#### **FEATURES**

- -55°C to +125°C operation
- 50 dB min. attenuation at 500 kHz differential mode
- 45 dB min. attenuation at 5MHz common mode
- Compliant to MIL-STD-461C, CE03
- Compatible with MIL-STD-704A through E

# EMI INPUT FILTER 28 VOLT INPUT SURFACE MOUNT

# FMGA EMI FILTER 0.8 AMP



MODEL

FMGA-461 0.8 amp

Size (max.): 1.010 x 0.880 x 0.250 inches (25.65 x 22.35 x 6.35 mm)

Shown with "Gull Wing" lead option, also available with straight leads. See Section B8, case B, for dimensions and options.

Weight: 10.3 grams typical, 11.5 grams maximum

Screening: Standard or ES. See Section C2 for screening options, see

Section A5 for ordering information.

#### **DESCRIPTION**

Interpoint's surface mount FMGA-461™ EMI filter has been designed to work with Interpoint's surface mount MGA and MGH Series DC/DC converters. Multiple MGA or MGH Series converters can be operated from a single FMGA filter provided the total power line current does not exceed the filter's maximum rating. The FMGA filter will reduce the converter's power line reflected ripple current to within the limit of MIL-STD-461C, Method CE03 as shown in Figures 4 through 7. The filter uses only ceramic capacitors for reliable high-temperature operation.

#### **CONNECTION AND OPERATION**

Where more than one pin has the same designation (e.g. pins 7, 8, and 9 are Positive Output), all of those pins must be connected for output performance to meet the specifications.

The MGA Series has an internal 2  $\mu F$  capacitor its input terminals and the MGH Series has an internal 0.47  $\mu F$  capacitor across its input power terminals. When the MGA or MGH converters are used with the FMGA filter, this capacitor becomes part of the filter and forms its final LC output section. When 2 or 3 MGA or MGH converters are used with a single filter, this capacitor becomes larger, improving the rejection versus frequency.

#### TRANSIENT DAMPING

The optional damping circuit shown in Figure 2 will prevent filter overshoot caused by 80 V transients with rise times of less than 200

microseconds. The damping circuit can be used with a 1.50  $\Omega$  resistor in series with the filter's positive input where the additional line loss can be tolerated. For transients with rise times of greater than 200 microseconds, there is no overshoot and the damping circuit is not required.

#### SURFACE MOUNT PACKAGE

The FMGA EMI filter can be surface mounted with pick-and-place equipment or manually. It is recommended that the case be attached with flexible epoxy adhesive or silicone which is thermally conductive (>1 watt /meter/°K).

Internal components are soldered with SN96 (melting temperature 221°C) to prevent damage during reflow. Maximum reflow temperature for surface mounting the FMGA filter is 220°C for a maximum of 30 seconds. SN60, 62, or 63 are the recommended types of solder. Hand soldering should not exceed 300°C for 10 seconds per pin.

The hermetically sealed metal cases are available in two different lead configurations. See Section B8, case B.

#### **LAYOUT REQUIREMENTS**

The case of the filter must be connected to the case of the converter through a low impedance connection to minimize EMI.



### FMGA EMI FILTER **0.8 AMP**

# **EMI INPUT FILTERS**

#### **ABSOLUTE MAXIMUM RATINGS**

- Lead Soldering Temperature (10 sec per lead)

#### Storage Temperature Range (Case)

• -65°C to +150°C

#### RECOMMENDED OPERATING CONDITIONS

- Input Voltage Range
   16 to 40 VDC continuous
  Case Operating Temperature (Tc)
  - -55°C to +125°C full power

#### **Derating Input and Output Current**

• Derate linearly from 100% at 100°C to 0.60 Amps at 125°C case. Above 125°C derate to 0%

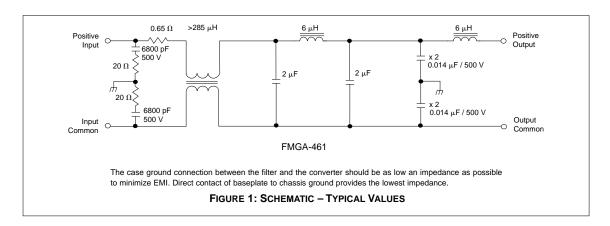
#### TYPICAL CHARACTERISTICS

#### Capacitance

- 0.045 µF 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.

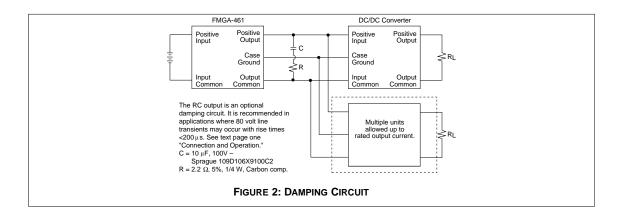
		FMGA-461			
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT VOLTAGE	CONTINUOUS	0	28	40	VDC
	TRANSIENT 100 ms	_	_	80	V
INPUT CURRENT		_	_	0.80	A
DIFFERENTIAL MODE	500 kHz	50	_	_	- dB
NOISE REJECTION	5 MHz	45	_	_	ub ub
COMMON MODE					
NOISE REJECTION	2 MHz - 50 MHz	40	_	_	dB
DC RESISTANCE (R <sub>DC</sub> )	TC = 25°C	_	_	1.50	Ω
OUTPUT VOLTAGE	STEADY STATE	$V_{OUT} = V_{IN} - I_{IN} (R_{DC})$			VDC
OUTPUT CURRENT	STEADY STATE (<100°C CASE)	_	<u> </u>	0.80	A
INTERNAL POWER					
DISSIPATION	MAXIMUM CURRENT	_	_	1.37	l w

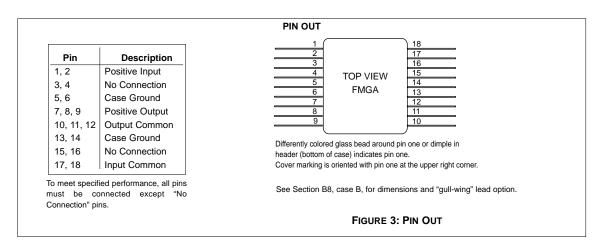




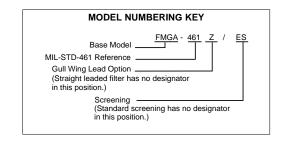
# **EMI INPUT FILTERS**

### FMGA EMI FILTER 0.8 AMP





DSCC NUMBER					
DSCC DRAWING (5915)	FMGA-461 FILTER SIMILAR PART				
IN PROCESS	FMGA-461/883				
For exact specifications for a DSCC product, refer to the DSCC drawing. Call you Interpoint representative for status on the FMGA DSCC models. See Section A3, "SMD/DSCC Lists", for more information.					

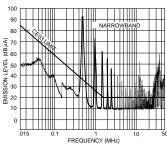




# FMGA EMI FILTER 0.8 AMP

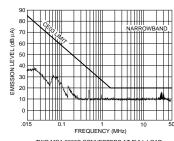
# **EMI INPUT FILTERS**

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



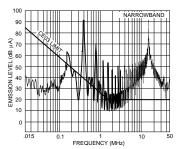
TWO MGA 2805S CONVERTERS AT FULL LOAD WITHOUT FILTERING TYPICAL POWER LINE SPECTRAL NOISE CURRENT

FIGURE 4



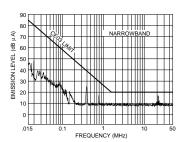
TWO MGA 2805S CONVERTERS AT FULL LOAD WITH FMGA-461 POWER LINE FILTERING TYPICAL POWER LINE SPECTRAL NOISE CURRENT

FIGURE 5



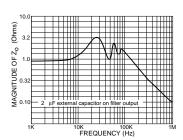
TWO MGH 2805S CONVERTERS AT FULL LOAD WITHOUT FILTERING TYPICAL POWER LINE SPECTRAL NOISE CURRENT

FIGURE 6



TWO MGH 2805S CONVERTERS AT FULL LOAD WITH FMGA-461 POWER LINE FILTERING TYPICAL POWER LINE SPECTRAL NOISE CURRENT

FIGURE 7



Typical Output Impedance (Z) With Input Shorted

FIGURE 8

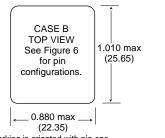
26221-001-DTS RevA DQ# 4011 FMGA-461 is a trademark of Interpoint. © Interpoint 1999

26221-001-DTS Rev A DQ# 4011
All technical information is believed to be accurate, but no responsibility is assumed for errors or omissions. Interpoint reserves the right to make changes in products or specifications without notice. FMGA-461 is a trademark of Interpoint. Copyright © 1998 - 1999 Interpoint. All rights reserved.





Differently colored glass bead around pin one or dimple in header (bottom or side of case) indicates pin one.



Cover marking is oriented with pin one at the upper right corner.

#### Materials

Header Kovar/Nickel/Gold
Cover Kovar/Nickel
Pins Kovar/Nickel/Gold,
matched glass seal

#### Case dimensions in inches (mm)

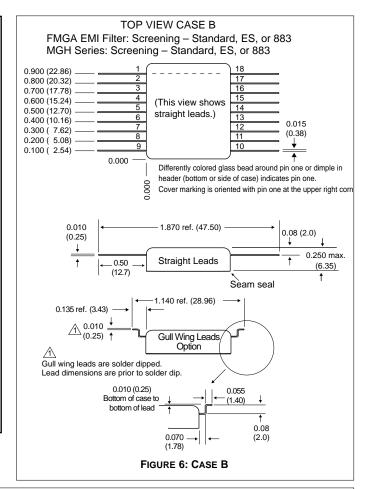
 $\begin{array}{ll} \hbox{Tolerance} & \pm 0.005 \ (0.13) \ \hbox{for three decimal places} \\ & \pm 0.01 \ (0.3) \ \hbox{for two decimal places} \\ & \hbox{unless otherwise specified} \end{array}$ 

#### CAUTION

Maximum reflow temperature is 220°C for a maximum of 30 seconds. SN60, SN62, or SN63 are the recommended types of solder. See below for Solder Mask instructions.

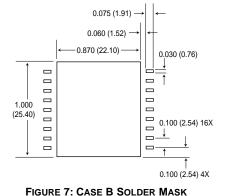
Hand soldering should not exceed 300  $^{\circ}\text{C}$  for 10 seconds per pin.

FIGURE 5: CASE B MAXIMUM DIMENSIONS



#### Solder Mask Notes

- Pad dimensions are for the solder mask opening. Lead common to each other can be connected underneath as desired.
- Ground pins should be connected to the center pad for improved grounding.
- 3. Center pad should not have a solder mask. Solder, copper, or Au/Ni plate are preferred over solder for adhesive attach.
- 4. Solder coat to solder down converter.
- If less rotation of case is desired, make the pad width 0.020inches (0.51 mm). Pad length can be extended 0.010 inches (0.25 mm) towards the case body and as-desired dimension away from the case body.
- Do not exceed 220°C as measured on the body of the converter (top or bottom).
- 7. Attach the body of the case to the board with a thermally conductive adhesive or SN60, 62, or 63 solder. The adhesive can be electrically conductive as well. It can be applied as an underfill post solder or dispensed and cured prior or during solder.



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.



## QA SCREENING 125°C PRODUCTS

# 125°C PRODUCTS

TEST (125°C Products)	STANDARD	/ES	/883 (Class H)*
PRE-CAP INSPECTION			
Method 2017, 2032	yes	yes	yes
TEMPERATURE CYCLE (10 times)			
Method 1010, Cond. C, -65°C to 150°C	no	no	yes
Method 1010, Cond. B, -55°C to 125°C	no	yes	no
CONSTANT ACCELERATION			
Method 2001, 3000 g	no	no	yes
Method 2001, 500 g	no	yes	no
BUBNIN			
BURN-IN			
Method 1015, 160 hours at 125°C	no	no	yes
96 hours at 125°C case (typical)	no	yes	no
FINAL ELECTRICAL TEST MIL-PRF-38534, Group A			
Subgroups 1 through 6: -55°C, +25°C, +125°C	no	no	yes
Subgroups 1 and 4: +25°C case	yes	yes	no
HERMETICITY TESTING			
Fine Leak, Method 1014, Cond. A	no	yes	yes
Gross Leak, Method 1014, Cond. C	no	yes	yes
Gross Leak, Dip (1 x 10 <sup>-3</sup> )	yes	no	no
FINAL VISUAL INSPECTION			
Method 2009	yes	yes	yes
	, 55	, 55	, , , ,

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

#### Applies to the following products

MOR Series	MHD Series	MGH Series	FMGA EMI Filter
MFLHP Series	MHV Series	MCH Series	FMSA EMI Filter
MFL Series	MHF+ Series	FM-704A EMI Filter	HUM Modules**
MHP Series	MHF Series**	FMD**/FME EMI Filter	LCM Modules**
MTR Series	MGA Series	FMC EMI Filter	LIM Modules
MQO Series**	MSA Series	FMH EMI Filter	

<sup>\*\*</sup>MFLHP Series, MQO Series, MHF Series, FMD EMI Filters, Hum Modules, and LCM Modules do not offer '883" screening.



<sup>\*883</sup> products are built with element evaluated components and are 100% tested and guaranteed over the full military temperature range of -55°C to +125°C.