

# Features

# Unregulated Converters

- Qualified with 65kV/μs @ Vcommon mode =1KV
- IEC/EN61010 for test, measurement and lab use
- IEC/EN60601 for medical applications
- Reinforced isolation 6.4kVDC or 8kVDC
- Optional continuous short circuit protection
- Very low isolation capacitance
- /X2 Option for >9mm input/output clearance



# RxxP2xx/R

**2 Watt  
SIP 7  
Single and Dual  
Output**



## Description

The RxxP2xx/R Series of DC/DC Converters are certified to IEC/EN/UL/CSA-60950. This makes them ideal for safety applications where approved or reinforced isolation is required. These versions are also EN61010-1 certified for lab equipment. 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. (1) [%]	max. Capacitive Load (2) [μF]
RxxP23.3S/R(3,4,5)	5, 12, 15, 24	3.3	600	72 - 78	3300
RxxP205S/R(3,4,5)	5, 12, 15, 24	5	400	79 - 84	1200
RxxP209S/R(3,4,5)	5, 12, 15, 24	9	222	80 - 87	1200
RxxP212S/R(3,4,5)	5, 12, 15, 24	12	167	80 - 87	680
RxxP215S/R(3,4,5)	5, 12, 15, 24	15	133	80 - 88	680
RxxP23.3D/R(3,4,5)	5, 12, 15, 24	±3.3	±300	73 - 80	±1500
RxxP205D/R(3,4,5)	5, 12, 15, 24	±5	±200	79 - 85	±470
RxxP209D/R(3,4,5)	5, 12, 15, 24	±9	±111	80 - 87	±470
RxxP212D/R(3,4,5)	5, 12, 15, 24	±12	±85	80 - 87	±330
RxxP215D/R(3,4,5)	5, 12, 15, 24	±15	±66	80 - 87	±330

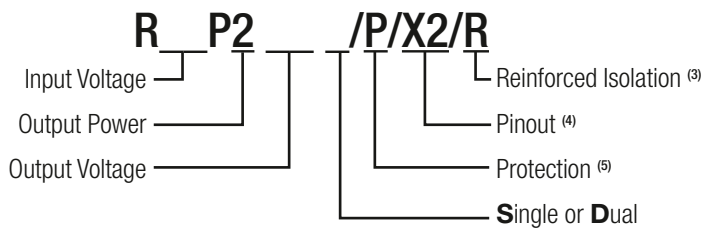
### Notes:

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



## Model Numbering



### Notes:

Note3: add suffix „/R6.4“ for 6.4kVDC/1second isolation or „/R8“ for 8kVDC/1second isolation

Note4: add suffix „/X2“ for single output with alternative pinout

Note5: add suffix „/P“ for continuous short circuit protection

EN/IEC60950-1 certified  
EN/IEC60601-1 certified  
UL/CSA 60950-1 certified  
ES/CSA60601-1 certified  
EN/IEC61010-1 certified  
IEC-60601-1 CB report

### Ordering Examples:

R05P23.3S/R8/P = 5V Input, 3.3V Output, Single Output, 8kVDC/1s isolation, Continuous Short Circuit Protection  
R24P205S/R6.4/P/X2 = 24V Input, 5V Output, Single Output, 6.4kVDC/1s isolation, Continuous SCP, Alternative Pinout  
R12P205D/R8/X2 = ±12V Input, ±5V Output, Dual Output, 8kVDC/1s isolation, Alternative Pinout



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**Specifications** (measured at Ta= 25°C, nominal input voltage, full load)

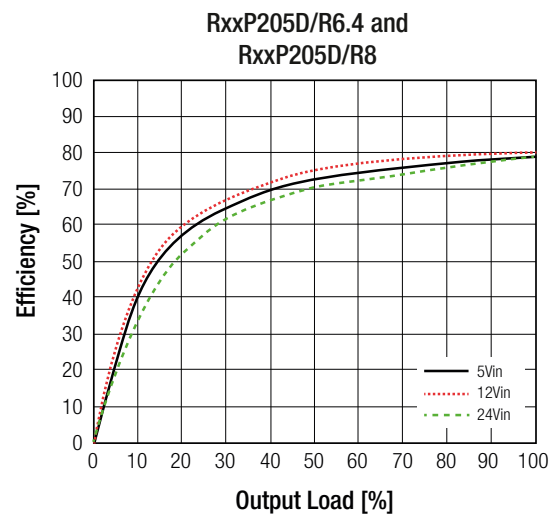
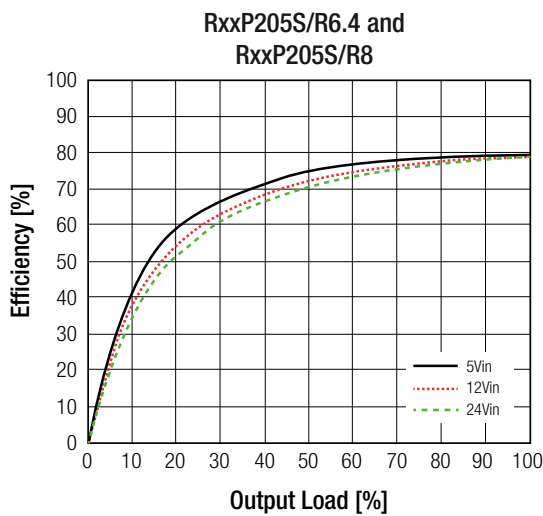
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range			±10%	
Minimum Load <sup>(6)</sup>		0%		
Internal Operating Frequency		20kHz	50kHz	85kHz
Output Ripple and Noise <sup>(7)</sup>	20MHz BW			200mVp-p

**Notes:**

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

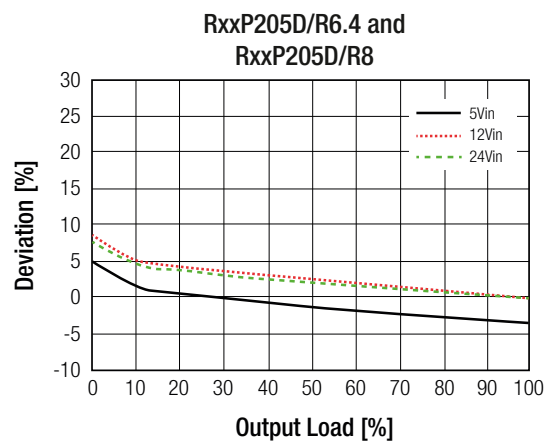
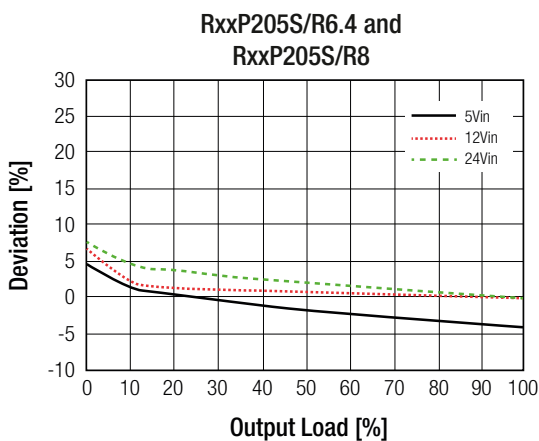
Note7: Measurements are made with a 0.1µF MLCC across output (low ESR)

**Efficiency vs. Load**



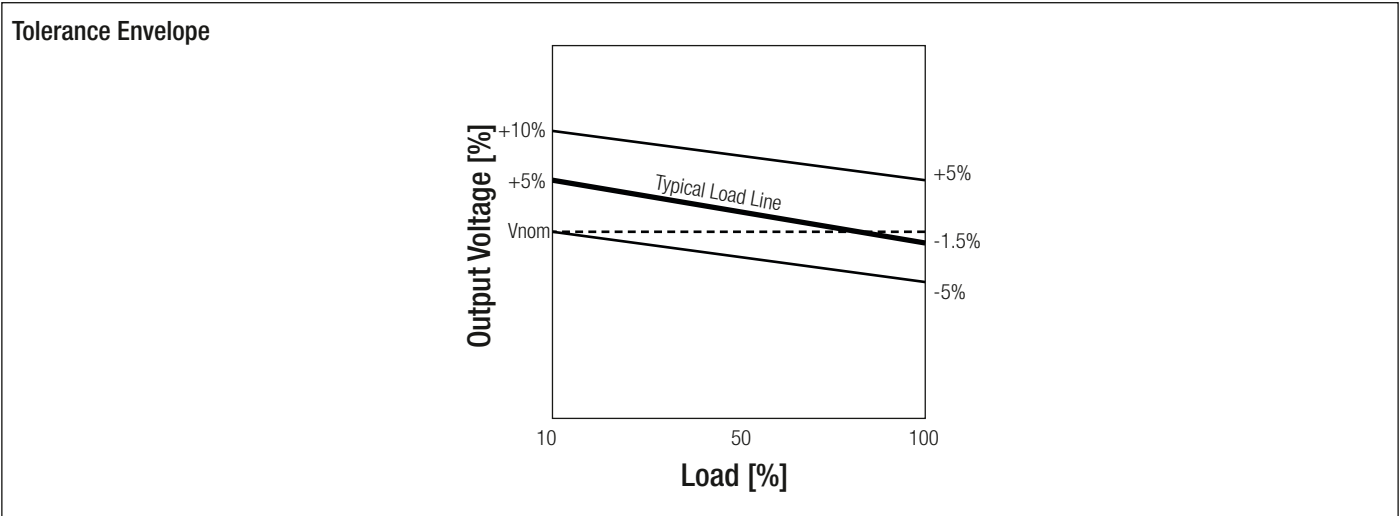
REGULATIONS			
Parameter	Condition		Value
Output Accuracy			±5.0% max.
Line Regulation	low line to high line, full load		1.2%/1% of Vin typ.
Load Regulation	10% to 100% load	3.3, 5VDC	15.0% typ.
		9, 12, 15VDC	10.0% typ.

**Deviation vs. Load**



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**Specifications** (measured at Ta= 25°C, nominal input voltage, full load)



PROTECTIONS				
Parameter	Type			Value
Short Circuit Protection (SCP)	without Suffix "P" with Suffix "P"			1 second continuous
Isolation Voltage <sup>(8)</sup>	I/P to O/P	tested for 1 second	/R6.4 /R8	6.4kVDC 8kVDC
		rated for 1 minute	/R6.4 /R8	3.2kVAC/60Hz 4kVAC/60Hz
Isolation Resistance				15GΩ min.
Isolation Capacitance				1.5pF min./10.0pF max.
Leakage Current				<0.01μA max.
Insulation Grade				reinforced
Means of Protection	34Vrms			2MOPP
Internal	clearance/creepage			>4.8mm
External	clearance/creepage			>4.8mm
<b>Notes:</b>				
Note8: For repeat Hi-Pot testing, reduce the time and/or the test voltage				

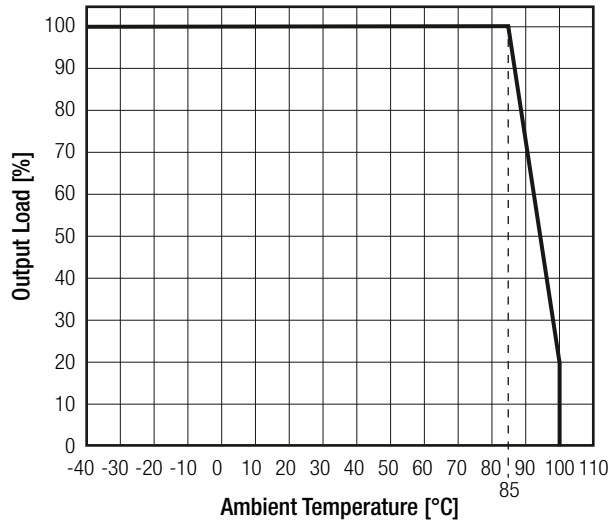
ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range	without derating @ natural convection 0.1m/s (see graph)		-40°C to +85°C
Maximum Case Temperature			+105°C
Operating Altitude			3000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	23429 x 10 <sup>3</sup> hours
		+85°C	9818 x 10 <sup>3</sup> hours

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**Specifications** (measured at Ta= 25°C, nominal input voltage, full load)

**Derating Graph**

(@ Chamber and natural convection 0.1 m/s)



**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	1605077-14	EN60950-1: 2006 + AM2:2013 IEC60950-1-2005 , 2nd Edition + AM2:2013
Information Technology Equipment, General Requirements for Safety	2207629	ANSI/UL60950-1, 1st Edition CAN/CSA C22.2 No. 60950-1
Medical Electric Equipment, General Requirements for Safety and Essential Performance	2207629	UL60601-1, 1st Edition CAN/CSA C22.2 No. 60601-1:2008
Medical Electric Equipment, General Requirements for Safety and Essential Performance	E314885-A5-UL	ANSI/AAMI ES60601-1:2005 +A2:10 CAN/CSA-C22.2 No. 60601-1:2008
Medical Electric Equipment, General Requirements for Safety and Essential Performance. (CB Scheme)	E314885-A5-CB-1	IEC60601-1:2005 + C2:2007
Medical Electric Equipment, General Requirements for Safety and Essential Performance	1205098-1	EN60601-1:2006 IEC60601-1:2005 + C2:2007
Safety requirements for electrical equipment for measurement, control and laboratory use	T1301251-313	EN61010:2010 IEC61010:2010, 3rd Edition
EAC	RU-AT.37.02367	TP TC 004/2011
RoHs 2+		RoHS (10/10)

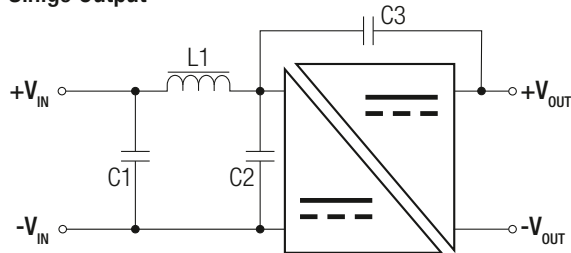
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter	EN55032, Class A/B

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### Specifications (measured at Ta= 25°C, nominal input voltage, full load)

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

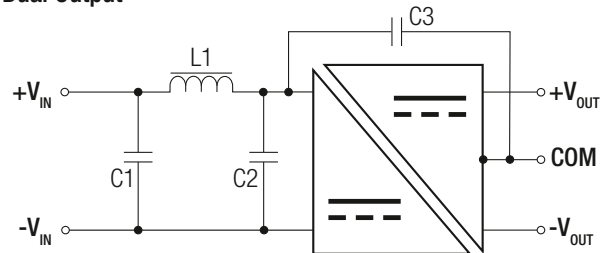
##### Single Output



##### Component List Class A

C1	L1	C3
10µF 100V MLCC	3.9µH choke WE 744 045 0039	470pF

##### Dual Output



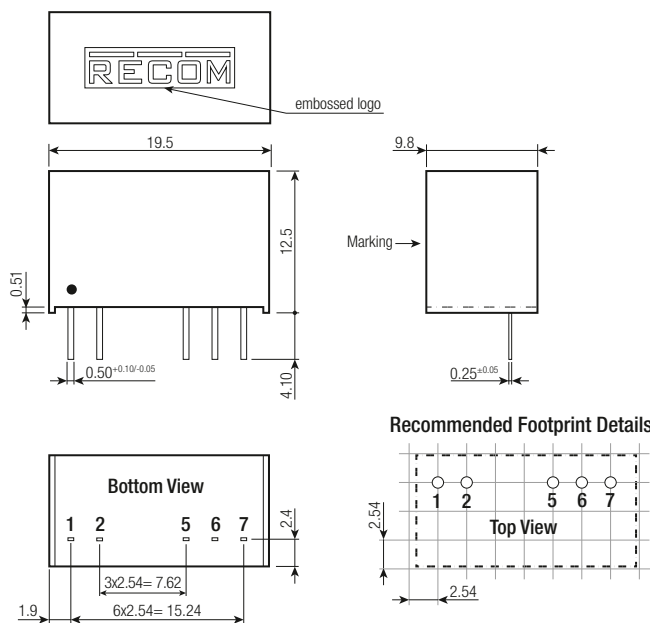
##### Component List Class B

C1	C1	L1	C3
10µF 100V MLCC	2.2µF 100V MLCC	12µH choke WE 744 045 120	470pF

### 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.

#### 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

### 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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