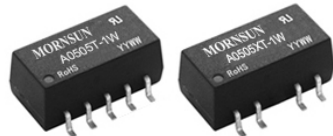


MORNSUN®

A_(X)T-1W Series

**1W, FIXED INPUT, ISOLATED & UNREGULATED
DUAL OUTPUT DC-DC CONVERTER
ULTRAMINIATURE SMD PACKAGE**

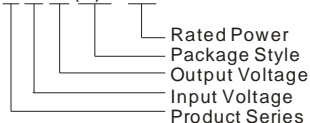


Patent Protection RoHS



PART NUMBER SYSTEM

A0505(X)T-1W



FEATURES

- Small Footprint
- SMD Package
- Efficiency up to 79%
- 1KVDC Isolation
- Operating Temperature Range:
-40°C ~ +85°C
- Low Temperature Rise
- Industry Standard Pinout
- No External Component Required

APPLICATIONS

The A_(X)T-1W Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage variation $\leq \pm 10\%$;
- 2) 1KVDC input and output isolation;
- 3) Regulated and low ripple noise is not required.

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

SELECTION GUIDE

| Model Number | Input Voltage(VDC) Nominal (Range) | Output Voltage (VDC) | Output Current (mA) | | Input Current (mA)(typ.) | | Reflected Ripple Current (mA,typ.) | Max. Capacitive Load [#] (μF) | Efficiency (%, typ.) @ Max. Load | Approval |
|--------------|--|-------------------------|------------------------|------|-----------------------------|--------------|---|--|--|----------|
| | | | Max. | Min. | @ Max. Load | @ No Load | | | | |
| A0305(X)-1W | 3.3 (2.97-3.63) | ±5 | ±100 | ±10 | 427 | 44 | 19 | 100 | 71 | |
| A0312XT-1W | | ±12 | ±42 | ±5 | 368 | 33 | 29 | | 79 | |
| A0315(X)T-1W | | ±15 | ±33 | ±4 | 361 | 27.4 | 45 | | 79 | |
| A0505(X)T-1W | 5 (4.5-5.5) | ±5 | ±100 | ±10 | 280 | 34 | 20 | | 71 | UL |
| A0509(X)T-1W | | ±9 | ±56 | ±6 | 249 | 27 | 20 | | 77 | UL |
| A0512(X)T-1W | | ±12 | ±42 | ±5 | 258 | 33 | 19 | | 78 | UL |
| A0515(X)T-1W | | ±15 | ±33 | ±4 | 250 | 31 | 19 | | 78 | UL |
| A1205(X)T-1W | 12 (10.8-13.2) | ±5 | ±100 | ±10 | 112 | 11 | 18 | | 71 | UL |
| A1209(X)T-1W | | ±9 | ±56 | ±6 | 112 | 17 | 17 | | 73 | UL |
| A1212(X)T-1W | | ±12 | ±42 | ±5 | 109 | 18 | 19 | | 74 | UL |
| A1215(X)T-1W | | ±15 | ±33 | ±4 | 110 | 22 | 16 | | 74 | UL |
| A1515(X)T-1W | 15(13.5-16.5) | ±15 | ±33 | ±4 | 80 | 11 | 14 | | 79 | |
| A2405(X)T-1W | 24 (21.6-26.4) | ±5 | ±100 | ±10 | 57 | 7 | 14 | | 72 | |
| A2409(X)T-1W | | ±9 | ±56 | ±6 | 53 | 7 | 18 | | 74 | |
| A2412(X)T-1W | | ±12 | ±42 | ±5 | 51 | 7 | 20 | | 76 | |
| A2415(X)T-1W | | ±15 | ±33 | ±4 | 51 | 7 | 16 | | 77 | |
| A2424(X)T-1W | | ±24 | ±21 | ±2 | 49 | 6 | 20 | | 78 | |

Note: 1. The A_XT-1W series have no 3,6,8,9 pin. For example A0505XT-1W.

2. A_XT-1W series: UL-609501 Pending.

3. [#] For each output.

INPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|------|------|------|------|
| Input Surge Voltage (1sec. max.) | 3.3VDC input | -0.7 | -- | 5 | VDC |
| Input Surge Voltage (1sec. max.) | 5VDC input | -0.7 | -- | 9 | VDC |

| | | | | | |
|--------------|-------------|--------------------|----|----|--|
| | 12VDC input | -0.7 | -- | 18 | |
| | 15VDC input | -0.7 | -- | 21 | |
| | 24VDC input | -0.7 | -- | 30 | |
| Input Filter | | Capacitance Filter | | | |

OUTPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------|-----------------------------|------------------------------|------|-------|-------|
| Output Power | | 0.1 | -- | 1 | W |
| Output Voltage Accuracy | | See tolerance envelope curve | | | |
| Output Voltage Balance | Dual Output, Balanced Loads | -- | ±0.5 | ±1.0 | % |
| Line Regulation | For Vin change of ±1% | -- | -- | ±1.2 | |
| Load Regulation | 10% to 100% load | 5VDC output | -- | 12.8 | |
| | | 9VDC output | -- | 8.3 | |
| | | 12VDC output | -- | 6.8 | |
| | | 15VDC output | -- | 6.3 | |
| | | 24VDC output | -- | 6.0 | |
| Temperature Drift | 100% load | -- | -- | ±0.03 | %/°C |
| Ripple & Noise* | 20MHz Bandwidth | -- | 50 | 75 | mVp-p |
| Short Circuit Protection** | | -- | -- | 1 | s |

Note: 1. Dual output models unbalanced load: ±5%.

2. *Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

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

COMMON SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--|--------------|------|------|---------|
| Isolation Voltage | Tested for 1 minute and leakage current less than 1 mA | 1000 | -- | -- | VDC |
| Isolation Resistance | Test at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input/Output, 100KHz/0.1V | A2424(X)T-1W | 100 | -- | pF |
| | | Other Models | 30 | -- | |
| Switching Frequency | Full load, nominal input (5V/12V) | -- | 100 | -- | KHz |
| | Full load, nominal input (15V/24V) | -- | 500 | -- | |
| MTBF | MIL-HDBK-217F @25°C | 3500 | -- | -- | K hours |
| Case Material | Epoxy Resin (UL94-V0) | | | | |
| Weight | | -- | 1.70 | -- | g |

ENVIRONMENTAL SPECIFICATIONS

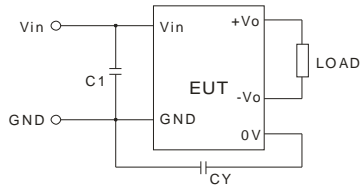
| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------|--------------------------------|---------------------|------|------|------|
| Storage Humidity | Non condensing | -- | -- | 95 | % |
| Operating Temperature | Power derating (above 85 °C) | -40 | -- | 85 | °C |
| Storage 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 | IEC/EN61000-4-2 Contact ±8KV perf. Criteria B |

EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit:



(Figure 1)

Recommended external circuit parameters:

①Vin: 15V

C1: 2.2μF/50V

②Vin: 24V

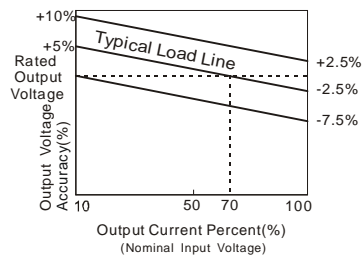
C1: 4.7μF/50V

CY: 100pF/2000V

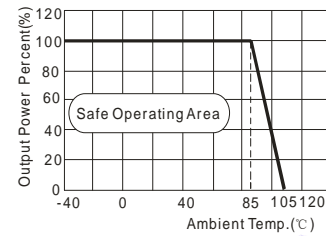
Note: Product bare input of 3.3V、5V、12V already meet CLASS A.

PRODUCT TYPICAL CURVE

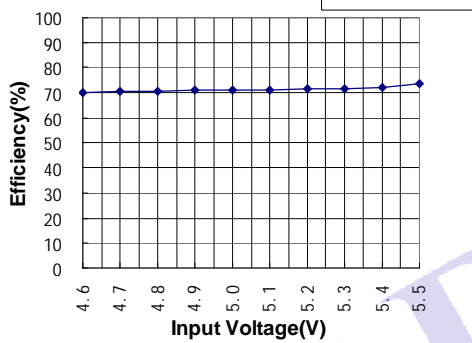
Tolerance Envelope Curve



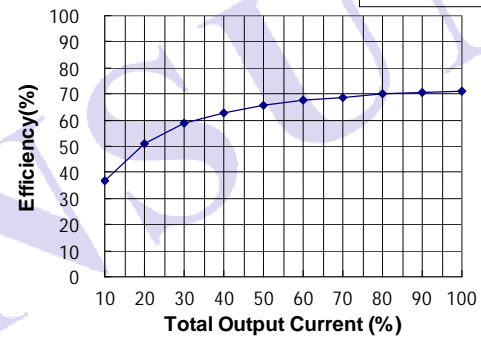
Temperature Derating Curve



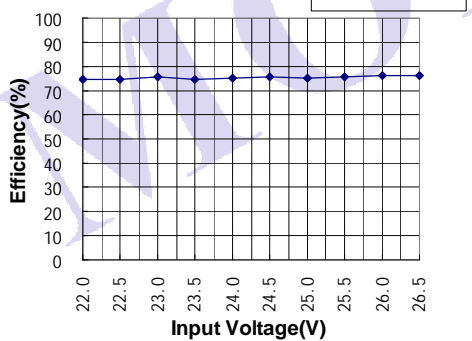
Efficiency VS Input Voltage curve
(Full Load)



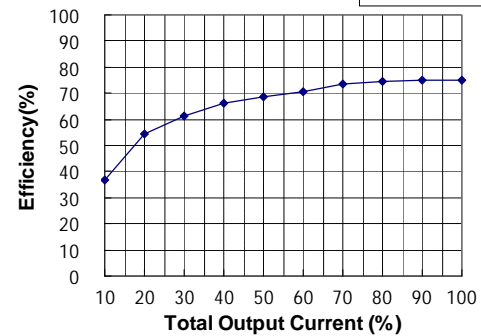
Efficiency VS Output Load curve
(Vin=Vin-nominal)



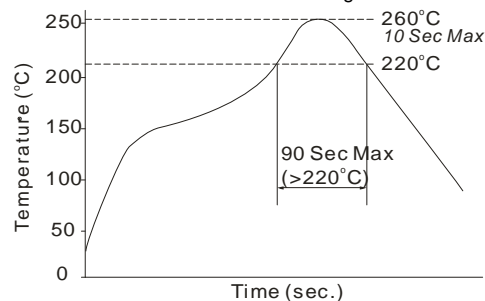
Efficiency VS Input Voltage curve
(Full Load)



Efficiency VS Output Load curve
(Vin=Vin-nominal)



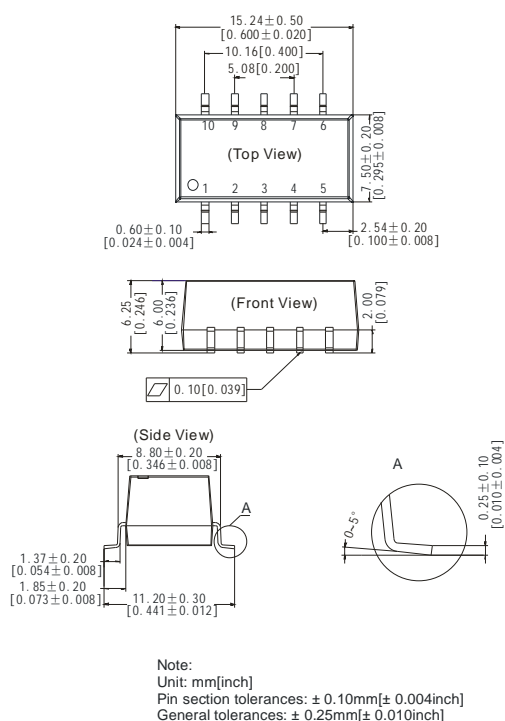
Recommended reflow Soldering Profile



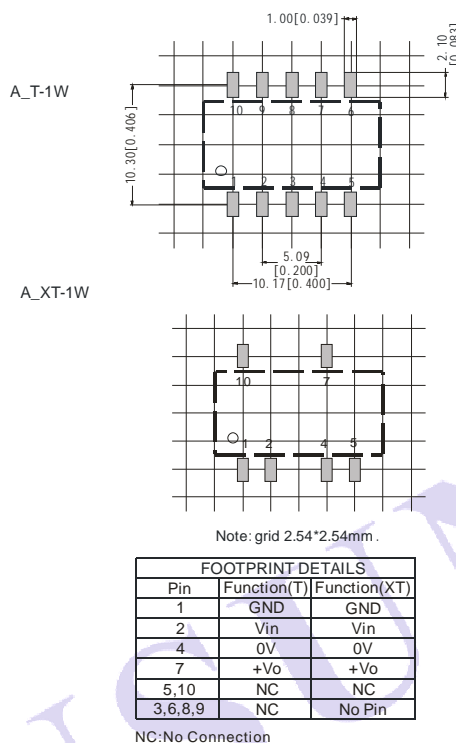
Remark: The curve applies only to the hot air reflow soldering

OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

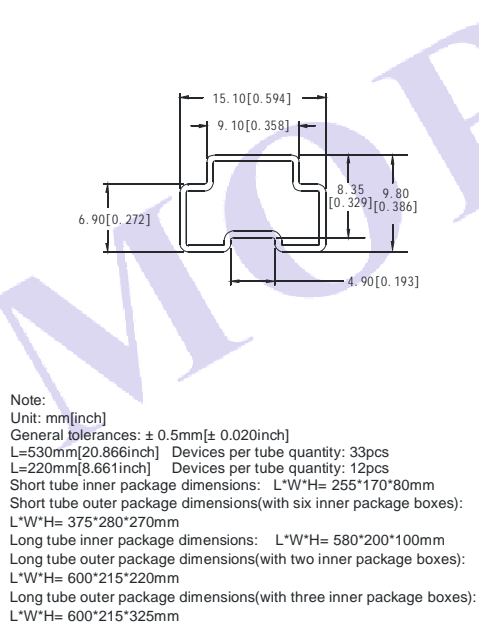
MECHANICAL DIMENSIONS



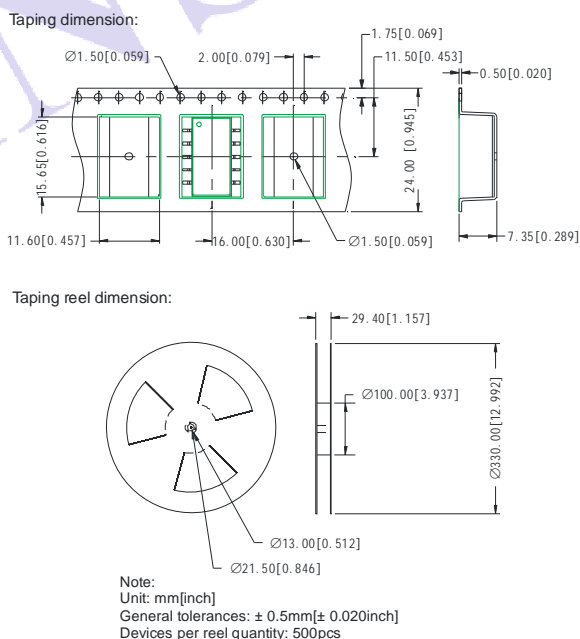
RECOMMENDED FOOTPRINT



TUBE OUTLINE DIMENSIONS



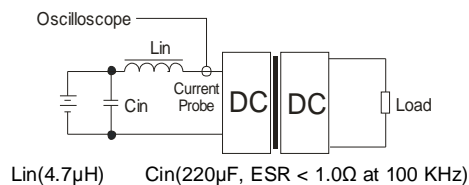
REEL PACKING OUTLINE DIMENSIONS



TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

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



DESIGN 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_(X)T-W2 series).

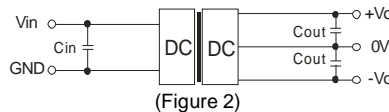
2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is add a circuit breaker to the circuit.

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).



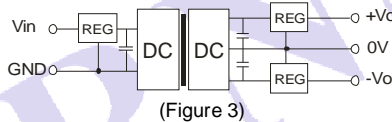
EXTERNAL CAPACITOR TABLE (TABLE 1)

| Vin (VDC) | Cin (μF) | Vout (VDC) | Cout [#] (μF) |
|--------------|-------------|---------------|---------------------------|
| 5 | 4.7 | ±5 | 4.7 |
| 12 | 2.2 | ±9 | 2.2 |
| 24 | 1 | ±12 | 2.2 |
| -- | -- | ±15 | 1 |

Note: [#] For each output. 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.



5) Cannot use in parallel and hot swap

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All date in the datasheet are measured according to nominal input voltage, rated output load, TA=25℃, humidity<75%, unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. The performance in the datasheet is just fit for the part number in the selection guide, and may be different from the customer-designed product, you can get more details from MORNSUN FAE.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

MORNSUN Science & Technology Co.,Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou,P.R.China.

Tel: 86-20-38601850

Fax:86-20-38601272

[Http://www.mornsun-power.com](http://www.mornsun-power.com)