

# DC/DC Converter

## SA\_(X)T-1W series

# SCHMID-M

1w, Fixed input, isolated & unregulated dual output



### FEATURES

- Efficiency up to 79%
- Operating Temperature Range: -40°C ~ +85°C
- Isolation voltage: 1K VDC
- SMD Package
- Internal surface mounted design
- International standard pin-out



SA\_(X)T-1W series is specially designed for applications where an isolated voltage is required in a distributed power supply system. It is suitable for:

1. Where the voltage of the input power supply is stable (voltage variation:  $\pm 10\%V_{in}$ );
  2. Where isolation is necessary between input and output (isolation voltage  $\leq 1000VDC$ );
  3. Where do not has high requirement of line regulation, load regulation and the ripple & noise of the output voltage;
- Such as: pure digital circuits, low frequency analog circuits, and IGBT power device driving circuits.

### Selection Guide

Part No.	Input Voltage (VDC)	Output		Efficiency (%Min./Typ.) @ Full Load	Max. Capacitive Load ( $\mu F$ )	Certification
	Nominal (Range)	Output Voltage (VDC)	Output Current (mA)(Max./Min.)			
SA0305XT-1W	3.3 (2.97-3.63)	$\pm 5$	$\pm 100/\pm 10$	67/71	100	
SA0312T-1W		$\pm 12$	$\pm 42/\pm 4.2$	75/79		
SA0315T-1W		$\pm 15$	$\pm 33/\pm 3.3$	75/79		
SA0505(X)T-1W	5 (4.5-5.5)	$\pm 5$	$\pm 100/\pm 10$	67/71		UL
SA0509(X)T-1W		$\pm 9$	$\pm 56/\pm 5.6$	73/77		UL
SA0512(X)T-1W		$\pm 12$	$\pm 42/\pm 4.2$	74/78		UL
SA0515(X)T-1W		$\pm 15$	$\pm 33/\pm 3.3$	74/78		UL
SA1205(X)T-1W	12 (10.8-13.2)	$\pm 5$	$\pm 100/\pm 10$	67/71		UL
SA1209(X)T-1W		$\pm 9$	$\pm 56/\pm 5.6$	69/73		UL
SA1212(X)T-1W		$\pm 12$	$\pm 42/\pm 4.2$	70/74		UL
SA1215(X)T-1W		$\pm 15$	$\pm 33/\pm 3.3$	70/74		UL
SA1515(X)T-1W	15 (13.5-16.5)	$\pm 15$	$\pm 33/\pm 3.3$	75/79		
SA2405(X)T-1W	24 (21.6-26.4)	$\pm 5$	$\pm 100/\pm 10$	68/72	UL	
SA2409T-1W		$\pm 9$	$\pm 56/\pm 5.6$	70/74		
SA2412(X)T-1W		$\pm 12$	$\pm 42/\pm 4.2$	72/76		
SA2415(X)T-1W		$\pm 15$	$\pm 33/\pm 3.3$	73/77		
SA2424(X)T-1W		$\pm 24$	$\pm 21/\pm 2.1$	74/78		

Notes: 1. The SA\_XT-1W series have no 3,6,8,9 pin. For example SA0505XT-1W.  
2. The capacitive loads of positive and negative outputs are identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	--	420/40	--	mA
	5V input	--	250/30	--	
	12V input	--	110/20	--	
	15V input	--	80/11	--	
	24V input	--	57/7	--	
Surge Voltage (1sec. max.)	3.3V input	-0.7	--	5	VDC
	5V input	-0.7	--	9	
	12V input	-0.7	--	18	

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Surge Voltage (1sec. max.)	15V input	-0.7	--	21	VDC
	24V input	-0.7	--	30	
Input Filter	Capacitor filter				

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		See tolerance envelope graph (Fig. 1)				
Line Regulation	Input voltage change: $\pm 1\%$	--	--	$\pm 1.2$	--	
Load Regulation	10%-100% load	5VDC output	--	12	--	%
		9VDC output	--	8	--	
		12VDC output	--	7	--	
		15VDC output	--	6	--	
		24VDC output	--	5	--	
Ripple & Noise*	20MHz bandwidth	--	50	75	mVp-p	
Temperature Drift Coefficient	100% load	--	--	$\pm 0.03$	%/°C	
Output Short Circuit Protection		--	--	1	s	

Note: 1. Dual output models unbalanced load:  $\pm 5\%$ .

2. Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

3. Supply voltage must be discontinued at the end of short circuit duration.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Isolation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1000	--	--	VDC	
Isolation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	M $\Omega$	
Isolation Capacitance	Input-output, 100KHz/0.1V	SA2424(X)T-1W	--	100	--	pF
		Other models	--	30	--	
Operating Temperature	Derating if the temperature $\geq 85^\circ\text{C}$ (see Fig. 2)	-40	--	85	°C	
Storage Temperature		-55	--	125		
Casing Temperature Rise	Ta=25°C	--	25	--		
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300		
Reflow Soldering Temperature		Peak temp. $\leq 245^\circ\text{C}$ , maximum duration time $\leq 60\text{s}$ at $217^\circ\text{C}$ . For actual application, please refer to IPC/JEDEC J-STD-020D.1.				
Storage Humidity	Non-condensing	--	--	95	%	
Switching Frequency	100% load, nominal input voltage(3.3V/5V/12V)	--	100	--	KHz	
	100% load, nominal input voltage(15V/24V)	--	500	--		
MTBF	MIL-HDFK-217F@25°C	3500	--	--	K hours	

### Physical Specifications

Casing Material	Black flame-retardant heat-proof epoxy resin (UL94-V0)
Package Dimensions	15.24*11.20*6.50 mm
Weight	1.7 g(Typ.)
Cooling Method	Free air convection

### EMC Specifications

EMI	Conducted disturbance	CISPR22/EN55022 CLASS A (see Fig. 5 for recommended circuit)
EMS	Electrostatic discharge	IEC/EN61000-4-2 Contact $\pm 6\text{KV}$ perf. Criteria B

### Product Characteristic Curve

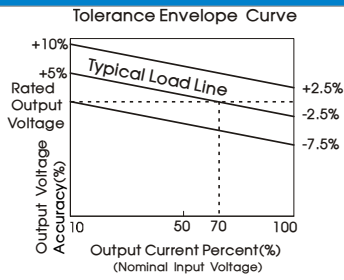


Fig. 1

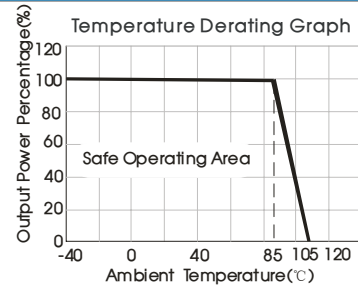
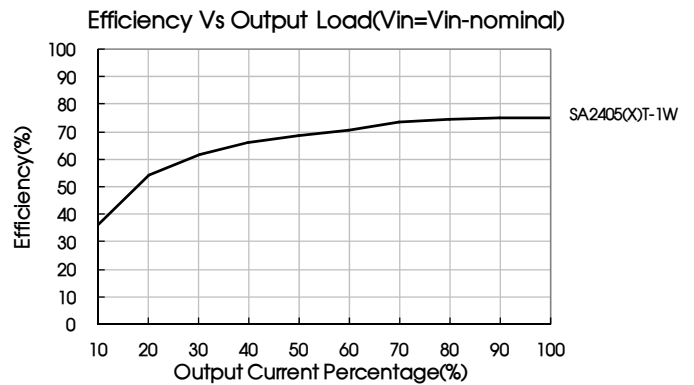
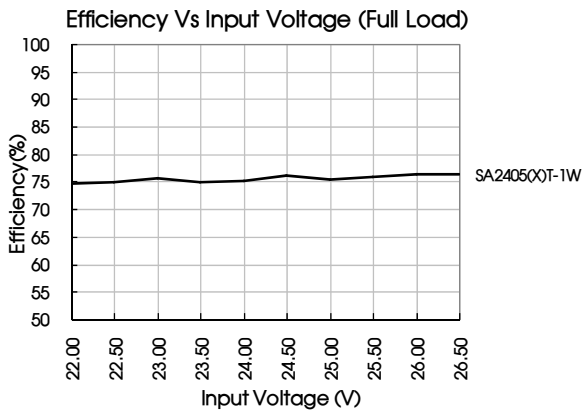
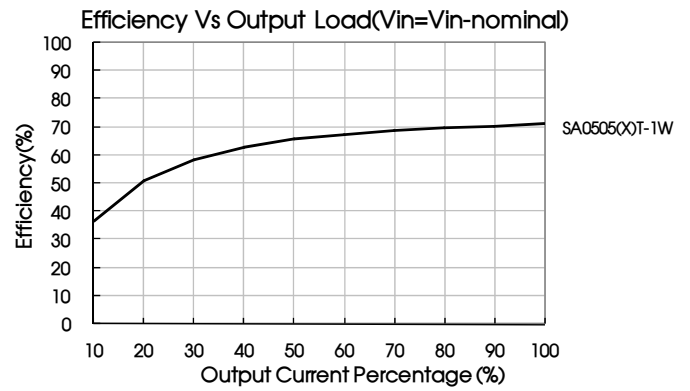
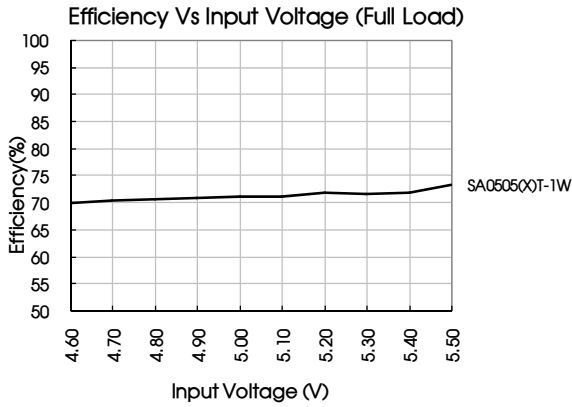


Fig. 2



### Design Reference

#### 1. Typical application

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules running well, the recommended capacitive load values as shown in Table 1.



Fig. 3

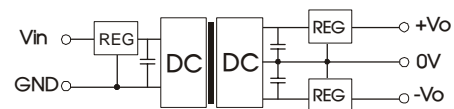


Fig.4

Recommended capacitive load value table (Table 1)

Vin (VDC)	Cin (μF)	Vout (VDC)	Cout (μF)
3.3	4.7	±5	4.7
5	4.7	±9	2.2
12	2.2	±12	2.2
15	2.2	±15	1
24	1	±24	0.47

It is not recommended to connect any external capacitor when output power is less than 0.5W.

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### 2. EMC typical recommended circuit

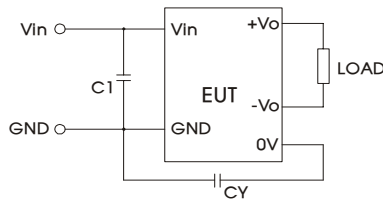


Fig.5

Input voltage (VDC)		15	24
EMI	C1	2.2μF /50V	4.7μF /50V
	CY	100pF/2000V	100pF/2000V

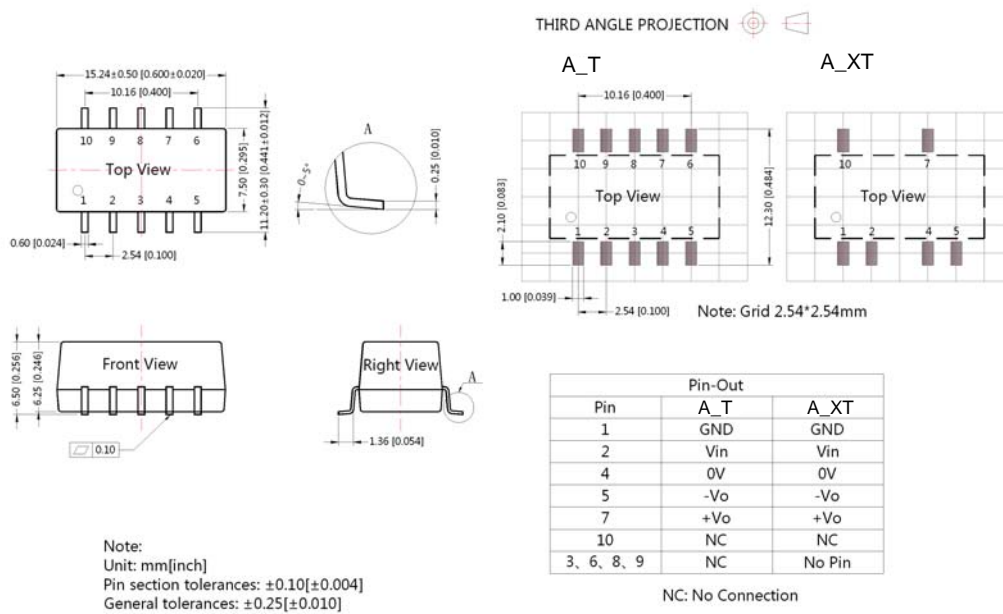
Note: Product bare input of 3.3V,5V,12V already meet CLASS A.

### 3. Output load requirements

To ensure the module work efficiently and reliably, during the operation, the min. output load should be no less than 10% of the full load. If the actual output power is low, please connect a resistor to the output terminal in parallel, with a recommended resistance which is 10% of the rated power, and derating is required during operation, or use our company's products with a lower rated output power (SA\_(X)T-W2 series).

4. For more information please find the application notes on [www.schmid-m.com](http://www.schmid-m.com)

## Dimensions and Recommended Layout



### Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58200019;
2. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
3. The max. capacitive load should be tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, data in this datasheet should be tested under the conditions of  $T_a=25^\circ\text{C}$ , humidity<75% when inputting nominal voltage and outputting rated load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
7. We can provide product customization service;
8. Specifications of this product are subject to changes without prior notice.