

Features

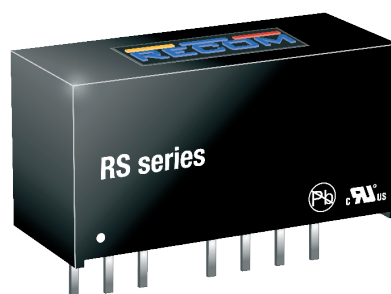
Regulated Converters

- 2:1 and 4:1 wide input voltage range
- SIP8 package style
- UL94 V-0 package material
- Continuous short circuit protected
- Low noise
- 1kVDC, 2kVDC or 3kVDC isolation

RECOM
DC/DC Converter

RS(-Z)

2 Watt
SIP8
Single & Dual
Output



CULUS
E224736

UL60950-1 certified
CAN/CSA No. 60950-1-07 certified
IEC/EN60950-1 certified
CB Report

PREFERRED ALTERNATIVES

For new medical applications:

REM3.5E



Description

High power-density, an industrial temperature range of -40°C to +100°C and extra features like Remote-On-Off- control are just some of the characteristics of this converter, ideal for highly sophisticated industrial designs. The RS series is available with isolation of 2kV or 3kV by choosing option „H2“ or „H3“. The standard version offers 2:1 input voltage range, while the “Z” version features 4:1 input voltage range, which includes an input voltage range covering both 5V and 12V supplies.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. [%]	max. Capacitive Load ⁽²⁾ [μF]
RS-xx3.3S	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	3.3	500	68-73	4700
RS-xx3.3SZ	9-36, 18-72			75	
RS-xx05S	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	5	400	73-78	1000
RS-xx05SZ	9-36, 18-72			80	
RS-xx09S	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	9	222	74-81	1000
RS-xx09SZ	9-36, 18-72			80	
RS-xx12S	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	12	166	75-83	1000
RS-xx12SZ	9-36, 18-72			83	
RS-xx15S	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	15	134	75-83	1000
RS-xx15SZ	9-36, 18-72			84	
RS-xx3.3D	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	±3.3	±250	68-73	±2200
RS-xx3.3DZ	9-36, 18-72			73	
RS-xx05D	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	±5	±200	73-78	±680
RS-xx05DZ	9-36, 18-72			77	
RS-xx09D	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	±9	±111	74-81	±680
RS-xx09DZ	9-36, 18-72			80	
RS-xx12D	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	±12	±83	75-83	±680
RS-xx12DZ	9-36, 18-72			81	
RS-xx15D	4.5-9 ⁽¹⁾ , 9-18, 18-36, 36-72	±15	±67	75-83	±680
RS-xx15DZ	9-36, 18-72			83	

Notes:

Note1: Derate to 85% load if V_{IN} is <5VDC (refer to „Line Derating for V_{IN} = <5VDC“)

Note2: Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage the converter

Model Numbering



Notes:

Note3: add „Z“ for 4:1 Input Voltage (24= 9-36VDC or 48= 18-72VDC)

Note4: add suffix „H2“ for 2kVDC isolation or „H3“ for 3kVDC isolation, without suffix = standard 1kVDC isolation

Ordering Examples:

RS-053.3S	4.5-9Vin	3.3Vout	Single	2:1 Input Voltage	1kVDC Isolation
RS-1212D/H2	9-18Vin	±12Vout	Dual	2:1 Input Voltage	2kVDC Isolation
RS-2415DZ/H3	9-36Vin	±15Vout	Dual	4:1 Input Voltage	3kVDC Isolation

Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. V_{in} , full load after warm up unless otherwise specified)

BASIC CHARACTERISTICS

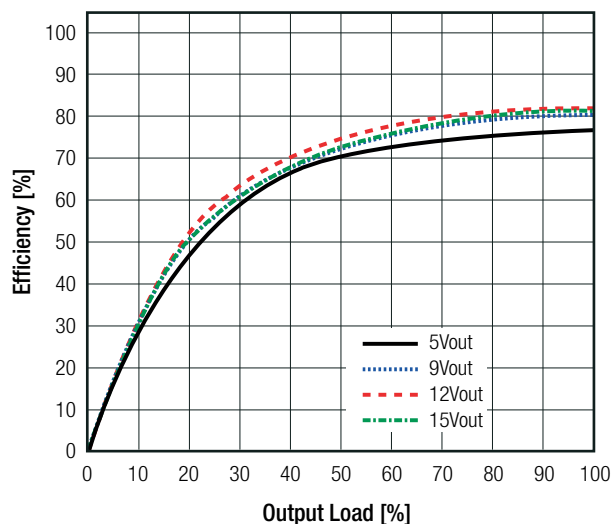
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	2:1 Input	5VDC	4.5VDC ⁽¹⁾		9VDC
		nom $V_{in} = 12\text{VDC}$	9VDC		18VDC
	4:1 Input	24VDC	18VDC		36VDC
		48VDC	36VDC		72VDC
Quiescent Current		5VDC		40mA	
		nom $V_{in} = 12\text{VDC}$		32mA	
		24VDC		25mA	
		48VDC		15mA	
Minimum Load ⁽⁵⁾			10%		
ON/OFF CTRL	refer to „ON/OFF CTRL“	DC-DC ON DC-DC OFF	open or high impedance external $V_{CTRL} = 5\text{--}12\text{VDC} + 1\text{N}4148$ and 68Ω resistor		
Internal Operating Frequency			100kHz		300kHz
Output Ripple and Noise	20MHz BW				50mVp-p

Notes:

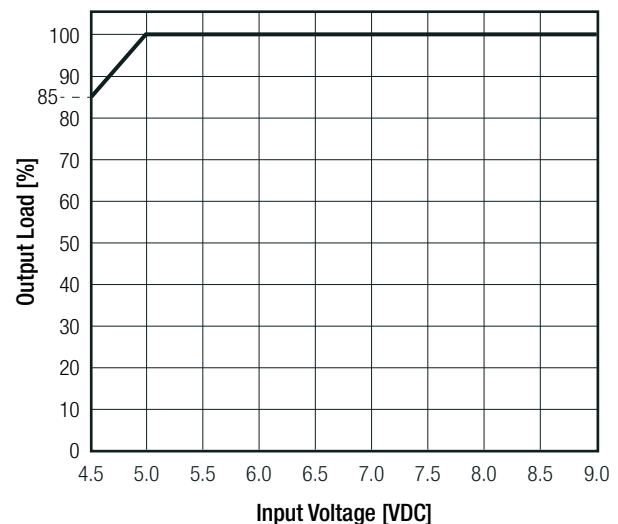
Note5: Operation below 10% load won't harm the converter, but specifications may not be met

Efficiency vs. Load

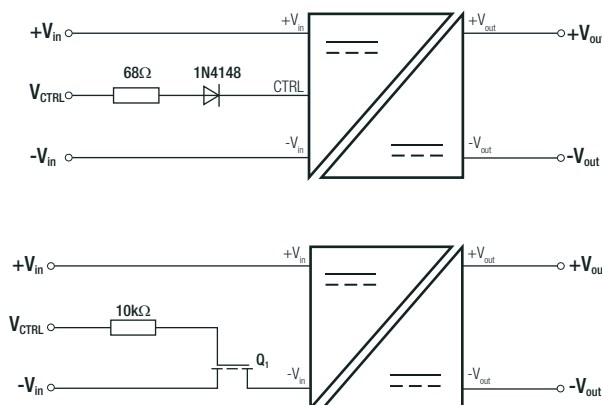
RS-24xx



Line Derating for $V_{IN} < 5\text{VDC}$



ON/OFF CTRL



DC-DC ON: Open or high impedance

DC-DC OFF: $V_{CTRL} = 5\text{--}12\text{VDC} + 1\text{N}4148$ and 68Ω resistor



Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. V_{in} , full load after warm up unless otherwise specified)

REGULATIONS

Parameter	Condition	Value
Output Accuracy		$\pm 2.0\%$ typ.
Line Regulation		$\pm 0.5\%$ max.
Load Regulation	20% to 100% load	0.5% max.

PROTECTIONS

Parameter	Type			Value
Short Circuit Protection (SCP)	below 100mΩ			continuous, auto recovery
Isolation Voltage ⁽⁶⁾	standard without suffix	tested for 1 second		1kVDC
		rated for 1 minute		500VAC/60Hz
	/H2 version	tested for 1 second		2kVDC
		rated for 1 minute		1kVAC/60Hz
	/H3 version	tested for 1 second		3kVDC
		rated for 1 minute		1.5kVAC/60Hz
Isolation Resistance				1GΩ min.
Isolation Capacitance	standard without suffix	2:1 Input 2:1 Input 4:1 Input	Single Dual Single	10pF min. / 40pF typ. / 60pF max. 120pF min. / 170pF typ. / 250pF max. 200pF max.
	/H2 and /H3 version	2:1 Input 4:1 Input	Single/Dual Single/Dual	5pF min. / 30pF typ. / 60pF max. 30pF max.
Insulation Grade	according to 60950-1			basic

Notes:

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

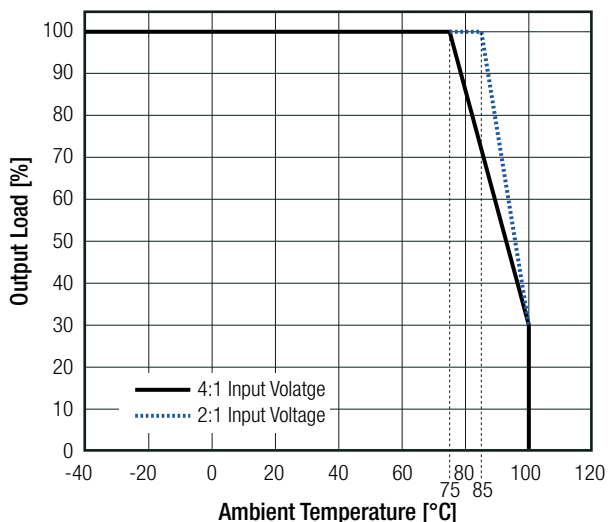
Note7: An input fuse is required if the mains supply is not over-current protected. Recommended fuse: slow blow type

ENVIRONMENTAL

Parameter	Condition	Value
Operating Temperature Range	with derating @ free air convection, refer to „Derating Graph“	-40°C to $+100^\circ\text{C}$
Operating Altitude	according to 60950-1	5000m
Operating Humidity	non-condensing	95% RH max.
Pollution Degree		PD2
MTBF	according to MIL-HDBK-217F, G.B.	$+25^\circ\text{C}$ 1398 x 10 ³ hours $+85^\circ\text{C}$ 210 x 10 ³ hours

Derating Graph

(@ Chamber and free air convection)



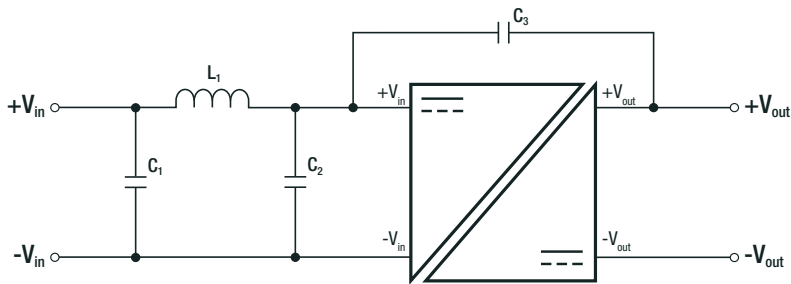
Specifications (measured @ ta= 25°C, nom. Vin, full load after warm up unless otherwise specified)

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety (LVD)	SPCLVD1605077-10	IEC60950-1, 2nd Edition, AM2: 2013 EN60950-1, 2nd Edition, A2:2013
Information Technology Equipment, General Requirements for Safety (CB)	L0339L48-CB-1-B1	IEC60950-1:2005, 2nd Edition + A2:2013
Information Technology Equipment, General Requirements for Safety	E224736-A35-UL	UL60950-1, 2nd Edition, 2014 CAN/CSA C22.2 No. 60950-1-07
Medical Electric Equipment, General Requirements for Safety and Essential Performance	SPC1006048	IEC 60601-1:1988 + A2:1995 EN 60601-1:1990 + A13 :1996
EAC	RU-AT.AB49.B.09571	TP TC 004/2011
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements ⁽⁸⁾	with external filter (see filter suggestion below)	EN55032, Class A EN55032, Class B

EMC Filtering Suggestions according to EN55032



Component List Class A

Model	C1, C2	C3	L1
RS-0505S	10µF/100V MLCC	N/A	3.9µH choke RLS-397
RS-1205S			
RS-2405S		1nF	
RS-4805S			

Component List Class B

Model	C1, C2	C3	L1
RS-0505S	10µF/100V MLCC	2.2nF	12µH choke RLS-126
RS-1205S			
RS-2405S			
RS-4805S			

Notes:

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

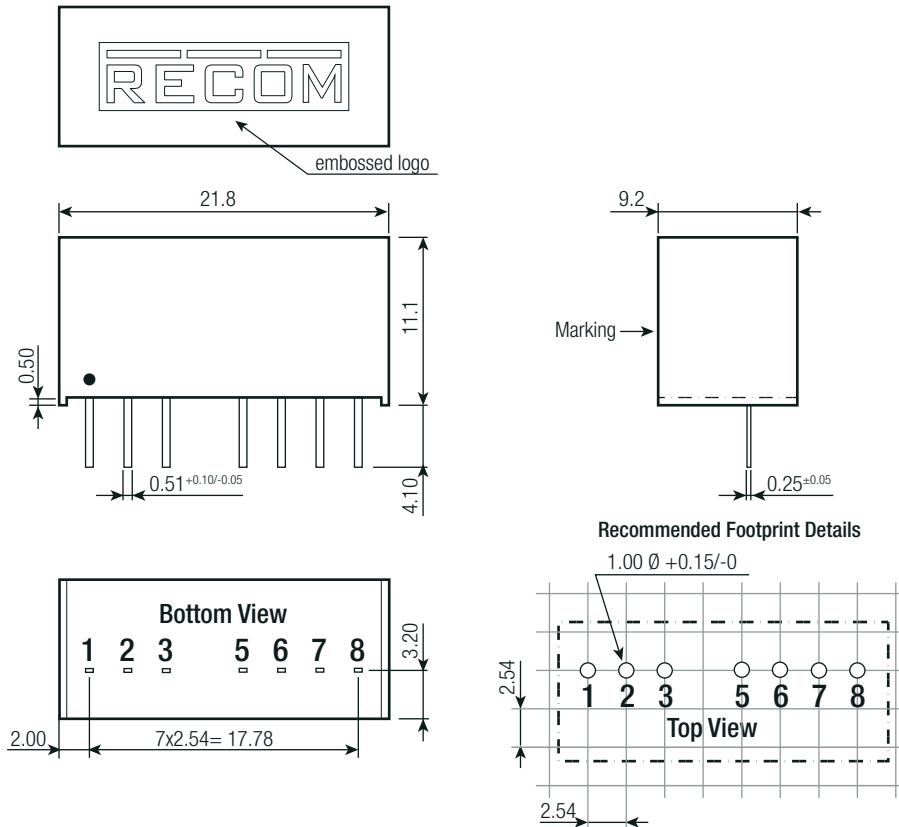
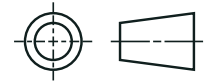
DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case Potting PCB	non-conductive black plastic, (UL94 V-0) epoxy, (UL94 V-0) FR4, (UL94 V-0)
Package Dimension (LxWxH)		21.8 x 9.2 x 11.1mm
Package Weight		4.7g typ.

continued on next page

Specifications (measured @ $t_a = 25^\circ\text{C}$, nom. Vin, full load after warm up unless otherwise specified)

Dimension Drawing (mm)



Pinning information

Pin #	Single	Dual
1	-Vin	-Vin
2	+Vin	+Vin
3	CTRL ⁽⁹⁾	CTRL ⁽⁹⁾
5	NC	NC
6	+Vout	+Vout
7	-Vout	COM
8	NC ⁽¹⁰⁾	-Vout

NC= no connection

Tolerance: xx.x = $\pm 0.5\text{mm}$

xx.xx = $\pm 0.25\text{mm}$

Notes:

Note9: This pin provides an Off function which puts the converter into a low power mode. When the pin is 'high' the converter is OFF and when the pin is open the converter is ON. There is no allowed low state for this pin. (refer to „ON/OFF CTRL“)

Note10: This pin is used internally. No external connection allowed

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 17.0 x 10.0mm
Packaging Quantity		22pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity		95% RH max.

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