

**AME50461 SERIES**

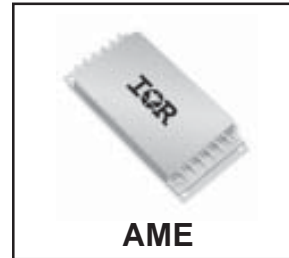
**ADVANCED ANALOG  
 EMI FILTER  
 HYBRID / HIGH RELIABILITY**

**Description**

The AME Series of EMI filters have been designed to provide full compliance with the input line reflected ripple current requirement specified by CE03 of MIL-STD-461C over the full military temperature range while operating in conjunction with the corresponding AFL series of DC/DC converters. These filters are offered as part of a complete family of conversion products providing single and dual output voltages while operating from nominal +28, +50 or +270 input line voltage. Other converters operating with a similar switching frequency will also benefit by use of this device.

These EMI filters are hermetically packaged in two enclosure variations, utilizing copper-core pins to minimize resistive DC losses. Three lead styles are available, each fabricated with Advanced Analog's rugged ceramic lead-to-package seal assuring long term hermetic seal integrity in harsh environments.

Manufactured in a facility fully qualified to MIL-PRF-38534, these converters are available in four screening grades to satisfy a wide range of applications. The CH grade is fully compliant to the requirements of MIL-PRF-38534 for class H. The HB grade is fully processed and screened to the class H requirement, but does not include element evaluation to the class H requirement.

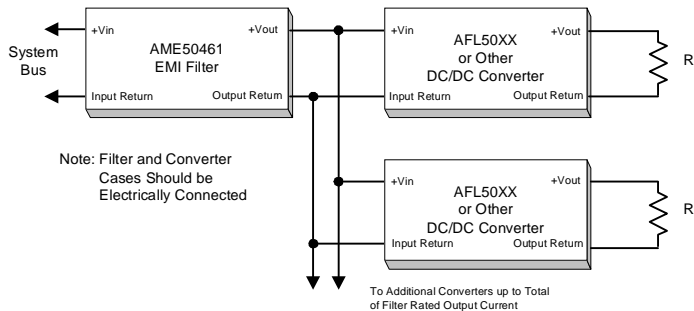


**Features**

- Up to 7.0 Ampere Output Current
- Attenuation > 35dB @ 200 KHz
- Low Profile (0.38") Seam Welded Package
- Ceramic Feedthru Copper-Core Pins
- Operation Over Full Military Temp. Range
- Standard Military Drawings Available

Both grades are tested to meet the complete group "A" test specification over the full military temperature range with no derating. Two grades with more limited screening are also available for use in less demanding applications. Variations in electrical, mechanical and screen requirements can be accommodated. Contact Advanced Analog for special requirements.

**Typical Connection Diagram**



Specifications

| ABSOLUTE MAXIMUM RATINGS <small>Note 1</small> |  |
|--|--|
| Input Voltage                                  | -300V to +300V <small>Note 2</small>                 |
| Input Current                                  | 7.0 A  |
| Lead Soldering Temperature                     | 300°C for 10 seconds                                 |
| Case Temperature                               | Operating -55°C to +125°C<br>Storage -65°C to +135°C |

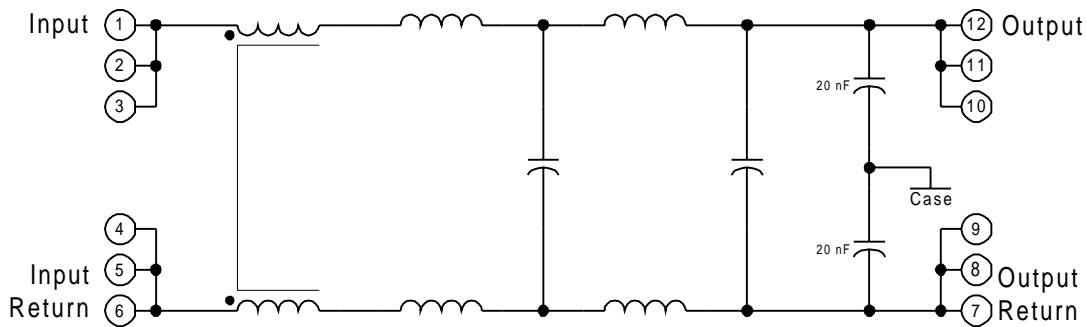
Electrical Characteristics  $-55^{\circ}\text{C} \leq T_{\text{CASE}} \leq +125^{\circ}\text{C}$ ,  $-40 \leq V_{\text{IN}} \leq +40$  unless otherwise specified

| Parameter                            | Group A Subgroups | Test Conditions   | Min  | Nom | Max  | Unit            |
|--------------------------------------|-------------------|---|------|-----|------|-----------------|
| INPUT VOLTAGE                        |                   | Steady State  | -100 |     | +100 | $V_{\text{DC}}$ |
|                                      |                   | Transient <small>Note 2</small>                                 | -300 |     | +300 |                 |
| OUTPUT VOLTAGE                       | 1, 2, 3           | $V_{\text{OUT}} = V_{\text{IN}} - I_{\text{IN}}(R_{\text{DC}})$ |      |     |      | $V_{\text{DC}}$ |
| OUTPUT CURRENT <small>Note 3</small> |                   |   |      |     | 7.0  | $A_{\text{DC}}$ |
| DC RESISTANCE <small>Note 4</small>  | 1                 | $T_{\text{C}} = 25^{\circ}\text{C}$                             |      |     | 60   | $m\Omega$       |
|                                      |                   | $T_{\text{C}} = 125^{\circ}\text{C}$                            |      |     | 100  |                 |
| POWER DISSIPATION                    |                   | Maximum Current   |      |     | 2.94 | w               |
|                                      |                   | $T_{\text{C}} = 125^{\circ}\text{C}$                            |      |     | 4.90 |                 |
| NOISE REDUCTION                      |                   | 200 KHz - 500 KHz   | 35   |     |      | dB              |
|                                      |                   | 500 KHz - 1 MHz   | 60   |     |      |                 |
|                                      |                   | 1 MHz - 50 MHz  | 65   |     |      |                 |
| ISOLATION                            | 1                 | Any Pin to Case<br>Tested @ 500VDC                              | 100  |     |      | $M\Omega$       |
| CAPACITANCE                          |                   | Measured Between Any Pin and Case                               |      | 40  |      | nF              |
| DEVICE WEIGHT                        |                   | Slight Variations with Case Style                               |      | 95  |      | gms             |

Notes to Specifications

1. Operation above maximum ratings may cause permanent damage to the device. Operation at maximum ratings may degrade performance and affect reliability.
2. Device can tolerate  $\pm 300$  Volt transient whose duration is  $\leq 100$  ms when  $R_s \geq 0.5 \Omega$ .
3. Derate Output Current linearly from 100% at  $125^{\circ}\text{C}$  to 0 at  $135^{\circ}\text{C}$ .
4. DC resistance is the total resistance of the device and includes the sum of the *input* to *output* resistance and the *return in* to *return out* resistance paths.

AME50461 Block Diagram



Refer to last page for Pin Designation

### Circuit Operation and Application Information

The AME series of filters employ three stages of filtering in a low pass configuration designed to attenuate the higher frequency components of ripple currents generated by high frequency switching DC/DC converters. The Block Diagram describes the general arrangement of the principal elements which have been connected to provide both differential and normal mode buffering between the input and output terminals.

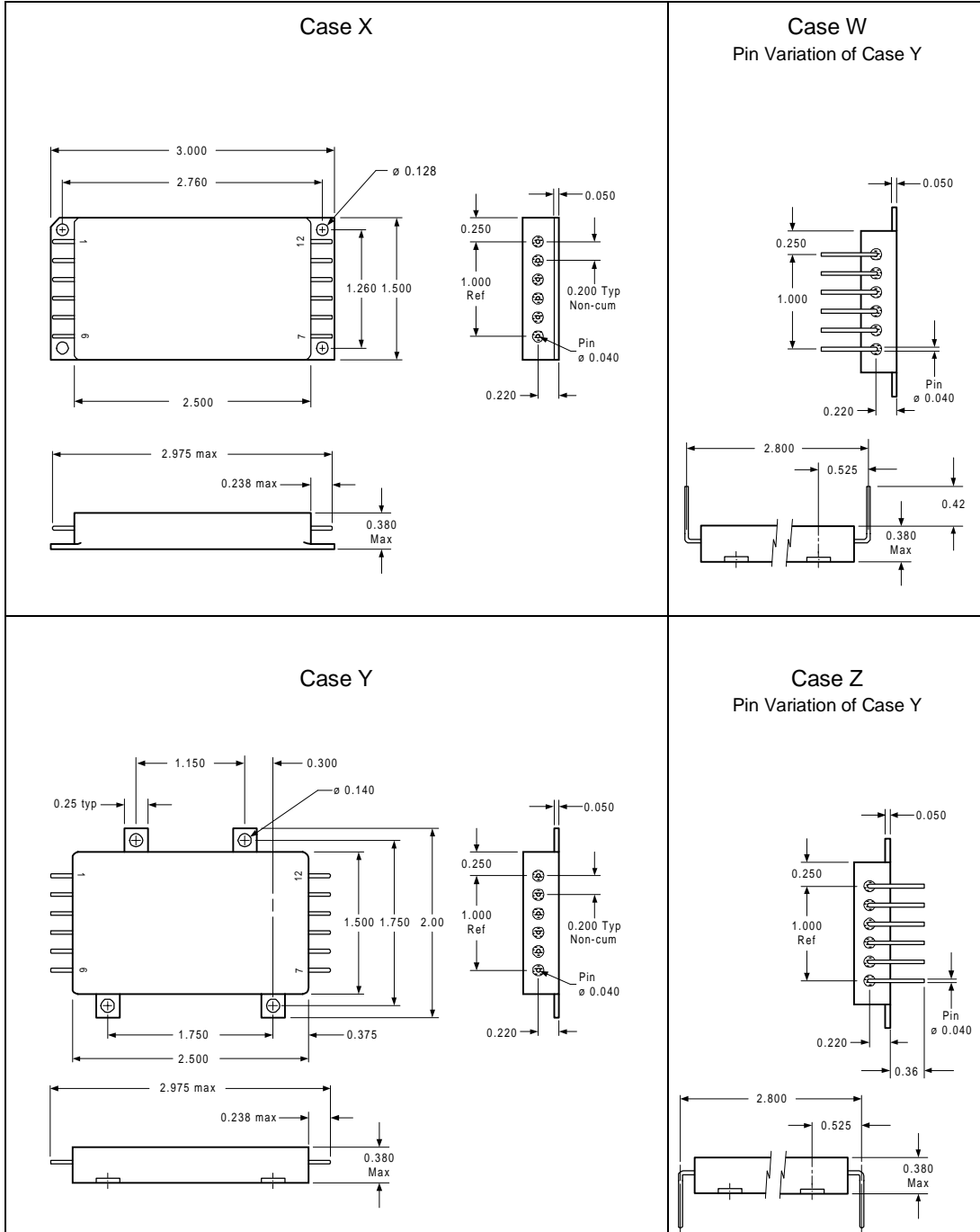
Employing only passive elements, AME filter operation is initiated simply by insertion into the input power path between one or more DC/DC converters and their input DC voltage bus. In this connection, output pins of the filter will be connected to input pins of the converters.

When a single AME filter is used in conjunction with multiple DC/DC converters, the use will be limited to the maximum output current capability specified in the AME electrical table.<sup>1</sup> A typical connection utilizing one filter to drive two converters is illustrated on page 1.

Although expressly designed to complement the AFL series of DC/DC converters, the AME50461 filters can be successfully operated in conjunction with other converters in the Advanced Analog line including the ASA, AHF, AHV and ATR series.

<sup>1</sup> To calculate the input current ( $i_{in}$ ) requirement of any one converter, first determine the maximum output power by multiplying output voltage by maximum load current, divide this power by the efficiency to obtain input power and then divide input power by input voltage to obtain the input current ( $i_{in}$ ). Note that to obtain worst case input current, you must use maximum load current, minimum efficiency and minimum line voltage in this calculation.

AME50461 Case Style Outlines



Tolerances, unless otherwise specified: .XX = ±0.010  
.XXX = ±0.005

Available Screening Levels and Process Variations for AME50461 Series

| Requirement                | MIL-STD-883 Method            | No Suffix    | ES Suffix       | HB Suffix        | CH Suffix        |
|----------------------------|-------------------------------|--------------|-----------------|------------------|------------------|
| Temperature Range          |                               | -20 to +85°C | -55°C to +125°C | -55°C to +125°C  | -55°C to +125°C  |
| Element Evaluation         |                               |              |                 |                  | MIL-PRF-38534    |
| Internal Visual            | 2017                          | *            | Yes             | Yes              | Yes              |
| Temperature Cycle          | 1010                          |              | Cond B          | Cond C           | Cond C           |
| Constant Acceleration      | 2001                          |              | 500g            | Cond A           | Cond A           |
| Burn-in                    | 1015                          | 48hrs@ 85°C  | 48hrs@ 125°C    | 160hrs @ 125°C   | 160hrs @ 125°C   |
| Final Electrical (Group A) | MIL-PRF-38534 & Specification | 25°C         | 25°C            | -55, +25, +125°C | -55, +25, +125°C |
| Seal, Fine & Gross         | 1014                          | Cond A       | Cond A, C       | Cond A, C        | Cond A, C        |
| External Visual            | 2009                          | *            | Yes             | Yes              | Yes              |

\* Per Commercial Standards

Pin Designation

| Pin No. | Designation     |
|---------|-----------------|
| 1       | Positive Input  |
| 2       | Positive Input  |
| 3       | Positive Input  |
| 4       | Input Return    |
| 5       | Input Return    |
| 6       | Input Return    |
| 7       | Output Return   |
| 8       | Output Return   |
| 9       | Output Return   |
| 10      | Positive Output |
| 11      | Positive Output |
| 12      | Positive Output |

Part Numbering

