

## Features

### Unregulated Converter

- 3kVDC or 4kVDC Isolation
- Optional Continuous Short Circuit Protected
- Custom Solutions Available
- UL94V-0 Package Material
- Efficiency to 84 %
- Suitable for IGBT Applications

#### Description

The RK and RH Series DC/DC-Converter complements Recom's industrial range of converters with very high isolations of 3KV and 4kVDC. The extended operating temperature range covering  $-40^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$  is a standard feature. The converters are EN-60601-1 certified, making them suitable for medical as well as IGBT driver applications.

#### Selection Guide

| Part Number |       | Input Voltage | Output Voltage | Output Current | Efficiency | Max Capacitive Load <sup>(1)</sup> |
|-------------|-------|---------------|----------------|----------------|------------|------------------------------------|
| SIP 7       | (4kV) | (VDC)         | (VDC)          | (mA)           | (%)        |                                    |
| RK-xx05S*   | (H)   | 5, 12, 15, 24 | 5              | 200            | 70-78      | 1000μF                             |
| RK-xx09S*   | (H)   | 5, 12, 15, 24 | 9              | 111            | 70-80      | 1000μF                             |
| RK-xx12S*   | (H)   | 5, 12, 15, 24 | 12             | 84             | 78-82      | 470μF                              |
| RK-xx15S*   | (H)   | 5, 12, 15, 24 | 15             | 66             | 80-82      | 470μF                              |
| RH-xx05D*   | (H)   | 5, 12, 15, 24 | ±5             | ±100           | 74-78      | ±470μF                             |
| RH-xx09D*   | (H)   | 5, 12, 15, 24 | ±9             | ±56            | 76-79      | ±470μF                             |
| RH-xx12D*   | (H)   | 5, 12, 15, 24 | ±12            | ±42            | 78-84      | ±220μF                             |
| RH-xx15D*   | (H)   | 5, 12, 15, 24 | ±15            | ±33            | 80-84      | ±220μF                             |
| RH-xx1509D* | (H)   | 5, 12, 24     | +15/-9         | +33/-56        | 70-81      | +220/-470μF                        |

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

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

#### 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 Vin typ.                             |                |
| Load Voltage Regulation<br>(10% to 100% full load)                  | 5V output type                 | 15% max.                                        |                |
|                                                                     | 9V, 12V, 15V, 24V output types | 10% max.                                        |                |
|                                                                     | RH-xx1509D                     | 10% max.                                        |                |
| Output Ripple and Noise (20MHz limited)                             | Single output types            | 100mVp-p max.                                   |                |
|                                                                     | Dual output types              | ±75mVp-p max.                                   |                |
| Operating Frequency                                                 | RK types                       | 50kHz min. / 100kHz typ. / 105kHz max.          |                |
|                                                                     | RH types                       | 57kHz min. / 100kHz typ. / 105kHz max.          |                |
|                                                                     | RK-xx1509D                     | 50kHz min. / 88kHz typ.                         |                |
| Efficiency at Full Load                                             |                                | 70% min. / 80% typ.                             |                |
| Minimum Load = 0%                                                   |                                | Specifications valid for 10% minimum load only. |                |
| Isolation Voltage                                                   | (tested for 1 second)          | 3000VDC                                         |                |
|                                                                     | (rated for 1 minute***)        | 1500VAC / 60Hz                                  |                |
| Isolation Voltage                                                   | H-Suffix                       | (tested for 1 second)                           | 4000VDC        |
|                                                                     | H-Suffix                       | (rated for 1 minute***)                         | 2000VAC / 60Hz |
| Isolation Capacitance                                               | RK types                       | 20pF min. / 75pF max.                           |                |
|                                                                     | RH types                       | 20pF min. / 65pF max.                           |                |
| Isolation Resistance                                                |                                | 15 GΩ min.                                      |                |
| Short Circuit Protection                                            |                                | 1 Second                                        |                |
| P-Suffix                                                            |                                | Continuous                                      |                |
| Operating Temperature Range (free air convection, without derating) |                                | -40°C to +90°C (see Graph)                      |                |
| Storage Temperature Range                                           |                                | -55°C to +125°C                                 |                |
| Relative Humidity                                                   |                                | 95% RH                                          |                |

continued on next page

## ECONOLINE

### DC/DC-Converter

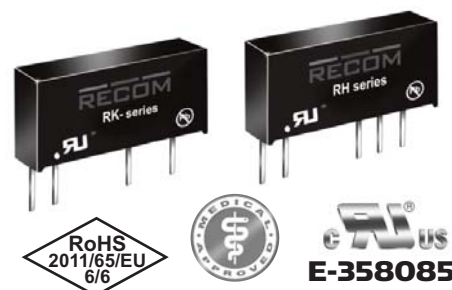
with 3 year Warranty

RECOM

1 Watt

SIP7

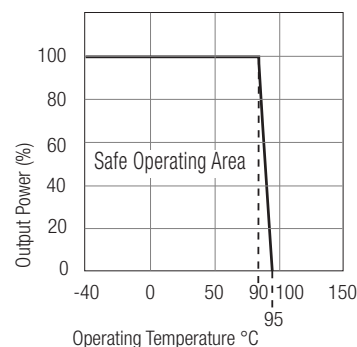
Single & Dual Output



**EN-60950-1 Certified**  
**IEC/EN-60601-1 Certified\*\***  
**UL-60950-1 Certified\*\***  
**\*\* +15/-9 Version excluded**

**RK\_RH**

### 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.

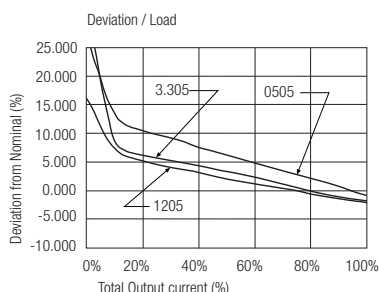
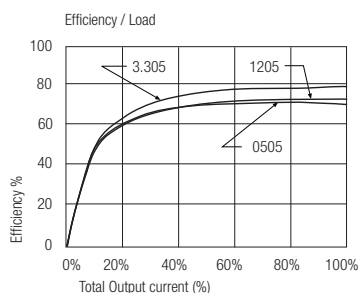
Refer to Application Notes

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

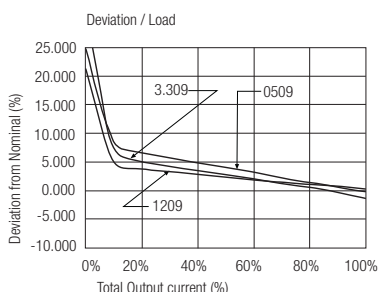
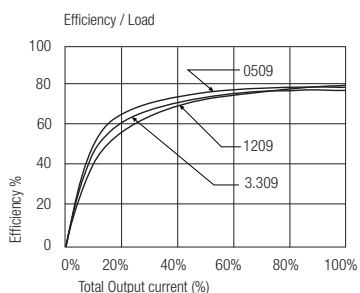
|                     |                        |                                   |
|---------------------|------------------------|-----------------------------------|
| Package Weight      |                        | 2.6g                              |
| H-Suffix            |                        | 2.8g                              |
| Packing Quantity    |                        | 25 pcs per Tube                   |
| MTBF (+25°C)        | RK types<br>RH types   | 992 x 10 <sup>3</sup> hours       |
| (+85°C)             |                        | 1012 x 10 <sup>3</sup> hours      |
|                     | RK types               | 145 x 10 <sup>3</sup> hours       |
|                     | RH types               | 151 x 10 <sup>3</sup> hours       |
| using MIL-HDBK 217F |                        |                                   |
| Certifications      |                        |                                   |
| EN General Safety   | Report: SPCLVD1109103  | EN60950-1: 2006 + A1:2011         |
| EN Medical Safety   | Report: SPCMD1205098-4 | IEC/EN 60601-1: 2006, 3rd Edition |
| UL General Safety   | Report: E358085        | UL60950-1, 2nd Edition            |

### Typical Characteristics

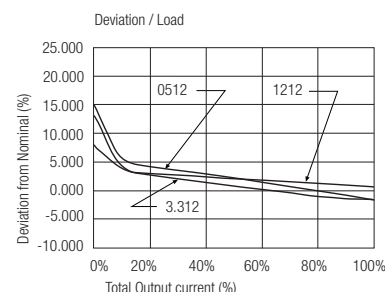
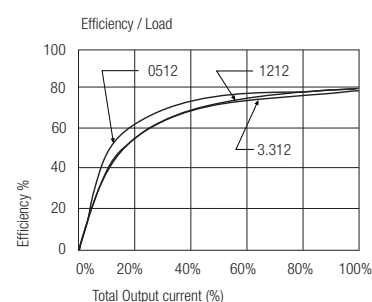
#### RK-xx05S



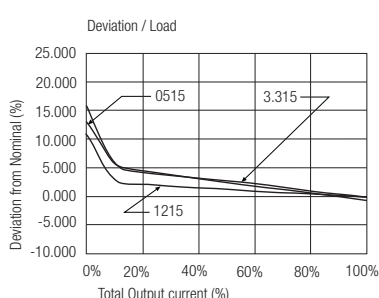
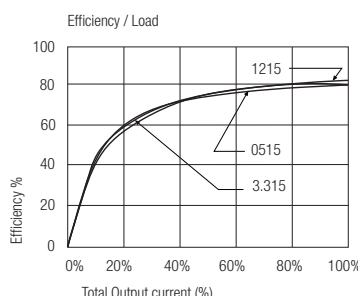
#### RK-xx09S



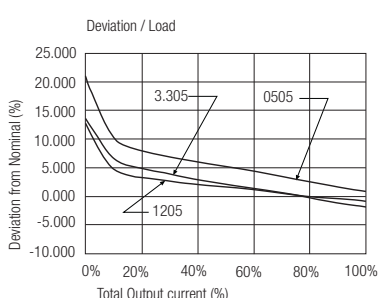
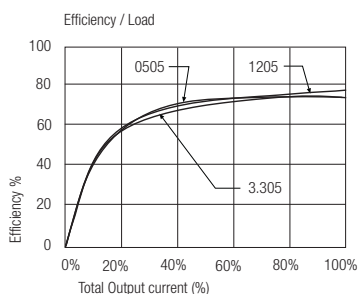
#### RK-xx12S



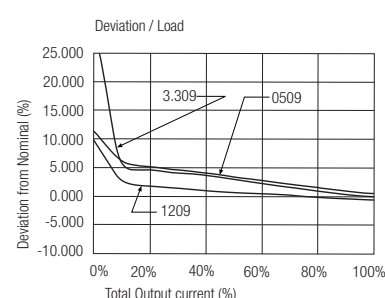
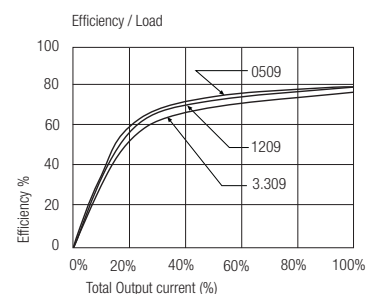
#### RK-xx15S



#### RH-xx05D

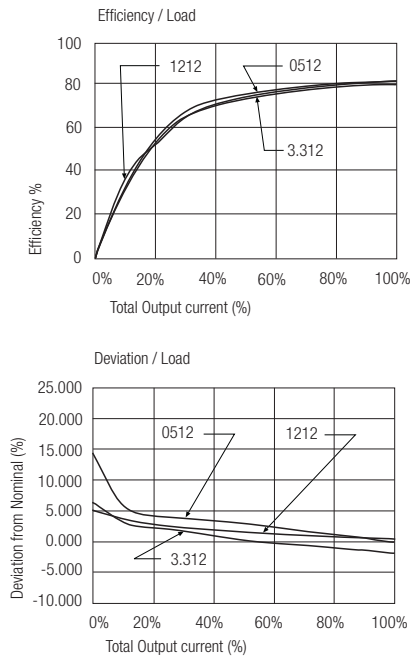


#### RH-xx09D

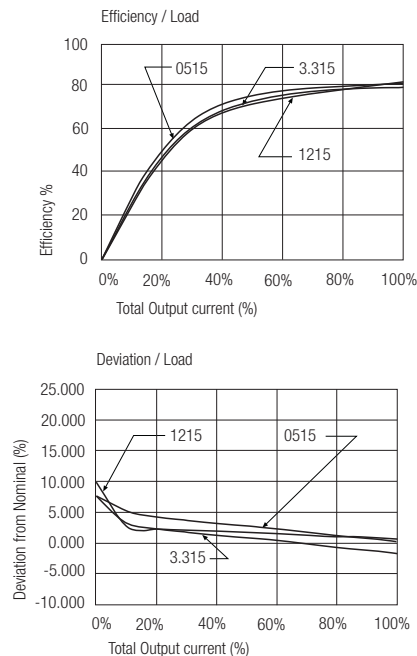


Typical Characteristics

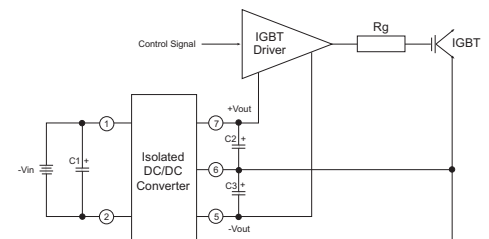
**RH-xx12D**



**RH-xx15D**



**IGBT Application Circuit**

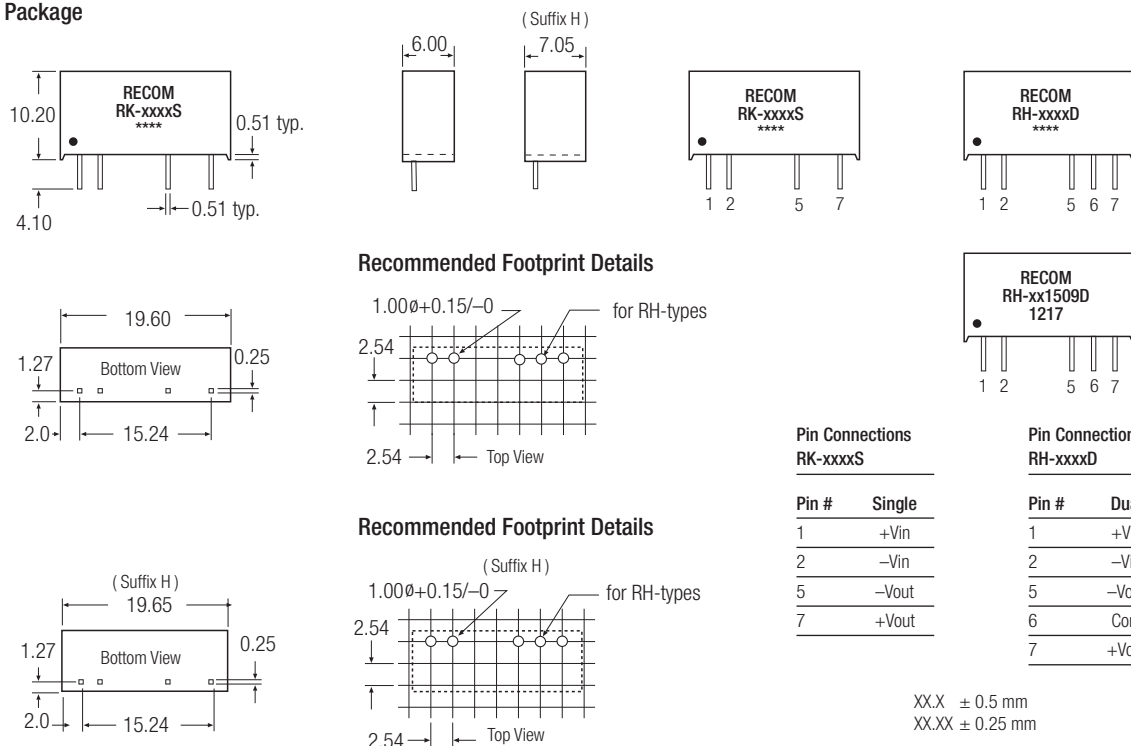


Notes

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)

7 PIN SIP Package



The product information and specifications are subject to change without prior notice. RECOM products are not authorized for use in safety-critical applications (such as life support) without RECOM's explicit written consent. A safety-critical application is defined as an application where a failure of a RECOM product may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The buyer shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.