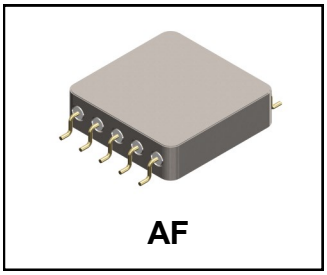
AF28461 SERIES

EMI FILTER
HYBRID-HIGH RELIABILITY



AF

Description

The AF28461 Series EMI filter is designed to provide full compliance with the input line reflected ripple current requirement specified by MIL-STD-461C and MIL-STD-461F over the extended temperature range while operating in conjunction with the corresponding ARA and ARE Series of DC-DC converters. The filter is offered as part of a family of high reliability conversion products that operate up to 50V input line. Other converters operating with a similar switching frequency could also benefit by use of this device.

The AF28461 filter is hermetically sealed in a seam welded enclosure utilizing axially oriented surface-mountable copper -core pins which minimize resistive losses. The package is fabricated with IR HiRel's rugged ceramic lead-to-package seal assuring long term hermetic seal integrity in harsh environments.

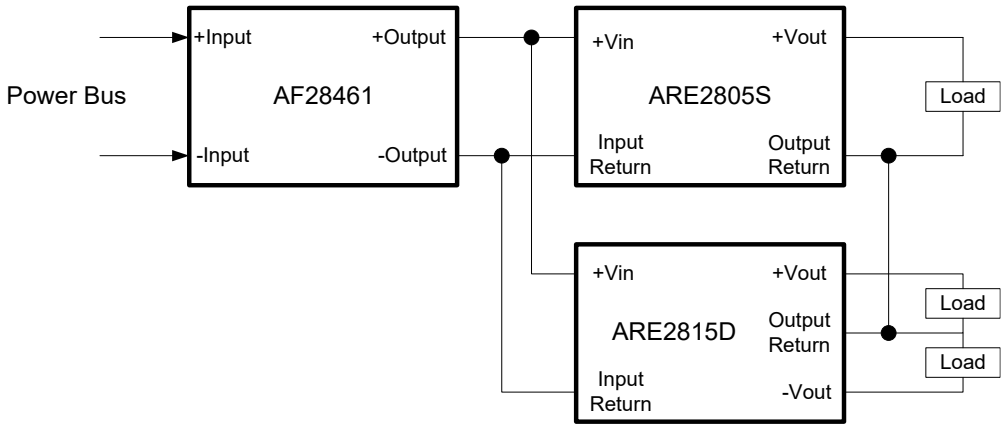
The filter is manufactured in a facility fully qualified to MIL-PRF-38534, and is available in two screening grades. The flight grade is designed with the requirements of MIL-PRF-38534 for class K.

Features

- Up to 1.0 A Output Current
- Attenuation > 60dB @ 500 kHz
- Low Profile Seam Welded Package
- Ceramic Insulated Copper Core Pins
- Operation Over Full Military Temp. Range -55°C to 105°C without Power Derating
- Class K Screened per MIL-STD-38534
- MIL-PRF-38534 Element Evaluated Components
- Enabling ARA and ARE Series DC-DC Converters to meet CE102 Requirements of MIL-STD-461F
- Derated per MIL-STD-1547 and IEEE-INST-002

The EM grade is processed and screened to a lower grade requirement. The filter is designed to meet the derating guidelines of MIL-STD-1547 and EEE-INST-002.

Typical Connection Diagram



Notes

1. One AF28461 filter is designed to accommodate up to two converters over rated voltage with rated load while not exceeding maximum power limit.
2. To obtain specified EMI performance, it is recommended that conductor length between filter and converter to be kept under 3 inches.
3. Cross section area of each conductor traces (on both input and output side) should be at least 0.05mm^2.
4. Filter can tolerate up to 20µH total line inductance on the input side.
5. At system integration, attention should be paid to maintain a conducting path with minimal inductance (< 25nH) between case of the filter and case of the converter.

Absolute Maximum Ratings, Note 1

Input Voltage	-50V to +50V, Note 2
Input Current	1.0A
Lead Soldering Temperature	+300°C for 10 seconds
Case Temperature-Operating	-55°C to +125°C
Case Temperature-Storage	-55°C to +135°C
Recommended Case Temperature-Operating	-55°C to +105°C

Specifications -55°C ≤ T_{CASE} ≤ +105°C, 100 ≤ V_{IN} ≤ +100V unless otherwise specified

Parameter	Group A Subgroup	Conditions	Min.	Nom.	Max.	Unit
Input Voltage		Steady State	-50	—	+50	V_{DC}
		Transient, Notes 2, 4	-100	—	+100	
Output Voltage	1. 2, 3	Continuous	$V_{OUT} = V_{IN} - I_{IN} (R_{DC})$			V_{DC}
Output Current			—	—	1.0	A_{DC}
DC Resistant, Note 3	1	T_C = 25°C	—	—	300	mΩ
Power Dissipation		Maximum Current, T_C = 25°C	—	—	0.3	W
Noise Reduction	4, 5, 6	T_C = 25°C 1.0 kHz 200 kHz - 500 kHz 500 kHz - 10 MHz	— -1.0 — —	— — — —	— +1.0 -40 -60	dB
Isolation	1	Any Pin to Case, Tested @ 500V_{DC}	100	—	—	MΩ
Capacitance	1, 2, 3	Measured between any Pin and Case	16	—	24	nF
Device Weight			—	—	23	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 ≤ 100ms when $R_S \geq 0.5\Omega$.
3. 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.
4. Derating guidelines do not apply for any input voltage transient conditions.

Typical EMI Filter Performance Curves

(Case Temperature = 25°C, V_{IN} = +28V, Rated Load, unless otherwise specified)

Fig 1. MIL-STD-461C CE03 Two ARE28XXXX Converters without EMI Filter

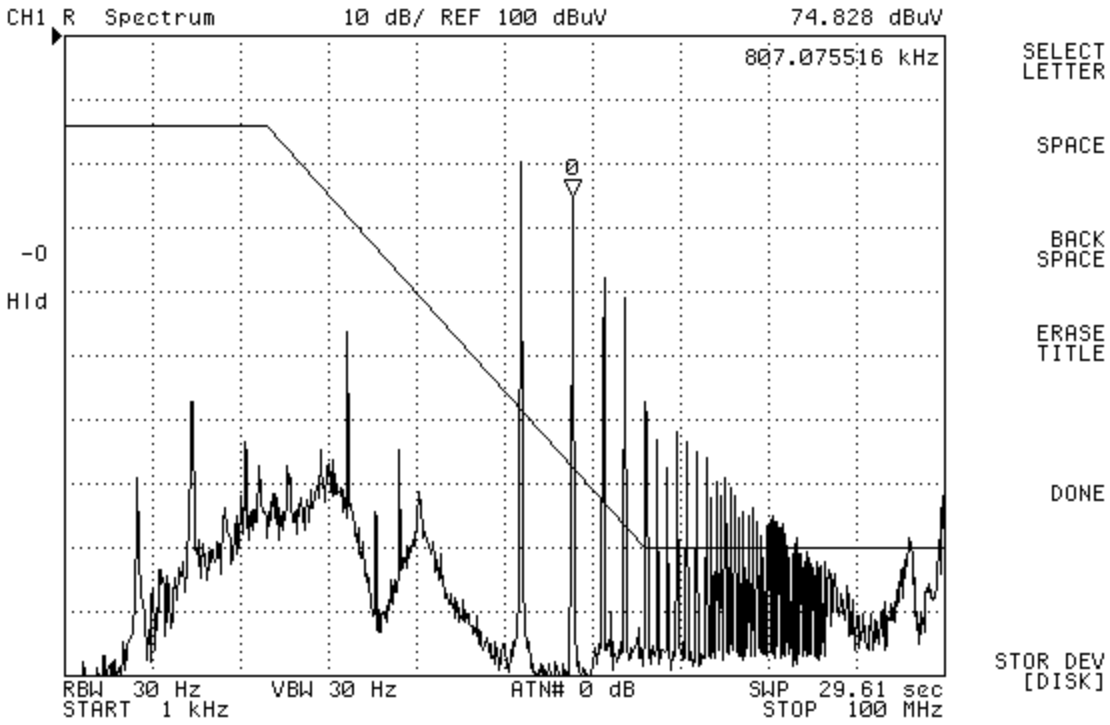


Fig 2. MIL-STD-461C CE03 Two ARE28XXXX Converters with EMI Filter

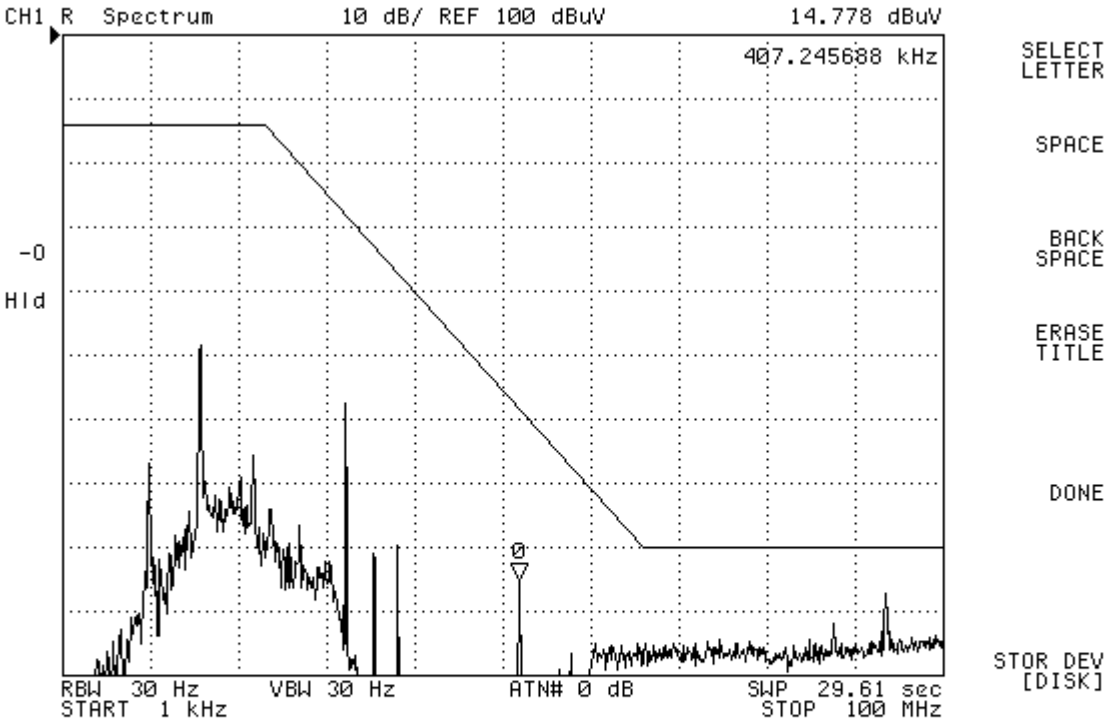


Fig 3. MIL-STD-461F CE102 Two ARE28XXXX Converters without EMI Filter

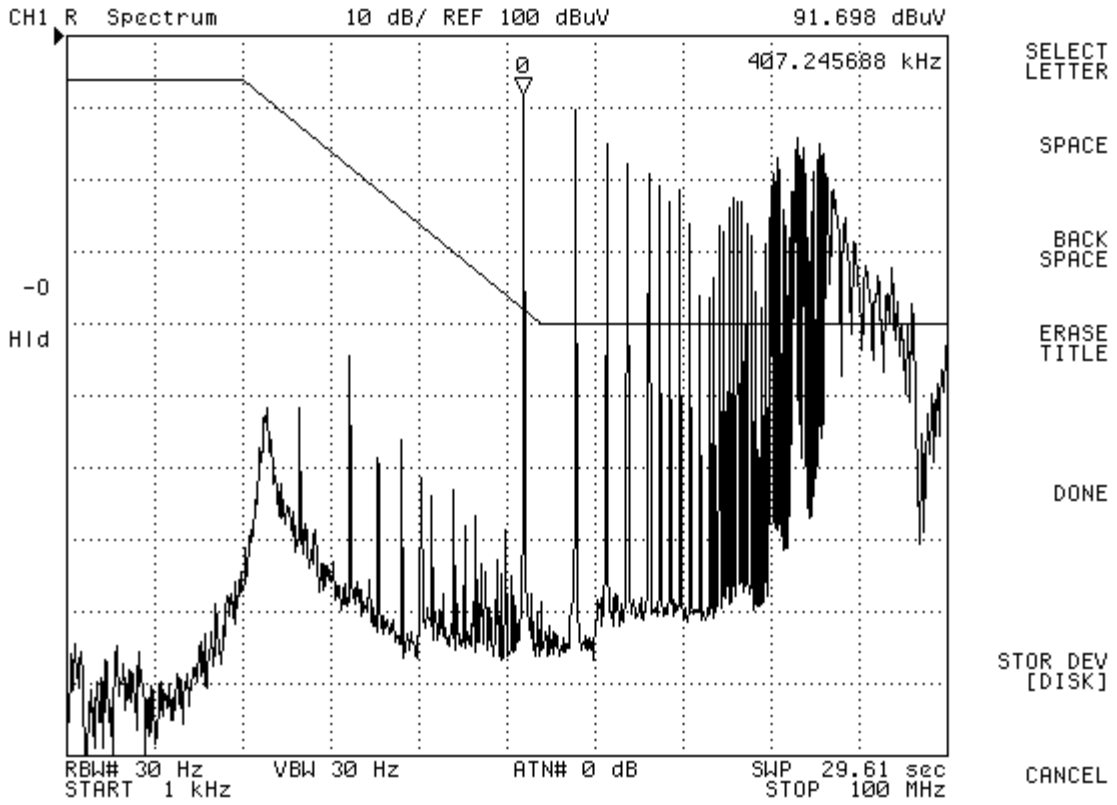
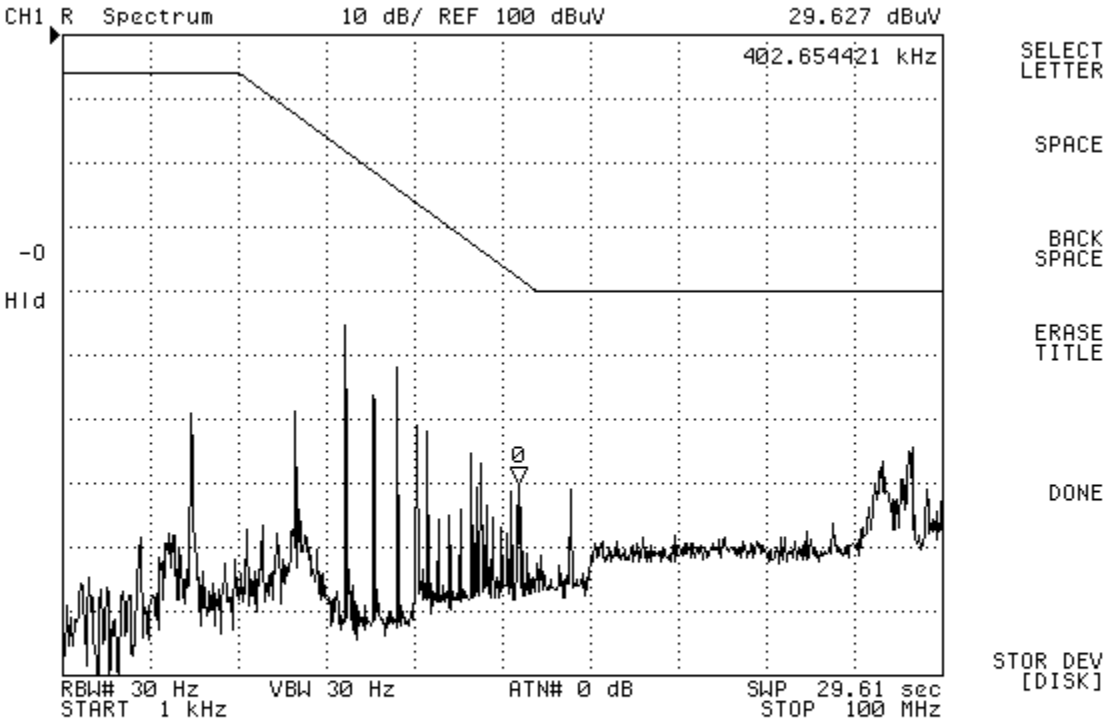


Fig 4. MIL-STD-461F CE102 Two ARE28XXXX Converters with EMI Filter



Mechanical Outline

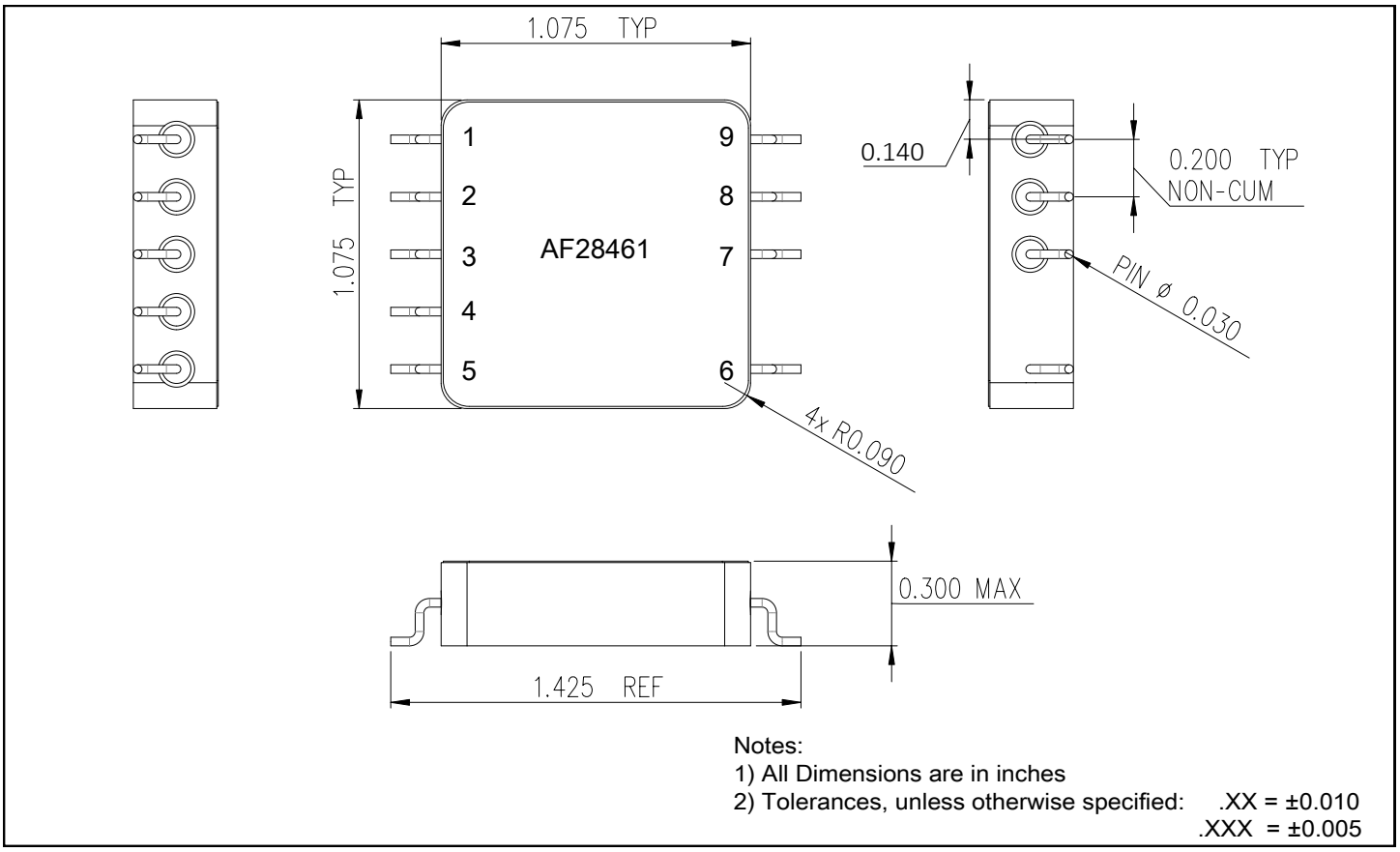
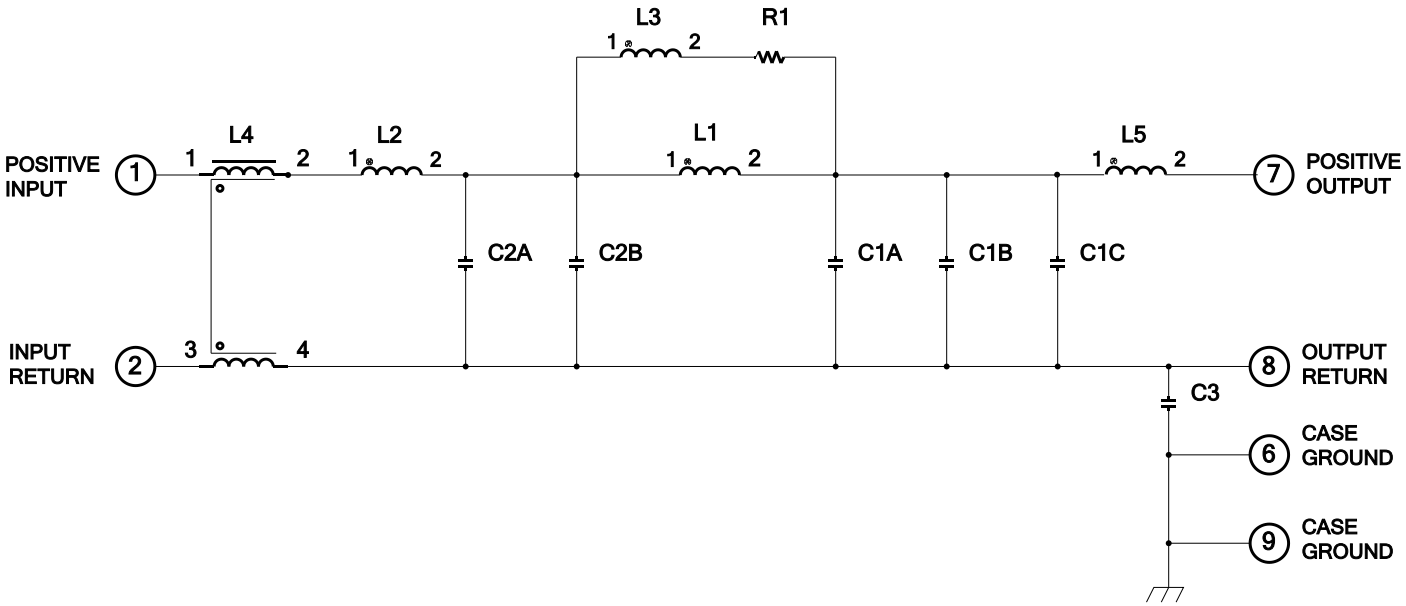


Fig 5. Block Diagram



Pin Designation

Pin #	Designation	Pin #	Designation
1	+ INPUT	6	CASE GROUND
2	INPUT RETURN	7	+ OUTPUT
3	NC	8	OUTPUT RETURN
4	NC	9	CASE GROUND
5	NC		

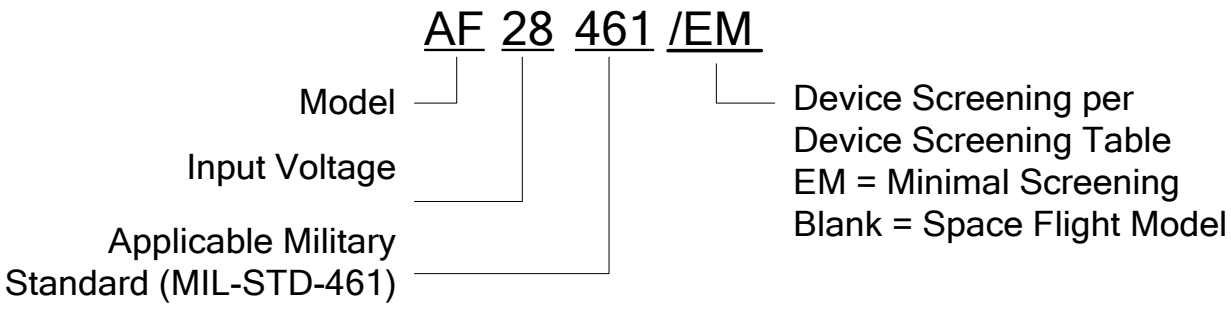
Device Screening

Part Number Designator		/EM ①	Flight No Suffix
Compliance Level	**MIL-PRF-38534**	—	—
Certification Mark	—	—	—
Screening Requirement	**MIL-STD-883 Method**	—	—
Temperature Range	—	Room Temperature	-55°C to +105°C
Element Evaluation	MIL-PRF-38534	N/A	Class K
Non-Destructive Bond Pull	2023	N/A	
Internal Visual	2017	IR Defined	Yes
Temperature Cycle	1010	N/A	Cond C
Constant Acceleration	2001, Y1 Axis	N/A	3000 Gs
PIND	2020	N/A	Cond A
Burn-In	1015	N/A	320 hrs @ 125°C (2 x 160 hrs)
Final Electrical (Group A)	MIL-PRF-38534 & Specification	Room Temperature	-55°C, +25°C, +105°C
PDA	MIL-PRF-38534	N/A	2%
Seal, Fine and Gross	1014	N/A	Cond A, C
Radiographic	2012	N/A	Yes
External Visual	2009	IR Defined	Yes

Note:

① **"EM" grade** parts are strictly intended to permit the customer to determine the electrical functionality of the device in the customer's application in ambient conditions. The use of EM devices in production applications presents an unquantifiable risk of failure and IR HiRel disclaims all responsibility for such failure.

Part Numbering



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