## **Features**

# Regulated Converters

- 2:1 and 4:1 Wide Input Voltage Ranges
- 1kVDC, 2kVDC & 3kVDC Isolation
- UL94V-O Package Material
- Continuous Short Circuit Protection
- Low Noise
- No External Capacitor needed
- Efficiency to 83 %

Rated Output Output Current

### Description

Part Number

High power-density, an industrial temperature range of  $-40^{\circ}$ C to  $+85^{\circ}$ 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" in which case it is also ideal for medical applications which additionally require EN-60601-1 certification.

**Efficiency** 

May

#### **Selection Guide** 5V. 12V. 24V and 48V Input Types

Innut

Part Number	Input	Rated Output	Output Current	Efficiency	Max
O.D.o.	Voltage Range	Voltage	at Full Load	typ.	Capacitive
SIP8	(VDC)	(VDC)	(mA)	(%)	Load
RS-xx3.3S (H2/H3)	4.5-9, 9-18	3.3	500	68-69	4700µF
	18-36, 36-72		100	70-73	1000 F
RS-xx05S (H2/H3)	4.5-9, 9-18	5	400	73-75	1000μF
DO 000 (110 (110)	18-36, 36-72		200	78	1000 F
RS-xx09S (H2/H3)	4.5-9, 9-18	9	222	74-78	1000μF
70 400 (110 (110)	18-36, 36-72			81	
RS-xx12S (H2/H3)	4.5-9, 9-18	12	166	75-80	1000µF
	18-36, 36-72			83	
RS-xx15S (H2/H3)	4.5-9, 9-18	15	134	75-80	1000µF
	18-36, 36-72			83	
RS-xx3.3D (H2/H3)	4.5-9, 9-18	±3.3	±250	68-69	±2200μF
	18-36, 36-72			70-73	
RS-xx05D (H2/H3)	4.5-9, 9-18	±5	±200	73-75	±680µF
	18-36, 36-72			78	
RS-xx09D (H2/H3)	4.5-9, 9-18	±9	±111	74-78	±680µF
	18-36, 36-72			81	
RS-xx12D (H2/H3)	4.5-9, 9-18	±12	±83	75-80	±680µF
	18-36, 36-72			83	
RS-xx15D (H2/H3)	4.5-9, 9-18	±15	±67	75-80	±680µF
	18-36, 36-72			83	
RS-xx3.3SZ (H2/H3)	9-36	3.3	500	75	4700µF
	18-72			75	
RS-xx05SZ (H2/H3)	9-36	5	400	80	1000µF
	18-72			80	
RS-xx09SZ (H2/H3)	9-36	9	222	80	1000µF
	18-72			80	
RS-xx12SZ (H2/H3)	9-36	12	166	83	1000µF
	18-72			83	
RS-xx15SZ (H2/H3)	9-36	15	134	84	1000µF
	18-72			84	
RS-xx3.3DZ (H2/H3)	9-36	±3.3	±250	73	±2200µF
	18-72			73	
RS-xx05DZ (H2/H3)	9-36	±5	±200	77	±680µF
	18-72			77	·
RS-xx09DZ (H2/H3)	9-36	±9	±111	80	±680µF
, ,	18-72			80	
RS-xx12DZ (H2/H3)	9-36	±12	±83	81	±680μF
(	18-72			81	
RS-xx15DZ (H2/H3)	9-36	±15	±67	83	±680µF
	18-72	-	-	83	<b>r</b>

No suffix is standard isolation (1kVDC) e.g, RS-0505S

\*add suffix /H2 or /H3 for 2kVDC or 3kVDC isolation, e.g, RS-0505S/H2, RS-0505DZ/H3

## **ECONOLINE**

DC/DC-Converter with 3 year Warranty



# 2 Watt SIP8 Isolated Single & Dual Output



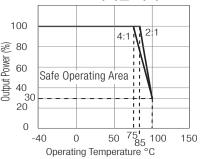
EN-60950-1 Certified EN-60601-1 Certified\* (\*/H suffix)

RS

## **Derating-Graph**

(Ambient Temperature)

 $RS-S(Z)_D(Z)$ 



**2:1** Input (RS-S/D) xx = 4.5-9Vin = 05

xx = 4.5-9Vin = 05xx = 9-18Vin = 12

xx = 18-36Vin = 24xx = 36-72Vin = 48 **4:1** Input (RS-SZ/DZ) xx = 9-36Vin = 24

xx = 18-72Vin = 48

Refer to Application Notes

## **ECONOLINE**

## DC/DC-Converter

# RS-S\_D(Z) Series

Puput Voltage Range   92 min Accuracy   92 m	<b>Specifications</b> (measured at $T_A = 25$ °C, r	ominal input voltage, fu	ull load and after warm-up time unless	otherwise specified)
Line Voltage Regulation	Input Voltage Range			2:1 and 4:1
Continum Load	Output Accuracy			±2% typ.
Minimum Load         10% ™           Output Ripple and Noise (20MHz limited)         Full Load         100Hz m.           Switching Frequency         Full Load         100Hz min. / 300kHz max.           Switching Frequency         Res 1 Load         100Hz min. / 300kHz max.           Efficiency at Full Load         Res 65xMs_D         40mA typ.           Oursecent Current         RS-65xMs_D         32mA typ.           Nominal Input Voltage         RS-12xMs_D, Sz_DZ         32mA typ.           Standard, H2 and H3)         Rs-24xMs_D, Sz_DZ         15mA typ.           Isolation Voltage         Standard         (tested for 1 second)         1000VDC           H2 Version         (tested for 1 second)         2000VDC         2000VDC           H2 Version         (tested for 1 second)         2000VDC         2000VDC           H2 And H3         2:1 Single         100F min. / 40pF typ. / 60pF max.           H2 And H3         2:1 Single         10pF min. / 40pF typ. / 60pF max.           Standard         2:1 Dual         5pF min. / 30pF typ. / 60pF max.           M2 And H3         2:1 Single         5pF min. / 30pF typ. / 60pF max.           M2 And H3         4:1 Single/Dual         5pF min. / 30pF typ. / 60pF max.           Standard         4:1 Single/Dual         5pF mi	Line Voltage Regulation			±0.5% max.
Output Rippie and Noise (20MHz limited)         Full Load         100MHz min. / 300kHz max.           Switching Frequency         Full Load         100MHz min. / 300kHz max.           Efficiency at Full Load         See Selection Guide           Quiescent Current         RS-05xxS_D         40mA typ.           Nominal input Voltage         RS-12xxS_D         32mA typ.           (Standard, H2 and /H3)         RS-24xxS_D, SZ_DZ         25mA typ.           Solation Voltage         Standard         (tested for 1 second)         1000VDC           (rated for 1 minute**)         500VAC / 60Hz           /H2 Version         (tested for 1 second)         2000VDC           (rated for 1 minute**)         1500VAC / 60Hz           /H3 Version         (tested for 1 second)         3000VDC           (rated for 1 minute**)         1500VAC / 60Hz           /H3 Version         (tested for 1 second)         600 Fmax.           /H3 Version         (tested for 1 second)         700 Fmax.           /H3 Version         (tested for 1 second)         700 Fmax.           /H2 and /H3         2:1 Single         10pF min. / 40pF my. / 60pF max.           /H2 and /H3         2:1 Dual         120pF min. / 170pF typ. / 250pF max.           /H2 and /H3         2:1 Dual         5pF min. / 30pF typ	Load Voltage Regulation		20%-100% Load	±0.5% max.
Switching Frequency         Full Load         100kHz min. / 300kHz max.           Efficiency at Full Load         See Selection Guide           Quiescent Current         RS-05xxS_D         40mA typ.           Nominal Injury Voltage         RS-12xxS_D         32mA typ.           (Standard, H2 and /H3)         RS-24xxS_D, SZ_DZ         25mA typ.           Isolation Voltage         Standard         (tested for 1 second)         1000VDC           (rated for 1 minute**)         500VAc / 60Hz           (tested for 1 second)         2000VDC           (rated for 1 minute**)         1000VDC           (rated for 1 minute**)         1000VDC           (rated for 1 minute**)         1500VAC / 60Hz           Isolation Capacitance         Standard         2:1 Single         10pF min. / 40pF typ. / 60pF max.           At2 and /H3         2:1 Single         10pF min. / 40pF min. / 40pF max.           At2 and /H3         2:1 Dual         120pF min. / 170pF typ. / 60pF max.           At2 and /H3         2:1 Dual         120pF min. / 170pF typ. / 60pF max.           Isolation Resistance         2:1 Dual         120pF min. / 170pF typ. / 60pF max.           Isolation Resistance         2:1         40mC to +85°C           Short Circuit Protection         2:1         40mC to +85°C <td>Minimum Load</td> <td></td> <td></td> <td>10% (2)</td>	Minimum Load			10% (2)
See Selection Guide   Curient   RS-05xxS_D   A0mA typ.     Nominal input Voltage   RS-12xxS_D   32mA typ.     Scandard, H2 and H3)   RS-24xxS_D, SZ_DZ   25mA typ.     RS-48xxS_D, SZ_DZ   15mA typ.     RS-48x	Output Ripple and Noise (20MHz limited)			50mVp-p max.
Nominal input Voltage   RS-05xxS_D   40mA typ.	Switching Frequency		Full Load	100kHz min. / 300kHz max.
Nominal input Voltage   RS-12xxS_D   32mA typ.     Standard, /H2 and /H3   RS-24xxS_D, SZ_DZ   25mA typ.     RS-24xxS_D, SZ_DZ   15mA typ.	Efficiency at Full Load			See Selection Guide
Standard, /H2 and /H3   Standard   RS-24xxS_D, SZ_DZ   SSMA typ.   RS-48xxS_D, SZ_DZ   SSMA typ.   RS-48xxS_D, SZ_DZ   SSMA typ.   SSMA	Quiescent Current		RS-05xxS_D	40mA typ.
Standard   (tested for 1 second)   1000VDC (rated for 1 minute**)   500VAC / 60Hz   (tested for 1 second)   1000VDC (rated for 1 minute**)   500VAC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   3000VDC / 60Hz   (tested for 1 second)   4120V / 60Pz	Nominal input Voltage		RS-12xxS_D	32mA typ.
Standard   (tested for 1 second)   1000VDC (rated for 1 minute**)   500VAC / 60Hz   (tested for 1 second)   1000VDC (rated for 1 minute**)   500VAC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   2000VDC / 60Hz   (tested for 1 second)   3000VDC / 60Hz   (tested for 1 second)   4120V / 60Pz	(Standard, /H2 and /H3)		RS-24xxS_D, SZ_DZ	25mA typ.
Standard   (tested for 1 second)   1000VDC   (rated for 1 minute**)   500VAC / 60Hz   2000VDC   (rated for 1 minute**)   1000VAC / 60Hz   2000VDC   (rated for 1 minute**)   1000VAC / 60Hz   2000VDC   (rated for 1 minute**)   1000VAC / 60Hz   2000VDC   (rated for 1 minute**)   1500VAC / 60Hz   2000VDC   (rated for 1 minute**)   (	,			
(rated for 1 minute**)	Isolation Voltage	Standard		
H2 Version	Ü		,	500VAC / 60Hz
Cated for 1 minute**) (tested for 1 second) (tested for 1 second) (tested for 1 second) (tested for 1 second) (rated for 1 minute**) (tested for 1		/H2 Version	(tested for 1 second)	
Salation Capacitance			(rated for 1 minute**)	1000VAC / 60Hz
Standard   2:1 Single   10pF min. / 40pF typ. / 60pF max. /H2 and /H3   2:1 Single   5pF min. / 30pF typ. / 60pF max. Standard   2:1 Dual   120pF min. / 170pF typ. / 250pF max. /H2 and /H3   2:1 Dual   5pF min. / 30pF typ. / 60pF max. Standard   4:1 Single/Dual   5pF min. / 30pF typ. / 60pF max. /H2 and /H3   4:1 Single/Dual   30pF max. /H2 and /H3		/H3 Version	(tested for 1 second)	3000VDC
A   A   A   A   A   A   B     S   S   S   S     S   S   S     S   S			(rated for 1 minute**)	1500VAC / 60Hz
Standard   2:1 Dual   120pF min. / 170pF typ. / 250pF max. /H2 and /H3   2:1 Dual   5pF min. / 30pF typ. / 60pF max. Standard   4:1 Single/Dual   200pF max. /H2 and /H3   4:1 Single/Dual   30pF max /H2 and /H3   30pF max /H2 and /H3	Isolation Capacitance	Standard	2:1 Single	10pF min. / 40pF typ. / 60pF max.
HZ and /H3 Standard Standard /H2 and /H3 Standard /H2 and /H3 /H3 and /H3 /H3 ingle/Dual         2:1 Dual Stangle/Dual         5pF min. / 30pF typ. / 60pF max.           Isolation Resistance         1GΩ min.           Short Circuit Protection         Continuous           Operating Temperature Range         2:1         -40°C to +85°C (bo Derating)           No Derating)         4:1         -40°C to +75°C (bo +75°C		/H2 and /H3	2:1 Single	5pF min. / 30pF typ. / 60pF max.
Standard /H2 and /H3         4:1 Single/Dual 4:1 Single/Dual         200pF max 30pF max		Standard	2:1 Dual	120pF min. / 170pF typ. / 250pF max.
		/H2 and /H3	2:1 Dual	5pF min. / 30pF typ. / 60pF max.
		Standard	4:1 Single/Dual	200pF max.
Short Circuit Protection         Continuous           Operating Temperature Range         2:1         -40°C to +85°C           (No Derating)         4:1         -40°C to +75°C           Storage Temperature Range         -55°C to +125°C           Relative Humidity         95% RH           Package Weight         4.7g           Packing Quantity         22 pcs per Tube           MTBF (+25°C)         Detailed Information see Application Notes chapter "MTBF"         using MIL-HDBK 217F         1398 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011		/H2 and /H3	4:1 Single/Dual	30pF max
Operating Temperature Range         2:1         -40°C to +85°C           (No Derating)         4:1         -40°C to +75°C           Storage Temperature Range         -55°C to +125°C           Relative Humidity         95% RH           Package Weight         4.7g           Packing Quantity         22 pcs per Tube           MTBF (+25°C)         Detailed Information see Application Notes chapter "MTBF"         1398 x 10³ hours           (+85°C)         Application Notes chapter "MTBF"         210 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	Isolation Resistance			1GΩ min.
(No Derating)         4:1         -40°C to +75°C           Storage Temperature Range         -55°C to +125°C           Relative Humidity         95% RH           Package Weight         4.7g           Packing Quantity         22 pcs per Tube           MTBF (+25°C) (+85°C)         Detailed Information see Application Notes chapter "MTBF"         using MIL-HDBK 217F         1398 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	Short Circuit Protection			Continuous
Storage Temperature Range         -55°C to +125°C           Relative Humidity         95% RH           Package Weight         4.7g           Packing Quantity         22 pcs per Tube           MTBF (+25°C) (+85°C)         Detailed Information see Application Notes chapter "MTBF"         using MIL-HDBK 217F         1398 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	Operating Temperature Range		2:1	-40°C to +85°C
Relative Humidity         95% RH           Package Weight         4.7g           Packing Quantity         22 pcs per Tube           MTBF (+25°C) (+85°C)         Detailed Information see Application Notes chapter "MTBF"         using MIL-HDBK 217F         1398 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	(No Derating)		4:1	-40°C to +75°C
Package Weight  Packing Quantity  MTBF (+25°C)   Detailed Information see	Storage Temperature Range			−55°C to +125°C
Packing Quantity         22 pcs per Tube           MTBF (+25°C) (+85°C)         Detailed Information see Application Notes chapter "MTBF"         using MIL-HDBK 217F         1398 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	Relative Humidity			95% RH
$ \frac{\text{MTBF (+25°C)}}{\text{(+85°C)}} \right\} \underbrace{\begin{array}{l} \textit{Detailed Information see} \\ \textit{Application Notes chapter "MTBF"} \end{array}}_{\text{EN General Safety}} \underbrace{\begin{array}{l} \text{using MIL-HDBK 217F} \\ \text{using MIL-HDBK 217F} \end{array}}_{\text{Using MIL-HDBK 217F}} \underbrace{\begin{array}{l} 1398 \times 10^3 \text{ hours} \\ 210 \times 10^3 \text{ hours} \end{array}}_{\text{EN 60950-1:2006 + 11:2009+A1:2010+A12:2011}} $	Package Weight			4.7g
(+85°C)         Application Notes chapter "MTBF"         using MIL-HDBK 217F         210 x 10³ hours           Certifications         EN General Safety         Report: SPCLVD1212007         EN60950-1:2006 + 11:2009+A1:2010+A12:2011	Packing Quantity			22 pcs per Tube
Certifications EN General Safety Report: SPCLVD1212007 EN60950-1:2006 + 11:2009+A1:2010+A12:2011	MTBF (+25°C) \ Detailed Information see		using MIL-HDBK 217F	1398 x 10 <sup>3</sup> hours
	(+85°C)	MTBF"	using MIL-HDBK 217F	210 x 10 <sup>3</sup> hours
EN Medical Safety Report: MDD1205098-3 + RM1205098-3 IEC/EN 60601-1 3rd Edition	Certifications	EN General Safety	Report: SPCLVD1212007	EN60950-1:2006 + 11:2009+A1:2010+A12:2011
		EN Medical Safety	Report: MDD1205098-3 + RM1205	098-3 IEC/EN 60601-1 3rd Edition
Medical Report + ISO14971 Risk Assessment				Medical Report + ISO14971 Risk Assessment

<sup>\*\*</sup>Any data referred to in this datasheet are of indicative nature and based on our practical experience only. For further details, please refer to our Application Notes.

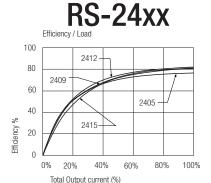
N	nte	20

Note 1:	Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter
Note 2:	The RS series requires a minimum of 10% load on the output to maintain specified regulation. Operating under no-load conditions
	will not damage these devices; however, they may not meet all listed specifications.

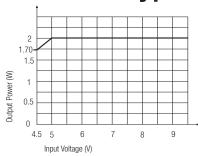
**ECONOLINE** 

# **RS-S\_D(Z)** Series

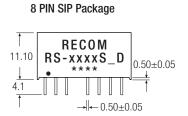
## **Typical Characteristics**



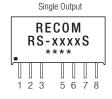
## **RS-05xx types**

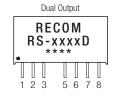


## Package Style and Pinning (mm)

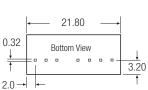




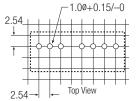




XX.X ± 0.5 mm XX.XX  $\pm$  0.25 mm







#### **Pin Connections**

Pin #	Single	Dual
1	–Vin	–Vin
2	+Vin	+Vin
3	CTRL	CTRL
5	NC	NC
6	+Vout	+Vout
7	–Vout	Com
8	NC*	–Vout

NC = No Connection

 $NC^* = NC$ , but no external Connection allowed.

Pin 8 (NC\*) This pin is used internally and must have no external connection.

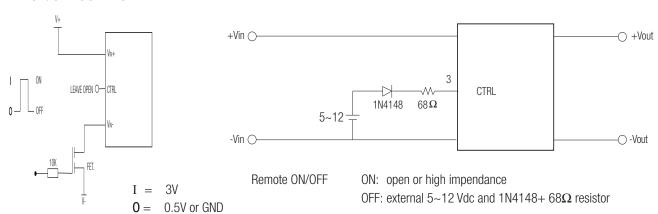
Pin 5 (NC) Not connected internally.

#### Pin 3 (CTRL)

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 high 'Z' the converter is ON. There is no allowed low state for this pin.

#### **Application Examples**

## ON/OFF CONTROL



The product information and specifications are subject to change without prior notice. All products are designed for non-safety critical commercial and industrial applications. The Buyer agrees to implement safeguards that anticipate the consequences of any failures that might cause harm, loss of life and/or damage property.

22