RS2-S/D10v2

1 W Unregulated Single & Dual Output DC/DC Converter

- **SIL7 Package**
- **Input Range ± 10 %**
- **Efficiency up to 82 %**
- **Continuous Short Circuit Protection**
- **Isolation 1500 VDC, up to 3000 VDC**
- **Operation Temperature Range -40 ~ 105 °C max.**
- **Non Conductive Black Plastic Case**

RoHS

Picture similar

Number Structure

RS2	-	05	05	S	10	A	1	v2
Series / Package		**Input Voltage**	**Output Voltage**	**Output Type**	**Power**	**Int. Code**	**Isolation Voltage**	**Version**
RS2 = SIL7		05 = 5.0 Vdc 12 = 12 Vdc 24 = 24 Vdc	05 = 5.0 Vdc 12 = 12 Vdc 15 = 15 Vdc	S = Single Output D = Dual Output	10 = 1 W	Logistics Code	1 = 1500 Vdc 3 = 3000 Vdc	2nd Version

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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.)				
RS2-0505S10AXv2	4.5-5.5	40	247	5	200	81	220
RS2-0512S10AXv2	4.5-5.5	40	247	12	83.3	81	100
RS2-0515S10AXv2	4.5-5.5	40	247	15	66.7	81	100
RS2-1205S10AXv2	10.8-13.2	18	104	5	200	80	220
RS2-1212S10AXv2	10.8-13.2	18	102	12	83.3	82	100
RS2-1215S10AXv2	10.8-13.2	18	103	15	66.7	81	100
RS2-2405S10AXv2	21.6-26.4	9	51	5	200	81	220
RS2-2412S10AXv2	21.6-26.4	9	52	12	83.3	80	100
RS2-2415S10AXv2	21.6-26.4	9	52	15	66.7	80	100
RS2-0505D10AXv2	4.5-5.5	40	247	±5	±100	81	±100
RS2-0512D10AXv2	4.5-5.5	40	247	±12	±41.67	81	±47
RS2-0515D10AXv2	4.5-5.5	40	244	±15	±33.33	82	±47
RS2-1205D10AXv2	10.8-13.2	18	104	±5	±100	80	±100
RS2-1212D10AXv2	10.8-13.2	18	102	±12	±41.67	82	±47
RS2-1215D10AXv2	10.8-13.2	18	102	±15	±33.33	82	±47
RS2-2405D10AXv2	21.6-26.4	9	53	±5	±100	79	±100
RS2-2412D10AXv2	21.6-26.4	9	51	±12	±41.67	81	±47
RS2-2415D10AXv2	21.6-26.4	9	51	±15	±33.33	81	±47

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)			15		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	5.0 Vdc Input		0.75		A
	12 Vdc Input		0.3		
	24 Vdc Input		0.15		
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			See tolerance envelope curve			%
Line Regulation	For 1 % Vin Change		-1.2		+1.2	%
Load Regulation	From 10 % to 100 % Load	5.0 Vdc Input			+10	%
		Other Input			+7.5	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual		-4		+4	%
Ripple & Noise (1)	20 MHz Bandwidth				75	mVpk-pk
Short Circuit Protection			Continuous, auto recovery			
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 10µF Electrolytic capacitor.						

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5.0 Vdc Input			9	VDC
	12 Vdc Input			18	
	24 Vdc Input			30	
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”	1500			VDC
		Suffix “3”	3000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			50		pF
Switching Frequency				50		kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C		3600			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		105	°C
Maximum Case Temperature				115	°C
Thermal Impedance		46.22			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30 - 65 LFM			

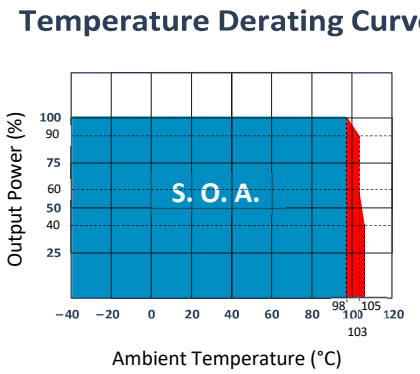
EMC Specifications			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±15 kV / Indirect: ±8 kV	A
RS	IEC 61000-4-3	10 V/m	A
EFT	IEC 61000-4-4	±2 kV	A
Surge	IEC 61000-4-5	±1.0 kV with external components	A
CS	IEC 61000-4-6	10 Vrms	A
PFMF	IEC 61000-4-8	30 A/m	A

Physical Specifications	
Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Epoxy (UL94V-0 rated)
Weight	2.4 g, typ.
Dimensions	0.76" x 0.24" x 0.39"

Electrical Characteristic Curves

Thermal Derating

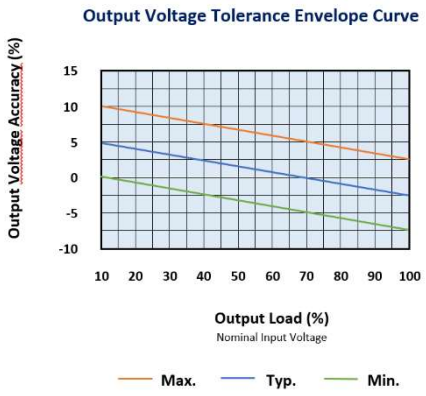
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.



Efficiency: 79% ~ 82%

Output Voltage Tolerance Envelope Curve

Output Voltage Tolerance Envelope Curve

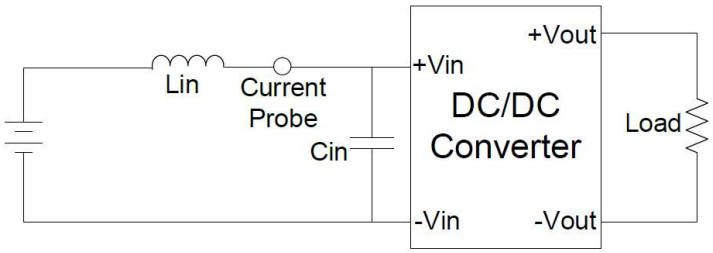


From 10% to 100% Load

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 (47 µF, ESR < 1.0 Ω at 100 kHz) at nominal input and full load.



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.

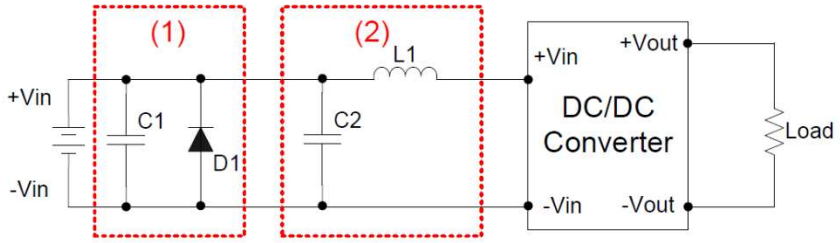
Repeated High-Voltage Isolation Testing

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 for SIL Models

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



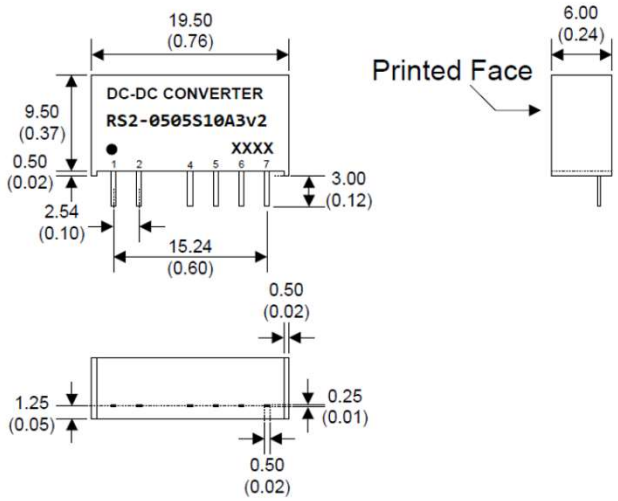
V in	C1	D1	C2	L1
05 V	Nippon Chemi-con KY-Series 1000µF / 35V	3.0SMCJ9.0AG	MLCC 4.7µF / 50V	6.8µH
12 V		3.0SMCJ18AG		
24 V	Nippon Chemi-con KY-Series 330µF / 50V	3.0SMCJ28AG		

Pin Connections

PIN CONNECTIONS				
ISOLATION	SUFFIX “1"		SUFFIX “3"	
PIN NUMBER	SINGLE	DUAL	SINGLE	DUAL
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
4	-Vout	-Vout	N.P.	N.P.
5	N.P.	COM	-Vout	-Vout
6	+Vout	+Vout	N.P.	COM
7	N.P.	N.P.	+Vout	+Vout
	*N.P. : No PIN			

Mechanical Specifications

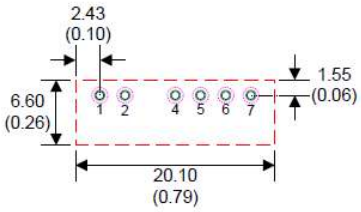
SIL Package



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)

Recommended Footprint Details

SIL Package



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.