

# DC/DC CONVERTERS 28 VOLT INPUT

MTO SERIES  
15 WATT

NOT RECOMMENDED FOR NEW DESIGNS

## FEATURES

- -55°C to +85°C operation
- 16 to 36 VDC input
- 50 V for 50 ms transient protection
- Fully isolated
- Fixed frequency switching
- Inhibit function
- Indefinite short circuit protection
- Up to 79% efficiency



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 cases F4 and J5 for dimensions.

Weight: 53 grams typical

Screening: Standard or ES. See screening table for more 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.

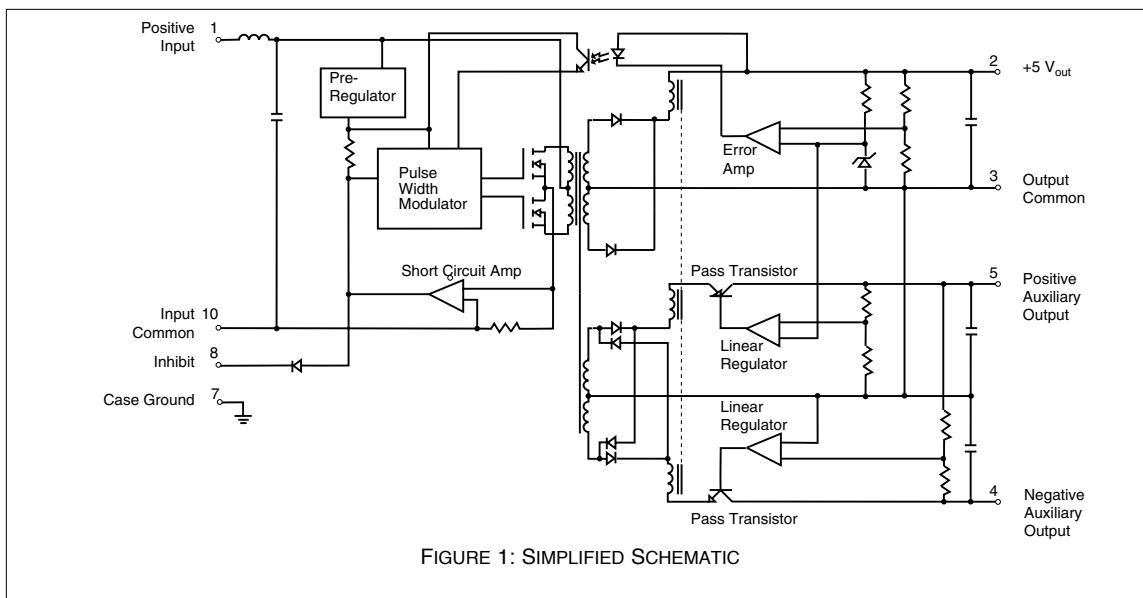


FIGURE 1: SIMPLIFIED SCHEMATIC

## 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

## 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

- 16 to 36 VDC continuous
- 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

## INHIBIT

### Inhibit TTL Open Collector

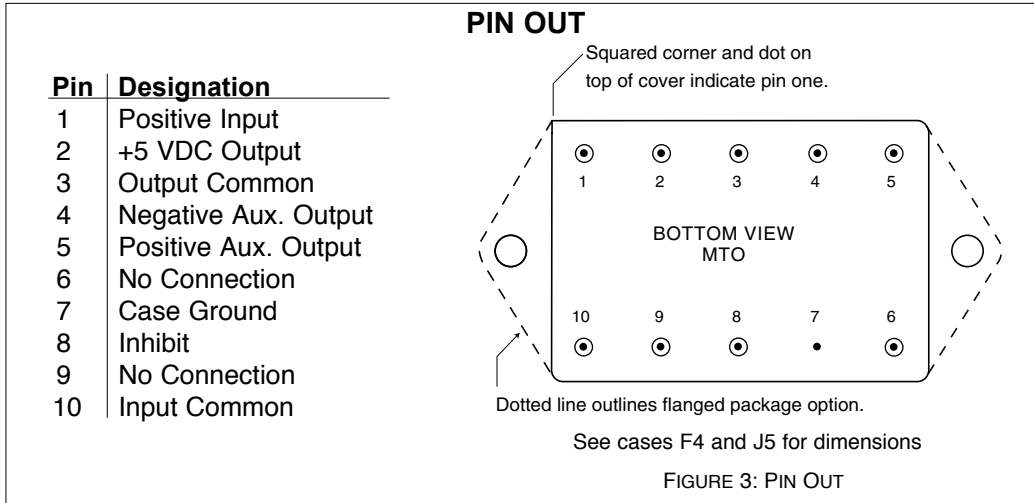
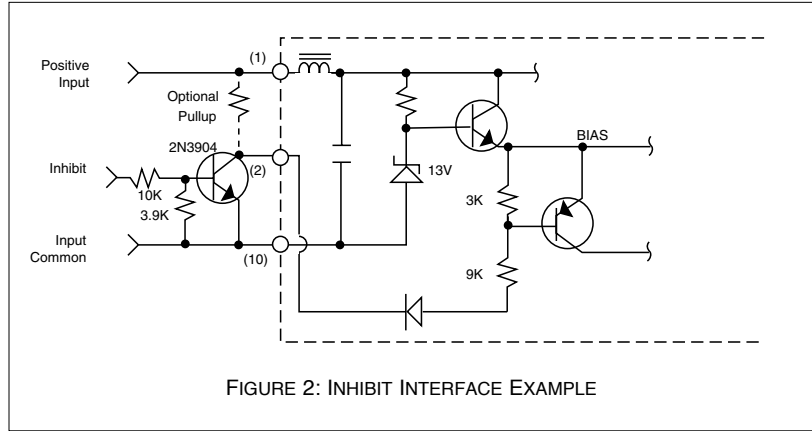
- Logic low (output disabled)  
V = <0.8 V  
Inhibit pin current < 2.0 mA
- Referenced to input common
- Logic high (output enabled)  
Unconnected or connected to Vin

Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, unless otherwise specified.

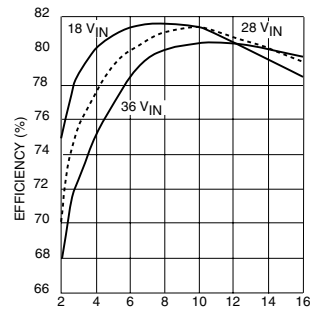
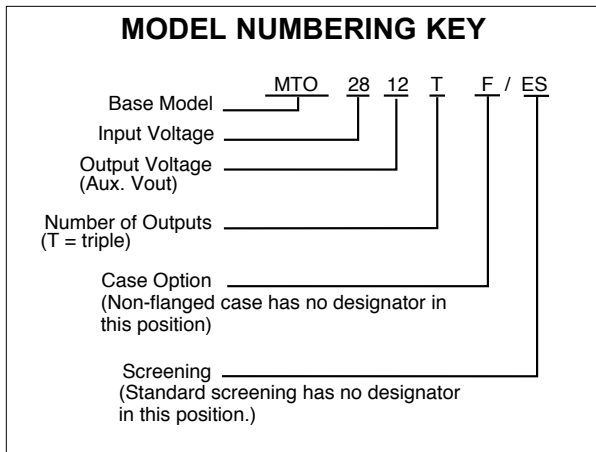
TRIPLE OUTPUT MODELS		MTO2812T			MTO2815T			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	MAIN	4.95	5.0	5.05	4.95	5.0	5.05	VDC
	+ AUXILIARY	11.88	12.0	12.12	14.85	15.0	15.15	
	- AUXILIARY	11.88	12.0	12.12	14.85	15.0	15.15	
OUTPUT CURRENT	MAIN <sup>1</sup>	100	—	2000	100	—	2000	mA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

### Notes

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

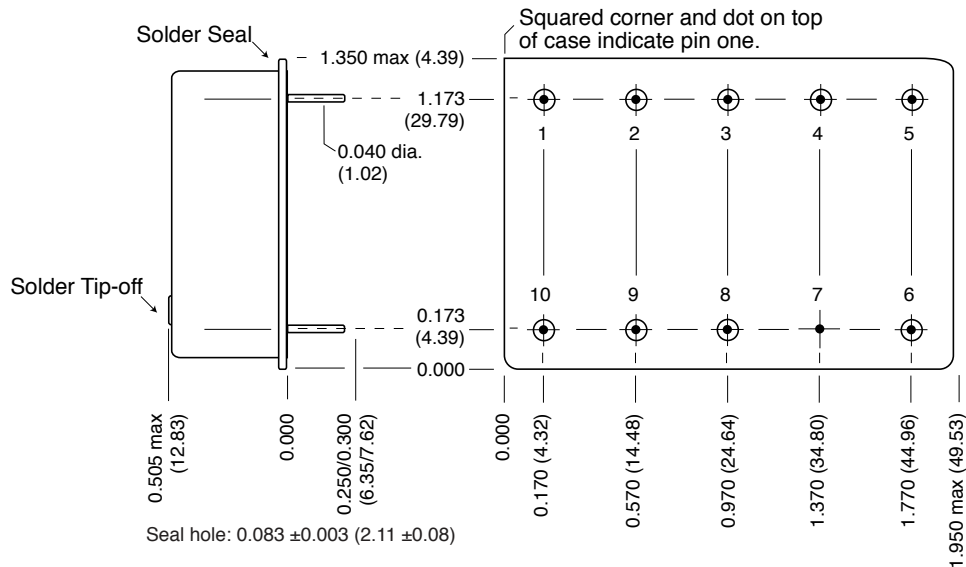


Typical Performance Curve: 25°C Tc



Output Power (Watts)  
Representative of all models  
MTO2815T Efficiency  
FIGURE 4

## BOTTOM VIEW CASE F4



### Case dimensions in inches (mm)

Tolerance  $\pm 0.005$  (0.13) for three decimal places  
 $\pm 0.01$  (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.

### Materials

Header Cold Rolled Steel/Nickel/Tin  
 Cover Cold Rolled Steel/Nickel/Tin  
 Pins #52 alloy, compression glass seal or ceramic seal

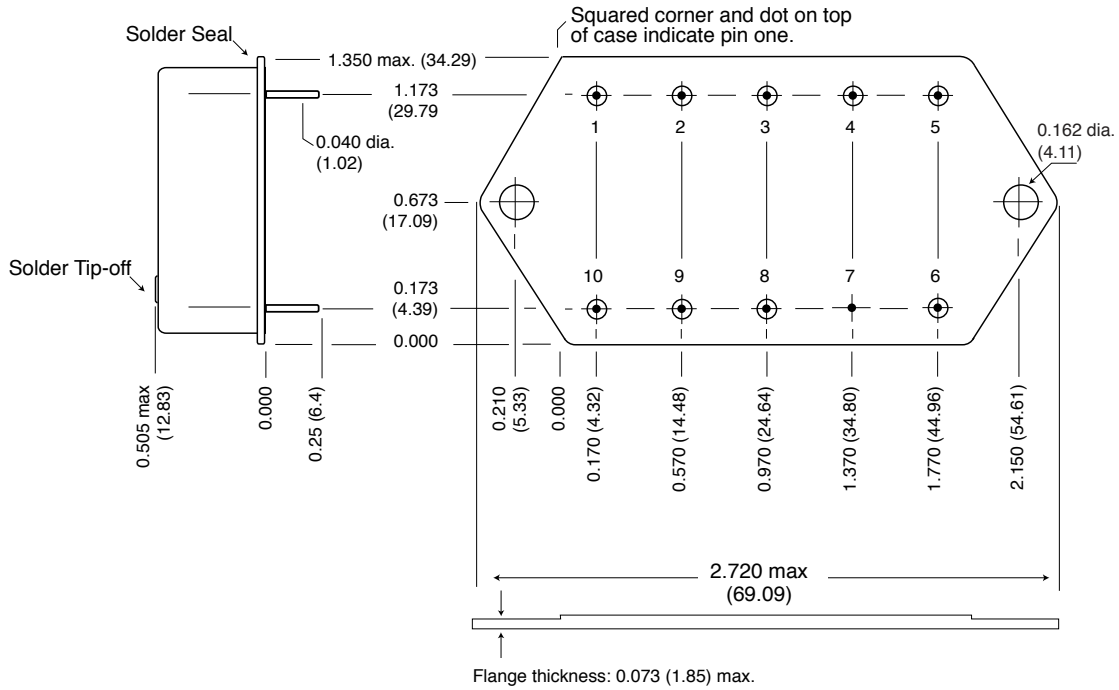
Case F4, Rev C, 20060802

Please refer to the numerical dimensions for accuracy. All 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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FIGURE 5: CASE F4

BOTTOM VIEW CASE J5



**Case dimensions in inches (mm)**

Tolerance  $\pm 0.005$  (0.13) for three decimal places  
 $\pm 0.01$  (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 J5, Rev E, 20100211  
 Please refer to the numerical dimensions for accuracy. All 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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FIGURE 6: CASE J5

## STANDARD AND /ES (NON-QML) PRODUCTS ENVIRONMENTAL SCREENING <sup>1</sup>

TEST PERFORMED	STANDARD NON-QML <sup>2</sup>	/ES NON-QML <sup>2</sup>
Pre-cap Inspection Method 2017, 2032	yes	yes
Temperature Cycle (10 times) Method 1010, Cond. B, -55°C to +125°C, ambient	no	yes
Constant Acceleration Method 2001, 500 g	no	yes
Burn-in Method 1015 <sup>3</sup> 96 hours	no	yes
Final Electrical Test MIL-PRF-38534, Group A Subgroups 1 and 4: +25°C case	yes	yes
Hermeticity Test Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C Gross Leak, Dip (1 x 10 <sup>-3</sup> )	no no yes	yes yes no
Final visual inspection Method 2009	yes	yes

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

Notes:

**1. Refers to products that do not offer QML screening.**

2. Standard and /ES, non-QML products, do not meet all of the requirements of MIL-PRF-38534.

3. Burn-in designed to bring the case temperature to the maximum case temperature of 85°C.