

# Features

- Qualified with 65kV/ $\mu$ s @ 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

# Unregulated Converters



## RxxPxx

**1 Watt  
SIP7  
Single and Dual  
Output**



### 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. <sup>(1)</sup> [%]	max. Capacitive Load <sup>(2)</sup> [ $\mu$ F]
RxxP3.3S <sup>(3,4)</sup>	5, 12, 15, 24	3.3	303	70	2200
RxxP05S <sup>(3,4)</sup>	5, 12, 15, 24	5	200	70 - 75	1000
RxxP09S <sup>(3,4)</sup>	5, 12, 15, 24	9	111	70 - 75	1000
RxxP12S <sup>(3,4)</sup>	5, 12, 15, 24	12	84	70 - 75	470
RxxP15S <sup>(3,4)</sup>	5, 12, 15, 24	15	66	75 - 80	470
RxxP3.3D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 3.3	$\pm$ 151	70	$\pm$ 1000
RxxP05D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 5	$\pm$ 100	70 - 75	$\pm$ 470
RxxP09D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 9	$\pm$ 55	70 - 75	$\pm$ 470
RxxP12D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 12	$\pm$ 41	70 - 75	$\pm$ 220
RxxP15D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 15	$\pm$ 33	75 - 80	$\pm$ 220
RxxP1509D <sup>(3,4)</sup>	12, 24	+15/-9	+33/-56	70 - 80	$\pm$ 220
R05P1509D <sup>(3,4)</sup>	5	+15/-9	$\pm$ 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

### Model Numbering



#### Notes:

- Note3: add suffix „/X2“ for single output with alternative pinout  
 Note4: add suffix „P“ for continuous short circuit protection

#### Ordering Examples:

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



[www.recom-power.com/eval-ref-boards](http://www.recom-power.com/eval-ref-boards)

[www.recom-power.com/bier](http://www.recom-power.com/bier)

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

### BASIC CHARACTERISTICS

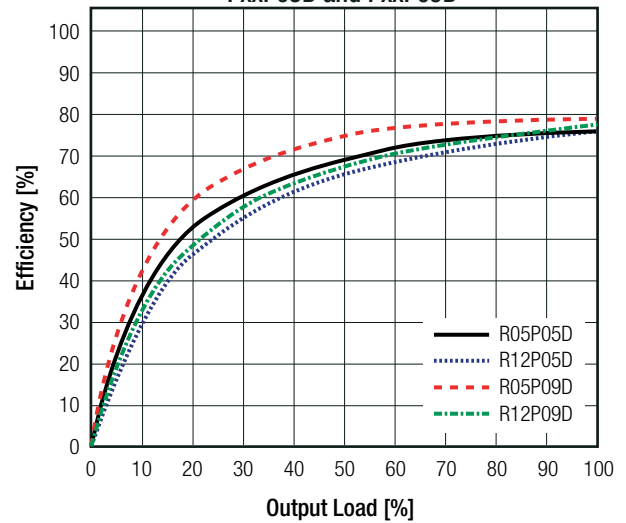
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range			±10%	
Minimum Load		0%		
Internal Operating Frequency	all types PxxP1509D	20kHz 20kHz	50kHz 60kHz	85kHz
Output Ripple and Noise	20MHz BW			200mVp-p

### Efficiency vs. Load

PxxP05S and PxxP09S



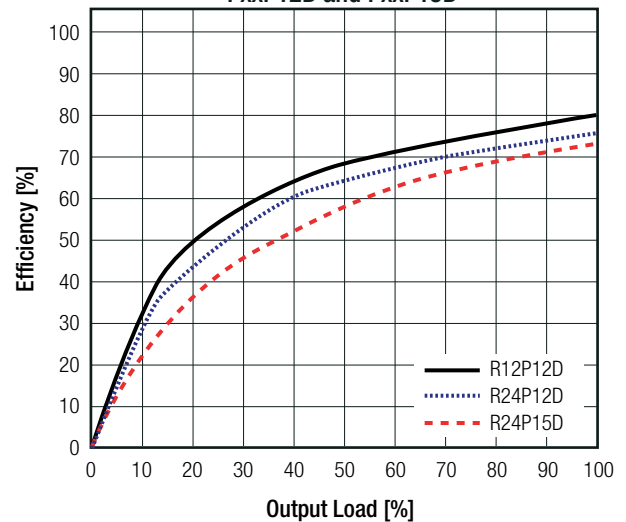
PxxP05D and PxxP09D



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 <sup>(5)</sup>	10% to 100% load	3.3, 5VDC 9, 12, 15VDC	15% typ. 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 with suffix "/P"	1 second continuous	
Isolation Voltage <sup>(6)</sup>	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	
<b>Notes:</b> 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	2974 x 10 <sup>3</sup> hours
		+85°C	728 x 10 <sup>3</sup> 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 CAN/CSA C22.2 No. 60950-1, 2nd Edition, 2014
Information Technology Equipment, General Requirements for Safety	SPCLVD1602031	EN60950-1:2006 +AM:2013 IEC60950-1:2005, 2nd Edition +AM:2013
Audio/Video, information and communication technology equipment. Safety requirements	E224736-A56-UL	UL62368-1, 2nd Edition, 2014 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 (see filter suggestion below)	EN55032, Class B EN55032, Class A

### EMC Filter Suggestion according to EN55032



#### Component List Class A

MODEL	C1	L1	G2	C3 (safety)
R05P05S	22µF	N/A	N/A	N/A
R05P12S	50V MLCC		N/A	
R12P05S	10µF		4.7µF	
R24P05S	100V MLCC		50V MLCC	

#### Component List Class B

MODEL	C1	L1	G2	C3 (safety)
R05P05S	10µF 100V MLCC	22µH choke RLS-226	N/A	1nF
R05P12S				
R12P05S				
R24P05S				

#### Notes:

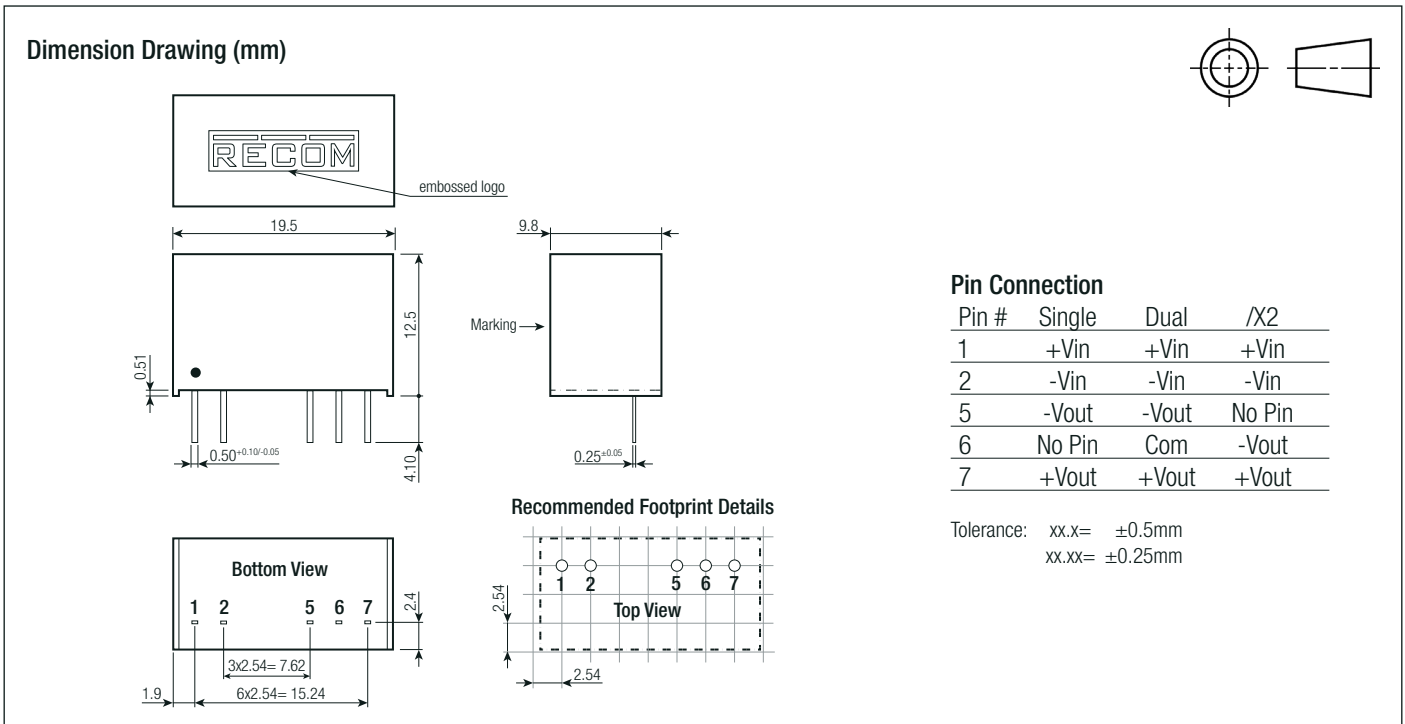
Note8: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

### DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case potting PCB	non-conductive black plastic, (UL94 V-0) silicon rubber compound, (UL94 V-0) 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)



### 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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