# Features

# Unregulated Converters

- Qualified with 65kV/µs @ Vcommon mode =1KV
- UL/CSA and IEC/EN safety certified
- High isolation 6.4kVDC/1s
- Optional continuous short circuit protection
- /X2 version with >9mm input/output clearance
- Suitable for IGBT applications

RECOM
DC/DC Converter

## RxxPxx

# 1 Watt SIP7 Single and Dual Output

3 YEAR warranty

## Description

The RxxPxxS_D Series of DC/DC Converters are certified to UL/CSA60950-1 as well as EN60950-1. This makes them ideal for safety applications where approved isolation is required.


## Selection Guide

| Part Number | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. (1) [%] | max. Capacitive Load (2) [µF] |
|---|---|---|---|---|---|
| RxxP3.3S (3,4) | 5, 12, 15, 24 | 3.3 | 303 | 70 | 2200 |
| RxxP05S (3,4) | 5, 12, 15, 24 | 5 | 200 | 70 - 75 | 1000 |
| RxxP09S (3,4) | 5, 12, 15, 24 | 9 | 111 | 70 - 75 | 1000 |
| RxxP12S (3,4) | 5, 12,15, 24 | 12 | 84 | 70 - 75 | 470 |
| RxxP15S (3,4) | 5, 12, 15, 24 | 15 | 66 | 75 - 80 | 470 |
| RxxP3.3D (3,4) | 5, 12, 15, 24 | ±3.3 | ±151 | 70 | ±1000 |
| RxxP05D (3,4) | 5, 12, 15, 24 | ±5 | ±100 | 70 - 75 | ±470 |
| RxxP09D (3,4) | 5, 12, 15, 24 | ±9 | ±55 | 70 - 75 | ±470 |
| RxxP12D (3,4) | 5, 12,15, 24 | ±12 | ±41 | 70 - 75 | ±220 |
| RxxP15D (3,4) | 5, 12, 15, 24 | ±15 | ±33 | 75 - 80 | ±220 |
| RxxP1509D (3,4) | 12, 24 | +15/-9 | +33/-56 | 70 - 80 | ±220 |
| R05P1509D (3,4) | 5 | +15/-9 | ±42 | 70 - 80 | +68/-220 |

**Notes:**

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

Note2: Max. Capacitive Load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter

EN/IEC62368-1 certified
UL/CSA60950-1 certified
UL/CSA62368-1 certified

## Model Numbering

R__P__ /P/X2

- Input Voltage
- Output Voltage
- Pinout (3)
- Protection (4)
- **S**ingle or **D**ual

**Notes:**

Note3: add suffix „/X2“ for single output with alternative pinout

Note4: add suffix „P“ for continous short circuit protection

**Ordering Examples:**

R05P05S/P = 5V Input, 5V Output, Single Output, Continous Short Circuit Protection
R05P3.3D/P = 5V Input, 3.3V Output, Dual Output, Continous Short Circuit Protection
R05P05S/P/X2 = 5V Input, 5V Output, Single Output, Continous Short Circuit Protection, Alternative Pinout

REF DESIGN available
www.recom-power.com/eval-ref-boards

dv/dt ADVISORY REPORT AVAILABLE
www.recom-power.com/bier

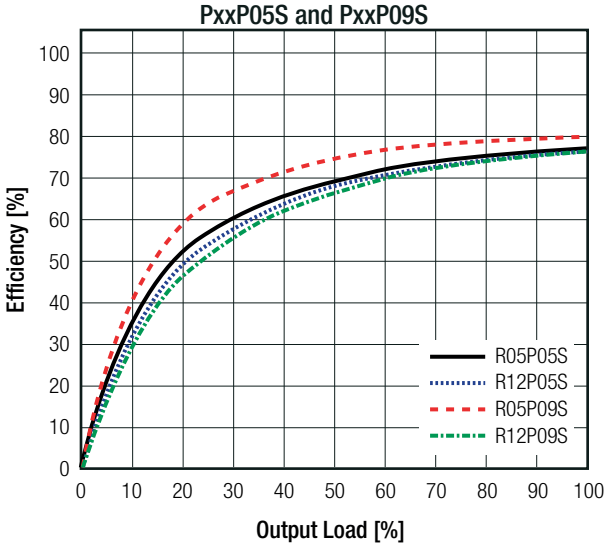
## Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

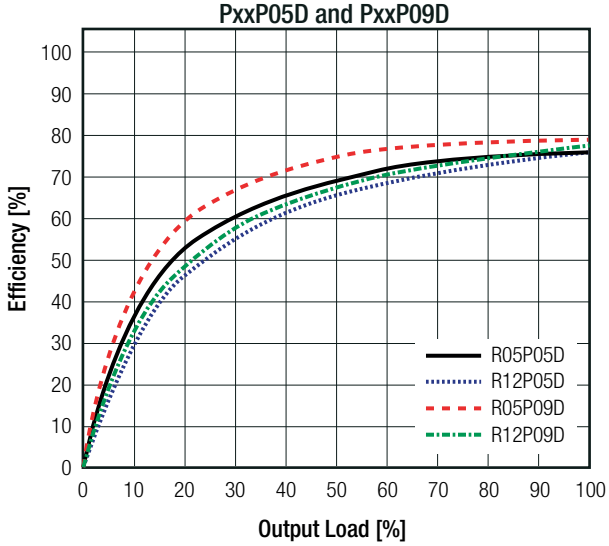
| Parameter | Condition | Min. | Typ. | Max. |
|---|---|---|---|---|
| Input Voltage Range | | | ±10% | |
| Minimum Load | | 0% | | |
| Internal Operating Frequency | all types<br>PxxP1509D | 20kHz<br>20kHz | 50kHz<br>60kHz | 85kHz |
| Output Ripple and Noise | 20MHz BW | | | 200mVp-p |

### Efficiency vs. Load

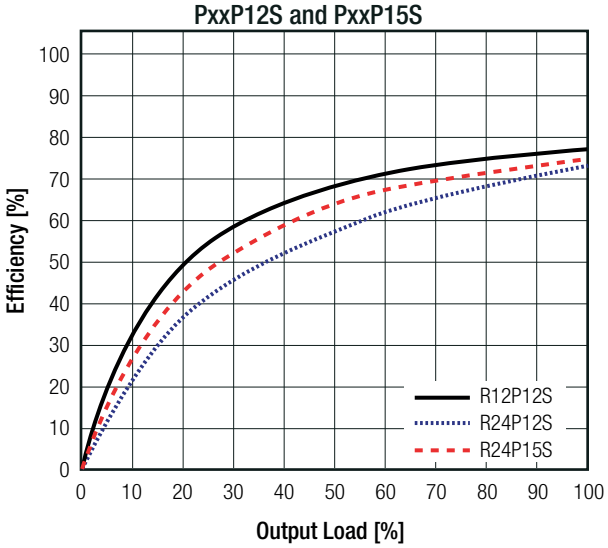
PxxP05S and PxxP09S



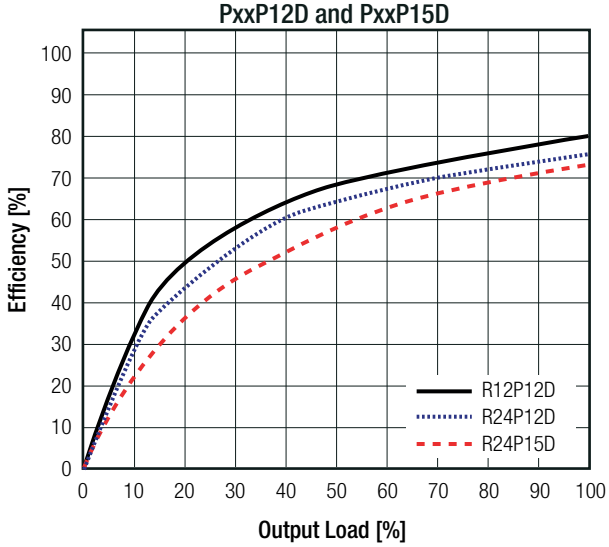

PxxP05D and PxxP09D




PxxP12S and PxxP15S




PxxP12D and PxxP15D




### REGULATIONS

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

**Notes:**

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

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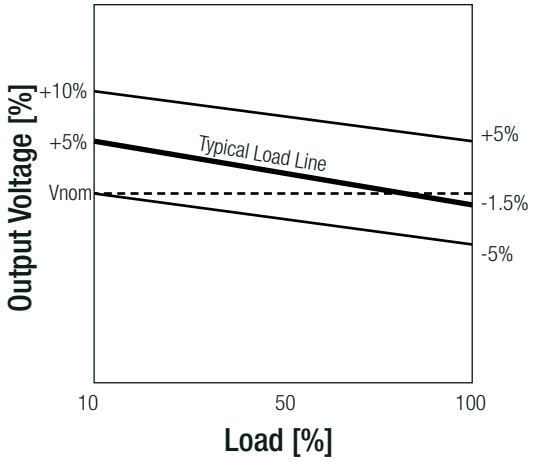
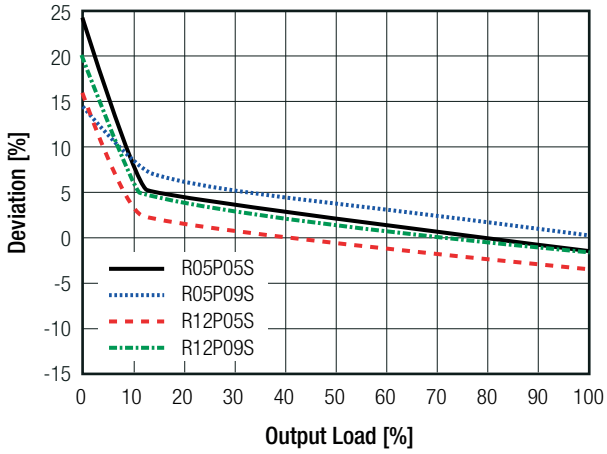
## Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### Tolerance Envelope

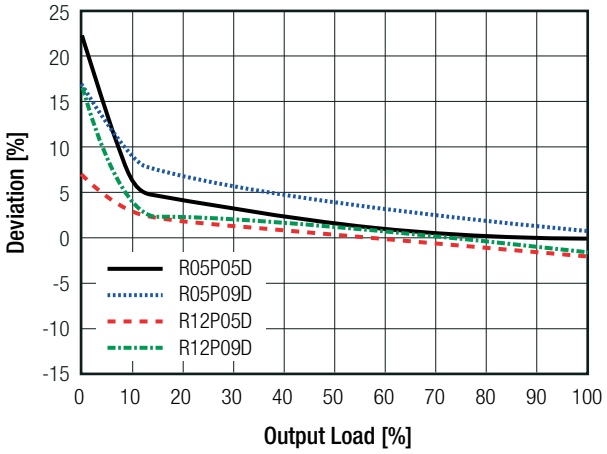



### Deviation vs. Load

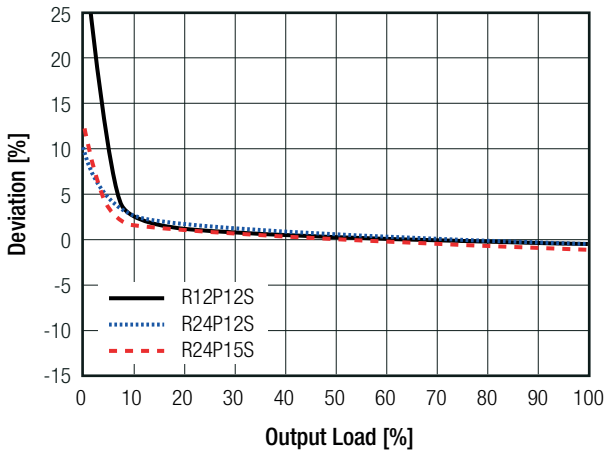
PxxP05S and PxxP09S



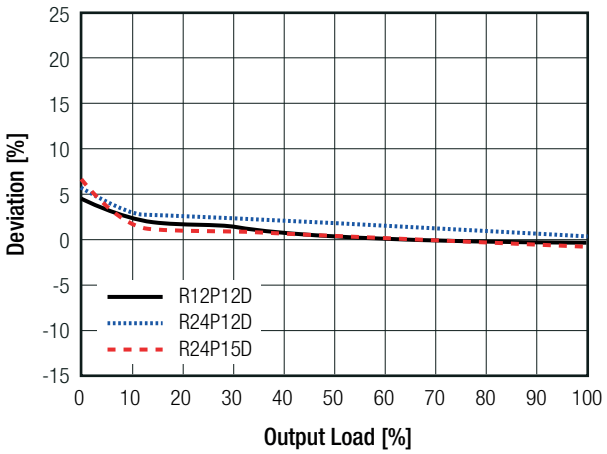

PxxP05D and PxxP09D




PxxP12S and PxxP15S




PxxP12D and PxxP15D



## 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 [6] | I/P to O/P | tested for 1 second | 6.4kVDC |
| | | rated for 1 minute | 3.2kVAC/60Hz |
| Isolation Resistance | | | 15GΩ min. |
| Isolation Capacitance | | | 4.0pF min. / 10pF max. |
| Insulation Grade | | | basic |

**Notes:**

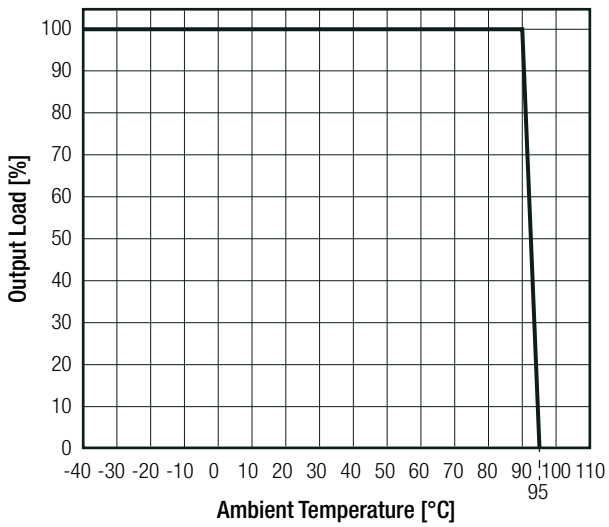
Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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

### ENVIRONMENTAL

| Parameter | Condition | | Value |
|---|---|---|---|
| Operating Temperature Range | without derating @ free air convection(see graph) | | -40°C to +90°C |
| Operating Altitude | | | 2000m |
| Operating Humidity | non-condensing | | 95% RH max. |
| Pollution Degree | | | PD2 |
| MTBF | according to MIL-HDBK-217F, G.B. | +25°C<br>+85°C | 2974 x $10^3$ hours<br>728 x $10^3$ hours |

**Derating Graph**
(@ Chamber and free air convection)



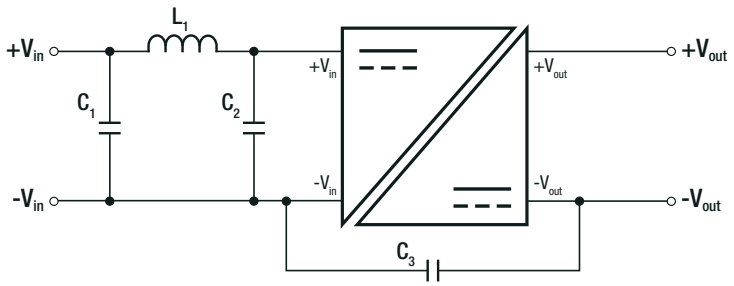
## Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety) | Report / File Number | Standard |
|---|---|---|
| Information Technology Equipment, General Requirements for Safety | E224736-A56-UL | UL60950-1, 2nd Edition, 2014<br>CAN/CSA C22.2 No. 60950-1, 2nd Edition, 2014 |
| Information Technology Equipment, General Requirements for Safety | SPCLVD1602031 | EN60950-1:2006 +AM:2013<br>IEC60950-1:2005, 2nd Edition +AM:2013 |
| Audio/video, information and communication technology equipment. Safety requirements | E224736-A56-UL | UL62368-1, 2nd Edition, 2014<br>CAN/CSA C22.2 No. 62368-1, 2nd Edition, 2014 |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB Scheme) | ATTCB106076 | IEC62368-1:2014, 2nd Edition |
| Audio/Video, information and communication technology equipment - Part1: Safety requirements | | EN62368-1: 2014 + A11:2017 |
| EAC | RU-AT.49.09571 | TP TC 004/2011 |
| RoHS 2+ | | RoHS-2011/65/EU + AM2015/863 |

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

### EMC Filter Suggestion according to EN55032




#### Component List Class A

| MODEL | C1 | L1 | C2 | C3 (safety) |
|---|---|---|---|---|
| R05P05S | 22µF 50V MLCC | N/A | N/A | N/A |
| R05P12S | | | N/A | |
| R12P05S | 10µF 100V MLCC | | 4.7µF 50V MLCC | |
| R24P05S | | | | |

#### Component List Class B

| MODEL | C1 | L1 | C2 | C3 (safety) |
|---|---|---|---|---|
| R05P05S | 10µF 100V MLCC | 22µH choke RLS-226 | N/A | 1nF |
| R12P05S | | | | |
| R24P05S | | | | |

**Notes:**

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

### DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|---|---|---|
| Material | case<br>potting<br>PCB | non-conductive black plastic, (UL94 V-0)<br>silicon rubber compound, (UL94 V-0)<br>FR4, (UL94 V-0) |
| Dimension (LxWxH) | | 19.5 x 9.8 x 12.5mm |
| Weight | | 4.3g typ. |

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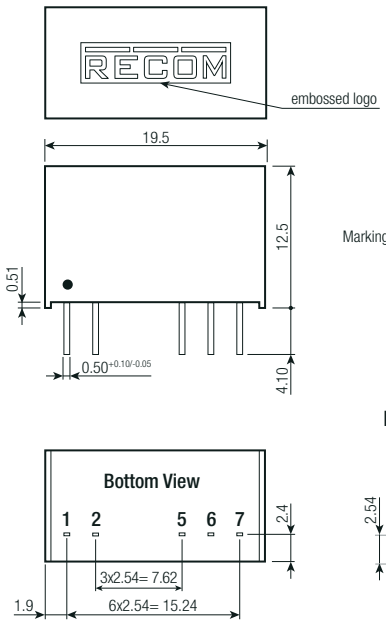
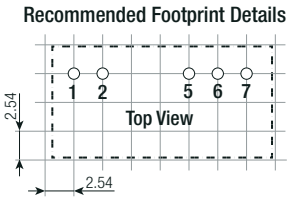
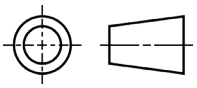
## Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### Dimension Drawing (mm)



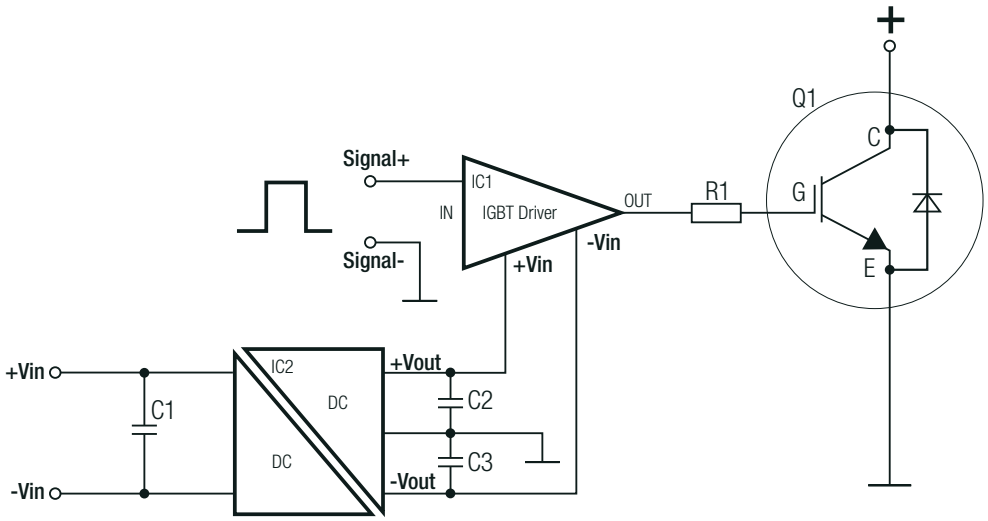
### Pin Connection

| Pin # | Single | Dual | /X2 |
|---|---|---|---|
| 1 | +Vin | +Vin | +Vin |
| 2 | -Vin | -Vin | -Vin |
| 5 | -Vout | -Vout | No Pin |
| 6 | No Pin | Com | -Vout |
| 7 | +Vout | +Vout | +Vout |

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

## INSTALLATION AND APPLICATION

### IGBT Application Circuit




## PACKAGING INFORMATION

| Parameter | Type | Value |
|---|---|---|
| Packaging Dimension (LxWxH) | tube | 520.0 x 22.3 x 12.0mm |
| Packaging Quantity | tube | 25pcs |
| Storage Temperature Range | | -55°C to +125°C |
| Storage Humidity | | 95% RH max. |

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- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
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