

- SIL7 Package
- Input Range $\pm 10 \%$
- Efficiency up to 87 %
- Low Ripple and Noise
- Isolation 3000 VDC / 6000 VDC
- Continuous Short Circuit Protection
- Operation Temperature Range -40 ~ 90 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure

RS4	-	05	05	S	20	A	3	(P)
Series / Package	Input Voltage	Output Voltage	Output Type	Power	Int. Code	Isolation Voltage	Pinning	
RS4 = SIL7	03 = 3.3 Vdc	03 = 3.3 Vdc	S = Single Output	20 = 2 W	Logistics Code	3 = 3000 Vdc 6 = 6000 Vdc	Blank = Normal P = w/o Pin 7	
	05 = 5.0 Vdc	05 = 5.0 Vdc	D = Dual Output					
	12 = 12 Vdc	12 = 12 Vdc						
	24 = 24 Vdc	15 = 15 Vdc						

* Isolation Voltage for Pinning P only 3 kVdc

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.)				
RS4-0303S20AX	2.97 ~ 3.63	55	657.89	3.3	500	76	3300
RS4-0305S20AX	2.97 ~ 3.63	65	777.00	5	400	78	2200
RS4-0312S20AX	2.97 ~ 3.63	70	739.06	12	166.66	82	470
RS4-0315S20AX	2.97 ~ 3.63	80	748.20	15	133.33	81	470
RS4-0503S20AX	4.5 ~ 5.5	50	423.07	3.3	500	78	3300
RS4-0505S20AX	4.5 ~ 5.5	50	493.82	5	400	81	2200
RS4-0512S20AX	4.5 ~ 5.5	50	470.56	12	166.66	85	470
RS4-0515S20AX	4.5 ~ 5.5	50	465.10	15	133.33	86	470
RS4-1203S20AX	10.8 ~ 13.2	25	174.05	3.3	500	79	3300
RS4-1205S20AX	10.8 ~ 13.2	30	200.80	5	400	83	2200
RS4-1212S20AX	10.8 ~ 13.2	35	193.79	12	166.66	86	470
RS4-1215S20AX	10.8 ~ 13.2	30	193.79	15	133.33	86	470
RS4-2403S20AX	21.6 ~ 26.4	20	88.14	3.3	500	78	3300
RS4-2405S20AX	21.6 ~ 26.4	20	100.40	5	400	83	2200
RS4-2412S20AX	21.6 ~ 26.4	20	95.78	12	166.66	87	470
RS4-2415S20AX	21.6 ~ 26.4	20	95.78	15	133.33	87	470
RS4-0303D20AX	2.97 ~ 3.63	50	632.91	±3.3	±250	79	±1680
RS4-0305D20AX	2.97 ~ 3.63	60	748.22	±5	±200	81	±1000
RS4-0312D20AX	2.97 ~ 3.63	70	730.16	±12	±83.33	83	±220
RS4-0315D20AX	2.97 ~ 3.63	80	721.42	±15	±66.66	84	±220
RS4-0503D20AX	4.5 ~ 5.5	45	407.40	±3.3	±250	81	±1680
RS4-0505D20AX	4.5 ~ 5.5	55	481.92	±5	±200	83	±1000
RS4-0512D20AX	4.5 ~ 5.5	50	459.75	±12	±83.33	87	±220
RS4-0515D20AX	4.5 ~ 5.5	60	459.72	±15	±66.66	87	±220
RS4-1203D20AX	10.8 ~ 13.2	30	169.75	±3.3	±250	81	±1680
RS4-1205D20AX	10.8 ~ 13.2	30	196.07	±5	±200	85	±1000
RS4-1212D20AX	10.8 ~ 13.2	35	193.79	±12	±83.33	86	±220
RS4-1215D20AX	10.8 ~ 13.2	40	191.55	±15	±66.66	87	±220
RS4-2403D20AX	21.6 ~ 26.4	20	84.87	±3.3	±250	81	±1680
RS4-2405D20AX	21.6 ~ 26.4	20	98.03	±5	±200	85	±1000
RS4-2412D20AX	21.6 ~ 26.4	25	95.78	±12	±83.33	87	±220
RS4-2415D20AX	21.6 ~ 26.4	25	95.77	±15	±66.66	87	±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
Start up Time	Nominal Vin and constant resistive load			10	ms
Recommended input fuse (slow blow)	3.3 Vdc Input		1.5		A
	5.0 Vdc Input		1.0		
	12 Vdc Input		0.5		
	24 Vdc Input		0.2		
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			-3		+3	%
Line Regulation	For 1 % Vin Change		-1.2		+1.2	%
Load Regulation	From 10 % to 100 % Load	RS4-0303S20AX RS4-0305S20AX RS4-0315S20AX RS4-0303D20AX RS4-0305D20AX			20	%
		RS4-0503S20AX RS4-0505S20AX RS4-0505D20AX			20	
		all others			15	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output	3.3Vdc, 5Vdc Input	-8		+8	%
		12Vdc, 24Vdc Input	-6		+6	
Ripple & Noise ⁽¹⁾	20 MHz Bandwidth			100	200	mVpk-pk
Short Circuit Protection			Continuous and automatic 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 capacitor.						

Absolute Maximum Ratings					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	3.3 Vdc Input			6	VDC
	5.0 Vdc Input			9	
	12 Vdc Input			18	
	24 Vdc Input			30	
Soldering Temperature	1.5mm 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 “3 P”	3000			VDC
		Suffix “3”	3000			
		Suffix “6”	6000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output				65	pF
Switching Frequency				100		kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25°C		2320			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		90	°C
Maximum Case Temperature				115	°C
Thermal Impedance		45			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

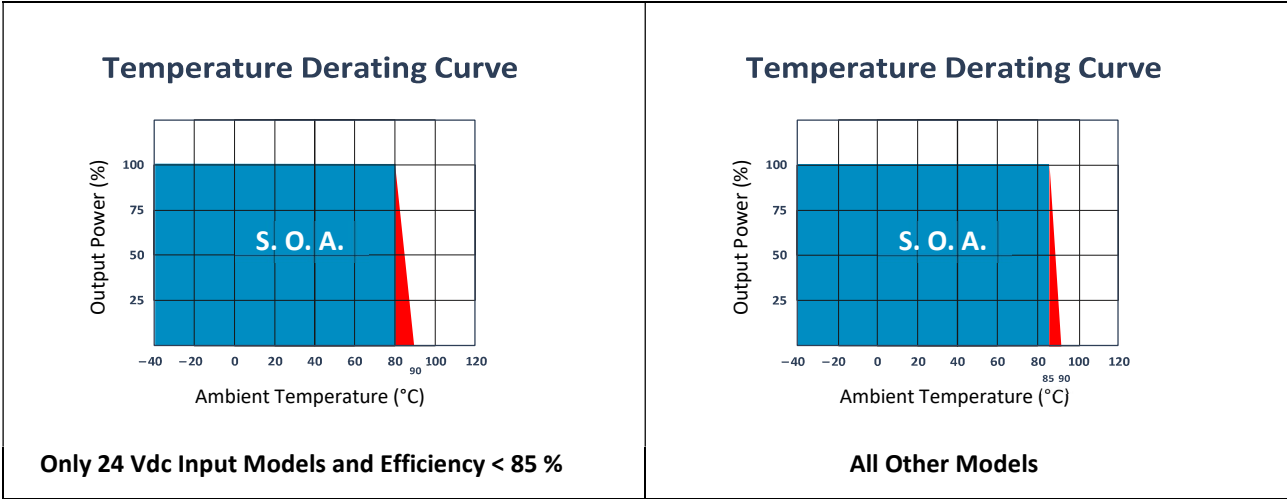
EMC Specifications			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air ± 15 kV, Contact ± 8 kV	A
RS	IEC 61000-4-3	10 V/m	A
EFT	IEC 61000-4-4	±2.0 kV with external components	A
Surge	IEC 61000-4-5	±2.0 kV 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	2.3 g, typ.
Dimensions	0.76" x 0.24" x 0.39"

Electrical Characteristic Curves

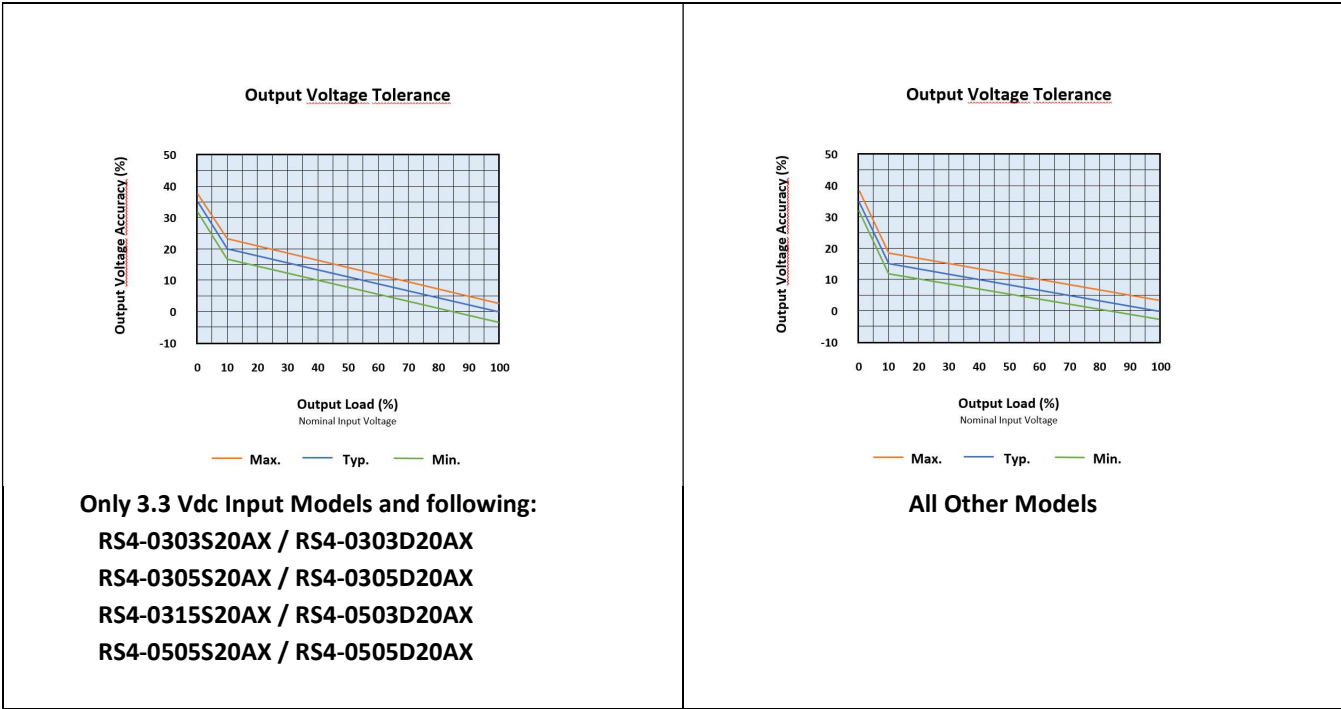
Thermal Derating

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.



Output Voltage Tolerance Envelope Curve

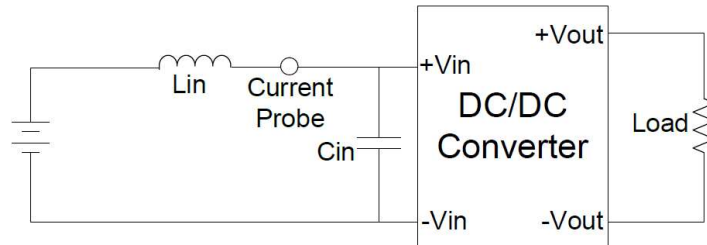
Output Voltage Tolerance Curve



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.

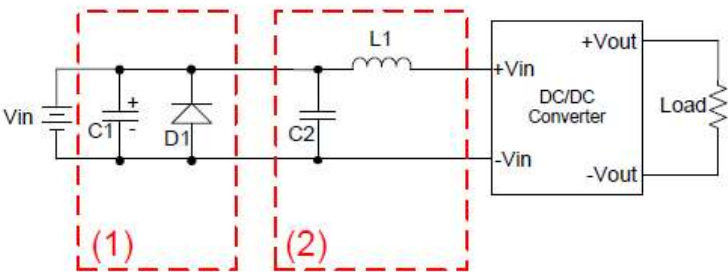
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

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

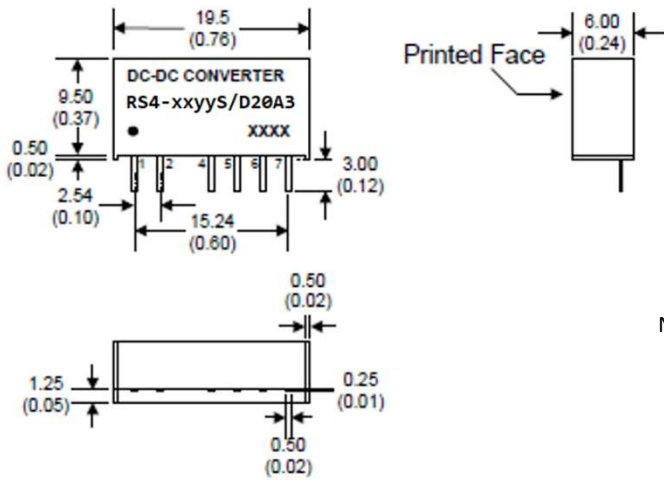


V in	C1	D1	C2	L1
3.3 Vdc	NIPPON Chemi-con KY series 470μF / 100V	SMDJ6.0A	MLCC 10μF / 50V	10μH
05 Vdc		SMDJ9.0A		
12 Vdc		SMDJ18.0A		
24 Vdc	NIPPON Chemi-con KY series 680μF / 100V	SMDJ30.0A		22μH

Pin Connections

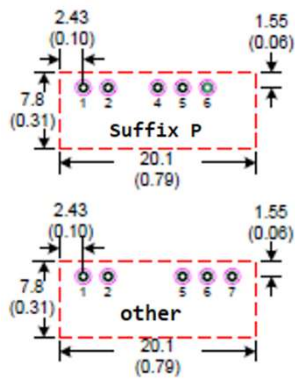
SIL 7 Package				
PIN NUMBER	Suffix "3" & "6"		Only Suffix "3 P"	
	SINGLE	DUAL	SINGLE - P	DUAL - P
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
4	N.P.	N.P.	-Vout	-Vout
5	-Vout	-Vout	N.P.	COM
6	N.P.	COM	+Vout	+Vout
7	+Vout	+Vout	N.P.	N.P.
*N.P. : No pin.				

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): $\varnothing 0.80$ (0.031)
 2. Top view pad (green): $\varnothing 1.00$ (0.039)
 3. Bottom view pad (pink): $\varnothing 1.60$ (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.