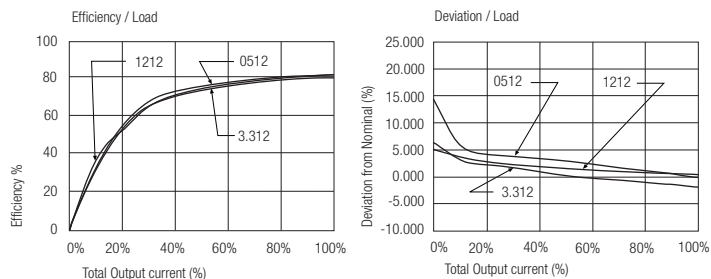


Typical Characteristics - Dual Outputs

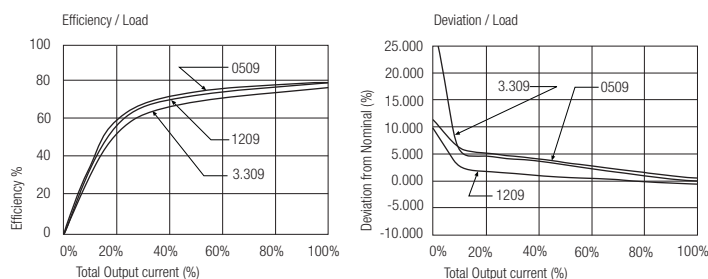
## RB-xx05D



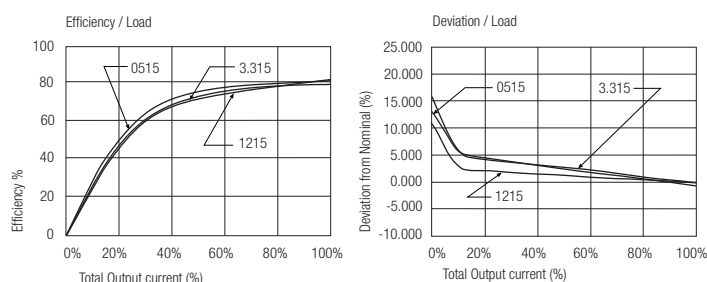
## RB-xx12D



## RB-xx09D



## RB-xx15D

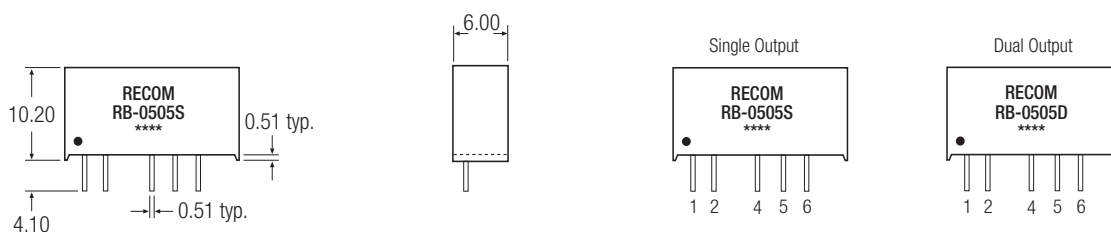


### Notes

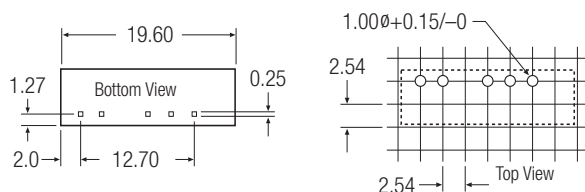
Note 1 Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

### Package Style and Pinning (mm)

#### SIP7 Package



#### Recommended Footprint Details



#### Pin Connections

| Pin # | Single | Dual  |
|-------|--------|-------|
| 1     | +Vin   | +Vin  |
| 2     | -Vin   | -Vin  |
| 4     | NC     | -Vout |
| 5     | -Vout  | Com   |
| 6     | +Vout  | +Vout |

NC = No Connection  
XX.X ± 0.5 mm  
XX.XX ± 0.25 mm