

## FEATURES

- -55°C to +85°C operation
- 4 to 8 VDC input
- Fully isolated
- Opto-coupler feedback
- Fixed frequency, 210 kHz typ.
- Inhibit function
- Indefinite short circuit protection
- Up to 80% efficiency

# DC/DC CONVERTERS 5 VOLT INPUT



## MHL SERIES 15 WATT

### MODELS VDC OUTPUT

DUAL  
±12  
±15

Size (max.): Non-flanged, case F4

1.950 x 1.350 x 0.505 inches (49.53 x 34.29 x 12.83 mm)

Flanged, case J5

2.720 x 1.350 x 0.505 inches (69.09 x 34.29 x 12.83 mm)

See Section B8, cases F4 and J5, for dimensions.

Weight: 57 grams typical

Screening: Standard or ES. See Section C2 for screening options, see Section A5 for ordering information.

## DESCRIPTION

The MHL Series™ of DC/DC converters offers either ±12 or ±15 volt outputs in a single package. MHL converters offer the high efficiency and wide input range of switching regulators with excellent load and line regulation. Input and output grounds are isolated from one another and from case ground. No external components are required for operation. The units are built using thick-film hybrid technology and are sealed in metal packages for military, aerospace, and other high-reliability applications. Unscreened models are sealed with solder and are guaranteed to pass a gross leak test (maximum leak rate of  $1 \times 10^{-3}$  atm.-cc/sec). Environmentally screened models (/ES) are hermetically sealed with solder and will pass a fine leak and gross leak test as described in Section C2.

The MHL converters employ pulse-width modulated switching regulator techniques in the forward mode, with a nominal clock frequency of 210 kHz. Isolation is achieved through the use of a transformer in the forward power circuit and an opto-coupler in the feedback/control loop. The full load output power (15 watts) is available over the input range of 4 to 8 VDC. Up to 14.3 watts can be obtained from a single output up to a combined load of 15 watts.

The efficiency is high over the entire input voltage range and from approximately 25% of full load to full load. This feature makes the converters ideal for either battery or aircraft power applications.

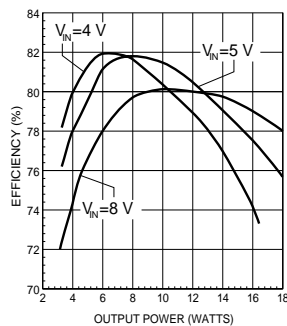
An inhibit function is provided to allow power shut-down and start-up from a logic input. An open circuit on the inhibit terminal produces normal operation, and a low level disables the converter. Input current in the inhibit mode is typically 20 mA. The converter features a "soft-start" function which provides a controlled 20 millisecond turn-on upon application of input power or inhibit release.

An input filter is incorporated in the unit to reduce input reflected ripple current. Both outputs are indefinitely protected against short circuits to ground or to one another by automatic current limiting circuitry. This feature adjusts the converter's output current, indefinitely maintaining it below approximately 125% of the rated maximum during a full short circuit condition.

The MHL Series of converters is rated to operate at full load at a case temperature of 85°C, with the output power derated linearly to zero at 115°C (0.5W/°C). Because of the unit's high efficiency, heat sinking requirements are minimized, but due consideration should be given to removing self-generated heat when operating the device at maximum ratings. To increase dissipation, heat conducting material (PCB, copper sheet, heat sink, or Interpoint's TMP accessory) should be brought into contact with the converter's baseplate.

When the MHL is used in applications requiring full-power operation for extended periods of time, or in shock and vibration environments, it is highly recommended that the flange-mount case option be used. This option provides improved thermal transfer capabilities as well as mechanically secure mounting configuration.

Typical Performance Curve



MHL0515D Efficiency  
FIGURE 1

CRANE

interpoint

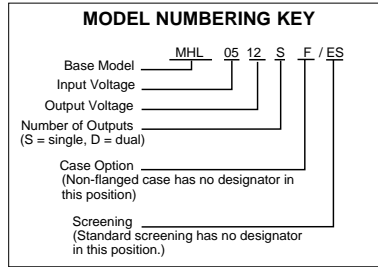
A CRANE CO. COMPANY

# MHL SERIES 15 WATT

# DC/DC CONVERTERS

ABSOLUTE MAXIMUM RATINGS	
Input Voltage	• 4 to 8 VDC
Output Power	• 15 watts
Lead Soldering Temperature (10 sec per lead)	• 300°C
Storage Temperature Range (Case)	• -55°C to +125°C

RECOMMENDED OPERATING CONDITIONS	
Input Voltage Range	• 4 to 8 VDC continuous
Case Operating Temperature (Tc)	• -55°C to +85°C full power • -55°C to +115°C absolute
Derating Output Power/Current	• Linearly from 100% at 85°C to 0% at 115°C



INHIBIT	
Inhibit TTL Open Collector	• Logic low (output disabled) • Referenced to input common • Logic high (output enabled) Open collector

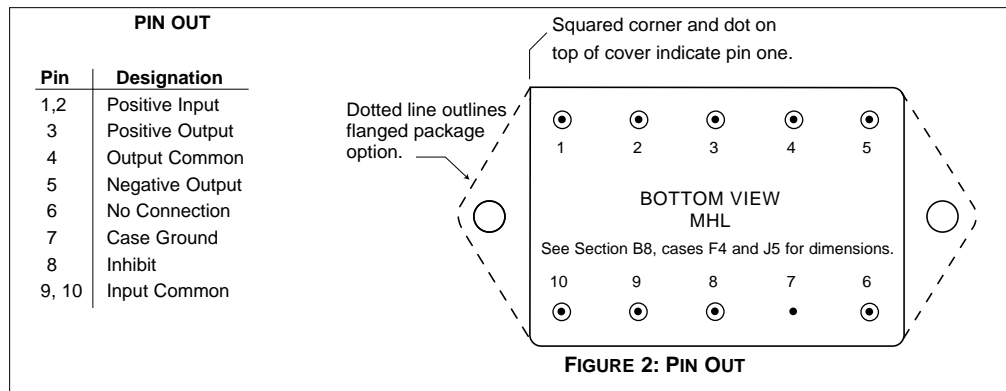
TYPICAL CHARACTERISTICS	
Output Voltage Temperature Coefficient	• 150 ppm/°C, typical
Input to Output Capacitance	• 80 pF typical
Isolation	• 100 megohm minimum at 500 V
Conversion Frequency	• 210 kHz, typical

Electrical Characteristics: 25°C Tc, 5 VDC Vin, 100% load, unless otherwise specified.

PARAMETER	CONDITIONS	MHL0512D			MHL0515D			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+V <sub>OUT</sub>	11.88	12.00	12.12	14.85	15.00	15.15	VDC
	-V <sub>OUT</sub>	11.88	12.00	12.12	±14.85	15.00	15.15	
OUTPUT CURRENT <sup>1</sup>		—	—	1.25	—	—	1.00	A
OUTPUT POWER <sup>1</sup>	Tc = -55°C TO +85°C	—	—	15.0	—	—	15.0	W
OUTPUT RIPPLE	BW = 1 MHz	—	40	100	—	40	120	mV p-p
LINE REGULATION 4 TO 8 V <sub>IN</sub>	+V <sub>OUT</sub>	—	0.05	0.10	—	0.05	0.10	%
	-V <sub>OUT</sub>	—	0.05	0.15	—	0.05	0.15	
LOAD REGULATION NO LOAD TO FULL	+V <sub>OUT</sub>	—	0.05	0.15	—	0.03	0.10	%
	-V <sub>OUT</sub>	—	0.25	0.50	—	0.20	0.40	
CROSS REGULATION <sup>2</sup>	+V <sub>OUT</sub>	—	2.2	3.5	—	1.9	3.0	%
	-V <sub>OUT</sub>	—	2.2	3.5	—	1.9	3.0	
INPUT VOLTAGE	Tc = -55°C TO +85°C	4	5	8	4	5	8	VDC
INPUT CURRENT	NO LOAD	—	120	150	—	140	180	mA
	FULL LOAD	—	—	4500	—	—	4500	
	INHIBITED	—	20	—	—	20	—	
INPUT RIPPLE CURRENT		—	50	120	—	70	150	mA p-p
EFFICIENCY	FULL LOAD	—	78	—	—	78	—	%

## Notes

- 95% of the maximum current or power is available from either output. The total of both outputs must not exceed the maximum specification.
- The effect on the positive output when it is held at 50 mA while the negative output is varied from 50 to 950 mA. The effect on the negative output when it is held at 50 mA while the positive output is varied from 50 to 950 mA.

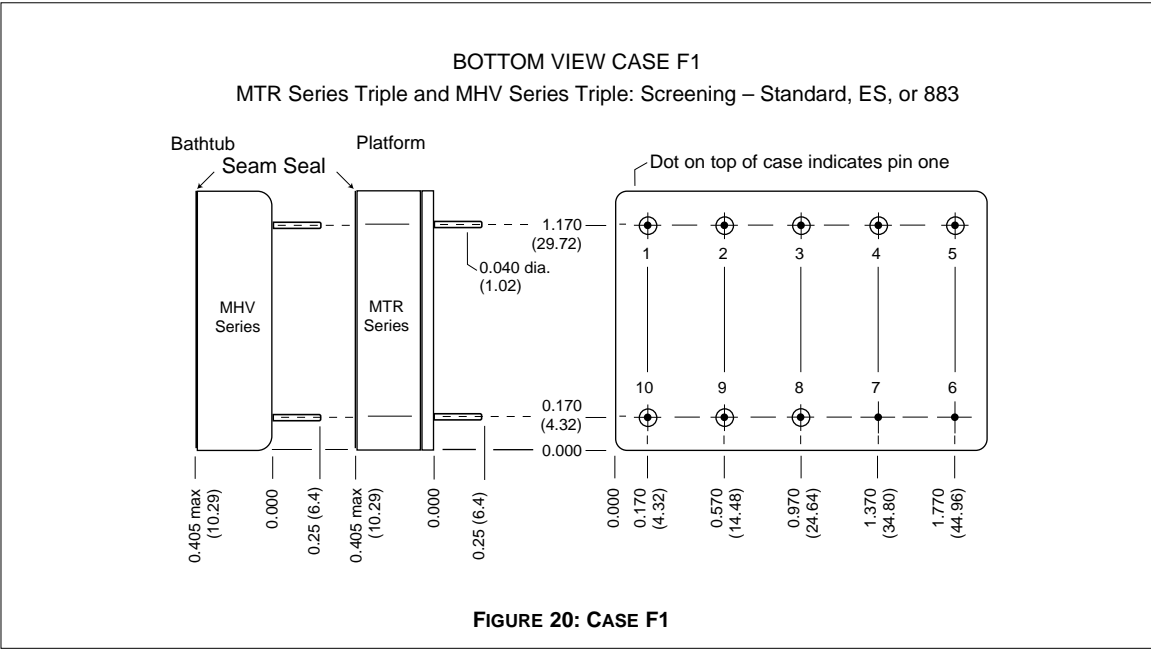
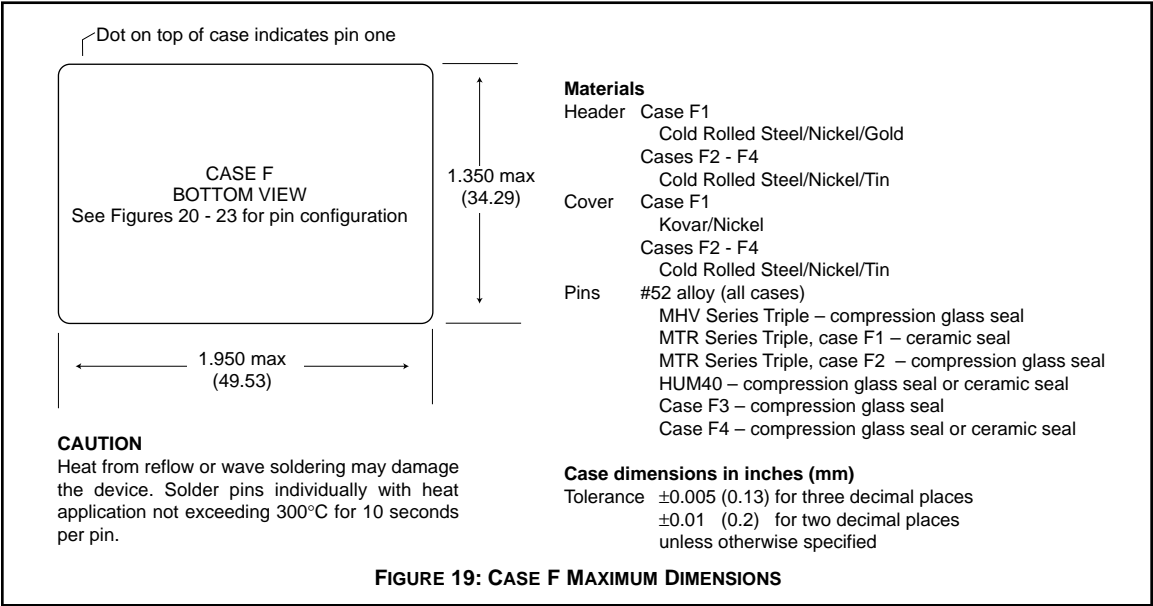


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CASE F

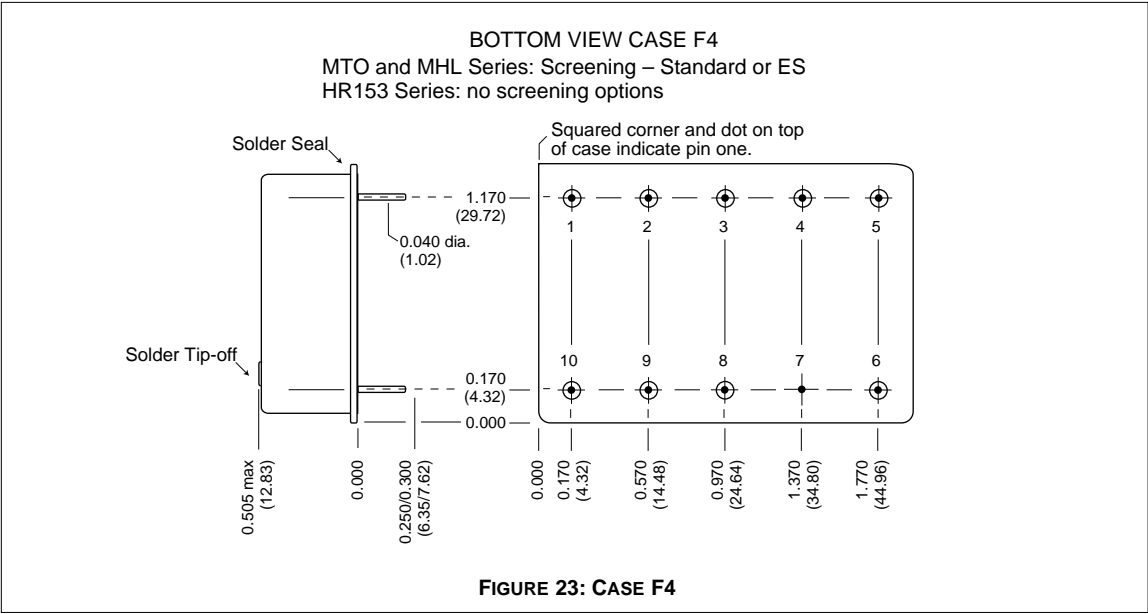
CASES



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.

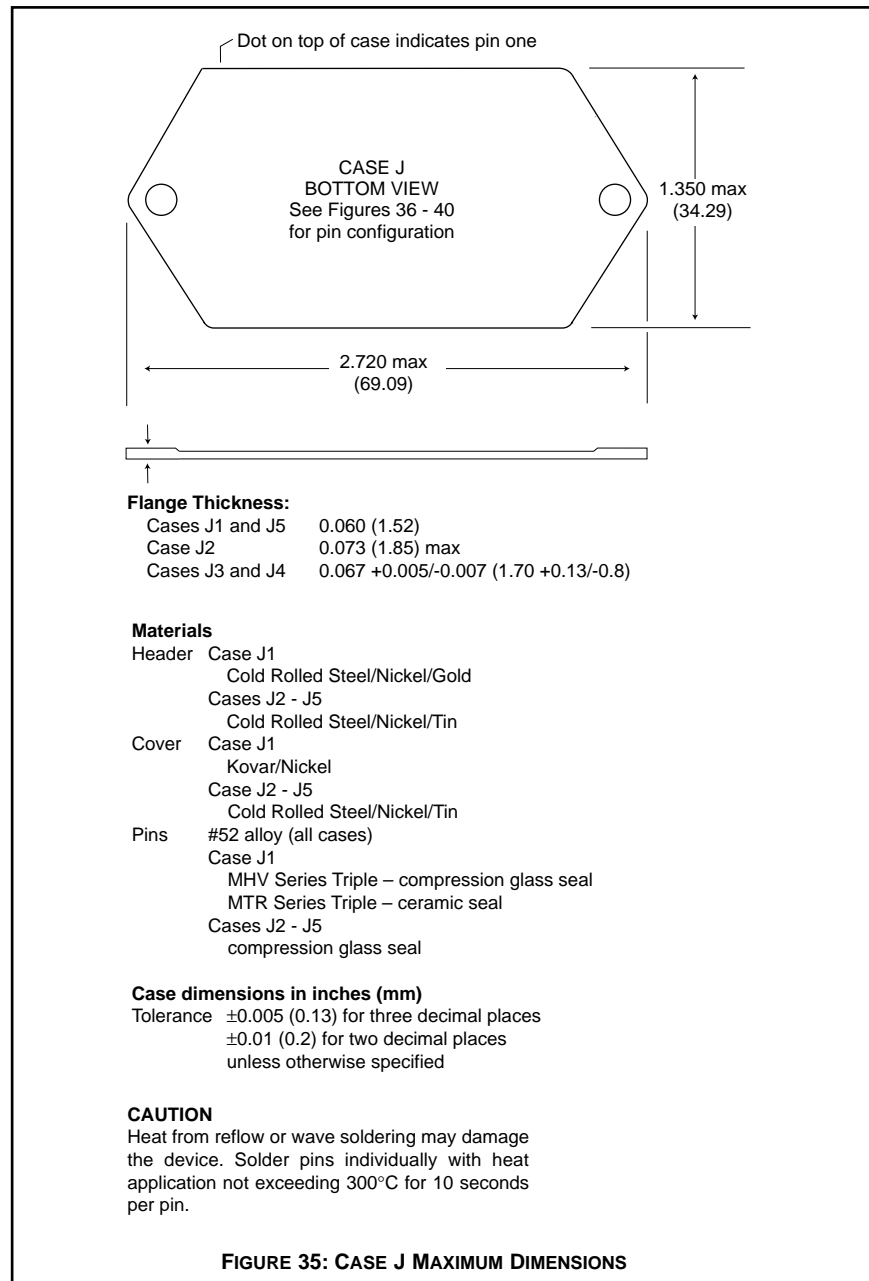
CASE F

CASES



## CASE J

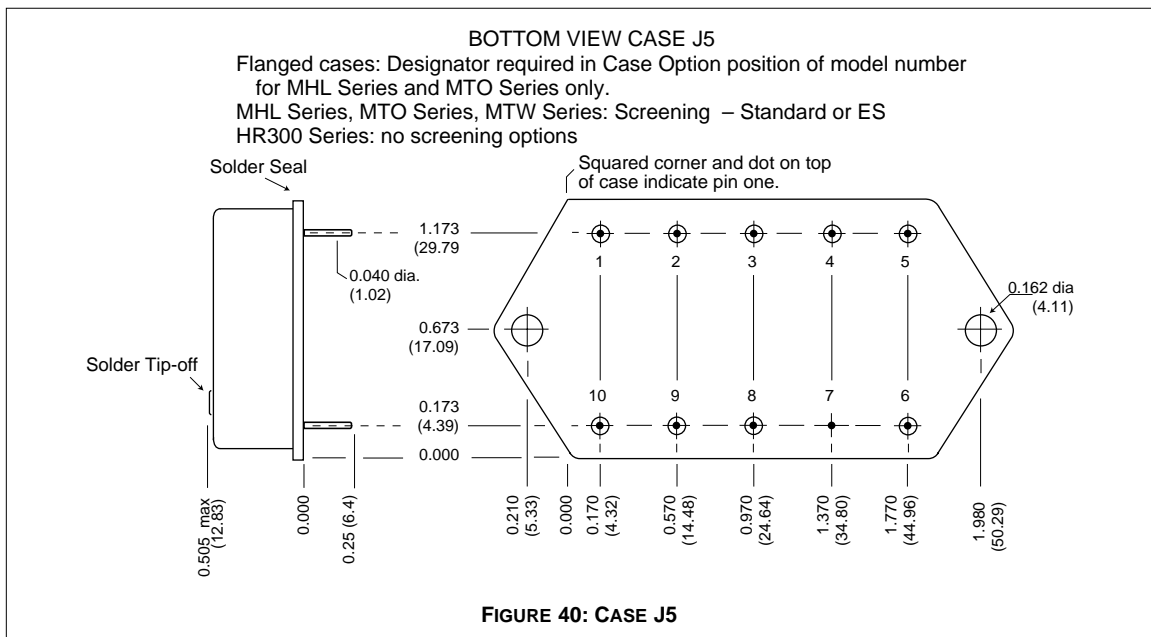
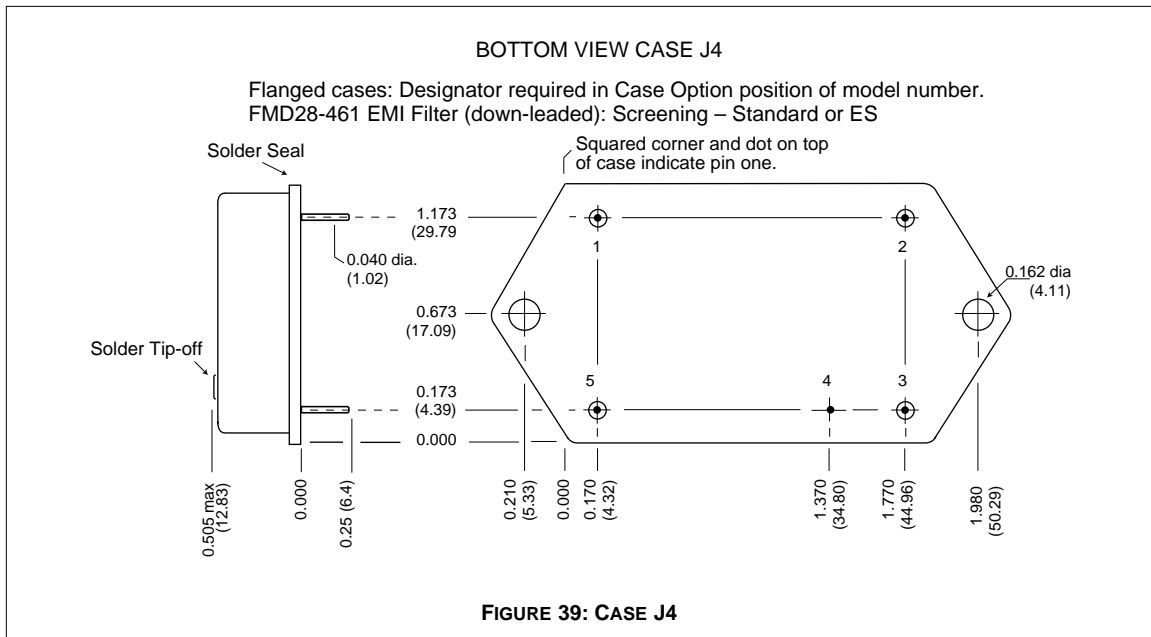
## CASES



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# CASES

## CASE J



## QA SCREENING 85°C PRODUCTS

### 85°C PRODUCTS

TEST (85°C Products excluding HR products)	STANDARD	/ES
PRE-CAP INSPECTION		
Method 2017	yes	yes
TEMPERATURE CYCLE (10 times)		
Method 1010, Cond. B, -55°C to 125°C	no	yes
CONSTANT ACCELERATION		
Method 2001, 500 g	no	yes
BURN-IN		
96 hours at 70°C ambient (typical)	no	yes
FINAL ELECTRICAL TEST MIL-PRF-38534, Group A		
Subgroups 1 and 4: +25°C case	yes	yes
HERMETICITY TESTING		
Fine Leak, Method 1014, Cond. A	no	yes
Gross Leak, Method 1014, Cond. C	no	yes
Gross Leak, Dip (1 x 10 <sup>-3</sup> )	yes	no
FINAL VISUAL INSPECTION		
Method 2009	yes	yes

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

Applies to the following products:

MFW Series  
 MTW Series  
 MHE/MLP Series  
 MHL Series  
 MRH Series  
 MTO Series  
 MSR Series  
 DCH Series  
 FM/FMA/FMB EMI Filters  
 MSF EMI Filter