



**THE DATASHEET OF  
RB-123.3S/HP**



# Features

# Unregulated Converters

- Low cost 1W converter
- Power sharing on dual output versions
- 1kVDC/1s or 2kVDC/1s isolation option
- Optional continuous short circuit protection
- Efficiency up to 85%
- UL94V-0 package material

## RB

**1 Watt**  
**SIP7**  
**Single and**  
**Dual Output**



### Description

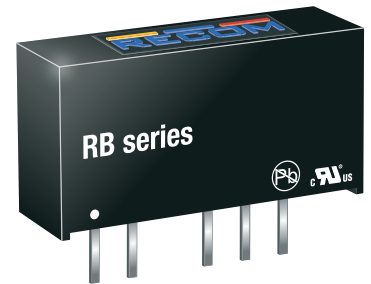
The RB series DC/DC converter has been designed for isolating or converting DC power rails in general purpose applications. Although low cost, it does not compromise on features and offers 1kVDC/1s or 2kVDC/1s isolation, a -40°C to +85°C operating temperature range and optional continuous short circuit protection.

### 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]
RB-xx3.3S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	3.3	303	75	2200
RB-xx05S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	5	200	70-78	2200
RB-xx09S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	9	111	70-78	1000
RB-xx12S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	12	84	78-80	470
RB-xx15S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	15	66	80-84	470
RB-xx24S <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	24	42	74-85	220
RB-xx3.3D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±3.3	±152	70	±1000
RB-xx05D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±5	±100	70-78	±1000
RB-xx09D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±9	±56	76-79	±470
RB-xx12D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±12	±42	78-82	±220
RB-xx15D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±15	±33	80-84	±220
RB-xx24D <sup>(3,4)</sup>	3.3, 5, 12, 15, 24	±24	±21	80-84	±100

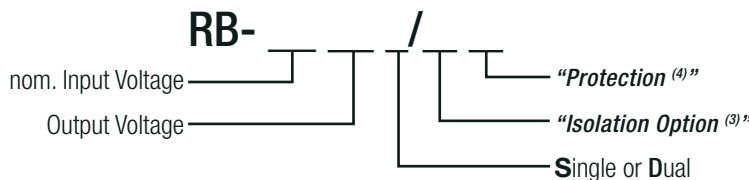
#### Notes:

- 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 and is defined as the capacitive load that will allow start up in under 1s without damage to the converter



UL60950-1 certified  
 CAN/CSA-C22.2 No 60950-1 certified  
 IEC/EN60950-1 certified  
 EN55032 compliant

### Model Numbering



#### Notes:

- Note3: standard part is without Continuous Short Circuit Protection  
 add suffix „/P“ for Continuous Short Circuit Protection  
 Note4: standard part is with 1kVDC/1s Isolation  
 add suffix „/H“ for 2kVDC/1s Isolation  
 or add suffix „/HP“ for 2kVDC/1s Isolation and Continuous Short Circuit Protection

#### Ordering Examples:

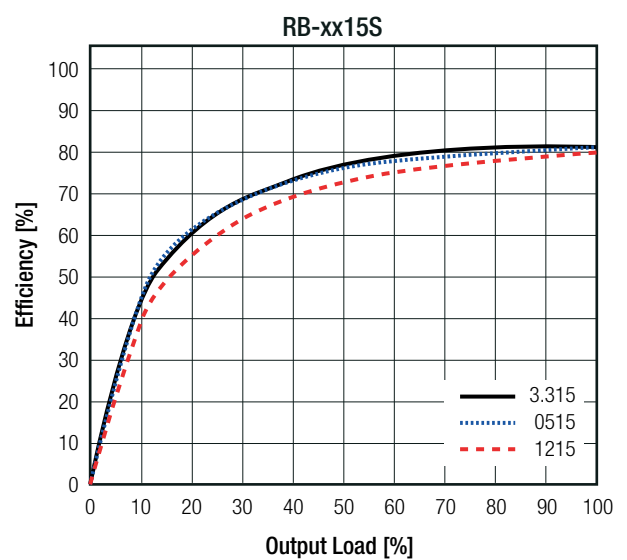
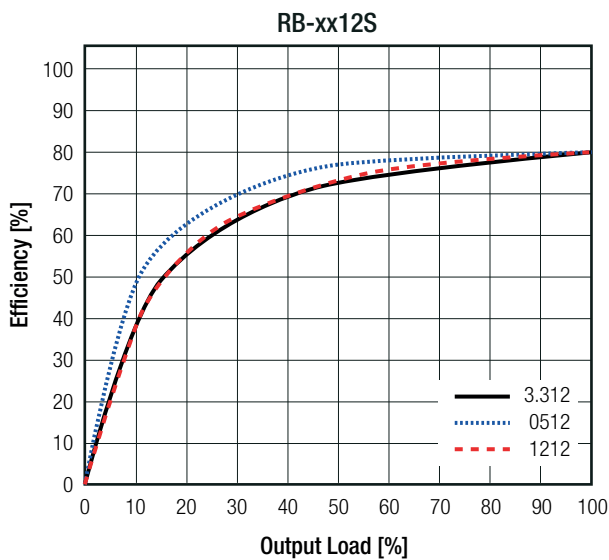
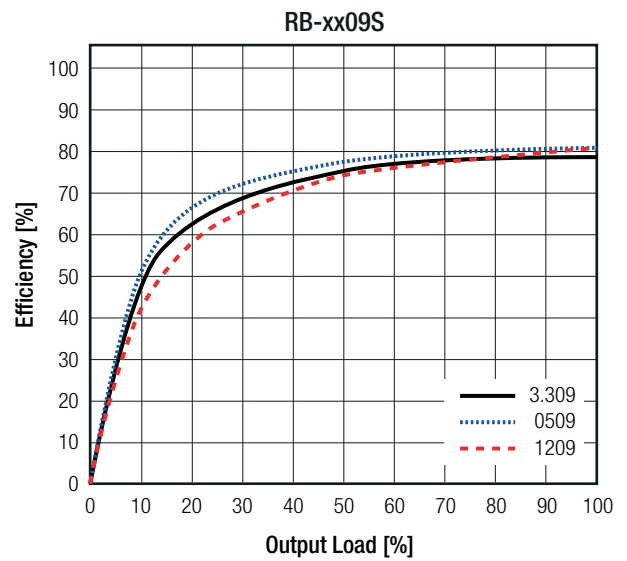
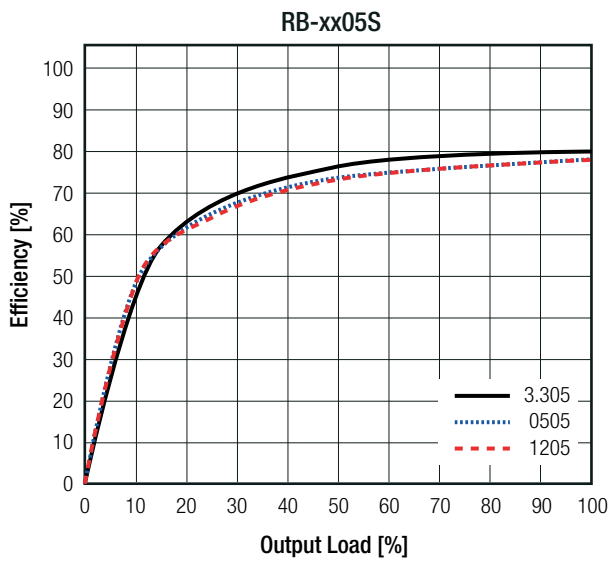
RB-123.3/P: 12VDC Input Voltage, 3.3VDC Output Voltage, Single Output with continuous short circuit protection and 1kVDC/1s isolation  
 RB-0509D/HP: 5VDC Input Voltage, ±9VDC Output Voltage, Dual Output with continuous short circuit protection and 2kVDC/1s isolation

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

**BASIC CHARACTERISTICS**

Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter			capacitor		
Input Voltage Range				±10%	
Minimum Load			0%		
Internal Operating Frequency			50kHz	100kHz	105kHz
Output Ripple and Noise	20MHz BW	Single output Dual output			100mVp-p ±75mVp-p

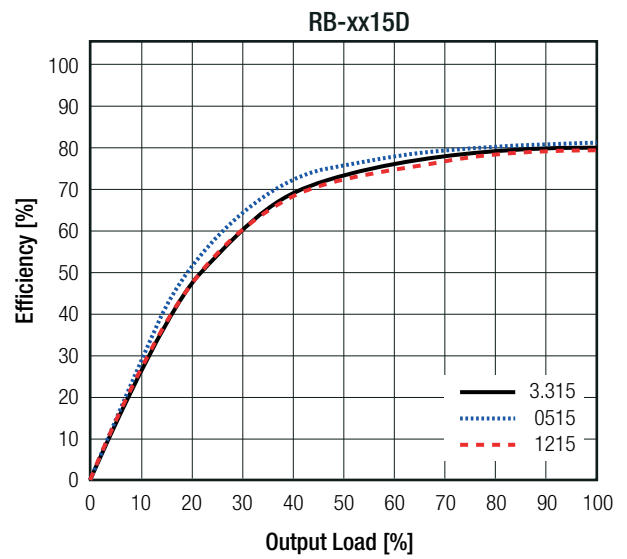
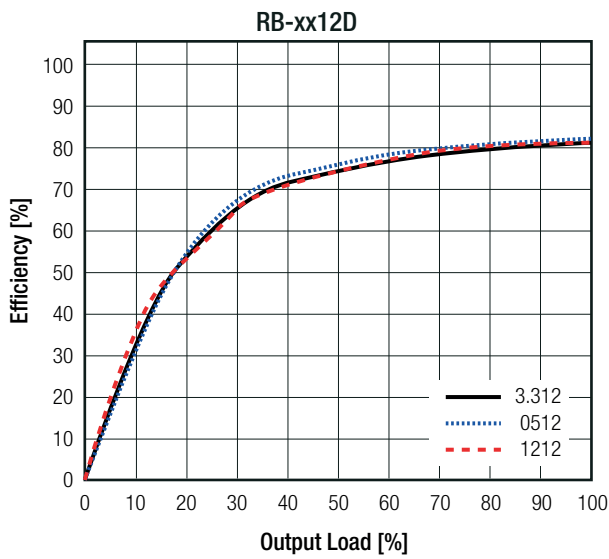
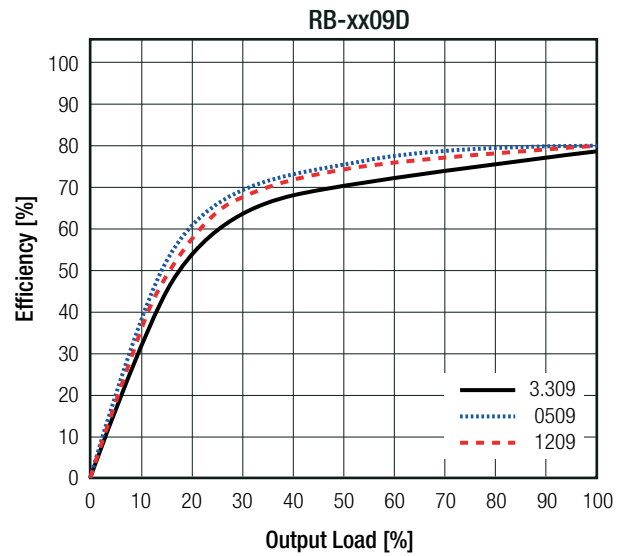
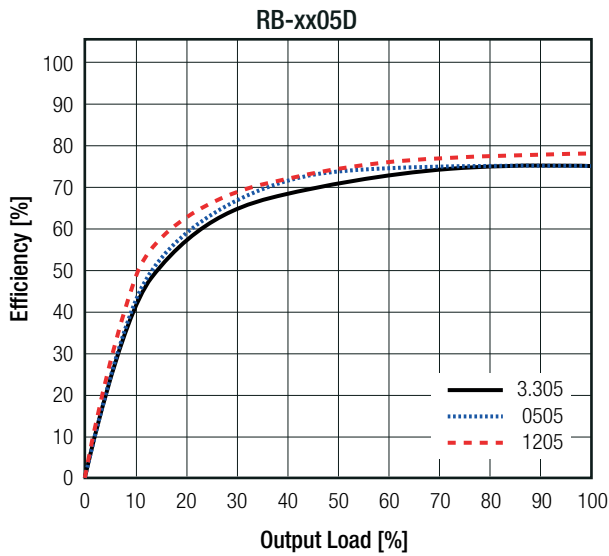
**Efficiency vs. Load**



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Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### Efficiency vs. Load



### REGULATIONS

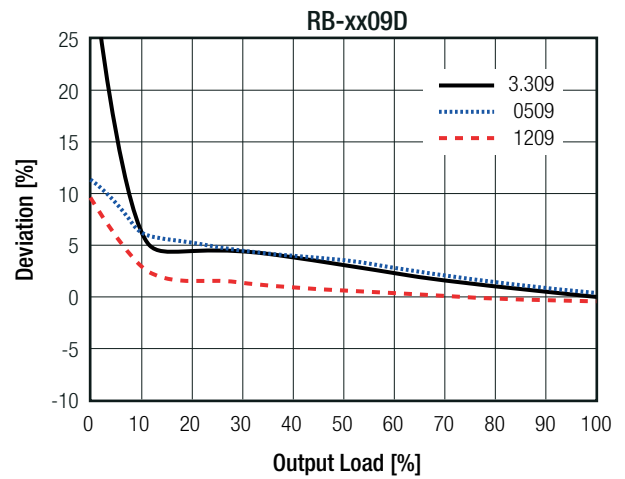
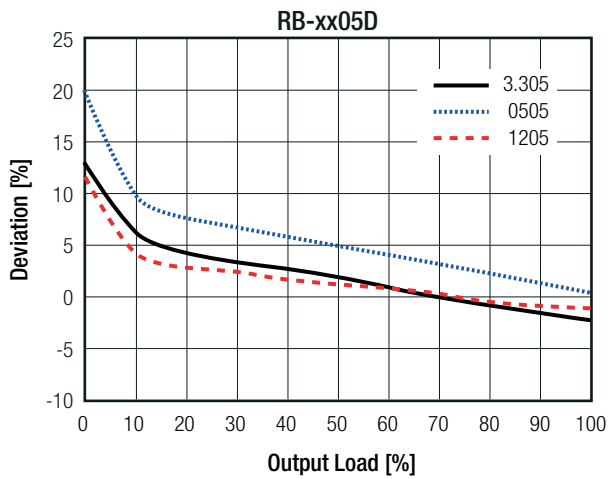
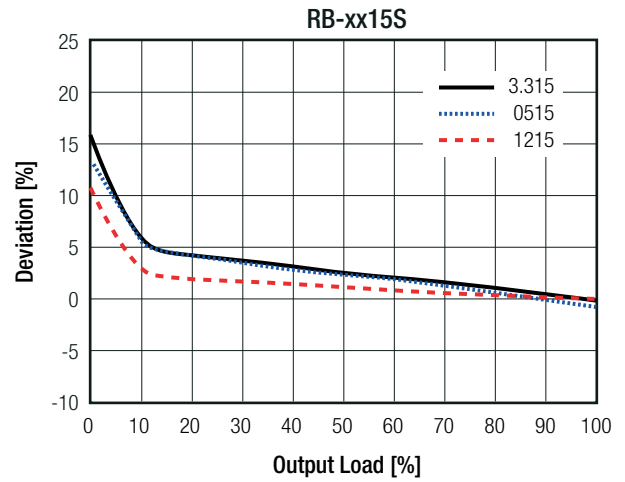
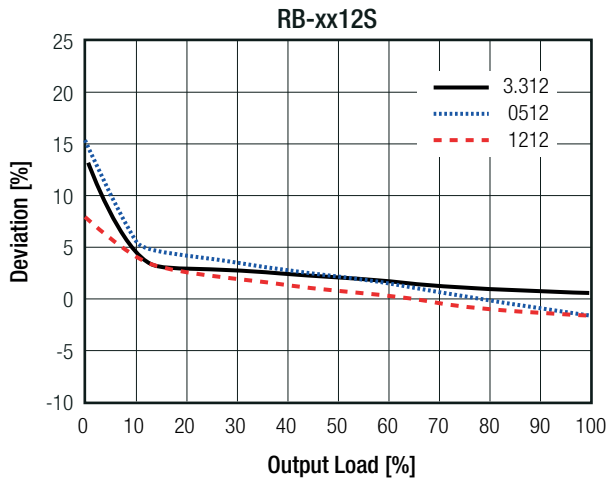
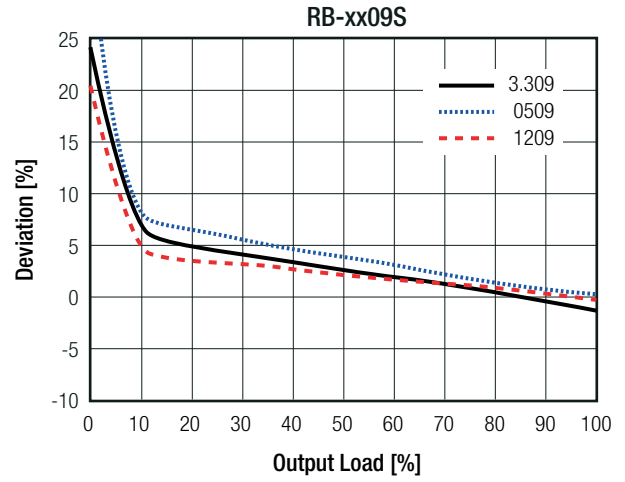
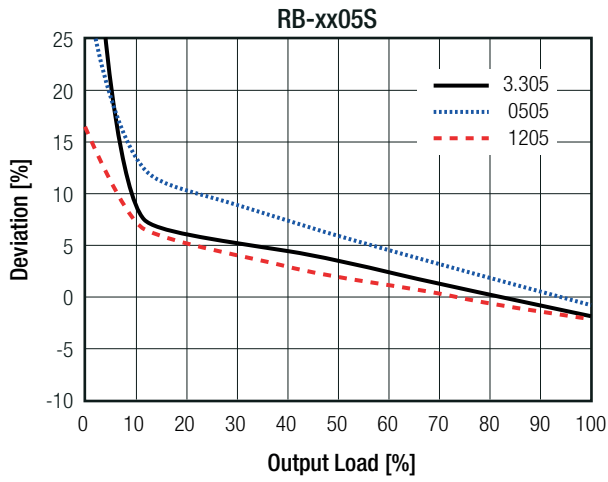
Parameter	Condition		Value
Output Accuracy			±5.0% typ.
Line Regulation	low line to high line		±1.2% of 1.0% Vin typ.
Load Regulation <sup>(5)</sup>	10% to 100% load	3.3, 5Vout	15.0% max.
		9, 12, 15, 24Vout	10.0% max.

**Notes:**

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

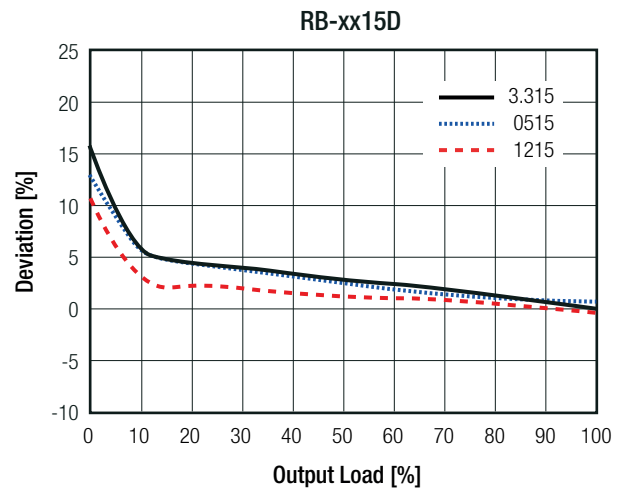
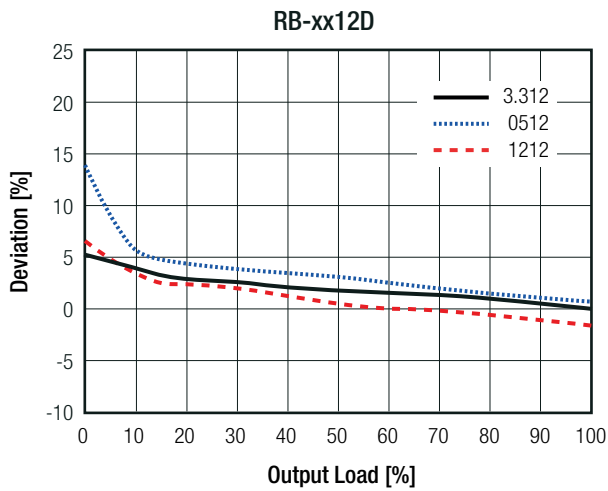
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Deviation vs. Load



**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

Deviation vs. Load



**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	without suffix	tested for 1 second rated for 1 minute 1kVDC 500VAC/60Hz
		with suffix "/H"	tested for 1 second rated for 1 minute 2kVDC 1kVAC/60Hz
Isolation Resistance			10GΩ min.
Isolation Capacitance			20pF min. / 75pF max.
Insulation Grade			basic (IEC/EN60950-1) functional (IEC/EN60601-1)

**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 also required. Recommended fuse: slow blow type

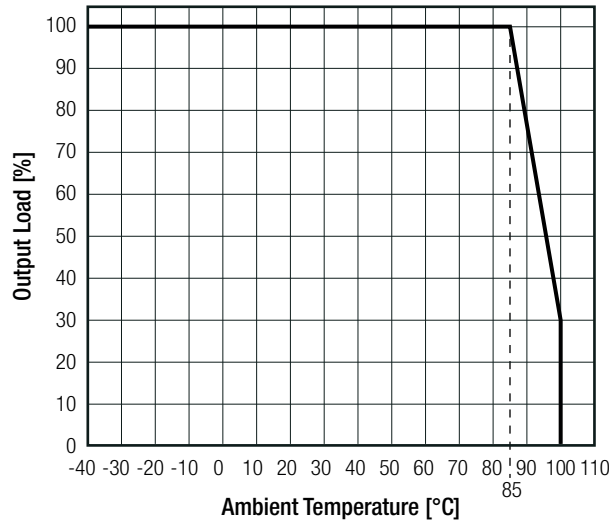
**ENVIRONMENTAL**

Parameter	Condition		Value
Operating Temperature Range	full load @ free air convection, refer to "Derating Graph"		-40°C to +85°C
Maximum Case Temperature			+105°C
Temperature Coefficient			±0.03%/K typ.
Thermal Impedance			56K/W typ.
Operating Altitude			3000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	16400 x 10 <sup>3</sup> hours
		+85°C	10200 x 10 <sup>3</sup> hours

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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

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

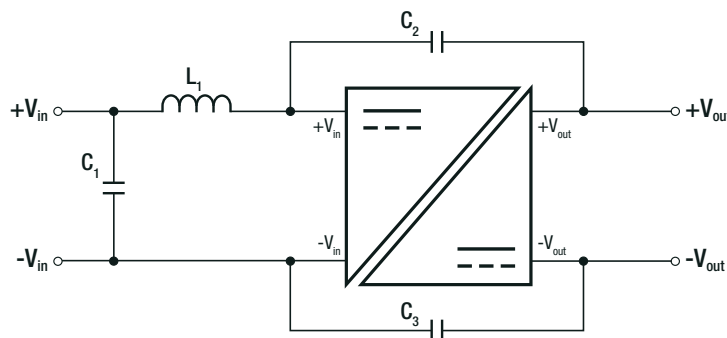


**SAFETY AND CERTIFICATIONS**

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E358085-A4-UL	UL60950-1, 2nd Edition:2007 CAN/CSA C22.2 No. 60950-1-03, 2nd Edition:2007
Information Technology Equipment, General Requirements for Safety	LVD1602031	IEC60950-1:2005, 2nd Edition + A2:2013 EN60950-1:2006 + A2:2013
Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance	WD-SE-R-180677-A0	IEC60601-1:2005 + A1:2012, 3rd Edition EN60601-1:2006 + A12:2014
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS 2		RoHS-2011/65/EU + AM-2015/863

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

**EMC Filter Suggestion according to EN55032**



**Component List Class A**

MODEL	C1	L1	C2 (safety)	C3 (safety)
RB-0505S	10µF 100V MLCC	N/A	N/A	2.2nF
RB-1205S				
RB-2405S				

**Component List Class B**

MODEL	C1	L1	C2 (safety)	C3 (safety)
RB-0505S	10µF 100V MLCC	22µH choke RLS-226	1nF	2.2nF
RB-1205S				
RB-2405S				

**Notes:**

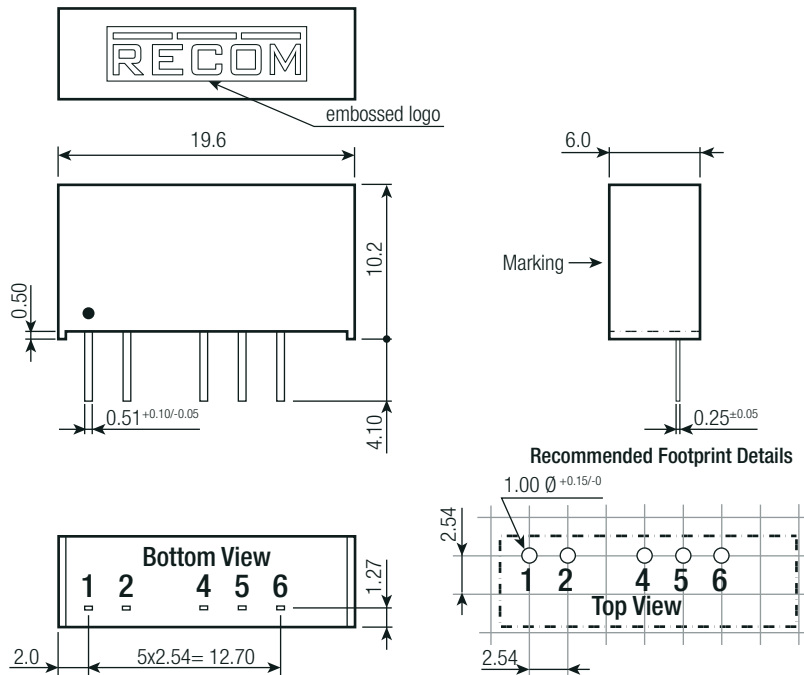
Note8: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

### Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

#### 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)
Dimension (LxWxH)		19.6 x 6.0 x 10.2mm
Weight		2.2g typ.

#### Dimension Drawing (mm)



#### Pinning Information

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	NC	-Vout
5	-Vout	Com
6	+Vout	+Vout

NC = No Connection

Tolerance:

xx.x= ±0.5mm

xx.xx= ±0.25mm



#### PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 16.0 x 9.0mm
Packaging Quantity	tube	25pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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