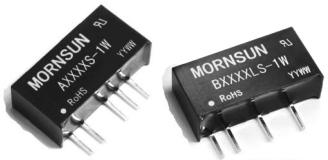
MORNSUN®

A_S-1W & B_LS-1W Series

1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



RoHS

PRODUCT FEATURES

- High Efficiency up to 84%
- 1KVDC Isolation
- SIP Package
- Internal SMD Construction
- Temperature Range: -40°C ~ +85°C
- No Heat sink Required
- No External Component Required
- Industry Standard Pinout
- RoHS Compliance

MODEL SELECTION

A0505S-1W

- Rated Power
- Package Style
- Output Voltage
- Input Voltage
- Product Series

APPLICATIONS

The A_S-1W & B_LS-1W series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

1) Where the voltage of the input power supply is fixed (voltage variation ≤ ±10%);
2) Where isolation is necessary between input and output (isolation voltage ≤1000VDC);
3) Where the regulation of the output voltage and the output ripple noise are not demanding.

Such as: purely digital circuits, ordinary low frequency analog circuits, and IGBT power device driving circuits.

PRODUCT PROGRAM

Model Number	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA) Max.	Output Current (mA) Min.	Input Current (mA)(typ.) @Max. Load	Input Current (mA)(typ.) @No Load	Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (%, typ.) @Max. Load	Approval
B0303LS-1W	3.3 (3.0-3.6)	3.3	303	31	417	42	14	220	72	
B0305LS-1W		5	200	20	392				74	
A0505S-1W	5 (4.5-5.5)	±5	±100	±10	273	33	20	100	72	UL
A0509S-1W		±9	±56	±6	268				77	UL
A0512S-1W		±12	±42	±5	253				79	UL
A0515S-1W		±15	±33	±4	229				80	UL
A0524S-1W		±24	±21	±3	241				82	
B0503LS-1W		3.3	303	31	271	35	21	220	72	
B0505LS-1W		5	200	20	273				70	UL CE
B0506LS-1W		6	167	16	267				70	
B0507LS-1W		7.2	139	14	264				72	
B0509LS-1W		9	111	12	252				78	UL CE
B0512LS-1W		12	83	9	250				78	UL CE
B0515LS-1W		15	67	7	248				80	UL CE
B0524LS-1W		24	42	5	237				81	
A1205S-1W	12 (10.8-13.2)	±5	±100	±10	114	17	15	100	72	UL
A1209S-1W		±9	±56	±6	109				78	UL
A1212S-1W		±12	±42	±5	105				79	UL
A1215S-1W		±15	±33	±4	105				78	UL
B1203LS-1W		3.3	303	31	112	14	22	220	74	
B1205LS-1W		5	200	20	116				71	UL CE
B1209LS-1W		9	111	12	107				76	UL CE
B1212LS-1W		12	83	9	101				78	UL CE
B1215LS-1W		15	67	7	101				79	UL CE

Model Number	Input Voltage(VDC)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (%, typ.) @Max. Load	Approval
	Nominal (Range)		Max.	Min.	@Max. Load	@No Load				
B1224LS-1W	12(10.8-13.2)	24	42	5	97	14	22	220	84	
A1505S-1W	15 (13.5-16.5)	±5	±100	±10	95	15	22	100	72	
A1512S-1W		±12	±42	±5	84				76	
A1515S-1W		±15	±33	±4	88				79	
B1505LS-1W		5	200	20	94	14	24	220	72	
B1512LS-1W		12	83	9	85				76	
B1515LS-1W		15	67	7	84				75	
A2405S-1W	24 (21.6-26.4)	±5	±100	±10	56	8	43	100	73	UL
A2409S-1W		±9	±56	±6	53				79	UL
A2412S-1W		±12	±42	±5	52				80	UL
A2415S-1W		±15	±33	±4	51				80	UL
A2424S-1W		±24	±21	±3	51				81	
B2405LS-1W		5	200	20	56	7	53	220	73	UL CE
B2409LS-1W		9	111	12	52				78	UL CE
B2412LS-1W		12	83	9	51				78	UL CE
B2415LS-1W		15	67	7	50				79	UL CE
B2424LS-1W		24	42	4	50				78	

Note: The A_S-W25/B_LS-W25 series also are available in our company.

INTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1 sec. max.)	3.3VDC Input Models	-0.7	--	5	VDC
	5VDC Input Models	-0.7	--	9	
	12VDC Input Models	-0.7	--	18	
	15VDC Input Models	-0.7	--	21	
	24VDC Input Models	-0.7	--	30	
Reverse Polarity Input Current*		--	--	0.4	A
Internal Power Dissipation*		--	--	0.45	W
Input Filter		C Filter			

Note: *If the product reverse did not seek to limit current or work does not limit the maximum power, may result in injury or permanent damage, testing is not recommended.

OUTPUT SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Units
Output Power			0.1	--	1	W
Output Voltage Accuracy			See tolerance envelope graph			
Output Voltage Balance	Dual Output, Balanced Loads		--	±0.5	±1	%
Line Regulation	For Vin change of ±1%		--	--	±1.2	
Load Regulation	10% to 100% load	(3.3V output)	--	12	20	
		(5V/6V/7.2V output)	--	10.5	15	
		(9V output)	--	8.3	15	
		(12V output)	--	6.8	15	
		(15V output)	--	6.3	15	
		(24V output)	--	5	15	
Temperature Drift	100% full load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	(AXXXXS-1W)	--	50	75	mVp-p
		(AXX24S-1W)	--	100	150	
		(BXXXXLS-1W)	--	75	100	
		(BXX24LS-1W)	--	100	150	
Short Circuit Protection**			--	--	1	s

*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.
Note: Dual output models unbalanced load: ±5%. **Supply voltage must be discontinued at the end of short circuit duration.

COMMON SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Units
Isolation Voltage	Tested for 1 minute and 1mA max		1000	--	--	VDC
Isolation Resistance	Test at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	24VDC Input/Output Models	--	100	--	pF
		Other Models	--	30	--	
Switching Frequency	Full load, nominal input		--	100	--	KHz
MTBF	MIL-HDBK-217F@25℃		3500	--	--	K hours
Case Material			Plastic(UL94-V0)			
Weight			--	2.1	--	g

ENVIRONMENTAL SPECIFICATIONS

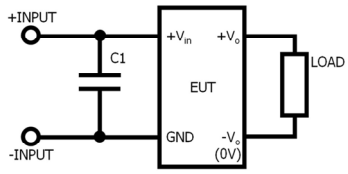
Item	Test Conditions	Min.	Typ.	Max.	Units
Storage Humidity		--	--	95	%
Operating Temperature	Power derating (above 85℃)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE		CISPR22/EN55022 CLASS A（External Circuit Refer to Figure1）
EMS	ESD	AxxxxS-1W Series	IEC/EN61000-4-2 Contact ±6KV perf. Criteria B
		BxxxxLS-1W Series	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit
（CLASS A）:



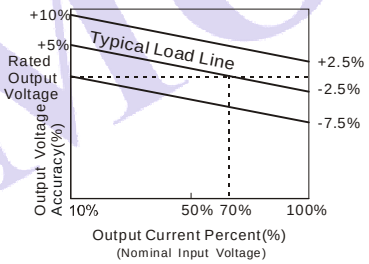
(Figure 1)

A_S-1W Series
Recommended external circuit parameters:
Vin：5V
C1：4.7μF/50V 1210
Vin：24V
C1：1μF/50V 1210
Remarks：Product bare input of 12V、15V can be tested by the CLASS A.

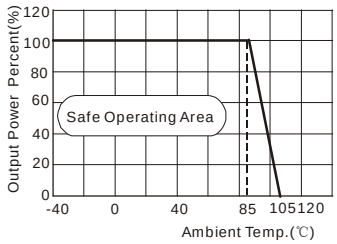
B_LS-1W Series
Recommended external circuit parameters:
Vin：3.3V
C1：4.7μF/50V 1210
Vin：5V/12V/15V/24V
C1：1μF/50V 1210
Remarks：Product bare input of 3.3V、5V、12V can be tested by the CLASS A, increase the capacitor margin increase.

PRODUCT TYPICAL CURVE

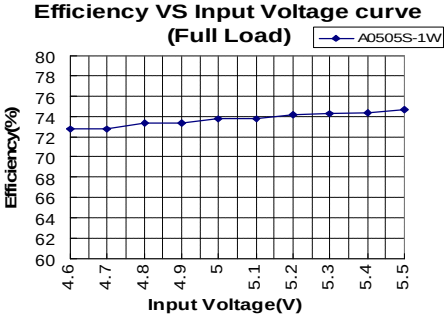
Tolerance Envelope Graph



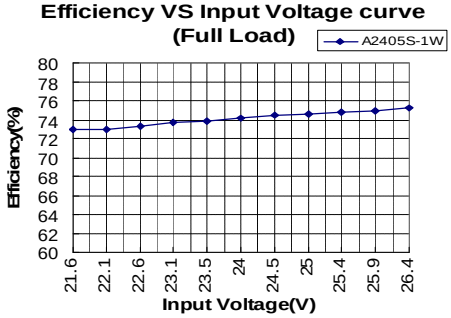
Temperature Derating Graph

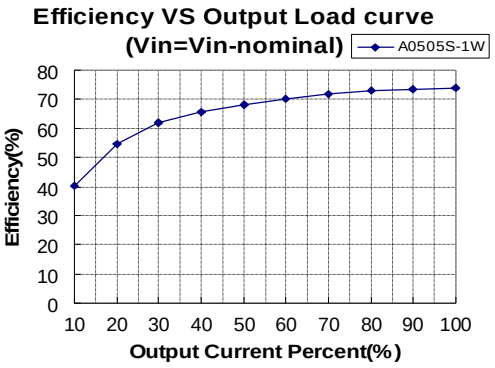


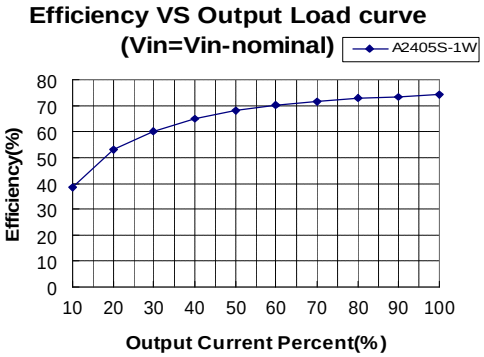
Efficiency VS Input Voltage curve
(Full Load)



Efficiency VS Input Voltage curve
(Full Load)

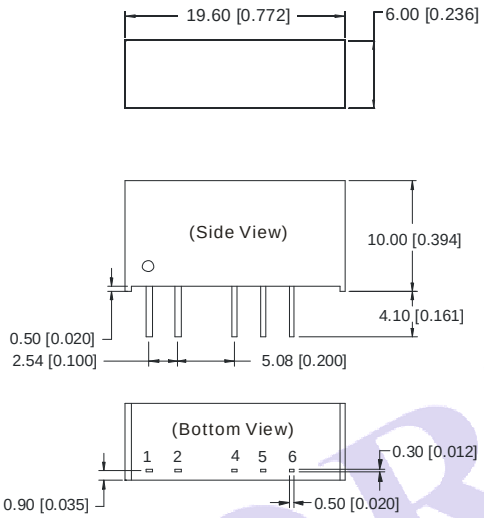






OUTLINE DIMENSIONS、RECOMMENDED FOOTPRINT & PACKAGING

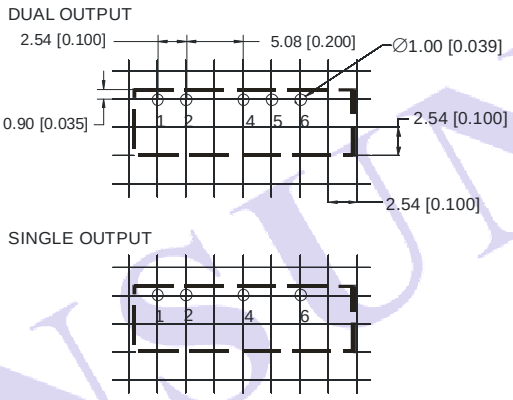
MECHANICAL DIMENSIONS



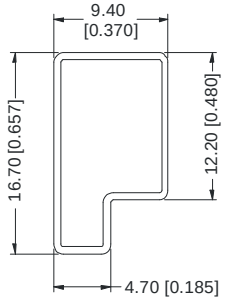
Note:
Unit:mm[inch]
Pin section tolerances:± 0.10mm[± 0.004inch]
General tolerances:± 0.25mm[± 0.010inch]

FOOTPRINT DETAILS		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No Pin	0V
6	+Vo	+Vo

RECOMMENDED FOOTPRINT



TUBE OUTLINE DIMENSIONS

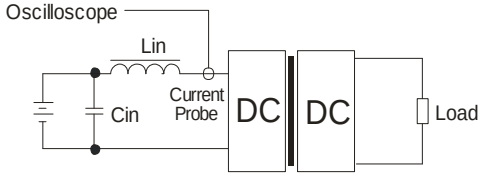


Note:
Unit :mm[inch]
General tolerances: ±0.50mm[±0.020inch]
L=530mm[20.866inch] Tube Quantity: 25pcs
L=220mm[8.661inch] Tube Quantity: 10pcs
Short tube inner packaging dimensions: L*W*H=255*170*80mm;
Short tube outer packaging dimensions(with six inner packaging boxes): L*W*H=375*280*270mm;
Long tube inner packaging dimensions: L*W*H=580*200*100mm;
Long tube outer packaging dimensions(with two inner packaging boxes): L*W*H=600*215*220mm;
Long tube outer packaging dimensions(with three inner packaging boxes): L*W*H=600*215*325mm.

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with a inductor Lin and Cin to simulate source impedance.



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN & APPLY CONSIDERATIONS

1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load ***could not be less than 10% of the full load.*** If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power (A_S -W25/B_LS-W25 series).

2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

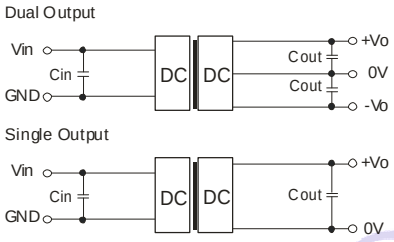
Input Fuse Selection Guide

3.3VDC Input Models	500mA slow-Blow Type	15VDC Input Models	100mA slow-Blow Type
5VDC Input Models	500mA slow-Blow Type	24VDC Input Models	100mA slow-Blow Type
12VDC Input Models	200mA slow-Blow Type		

3) Recommended circuit

If you want to further decrease the input/output ripple, an capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 2).

It should also be noted that the capacitance of filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 1).



(Figure 2)

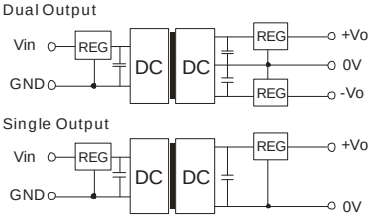
EXTERNAL CAPACITOR TABLE (TABLE 1)

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout (μF)
3.3/5	4.7	3.3/5/6	10	±5	4.7
12	2.2	7.2/9	4.7	±9	2.2
15	2.2	12	2.2	±12	1
24	1	15	1	±15	0.47
-	-	24	1	±24	0.47

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

4) Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear regulator and an capacitor filtering network with overheat protection that is connected to the input or output end in series (Figure 3), the recommended capacitance of its filter capacitor sees (Table 1), linear regulator based on the actual voltage and current to reasonable selection.



(Figure 3)

5) No parallel connection or plug and play

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all the test methods of indications are based on corporate standards.
4. Only typical models listed, other models may be different, please contact our technical person for more details.
5. Our company offer custom products.
6. Specifications subject to change without notice.

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