

## FEATURES

- -55°C to +85° C operation
- 9 to 16 or 16 to 36 VDC input
- Fully isolated
- Opto-coupler feedback
- Fixed frequency, 250 kHz typical
- Topology – Push-Pull Forward
- 50 V for 50 ms transient protection
- Inhibit function
- Indefinite short circuit protection
- Up to 79% efficiency

# DC/DC CONVERTERS 12 & 28 VOLT INPUT



## MTO SERIES 15 WATT

| MODELS     |
|------------|
| VDC OUTPUT |
| TRIPLE     |
| +5 & ±12   |
| +5 & ±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: 53 grams typical

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

## DESCRIPTION

Interpoint's MTO Series™ of DC/DC converters delivers 15 watts of output power with three output voltages and a choice of two input voltage ranges. The MTO Series converters are packaged in hermetically sealed metal cases and operate at full load over a case temperature range of -55°C to +85°C (measured at the base plate of the converter).

### CONVERTER DESIGN

The push-pull forward topology coupled with pulse-width modulation minimizes output noise and maintains good regulation. Nominal switching frequency is 250 kHz. Although an internal input filter reduces input ripple current, for applications requiring conformance to MIL-STD-461C, CE03, use the MTO in conjunction with Interpoint's FM-461 EMI filter.

Operating at maximum ratings may require removing self-generated heat. To increase heat dissipation, heat conducting material can be used in contact with the converter's base plate. Interpoint's Thermal Mounting Pad (TMP), model TMP-002, is designed for use with the MTO converter.

## FEATURES

An inhibit terminal, pin 8, provides shut-down and start-up control. Applying a logic low (<0.8 V) will disable the output of the converter reducing input current to 8 mA, typical. Leaving the terminal unconnected or connecting it to  $V_{in}$  will enable the converter. The inhibit pin has an open circuit voltage of approximately 10 volts.

Soft-start provides a controlled 20 milliseconds turn-on to minimize inrush current and reduce overshoot at initial start-up or when inhibit is released.

Internal current limiting circuitry protects all three outputs against short circuits. When output power exceeds approximately 125% of maximum output power, the output currents are limited. In addition, separate current limiting circuitry protects each output individually.

## PACKAGING

MTO converters are packaged in hermetically sealed metal cases. The cases are constructed of cold-rolled steel with a fused tin finish. MTO converters can be purchased in a flanged or non-flanged case. The flanged option provides increased heat dissipation and also provides greater stability when mechanically secured.

**CRANE**

**interpoint**  
A CRANE CO. COMPANY

# MTO SERIES 15 WATT

# DC/DC CONVERTERS

**ABSOLUTE MAXIMUM RATINGS**

**Output Power**

- 15 watts

**Lead Soldering Temperature (10 sec per lead)**

- 300°C

**Storage Temperature Range (Case)**

- -65°C to +125°C

**INHIBIT**

**Inhibit TTL Open Collector**

- Logic low (output disabled)  
V = <0.8 V  
Inhibit pin current < 2.0 mA
- Referenced to input common
- Logic high (output enabled)  
Unconnected or connected to Vin

**TYPICAL CHARACTERISTICS**

**Output Voltage Temperature Coefficient**

- 150 ppm/°C typical

**Input to Output Capacitance**

- 80 pF typical

**Current Limit**

- 125% of full load typical

**Isolation**

- 100 megohm minimum at 500 V

**Conversion Frequency**

- 250 kHz typical

**Inhibit Pin Voltage (unit enabled)**

- 10 V typical

**RECOMMENDED OPERATING CONDITIONS**

**Input Voltage Range**

- MTO12XXT 9 to 16 VDC continuous
- MTO28XXT 16 to 36 VDC continuous
- MTO12XXT 25 V for 50 msec transient
- MTO28XXT 50 V for 50 msec transient

**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

**Electrical Characteristics: 25°C Tc, 28 VDC Vin (12 VDC for 12V models), 100% load, unless otherwise specified.**

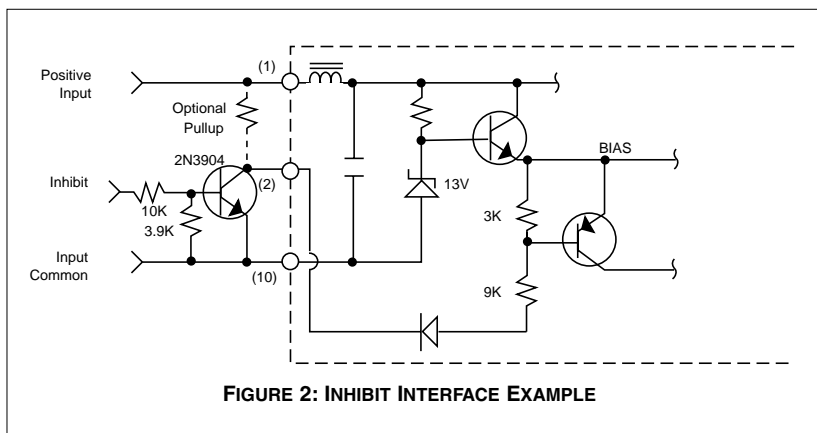
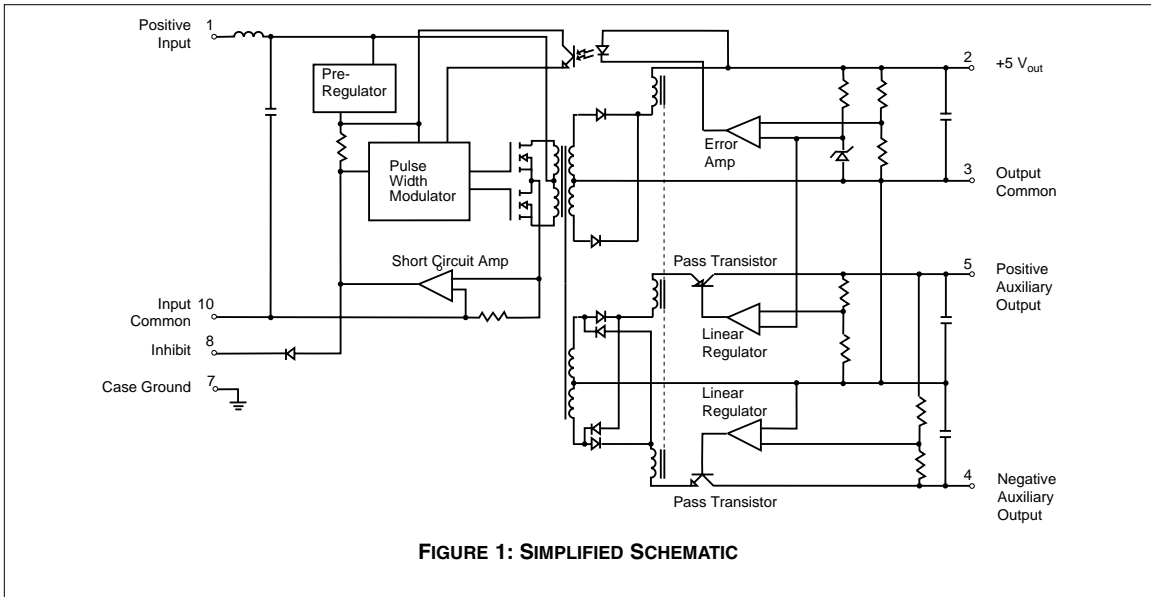
| PARAMETER                             | CONDITION         | MTO1212T |      |       | MTO1215T |      |       | MTO2812T |      |       | MTO2815T |      |       | UNITS  |
|---------------------------------------|-------------------|----------|------|-------|----------|------|-------|----------|------|-------|----------|------|-------|--------|
|                                       |                   | MIN      | TYP  | MAX   | MIN      | TYP  | MAX   | MIN      | TYP  | MAX   | MIN      | TYP  | MAX   |        |
| OUTPUT VOLTAGE                        | MAIN              | 4.95     | 5.0  | 5.05  | 4.95     | 5.0  | 5.05  | 4.95     | 5.0  | 5.05  | 4.95     | 5.0  | 5.05  | VDC    |
|                                       | + AUXILIARY       | 11.88    | 12.0 | 12.12 | 14.85    | 15.0 | 15.15 | 11.88    | 12.0 | 12.12 | 14.85    | 15.0 | 15.15 |        |
|                                       | - AUXILIARY       | 11.88    | 12.0 | 12.12 | 14.85    | 15.0 | 15.15 | 11.88    | 12.0 | 12.12 | 14.85    | 15.0 | 15.15 |        |
| OUTPUT CURRENT                        | MAIN <sup>1</sup> | 100      | —    | 2000  | 100      | —    | 2000  | 100      | —    | 2000  | 100      | —    | 2000  | mA     |
|                                       | AUXILIARY         | —        | —    | ±208  | —        | —    | ±167  | —        | —    | ±208  | —        | —    | ±167  |        |
| OUTPUT POWER                          | MAIN              | —        | —    | 10.0  | —        | —    | 10.0  | —        | —    | 10.0  | —        | —    | 10.0  | W      |
|                                       | + AUXILIARY       | —        | —    | 2.5   | —        | —    | 2.5   | —        | —    | 2.5   | —        | —    | 2.5   |        |
|                                       | - AUXILIARY       | —        | —    | 2.5   | —        | —    | 2.5   | —        | —    | 2.5   | —        | —    | 2.5   |        |
|                                       | TOTAL             | —        | —    | 15    | —        | —    | 15    | —        | —    | 15    | —        | —    | 15    |        |
| OUTPUT RIPPLE VOLTAGE, BW = 1 MHz     | MAIN              | —        | —    | 80    | —        | —    | 80    | —        | —    | 80    | —        | —    | 80    | mV p-p |
|                                       | ± AUXILIARY       | —        | —    | 30    | —        | —    | 30    | —        | —    | 30    | —        | —    | 30    |        |
| LINE REGULATION<br>Vin = MIN. TO MAX. | MAIN              | —        | 5    | 10    | —        | 5    | 10    | —        | 5    | 10    | —        | 5    | 10    | mV     |
|                                       | ±AUXILIARY        | —        | 30   | 48    | —        | 30   | 60    | —        | 30   | 48    | —        | 30   | 60    |        |
| LOAD REGULATION<br>NO LOAD TO FULL    | MAIN              | —        | 10   | 20    | —        | 10   | 20    | —        | 10   | 20    | —        | 10   | 20    | mV     |
|                                       | ± AUXILIARY       | —        | 30   | 48    | —        | 30   | 60    | —        | 30   | 48    | —        | 30   | 60    |        |
| INPUT VOLTAGE                         | CONTINUOUS        | 9        | 12   | 16    | 9        | 12   | 16    | 16       | 28   | 36    | 16       | 28   | 36    | VDC    |
|                                       | TRANSIENT 50 ms   | —        | —    | 25    | —        | —    | 25    | —        | —    | 50    | —        | —    | 50    |        |
| INPUT CURRENT                         | NO LOAD           | —        | —    | 60    | —        | —    | 60    | —        | —    | 30    | —        | —    | 30    | mA     |
|                                       | FULL LOAD         | —        | —    | 1670  | —        | —    | 1670  | —        | —    | 700   | —        | —    | 700   |        |
|                                       | INHIBITED         | —        | 8    | 10    | —        | 8    | 10    | —        | 8    | 10    | —        | 8    | 10    |        |
| INPUT RIPPLE CURRENT                  |                   | —        | 50   | 100   | —        | 50   | 100   | —        | 20   | 50    | —        | 20   | 50    | mA p-p |
| EFFICIENCY                            |                   | 76       | 79   | —     | 76       | 79   | —     | 76       | 79   | —     | 76       | 79   | —     | %      |

Note

1. Minimum load required for full output capability on auxiliary outputs. Minimum current can be reduced when dual outputs are used at reduced loads.

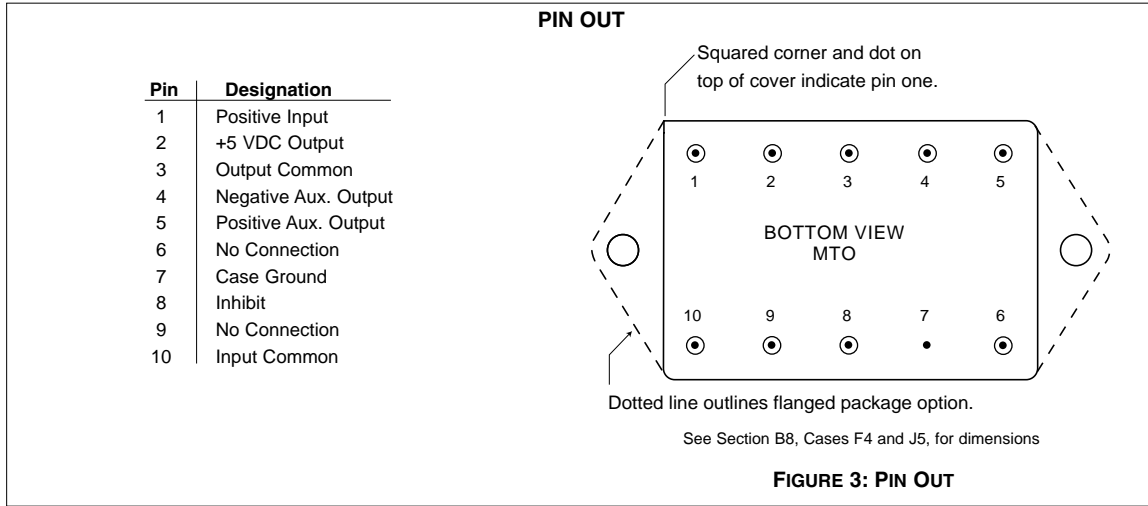
# DC/DC CONVERTERS

**MTO SERIES  
15 WATT**

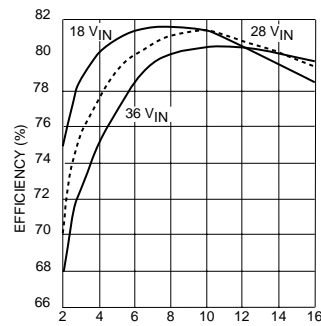
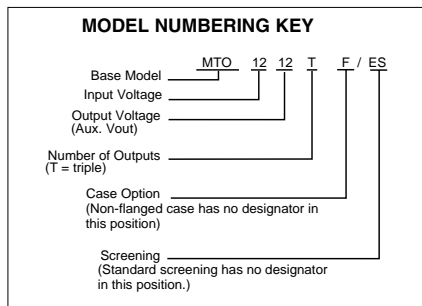


# MTO SERIES 15 WATT

# DC/DC CONVERTERS



**Typical Performance Curve: 25°C Tc**

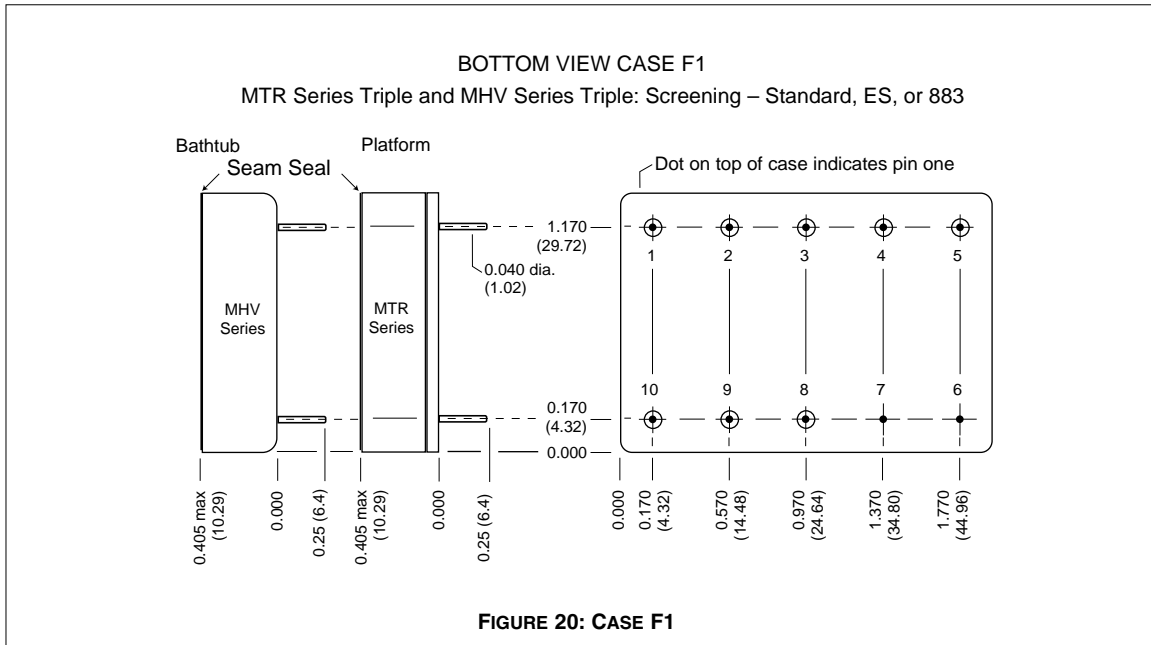
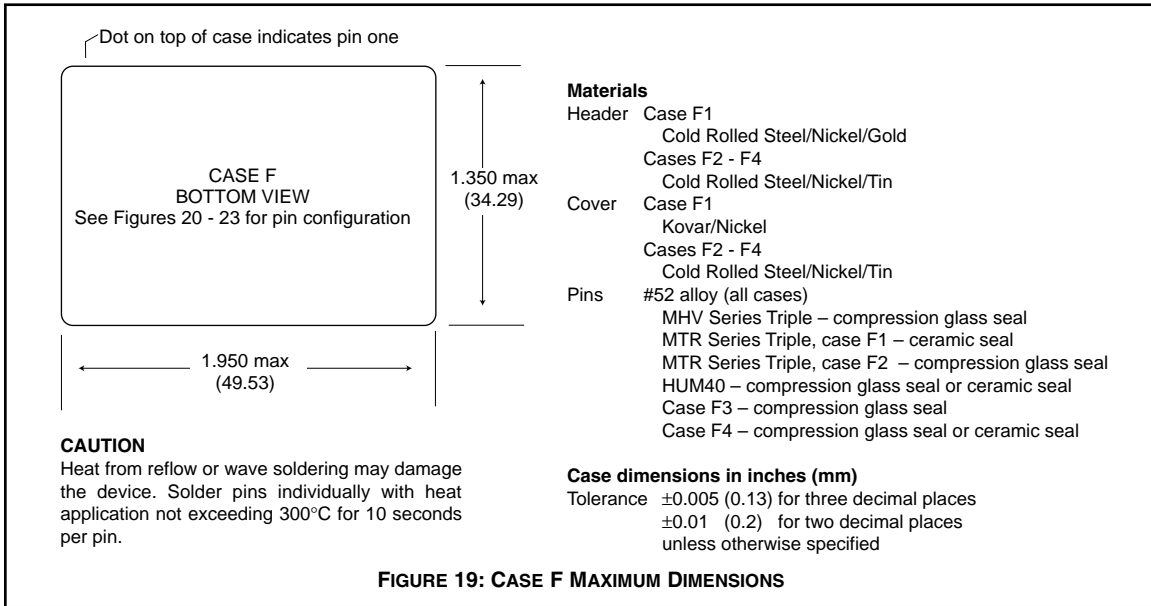


Output Power (Watts)  
Representative of all models  
MTO2815T Efficiency

**FIGURE 4**

# CASE F

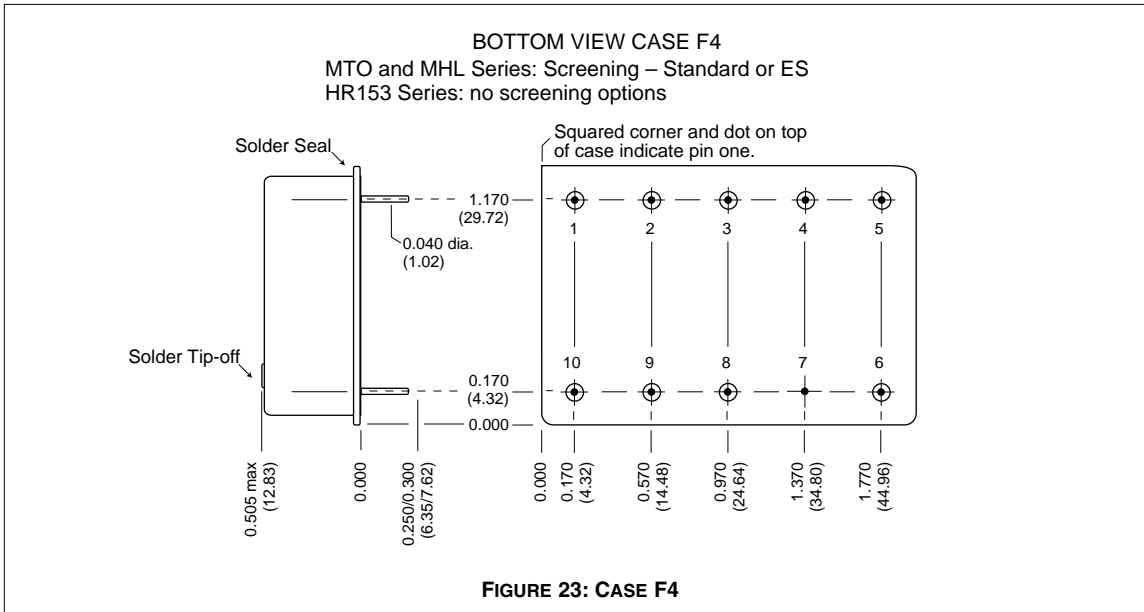
# CASES



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.

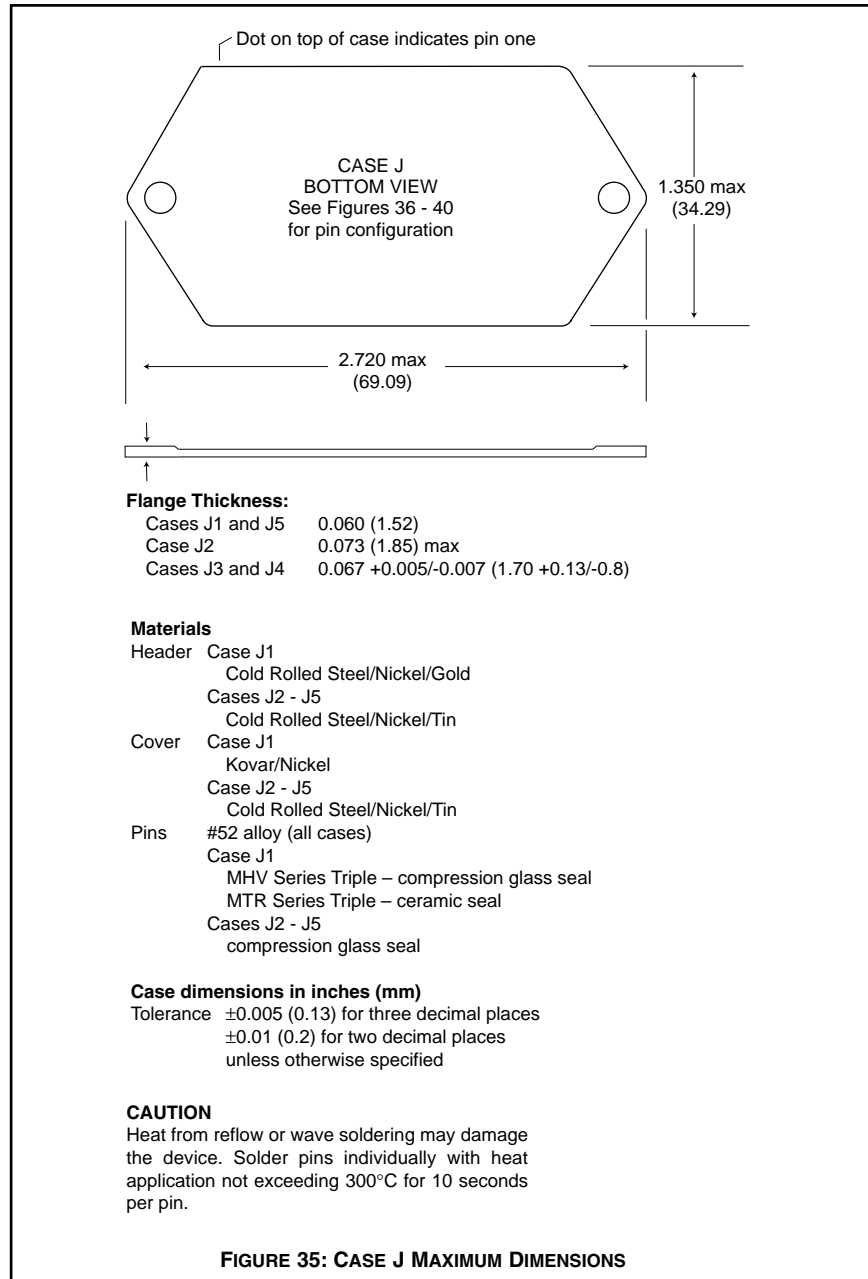
# CASE F

# CASES



# CASE J

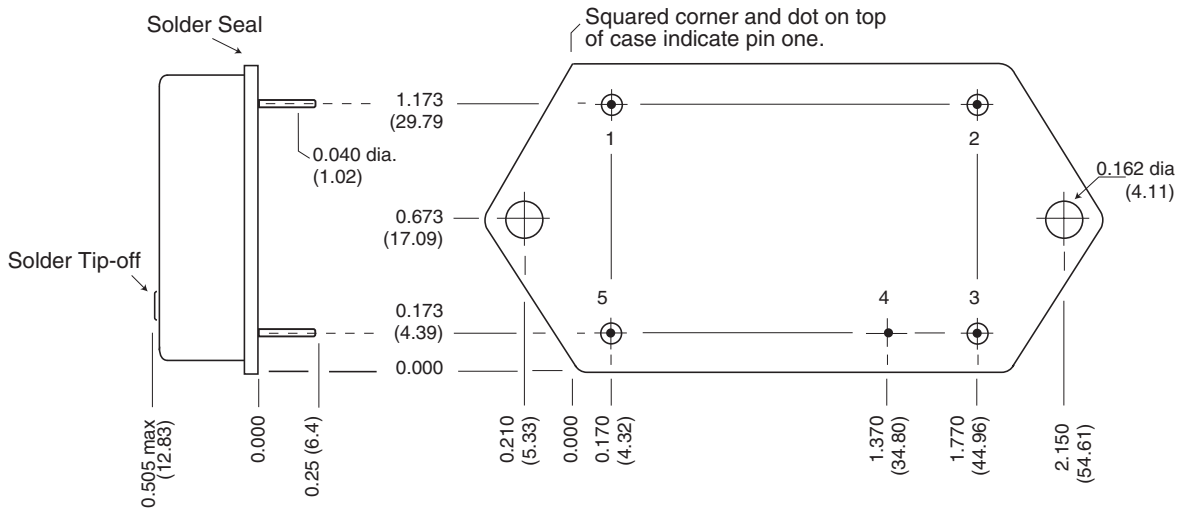
# CASES



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.

## BOTTOM VIEW CASE J4 (Rev B)

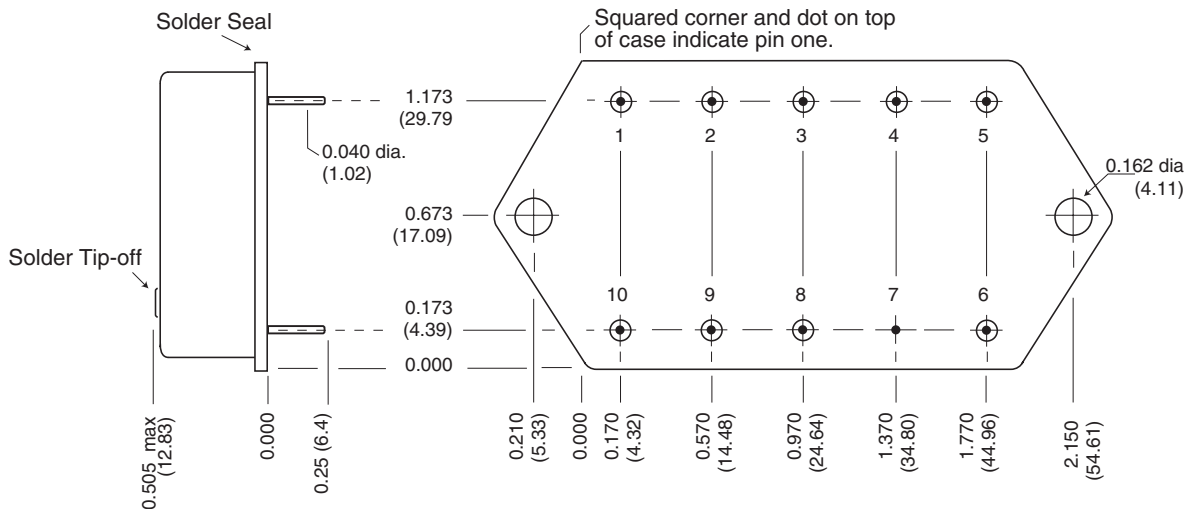
Flanged cases: Designator required in Case Option position of model number.  
 FMD28-461 EMI Filter (down-leaded): Screening – Standard or ES



**FIGURE 39: CASE J4**

## BOTTOM VIEW CASE J5 (Rev B)

Flanged cases: Designator required in Case Option position of model number  
 for MHL Series and MTO Series only.  
 MHL Series, MTO Series, MTW Series: Screening – Standard or ES  
 HR300 Series: no screening options



**FIGURE 40: CASE J5 (mounting hole dimension corrected to 2.150 (rev 20060626))**



**QA SCREENING  
85°C PRODUCTS**

**85°C PRODUCTS**

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