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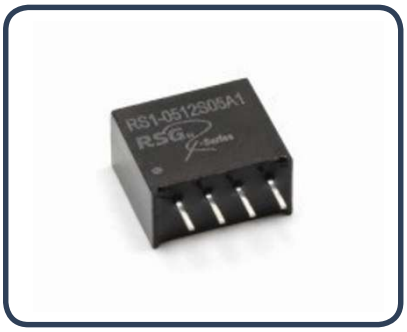
RS1-S30

3 W Unregulated Single Output DC/DC Converter

- SIL4 Package
- Input Range ± 10 %
- Efficiency up to 91 %
- Low Ripple and Noise
- Isolation 3000 VDC
- EMI Complies with EN55032 Class B
- Operation Temperature Range -40 ~ 100 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure

RS1	-	05	05	S	30	A	3
Series / Package		**Input Voltage**	**Output Voltage**	**Output Type**	**Power**	**Int. Code**	**Isolation Voltage**
RS1 = SIL4		05 = 5.0 Vdc 12 = 12 Vdc 24 = 24 Vdc	05 = 5.0 Vdc 09 = 9.0 Vdc 12 = 12 Vdc 15 = 15 Vdc	S = Single Output	30 = 3 W	Logistics Code	3 = 3000 Vdc

Model Selection Guide

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @ FL (%, typ.)	Capacitive Load @ FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
RS1-0505S30A3	4.5 ~ 5.5	50	723	5	600	83	3300
RS1-0509S30A3	4.5 ~ 5.5	60	690	9	333	87	1200
RS1-0512S30A3	4.5 ~ 5.5	55	682	12	250	88	1000
RS1-0515S30A3	4.5 ~ 5.5	60	682	15	200	88	820
RS1-1205S30A3	10.8 ~ 13.2	25	294	5	600	85	3300
RS1-1209S30A3	10.8 ~ 13.2	30	281	9	333	89	1200
RS1-1212S30A3	10.8 ~ 13.2	30	278	12	250	90	1000
RS1-1215S30A3	10.8 ~ 13.2	30	275	15	200	91	820
RS1-2405S30A3	21.6 ~ 26.4	15	147	5	600	85	3300
RS1-2409S30A3	21.6 ~ 26.4	15	141	9	333	89	1200
RS1-2412S30A3	21.6 ~ 26.4	15	139	12	250	90	1000
RS1-2415S30A3	21.6 ~ 26.4	15	138	15	200	91	820

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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	5.0 Vdc Input	4.5	5.0	5.5	VDC
	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
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	5.0 Vdc Input		1.0		A
	12 Vdc Input		0.5		
	24 Vdc Input		0.25		
Note： 1. Measured with a simulated source inductance of 12 µH and a source capacitor Cin (10 µF, ESR < 1 Ω at 100 kHz).					

Output Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-3		+3	%
Line Regulation	For 1 % Vin Change	-1.2		+1.2	%
Load Regulation	From 10 % to 100 % Load			10	%
Ripple & Noise [1]	20 MHz Bandwidth			100	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			
Note： 1. Measured with a 0.1 µF MLCC and 10 µF electrolytic capacitor.					

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5.0 Vdc Input			7	VDC
	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.	3000			VDC
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output			65	pF
Switching Frequency		40		70	kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C	6700			k hours
Safety Standard	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance	RoHS	Designed to meet			

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Environmental Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				115	°C
Thermal Impedance		50			°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		B
ESD	IEC 61000-4-2	Air: ±8 kV, Indirect: ±6 kV	A
RS	IEC 61000-4-3	10 V/m	A
EFT	IEC 61000-4-4	±2.0 kV with external components	A
Surge	IEC 61000-4-5	±2.0 kV with external components	A
CS	IEC 61000-4-6	10 Vrms	A
PFMF	IEC 61000-4-8	100 A/m	A

Physical Specifications	
Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Silicone (UL94V-0 rated)
Weight	2.2 g, typ.
Dimensions	0.46" x 0.29" x 0.40"

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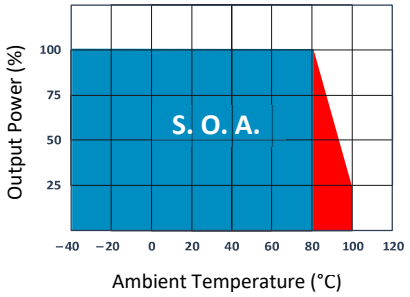
Electrical Characteristic Curves

Thermal Derating

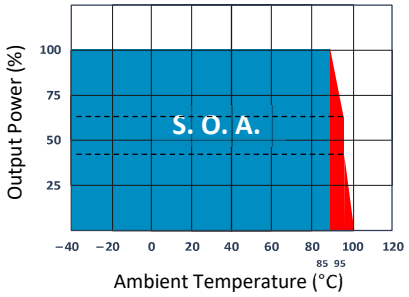
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.

Temperature Derating Curve



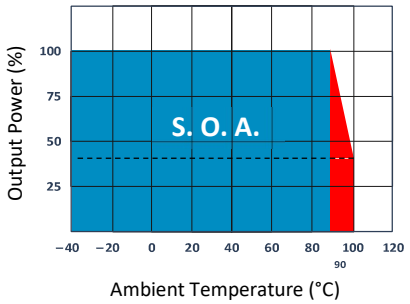
Only 5 Vdc Output Models

Temperature Derating Curve



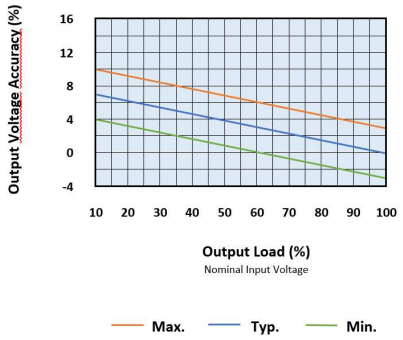
Only 5 Vdc Input Models
(except 5 Vdc Output Model)

Temperature Derating Curve



All other Models

Output Voltage Tolerance Envelope Curve



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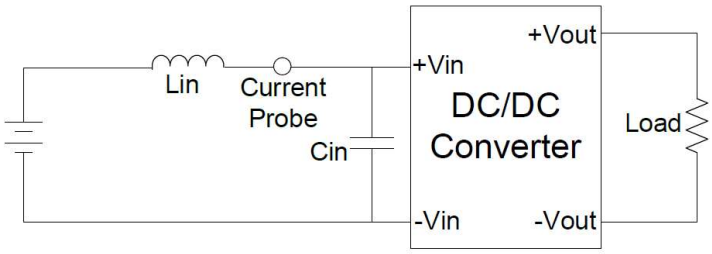
Test Configurations

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor Lin (12 µH) and a source capacitor Cin (10 µF, 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.

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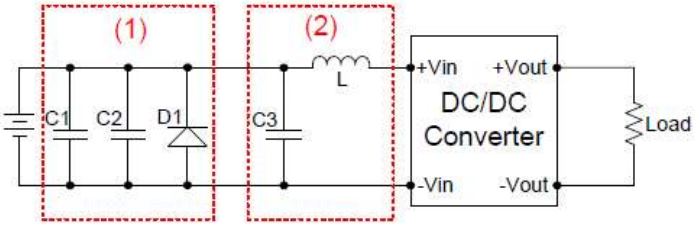
EMC Filter Details

EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



V in	C1, C2	D1	L	C3
5 Vdc	Ruiby-con BXF-Series 100µF / 250V	SMDJ8.0A	2,2µH	MLCC 2,2µF / 50V
12 Vdc		SMDJ16A	4,7µH	MLCC 4,7µF / 50V
24 Vdc		SMDJ30A		

Pin Connections

SIL 4 Package	
PIN NUMBER	SINGLE
1	-Vin
2	+Vin
3	-Vout
4	+Vout

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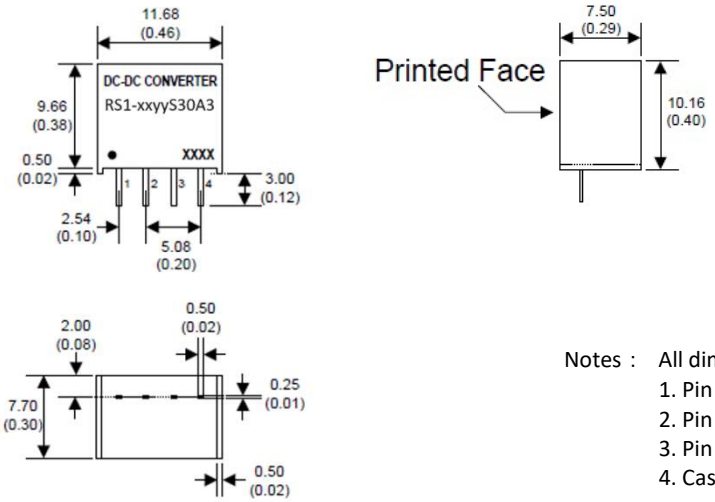
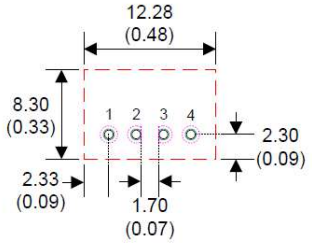
Mechanical Specifications



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)

Recommended Footprint Details



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)

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.

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