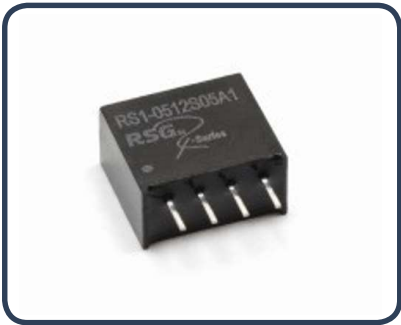


- SIL4 Package
- Input Range $\pm 10 \%$
- Efficiency up to 88 %
- Low Ripple and Noise
- Isolation 1000 VDC, up to 3000 VDC
- EMI Complies with EN55032 Class B
- Operation Temperature Range -40 ~ 90 °C max.
- Non Conductive Black Plastic Case

RoHS



Picture similar

Number Structure							
RS1	-	05	05	S	20	A	1
Series / Package	Input Voltage		Output Voltage	Output Type	Power	Int. Code	Isolation Voltage
RS1 = SIL4	05 = 5.0 Vdc		03 = 3.3 Vdc	S = Single Output	20 = 2 W	Logistics Code	1 = 1000 Vdc 3 = 3000 Vdc
	12 = 12 Vdc		05 = 5.0 Vdc				
	15 = 15 Vdc		07 = 7.2 Vdc				
	24 = 24 Vdc		09 = 9.0 Vdc				
			12 = 12 Vdc				
			15 = 15 Vdc				
			24 = 24 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.)				
RS1-0503S20AX	4.5 ~ 5.5	32	343	3.3	400	77	470
RS1-0505S20AX	4.5 ~ 5.5	30	494	5	400	81	470
RS1-0507S20AX	4.5 ~ 5.5	40	488	7.2	278	82	470
RS1-0509S20AX	4.5 ~ 5.5	30	482	9	222	83	470
RS1-0512S20AX	4.5 ~ 5.5	38	477	12	167	84	470
RS1-0515S20AX	4.5 ~ 5.5	35	466	15	133	86	470
RS1-0524S20AX	4.5 ~ 5.5	35	466	24	83	86	470
RS1-1203S20AX	10.8 ~ 13.2	20	147	3.3	400	75	470
RS1-1205S20AX	10.8 ~ 13.2	23	206	5	400	81	470
RS1-1207S20AX	10.8 ~ 13.2	20	199	7.2	278	84	470
RS1-1209S20AX	10.8 ~ 13.2	23	199	9	222	84	470
RS1-1212S20AX	10.8 ~ 13.2	20	197	12	167	85	470
RS1-1215S20AX	10.8 ~ 13.2	30	199	15	133	84	470
RS1-1224S20AX	10.8 ~ 13.2	40	201	24	83	83	470
RS1-1503S20AX	13.5 ~ 16.5	25	115	3.3	400	77	470
RS1-1505S20AX	13.5 ~ 16.5	20	167	5	400	80	470
RS1-1507S20AX	13.5 ~ 16.5	20	161	7.2	278	83	470
RS1-1509S20AX	13.5 ~ 16.5	20	159	9	222	84	470
RS1-1512S20AX	13.5 ~ 16.5	20	157	12	167	85	470
RS1-1515S20AX	13.5 ~ 16.5	15	154	15	133	87	470
RS1-1524S20AX	13.5 ~ 16.5	20	157	24	83	85	470
RS1-2403S20AX	21.6 ~ 26.4	7	71	3.3	400	78	470
RS1-2405S20AX	21.6 ~ 26.4	15	102	5	400	82	470
RS1-2407S20AX	21.6 ~ 26.4	12	101	7.2	278	83	470
RS1-2409S20AX	21.6 ~ 26.4	10	97	9	222	86	470
RS1-2412S20AX	21.6 ~ 26.4	12	95	12	167	88	470
RS1-2415S20AX	21.6 ~ 26.4	8	97	15	133	86	470
RS1-2424S20AX	21.6 ~ 26.4	10	95	24	83	88	470

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	
	15 Vdc Input	13.5	15	16.5	
	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		0.63		A
	12 Vdc Input		0.25		
	15 Vdc Input		0.25		
	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		-3		+3	%
Line Regulation	For 1 % Vin Change	-1.2		+1.2	%
Load Regulation	From 20 % to 100 % Load	RS1-0503S20AX RS1-0505S20AX RS1-0507S20AX RS1-0509S20AX		12	%
		All other Output		8	
Ripple & Noise	20 MHz Bandwidth			150	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)	5.0 Vdc Input			7	VDC
	12 Vdc Input			15	
	15 Vdc Input			18	
	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				70		kHz
Reliability Calculated MTBF	MIL-HDBK-217 F @ 25 °C		1121			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				100	°C
Thermal Impedance		60			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30 - 65 LFM			

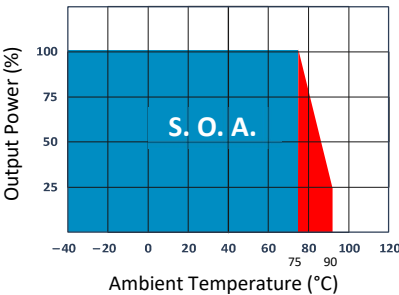
EMC Specifications			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±8 kV, Indirect: ±6 kV	A
RS	IEC 61000-4-3	10 V/m	A
EFT	IEC 61000-4-4	±2.0 kV with external components	A
Surge	IEC 61000-4-5	±0.5 kV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

Physical Specifications	
Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Alloy 42
Potting Material	Epoxy (UL94V-0 rated)
Weight	1.9 g, typ.
Dimensions	0.46" x 0.29" x 0.40"

Thermal Derating

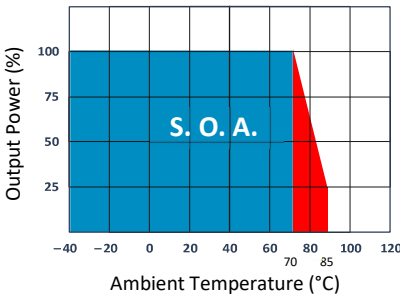
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum operating temperature, reliability of the unit may be affected.

Temperature Derating Curve



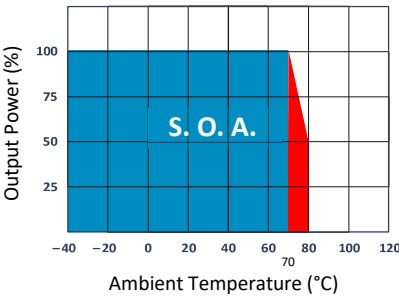
3.3 Vdc Output Models

Temperature Derating Curve



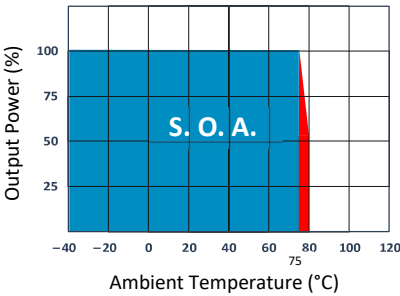
5Vdc & 7.2 Vdc Output Models

Temperature Derating Curve



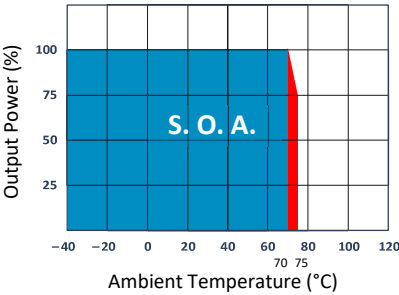
9 Vdc & 12 Vdc Output & 83 % ~ 85 % Models

Temperature Derating Curve



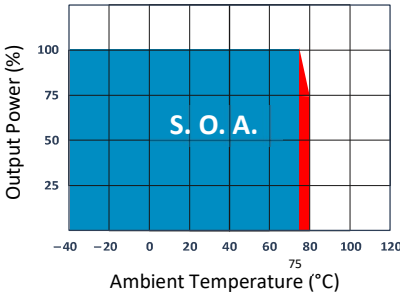
9 Vdc & 12 Vdc Output & 86 % ~ 88 % Models

Temperature Derating Curve



15 Vdc & 24 Vdc Output & 83 % ~ 85 % Models

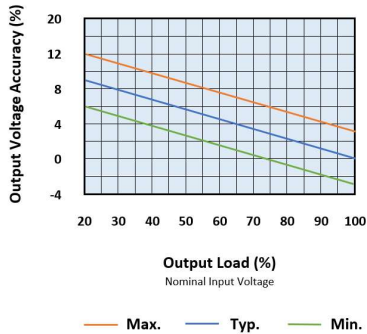
Temperature Derating Curve



15 Vdc & 24 Vdc Output & 86 % ~ 88 % Models

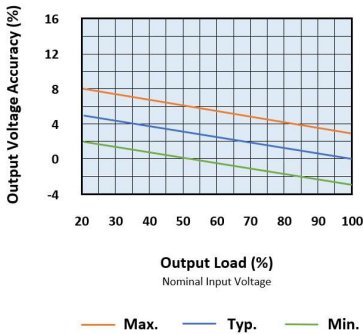
Output Voltage Tolerance Envelope Curve

Output Voltage Tolerance Envelope Curve



RS1-0503S20AX / RS1-0505S20AX
RS1-0507S20AX / RS1-0509S20AX

Output Voltage Tolerance Envelope Curve

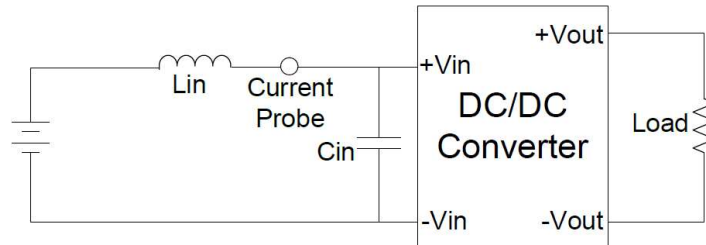


Other Models

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.

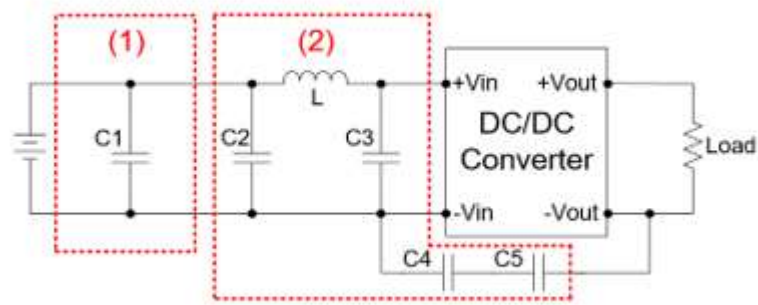
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

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

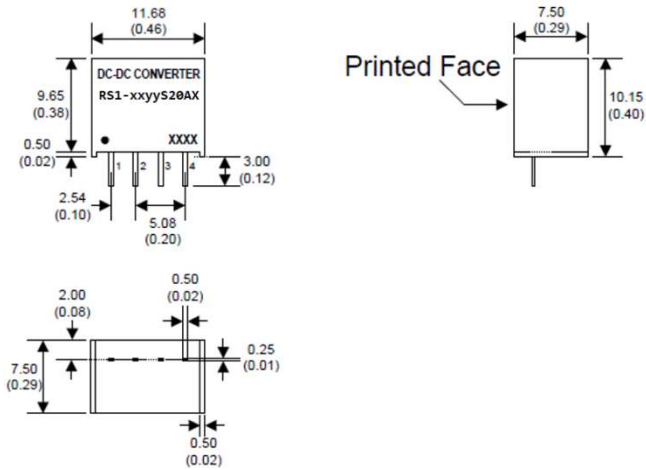


V in	C1	C2	L	C3	C4	C5
05 Vdc	Nippon Chemi-con KY-Series 470µF / 100V	MLCC 2,2µF / 100V	18µH	/	/	/
12 Vdc						
15 Vdc						
24 Vdc				MLCC 2,2µF / 100V	MLCC 470pF / 2kV	/
24 Vdc (3 kV)					MLCC 820pF / 2kV	MLCC 820pF / 2kV

Pin Connections

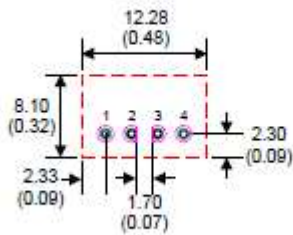
SIL 4 Package	
PIN NUMBER	SINGLE
1	-Vin
2	+Vin
3	-Vout
4	+Vout

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.