# Features

# Unregulated Converters

- Low cost 1W converter
- Power sharing on dual output versions
- 1kVDC/1s or 2kVDC/1s isolation option
- Optional continuous short circuit protection
- Efficiency up to 85%
- UL94V-0 package material

RECOM
DC/DC Converter

# RB

# 1 Watt SIP7 Single and Dual Output

YEAR 3 warranty

## 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/1s or 2kVDC/1s isolation, a –40°C to +85°C operating temperature range and optional continuous short circuit protection.

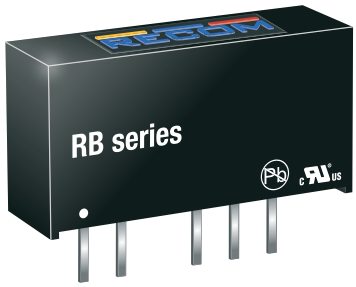
## Selection Guide

| Part Number | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. (1) [%] | max. Capacitive Load (2) [µF] |
|---|---|---|---|---|---|
| RB-xx3.3S(3,4) | 3.3, 5, 12, 15, 24 | 3.3 | 303 | 75 | 2200 |
| RB-xx05S (3,4) | 3.3, 5, 12, 15, 24 | 5 | 200 | 70-78 | 2200 |
| RB-xx09S (3,4) | 3.3, 5, 12, 15, 24 | 9 | 111 | 70-78 | 1000 |
| RB-xx12S (3,4) | 3.3, 5, 12, 15, 24 | 12 | 84 | 78-80 | 470 |
| RB-xx15S (3,4) | 3.3, 5, 12, 15, 24 | 15 | 66 | 80-84 | 470 |
| RB-xx24S (3,4) | 3.3, 5, 12, 15, 24 | 24 | 42 | 74-85 | 220 |
| RB-xx3.3D (3,4) | 3.3, 5, 12, 15, 24 | ±3.3 | ±152 | 70 | ±1000 |
| RB-xx05D (3,4) | 3.3, 5, 12, 15, 24 | ±5 | ±100 | 70-78 | ±1000 |
| RB-xx09D (3,4) | 3.3, 5, 12, 15, 24 | ±9 | ±56 | 76-79 | ±470 |
| RB-xx12D (3,4) | 3.3, 5, 12, 15, 24 | ±12 | ±42 | 78-82 | ±220 |
| RB-xx15D (3,4) | 3.3, 5, 12, 15, 24 | ±15 | ±33 | 80-84 | ±220 |
| RB-xx24D (3,4) | 3.3, 5, 12, 15, 24 | ±24 | ±21 | 80-84 | ±100 |

**Notes:**

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Max Cap Load is tested at nominal input and full resistive load and is defined as the capacitive load that will allow start up in under 1s without damage to the converter




RoHS compliant 10 from 10 · REACH compliant · EAC

c UL us E358085

UL60950-1 certified
CAN/CSA-C22.2 No 60950-1 certified
IEC/EN60950-1 certified
EN55032 compliant

## Model Numbering

RB- ___ ___ / ___ ___

- nom. Input Voltage
- Output Voltage
- Single or Dual
- *"Isolation Option (3)"*
- *"Protection (4)"*

**Notes:**

Note3: standard part is without Continuous Short Circuit Protection
add suffix „/P" for Continuous Short Circuit Protection

Note4: standard part is with 1kVDC/1s Isolation
add suffix „/H" for 2kVDC/1s Isolation
or add suffix „/HP" for 2kVDC/1s Isolation and Continuous Short Circuit Protection

**Ordering Examples:**

RB-123.3/P: 12VDC Input Voltage, 3.3VDC Output Voltage, Single Output with continuous short circuit protection and 1kVDC/1s isolation
RB-0509D/HP: 5VDC Input Voltage, ±9VDC Output Voltage, Dual Output with continuous short circuit protection and 2kVDC/1s isolation

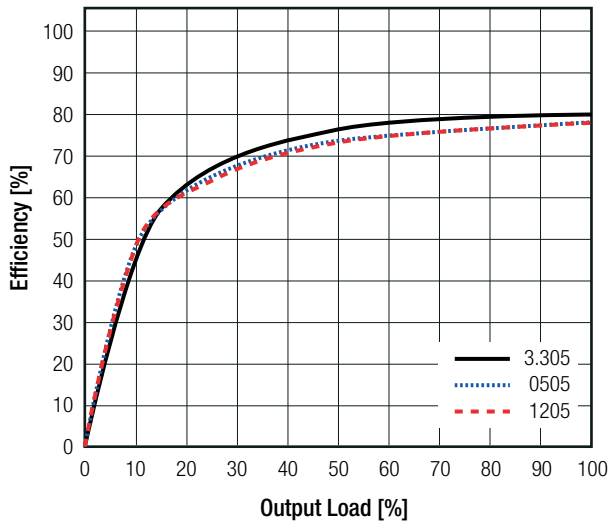
## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### BASIC CHARACTERISTICS

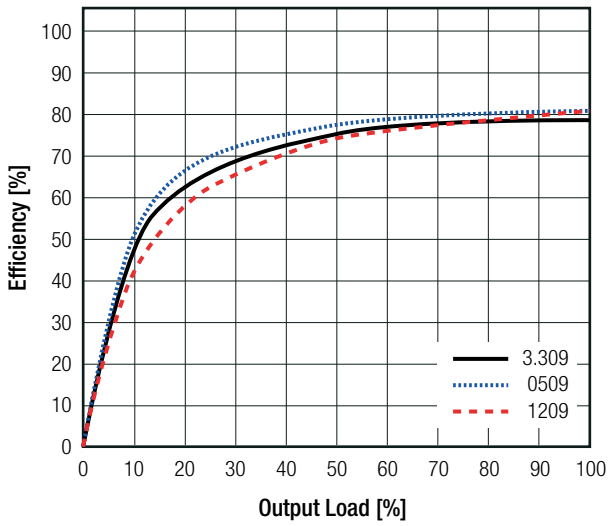
| Parameter | Condition | | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Internal Input Filter | | | | | capacitor |
| Input Voltage Range | | | | ±10% | |
| Minimum Load | | | 0% | | |
| Internal Operating Frequency | | | 50kHz | 100kHz | 105kHz |
| Output Ripple and Noise | 20MHz BW | Single output<br>Dual output | | | 100mVp-p<br>±75mVp-p |

### Efficiency vs. Load

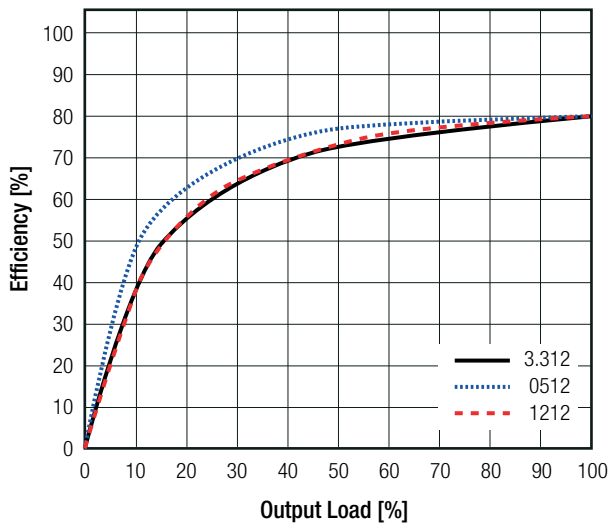
RB-xx05S



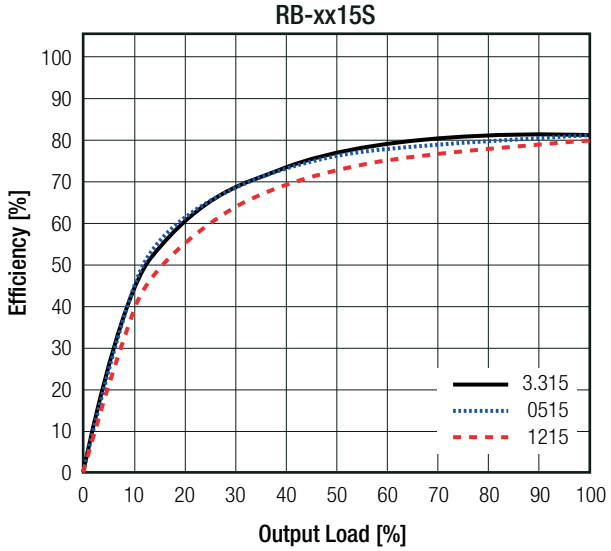

RB-xx09S




RB-xx12S




RB-xx15S

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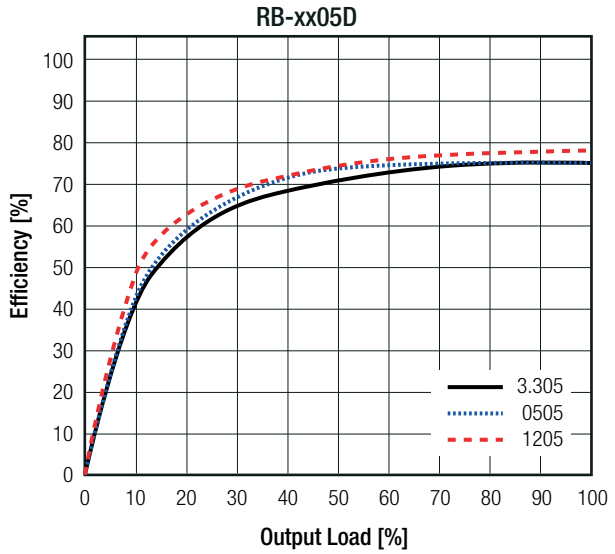
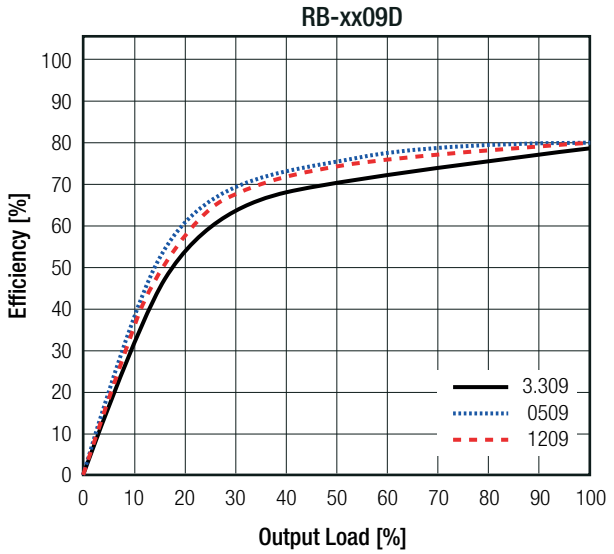
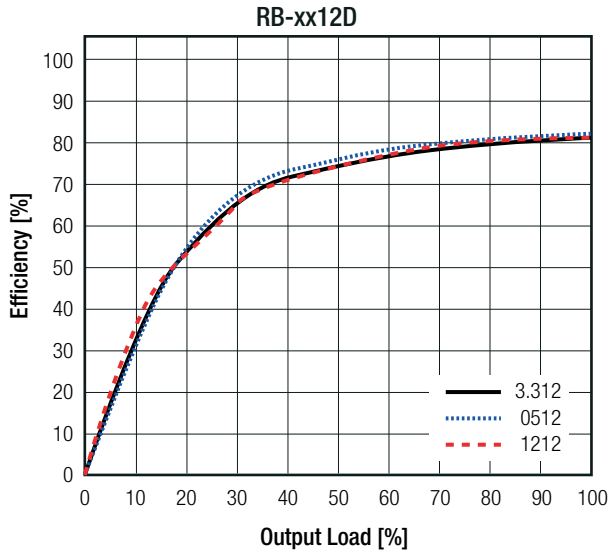
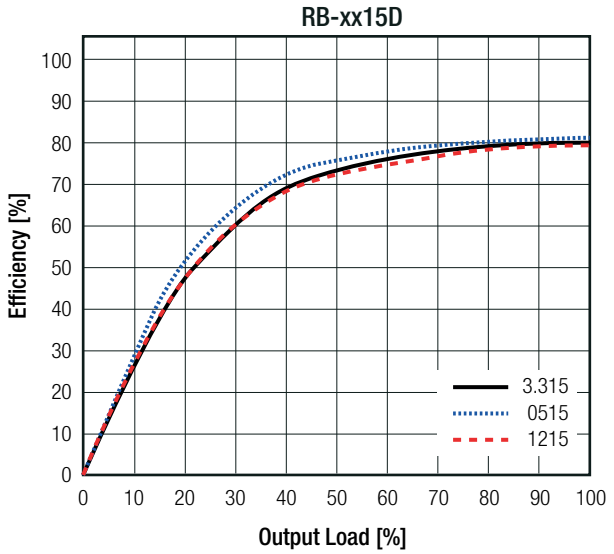
## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### Efficiency vs. Load




### REGULATIONS

| Parameter | Condition | | Value |
|---|---|---|---|
| Output Accuracy | | | ±5.0% typ. |
| Line Regulation | low line to high line | | ±1.2% of 1.0% Vin typ. |
| Load Regulation (5) | 10% to 100% load | 3.3, 5Vout<br>9, 12, 15, 24Vout | 15.0% max.<br>10.0% max. |

**Notes:**

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

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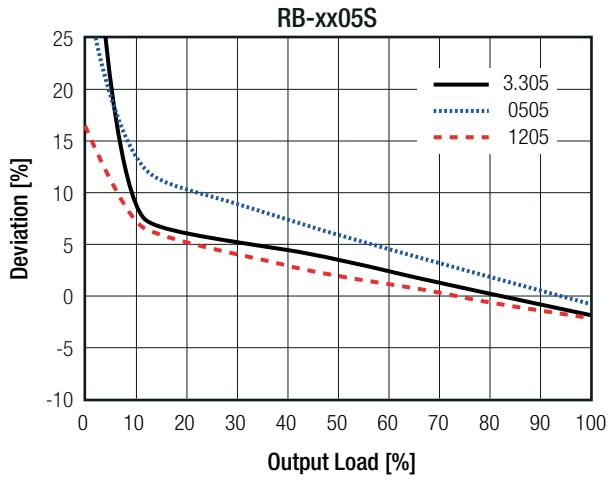
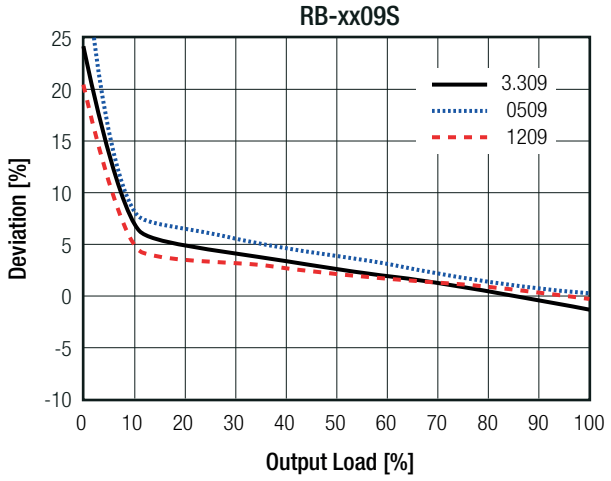
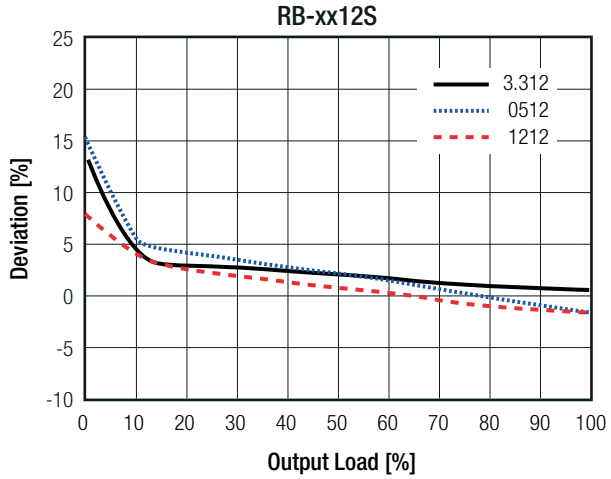
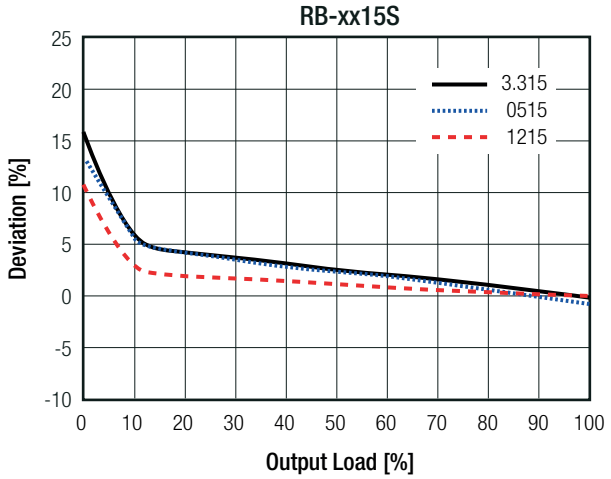
## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

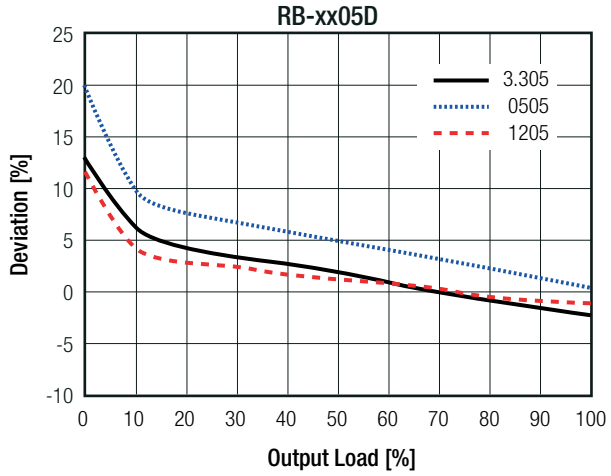
### Deviation vs. Load

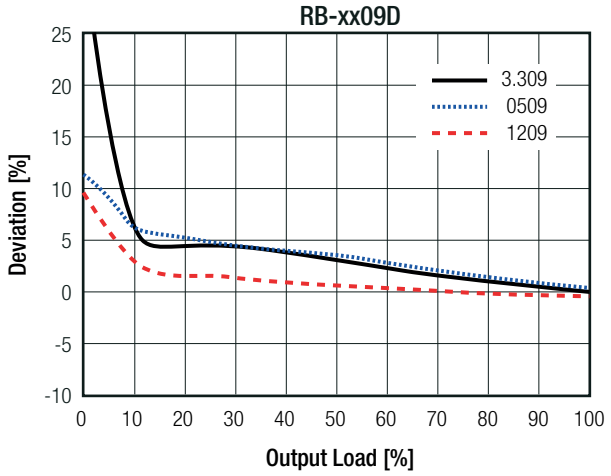


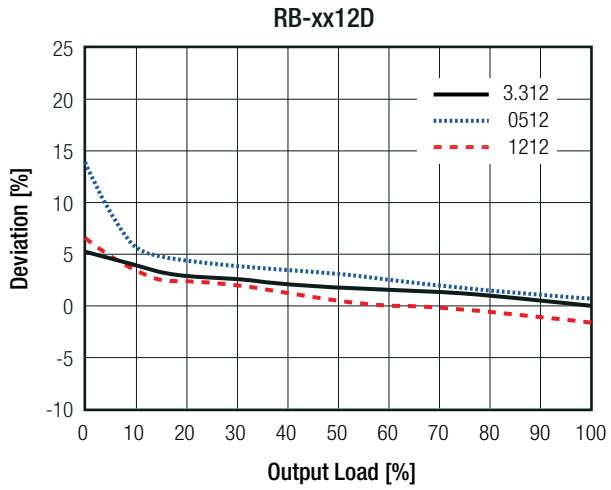



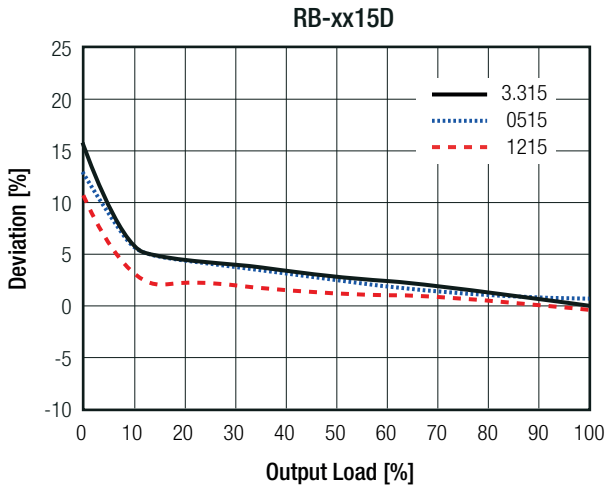



## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

Deviation vs. Load




| PROTECTIONS | | | | |
|---|---|---|---|---|
| **Parameter** | **Type** | | | **Value** |
| Short Circuit Protection (SCP) | without suffix<br>with suffix "/P" | | | 1 second<br>continuous |
| Isolation Voltage [6] | I/P to O/P | without suffix | tested for 1 second<br>rated for 1 minute | 1kVDC<br>500VAC/60Hz |
| | | with suffix "/H" | tested for 1 second<br>rated for 1 minute | 2kVDC<br>1kVAC/60Hz |
| Isolation Resistance | | | | 10GΩ min. |
| Isolation Capacitance | | | | 20pF min. / 75pF max. |
| Insulation Grade | | | | basic (IEC/EN60950-1)<br>functional (IEC/EN60601-1) |

**Notes:**

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note7: Refer to local saftey regulations if input over-current protection is also required. Recommended fuse: slow blow type

| ENVIRONMENTAL | | | |
|---|---|---|---|
| **Parameter** | **Condition** | | **Value** |
| Operating Temperature Range | full load @ free air convection, refer to ***"Derating Graph"*** | | -40°C to +85°C |
| Maximum Case Temperature | | | +105°C |
| Temperature Coefficient | | | ±0.03%/K typ. |
| Thermal Impedance | | | 56K/W typ. |
| Operating Altitude | | | 3000m |
| Operating Humidity | non-condensing | | 95% RH max. |
| Pollution Degree | | | PD2 |
| MTBF | according to MIL-HDBK-217F, G.B. | +25°C<br>+85°C | 16400 x $10^3$ hours<br>10200 x $10^3$ hours |

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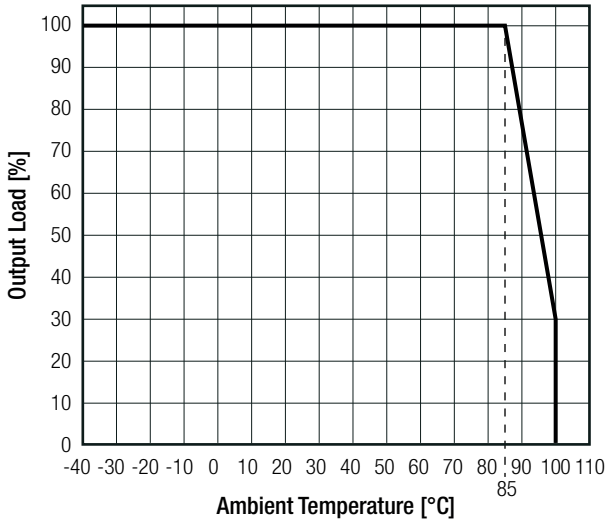
## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### Derating Graph
(@ free air convection)

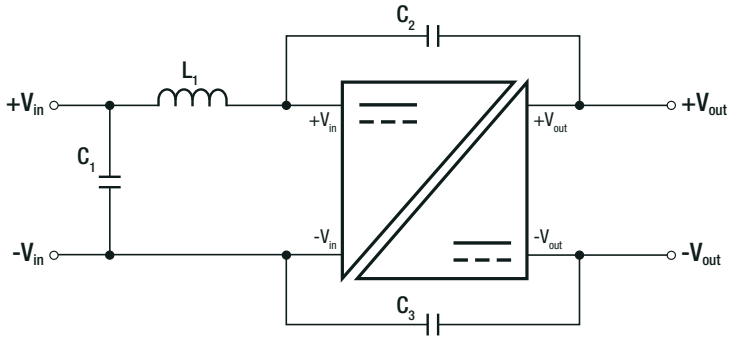



### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety) | Report / File Number | Standard |
|---|---|---|
| Information Technology Equipment, General Requirements for Safety | E358085-A4-UL | UL60950-1, 2nd Edition:2007<br>CAN/CSA C22.2 No. 60950-1-03, 2nd Edition:2007 |
| Information Technology Equipment, General Requirements for Safety | LVD1602031 | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013 |
| Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance | WD-SE-R-180677-A0 | IEC60601-1:2005 + A1:2012, 3rd Edition<br>EN60601-1:2006 + A12:2014 |
| EAC | RU-AT.49.09571 | TP TC 004/2011 |
| RoHS 2 | | RoHS-2011/65/EU + AM-2015/863 |

| EMC Compliance | Condition | Standard / Criterion |
|---|---|---|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter<br>(see filter suggestion below) | EN55032, Class A and B |

### EMC Filter Suggestion according to EN55032




#### Component List Class A

| MODEL | C1 | L1 | C2 (safety) | C3 (safety) |
|---|---|---|---|---|
| RB-0505S | 10µF<br>100V MLCC | N/A | N/A | 2.2nF |
| RB-1205S | | | | |
| RB-2405S | | | | |

#### Component List Class B

| MODEL | C1 | L1 | C2 (safety) | C3 (safety) |
|---|---|---|---|---|
| RB-0505S | 10µF<br>100V MLCC | 22µH choke<br>RLS-226 | 1nF | 2.2nF |
| RB-1205S | | | | |
| RB-2405S | | | | |

**Notes:**

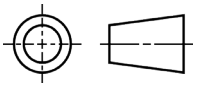
Note8: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

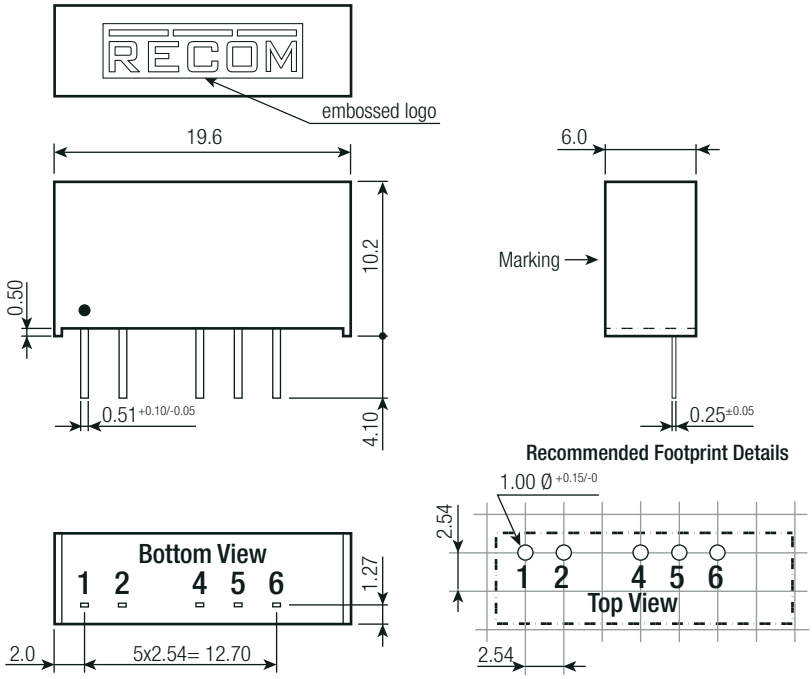
## Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|---|---|---|
| Material | case<br>potting<br>PCB | non-conductive black plastic, (UL94 V-0)<br>epoxy, (UL94 V-0)<br>FR4, (UL94 V-0) |
| Dimension (LxWxH) | | 19.6 x 6.0 x 10.2mm |
| Weight | | 2.2g typ. |

**Dimension Drawing (mm)**






**Pinning Information**

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

NC = No Connection
Tolerance:
xx.x= ±0.5mm
xx.xx= ±0.25mm

### PACKAGING INFORMATION

| Parameter | Type | Value |
|---|---|---|
| Packaging Dimension (LxWxH) | tube | 520.0 x 16.0 x 9.0mm |
| Packaging Quantity | tube | 25pcs |
| Storage Temperature Range | | -55°C to +125°C |
| Storage Humidity | non-condensing | 95% RH max. |

The product information and specifications may be subject to changes even without prior written notice.The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant 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.

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

**Как с нами связаться**

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