

SA-L Series

0.25W Unregulated Single output

Features

- 4 Pin SIL / 8 Pin DIL Package
- 1000 VDC Isolation
- Up to 3000 VDC Isolation
- Low Ripple and Noise
- Efficiency up to 76%
- -40 ~ 85°C Operation Temperature Range
- Non-Conductive Black Plastic Case
- EMI Complies With EN55022 Class B

SCHMID-M



The SA series is a family of cost effective 0.25W single output DC-DC converters. These converters achieve low cost and ultra-miniature SIP 4 pin or DIP 8 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 3.3, 5, 12, 15, 24, 48 Vdc with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24 Vdc. High performance features include 1000Vdc~3000Vdc input/output isolation, high efficiency operation and output voltage accuracy of $\pm 3\%$ maximum. Standard features include an input range of $\pm 10\%$ tolerance and low output noise and ripple.

All specifications typical at $T_a=25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS	
Voltage accuracy	$\pm 3\%$
Line regulation	$\pm 1.2\%$ / Per 1% Vin Change
Load regulation	(From 20% to 100% Load) $\pm 10\%$ (Output 3.3V Model) $\pm 20\%$
Ripple & noise(20 MHz bandwidth)(1)	100mV pk-pk
Temperature coefficient	$\pm 0.02\%/^\circ\text{C}$
Capacitor load(2)	See table

INPUT SPECIFICATIONS	
Voltage Range	$\pm 10\%$
Max. Input Current	See table
No-Load Input Current	See table
Input Filter	Capacitors
Input Reflected Ripple Current(3)	20mA pk-pk

GENERAL SPECIFICATIONS	
Efficiency	See table
I/O Isolation Voltage(3 sec)	
Input/Output	1000~3000Vdc
I/O Isolation Capacitance	60 pF Typ.
I/O Isolation Resistance	1000M Ohm
Switching Frequency	Variable 80kHz
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.121Mhrs
Safety Standard : (designed to meet)	IEC 60950-1

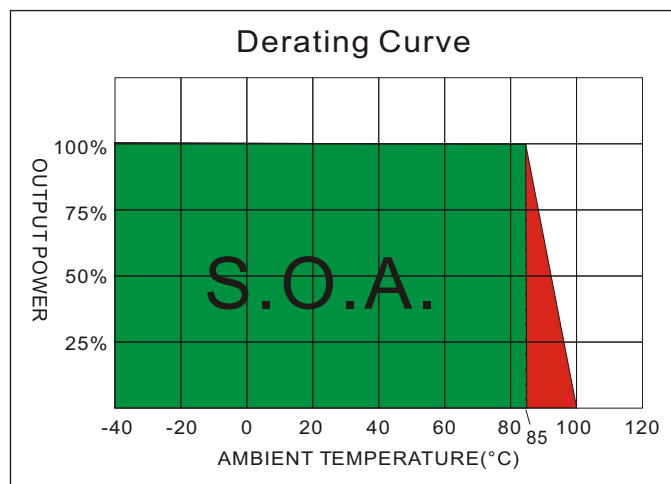
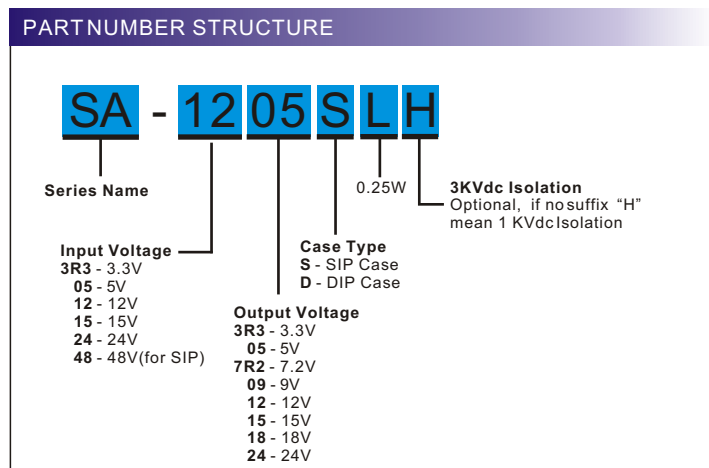
ENVIRONMENT SPECIFICATIONS	
Operating Temperature	-40°C~85°C(See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	-40°C~125°C
Cooling	Nature Convection

PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	
SIP Case	0.5mm Alloy42 Solder-coated
DIP Case	$\varnothing 0.5\text{mm}$ Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	(SIP/1.5g) (DIP/1.8g)
Dimensions	SIP Case 0.46"x0.24"x0.40" DIP Case 0.50"x0.40"x0.27"

ABSOLUTE MAXIMUM RATINGS(4)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Voltage(100mS)	
3.3 Models	0~5 Vdc
5 Models	0~7 Vdc
12 Models	0~15 Vdc
15 Models	0~18 Vdc
24 Models	0~28 Vdc
48 Models(for SIP)	0~54 Vdc
Soldering Temperature (1.5mm from case 10sec. max.)	260°C ,max.

EMC SPECIFICATIONS		
Radiated Emissions	EN55022	CLASS B
Conducted Emissions (6)	EN55022	CLASS B
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT (7)	IEC 61000-4-4	Perf. Criteria A
Surge (7)	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

SA - 0.25W Unregulated Single output



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)		Full load (mA)			
SA-3R3R3SL	3.3	30	120	3.3	75.7	63	100	
SA-3R305SL	3.3	25	115	5	50	66	100	
SA-3R37R2SL	3.3	25	118	7.2	34.72	64	100	
SA-3R309SL	3.3	25	118	9	27.77	64	100	
SA-3R312SL	3.3	32	113	12	20.83	67	100	
SA-3R315SL	3.3	25	118	15	16.67	64	100	
SA-3R318SL	3.3	25	115	18	13.88	66	100	
SA-3R324SL	3.3	20	115	24	10.41	66	100	
SA-053R3SL	5	20	78	3.3	75.7	64	100	
SA-0505SL	5	17	70	5	50	71	100	
SA-057R2SL	5	18	74	7.2	34.72	68	100	
SA-0509SL	5	15	68	9	27.77	73	100	
SA-0512SL	5	14	66	12	20.83	76	100	
SA-0515SL	5	20	70	15	16.67	71	100	
SA-0518SL	5	17	69	18	13.88	72	100	
SA-0524SL	5	18	65	24	10.41	77	100	
SA-123R3SL	12	10	32	3.3	75.7	65	100	
SA-1205SL	12	12	31	5	50	67	100	
SA-127R2SL	12	10	31	7.2	34.72	67	100	
SA-1209SL	12	12	33	9	27.77	64	100	
SA-1212SL	12	15	33	12	20.83	63	100	
SA-1215SL	12	13	31	15	16.67	67	100	
SA-1218SL	12	13	32	18	13.88	65	100	
SA-1224SL	12	18	38	24	10.41	55	100	
SA-153R3SL	15	12	26	3.3	75.7	63	100	
SA-1505SL	15	8	27	5	50	62	100	
SA-157R2SL	15	12	28	7.2	34.72	60	100	
SA-1509SL	15	12	28	9	27.77	60	100	
SA-1512SL	15	12	27	12	20.83	62	100	
SA-1515SL	15	10	27	15	16.67	61	100	
SA-1518SL	15	12	29	18	13.88	57	100	
SA-1524SL	15	12	29	24	10.41	57	100	

Suffix "H" means 3 KVdc isolation

SA - 0.25W Unregulated Single output

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full Load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
		No-Load (mA)	Full Load (mA)				
SA-243R3SL	24	8	17	3.3	75.7	60	100
SA-2405 SL	24	7	17	5	50	61	100
SA-247R2SL	24	8	18	7.2	34.72	57	100
SA-2409 SL	24	8	17	9	27.77	62	100
SA-2412 SL	24	10	19	12	20.83	56	100
SA-2415 SL	24	7	19	15	16.67	55	100
SA-2418 SL	24	10	18	18	13.88	57	100
SA-2424 SL	24	10	18	24	10.41	59	100
SA-483R3SL	48	8	9	3.3	75.7	55	100
SA-4805 SL	48	8	10	5	50	53	100
SA-487R2SL	48	8	10	7.2	34.72	54	100
SA-4809 SL	48	8	10	9	27.77	54	100
SA-4812 SL	48	8	9	12	20.83	55	100
SA-4815 SL	48	8	10	15	16.67	54	100
SA-4818 SL	48	8	11	18	13.88	49	100
SA-4824 SL	48	10	11	24	10.41	49	100
SA-3R3 3R3DL	3.3	25	124	3.3	75.7	61	100
SA-3R3 05DL	3.3	25	118	5	50	64	100
SA-3R3 7R2DL	3.3	25	118	7.2	34.72	64	100
SA-3R3 09DL	3.3	25	118	9	27.77	64	100
SA-3R3 12DL	3.3	25	120	12	20.83	63	100
SA-3R3 15DL	3.3	25	118	15	16.67	64	100
SA-3R3 18DL	3.3	25	115	18	13.88	66	100
SA-3R3 24DL	3.3	20	115	24	10.41	66	100
SA-05 3R3DL	5	20	83	3.3	75.7	60	100
SA-05 05DL	5	15	72	5	50	69	100
SA-05 7R2DL	5	18	71	7.2	34.72	70	100
SA-05 09DL	5	18	71	9	27.77	70	100
SA-05 12DL	5	20	74	12	20.83	68	100
SA-05 15DL	5	20	74	15	16.67	68	100
SA-05 18DL	5	17	68	18	13.88	73	100
SA-05 24DL	5	23	72	24	10.41	69	100
SA-12 3R3DL	12	12	31	3.3	75.7	67	100
SA-12 05DL	12	10	32	5	50	65	100
SA-12 7R2DL	12	15	32	7.2	34.72	65	100
SA-12 09DL	12	12	35	9	27.77	60	100
SA-12 12DL	12	13	31	12	20.83	68	100
SA-12 15DL	12	16	37	15	16.67	57	100
SA-12 18DL	12	16	38	18	13.88	55	100
SA-12 24DL	12	18	41	24	10.41	51	100
SA-15 3R3DL	15	12	26	3.3	75.7	63	100
SA-15 05DL	15	10	26	5	50	63	100
SA-15 7R2DL	15	12	28	7.2	34.72	60	100
SA-15 09DL	15	12	28	9	27.77	60	100
SA-15 12DL	15	12	28	12	20.83	60	100
SA-15 15DL	15	13	28	15	16.67	59	100
SA-15 18DL	15	12	29	18	13.88	57	100

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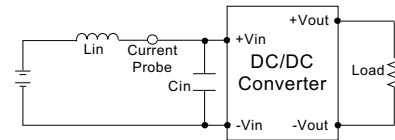
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load (uF)
		No-Load (mA)	Full Load (mA)				
SA-15 24DL	15	12	29	24	10.41	57	100
SA-24 3R3DL	24	8	18	3.3	75.7	58	100
SA-24 05DL	24	7	17	5	50	60	100
SA-24 7R2DL	24	8	18	7.2	34.72	59	100
SA-24 09DL	24	8	18	9	27.77	58	100
SA-24 12DL	24	10	19	12	20.83	55	100
SA-24 15DL	24	7	18	15	16.67	59	100
SA-24 18DL	24	10	20	18	13.88	53	100
SA-24 24DL	24	10	19	24	10.41	55	100

Suffix "H" means 3 KVdc isolation

TEST CONFIGURATIONS

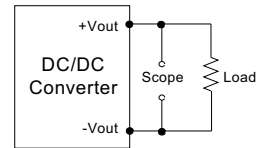
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (12uH) and a source capacitor C_{in} (47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

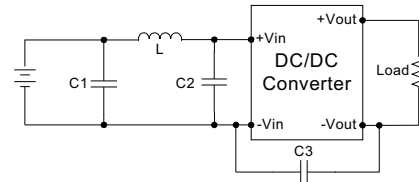
The Scope measurement bandwidth is 20MHz.



EMI Filter

Input filter components (C_1 , L , C_2 , C_3) are used to help meet conducted emissions requirement for the module.

These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

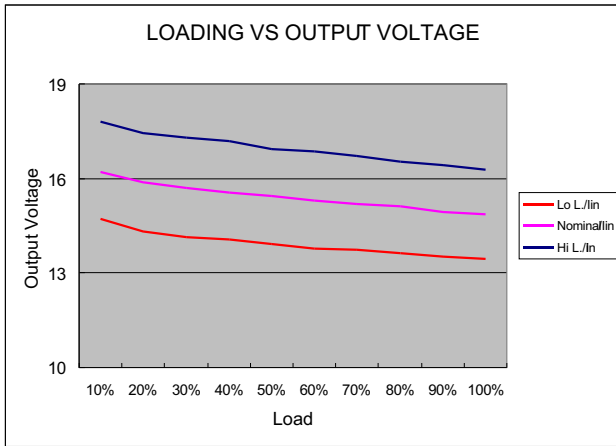


	C1	L	C2	C3
SA-3R3XXXXX	1210, 2.2uF/100V	18uH		
SA-05XXXXX	1210, 2.2uF/100V	18uH		
SA-12XXXXX	1210, 2.2uF/100V	18uH		
SA-15XXXXX	1210, 2.2uF/100V	18uH		
SA-24XXXXX	1210, 2.2uF/100V	18uH	1210, 2.2uF/100V	1206, 470pF/2KV
SA-48XXXXX	Electrolytic capacitor, 10uF/100V	18uH	1210, 2.2uF/100V	1206, 470pF/2KV

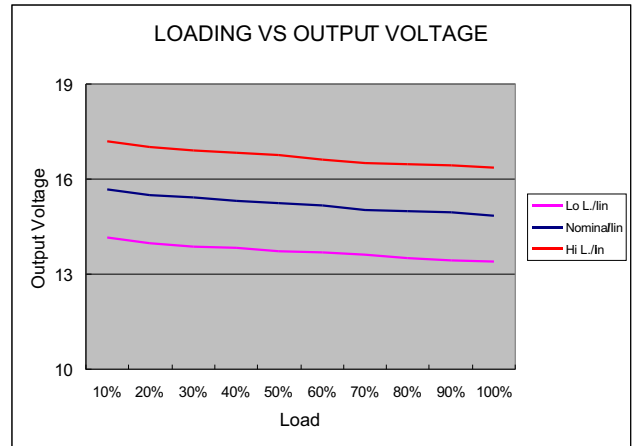
NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal V_{in} and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12uH.
4. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
5. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
6. Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
7. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. The filter capacitor Schmid-M suggest: Nippon-chemi-con SKY series, 470uF/100V.

SA - 0.25W Unregulated Single output

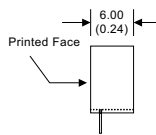
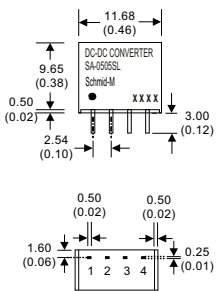


5 Models



12 Models

MECHANICAL SPECIFICATIONS



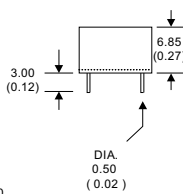
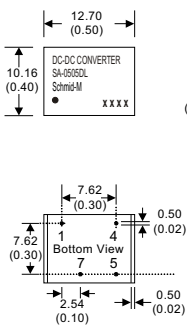
* The thickness of 48V input voltage model is 7.50(0.29)

4 Pin SIL Package

- 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. Case Tolerance: ±0.5 (±0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-V Input
2	+V Input
3	-V Output
4	+V Output

(The Pin Connection of high isolation one is the same with normal one.)



8 Pin DIL Package

- 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. Case Tolerance: ±0.5 (±0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-V Input
4	+V Input
5	+V Output
7	-V Output

(The Pin Connection of high isolation one is the same with normal one.)