



1T10A4_3UP series

1W - Dual Output DC-DC converter - Isolated & Unregulated

DC-DC Converter

1 Watt

-  SMT10 package type
-  Operating temperature range: -40°C to +105°C
-  1500VDC isolation voltage
-  Up to 85% efficiency
-  No-load input current as low as 8mA
-  MTBF: 3,500,000 hours

Introducing our new 1T10A4_3UP series, a compact and energy-efficient DC-DC converter solution designed for reliable performance in space-constrained and demanding applications. Housed in a robust SMT10 package, the series supports modern, high-density PCB layouts. The converters operate over an extended temperature range from -40 °C to +105 °C and provide a 1500 VDC isolation voltage, ensuring safe and stable operation under harsh environmental conditions. With efficiencies of up to 88 % and an ultra-low no-load input current of only 8 mA, the series is well suited for energy-sensitive and always-on applications. A high MTBF of 3,500,000 hours highlights the long-term reliability of the 1T10A4_3UP series, making it an excellent choice for industrial, embedded, and high-reliability designs.



| Common specifications | |
|------------------------------|---|
| Short circuit protection | Continuous, self recovery |
| Switching frequency | 220KHz (typ.) full load, nominal input voltage |
| Operating temperature | -40°C - +105°C (with derating) |
| Storage temperature | -55°C - +125°C |
| Case temperature rise | +25°C Typ. (Ta = 25°C, nominal input, output load) |
| Reflow soldering temperature | Peak temp. ≤240°C, maximum duration time ≤60s over 217°C |
| Storage humidity | 95% RH (non-condensing) |
| Input filter | Capacitance filter |
| Hot plug | Unavailable |
| MTBF (MIL-HDBK-217F@25°C) | > 3,500,000 Hours |
| Case material | Black plastic; flame-retardant and heat-resistant (UL94V-0 rated) |
| Package dimensions | 15.24 x 11.40 x 7.25 mm |
| Weight | 1.4g (typ.) |
| Cooling method | Free air convection |

| Output specifications | | | | | |
|---|--------------------------------|-----|-------|-----|-------|
| Item | Operating condition | Min | Typ | Max | Units |
| Output voltage accuracy | See figure 1 | | | | |
| Linear regulation (input voltage variation ±1%) | 3.3VDC Output | | ±1.5 | | % |
| | Others Output | | ±1.2 | | |
| Load regulation (10% - 100% load) | 3.3VDC output | | 15 | 20 | |
| | 5VDC output | | 10 | 15 | |
| | 9VDC output | | 8 | 10 | % |
| | 12VDC output | | 7 | 10 | |
| | 15VDC output | | 6 | 10 | |
| | 24VDC output | | 5 | 10 | |
| Ripple & noise | 20MHz bandwidth (peak to peak) | | 60 | 150 | mV |
| Temperature coefficient | Full load | | ±0.03 | | %/°C |

| Isolation specifications | | | | | |
|--------------------------|---|------|-----|-----|-------|
| Item | Operating Conditions | Min | Typ | Max | Units |
| Isolation voltage | Input-output, test time 1 minute, leakage current less than 1mA | 3000 | | | VDC |
| Isolation resistance | Input-output, isolated voltage 500VDC | 1000 | | | MΩ |
| Isolation capacitance | Input-output, 100KHz/0.1V | | 20 | | pF |

| EMC specifications | | | | |
|--------------------|-----|-----------------|---|--|
| EMI | CE | CISPR32/EN55032 | CLASS B | |
| EMI | RE | CISPR32/EN55032 | CLASS B | |
| EMS | ESD | IEC/EN61000-4-2 | Air ±8kV, Contact ±4kV (perf. criteria B) | |

| Input specifications | | | | | |
|-----------------------------------|---------------------------|------|--------|-------|-------|
| Item | Operating condition | Min | Typ | Max | Units |
| Input current (full load/no load) | 5VDC Input | | | | |
| | • 3.3VDC Output | | 270/8 | 286/- | |
| | • 5VDC Output | | 244/8 | 257/- | |
| | • 9VDC/12VDC Output | | 241/12 | 254/- | |
| | • 15VDC/24VDC Output | | 241/18 | 254/- | |
| | 12VDC Input | | | | |
| | • 5VDC Output | | 102/8 | 107/- | mA |
| | • 9VDC/12VDC/15VDC Output | | 101/8 | 106/- | |
| | • 24VDC Output | | 99/8 | 103/- | |
| | 24VDC Input | | | | |
| • Others Output | | 51/8 | 55/- | | |
| • 24VDC Output | | 50/8 | 53/- | | |
| Reflected ripple current | | | 15 | | mA |
| Impulse voltage | 5VDC Input | -0.7 | | 9 | |
| | 12VDC Input | -0.7 | | 18 | VDC |
| | 24VDC Input | -0.7 | | 30 | |

- The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
- It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
- Suggested dual output module load imbalance: ≤ ± 5%. If it exceeds ± 5%, it cannot be guaranteed that the product performance meets all performance indicators in this datasheet;
- The maximum capacitive load is tested within the input voltage range and under full load conditions;
- Unless otherwise specified, all indicators in this datasheet are measured at Ta = 25°C, humidity <75% RH, nominal input voltage, and output rated load;
- All indicator testing methods in this datasheet are based on our company's standards;
- For specific requirements please contact our technical team directly;
- Product specifications are subject to change without prior notice.

Example:

1T10A4_1205D3UP

1 = 1Watt; T10 = SMT10; A4 = Series; 12 = 12Vin; 05 = 05Vout; D = Dual Output; 3 = 3kVDC isolation; U = Unregulated Output; P = Short circuit protection.

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Product Selection Guide

| Approval | Part number | Input Voltage (VDC) Nominal | Output Voltage (VDC) | Output Current min. (mA) | Output Current max. (mA) | Full Load Efficiency % (typ.) | Capacitive Load (μF) max. |
|----------|-----------------|-----------------------------|----------------------|--------------------------|--------------------------|-------------------------------|---------------------------|
| | 1T10A4_0503D3UP | 5 | ±3.3 | ±15 | ±152 | 78 | 1200 |
| | 1T10A4_0505D3UP | 5 | ±5 | ±10 | ±100 | 82 | 1200 |
| | 1T10A4_0509D3UP | 5 | ±9 | ±6 | ±56 | 83 | 470 |
| | 1T10A4_0512D3UP | 5 | ±12 | ±4 | ±42 | 83 | 220 |
| | 1T10A4_0515D3UP | 5 | ±15 | ±4 | ±34 | 83 | 220 |
| | 1T10A4_0524D3UP | 5 | ±24 | ±3 | ±21 | 83 | 100 |
| | 1T10A4_1205D3UP | 12 | ±5 | ±10 | ±100 | 82 | 1200 |
| | 1T10A4_1212D3UP | 12 | ±12 | ±4 | ±42 | 83 | 220 |
| | 1T10A4_1215D3UP | 12 | ±15 | ±4 | ±34 | 83 | 220 |
| | 1T10A4_1224D3UP | 12 | ±24 | ±3 | ±21 | 85 | 100 |
| | 1T10A4_2405D3UP | 24 | ±5 | ±10 | ±100 | 82 | 1200 |
| | 1T10A4_2412D3UP | 24 | ±12 | ±4 | ±42 | 83 | 220 |
| | 1T10A4_2415D3UP | 24 | ±15 | ±4 | ±34 | 83 | 220 |
| | 1T10A4_2424D3UP | 24 | ±24 | ±3 | ±21 | 85 | 100 |

Product characteristic curve

Temperature derating graph

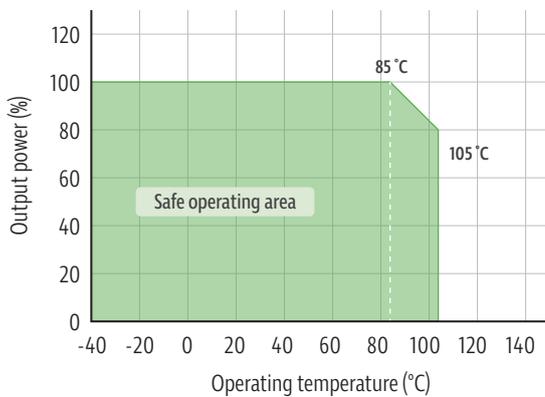


Figure 2

Output regulation curve

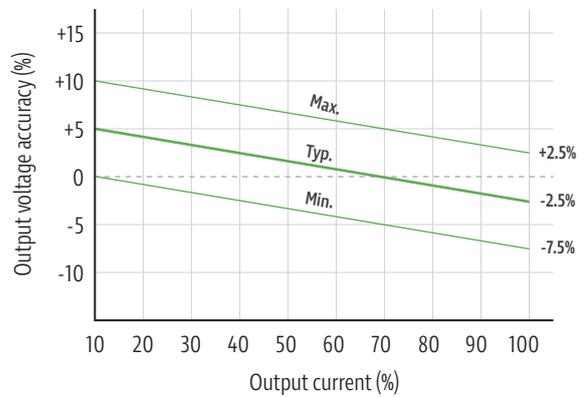


Figure 1-1

Output regulation curve
3.3VDC output

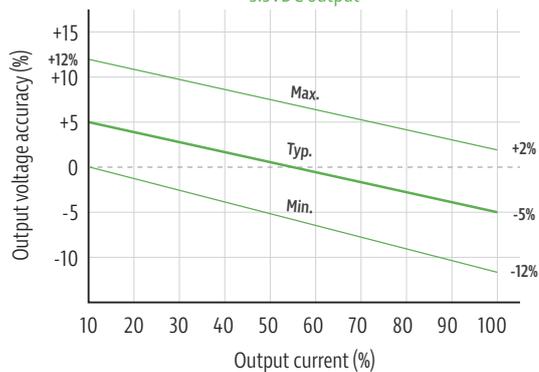


Figure 1-2

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Recommended circuits for application

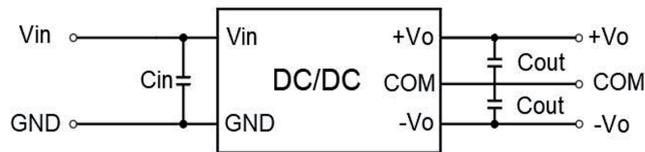


Figure 3

Recommended capacitive load value table

| Vin (VDC) | Cin (μF) | Vo (VDC) | Cout (μF) |
|-----------|-----------|----------|-----------|
| 5VDC | 4.7μF/16V | 3.3/5VDC | 10μF |
| 12VDC | 2.2μF/25V | 9/12VDC | 1μF |
| 24VDC | 1.0μF/50V | 15/24VDC | 0.47μF |

Recommended EMC circuit

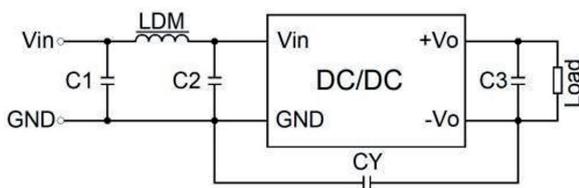


Figure 4

EMI recommended parameter table

| Vin (VDC) | 5VDC | 12/24VDC |
|-----------|----------------------------|------------|
| C1/C2 | 4.7μF /25V | 4.7μF /50V |
| CY | 1nF/4KV | |
| C3 | Refer to the Cout in Fig.3 | |
| LDM | 6.8μH | |

1. Typical applications

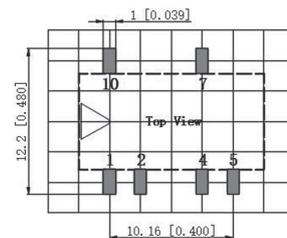
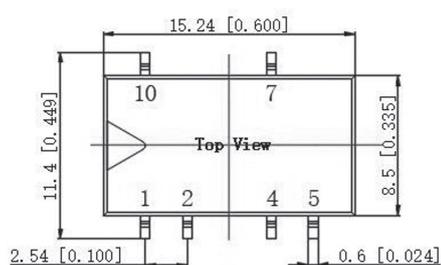
If further reduction of input and output ripple is required, a capacitor filtering network can be connected at the input and output terminals, and the application circuit is shown in fig.3. However, attention should be paid to selecting appropriate filtering capacitors. If the capacitance is too large, it is likely to cause startup problems. For each output, while ensuring safe and reliable operation, please refer to the recommended capacitive load value table above.

2. EMC typical recommended circuit see fig. 4.

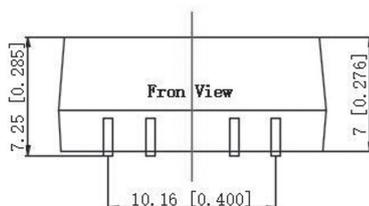
3. Output load requirements

To ensure the efficient and reliable operation of the module, its minimum output load should not be less than 10% of the rated load when in use. If your required power is indeed small, please connect a resistor in parallel at the output end (the sum of the power consumed by the resistor and the actual power used is greater than or equal to 10% of the rated power).

Mechanical dimensions



The grid distance is 2.54mm x 2.54mm



Pin Definition Table

| Pin | Function |
|-----|----------|
| 1 | GND |
| 2 | Vin |
| 4 | COM |
| 5 | -Vo |
| 7 | +Vo |
| 10 | NC |

NC: cannot be connected to any external circuit

Note:
Unit: mm [inch]
Pin section tolerances: ±0.10 [±0.004]
General tolerances: ±0.50 [±0.020]