# 4W Isolated DC-DC Power Module

## ATMV12V500V8MA1




Figure 1. Top View



Figure 2. Side View



Figure 3. Side View



Figure 4. Bottom View

## FEATURES

- Wide Input Power Voltage Range: 10V to 18V
- Output Voltage: 500V
- Max. Output Current: 8mA
- High Efficiency: 78%
  @$V_{IN}$ = 12V & $V_{OUT}$ =500V & $I_{OUT}$ = 8mA
- Output Ripple Voltage: ±1% @20MHz
- Isolation Voltage: 1500VDC
- Output Short-Circuit Protection: Automatic Recovery
- Full Aluminum Housing for Complete Shielding
- Industry Standard DIP Package
- Operating Temperature Range: −40°C ~ +85°C
- 100 % Lead (Pb)-free and RoHS Compliant

## APPLICATIONS

This power module, ATMV12V500V8MA1, is designed for achieving DC-DC conversion from low voltage to high voltage as a power supply source. It is widely used in scientific research and other fields including:

- Sustaining Ion Pumps
- Spectral Analysis
- Electrophoresis
- Particle Accelerator
- Capillary Electrophoresis
- Piezo Devices
- Photo Multiplier Tubes
- Avalanche Photo Diodes


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## DESCRIPTION

This Power Module is a medium voltage, isolated DC−DC converter with 2:1 input voltage range. With a wide operating temperature range, built in short-circuit protection, providing this unit with high reliability and long life.

**Table 1. Pin Names, Functions and Specifications.**

| No. | Name | Type | Description | Min. | Typ. | Max. |
|---|---|---|---|---|---|---|
| 1 | $V_{IN-}$ | Input | Negative Input Voltage | | 0V | |
| 2 | $V_{IN+}$ | Input | Positive Input Voltage | 10V | 12V | 18V |
| 3 | $V_{OUT+}$ | Output | Positive Output Voltage | | | 500V |
| 4 | NP | | - | | | |
| 5 | $V_{OUT-}$ | Output | Negative Output Voltage | | 0V | |

## SPECIFICATIONS

**Table 2.**

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit/Note |
|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | 10 | 12 | 18 | V |
| Input Quiescent Current | $I_{IN_QC}$ | $V_{IN}$ = 12V<br>$I_{OUT}$ = 0mA | | 21 | | mA |
| Input Current | $I_{IN}$ | $I_{OUT}$ = 8mA | | 417 | | mA |
| Leakage Current | $I_L$ | | | 2 | | mA |
| Output Voltage | $V_{OUT}$ | $V_{IN}$ = 10V ~ 18V<br>$I_{OUT}$ = 0 ~ 8mA | | | 500 | V |
| Output Voltage Accuracy | | $V_{IN}$ = 10V ~ 18V | | ±2 | | % |
| Output Current Range | $I_{OUTMAX}$ | $V_{IN}$ = 10V ~ 18V | 0 | | 8 | mA |
| Output Voltage Ripple | $V_{OUT_RP}$ | Bandwidth = 20MHz | | ±1 | | % |
| Output Short-Circuit Protection Time | $t_{SC}$ | | | ≤60 | | s |
| Switching Frequency | $f_{SW}$ | $V_{VPS}$ = 12V<br>$I_{OUT}$ = 8mA | | 125 | | kHz |
| Line Regulation | $\Delta V_{OUT}/\Delta V_{VPS}$ | $V_{VPS}$ = 12V<br>$I_{OUT}$ = 8mA | | ±1 | | % |
| Load Regulation | $\Delta V_{OUT}/\Delta I_{OUT}$ | $V_{VPS}$ = 12V<br>Load change from 10% to 100% | | ±1 | | % |
| Isolation Voltage | $V_{IS}$ | | | 1500 | | VDC |
| Isolation Resistance | | $V_{VPS}$ = 10V ~ 18V<br>$V_{OUT}$ = 500V<br>$V_{IS}$ = 1500VDC<br>$I_{OUT}$ = 8mA<br>$T_A$ = 25℃<br>70%RH | | 1000 | | MΩ |


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| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit/Note |
|---|---|---|---|---|---|---|
| Isolation Capacitance | | | | 1 | | nF |
| Output Voltage Temperature Coefficient | $TCV_{OUT}$ | $V_{VPS}$ = 12V<br>$I_{OUT}$ = 8mA | | | 0.03 | %/°C |
| Cooling Method | | | Air Cooling | | | |
| Mean Time Between Failure | MTBF | MIL-HDBK-217F@25°C | | 1000 | | Kh |
| Operating Temperature Range | $T_{opr}$ | | −40 | | 85 | °C |
| Storage Temperature Range | $T_{stg}$ | | −40 | | 105 | °C |
| Maximum Soldering Temperature on Connection Pins | $T_{sld}$ | Soldering Time:10s | | | 300 | °C |
| Case Temperature Rise | $T_{cs}$ | $V_{VPS}$ = 12V<br>$I_{OUT}$ = 8mA<br>$T_A$ = 25℃ | | 35 | | °C |
| Storage Relative Humidity Range | RH | | | | 95 | % |
| Case Material | | | Aluminum | | | |
| External Dimensions (Exclude Connection Pins) | | | 50.8×25.4×10.5 | | | mm |
| | | | 2×1×0.41 | | | inch |
| Weight | | | | 25 | | g |
| | | | | 0.055 | | lbs |
| | | | | 0.881 | | Oz |

## TYPICAL PERFORMANCE CHARACTERISTICS

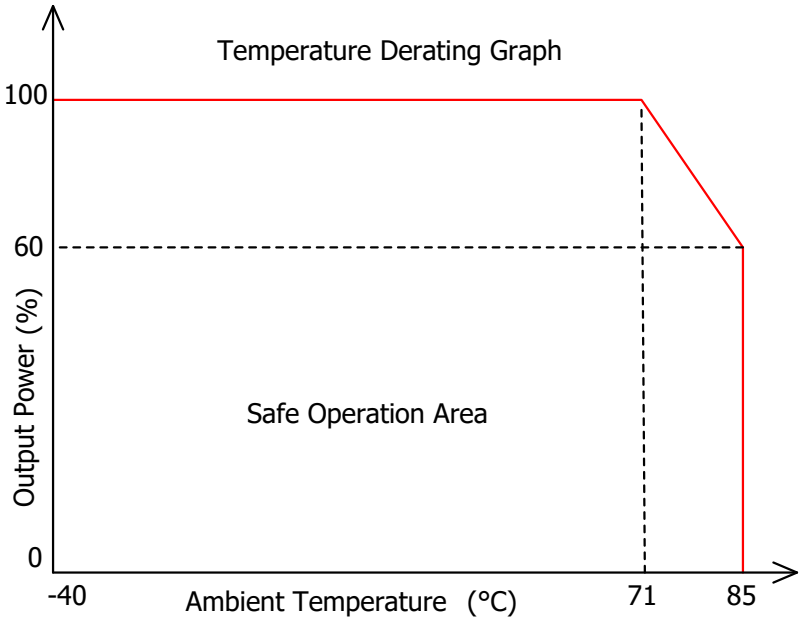



Figure 5. Derating Curve


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## TYPICAL APPLICATIONS

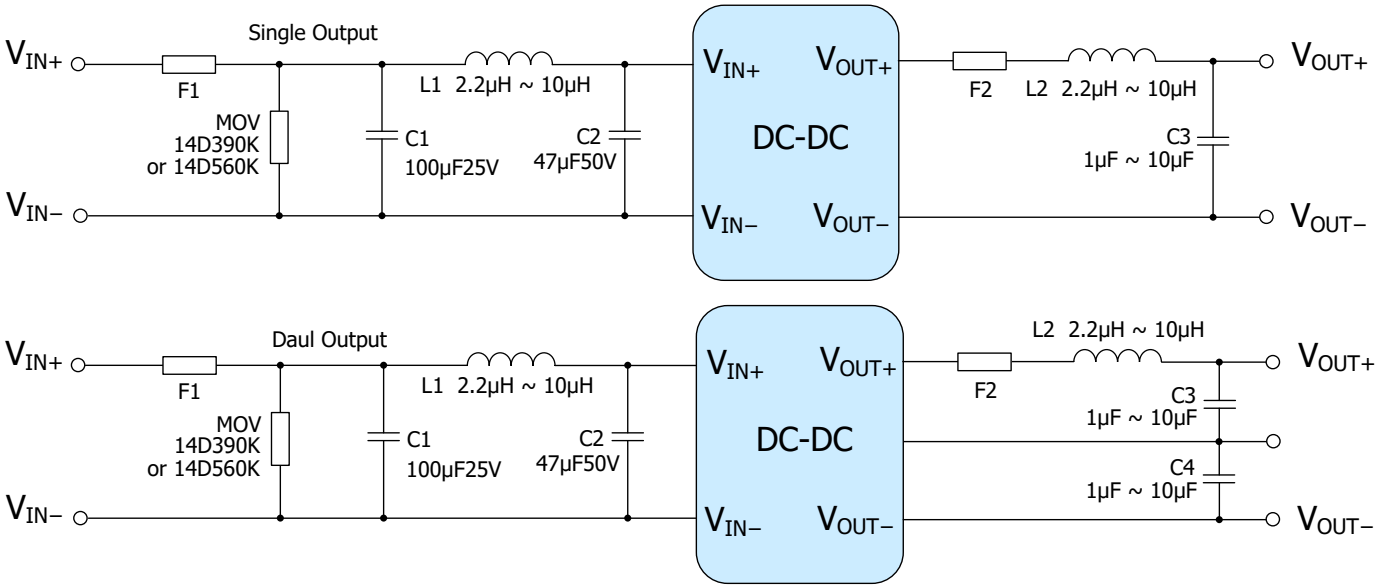



Figure 6. Typical Applications

**Table 3. Recommended Values**

| | | |
|---|---|---|
| F1 | Input Time-delay Fuse | |
| F2 & F3 | Output Time-delay Fuse, or Resettable Fuse (PTC) | |
| MOV | 14D390K | Input Voltage: 12VDC |
| | 14D560K | Input Voltage: 24VDC |
| C1 & C2 | 100μF/25V | Input Voltage: 2VDC |
| | 47μF/50V | Input Voltage: 24VDC |
| C3 & C4 | 1.0μF ~ 10μF (High Frequency ESR) | |
| L1, L2 & L3 | 2.2μH ~ 10μH | |

To further reduce the input and output ripple, the parameters of the LC filter can be appropriately increased, but it should be noted that the external capacitor at the output end should not be too large, and should be lower than the maximum capacitive load of the product.

## NAMING PRINCIPLE

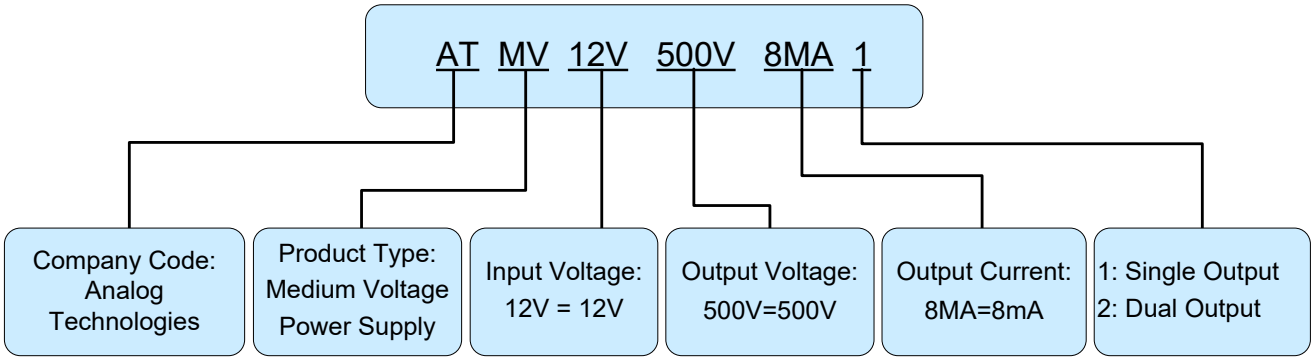
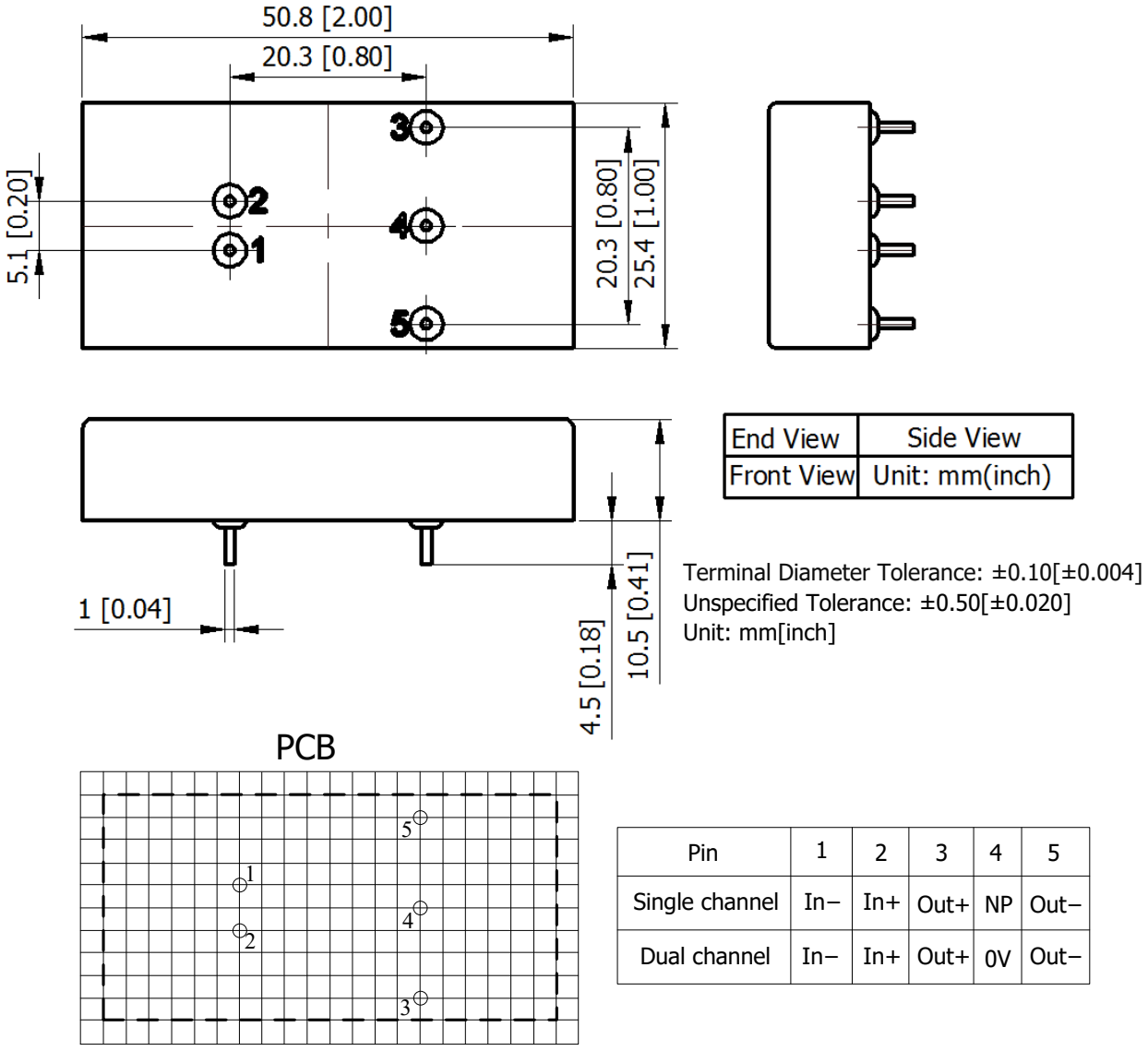



Figure 7. Naming Convention of ATMV12V500V8MA1


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## OUTLINE DIMENSIONS




| Pin | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Single channel | In− | In+ | Out+ | NP | Out− |
| Dual channel | In− | In+ | Out+ | 0V | Out− |

Figure 8. Outline Dimensions


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| Part Number | Buy Now |
|---|---|
| ATMV12V500V8MA1 | * * |

*: both and are our online store icons. Our products can be ordered from either one of them with the same pricing and delivery time.

**Table 4. ATMV12V500V8MA1 and Its Families**

| Product Model | Input Voltage | | Output Voltage | Output Current | Efficiency | MAX. Capacitive Load |
|---|---|---|---|---|---|---|
| | Typ. | Range | V | mA | % | µF |
| ATMV12V50V160MA1 | 12 | 9 ~ 18 | 50 | 160 | 78 | 100 |
| ATMV12V100V80MA1 | | | 100 | 80 | 76 | 100 |
| ATMV12V200V40MA1 | | | 200 | 40 | 75 | 68 |
| ATMV12V300V20MA1 | | | 300 | 20 | 74 | 47 |
| ATMV12V400V10MA1 | | | 400 | 10 | 73 | 33 |
| ATMV12V500V8MA1 | | | 500 | 8 | 72 | 22 |
| ATMV12V600V6.7MA1 | | | 600 | 6.7 | 70 | 10 |
| ATMV12V700V4.3MA1 | | | 700 | 4.3 | 68 | 4.7 |
| ATMV24V50V160MA1 | 24 | 18 ~ 36 | 100 | 80 | 78 | 100 |
| ATMV24V200V40MA1 | | | 200 | 40 | 77 | 68 |
| ATMV24V300V20MA1 | | | 300 | 20 | 75 | 47 |
| ATMV24V400V10MA1 | | | 400 | 10 | 74 | 33 |
| ATMV24V500V8MA1 | | | 500 | 8 | 73 | 22 |
| ATMV24V600V6.7MA1 | | | 600 | 6.7 | 71 | 10 |
| ATMV24V700V4.3MA1 | | | 700 | 4.3 | 70 | 4.7 |
| ATMV12V50V80MA2 | 12 | 9 ~ 18 | ±50 | ±80 | 76 | 68 |
| ATMV12V100V40MA2 | | | ±100 | ±40 | 75 | 68 |
| ATMV12V150V20MA2 | | | ±150 | ±20 | 74 | 47 |
| ATMV12V200V10MA2 | | | ±200 | ±10 | 73 | 33 |
| ATMV12V250V8MA2 | | | ±250 | ±8.0 | 72 | 22 |
| ATMV12V300V6.6MA2 | | | ±300 | ±6.6 | 70 | 10 |


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| Product Model | Input Voltage | | Output Voltage | Output Current | Efficiency | MAX. Capacitive Load |
|---|---|---|---|---|---|---|
| | Typ. | Range | V | mA | % | μF |
| ATMV24V50V80MA2 | 24 | 18 ~ 36 | ±50 | ±80 | 78 | 68 |
| ATMV24V100V40MA2 | | | ±100 | ±40 | 77 | 68 |
| ATMV24V150V20MA2 | | | ±150 | ±20 | 75 | 47 |
| ATMV24V200V10MA2 | | | ±200 | ±10 | 74 | 33 |
| ATMV24V250V8MA2 | | | ±250 | ±8.0 | 73 | 22 |
| ATMV24V300V6.6MA2 | | | ±300 | ±6.6 | 71 | 10 |

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