# 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°C to +90°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 SIP 7 | (4kV) | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency (%) | Max Capacitive Load[1] |
|---|---|---|---|---|---|---|
| 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°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 | | 5V output type | 15% max. |
| (10% to 100% full load) | | 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


RoHS 2011/65/EU 6/6

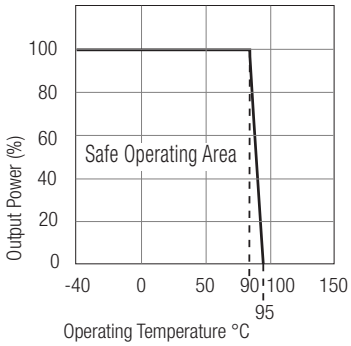
E-358085

**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°C, nominal input voltage, full load and after warm-up)

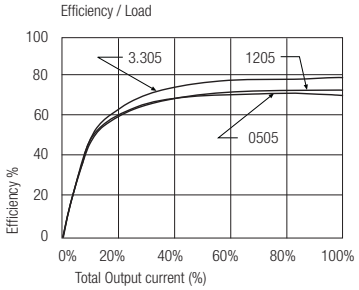
| | | | |
|---|---|---|---|
| Package Weight | | | 2.6g |
| H-Suffix | | | 2.8g |
| Packing Quantity | | | 25 pcs per Tube |
| MTBF (+25°C) | *Detailed Information see Application Notes chapter "MTBF"* | RK types | 992 x $10^3$ hours |
| | | RH types | 1012 x $10^3$ hours |
| (+85°C) | | RK types | 145 x $10^3$ hours |
| using MIL-HDBK 217F | | RH types | 151 x $10^3$ hours |

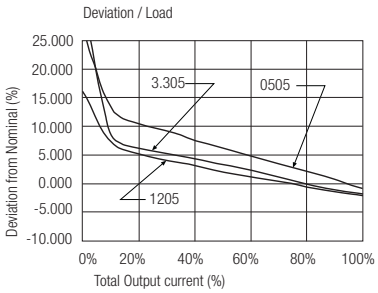
Certifications

| | | |
|---|---|---|
| EN General Safety | Report: SPCLVD1109103 | EN60950-1: 2006 + A12:2011 |
| EN Medical Safety | Report: SPCMDD1205098-4 | IEC/EN 60601-1: 2006, 3rd Edition |
| UL General Safety | Report: E358085 | UL60950-1, 2nd Edtition |

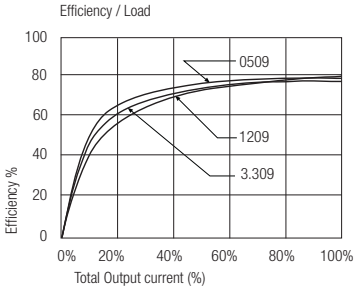
## Typical Characteristics

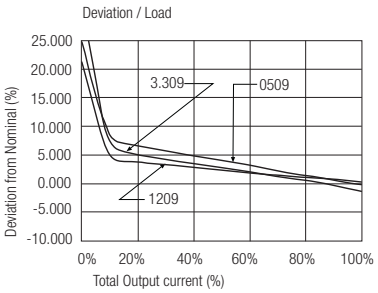
### RK-xx05S



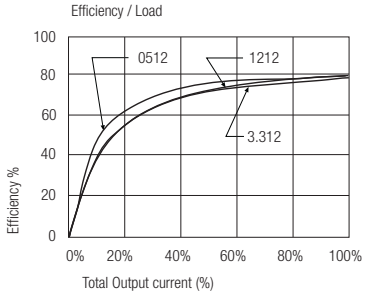



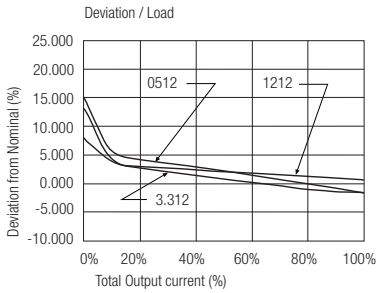

### RK-xx09S



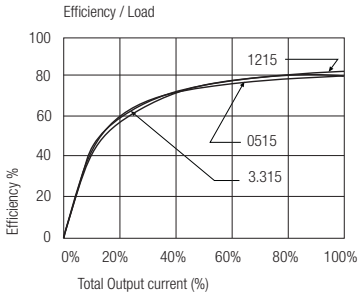



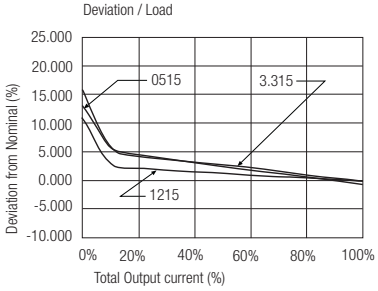

### RK-xx12S




### RK-xx15S

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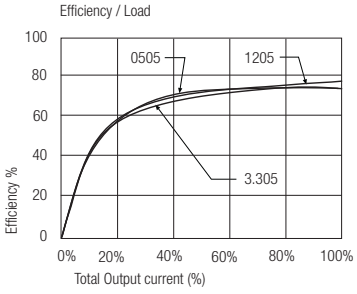
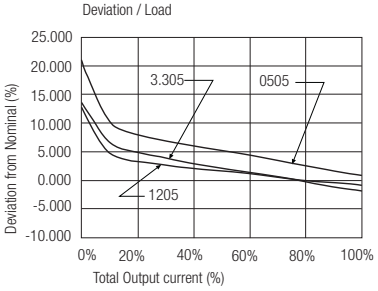
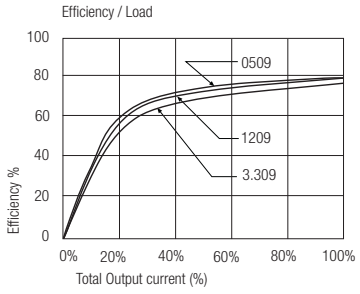
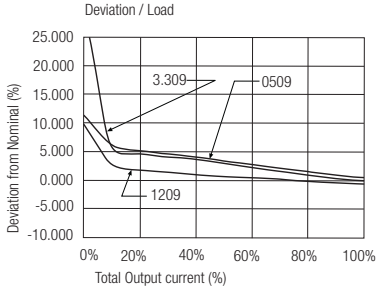


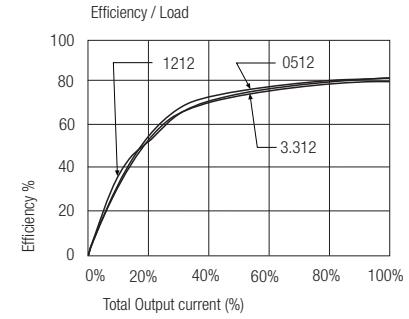

### RH-xx09D

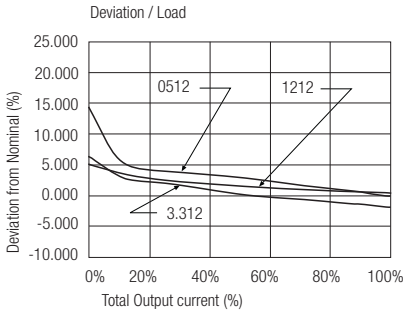


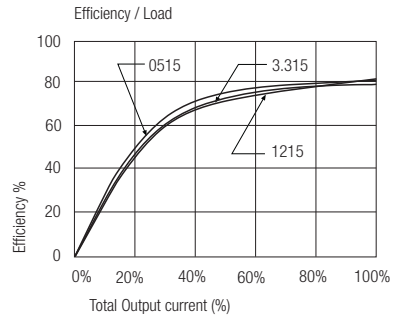
## Typical Characteristics

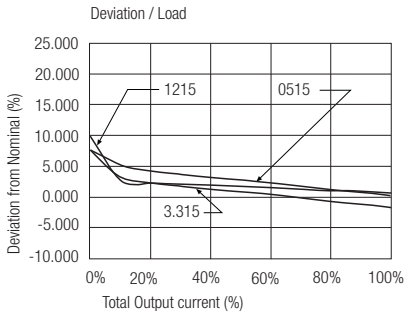
### RH-xx12D



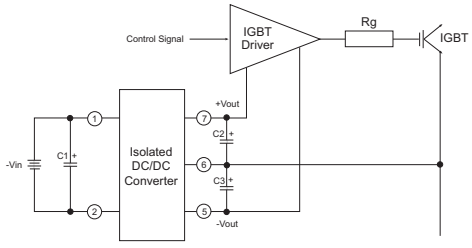




### RH-xx15D




### IGBT Application Circuit

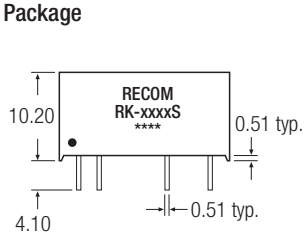


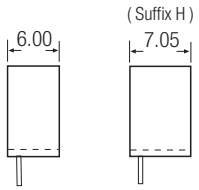

Notes

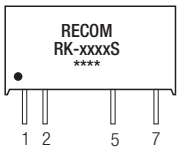
Note 1 Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

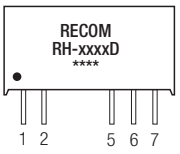
## Package Style and Pinning (mm)

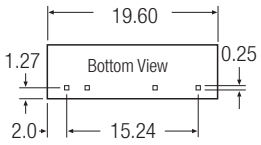
### 7 PIN SIP Package



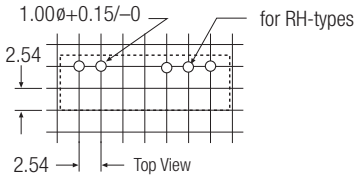



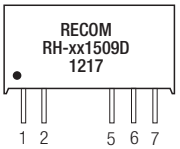



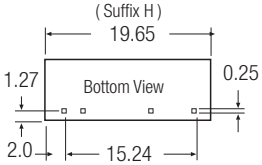



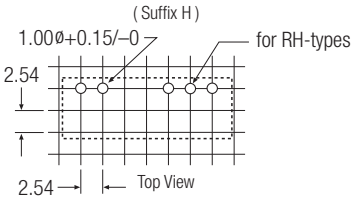

Recommended Footprint Details




Recommended Footprint Details




**Pin Connections RK-xxxxS**

| Pin # | Single |
|---|---|
| 1 | +Vin |
| 2 | –Vin |
| 5 | –Vout |
| 7 | +Vout |

**Pin Connections RH-xxxxD**

| Pin # | Dual |
|---|---|
| 1 | +Vin |
| 2 | –Vin |
| 5 | –Vout |
| 6 | Com |
| 7 | +Vout |

XX.X ± 0.5 mm
XX.XX ± 0.25 mm