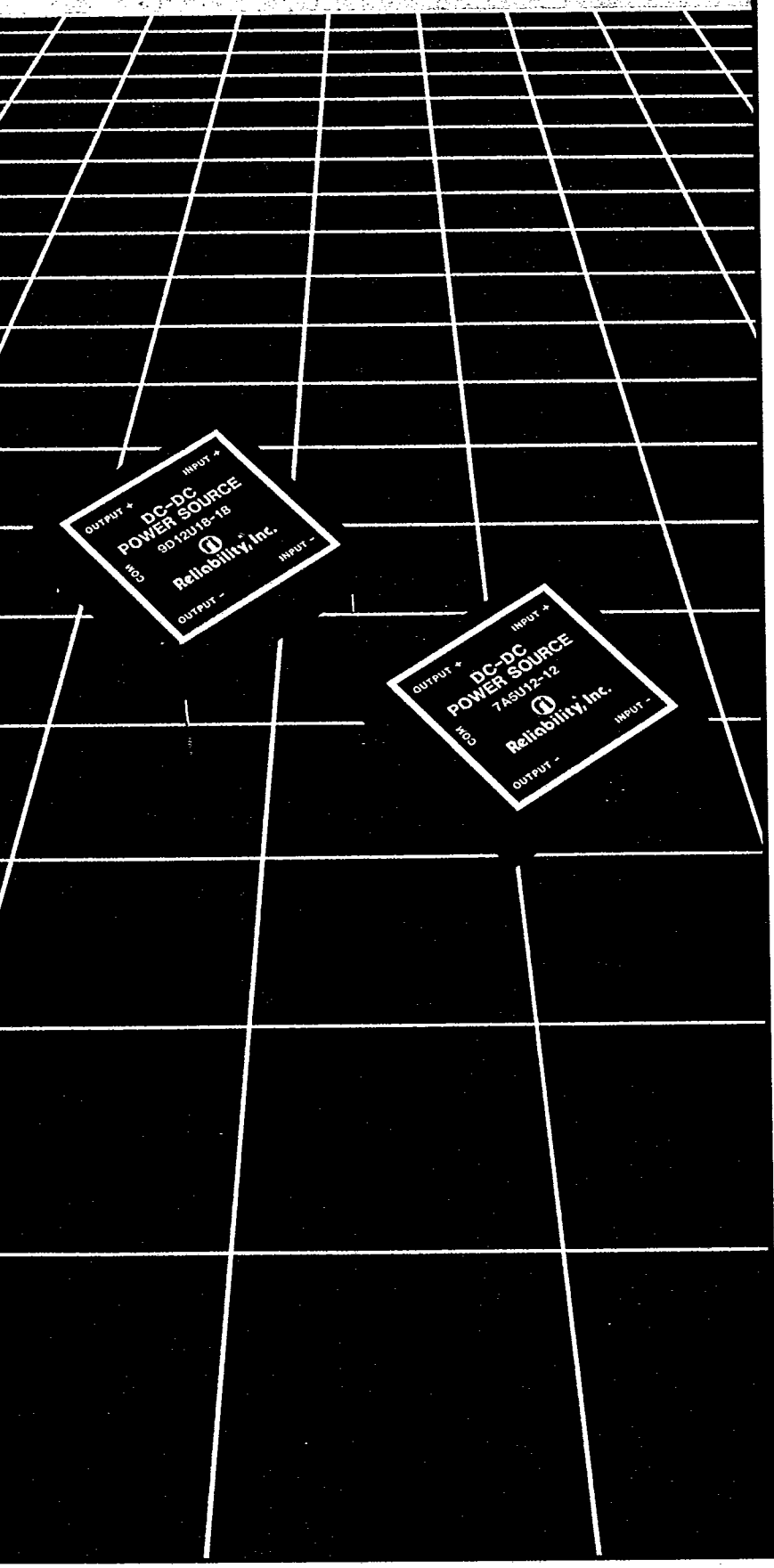
# Z-PAC

## 90% MINIMUM EFFICIENCY

### DC/DC CONVERTER SERIES




## FEATURES

- Efficiency 90% minimum
- Input/Output isolated
- PC mountable
- Single, and combinable dual outputs
- Meets FCC Sec 15 Sub Part J, A&B
- Full range operating to 85°C
- Flame retardant encapsulant and shell
- Designed for low noise, high efficient applications
- Bipolar tracking
- Outputs may be paralleled
- 100% burned-in and triple tested
- 3 year warranty

## GENERAL DESCRIPTION

The Z-PAC series of DC/DC converters provides the performance advantage of conventional linear converters with a minimum efficiency of 90%. These units are designed to encompass A/D, D/A, operational amplifiers, RS232, 424 and 488 as well as negative voltage biasing. The units are also suitable for battery or solar cell powered equipment and in a wide variety of other uses in commercial and industrial equipment. The series operates from inputs of 5 and 12 VDC with single and dual outputs. All Z-PAC devices operate over their full temperature range with no derating.

## GENERAL ELECTRICAL SPECIFICATIONS

(Specifications at Nominal Input and 25°C)

| PARAMETER | LIMIT | CONDITIONS |
|---|---|---|
| Input Voltage Range | 4.5 - 5.5 VDC<br>10.8 - 13.2 VDC | 5V Input Devices<br>12V Input Devices |
| Maximum Input Voltage[1] | 8 VDC (Max.)<br>15 VDC (Max.) | 5V Input Devices<br>12V Input Devices |
| Input Filter | Filter Capacitor | All Device Types |
| Input/Output Isolation<br>Voltage<br>Resistance | <br>500 VDC (Min.)<br>$10^3$ megohms (Min.) | <br>All Device Types |
| Power Efficiency[2] | 90% (Min.) | Nom. Line at 80% of Full Load |
| Load Regulation | See Graphs | Bipolar Tracking |
| Minimum Load Required | 25 ma | All Units |
| Line Regulation | 1.25%/1% (Max.) | Δ Vo/Vin, 80% Full Load |
| Output Noise/Ripple | 100 mV, P-P (Max.) | 20 HZ-20MHZ Bandwidth, External Capacitor Across Outputs (See Test Circuit.) |
| Short Circuit Protection | Momentary | Recommend for Full Protection, Use External Fuse (See Application Notes.) |
| Switching Frequency | 80 KHZ | Typical |
| Operating Temperature | -40°C to +85°C | |
| Derating | None | To 85°C |
| Storage Temperature | -55°C to +125°C | |
| Case | UL94V-0 | |
| FCC Sec. 15 Sub Part J | Yes | Class B Radiated, Class A Conducted |

(1) Note: The output voltage will increase accordingly. Units may be operated at maximum input voltage continuously.
(2) Minimum of 85% for single 5V outputs.

## SELECTION GUIDE STANDARD PRODUCTS

| DEVICE TYPE | INPUT VOLTAGE RANGE (VDC) | INPUT CURRENT A (MAX) | OUTPUT VOLTAGE VDC | OUTPUT CURRENT ma (MAX) | PACKAGE |
|---|---|---|---|---|---|
| 7A5U5 | 4.5 - 5.5 | 1.484 | + or - 5 | 1500 | A |
| 7D5U5 | 4.5 - 5.5 | 1.484 | + or - 5 | 1500 | D |
| 7A5U12-12 | 4.5 - 5.5 | 1.28 | ± 12 | ± 300 | A |
| 7D5U12-12 | 4.5 - 5.5 | 1.28 | ± 12 | ± 300 | D |
| 7A5U15-15 | 4.5 - 5.5 | 1.36 | ± 15 | ± 250 | A |
| 7D5U15-15 | 4.5 - 5.5 | 1.36 | ± 15 | ± 250 | D |
| 9A5U18-18 | 4.5 - 5.5 | 1.647 | ± 18 | ± 250 | A |
| 9D5U18-18 | 4.5 - 5.5 | 1.647 | ± 18 | ± 250 | D |

*continued next page*

# SELECTION GUIDE
# STANDARD PRODUCTS (CONTINUED)

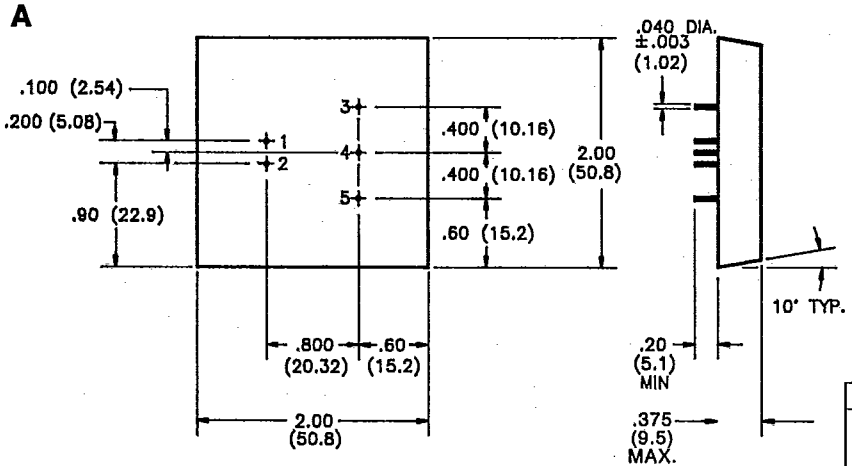
| DEVICE TYPE | INPUT VOLTAGE RANGE (VDC) | INPUT CURRENT A (MAX) | OUTPUT VOLTAGE VDC | OUTPUT CURRENT ma (MAX) | PACKAGE |
|---|---|---|---|---|---|
| 7A12U5 | 10.8 - 13.2 | .631 | + or - 5 | 1500 | A |
| 7D12U5 | 10.8 - 13.2 | .631 | + or - 5 | 1500 | D |
| 7A12U12-12 | 10.8 - 13.2 | .525 | ± 12 | ± 300 | A |
| 7D12U12-12 | 10.8 - 13.2 | .525 | ± 12 | ± 300 | D |
| 7A12U15-15 | 10.8 - 13.2 | .555 | ± 15 | ± 250 | A |
| 7D12U15-15 | 10.8 - 13.2 | .555 | ± 15 | ± 250 | D |
| 9A12U18-18 | 10.8 - 13.2 | .653 | ± 18 | ± 250 | A |
| 9D12U18-18 | 10.8 - 13.2 | .653 | ± 18 | ± 250 | D |
| 7A5U15 | 4.5 - 5.5 | 1.360 | + or - 15 | 500 | A |

## SINGLE OUTPUT CONFIGURATIONS

| OUTPUT VOLTAGE VDC | OUTPUT CURRENT ma (MAX) | INPUT VOLTAGE RANGE VDC | DEVICE TYPE | PACKAGE |
|---|---|---|---|---|
| + or - 12 | 500 | 4.5 - 5.5 | 7A5U12-12 | A |
| | | | 7D5U12-12 | D |
| | | 10.8 - 13.2 | 7A12U12-12 | A |
| | | | 7D12U12-12 | D |
| + or - 15 | 400 | 4.5 - 5.5 | 7A5U15-15 | A |
| | | | 7D5U15-15 | D |
| | | 10.8 - 13.2 | 7A12U15-15 | A |
| | | | 7D12U15-15 | D |
| + or - 18 | 400 | 4.5 - 5.5 | 9A5U18-18 | A |
| | | | 9D5U18-18 | D |
| | | 10.8 - 13.2 | 9A12U18-18 | A |
| | | | 9D12U18-18 | D |
| + or - 24 | 300 | 4.5 - 5.5 | 7A5U12-12 | A |
| | | | 7D5U12-12 | D |
| | | 10.8 - 13.2 | 7A12U12-12 | A |
| | | | 7D12U12-12 | D |
| + or - 30 | 250 | 4.5 - 5.5 | 7A5U15-15 | A |
| | | | 7D5U15-15 | D |
| | | 10.8 - 13.2 | 7A12U15-15 | A |
| | | | 7D12U15-15 | D |
| + or - 36 | 250 | 4.5 - 5.5 | 9A5U18-18 | A |
| | | | 9D5U18-18 | D |
| | | 10.8 - 13.2 | 9A12U18-18 | A |
| | | | 9D12U18-18 | D |

# MECHANICAL DIMENSIONS AND PIN CONNECTIONS

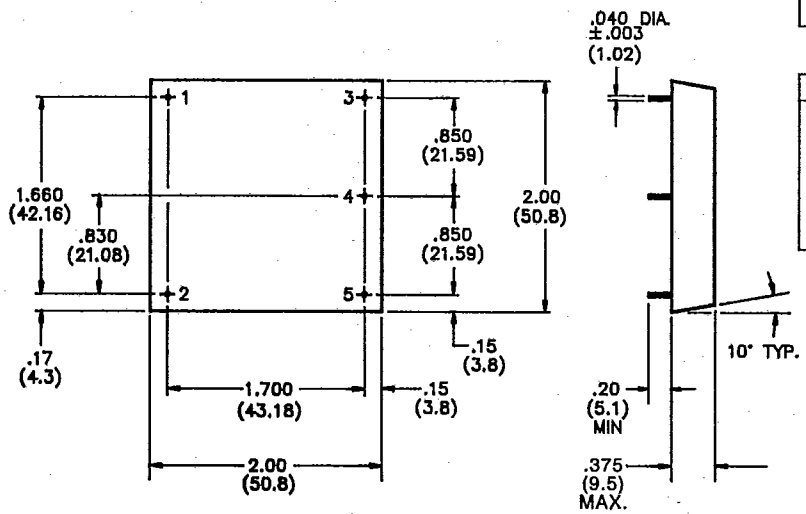
**A**




**D or A PINOUT**

| PIN | SINGLE OUTPUT |
|---|---|
| 1 | + INPUT |
| 2 | – INPUT |
| 3 | + OUTPUT |
| 4 | COMMON |
| 5 | COMMON |

**D**

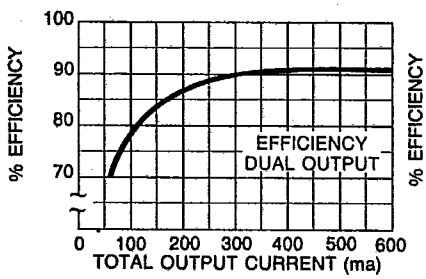


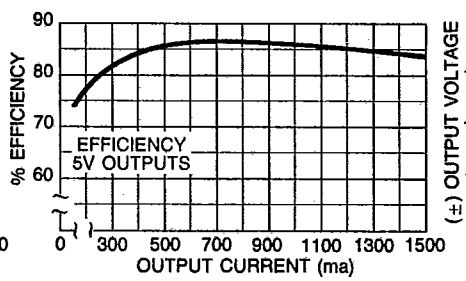

**D or A PINOUT**

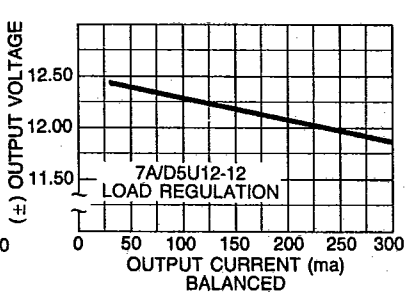
| PIN | DUAL OUTPUT |
|---|---|
| 1 | + INPUT |
| 2 | – INPUT |
| 3 | + OUTPUT |
| 4 | COMMON |
| 5 | – OUTPUT |

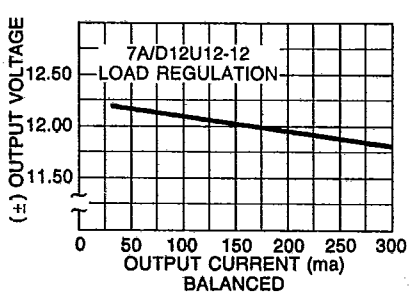
Note: All dimensions in parentheses are mm.
Tolerances unless otherwise specified: .XX ± .03
.XXX ± .010

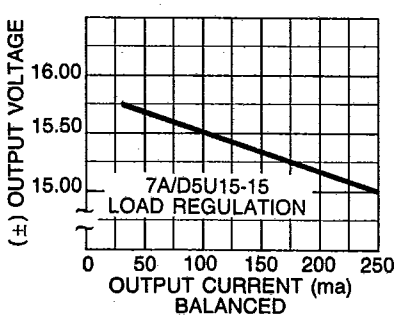
# PERFORMANCE GRAPHS

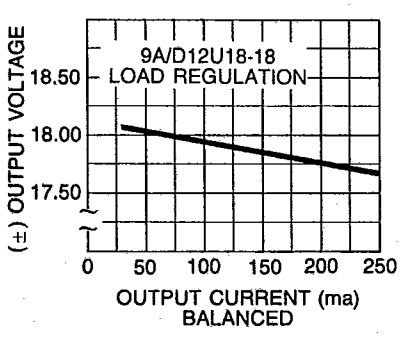
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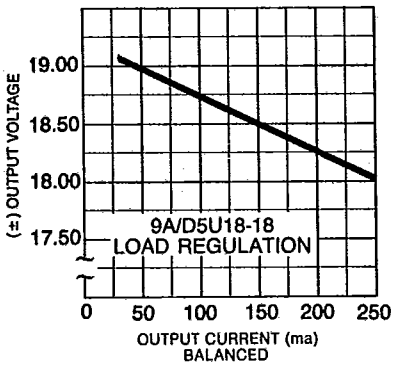
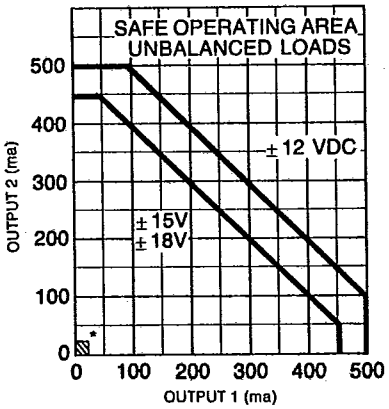
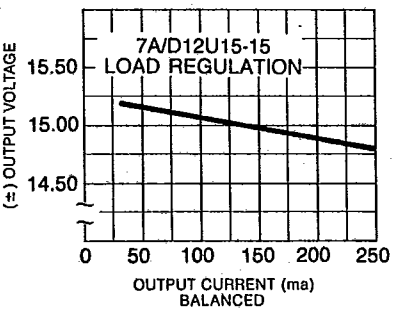
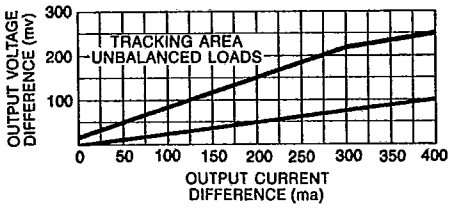
## PERFORMANCE GRAPHS



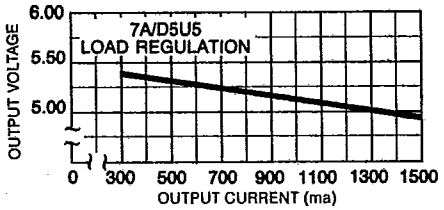



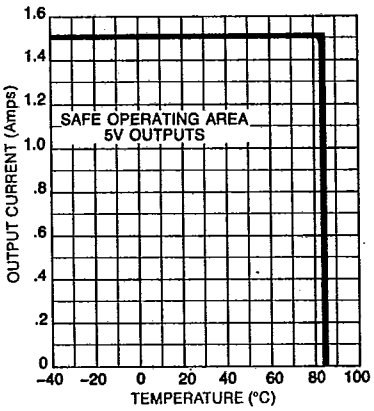



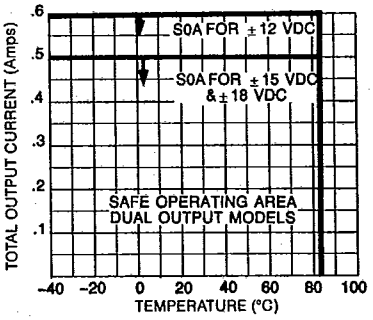

BIOPOLAR TRACKING

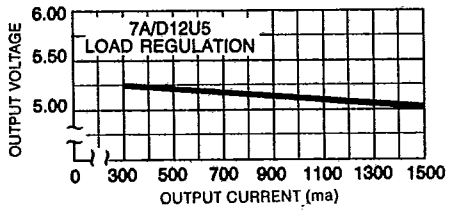



*OBSERVE MINIMUM
LOAD REQUIREMENT

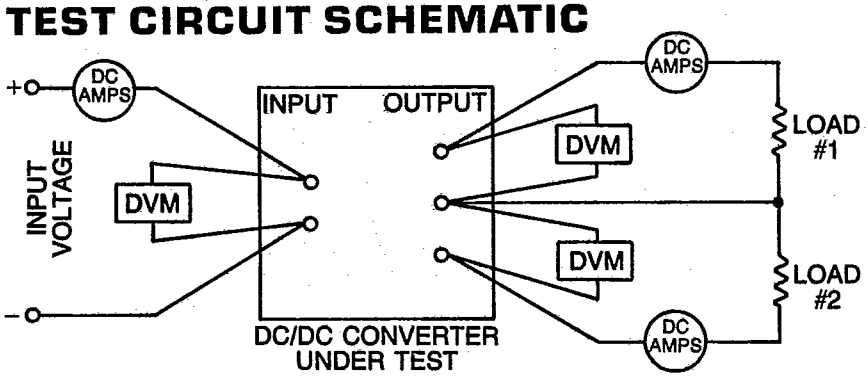



## TEST CIRCUIT SCHEMATIC




## OUTPUT NOISE

Noise measurements must be made with care in order to avoid introducing extraneous signals. The oscilloscope ground clip lead should not be used. This clip lead forms an inductive pickup loop when placed in a field of radiated high frequency energy.

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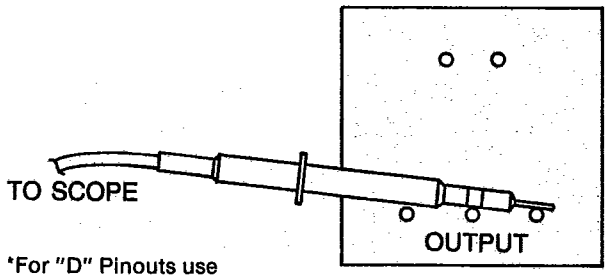
To measure output noise, press the ground band or ring of the oscilloscope probe directly against the output common terminal of the DC/DC converter while the tip makes contact with the voltage output terminal. The scope bandwidth should be 20 MHZ and a .1μfd capacitor paralleled with a 47 μfd capacitor across each output.

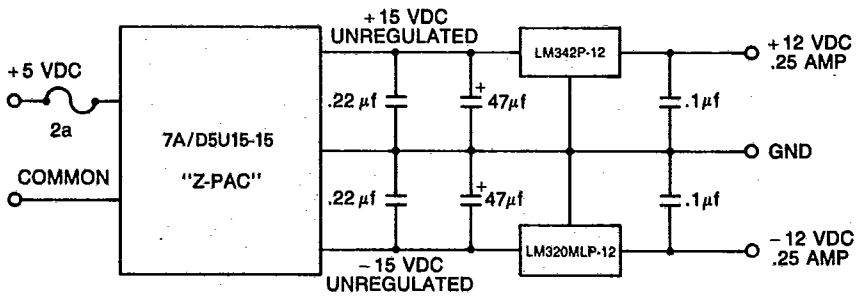
OUTPUT NOISE MEASUREMENT TECHNIQUE




*For "D" Pinouts use Tektronix Adaptor 206-0114-01

Z-PAC

## SIMPLIFIED POST REGULATION CIRCUIT




## APPLICATIONS

The 7A/D and 9A/D series of DC/DC converters has been designed for high efficiency general purpose use. Their excellent load regulation and differential output voltage specifications allow their application in critical OP amp systems. In some systems, these new converters can replace existing linear regulated converters, reducing cost and improving efficiency. The high efficiency of 90+ percent is achieved by using state-of-the-art Mosfets and diodes switching at 80 KHZ. The 7A/D and 9A/D provides momentary short circuit protection but good design practice will require a fuse on the DC/DC input to prevent large circulating currents in an output short. When using the 7A/D units at full rated power, we recommend a max of a 2 amp fuse on the 5 volt input units and a 1 amp fuse for 12 volt inputs. On 9A/D units at full rated power, we recommend a max of 2.5 amp fuse for 5 volt input units and a 1 amp fuse for 12 volt input units. When using other than full rated power to calculate the fuse size required, determine the maximum output power and multiply by 1.1 to obtain the input power. Divide the input power by the minimum input voltage to determine the maximum input current. Select a fuse with a current rating 1.25 times the maximum input current. If the unit is to be operated at elevated temperatures, be sure to further derate the fuse.

**Do not operate the 7A/D or 9A/D converters under no load conditions. To prevent high output voltages always have at least 25ma of load current on each output.**

The positive or negative output may be used as an output common to obtain 24, 30, or 36 VDC. In this application, do not use pin 4, the standard output common. The maximum output current will be as specified for a single output, i.e. 300ma for 24V and 250ma for 30 VDC and 36 VDC.

For optimum noise performance, each output should be by-passed with a 0.1 μfd capacitor in parallel with a 47 μfd capacitor. These capacitors should be installed as close to the output pins as possible. A ground plane under the entire unit will also improve noise and reduce any radiated interference from the converter.