

# Features

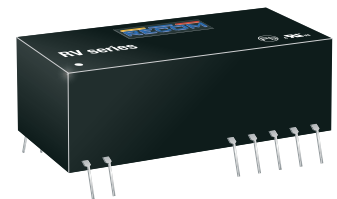
## Unregulated Converters

- UL/CSA/IEC/EN safety certified and CB report
- 6kVDC/1s isolation
- Optional continuous short circuit protection
- Efficiency up to 82%
- Space saving package
- Very low isolation capacitance
- Suitable for IGBT application

**RECOM**  
DC/DC Converter

## RV

**2 Watt  
DIP24  
miniature  
Single and Dual  
Output**



UL60950-1 certified  
CAN/CSA-C22.2 No. 60950-1-07 certified  
IEC/EN60950-1 certified  
UL62368-1 certified  
CAN/CSA-C22.2 No. 62368-1-14 certified  
IEC/EN62368-1 certified  
CB report

## Description

Very high isolation in a small size are the main features of this miniature DIP24 converter, ideal for highly sophisticated industrial, test and measurement and medical designs where board space is at a premium.

## Selection Guide

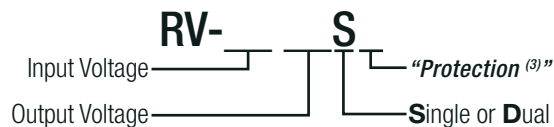
| Part Number              | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. <sup>(1)</sup> [%] | max. Capacitive Load <sup>(2)</sup> [μF] |
|--------------------------|--------------------------|----------------------|---------------------|------------------------------------|------------------------------------------|
| RV-xx3.3S <sup>(3)</sup> | 3.3, 5, 12, 15, 24       | 3.3                  | 600                 | 70                                 | 3300                                     |
| RV-xx05S <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | 5                    | 400                 | 70-75                              | 1200                                     |
| RV-xx09S <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | 9                    | 222                 | 70-75                              | 1200                                     |
| RV-xx12S <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | 12                   | 167                 | 70-75                              | 680                                      |
| RV-xx15S <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | 15                   | 132                 | 75-80                              | 680                                      |
| RV-xx24S <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | 24                   | 83                  | 75-80                              | 220                                      |
| RV-xx3.3D <sup>(3)</sup> | 3.3, 5, 12, 15, 24       | ±3.3                 | ±300                | 70                                 | ±1500                                    |
| RV-xx05D <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | ±5                   | ±200                | 70-75                              | ±470                                     |
| RV-xx09D <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | ±9                   | ±111                | 70-75                              | ±470                                     |
| RV-xx12D <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | ±12                  | ±85                 | 70-75                              | ±220                                     |
| RV-xx15D <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | ±15                  | ±66                 | 75-80                              | ±220                                     |
| RV-xx24D <sup>(3)</sup>  | 3.3, 5, 12, 15, 24       | ±24                  | ±42                 | 75-80                              | ±100                                     |
| RV-xx1509D               | 5, 12, 24                | +15/-9               | +67/-111            | 70-82                              | ±330                                     |

### 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

## Model Numbering



### Notes:

Note3: standard part is without continuous short circuit protection  
add suffix „/P“ for continuous short circuit protection

### Ordering Examples

RV-053.3S/P = 5V Input, 3.3V Output, Single, short circuit protection

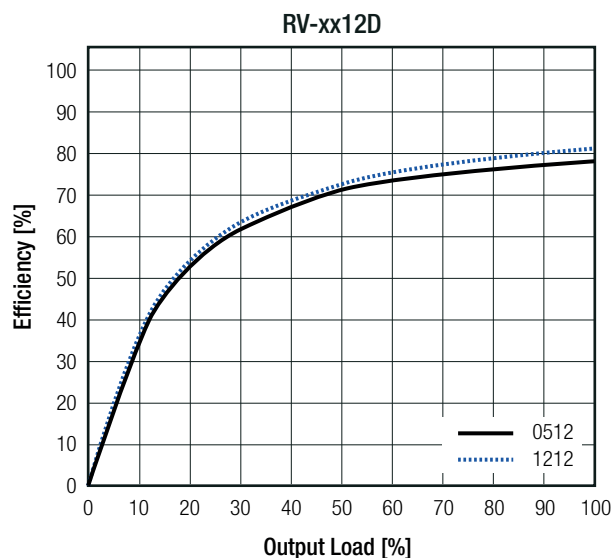
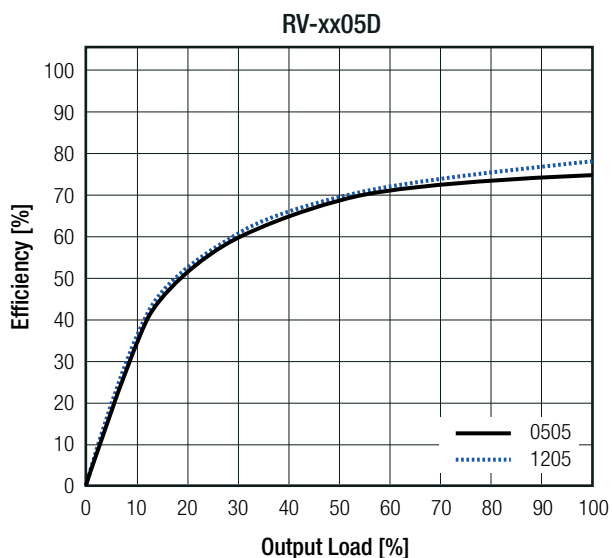
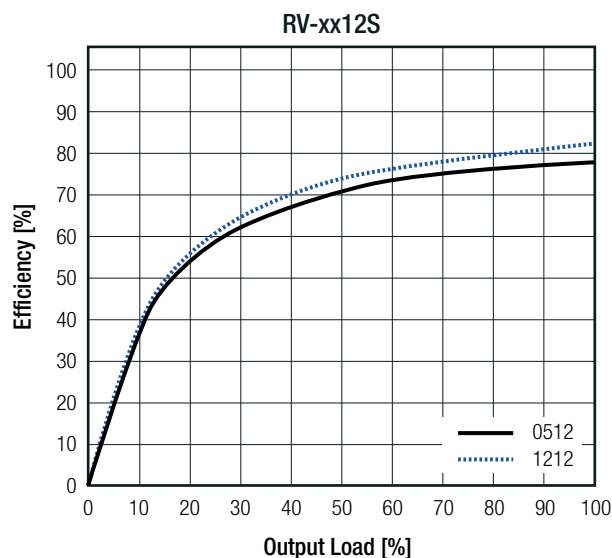
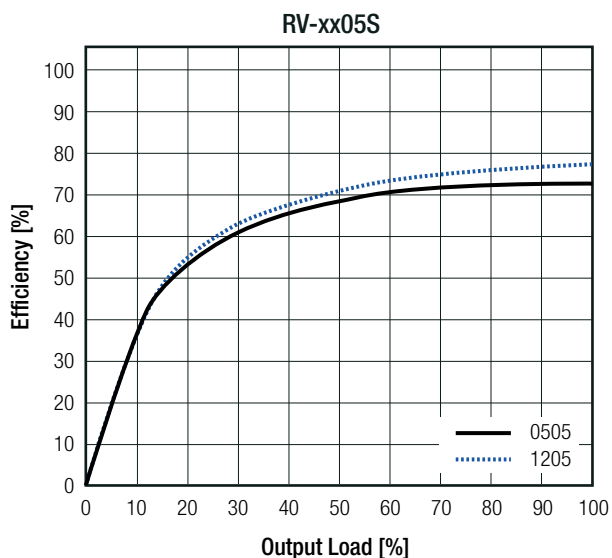
RV-1212D = 12V Input, 12V Output, Dual

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

| Parameter                    | Condition                | Min.           | Typ.           | Max.     |
|------------------------------|--------------------------|----------------|----------------|----------|
| Input Voltage Range          |                          |                | ±10%           |          |
| Minimum Load                 |                          | 0%             |                |          |
| Internal Operating Frequency | all others<br>RV-XX1509D | 20kHz<br>20kHz | 50kHz<br>47kHz | 85kHz    |
| Output Ripple and Noise      | 20MHz BW                 |                |                | 200mVp-p |

### 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 <sup>(4)</sup> | 10% to 100% load      | 3.3Vout                      | 20.0% max.             |
|                                |                       | 5Vout                        | 15.0% max.             |
|                                |                       | 9, 12, 15, 24 and +15/-9Vout | 10.0% max.             |

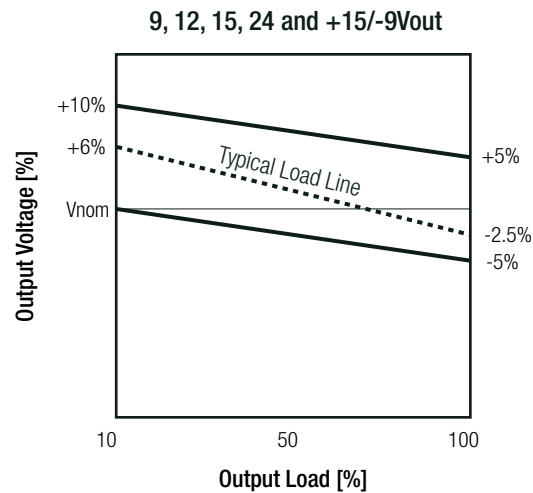
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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

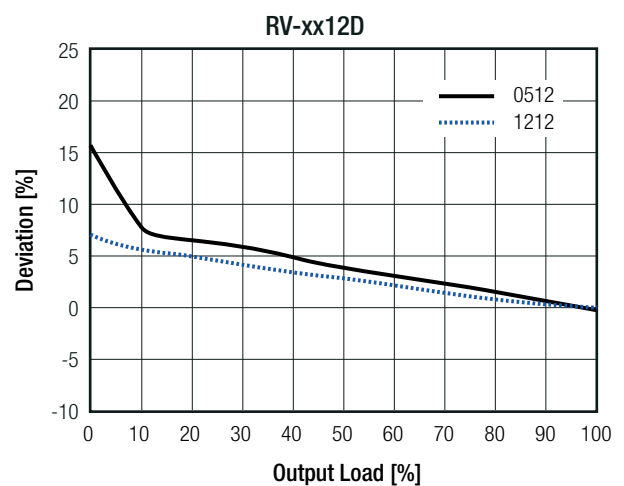
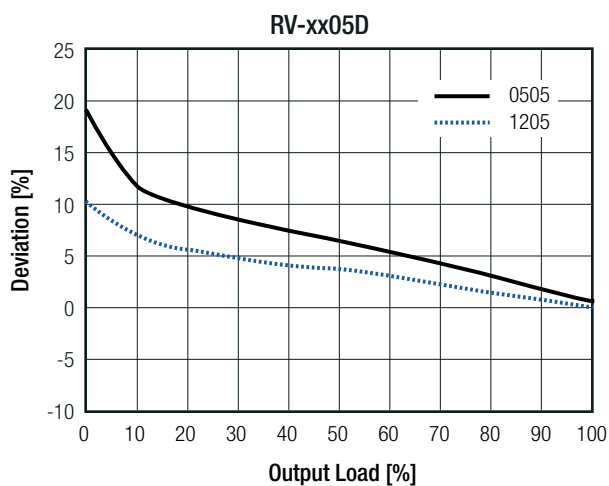
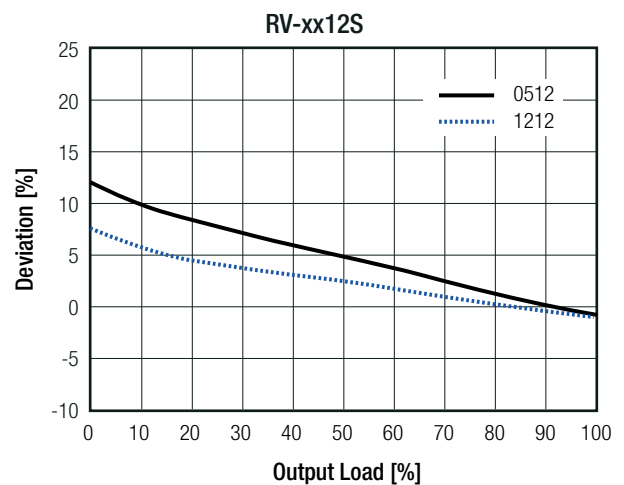
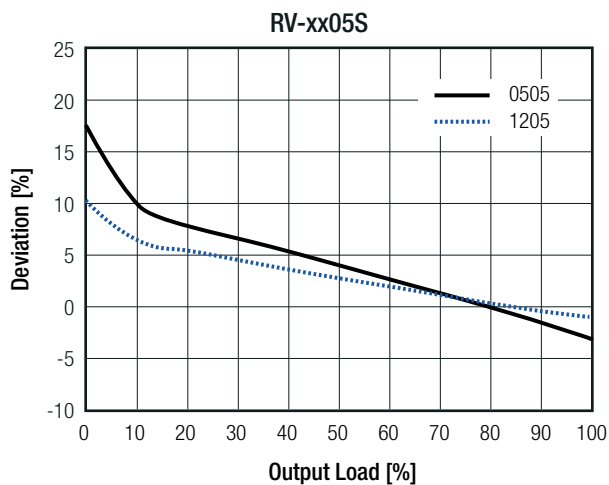
**Notes:**

Note4: Operation below 10% load will not harm the converter, but specifications may not be met

### Tolerance Envelope



### Deviation vs. Load



**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**PROTECTIONS**

| Parameter                        | Type                               |                                           | Value                                                              |
|----------------------------------|------------------------------------|-------------------------------------------|--------------------------------------------------------------------|
| Short Circuit Protection (SCP)   | without suffix<br>with suffix "/P" |                                           | 1 second<br>continuous                                             |
| Isolation Voltage <sup>(5)</sup> | I/P to O/P                         | tested for 1 second<br>rated for 1 minute | 6kVDC<br>3kVAC/60Hz                                                |
| Isolation Resistance             |                                    |                                           | 15GΩ min.                                                          |
| Isolation Capacitance            |                                    |                                           | 2pF min. / 12pF max.                                               |
| Insulation Grade                 |                                    |                                           | basic (IEC/EN60950-1, IEC/EN62368-1)<br>functional (IEC/EN60601-1) |

**Notes:**

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

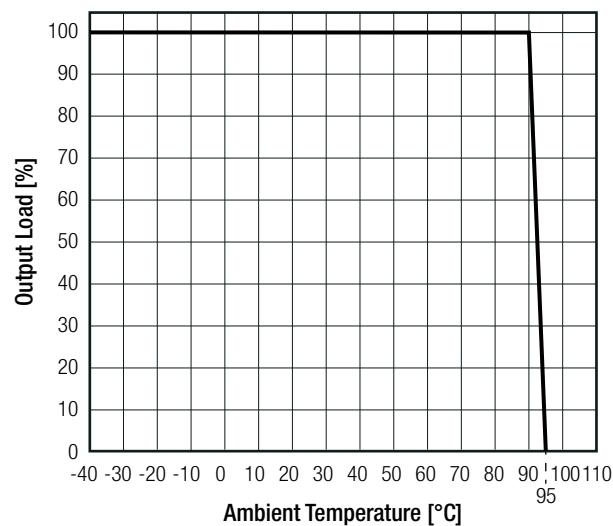
Note6: Refer to local safety regulations if input over-current protection is required. Recommended fuse: slow blow type

**ENVIRONMENTAL**

| Parameter                   | Condition                                   |                | Value                                                       |
|-----------------------------|---------------------------------------------|----------------|-------------------------------------------------------------|
| Operating Temperature Range | full load @ free air convection (see graph) |                | -40°C to +90°C                                              |
| 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 | 1154 x 10 <sup>3</sup> hours<br>168 x 10 <sup>3</sup> hours |

**Derating Graph**

(@ free air convection)



### Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

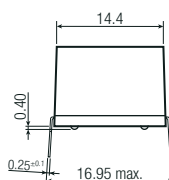
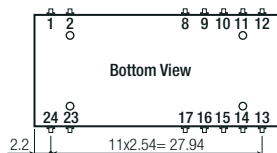
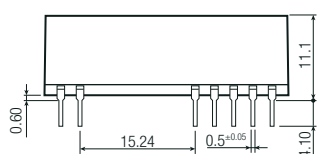
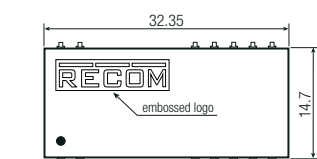
#### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety)                                                                                | Report / File Number | Standard                                                                             |
|----------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------|
| Information Technology Equipment, General Requirements for Safety                                        | E224736-A56-UL       | CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2014<br>UL No. 60950-1, 2nd Edition, 2014 |
| Information Technology Equipment, General Requirements for Safety (LVD)                                  | LVD1602031           | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013                   |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements             | E224736-A56-UL       | CAN/CSA-C22.2 No. 62368-1-14, 2nd Edition<br>UL62368-1, 2nd Edition, 2014            |
| Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance     | WD-SE-R-180541-A0    | IEC60601-1:2005 + A1:2012, 3rd Edition<br>EN60601-1:2006 + A12:2014                  |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements             | ATTCB106076          | EN62368-1:2014 + A11:2017                                                            |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme) |                      | IEC62368-1:2014 2nd Edition                                                          |
| EAC                                                                                                      | RU-AT.49.09571       | TP TC 004/2011                                                                       |
| RoHS 2                                                                                                   |                      | RoHS-2011/65/EU + AM-2015/863                                                        |

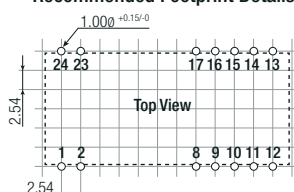
#### DIMENSION AND PHYSICAL CHARACTERISTICS

| 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) |                        | 32.35 x 14.7 x 11.1mm                                                            |
| Weight            |                        | 9.0g typ.                                                                        |

#### Dimension Drawing (mm)



#### Recommended Footprint Details



#### Pinning Information

| Pin #      | Single | Dual  |
|------------|--------|-------|
| 1          | +Vin   | +Vin  |
| 2          | -Vin   | -Vin  |
| 8, 17      | NC     | -Vout |
| 9, 11, 14  | NC     | NC    |
| 10, 15     | -Vout  | Com   |
| 12, 13     | +Vout  | +Vout |
| 16, 23, 24 | NC     | NC    |

NC= No Connection

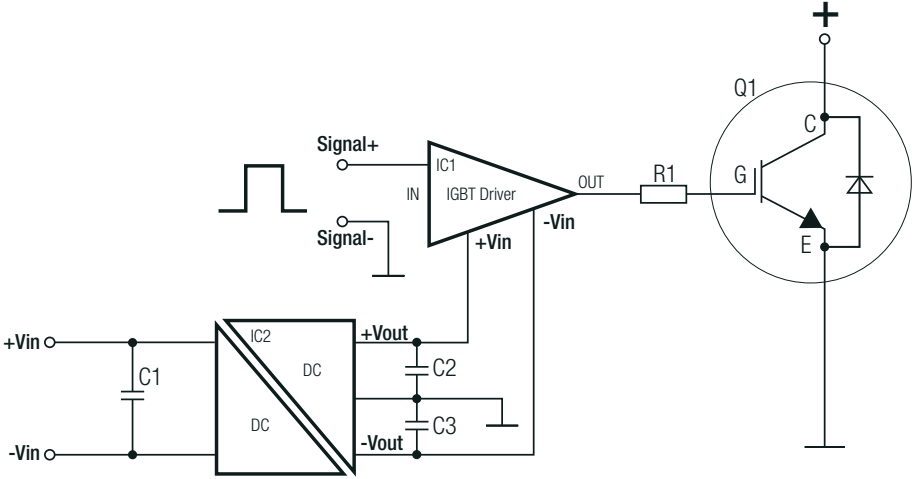
Tolerance: xx.x= ±0.5mm

xx.xx= ±0.25mm

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

INSTALLATION AND APPLICATION

IGBT Application Circuit



PACKAGING INFORMATION

| Parameter                   | Type           | Value                 |
|-----------------------------|----------------|-----------------------|
| Packaging Dimension (LxWxH) | tube           | 530.0 x 21.0 x 18.0mm |
| Packaging Quantity          | tube           | 15pcs                 |
| Storage Temperature Range   |                | -55°C to +125°C       |
| Storage Humidity            | non-condensing | 95% RH max.           |

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