

## Series AM2DC-Z

### 2 Watt | DC-DC Converter



#### FEATURES:

- RoHS compliant SIP7 package
- High efficiency up to 82%
- I/O Isolation 6000 VDC
- Low coupling capacity
- Physical clearance of Isolation barrier 6mm
- Safety barrier 100% production tested
- Rated working voltage of 250 Vrms
- Continuous Short Circuit Protection



#### Models Single output

| Model           | Input Voltage (V) | Output Voltage (V) | Output Current Max (mA) | Max Capacitive Load (uF) | Efficiency (%) |
|-----------------|-------------------|--------------------|-------------------------|--------------------------|----------------|
| AM2DC-0503SH60Z | 5                 | 3.3                | 600                     | 1000                     | 73             |
| AM2DC-0505SH60Z | 5                 | 5                  | 400                     | 470                      | 78             |
| AM2DC-0509SH60Z | 5                 | 9                  | 222                     | 470                      | 80             |
| AM2DC-0512SH60Z | 5                 | 12                 | 167                     | 220                      | 80             |
| AM2DC-0515SH60Z | 5                 | 15                 | 133                     | 220                      | 82             |
| AM2DC-1203SH60Z | 12                | 3.3                | 600                     | 1000                     | 73             |
| AM2DC-1205SH60Z | 12                | 5                  | 400                     | 470                      | 78             |
| AM2DC-1209SH60Z | 12                | 9                  | 222                     | 470                      | 80             |
| AM2DC-1212SH60Z | 12                | 12                 | 167                     | 220                      | 80             |
| AM2DC-1215SH60Z | 12                | 15                 | 133                     | 220                      | 82             |
| AM2DC-1503SH60Z | 15                | 3.3                | 600                     | 1000                     | 73             |
| AM2DC-1505SH60Z | 15                | 5                  | 400                     | 470                      | 78             |
| AM2DC-1509SH60Z | 15                | 9                  | 222                     | 470                      | 80             |
| AM2DC-1512SH60Z | 15                | 12                 | 167                     | 220                      | 80             |
| AM2DC-1515SH60Z | 15                | 15                 | 133                     | 220                      | 82             |
| AM2DC-2403SH60Z | 24                | 3.3                | 600                     | 1000                     | 73             |
| AM2DC-2405SH60Z | 24                | 5                  | 400                     | 470                      | 78             |
| AM2DC-2409SH60Z | 24                | 9                  | 222                     | 470                      | 80             |
| AM2DC-2412SH60Z | 24                | 12                 | 167                     | 220                      | 80             |
| AM2DC-2415SH60Z | 24                | 15                 | 133                     | 220                      | 82             |

#### Models Dual output

| Model             | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Max Capacitive Load (uF) | Efficiency (%) |
|-------------------|-------------------|--------------------|-------------------------|--------------------------|----------------|
| AM2DC-0503DH60Z   | 5                 | ±3.3               | ±300                    | ±470                     | 73             |
| AM2DC-0505DH60Z   | 5                 | ±5                 | ±200                    | ±220                     | 78             |
| AM2DC-0509DH60Z   | 5                 | ±9                 | ±111                    | ±220                     | 80             |
| AM2DC-0512DH60Z   | 5                 | ±12                | ±83                     | ±100                     | 80             |
| AM2DC-0515DH60Z   | 5                 | ±15                | ±67                     | ±100                     | 82             |
| AM2DC-051509DH60Z | 5                 | +15/-9             | +67/-111                | +100/-220                | 72             |
| AM2DC-1203DH60Z   | 12                | ±3.3               | ±300                    | ±470                     | 73             |
| AM2DC-1205DH60Z   | 12                | ±5                 | ±200                    | ±220                     | 78             |
| AM2DC-1209DH60Z   | 12                | ±9                 | ±111                    | ±220                     | 80             |
| AM2DC-1212DH60Z   | 12                | ±12                | ±83                     | ±100                     | 80             |
| AM2DC-1215DH60Z   | 12                | ±15                | ±67                     | ±100                     | 82             |
| AM2DC-121509DH60Z | 12                | +15/-9             | +67/-111                | +100/-220                | 72             |
| AM2DC-1503DH60Z   | 15                | ±3.3               | ±300                    | ±470                     | 73             |
| AM2DC-1505DH60Z   | 15                | ±5                 | ±200                    | ±220                     | 78             |
| AM2DC-1509DH60Z   | 15                | ±9                 | ±111                    | ±220                     | 80             |
| AM2DC-1512DH60Z   | 15                | ±12                | ±83                     | ±100                     | 80             |
| AM2DC-1515DH60Z   | 15                | ±15                | ±67                     | ±100                     | 82             |
| AM2DC-151509DH60Z | 15                | +15/-9             | +67/-111                | +100/-220                | 72             |

## Models

### Dual output (continued)

| Model             | Input Voltage (V) | Output Voltage (V) | Output Current max (mA) | Max Capacitive Load (uF) | Efficiency (%) |
|-------------------|-------------------|--------------------|-------------------------|--------------------------|----------------|
| AM2DC-2403DH60Z   | 24                | ±3.3               | ±300                    | ±470                     | 73             |
| AM2DC-2405DH60Z   | 24                | ±5                 | ±200                    | ±220                     | 78             |
| AM2DC-2409DH60Z   | 24                | ±9                 | ±111                    | ±220                     | 80             |
| AM2DC-2412DH60Z   | 24                | ±12                | ±83                     | ±100                     | 80             |
| AM2DC-2415DH60Z   | 24                | ±15                | ±67                     | ±100                     | 82             |
| AM2DC-241509DH60Z | 24                | +15/-9             | +67/-111                | +100/-220                | 72             |

## Input Specifications

| Parameters                     | Nominal                       | Typical   | Maximum | Units  |
|--------------------------------|-------------------------------|-----------|---------|--------|
| Voltage range                  | 5                             | 4.5-5.5   |         | VDC    |
|                                | 12                            | 10.8-13.2 |         |        |
|                                | 15                            | 13.5-16.5 |         |        |
|                                | 24                            | 21.6-26.4 |         |        |
| Filter                         | Capacitor                     |           |         |        |
| Startup time                   | Vnom, constant resistive load | 20        |         | ms     |
| Absolute Maximum Rating        | 5 Vin                         |           | 0-7     | VDC    |
|                                | 12 Vin                        |           | 0-15    |        |
|                                | 15 Vin                        |           | 0-18    |        |
|                                | 24 Vin                        |           | 0-28    |        |
| Peak Input Voltage time        |                               |           | 100     | ms     |
| Quiescent Current              | 5 Vin                         | 70        |         | mA     |
|                                | 12 Vin                        | 40        |         |        |
|                                | 15 Vin                        | 30        |         |        |
|                                | 24 Vin                        | 20        |         |        |
| Input Reflected Ripple current | See the suggested circuit     | 20        |         | mA p-p |

## Isolation Specifications

| Parameters                           | Conditions                      | Typical | Rated | Units |
|--------------------------------------|---------------------------------|---------|-------|-------|
| Tested I/O voltage (rated for 1 min) | 60 sec                          |         | 6000  | VDC   |
| Rated working voltage                | Reinforced Insulation, 1 x MOPP | 250     |       | V rms |
|                                      | Reinforced Insulation, 2 x MOPP | 125     |       |       |
| Resistance                           |                                 | >1000   |       | MOhm  |
| Capacitance                          |                                 | 10      |       | pF    |

## Output Specifications

| Parameters                     | Conditions                             | Typical | Maximum | Units  |
|--------------------------------|----------------------------------------|---------|---------|--------|
| Voltage accuracy               |                                        | ±3      |         | %      |
| Short Circuit protection       | Continuous                             |         |         |        |
| Short circuit restart          | Auto recovery                          |         |         |        |
| Line voltage regulation        | For 1% change of V in                  | ±1.2    |         | %      |
| Load voltage regulation        | From 10 to 100% load                   | ±10     |         | %      |
| Cross Regulation (dual output) | 25% to 100% one load & 100% other load | ±4      |         | %      |
| Temperature coefficient        |                                        | ±0.03   |         | %/°C   |
| Ripple and Noise*              | 20MHz Bandwidth                        |         | 100     | mV p-p |

\*Output ripple and noise are measured with external connection of 10uF electrolytic capacitor and 1uF ceramic capacitor.

## General Specifications

| Parameters                      | Conditions                                                       | Typical                                   | Maximum                 | Units |
|---------------------------------|------------------------------------------------------------------|-------------------------------------------|-------------------------|-------|
| Switching frequency             | 100% load, depending of the model                                | 50 - 100                                  |                         | KHz   |
| Creepage and Clearance Distance | Input to Output                                                  | >6                                        |                         | mm    |
| Operating temperature           | Full Load without Derating                                       | -40 to +85                                |                         | °C    |
| Storage temperature             |                                                                  | -40 to +125                               |                         | °C    |
| Maximum case temperature        |                                                                  |                                           | 100                     | °C    |
| Cooling                         | Free air convection                                              |                                           |                         |       |
| Humidity                        |                                                                  |                                           | 95                      | % RH  |
| Case material                   | Non-conductive black plastic, epoxy encapsulated (UL94V-0 rated) |                                           |                         |       |
| Soldering temperature           | 1.5mm from case for 10 sec.                                      |                                           | 260                     | °C    |
| Weight                          |                                                                  | 4.2                                       |                         | g     |
| Dimensions (L x W x H)          |                                                                  | 0.77 x 0.39 x 0.49 inches                 | 19.56 x 9.80 x 12.50 mm |       |
| MTBF                            |                                                                  | >2 390 000 hrs (MIL-HDBK-217 F at +25 °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.

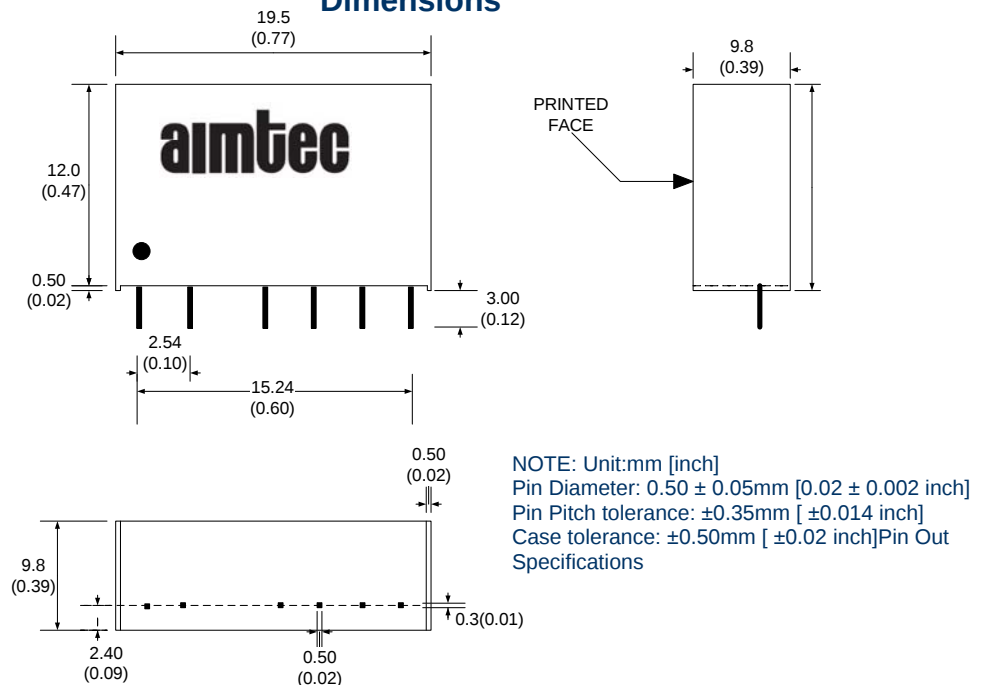
## Safety Specifications

| Parameters |                                                                                                                                                                                                                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards  | EN 55022: 2010, Class B<br>EN 55024: 2010<br>IEC 61000-4-2: 2008, Criteria A<br>IEC 61000-4-3: 2010, Criteria A<br>IEC 61000-4-4: 2012, Criteria A (with external circuit)<br>IEC 61000-4-6: 2008, Criteria A<br>IEC 61000-4-8: 2009, Criteria A<br>Designed to meet IEC/EN 60950-1 & IEC/EN 60601-1 |

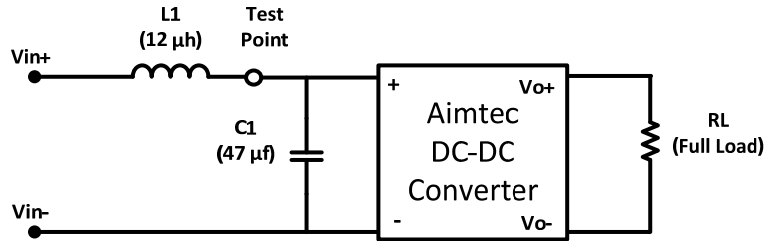
## Pin Out Specifications

| Pin | 6000 VDC   |            |
|-----|------------|------------|
|     | Single     | Dual       |
| 1   | + V Input  | + V Input  |
| 2   | - V Input  | - V Input  |
| 5   | - V Output | - V Output |
| 6   | No pin     | Common     |
| 7   | + V Output | + V Output |

## Dimensions

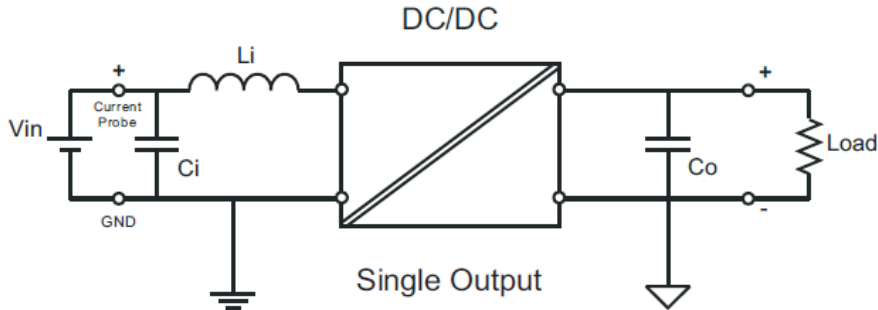


## Input Reflected Ripple Current Test Circuit



\* Tested at full load, and nominal input

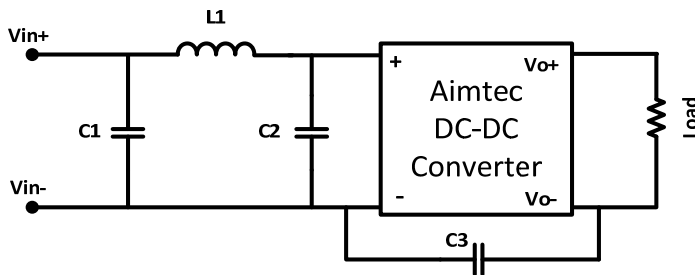
## Recommended Application circuit for reducing the output ripple and noises:



Recommended Output Capacitor to reduce the converter's ripple and noises for single output models is 4.7 $\mu$ F to 100 $\mu$ F and for dual output models is 4.7 $\mu$ F to 68 $\mu$ F connected to both outputs.

$L_i$  with value of 12 $\mu$ H and  $C_i$  with value 10 $\mu$ F to 100 $\mu$ F are recommended to be connected to the input of the converter for EMI improvement.

## EMI Filter Circuit recommendation



| Vin         | C1                 | L1         | C2                 | C3           |
|-------------|--------------------|------------|--------------------|--------------|
| 5, 12, 15 V | 470 $\mu$ F / 100V | 18 $\mu$ H |                    |              |
| 24 V        | 470 $\mu$ F / 100V | 18 $\mu$ H | 2.2 $\mu$ F / 100V | 470 pF / 2kV |

\* Electrolytic type

**NOTE:** 1. Datasheets are updated as needed and as such, specifications are subject to change without notice. Once printed or downloaded, datasheets are no longer controlled by Aimtec; refer to [www.aimtec.com](http://www.aimtec.com) for the most current product specifications. 2. Product labels shown, including safety agency certifications on labels, may vary based on the date manufactured. 3. Mechanical drawings and specifications are for reference only. 4. All specifications are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified. 5. Aimtec may not have conducted destructive testing or chemical analysis on all internal components and chemicals at the time of publishing this document. CAS numbers and other limited information are considered proprietary and may not be available for release. 6. This product is not designed for use in critical life support systems, equipment used in hazardous environments, nuclear control systems or other such applications which necessitate specific safety and regulatory standards other the ones listed in this datasheet. 7. Warranty is in accordance with Aimtec's standard Terms of Sale available at [www.aimtec.com](http://www.aimtec.com).