

- SIL7 / DIL14 Package
- Input Range $\pm 10 \%$
- Regulated Single Output
- Low Ripple and Noise
- Isolation 1000 VDC, up to 3000 VDC
- Operation Temperature Range -40 ~ 100 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure

RS4	-	05	05	RS	10	A	1
Series / Package		Input Voltage	Output Voltage	Output Type	Power	Int. Code	Isolation Voltage
RS4 = SIL7		03 = 3.3 Vdc	03 = 3.3 Vdc	RS = Regulated - Single Out.	10 = 1 W	Logistics Code	1 = 1000 Vdc 3 = 3000 Vdc
RD4 = DIL14		05 = 5.0 Vdc	05 = 5.0 Vdc				
		12 = 12 Vdc	07 = 7.2 Vdc				
		24 = 24 Vdc	09 = 9.0 Vdc				
			12 = 12 Vdc				
			15 = 15 Vdc				

Model Selection Guide

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @ FL (% , typ.)	Capacitive Load @ FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. Load (mA)	Full Load (mA)		
RS4-0303RS10AX	2.97-3.63	35	497	3.3	-	303	61	220
RS4-0305RS10AX	2.97-3.63	40	473	5	-	200	64	220
RS4-0307RS10AX	2.97-3.63	40	481	7.2	-	139	63	220
RS4-0309RS10AX	2.97-3.63	40	481	9	-	111	63	220
RS4-0312RS10AX	2.97-3.63	40	481	12	-	83	63	220
RS4-0315RS10AX	2.97-3.63	45	481	15	-	67	63	220
RS4-0503RS10AX	4.5-5.5	30	333	3.3	-	303	60	220
RS4-0505RS10AX	4.5-5.5	30	290	5	-	200	69	220
RS4-0507RS10AX	4.5-5.5	35	299	7.2	-	139	67	220
RS4-0509RS10AX	4.5-5.5	38	286	9	-	111	70	220
RS4-0512RS10AX	4.5-5.5	40	286	12	-	83	70	220
RS4-0515RS10AX	4.5-5.5	40	282	15	-	67	71	220
RS4-1203RS10AX	10.8-13.2	15	141	3.3	-	303	59	220
RS4-1205RS10AX	10.8-13.2	20	124	5	-	200	67	220
RS4-1207RS10AX	10.8-13.2	25	126	7.2	-	139	66	220
RS4-1209RS10AX	10.8-13.2	25	124	9	-	111	67	220
RS4-1212RS10AX	10.8-13.2	25	121	12	-	83	69	220
RS4-1215RS10AX	10.8-13.2	30	123	15	-	67	68	220
RS4-2403RS10AX	21.6-26.4	15	65	3.3	-	303	64	220
RS4-2405RS10AX	21.6-26.4	15	60	5	-	200	69	220
RS4-2407RS10AX	21.6-26.4	15	60	7.2	-	139	69	220
RS4-2409RS10AX	21.6-26.4	15	60	9	-	111	70	220
RS4-2412RS10AX	21.6-26.4	15	60	12	-	83	70	220
RS4-2415RS10AX	21.6-26.4	13	59	15	-	67	71	220
RD4-0303RS10AX	2.97-3.63	35	497	3.3	-	303	61	220
RD4-0305RS10AX	2.97-3.63	35	481	5	-	200	63	220
RD4-0307RS10AX	2.97-3.63	40	481	7.2	-	139	63	220
RD4-0309RS10AX	2.97-3.63	40	481	9	-	111	63	220
RD4-0312RS10AX	2.97-3.63	40	481	12	-	83	63	220
RD4-0315RS10AX	2.97-3.63	45	481	15	-	67	63	220
RD4-0503RS10AX	4.5-5.5	30	345	3.3	-	303	58	220
RD4-0505RS10AX	4.5-5.5	30	308	5	-	200	65	220
RD4-0507RS10AX	4.5-5.5	43	308	7.2	-	139	65	220
RD4-0509RS10AX	4.5-5.5	38	308	9	-	111	65	220
RD4-0512RS10AX	4.5-5.5	40	286	12	-	83	70	220
RD4-0515RS10AX	4.5-5.5	35	299	15	-	67	67	220
RD4-1203RS10AX	10.8-13.2	20	149	3.3	-	303	56	220
RD4-1205RS10AX	10.8-13.2	20	124	5	-	200	67	220
RD4-1207RS10AX	10.8-13.2	20	124	7.2	-	139	67	220
RD4-1209RS10AX	10.8-13.2	25	124	9	-	111	67	220
RD4-1212RS10AX	10.8-13.2	20	121	12	-	83	69	220
RD4-1215RS10AX	10.8-13.2	25	126	15	-	67	66	220
RD4-2403RS10AX	21.6-26.4	10	68	3.3	-	303	61	220
RD4-2405RS10AX	21.6-26.4	10	63	5	-	200	66	220
RD4-2407RS10AX	21.6-26.4	12	67	7.2	-	139	62	220
RD4-2409RS10AX	21.6-26.4	15	60	9	-	111	70	220
RD4-2412RS10AX	21.6-26.4	15	58	12	-	83	72	220
RD4-2415RS10AX	21.6-26.4	15	58	15	-	67	72	220

ALL SPECIFICATIONS ARE TYPICAL AT 25 °C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

Input Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	3.3 Vdc Input	2.97	3.3	3.63	VDC
	5.0 Vdc Input	4.5	5.0	5.5	
	12 Vdc Input	10.8	12	13.2	
	24 Vdc Input	21.6	24	26.4	
Input Current (No Load)		See Table			mA
Input Current (Full Load)		See Table			mA
Input Filter		Capacitor			-
Input Reflected Ripple Current ⁽¹⁾			20		mApk-pk
Recommended input fuse (slow blow)	3.3 Vdc Input		1.25		A
	5.0 Vdc Input		0.8		
	12 Vdc Input		0.35		
	24 Vdc Input		0.16		
Note : 1. Measured with a simulated source inductance of 12 μH and a source capacitor Cin (47 μF, ESR < 1 Ω at 100 kHz).					

Output Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-2.0		+2.0	%
Line Regulation		-0.5		+0.5	%
Load Regulation	From 0 % to 100 % Load	-1.5		+1.5	%
Ripple & Noise ⁽¹⁾	20 MHz Bandwidth			50	mVpk-pk
Short Circuit Protection		Short Term (1 sec.)			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	3.3 Vdc Input			6	VDC
	5.0 Vdc Input			7	
	12 Vdc Input			15	
	24 Vdc Input			28	
Soldering Temperature	1.5 mm from case 10 sec. max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

General Specifications						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Efficiency			See Table			%
Isolation Voltage	Input-output, and rated for 60 sec.	Suffix “1”	1000			VDC
		Suffix “3”	3000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				50		kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C		3500			k hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance	RoHS		Designed to meet			

Environmental Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				100	°C
Thermal Impedance		60.48			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30 - 65 LFM			

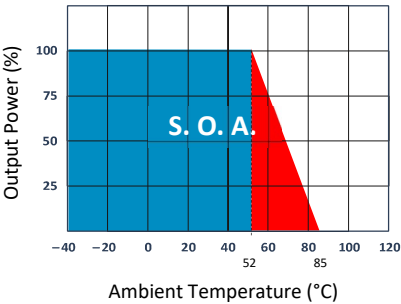
EMC Specifications			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032	with external components	B
ESD	IEC 61000-4-2	Contact ±6 kV with ext. components	A
RS	IEC 61000-4-3	10 V/m with external components	A
EFT	IEC 61000-4-4	±2.0 kV with external components	A
Surge	IEC 61000-4-5	±0.5 kV with external components	A
CS	IEC 61000-4-6	10 Vrms with external components	A
PFMF	IEC 61000-4-8	1 A/m with external components	A

Physical Specifications		
Parameter		Value
Case Material		Nonconductive Black Plastic (UL94V-0 rated)
Pin Material		Alloy 42
Potting Material		Epoxy (UL94V-0 rated)
Weight	SIL	2.8 g, typ.
	DIL	2.7 g, typ.
Dimensions	SIL	0.76" x 0.28" x 0.39"
	DIL	0.80" x 0.40" x 0.27"

Thermal Derating

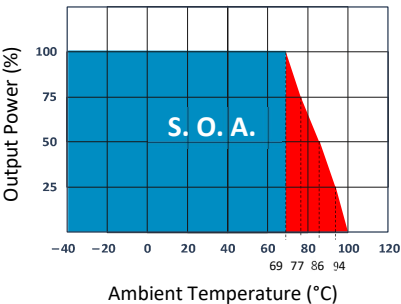
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.

Temperature Derating Curve



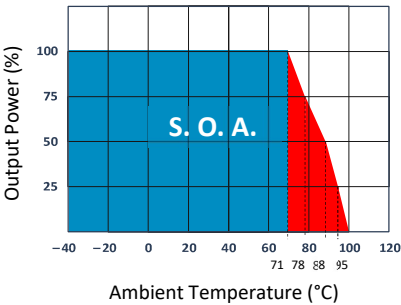
Efficiency 56 % ~ 63 % Models

Temperature Derating Curve



Efficiency 64 % ~ 67 % Models

Temperature Derating Curve

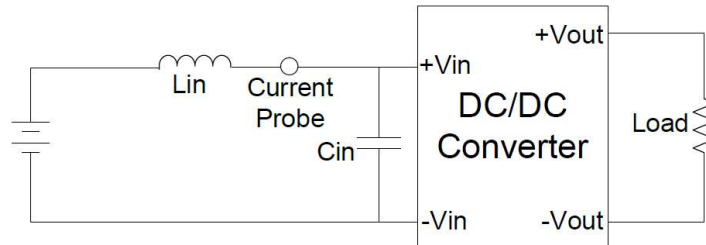


Efficiency 68 % ~ 72 % Models

Test Configurations

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR < 1.0 Ω at 100 kHz) at nominal input and full load.



Design & Feature Configurations

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4 V peak, or 60 Vdc).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

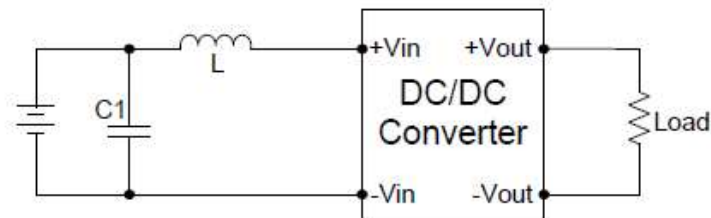
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20 % from specified test voltage.

EMC Filter Details

EMC Filter

The Circuit is used to meet EMI test.



V in	C1	L
3.3 Vdc	Nippon Chemi-con KY-Series 470μF / 100V	12μH
05 Vdc		
12 Vdc		
24 Vdc		

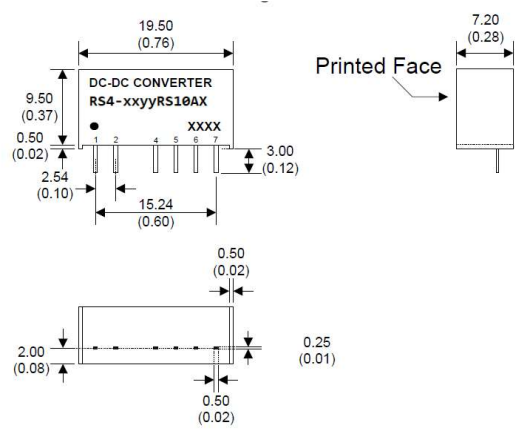
Pin Connections

SIL Package		
PIN NUMBER	Suffix “1”	Suffix “3”
1	+Vin	+Vin
2	-Vin	-Vin
4	-Vout	N.P.
5	N.P.	-Vout
6	+Vout	N.P.
7	N.P.	+Vout
*N.P. : No PIN		

DIL Package		
PIN NUMBER	Suffix “1”	Suffix “3”
1	-Vin	-Vin
7	N.C.	N.C.
8	N.P.	+Vout
9	+Vout	N.P.
10	N.P.	-Vout
11	-Vout	N.P.
14	+Vin	+Vin
*N.P. : No PIN		
*N.C. : No Connection		

Mechanical Specifications

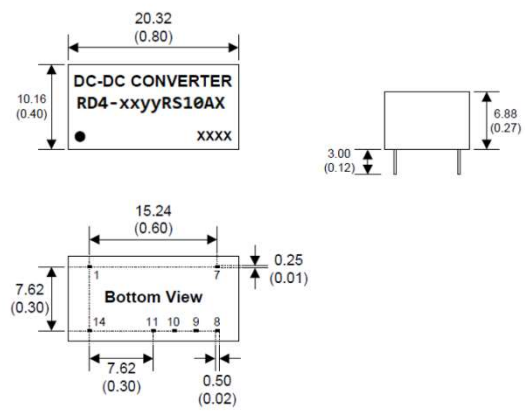
SIL Package



- Notes : All dimensions are typical in millimeters (inches).
1. Pin dimension tolerance: ± 0.05 (± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Pin to case tolerance: ± 0.5 (± 0.02)
 4. Case Tolerance: ± 0.5 (± 0.02)

Mechanical Specifications

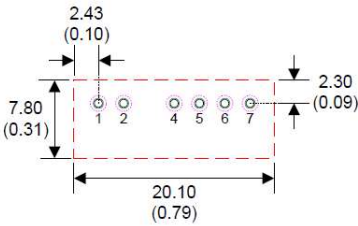
DIL Package



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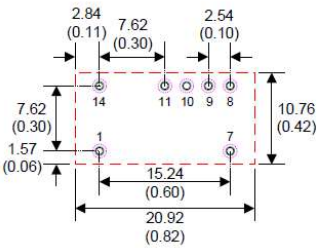
Recommended Footprint Details

SIL Package



SIL Notes : All dimensions are typical in millimeters (inches).
1. Through hole (black): Ø 0.80 (0.031)
2. Top view pad (green): Ø 1.00 (0.039)
3. Bottom view pad (pink): Ø 1.60 (0.063)

DIL Package



DIL Notes : All dimensions are typical in millimeters (inches).
1. Through hole (black): Ø 0.80 (0.031)
2. Top view pad (green): Ø 1.00 (0.039)
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Notes

The information and specification contained in this data sheet are believed to be correct at time of publication. However, Acal BFi accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice.