SA-0.5W Series

0.5W Unregulated Single output

Features

- SIP4 / DIP8 Package
- 1000 VDC Isolation, Up to 3000 VDC
- Efficiency up to 81%
- Operation Temperature Range -40 ~ 89°C max.
- Non-Conductive Black Plastic Case
- EMI Complies With EN55032 Class B

PART NUMBER STRUCTURE

SA - 12 05 S H
(1) (2) (3) (4) (5)

(1) Series

(2) Input Voltage Range
- **3R3 -** 2.97-3.63 V
- **05 -** 4.5-5.5 V
- **12 -** 10.8-13.2 V
- **15 -** 13.5-16.5 V
- **24 -** 21.6-26.4 V

(3) Output Voltage
- **3R3 -** 3.3 V
- **05 -** 5.0 V
- **7R2 -** 7.2 V
- **09 -** 9.0 V
- **12 -** 12 V
- **15 -** 15 V
- **18 -** 18 V
- **24 -** 24 V

(4) Case Type
- **S -** SIP Case
- **D -** DIP Case

(5) Isolation Voltage (Optional)
- **Blank -** 1 KVDC
- **H -** 3 KVDC

SA-0.5W Series

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

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.)				
SA-3R33R3S	2.97-3.63	20	197	3.3	152	77	100
SA-3R305S	2.97-3.63	25	214	5	100	71	100
SA-3R37R2S	2.97-3.63	25	217	7.2	69	70	100
SA-3R309S	2.97-3.63	40	203	9	56	75	100
SA-3R312S	2.97-3.63	30	197	12	42	77	100
SA-3R315S	2.97-3.63	32	200	15	33	76	100
SA-3R318S	2.97-3.63	25	208	18	28	73	100
SA-3R324S	2.97-3.63	38	200	24	21	76	100
SA-053R3S	4.5-5.5	20	132	3.3	151.5	76	100
SA-0505S	4.5-5.5	15	124	5	100	81	100
SA-057R2S	4.5-5.5	15	129	7.2	69.44	78	100
SA-0509S	4.5-5.5	15	129	9	55.55	78	100
SA-0512S	4.5-5.5	18	125	12	41.67	80	100
SA-0515S	4.5-5.5	22	125	15	33.33	80	100
SA-0518S	4.5-5.5	25	129	18	27.77	78	100
SA-0524S	4.5-5.5	25	130	24	20.83	77	100
SA-123R3S	10.8-13.2	15	58	3.3	151.5	72	100
SA-1205S	10.8-13.2	10	55	5	100	77	100
SA-127R2S	10.8-13.2	15	54	7.2	69.44	78	100
SA-1209S	10.8-13.2	15	55	9	55.56	76	100
SA-1212S	10.8-13.2	20	60	12	41.67	70	100
SA-1215S	10.8-13.2	20	59	15	33.33	71	100
SA-1218S	10.8-13.2	20	62	18	27.77	68	100
SA-1224S	10.8-13.2	18	59	24	20.83	71	100
SA-153R3S	13.5-16.5	10	45	3.3	151.5	75	100
SA-1505S	13.5-16.5	8	43	5	100	78	100
SA-157R2S	13.5-16.5	12	45	7.2	69.44	75	100
SA-1509S	13.5-16.5	12	45	9	55.55	75	100
SA-1512S	13.5-16.5	15	47	12	41.67	72	100
SA-1515S	13.5-16.5	15	48	15	33.33	70	100
SA-1518S	13.5-16.5	12	51	18	27.77	66	100
SA-1524S	13.5-16.5	15	46	24	20.83	73	100
SA-243R3S	21.6-26.4	8	29	3.3	151.5	72	100
SA-2405S	21.6-26.4	8	29	5	100	73	100
SA-247R2S	21.6-26.4	10	31	7.2	69.44	69	100
SA-2409S	21.6-26.4	8	30	9	55.55	70	100
SA-2412S	21.6-26.4	8	30	12	41.67	71	100
SA-2415S	21.6-26.4	10	29	15	33.33	73	100
SA-2418S	21.6-26.4	8	29	18	27.77	72	100
SA-2424S	21.6-26.4	10	30	24	20.83	71	100

SA-0.5W Series

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.)				
SA-3R33R3D	2.97-3.63	20	197	3.3	152	77	100
SA-3R305D	2.97-3.63	30	214	5	100	71	100
SA-3R37R2D	2.97-3.63	25	217	7.2	69	70	100
SA-3R309D	2.97-3.63	40	203	9	56	75	100
SA-3R312D	2.97-3.63	30	197	12	42	77	100
SA-3R315D	2.97-3.63	32	200	15	33	76	100
SA-3R318D	2.97-3.63	25	208	18	28	73	100
SA-3R324D	2.97-3.63	38	200	24	21	76	100
SA-053R3D	4.5-5.5	16	129	3.3	151.5	78	100
SA-0505D	4.5-5.5	15	124	5	100	81	100
SA-057R2D	4.5-5.5	18	129	7.2	69.44	78	100
SA-0509D	4.5-5.5	15	129	9	55.55	78	100
SA-0512D	4.5-5.5	18	125	12	41.67	80	100
SA-0515D	4.5-5.5	22	125	15	33.33	80	100
SA-0518D	4.5-5.5	23	129	18	27.77	78	100
SA-0524D	4.5-5.5	25	130	24	20.83	77	100
SA-123R3D	10.8-13.2	15	58	3.3	151.5	72	100
SA-1205D	10.8-13.2	10	55	5	100	77	100
SA-127R2D	10.8-13.2	15	54	7.2	69.44	78	100
SA-1209D	10.8-13.2	15	55	9	55.56	76	100
SA-1212D	10.8-13.2	20	58	12	41.67	72	100
SA-1215D	10.8-13.2	20	59	15	33.33	71	100
SA-1218D	10.8-13.2	20	62	18	27.77	68	100
SA-1224D	10.8-13.2	18	59	24	20.83	71	100
SA-153R3D	13.5-16.5	10	45	3.3	151.5	75	100
SA-1505D	13.5-16.5	8	43	5	100	78	100
SA-157R2D	13.5-16.5	12	45	7.2	69.44	75	100
SA-1509D	13.5-16.5	12	45	9	55.55	75	100
SA-1512D	13.5-16.5	15	47	12	41.67	72	100
SA-1515D	13.5-16.5	15	48	15	33.33	70	100
SA-1518D	13.5-16.5	12	51	18	27.77	66	100
SA-1524D	13.5-16.5	15	46	24	20.83	73	100
SA-243R3D	21.6-26.4	10	29	3.3	151.5	72	100
SA-2405D	21.6-26.4	10	29	5	100	74	100
SA-247R2D	21.6-26.4	10	31	7.2	69.44	69	100
SA-2409D	21.6-26.4	8	30	9	55.55	70	100
SA-2412D	21.6-26.4	8	31	12	41.67	69	100
SA-2415D	21.6-26.4	10	29	15	33.33	73	100
SA-2418D	21.6-26.4	8	29	18	27.77	72	100
SA-2424D	21.6-26.4	10	30	24	20.83	71	100

SA-0.5W Series

INPUT SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Voltage Range	3.3 V Input	2.97	3.3	3.63	VDC
	5 V Input	4.5	5	5.5	
	12 V Input	10.8	12	13.2	
	15 V Input	13.5	15	16.5	
	24 V Input	21.6	24	26.4	
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)	3.3 V Input	0.315			A
	5 V Input	0.2			
	12 V & 15 V & 24 V Input	0.1			
Note： 1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS						
Parameter	**Conditions**		**Min.**	**Typ.**	**Max.**	**Unit**
Output Voltage Accuracy			-3		+3	%
Line Regulation	For 1% Vin Change	SA-3R33R3S SA-3R305S	-1.3		+1.3	%
		Other Output	-1.2		+1.2	
Load Regulation	From 20% to 100% Load	SA-3R305S			10	%
		Other Output			8	
Ripple & Noise	20MHz bandwidth				100	mVpk-pk
Short Circuit Protection			Short Term (1sec)			
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 V Input			6	VDC
	5 V Input			7	
	12 V Input			15	
	15 V Input			18	
	24 V Input			28	
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note：These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

SA-0.5W Series

GENERAL SPECIFICATIONS						
Parameter	**Conditions**		**Min.**	**Typ.**	**Max.**	**Unit**
Isolation Voltage	Input-output, and rated for 60sec	Standard Type	1000			VDC
		Suffix “H”	3000			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				80		kHz
MTBF	MIL-HDBK-217 F @ 25°C		1121			k hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance			RoHS			

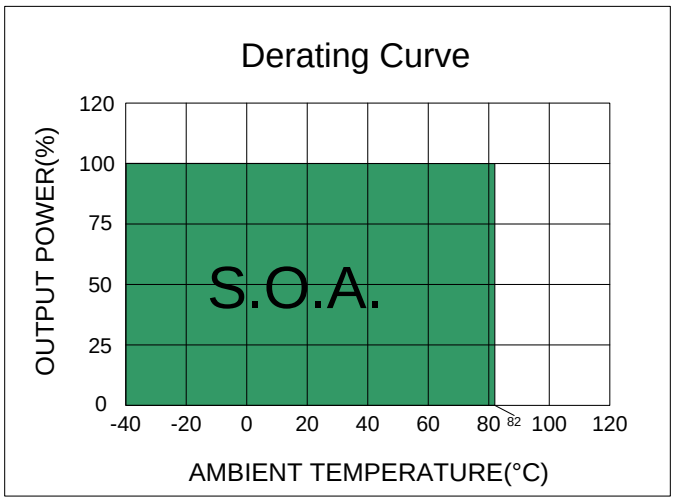
ENVIRONMENT SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Operating Ambient Temperature	See the Derating Curve	-40		89	°C
Maximum Case Temperature				100	°C
Thermal Impedance		70			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural 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: ±8kV / Indirect: ±6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2.0kV with external components	A
Surge	IEC 61000-4-5	±0.5kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

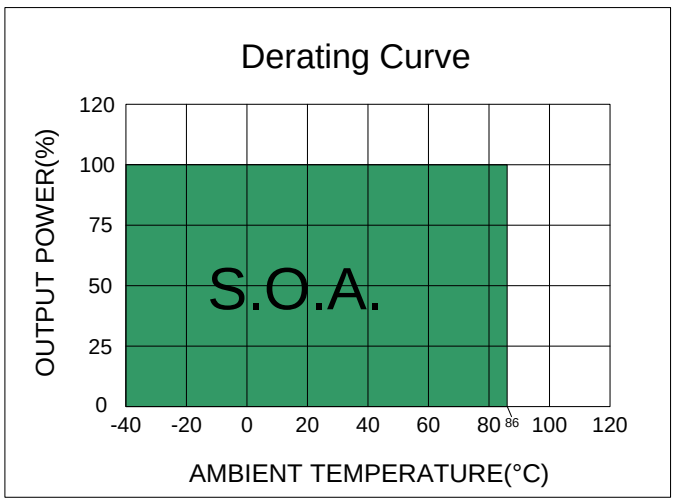
PHYSICAL SPECIFICATIONS		
Parameter		**Value**
Case Material		Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	SIP Case	Alloy 42
	DIP Case	Ø0.5mm Brass Solder-coated
Potting Material		Epoxy (UL94V-0 rated)
Weight	SIP Case	1.5 g, typ.
	DIP Case	1.8 g, typ.
Dimensions	SIP Case	0.46" x 0.24" x 0.40"
	DIP Case	0.50" x 0.40" x 0.27"

SA-0.5W Series

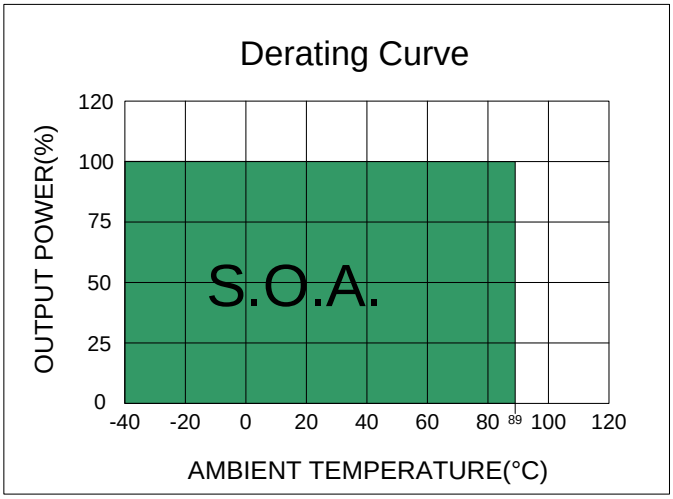
ELECTRICAL CHARACTERISTIC CURVES



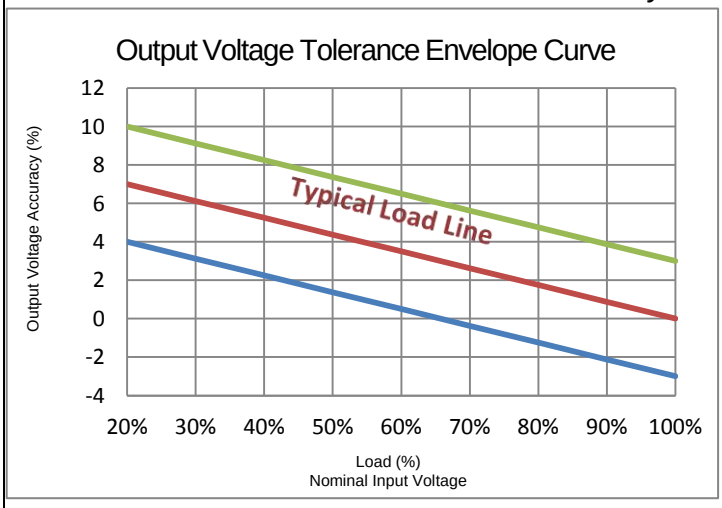
Efficiency 66 ~ 71 % Models



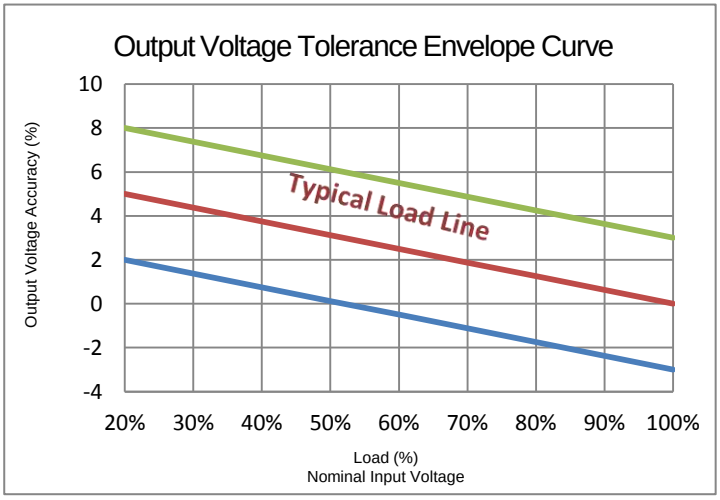
Efficiency 72 ~ 76 % Models



Efficiency 77 ~ 81% Models



SA-3R305S



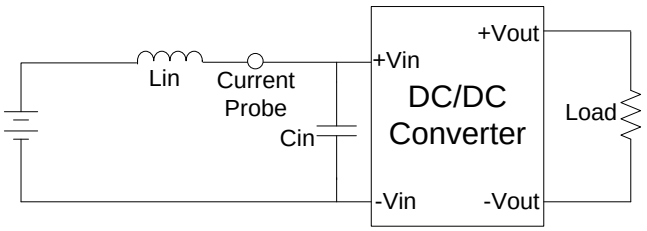
Other Models

SA-0.5W Series

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor Lin (12μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz) 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 42.4V peak, or 60VDC).

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.

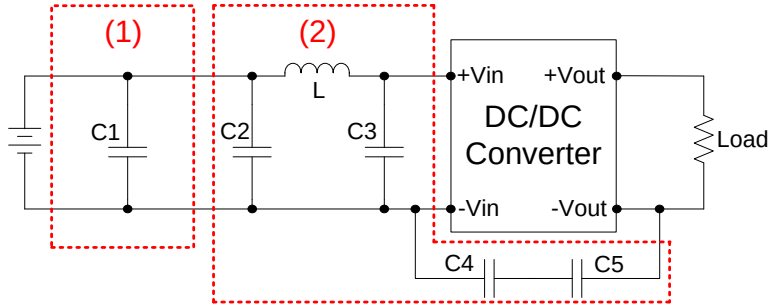
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

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.

DESIGN & FEATURE CONFIGURATIONS

EMC Filter

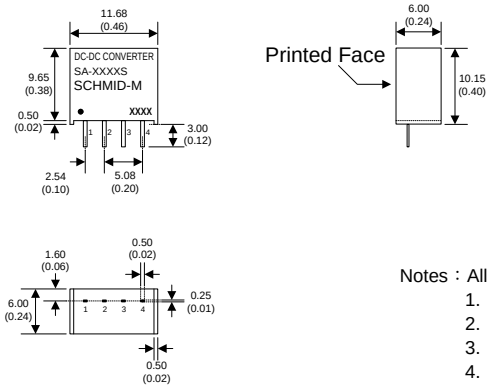
The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	C2	L	C3	C4	C5
SA-3R3XXX	NIPPON Chemi-con KY Series 470μF, 100V	MLCC 2.2μF, 100V	18μH			
SA-05XXX						
SA-12XXX						
SA-15XXX						
SA-24XXX				MLCC 2.2μF, 100V	MLCC 470pF, 2kV	
SA-24XXXH					MLCC 820pF, 2kV	MLCC 820pF, 2kV

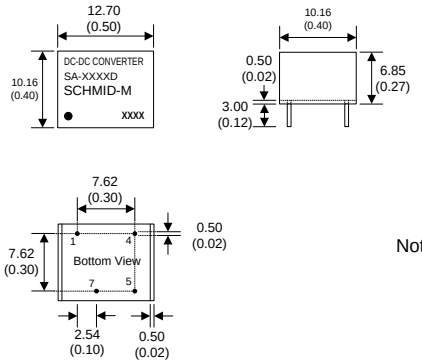
SA-0.5W Series

MECHANICAL SPECIFICATIONS



PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
2	+Vin
3	-Vout
4	+Vout

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)

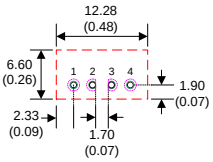


PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
4	+Vin
5	+Vout
7	-Vout

Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5±0.05 (0.02±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)

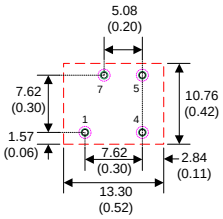
RECOMMENDED FOOTPRINT DETAILS

SIP4 Package



Notes：1. All dimensions are typical in millimeters (inches).
Through hole (black) 1~4:Ø0.80 (0.031)
Top view pad (green) 1~4:Ø1.00 (0.039)
Bottom view pad (pink) 1~4:Ø1.60 (0.063)

DIP8 Package



Notes：1. All dimensions are typical in millimeters (inches).
Through hole (black) 1~7:Ø0.80 (0.031)
Top view pad (green) 1~7:Ø1.00 (0.039)
Bottom view pad (pink) 1~7:Ø1.60 (0.063)