

## Series AM4T-Z

### 4 Watt | DC-DC Converter



#### FEATURES:

- RoHS compliant
- 24 Pin DIP Package
- Low profile metal package
- High efficiency up to 85%
- Operating temperature -40°C to + 85°C
- Input / Output isolation 1500 or 3500VDC
- Pin compatible with multiple manufacturers
- Continuous short circuit protection

#### Models

##### Single output



| Model          | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Capacitive load, max (μF) | Efficiency (%) |
|----------------|-------------------|--------------------|-------------------------|---------------------------|----------------|
| AM4T-0503SZ    | 4.5-9             | 3.3                | 1200                    | 3300                      | 73             |
| AM4T-0505SZ    | 4.5-9             | 5                  | 800                     | 1000                      | 77             |
| AM4T-0512SZ    | 4.5-9             | 12                 | 330                     | 220                       | 81             |
| AM4T-0515SZ    | 4.5-9             | 15                 | 260                     | 100                       | 82             |
| AM4T-1203SZ    | 9-18              | 3.3                | 1200                    | 3300                      | 72             |
| AM4T-1205SZ    | 9-18              | 5                  | 800                     | 1000                      | 78             |
| AM4T-1207SZ    | 9-18              | 7.2                | 550                     | 470                       | 78             |
| AM4T-1209SZ    | 9-18              | 9                  | 440                     | 4700                      | 78             |
| AM4T-1212SZ    | 9-18              | 12                 | 330                     | 220                       | 80             |
| AM4T-1215SZ    | 9-18              | 15                 | 260                     | 100                       | 80             |
| AM4T-1218SZ    | 9-18              | 18                 | 220                     | 47                        | 80             |
| AM4T-1224SZ    | 9-18              | 24                 | 160                     | 47                        | 80             |
| AM4T-2403SZ    | 18-36             | 3.3                | 1200                    | 2200                      | 75             |
| AM4T-2405SZ    | 18-36             | 5                  | 800                     | 1000                      | 80             |
| AM4T-2407SZ    | 18-36             | 7.2                | 550                     | 470                       | 80             |
| AM4T-2409SZ    | 18-36             | 9                  | 440                     | 470                       | 80             |
| AM4T-2412SZ    | 18-36             | 12                 | 330                     | 220                       | 83             |
| AM4T-2415SZ    | 18-36             | 15                 | 260                     | 220                       | 80             |
| AM4T-2418SZ    | 18-36             | 18                 | 220                     | 100                       | 80             |
| AM4T-2424SZ    | 18-36             | 24                 | 160                     | 100                       | 85             |
| AM4T-4803SZ    | 36-72             | 3.3                | 1200                    | 2200                      | 75             |
| AM4T-4805SZ    | 36-72             | 5                  | 800                     | 680                       | 80             |
| AM4T-4807SZ    | 36-72             | 7.2                | 550                     | 470                       | 80             |
| AM4T-4809SZ    | 36-72             | 9                  | 440                     | 470                       | 82             |
| AM4T-4812SZ    | 36-72             | 12                 | 330                     | 330                       | 80             |
| AM4T-4815SZ    | 36-72             | 15                 | 260                     | 100                       | 81             |
| AM4T-4818SZ    | 36-72             | 18                 | 220                     | 47                        | 81             |
| AM4T-4824SZ    | 36-72             | 24                 | 160                     | 47                        | 82             |
| AM4T-0503SH35Z | 4.5-9             | 3.3                | 1200                    | 3300                      | 73             |
| AM4T-0505SH35Z | 4.5-9             | 5                  | 800                     | 1000                      | 77             |
| AM4T-0512SH35Z | 4.5-9             | 12                 | 330                     | 220                       | 81             |
| AM4T-0515SH35Z | 4.5-9             | 15                 | 260                     | 100                       | 82             |
| AM4T-1203SH35Z | 9-18              | 3.3                | 1200                    | 3300                      | 72             |
| AM4T-1205SH35Z | 9-18              | 5                  | 800                     | 1000                      | 78             |
| AM4T-1207SH35Z | 9-18              | 7.2                | 550                     | 470                       | 78             |
| AM4T-1209SH35Z | 9-18              | 9                  | 440                     | 4700                      | 78             |
| AM4T-1212SH35Z | 9-18              | 12                 | 330                     | 220                       | 80             |
| AM4T-1215SH35Z | 9-18              | 15                 | 260                     | 100                       | 80             |
| AM4T-1218SH35Z | 9-18              | 18                 | 220                     | 47                        | 80             |
| AM4T-1224SH35Z | 9-18              | 24                 | 160                     | 47                        | 80             |
| AM4T-2403SH35Z | 18-36             | 3.3                | 1200                    | 2200                      | 75             |
| AM4T-2405SH35Z | 18-36             | 5                  | 800                     | 1000                      | 80             |
| AM4T-2407SH35Z | 18-36             | 7.2                | 550                     | 470                       | 80             |
| AM4T-2409SH35Z | 18-36             | 9                  | 440                     | 470                       | 80             |
| AM4T-2412SH35Z | 18-36             | 12                 | 330                     | 220                       | 83             |
| AM4T-2415SH35Z | 18-36             | 15                 | 260                     | 220                       | 80             |
| AM4T-2418SH35Z | 18-36             | 18                 | 220                     | 100                       | 80             |

## Models

### Single output (continued)

| Model          | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Capacitive load, max (μF) | Efficiency (%) |
|----------------|-------------------|--------------------|-------------------------|---------------------------|----------------|
| AM4T-2424SH35Z | 18-36             | 24                 | 160                     | 100                       | 85             |
| AM4T-4803SH35Z | 36-72             | 3.3                | 1200                    | 2200                      | 75             |
| AM4T-4805SH35Z | 36-72             | 5                  | 800                     | 680                       | 80             |
| AM4T-4807SH35Z | 36-72             | 7.2                | 550                     | 470                       | 80             |
| AM4T-4809SH35Z | 36-72             | 9                  | 440                     | 470                       | 82             |
| AM4T-4812SH35Z | 36-72             | 12                 | 330                     | 330                       | 80             |
| AM4T-4815SH35Z | 36-72             | 15                 | 260                     | 100                       | 81             |
| AM4T-4818SH35Z | 36-72             | 18                 | 220                     | 47                        | 81             |
| AM4T-4824SH35Z | 36-72             | 24                 | 160                     | 47                        | 82             |

## Models

### Dual output

| Model          | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Capacitive load, max (μF) | Efficiency (%) |
|----------------|-------------------|--------------------|-------------------------|---------------------------|----------------|
| AM4T-0503DZ    | 4.5-9             | ±3.3               | ±600                    | ±680                      | 76             |
| AM4T-0505DZ    | 4.5-9             | ±5                 | ±400                    | ±470                      | 79             |
| AM4T-0512DZ    | 4.5-9             | ±12                | ±160                    | ±100                      | 81             |
| AM4T-0515DZ    | 4.5-9             | ±15                | ±130                    | ±47                       | 81             |
| AM4T-1203DZ    | 9-18              | ±3.3               | ±600                    | ±680                      | 73             |
| AM4T-1205DZ    | 9-18              | ±5                 | ±400                    | ±470                      | 78             |
| AM4T-1207DZ    | 9-18              | ±7.2               | ±270                    | ±220                      | 80             |
| AM4T-1209DZ    | 9-18              | ±9                 | ±220                    | ±220                      | 80             |
| AM4T-1212DZ    | 9-18              | ±12                | ±160                    | ±100                      | 80             |
| AM4T-1215DZ    | 9-18              | ±15                | ±130                    | ±47                       | 80             |
| AM4T-1218DZ    | 9-18              | ±18                | ±110                    | ±22                       | 76             |
| AM4T-1224DZ    | 9-18              | ±24                | ±80                     | ±22                       | 79             |
| AM4T-2403DZ    | 18-36             | ±3.3               | ±600                    | ±680                      | 73             |
| AM4T-2405DZ    | 18-36             | ±5                 | ±400                    | ±470                      | 79             |
| AM4T-2407DZ    | 18-36             | ±7.2               | ±270                    | ±220                      | 80             |
| AM4T-2409DZ    | 18-36             | ±9                 | ±220                    | ±220                      | 80             |
| AM4T-2412DZ    | 18-36             | ±12                | ±160                    | ±100                      | 82             |
| AM4T-2415DZ    | 18-36             | ±15                | ±130                    | ±47                       | 80             |
| AM4T-2418DZ    | 18-36             | ±18                | ±110                    | ±22                       | 80             |
| AM4T-2424DZ    | 18-36             | ±24                | ±80                     | ±22                       | 78             |
| AM4T-4803DZ    | 36-72             | ±3.3               | ±600                    | ±680                      | 72             |
| AM4T-4805DZ    | 36-72             | ±5                 | ±400                    | ±470                      | 78             |
| AM4T-4807DZ    | 36-72             | ±7.2               | ±270                    | ±220                      | 78             |
| AM4T-4809DZ    | 36-72             | ±9                 | ±220                    | ±220                      | 78             |
| AM4T-4812DZ    | 36-72             | ±12                | ±160                    | ±100                      | 80             |
| AM4T-4815DZ    | 36-72             | ±15                | ±130                    | ±47                       | 80             |
| AM4T-4818DZ    | 36-72             | ±18                | ±110                    | ±22                       | 80             |
| AM4T-4824DZ    | 36-72             | ±24                | ±80                     | ±22                       | 80             |
| AM4T-0503DH35Z | 4.5-9             | ±3.3               | ±600                    | ±680                      | 76             |
| AM4T-0505DH35Z | 4.5-9             | ±5                 | ±400                    | ±470                      | 79             |
| AM4T-0512DH35Z | 4.5-9             | ±12                | ±160                    | ±100                      | 81             |
| AM4T-0515DH35Z | 4.5-9             | ±15                | ±130                    | ±47                       | 81             |
| AM4T-1203DH35Z | 9-18              | ±3.3               | ±600                    | ±680                      | 73             |
| AM4T-1205DH35Z | 9-18              | ±5                 | ±400                    | ±470                      | 78             |
| AM4T-1207DH35Z | 9-18              | ±7.2               | ±270                    | ±220                      | 80             |
| AM4T-1209DH35Z | 9-18              | ±9                 | ±220                    | ±220                      | 80             |
| AM4T-1212DH35Z | 9-18              | ±12                | ±160                    | ±100                      | 80             |
| AM4T-1215DH35Z | 9-18              | ±15                | ±130                    | ±47                       | 80             |
| AM4T-1218DH35Z | 9-18              | ±18                | ±110                    | ±22                       | 76             |
| AM4T-1224DH35Z | 9-18              | ±24                | ±80                     | ±22                       | 79             |
| AM4T-2403DH35Z | 18-36             | ±3.3               | ±600                    | ±680                      | 73             |
| AM4T-2405DH35Z | 18-36             | ±5                 | ±400                    | ±470                      | 79             |

## Models

### Dual output (continued)

| Model          | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Capacitive load, max (μF) | Efficiency (%) |
|----------------|-------------------|--------------------|-------------------------|---------------------------|----------------|
| AM4T-2407DH35Z | 18-36             | ±7.2               | ±270                    | ±220                      | 80             |
| AM4T-2409DH35Z | 18-36             | ±9                 | ±220                    | ±220                      | 80             |
| AM4T-2412DH35Z | 18-36             | ±12                | ±160                    | ±100                      | 82             |
| AM4T-2415DH35Z | 18-36             | ±15                | ±130                    | ±47                       | 80             |
| AM4T-2418DH35Z | 18-36             | ±18                | ±110                    | ±22                       | 80             |
| AM4T-2424DH35Z | 36-72             | ±24                | ±80                     | ±22                       | 79             |
| AM4T-4803DH35Z | 36-72             | ±3.3               | ±600                    | ±680                      | 73             |
| AM4T-4805DH35Z | 36-72             | ±5                 | ±400                    | ±470                      | 79             |
| AM4T-4807DH35Z | 36-72             | ±7.2               | ±270                    | ±220                      | 80             |
| AM4T-4809DH35Z | 36-72             | ±9                 | ±220                    | ±220                      | 80             |
| AM4T-4812DH35Z | 36-72             | ±12                | ±160                    | ±100                      | 82             |
| AM4T-4815DH35Z | 36-72             | ±15                | ±130                    | ±47                       | 80             |
| AM4T-4818DH35Z | 36-72             | ±18                | ±110                    | ±22                       | 80             |
| AM4T-4824DH35Z | 36-72             | ±24                | ±80                     | ±22                       | 79             |

## Input Specifications

| Parameters                     | Nominal            | Typical | Maximum | Units |
|--------------------------------|--------------------|---------|---------|-------|
| Voltage range                  | 5                  | 4.5-9   |         | VDC   |
|                                | 12                 | 9-18    |         |       |
|                                | 24                 | 18-36   |         |       |
|                                | 48                 | 36-72   |         |       |
| Filter                         | $\pi$ (Pi) Network |         |         |       |
| Turn on Transient process time |                    |         | 350     | ms    |
| Start up time                  |                    | 500     |         | ms    |
| Absolute Maximum Rating        | 5 Vin              | -0.7-15 |         | VDC   |
|                                | 12 Vin             | -0.7-24 |         |       |
|                                | 24 Vin             | -0.7-40 |         |       |
|                                | 48 Vin             | -0.7-80 |         |       |
| Peak Input Voltage time        |                    | 100     |         | ms    |

## Isolation Specifications

| Parameters         | Conditions | Typical | Rated        | Units |
|--------------------|------------|---------|--------------|-------|
| Tested I/O voltage | 3 sec      |         | 1500 or 3500 | VDC   |
| Resistance         |            | > 1000  |              | MOhm  |
| Capacitance        |            | 470     |              | pF    |

## Output Specifications

| Parameters                       | Conditions         | Typical | Maximum | Units  |
|----------------------------------|--------------------|---------|---------|--------|
| Voltage accuracy                 |                    | ±1      |         | %      |
| Voltage balance                  | Balanced Load      | ±1      |         | %      |
| Short circuit protection         | Continuous         |         |         |        |
| Short circuit restart            | Auto Recovery      |         |         |        |
| Over current protection          | 120% Iout max      |         |         |        |
| Line voltage regulation (Single) |                    | ±0.5    |         | %      |
| Line voltage regulation (Dual)   |                    | ±0.5    |         | %      |
| Load voltage regulation (Single) | 0 – 100% load      | ±0.5    |         | %      |
| Load voltage regulation (Single) | 0 – 100% load      | ±1.5    |         | %      |
| 3.3V output model                |                    |         |         |        |
| Load voltage regulation (Dual)   | 0 – 100% load      | ±0.5    |         | %      |
| Load voltage regulation (Dual)   | 0 – 100% load      | ±1.5    |         | %      |
| ±3.3V output model               |                    |         |         |        |
| Temperature coefficient          |                    | ±0.02   |         | %/°C   |
| Ripple & Noise                   | At 20MHz Bandwidth | 60      |         | mV p-p |
| Rising time                      |                    | 10      |         | ms     |

## General Specifications

| Parameters            | Conditions                                                               | Typical                   | Maximum                  | Units |
|-----------------------|--------------------------------------------------------------------------|---------------------------|--------------------------|-------|
| Switching frequency   | 100% load                                                                | 266                       |                          | KHz   |
| Operating temperature | Full Load without Derating<br>(except 5V input models see chart)         | -40 to +85                |                          | °C    |
| Storage temperature   |                                                                          | -40 to +125               |                          | °C    |
| Max Case temperature  |                                                                          |                           | 100                      | °C    |
| Cooling               | Free air convection                                                      |                           |                          |       |
| Humidity              |                                                                          |                           | 90                       | %     |
| Case material         | Nickel coated copper                                                     |                           |                          |       |
| Weight                |                                                                          | 17                        |                          | g     |
| Dimensions(L x W x H) | Tolerance $\pm 0.5$ mm or $\pm 0.02$ inches                              | 1.28 x 0.84 x 0.41 inches | 32.25 x 21.35 x 10.50 mm |       |
| MTBF                  | >1 121 000 hrs (MIL-HDBK -217F, Ground Benign, $t=+25^{\circ}\text{C}$ ) |                           |                          |       |

NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

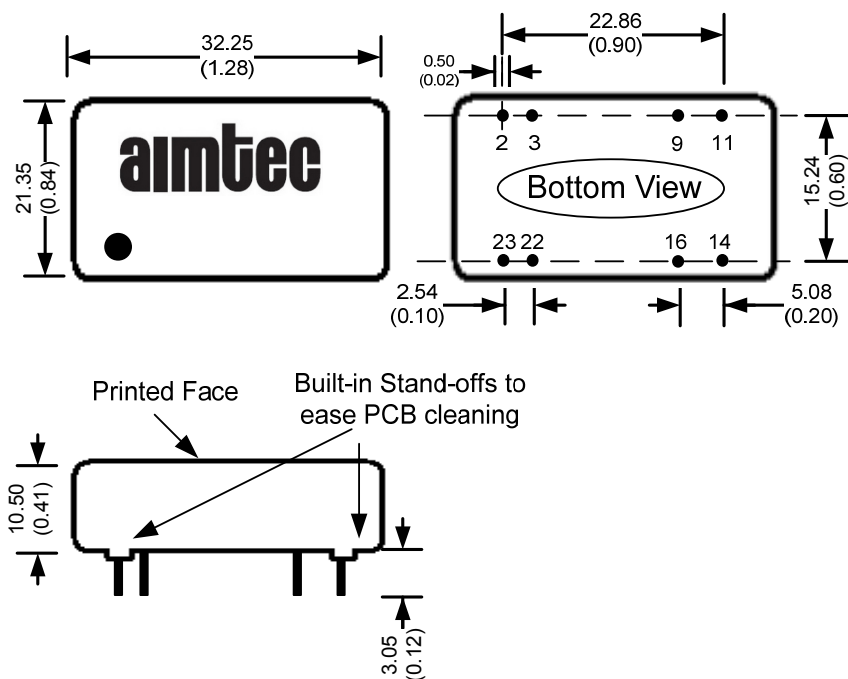
## Safety Specifications

| Parameters                                   |                                                                   |
|----------------------------------------------|-------------------------------------------------------------------|
| Agency Approval                              | CE                                                                |
| Standards                                    | EN55022 Class A, EN55024                                          |
|                                              | IEC61000-4-2, Perf. Criteria B                                    |
|                                              | IEC61000-4-3, Perf. Criteria A                                    |
|                                              | IEC61000-4-4, Perf. Criteria B (external 220uF/100V cap required) |
|                                              | IEC61000-4-5, Perf. Criteria B (external 220uF/100V cap required) |
|                                              | IEC61000-4-6, Perf. Criteria A                                    |
|                                              | IEC61000-4-8, Perf. Criteria A                                    |
| Note: also designed to meet IEC 60950-1:2001 |                                                                   |

## Pin Out Specifications

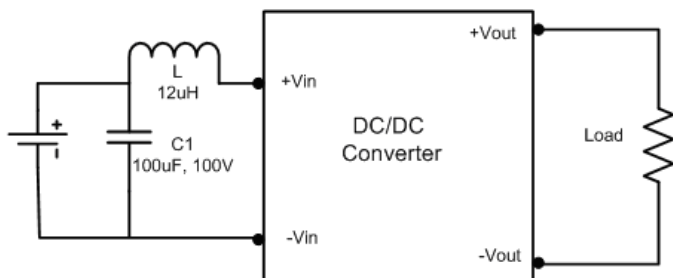
| Pin | 1500 and 3500VDC |           |
|-----|------------------|-----------|
|     | Single           | Dual      |
| 2   | -V Input         | -V Input  |
| 3   | -V Input         | -V Input  |
| 9   | No pin           | Common    |
| 11  | N.C.             | -V Output |
| 14  | +V Output        | +V Output |
| 16  | -V Output        | Common    |
| 22  | +V Input         | +V Input  |
| 23  | +V Input         | +V Input  |

## Dimensions

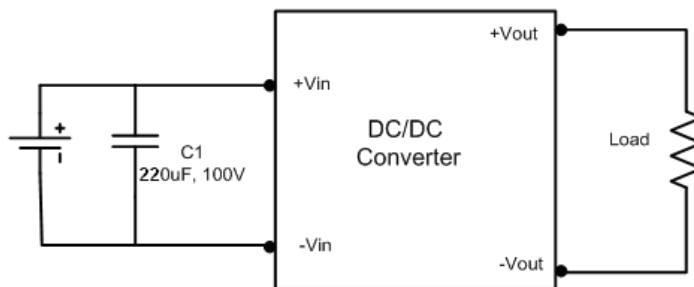


## Test Circuits

### Conducted Emissions:

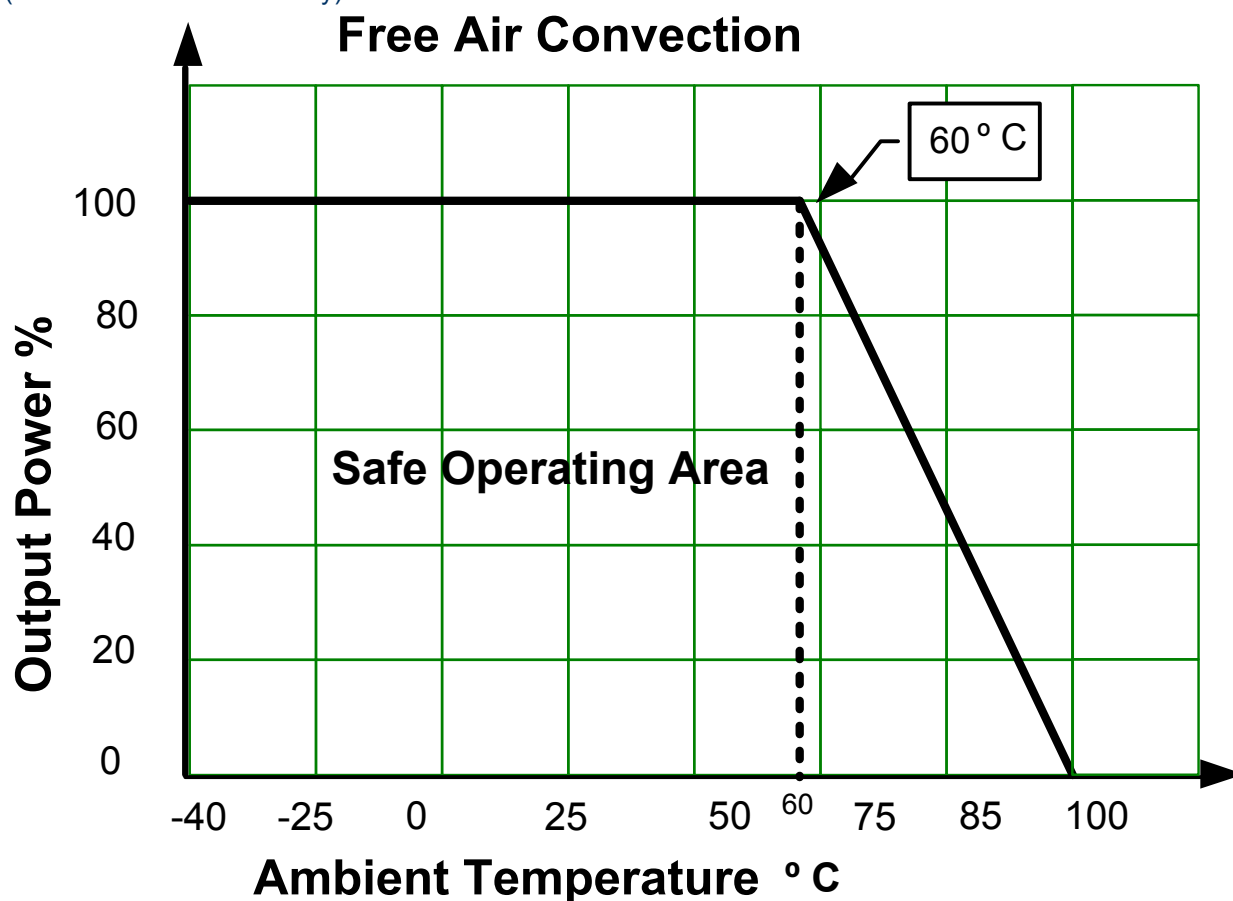


### Surge:



## Derating

(AM4T-05xxxx Devices only)



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