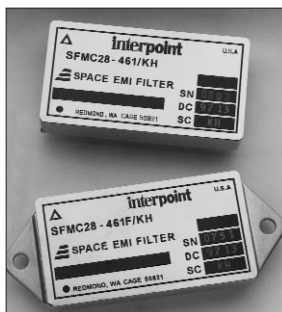


FEATURES

- -55° to +125°C operation
- 28 volt input
- Up to 2.7 amps throughput current
- Up to 55 dB attenuation at 500 kHz
- Up to 60 dB attenuation at 1 MHz and 5 MHz
- Compliant to MIL-STD-461C, CE03
- Compatible with MIL-STD-704E DC power bus

EMI INPUT FILTER

28 VOLT INPUT



SFMC EMI FILTER

2.7 AMP

MODEL

SFMC28-461 2.7 amp

Size: Non-flanged, case H1
2.125 x 1.125 x 0.400 (53.98 x 28.56 x 10.16 mm)
Flanged case, K2
2.910 x 1.125 x 0.400 inches (73.91 x 28.58 x 10.16 mm)

Weight: 48 grams maximum

Screening: Space Prototype, Class H, or Class K.

DESCRIPTION

The SFMC28-461™ EMI filters provide an off-the-shelf filtering solution compliant to MIL-PRF-38534, Class H or Class K, for use in your space system. SFMC28-461 filters reduce the input line reflected ripple current of Interpoint's switching DC/DC converters. Use an SFMC28-461 filter with Interpoint's SMSA and SMHF series of DC/DC converters to meet MIL-STD-461C levels of conducted emission (CE01, CE03). The SFMC filters are designed exclusively with passive components providing maximum tolerance for space environments.

The SFMC28-461 EMI filters offer the following options to meet the special requirements of space applications:

- Environmental screening levels to standard (O), Class H (H), or Class K (K) requirements. See page four for screening details.
- Technical reports :
 - Radiation Susceptibility Analysis
 - Electrical/Thermal Stress Analysis and Derating Report
 - MTBF Report (Mean Time Between Failures)
 - FMEA Report (Failure Modes and Effects Analysis)

RIPPLE REDUCTION

The SFMC28-461 EMI filter, when used with Interpoint's converters, reduces reflected input ripple current by a minimum of 55 dB at 500 kHz and 60 dB at 1 MHz. The filter and converter combination performance exceeds the CE03 requirements of MIL-STD-461C.

INSERTION LOSS

The maximum DC insertion loss for the SFMC28-461 filter (at a load of 22 watts) represents an output power loss of less than 2%.

FILTER DESIGN

SFMC28-461 filters incorporate thick-film hybrid technology and use only high quality ceramic capacitors for reliable high temperature operation.

Derating according to the requirements of MIL-STD-975 assures dependable performance in the harsh environments of space. MIL-STD-975 derating applies to operating temperatures at or below 90°C.

All SFMC28-461 filters are built to the same assembly drawing regardless of environmental screening or radiation tolerance level. Filters designated level OO, indicating standard environmental screening, are electrically comparable to filters designated level KH, the highest environmental screening level. This ensures consistency between your prototype or test system using level OO filters and your flight system using filters with higher levels of environmental screening and radiation tolerance. Element evaluation (screening at the component level) of Class H or Class K filters ensures even greater reliability. Refer to Table 1, 2, and 3 for more information.

OPERATING TEMPERATURE

The filter operates at full load over the temperature range of -55°C to +125°C case. Above +125°C, the current must be derated as specified on page two.

PACKAGING FOR SPACE

SFMC28-461 EMI filters are encased in high-reliability, hermetically-sealed metal packages and weigh just 48 grams. A small footprint of 2.110 Inches (53.59 mm) by 1.115 inches (28.32 mm) by 0.400 inches (10.16 mm) minimizes the board area needed for the filter. Cover marking inks are NASA approved to Total Mass Loss (TML) and Collected Volatile Condensable Material (CVCM) outgassing requirements for operation in space environments.

SFMC EMI FILTER

2.7 AMP

EMI INPUT FILTERS

ABSOLUTE MAXIMUM RATINGS

Input Voltage

- 0 to 40 VDC continuous

Lead Soldering Temperature (10 sec per lead)

- 300° C

Storage Temperature Range (Case)

- -65°C to +150°C

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range

- 16 to 40 VDC continuous for 40 W load

Case Operating Temperature (Tc)

- -55 to +125°C full power

Derating

- Derate linearly from 100% at 125°C to 0 at 135°C case

TYPICAL CHARACTERISTICS

Capacitance

- 0.048 μ F max., any pin to case

Isolation

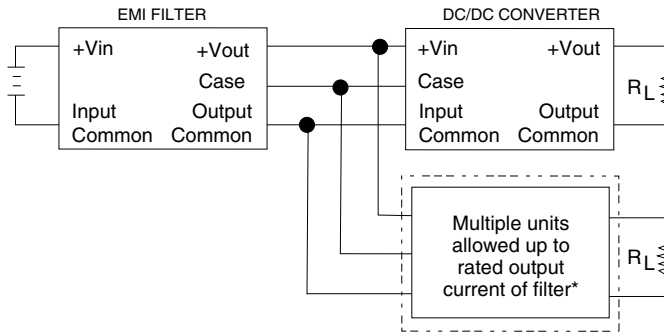
- 100 megohm minimum at 500 V
- Any pin to case, except case pin

Electrical Characteristics: 25°C Tc, nominal Vin, unless otherwise specified.

PARAMETER	CONDITIONS	SFMC28-461			UNITS
		MIN	TYP	MAX	
INPUT VOLTAGE	CONTINUOUS	0	28	40	VDC
INPUT CURRENT		—	—	2.7	A
NOISE REJECTION	500 kHz	55	—	—	dB
	1 MHz	60	—	—	
	5 MHz	60	—	—	
DC RESISTANCE (R _{DC})	TC = 25°C	—	—	0.20	Ω
OUTPUT VOLTAGE ¹	STEADY STATE	$V_{OUT} = V_{IN} - I_{IN} (R_{DC})$			VDC
OUTPUT CURRENT	STEADY STATE	—	—	2.7	A
REFLECTED RIPPLE CURRENT	FROM CONVERTER TO FILTER	—	—	1.0	Arms
INTERNAL POWER DISSIPATION	MAXIMUM CURRENT	—	—	1.6	W

Notes

1. Typical applications result in Vout within 2% of Vin.

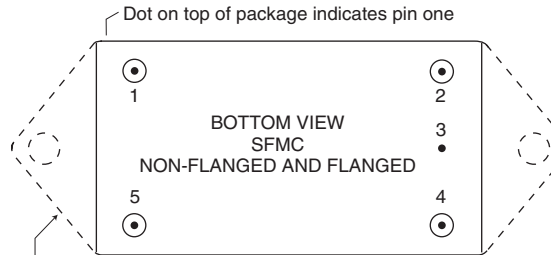


Output impedance of the filter must be less than the combined input impedance of the DC/DC converters.

FIGURE 1: CONNECTION DIAGRAM

PIN OUT

Pin	Designation
1	Positive Input
2	Positive Output
3	Case Ground
4	Output Common
5	Input Common



Dotted line outlines flanged package option.

See Figures 6 and 7 for dimensions.

FIGURE 2: PIN OUT

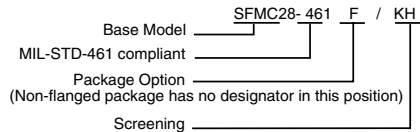
DSCC NUMBER

DSCC DRAWING (5915)	SFMC28-461 FILTER SIMILAR PART
94010H02HXC	SFMC28-461/HH
94010H02HZC	SFMC28-461F/HH
94010H02KXC	SFMC28-461/KH
94010H02KZC	SFMC28-461/KH

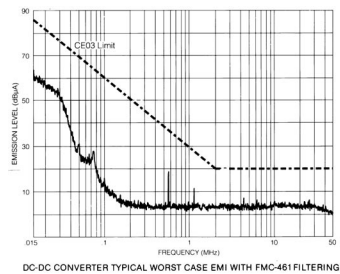
Flanged SMDs have the suffix HZC in place of HXC.

Interpoint's DSCC drawing models are similar in performance and dimensions to standard models, however, slight differences in specifications may exist. Refer to the DSCC drawing for the exact specifications. DSCC drawings can be downloaded from www.dsccols.com/programs/smcr

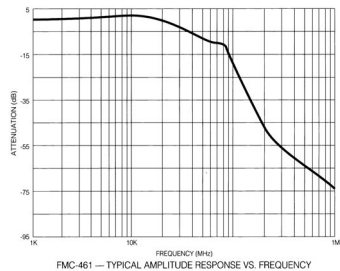
MODEL NUMBERING KEY



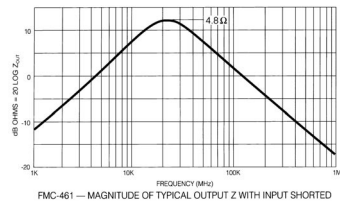
Typical Performance Curves: 25°C Tc , nominal Vin, unless otherwise specified.



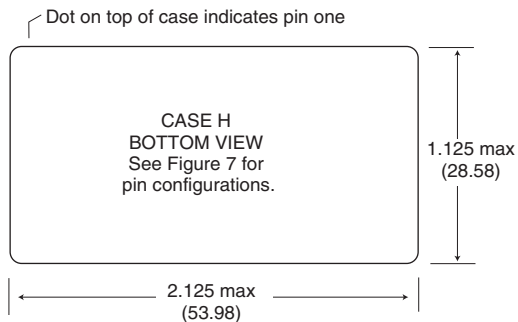
DC/DC Converter Typical Worst Case
EMI With FMC-461 Filter
FIGURE 3



FMC-461 Typical Amplitude
Response vs. Frequency
FIGURE 4



Typical Output Impedance (Z)
With Input Shorted
FIGURE 5



Materials

Header Cold Rolled Steel/Nickel/Gold
Cover Kovar/Nickel
Pins #52 alloy, ceramic seal
case H1

Case dimensions in inches (mm)

Tolerance ± 0.005 (0.13) for three decimal places
 ± 0.01 (0.3) for two decimal places
unless otherwise specified

CAUTION

Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

FIGURE 6: CASE H MAXIMUM DIMENSIONS

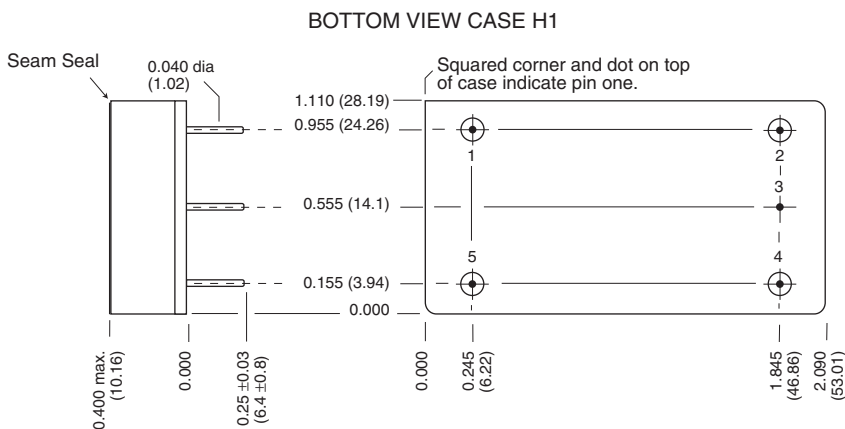
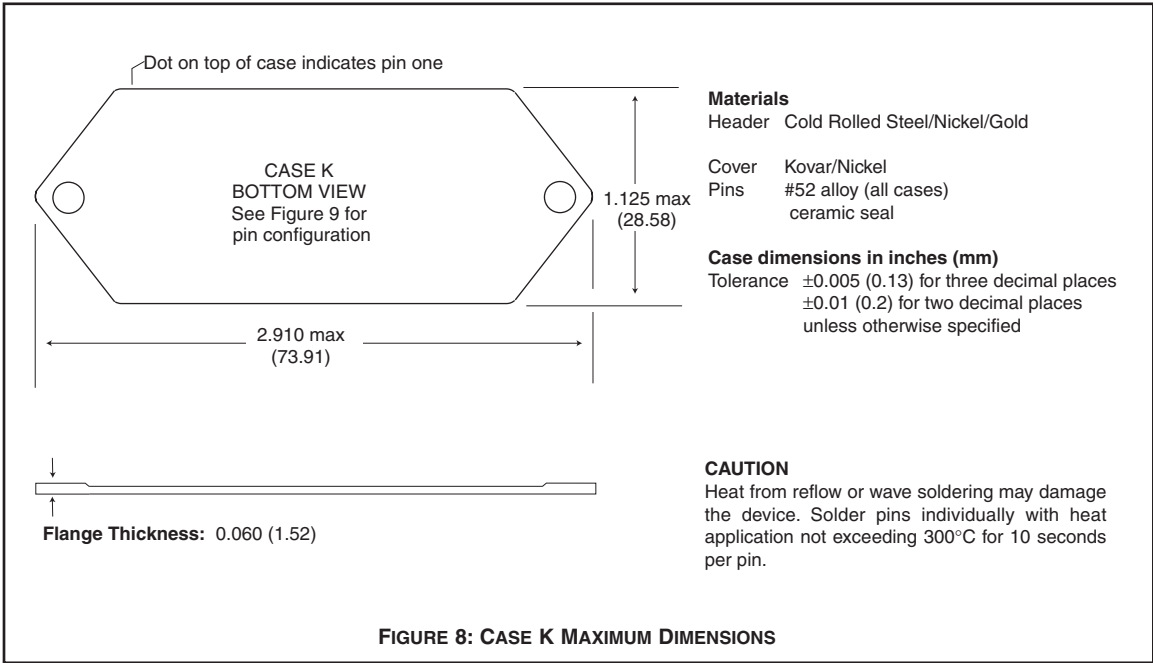
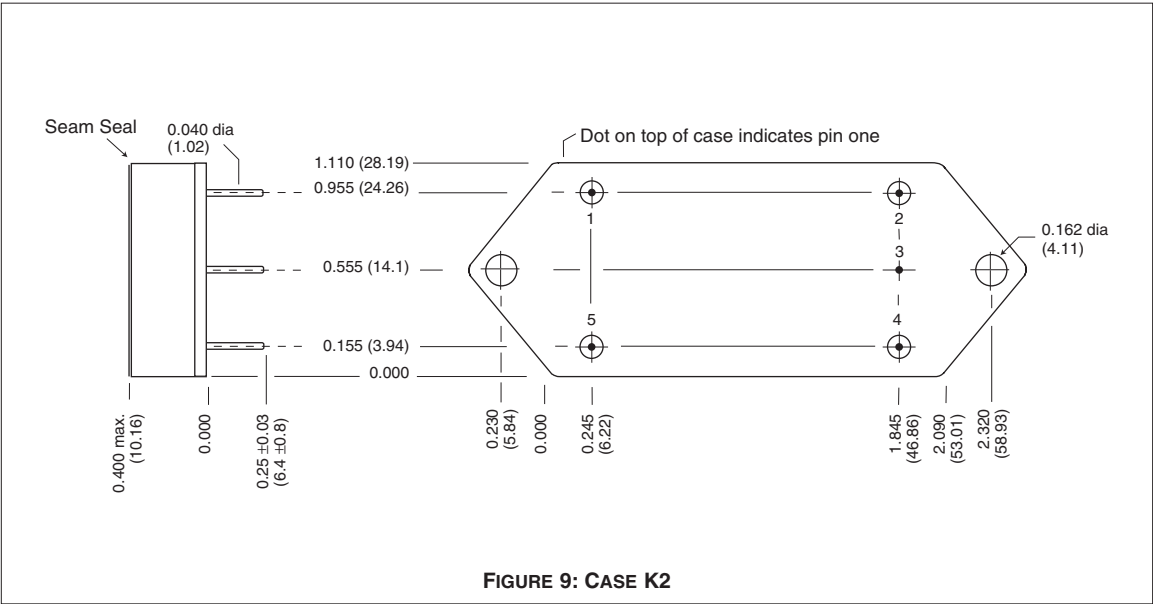


FIGURE 7: CASE H1

Note: Although every effort has been made to render the case drawings at actual size, variations in the printing process may cause some distortion. Please refer to the numerical dimensions for accuracy.

SFMC EMI FILTER
2.7 AMP

EMI INPUT FILTERS



Note: Although every effort has been made to render the case drawings at actual size, variations in the printing process may cause some distortion. Please refer to the numerical dimensions for accuracy.

TABLE 1: ELEMENT EVALUATION

ELEMENT EVALUATION TEST PERFORMED (COMPONENT LEVEL)	SPACE PROTOTYPE (O)		CLASS H		CLASS K	
	M/S	P	M/S	P	M/S	P
Element Electrical	yes	no	yes	yes	yes	yes
Element Visual	no	no	yes	yes	yes	yes
Internal Visual	no	no	yes	no	yes	no
Temperature Cycling	no	no	no	no	yes	yes
Constant Acceleration	no	no	no	no	yes	yes
Interim Electrical	no	no	no	no	yes	no
Burn-in	no	no	no	no	yes	no
Post Burn-in Electrical	no	no	no	no	yes	no
Steady State Life	no	no	no	no	yes	no
Voltage Conditioning /Aging	no	no	no	no	no	yes
Visual Inspection	no	no	no	no	no	yes
Final Electrical	no	no	yes	yes	yes	yes
SEM	no	no	no	no	yes	no
SLAM™/C-SAM: Input capacitors only (Add'l test, not req. by H or K)	no	no	no	yes	no	yes

Notes

M/S Active components (Microcircuit and Semiconductor Die)

P Passive components

Definitions

Element Evaluation: Component testing/screening per MIL-STD-883 as determined by MIL-PRF-38534

SEM: Scanning Electron Microscopy

SLAM™: Scanning Laser Acoustic Microscopy

C-SAM: C - Mode Scanning Acoustic Microscopy

TABLE 2: PRODUCT ENVIRONMENTAL SCREENING

ENVIRONMENTAL SCREENING TEST PERFORMED (END ITEM LEVEL)	SPACE PROTOTYPE (O)	CLASS H	CLASS K
Pre-cap inspection Method 2017, 2032	yes	yes	yes
Temperature cycle Method 1010, Cond. C	yes	yes	yes
Constant acceleration Method 2001, 3000 g	yes	yes	yes
PIND Test Method 2020, Cond. B	no	yes	yes
Radiography Method 2012	no	no	yes
Pre burn-in test	yes	yes	yes
Burn-in, Method 1015, 125°C			
96 hours	yes	no	no
160 hours	no	yes	no
2 x 160 hour (includes mid BI test)	no	no	yes
Final electrical test MIL-PRF-38534, Group A	yes	yes	yes
Hermeticity test			
Fine Leak, Method 1014, Cond. A	yes	yes	yes
Gross Leak, Method 1014, Cond. C	yes	yes	yes
Final visual inspection Method 2009	yes	yes	yes

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534

**TABLE 3:
REPORTS INCLUDED WITH PURCHASE OF CLASS H OR K PRODUCTS**

1. Electrical/Thermal Stress Analysis and Derating Report
2. MTBF Report

Contact Information:

www.interpoint.com

Interpoint Headquarters USA
Phone: 1-800-822-8782
+425-882-3100
Email: power@intp.com

Interpoint UK
Phone: +44-1252-872266
Email: poweruk@intp.com

Interpoint France
Phone: +33-134285455
Email: powerfr@intp.com