

# Features

# Unregulated Converters

- Qualified with 65kV/ $\mu$ s @ common mode =1KV
- Isolation 6.4kVDC
- Optional continuous short circuit protection
- Unique transformer system
- Compact SIP7 package
- /X2 version with >9mm input/output clearance
- Very low isolation capacitance



## RxxP2xx

**2 Watt  
SIP7  
Single and Dual  
Output**



### Description

The RxxP2xxS\_D series of DC/DC converters are certified to UL/CSA60950-1 and UL/CSA62368-1 as well as IEC/EN62368-1. This makes them ideal for safety applications where approved isolation is required. The /X2 version has an input/output clearance of more than 9mm.

### 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]
RxxP23.3S <sup>(3,4)</sup>	5, 12, 15, 24	3.3	600	70	3300
RxxP205S <sup>(3,4)</sup>	5, 12, 15, 24	5	400	70 - 75	1200
RxxP209S <sup>(3,4)</sup>	5, 12, 15, 24	9	222	70 - 75	1200
RxxP212S <sup>(3,4)</sup>	5, 12, 15, 24	12	167	70 - 75	680
RxxP215S <sup>(3,4)</sup>	5, 12, 15, 24	15	133	75 - 80	680
RxxP23.3D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 3.3	$\pm$ 300	70	$\pm$ 1500
RxxP205D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 5	$\pm$ 200	70 - 75	$\pm$ 470
RxxP209D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 9	$\pm$ 111	70 - 75	$\pm$ 470
RxxP212D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 12	$\pm$ 83	70 - 75	$\pm$ 330
RxxP215D <sup>(3,4)</sup>	5, 12, 15, 24	$\pm$ 15	$\pm$ 66	75 - 80	$\pm$ 330



#### Notes:

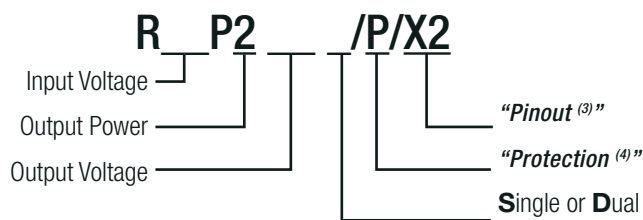
Note1: Efficiency is tested at nominal input and full load at +25°C ambient

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



IEC/EN62368-1 certified  
UL/CSA60950-1 certified  
UL/CSA62368-1 certified  
EN55032 compliant  
CB Report

### Model Numbering



#### Notes:

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

Note4: add suffix „/P“ for continuous short circuit protection

#### Ordering Examples:

R05P205S/P = 5V Input, 5V Output, Single Output, Continuous Short Circuit Protection

R05P23.3D/P = 5V Input, 3.3V Output, Dual Output, Continuous Short Circuit Protection

R05P205S/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**

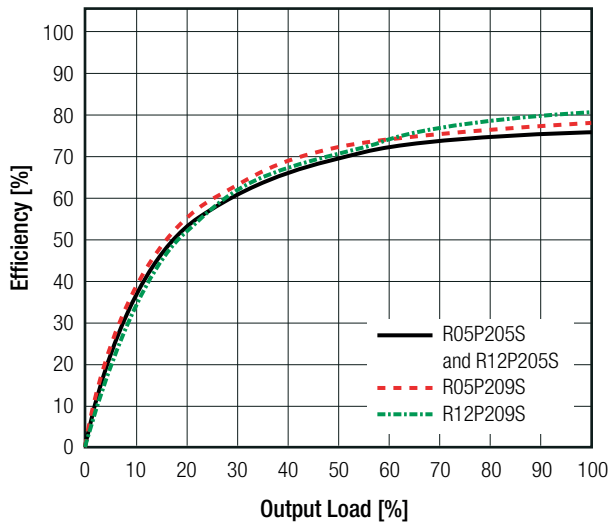
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range			±10%	
Minimum Load			0%	
Internal Operating Frequency		20kHz	50kHz	85kHz
Output Ripple and Noise <sup>(6)</sup>	20MHz BW			200mVp-p

**Notes:**

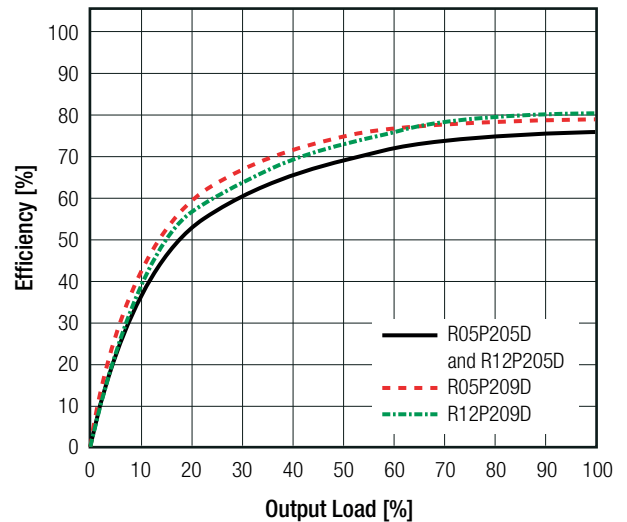
Note5: Measurements are made with a 0.1µF MLCC across output (low ESR)

**Efficiency vs. Load**

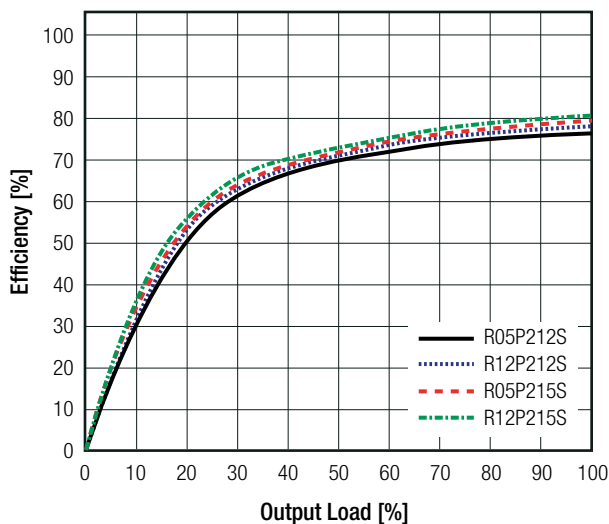
**RxxP205S and RxxP209S**



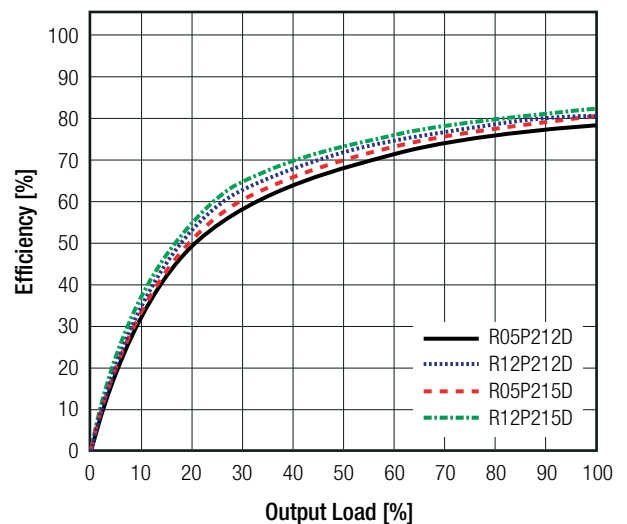
**RxxP205D and RxxP209D**



**RxxP212S and RxxP215S**



**RxxP212D and RxxP215D**



**REGULATIONS**

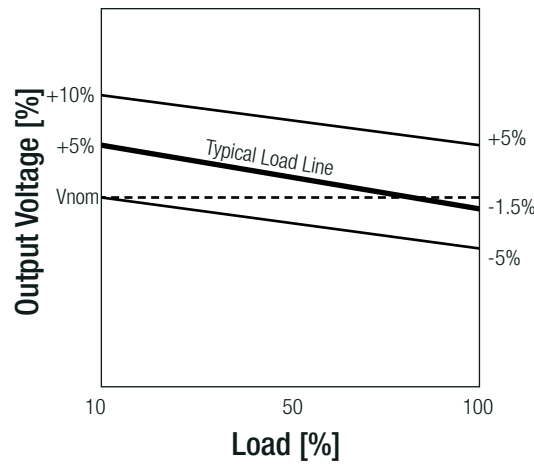
Parameter	Condition	Value
Output Accuracy		±5.0% max.
Line Regulation	low line to high line, full load	1.2%/1% of Vin typ.
Load Regulation <sup>(6)</sup>	10% to 100% load	3.3, 5VDC 9, 12, 15VDC 15% typ. 10% typ.

**Notes:**

Note6: Operation below 10% load will not harm the converter, but specifications may not be met

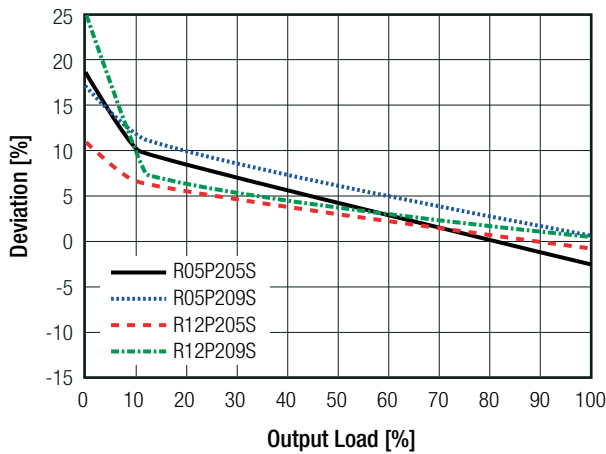
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Tolerance Envelope

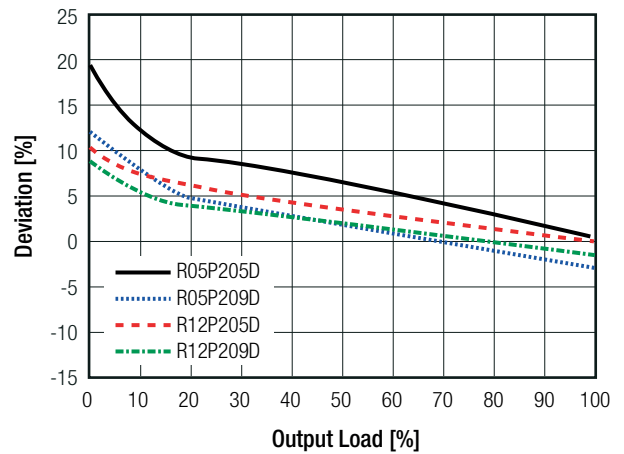


Deviation vs. Load

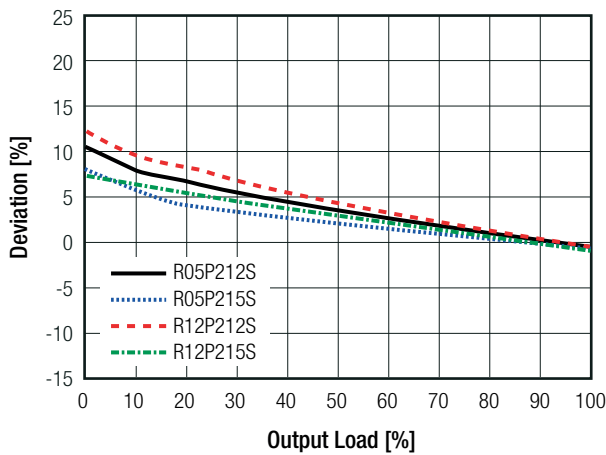
RxxP205S and RxxP209S



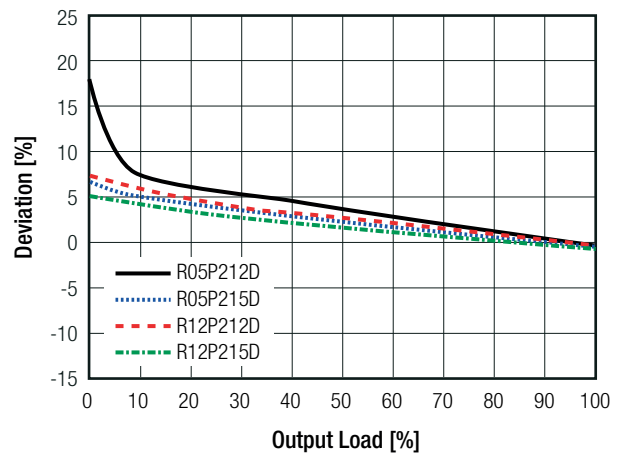
RxxP205D and RxxP209D



RxxP212S and RxxP215S



RxxP212D and RxxP215D



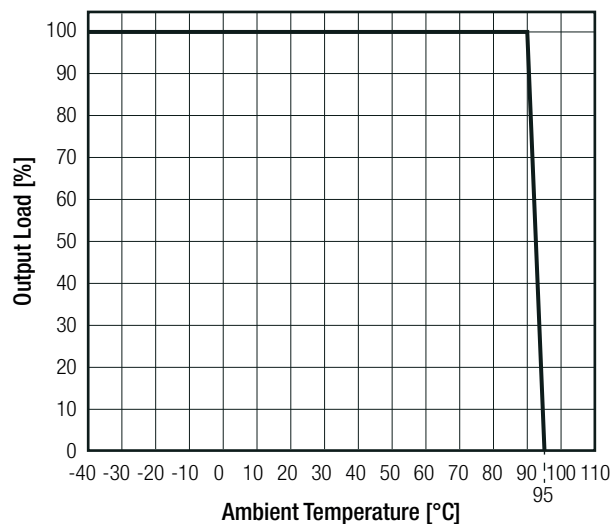
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

PROTECTIONS			
Parameter	Type		Value
Short Circuit Protection (SCP)	without Suffix "/P" with Suffix "/P"		1 second continuous
Isolation Voltage <sup>(7)</sup>	I/P to O/P	tested for 1 second	6.4kVDC
		rated for 1 minute	3.2kVAC/60Hz
		working voltage	250VACrms
Isolation Resistance			15GΩ min.
Isolation Capacitance			1.5pF min. / 10pF max.
Insulation Grade			basic (IEC/EN/UL62368-1)
<b>Notes:</b>			
Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage			
Note8: 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 +95°C	
Maximum Case Temperature			+105°C	
Operating Altitude			2000m (IEC/EN/UL62368-1) 3000m (IEC/EN60601-1)	
Operating Humidity	non-condensing		95% RH max.	
Pollution Degree			PD2	
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	Single Dual	2113 x 10 <sup>3</sup> hours 2434 x 10 <sup>3</sup> hours
		+85°C	Single Dual	299 x 10 <sup>3</sup> hours 334 x 10 <sup>3</sup> hours

**Derating Graph**

(@ Chamber and free air convection)

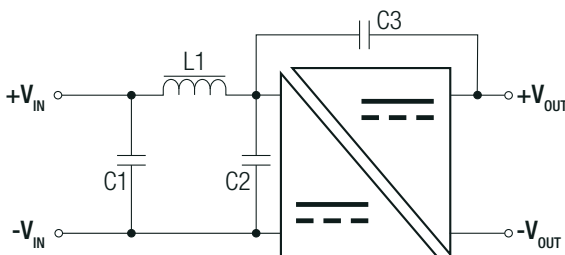


**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

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	LVD1602031	EN60950-1:2006 + A2:2013 IEC60950-1:2005 2nd Edition + A2:2013
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. Safety requirements	ATTCB106076	EN62368-1:2014 +A11:2017
Audio/video, information and communication technology equipment. Safety requirements (CB Scheme)		IEC62368-1:2014, 2nd Edition
Medical electrical equipment Part 1: General requirements for basic safety and essential performance	WD-SE-R-180541-A0	EN60601-1:2006 + A12:2014 IEC60601-1:2005 + A1:2012, 3rd Edition
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS2		RoHS-2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter	EN55032, Class A and B

**EMC Filtering Suggestions according to EN55032 Class A and Class B**



**Component List Class A**

C1	L1	C3
10µF 100V MLCC	-	-

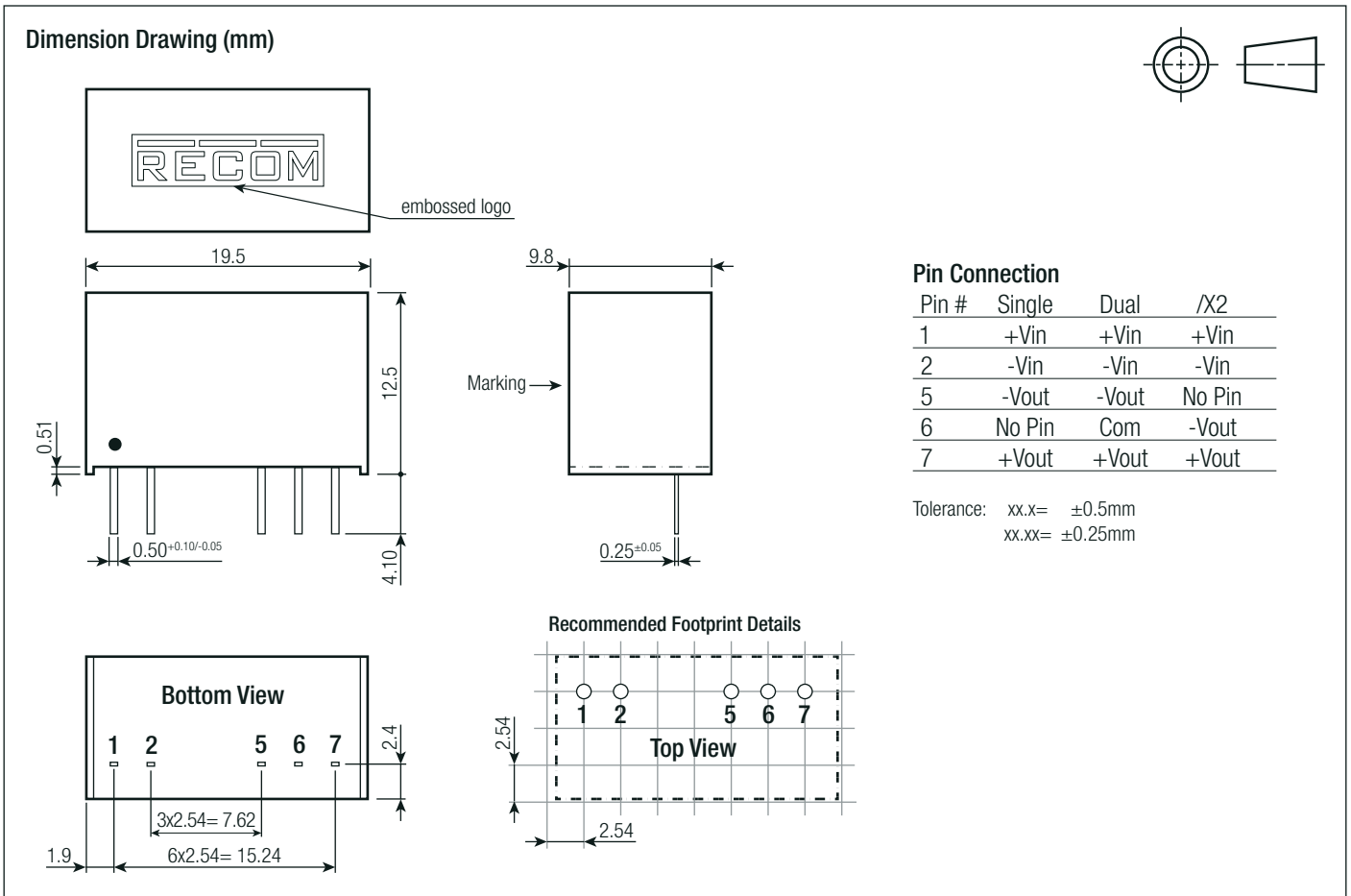
**Component List Class B**

C1	C2	L1	C3
10µF 100V MLCC	10µF 100V MLCC	12µH choke WE 744 045 120	2n2F 8kV

DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	Type	Value
Material	case potting PCB	non-conductive black plastic, (UL94 V-0) epoxy, (UL94 V-0) FR4, (UL94 V-0)
Package Dimension (LxWxH)		19.5 x 9.8 x 12.5mm
Package Weight		4.3g typ.

continued on next page

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



**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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