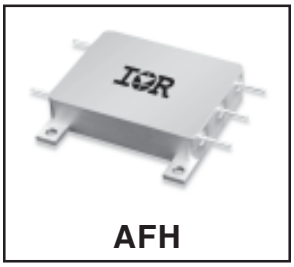
International
IOR Rectifier

# AFH461 SERIES

## EMI FILTER
## HYBRID - HIGH RELIABILITY




### Description

The AFH Series EMI filter has been designed to provide full compliance with the input line reflected ripple current requirement specified by CE03 of MIL-STD-461C over the extended military temperature range while operating in conjunction with the corresponding AMA, AMF and AMR series of DC-DC converters. These filters are offered as part of a family of high reliability conversion products providing single, dual and triple output voltages while operating from nominal +28 volt input line. Other converters operating with a similar switching frequency will also benefit by use of this device.

These EMI filters are hermetically packaged in a seam welded enclosure utilizing axially oriented copper-core pins which minimize resistive DC losses. This package has been configured to complement the AMA, AMF and AMR packages as a convenience in system installation and is fabricated with International Rectifier's rugged ceramic lead-to-package seal assuring long term hermetic seal integrity in harsh environments.

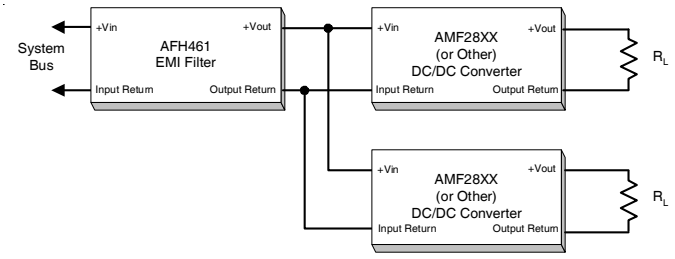
Designed to meet the stringent requirements of military and aerospace use, these devices are manufactured in a facility fully qualified to MIL-PRF-38534, and are available in two screening grades. The flight grade is designed with the requirements of MIL-PRF-38534 for class K.

### Features

- Up to 2.0 A Output Current
- Attenuation > 60dB@500 kHz
- Low Profile Seam Welded Package
- Ceramic Insulated Copper Core Pins
- Operation Over Full Military Temp. Range
- No Derating for -55°C to +125°C

The EM grade is processed and screened to a lower grade requirement. Flight grade are tested to meet the complete group "A" test specifications over the full military temperature range with no derating. The design does not meet MIL-STD-975 voltage derating requirements for some ineternal components. Variations in electrical, mechanical and screening requirements can be accommodated. Contact IR San Jose for special requirements.

### Typical Connection Diagram



## Specifications

| Absolute Maximum Ratings, Note 1 | |
|---|---|
| Input Voltage | -80V to +80V, Note 2 |
| Input Curent | 3.0A |
| Lead Soldering Temperature | +300°C for 10 seconds |
| Case Temperature - Operating | -55°C to +125°C |
| Case Temperature - Storage | -65°C to +135°C |

## Electrical Characteristics -55°C≤$T_{CASE}$ ≤+125°C, 0≤$V_{IN}$≤+50 unless otherwise specified

| Parameter | Group A Subgroup | Conditions | Min. | Nom. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Voltage | 1, 2, 3 | $I_{IN}$ < 500 □A | 0 | | +40 | $V_{DC}$ |
| | | Transient, Note 2 | -50 | | +50 | |
| Output Current, Note 3 | | | | | 2.0 | $A_{DC}$ |
| DC Resistant, Note 4 | 1 | $T_C$ = 25°C | | 150 | 250 | m□ |
| Power Dissipation | | Maximum Current, $T_C$ = 25°C | | | 1.0 | W |
| Noise Reduction | 4, 5, 6 | $T_C$ = 25°C<br>1.0 kHZ<br>200 kHz - 500 kHz<br>500 kHz - 10 MHz | -1.0 | | +1.0<br>-40<br>-60 | dB |
| Isolation | 1 | Any Pin to Case, Tested @ 500$V_{DC}$ | 100 | | | M□ |
| Capacitance | 1, 2, 3 | Measured between any Pin and Case | 32 | 44 | 48 | nF |
| Device Weight | | Slight variation with Case Style | | 30 | | g |

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 ± 100 Volt transient whose duration is ≤ 100 ms when $R_S$ ≥ 0.5 Ω.
3. Derate Output Current linearly from 100% at 125°C to 0 at 135°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.

## Typical Filter CE03 Performance

**Fig 1. AHF2805S CE03 Performance without AFH461 Filter**

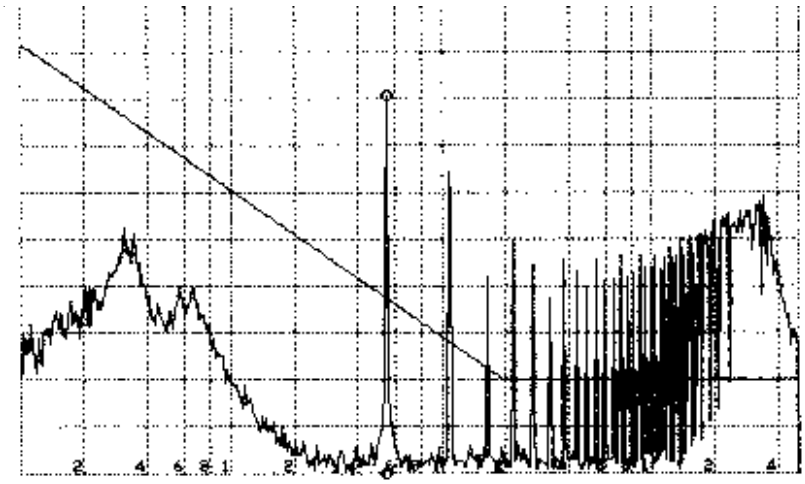
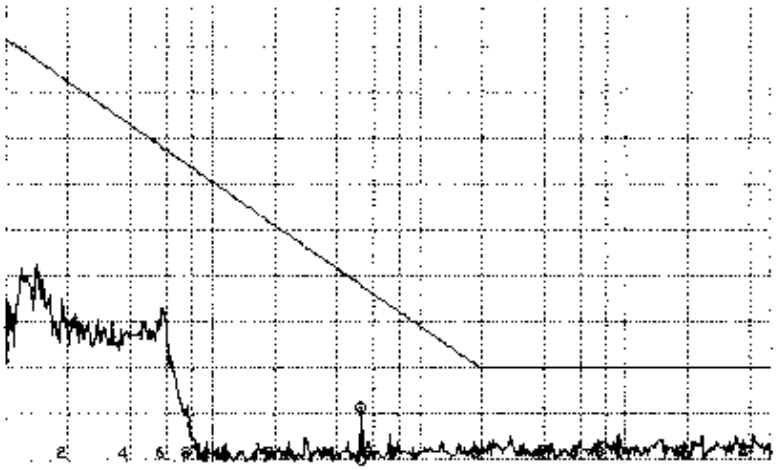


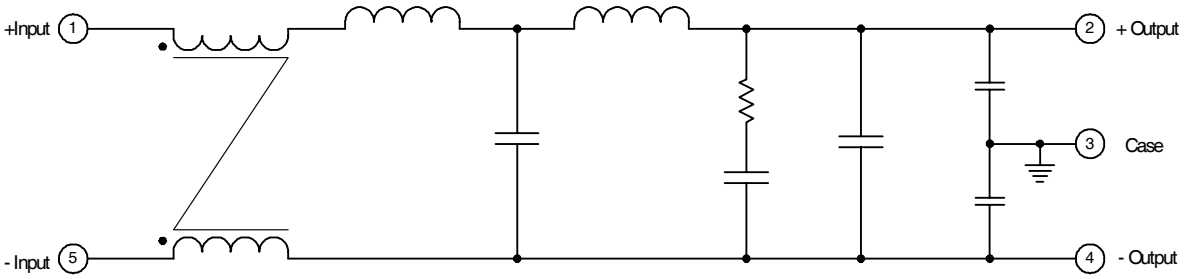
**Fig 2. AHF2805S CE03 Performance with AFH461 Filter**



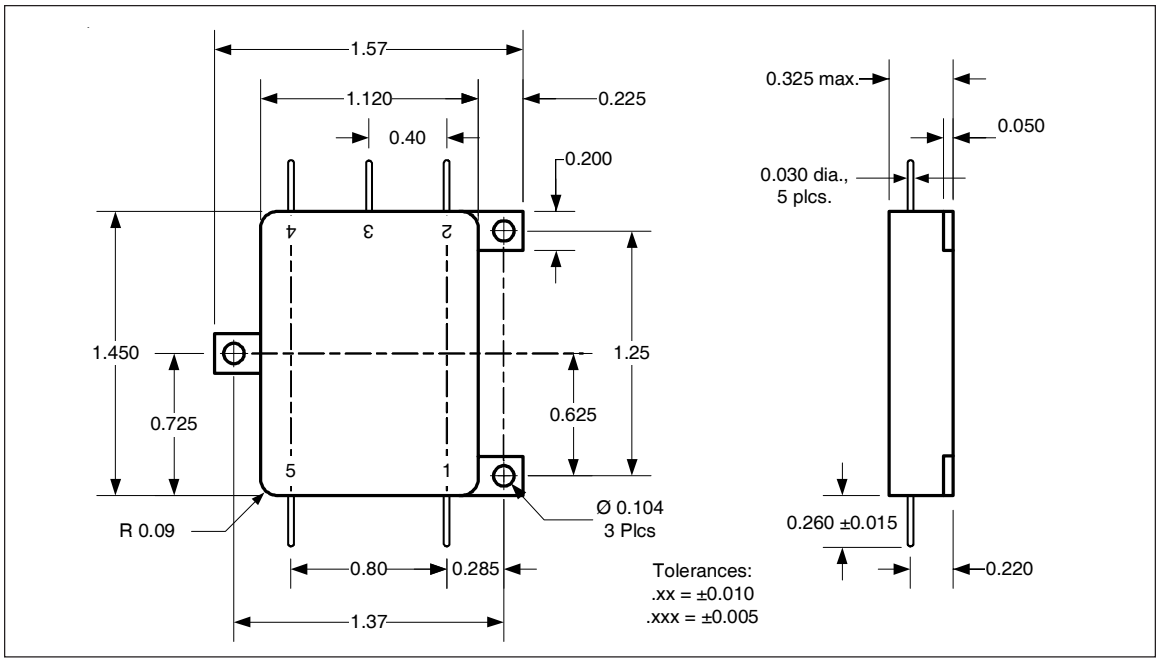
## Available Screening Levels and Process Variations

| Requirement | MIL-STD-883 Method | Flight No Suffix | /EM Suffix |
|---|---|---|---|
| Temperature Range | | -55°C to +125°C | -55°C to +125°C |
| Element Evaluation | | MIL-PRF-38534, Class K | — |
| Internal Visual | 2017 | Yes | Yes |
| Temperature Cycle | 1010 | Cond C | — |
| Constant Acceleration | 2001 | Cond A | — |
| Burn-in<br>Interim Electrical @ 160 hrs | 1015 | 320 hrs @ 125°C | 48 hrs @ 125°C |
| Final Electrical (Group A)<br>Read & Record Data | MIL-PRF-38534<br>& Specification | -55°C, +25°C, +125°C | +25°C |
| PDA (25°C, interim to final) | | 2% | — |
| Seal, Fine & Gross | 1014 | Cond A, C | Cond A, C |
| Radiographic | 2012 | Yes | — |
| External Visual | 2009 | Yes | Yes |

**Fig 3. Block Diagram**



## Case Style Outline




## Pin Designation

| Pin No. | Designation |
|---|---|
| 1 | Positive Input |
| 2 | Positive Output |
| 3 | Case Ground |
| 4 | Output Common |
| 5 | Input Common |

## Part Numbering

**AFH 461 / EM**

- **AFH** — Model
- **461** — Applicable Military Test Standard
- **/EM** — Screening Suffix
  - None = Flight
  - /EM = Engineering Model



**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, Tel: (310) 252-7105
**IR SAN JOSE:** 2520 Junction Avenue, San Jose, California 95134, Tel: (408) 434-5000
Visit us at www.irf.com for sales contact information.