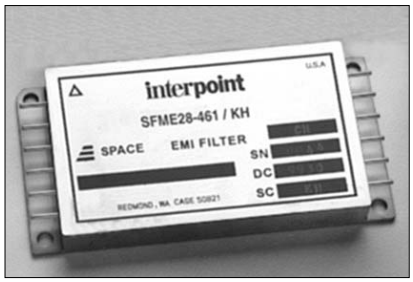
EMI INPUT FILTER 28 VOLT INPUT

SFME28-461 EMI FILTER 10 AMP

FEATURES

- **Fully qualified to Class H or K**
- **Passive components for maximum tolerance in space environments**
- **–55° to +125°C operation**
- 60 dB minimum attenuation at 500 kHz and 1 MHz
- Compliant to MIL-STD-461C, CE03 and MIL-STD-461D, CE102
- Compatible with MIL-STD-704 A-E
- Meets MIL-STD-975M with temperature limitations



INPUT VOLTAGE AND CURRENT	
Input (V)	Current (A)
28	10

Size (max.): 3.005 x 1.505 x 0.400 inches (76.33 x 38.23 x 10.16mm)
See cases “U Maximum Dimensions” and “U for dimensions.
Weight: 86 grams maximum
Screening: Space Prototype, Class H, or Class K
Radiation: Designed with passive components providing maximum tolerance for space environment requirements.
See “QA Screening: Class H and K, QML” for more information.
Available configurations: OH, HH, or KH

DESCRIPTION

The SFME28-461™ Series EMI filter modules are specifically designed to reduce the reflected input ripple current or ripple voltage of high frequency DC/DC converters. SFME28-461 filters minimize electromagnetic interference (EMI) for Interpoint’s space applications converters. These filters are intended for use in 28 volt applications which must meet MIL-STD-461 levels of conducted emissions. One filter can be used with multiple converters up to the rated output current of the filter.

INPUT RIPPLE AND EMI

Switching DC/DC converters naturally generate two noise components on the power input line: differential noise and common mode noise. Input ripple current refers to both of these components.

Differential noise occurs between the positive input and input common. Most Interpoint converters have an input filter that reduces differential noise which is sufficient for most applications.

Common mode noise occurs across stray capacitances between the converter’s power train components and the baseplate (bottom of the package) of the converter.

Where low conducted noise currents or voltages are required to meet CE03 of MIL-STD-461C or CE102 of MIL-STD-461D, a power line filter is needed. The SFME28-461 Series of EMI power line filters reduces the common mode and differential noise generated by the converters. SFME28-461 filters reduce input ripple current by a minimum of 60 dB at 500 kHz and 1 MHz when used in conjunction with Interpoint’s DC/DC converters.
The filter must be placed as close as possible to the converter for optimum performance. The baseplates of the filter and the converter should be connected with the shortest and widest possible conductors. For the best connection, mount the filter’s and converter’s baseplates on or above a small ground plane.

OPERATION OVER TEMPERATURE

All SFME28-461 Series filters are rated for full power operation from –55°C to +125°C case temperature. Current is derated linearly to zero at +135°C case temperature.

INSERTION LOSS

The maximum dc insertion loss at full load and nominal input voltage represents a power loss of less than 4%.

PACKAGING

SFME28-461filters are sealed in metal hermetic side-leaded packages.

CRANE AEROSPACE & ELECTRONICS

Contact Information Interpoint, a Crane Co. Company
PO Box 97005 • Redmond WA 98073-9705
425-895-4053 • electronics@craneae.com
www.craneae.com/power

ABSOLUTE MAXIMUM RATINGS

Input Voltage
- 0 to 50 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
- 0 to 50 VDC continuous for 28 V models

Case Operating Temperature (Tc)
- –55°C to +125°C full power
- -55°C to +135°C absolute

Derating DC Input/Output current
- Linearly from 100% at 125°C to 0% at 135°C

TYPICAL CHARACTERISTICS

Capacitance
- 0.060 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.

		SFME28-461			
PARAMETER	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNITS**
INPUT VOLTAGE	CONTINUOUS	0	28	50	VDC
	TRANSIENT 100 MS[1,2]	-100	—	100	
NOISE REJECTION	500 kHz	60	70	—	dB
	1 MHz	60	70	—	
DC RESISTANCE (R_{DC})	AT MAXIMUM CURRENT Tc = 25°C	—	—	0.07	Ω
	Tc = -55 TO 125°C[1]	—	—	0.10	
OUTPUT VOLTAGE	STEADY STATE	$V_{OUT} = V_{IN} - I_{IN} (R_{DC})$			VDC
OUTPUT CURRENT[1]	STEADY STATE	_	_	10	A
POWER DISSIPATION[1]	AT MAXIMUM CURRENT Tc = 25°C	—	—	8.5	W
	Tc = 125°C	—	—	11	

Notes:
1. Guaranteed by design, not tested.
2. 28 V models = 0.5 Ω source impedance.

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EMI INPUT FILTER

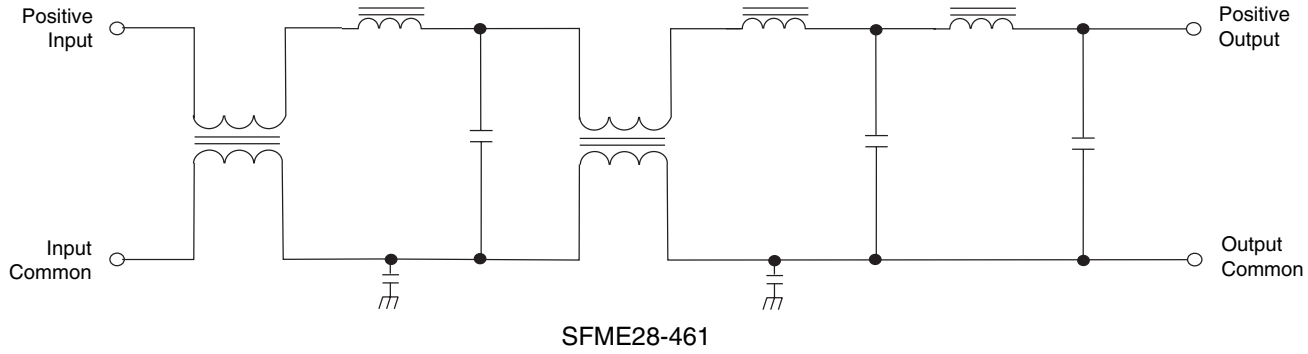
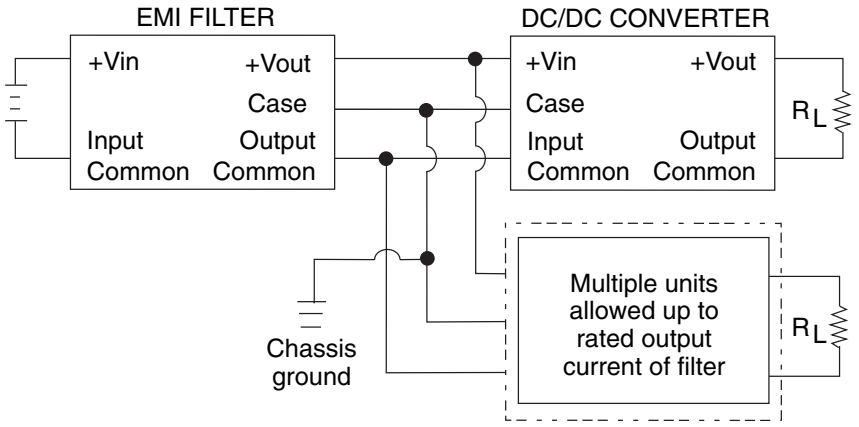


FIGURE 1: SCHEMATIC



The case ground connection between the filter and the converter should be as low an impedance as possible to minimize EMI. Direct contact of baseplate to chassis ground provides the lowest impedance.

FIGURE 2: CONNECTION DIAGRAM

PIN OUT

Pin[1]	Designation
1, 2, 3	Positive Input
4, 5, 6	Input Common
7, 8, 9	Output Common
10, 11, 12	Positive Output
—	Case Ground[2]

Notes
1. All pins must be connected.
2. The baseplate is the only case ground connection and should directly contact chassis ground.

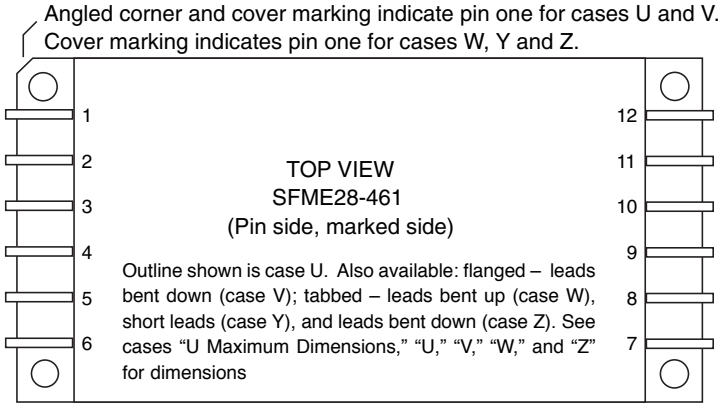


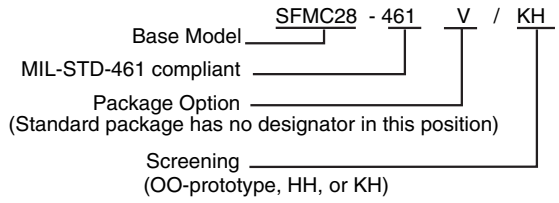
FIGURE 3: PIN OUT

DSCC NUMBERS

DSCC DRAWING (5915)	SFME28-461 SERIES SIMILAR PART
95004-02HXC	SFME28-461/HH
95004-02HTC	SFME28-461W/HH
95004-02HUC	SFME28-461V/HH
95004-02HYC	SFME28-461Y/HH
95004-02HZC	SFME28-461Z/HH

The SMD number shown is for Class H screening. See the SMD for the numbers for Class K screening. For exact specifications for an SMD product, refer to the SMD drawing. SMDs can be downloaded from http://www.dscc.dla.mil/programs/smcr

MODEL NUMBERING KEY



Package Option: See cases "U Maximum Dimensions," "U," "V," "W," and "Z" for dimensions. Standard package (case U) has no designator in this position.

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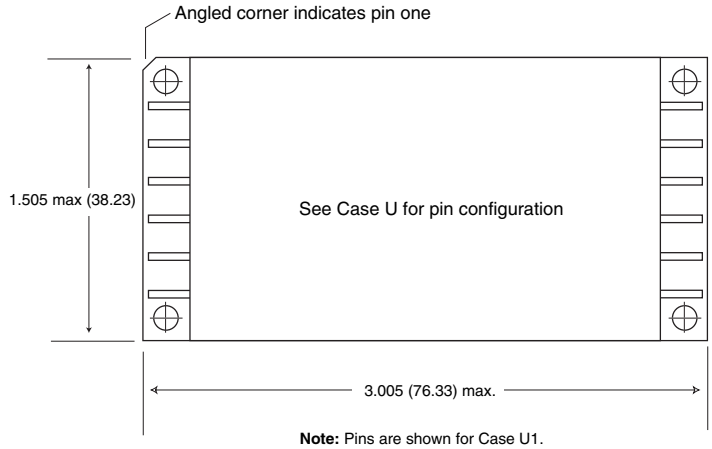
CASES

CASE U MAXIMUM DIMENSIONS
TOP VIEW (PIN SIDE)



Note: Pins are shown for Case U1.

Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold
	compression glass seal

Case dimensions in inches (mm)

Tolerance	±0.005 (0.13) for three decimal places
	±0.01 (0.2) 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

Case U maximum dimensions, Rev B, September 27 2005
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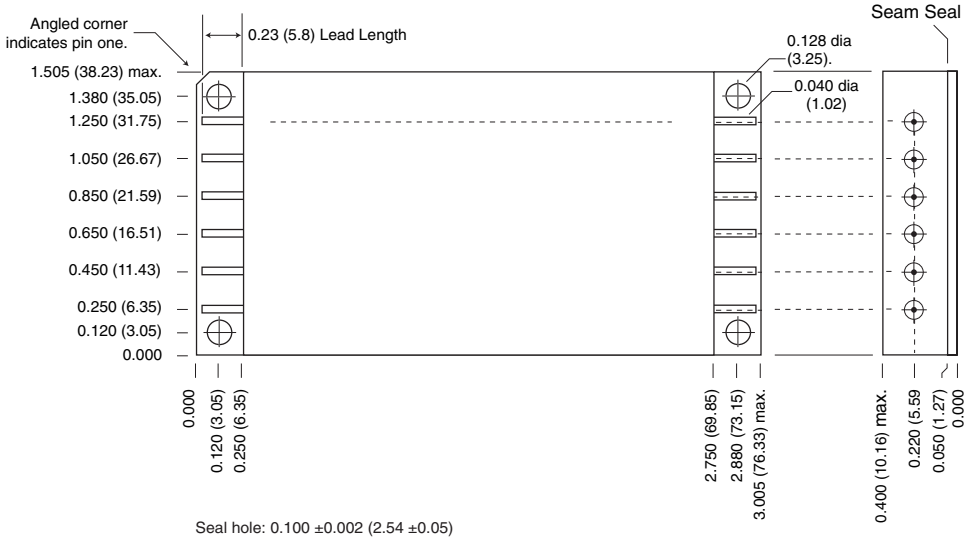
CRANE AEROSPACE & ELECTRONICS

CASES

TOP VIEW CASE U

MOR Series, MFL Series, MHP Series, MFLHP Series,
FMTR Series. SMFL Series, SMFLHP Series, SMHP Series,
FME EMI Filter, FMD270 EMI Filter, SFCS EMI Filter,
SFME EMI Filter, HUM70 Module, and LCM Module



Seal hole: 0.100 ±0.002 (2.54 ±0.05)

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

Case U, Rev B, September 27, 2005
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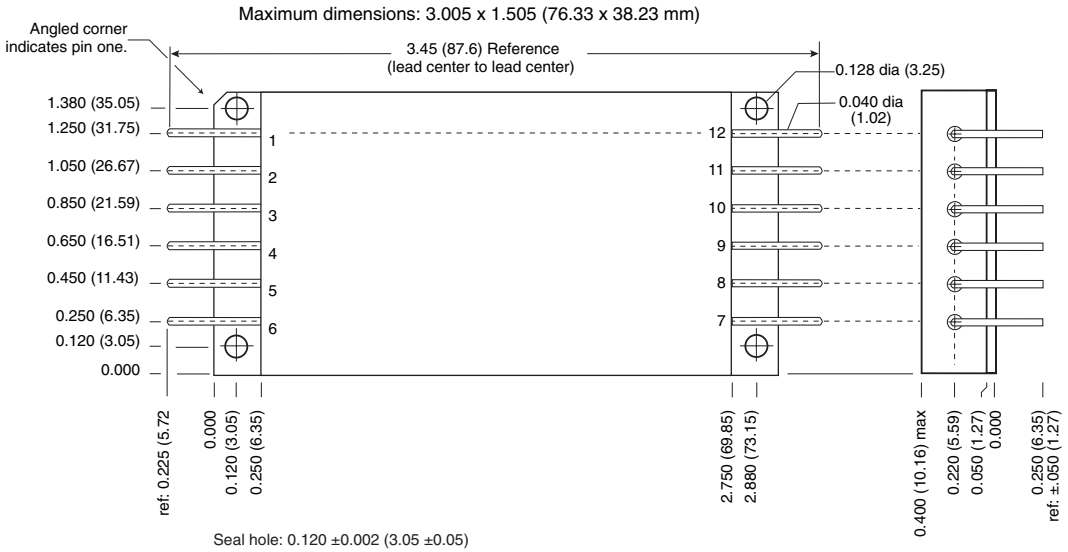
CASES

TOP VIEW CASE V*
Flanged case, down leaded

MOR Series, FME EMI Filters
Also available in U, W, Y, and Z cases

*Requires case option designator added to model number: MOR2805S**V**



Seal hole: 0.120 ±0.002 (3.05 ±0.05)

Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold compression glass seal

Case dimensions in inches (mm)

Tolerance	±0.005 (0.13) for three decimal places ±0.01 (0.2) 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.

Case V, Rev B, September 27, 2005
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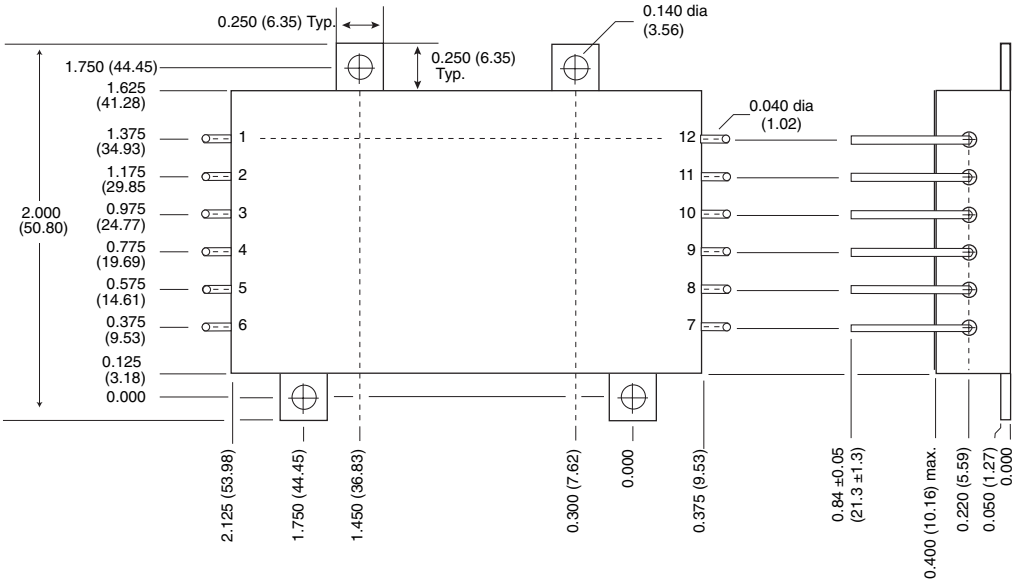
CASES

TOP VIEW CASE W*
(Tabbed case, up-leaded)

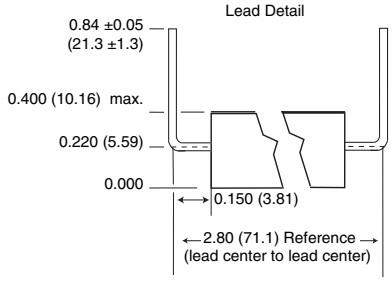
MOR Series and FME EMI Filters
Also available in U2, V, Y, and Z cases

*Requires case option designator added to model number: MOR2805S**W**



Seal hole: 0.120 ±0.002 (3.05 ±0.05)

Lead Detail



Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold
	compression glass seal

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.2) 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.

Case W, Rev B, September 27, 2005
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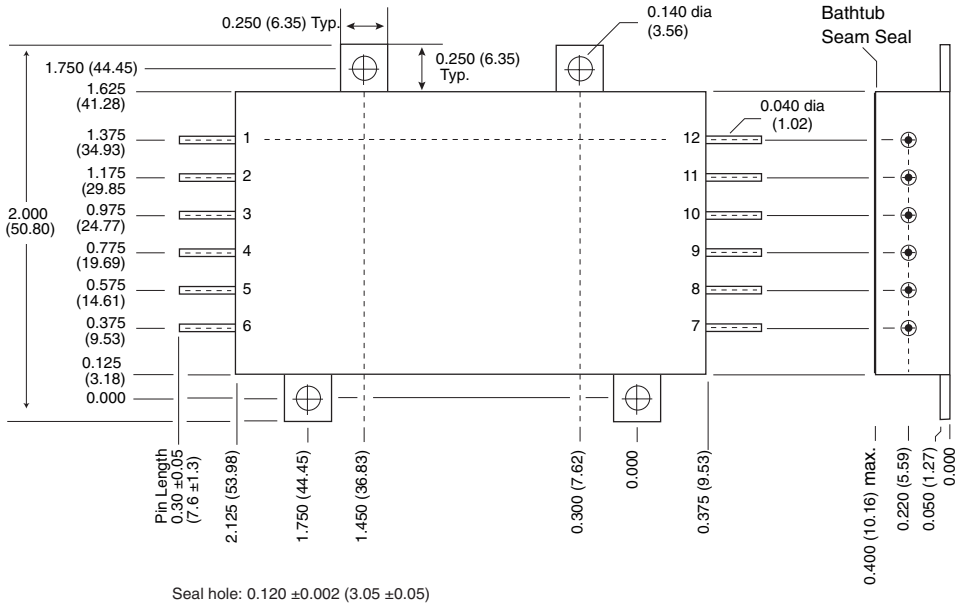
CASES

TOP VIEW CASE Y*
(Tabbed case, straight leads)

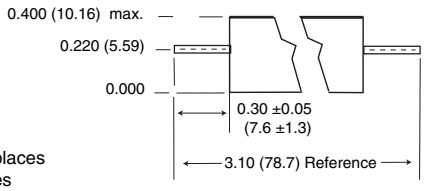
MOR Series and FME EMI Filters
Also available in U, V, W, and Z cases

*Requires case option designator added to model number: MOR2805S**Y**



Seal hole: 0.120 ±0.002 (3.05 ±0.05)

Lead Detail



Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold compression glass seal

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.2) 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.

Case Y, Rev B, September 27, 2005
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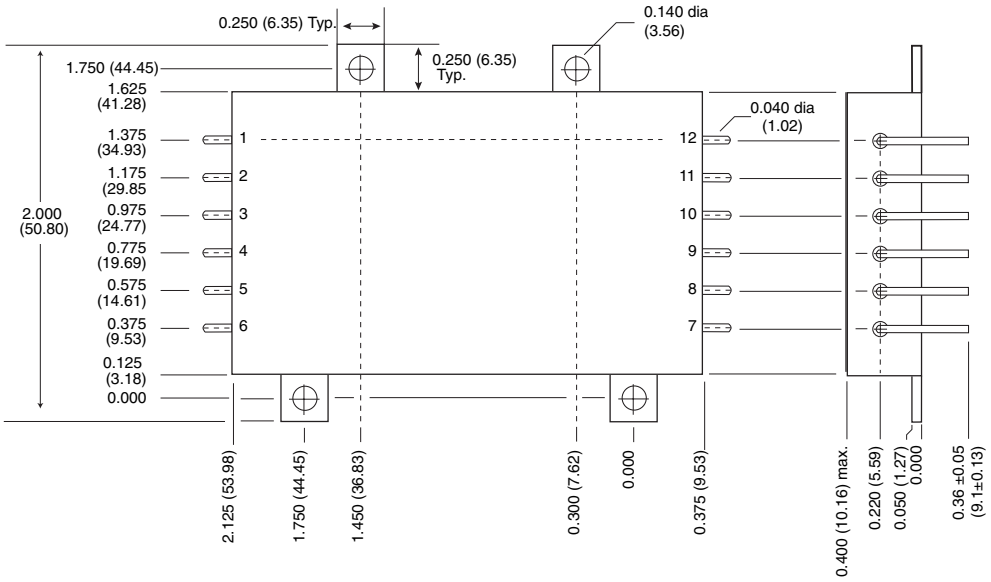
CASES

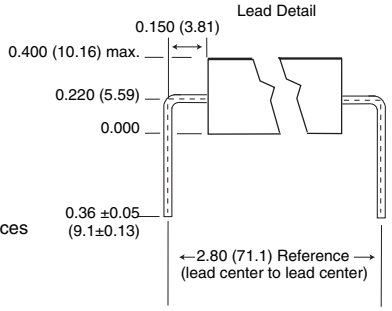
TOP VIEW CASE Z*
(Tabbed case, down-leaded)
MOR Series and FME EMI Filters
Also available in U, V, Y, and W cases

*Requires case option designator added to model number: MOR2805S**Z**



Seal hole: 0.120 ±0.002 (3.05 ±0.05)

Lead Detail



Materials

Header	Cold Rolled Steel/Nickel/Gold
Cover	Kovar/Nickel
Pins	#52 alloy/Gold compression glass seal

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.2) 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.

Case Z, Rev B, September 27, 2005
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QUALITY ASSURANCE

CLASS H, QML SCREENING

TEST	125°C STANDARD non-QML	125°C /ES non-QML	Class H /883 QML
Pre-cap Inspection			
Method 2017, 2032	yes	yes	yes
Temperature Cycle (10 times)			
Method 1010, Cond. C, -65°C to 150°C, ambient	no	no	yes
Method 1010, Cond. B, -55°C to 125°C, ambient	no	yes	no
Constant Acceleration			
Method 2001, 300 g	no	no	yes
Method 2001, 500g	no	yes	no
Burn-In			
Method 1015, 160 hours at 125°C case, typical	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 case	no	no	yes
Subgroups 1 and 4: +25°C case	yes	yes	no
Hermeticity Test			
Fine Leak, Method 1014, Cond. A	no	yes	yes
Gross Leak, Method 1014, Cond. C	no	yes	yes
Gross Leak, Dip (1 x 10^{-3})	yes	no	no
Final Visual Inspection			
Method 2009	yes	yes	yes

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

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QA Screening Class H, QML Rev B September 30, 2005. This revision supercedes all previous releases. 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.
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