

MTO Triple DC-DC Converters

16 TO 36 VOLT INPUT – 15 WATT NOT RECOMMENDED FOR NEW DESIGNS

FEATURES

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



MODELS
OUTPUT VOLTAGE (V)
TRIPLE
5 & ±12
5 & ±15

DESCRIPTION

The Interpoint® MTO Series™ of DC-DC converters delivers 15 watts of output power with three output voltages. 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 FMCE-0328 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 Thermal Mounting Pad (TMP), model TMP-102, 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 volts) will disable the output of the converter reducing input current to 8 mA, typical. Leaving the terminal unconnected or connecting it to Vin 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.

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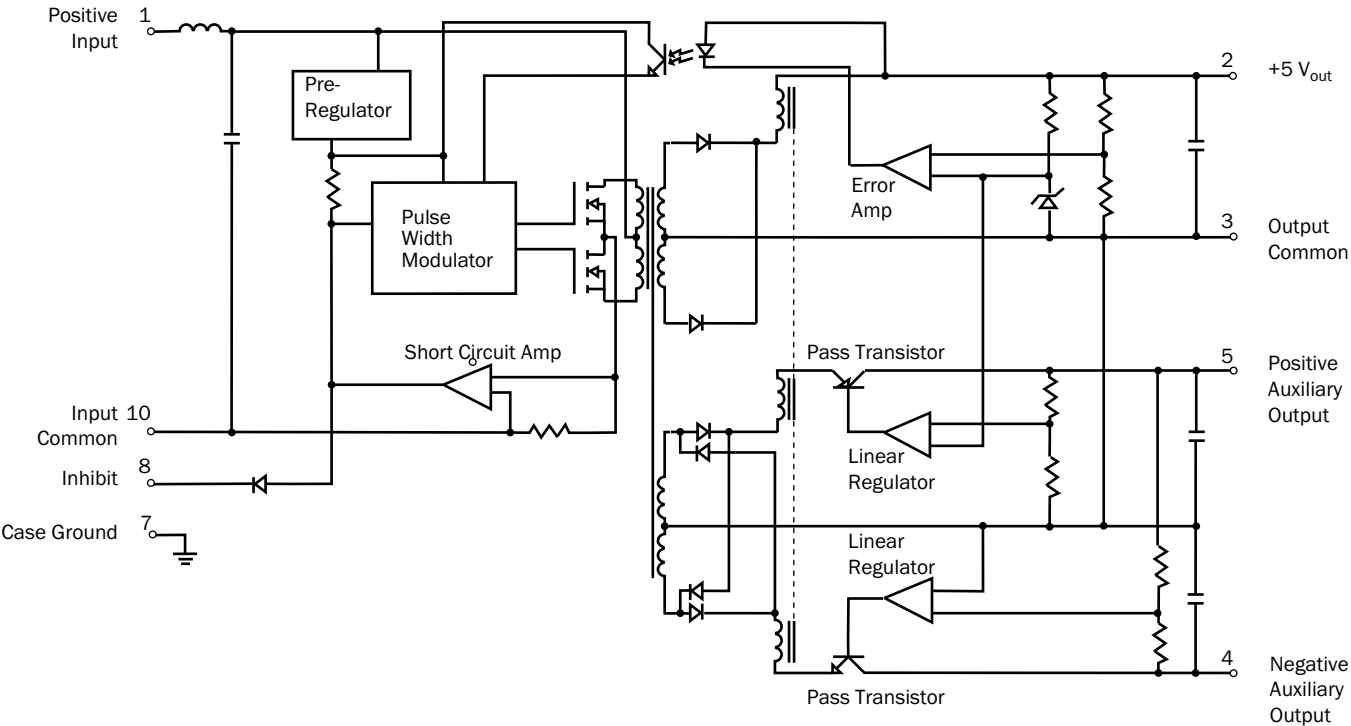


FIGURE 1: SIMPLIFIED SCHEMATIC

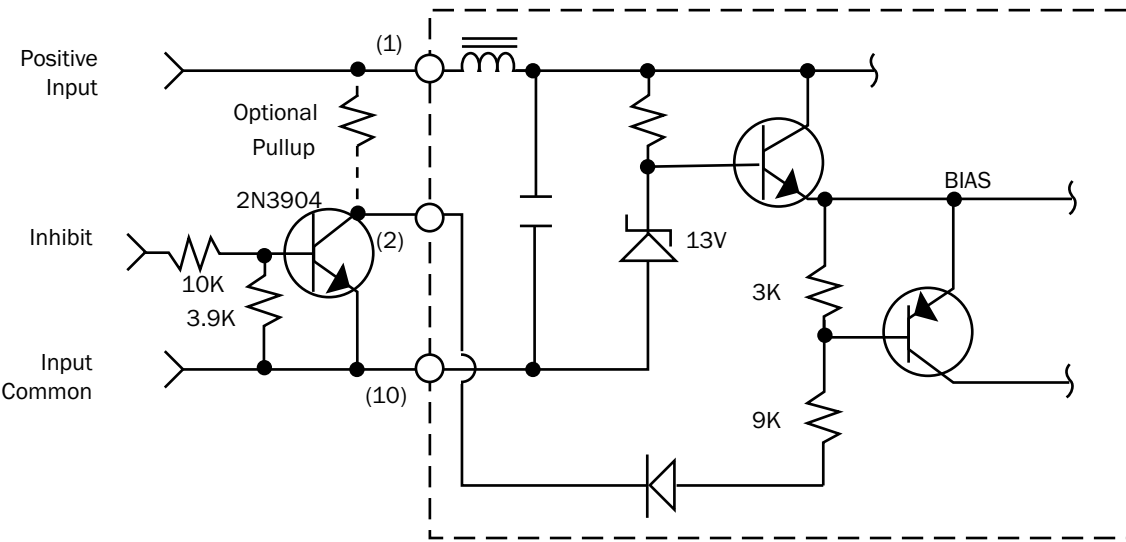


FIGURE 2: INHIBIT INTERFACE EXAMPLE

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PIN OUT	
Pin	Triple Output
1	Positive Input
2	Main (+5) Output
3	Output Common
4	Negative Aux. Output
5	Positive Aux. Output
6	No Connection
7	Case Ground
8	Inhibit
9	No Connection
10	Input Common

TABLE 1: PIN OUT

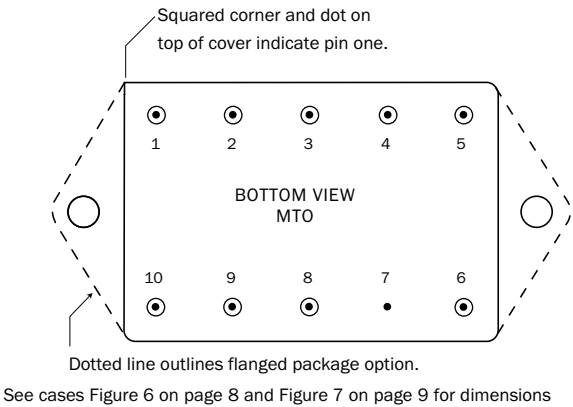


FIGURE 3: PIN OUT

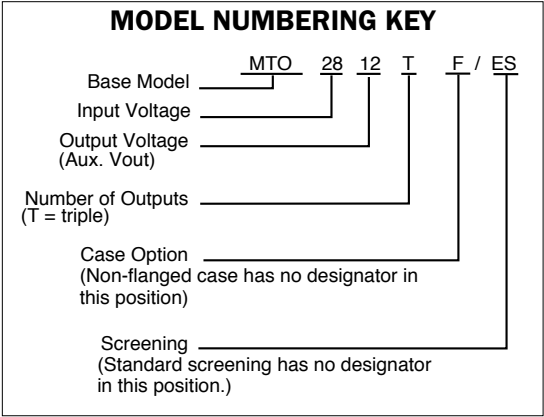


FIGURE 4: MODEL NUMBERING KEY

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MODEL NUMBER OPTIONS					
TO DETERMINE THE MODEL NUMBER ENTER ONE OPTION FROM EACH CATEGORY IN THE FORM BELOW.					
CATEGORY	Base Model and Input Voltage	Output Voltage	Number of Outputs ¹	Case Options ²	Screening ³
OPTIONS	MT028	12, 15	T	(non-flanged, leave blank) F (flanged)	(standard, leave blank) ES
FILL IN FOR MODEL # ⁴	MT028	_____	_____	_____	/ _____

Notes

- Number of Outputs: T is a triple output.
- Case Options: For the standard case, Figure 6 on page 8, leave the case option blank. For the flanged case option, Figure 7 on page 9, insert the letter F in the Case Option position.
- Screening: For standard screening leave the screening option blank. For other screening options, insert the desired screening level.
For more information see Table 6 on page 10.
- If ordering by model number add a "Q" to request solder dipped leads (MT02812T/ES-Q).

TABLE 2: MODEL NUMBER OPTIONS

TYPICAL PERFORMANCE CURVE: 25 °C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

THIS IS AN EXAMPLES FOR REFERENCE ONLY AND ARE NOT GUARANTEED SPECIFICATIONS.

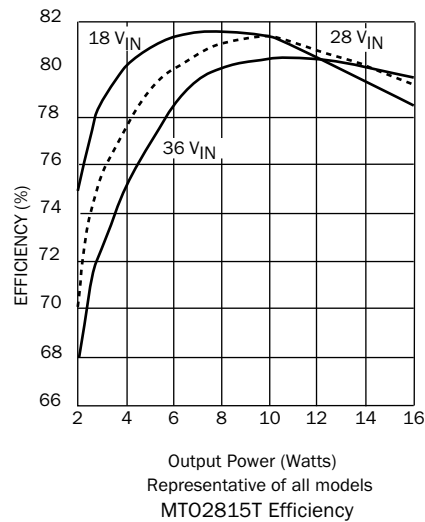


FIGURE 5

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TABLE 3: OPERATING CONDITIONS, ALL MODELS, 25 °C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

MTO SERIES		ALL MODELS			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	
LEAD SOLDERING TEMPERATURE ¹	10 SECONDS MAX.	—	—	300	°C
STORAGE TEMPERATURE ¹		-65	—	+125	°C
CASE OPERATING TEMPERATURE	FULL POWER	-55	—	+85	°C
	ABSOLUTE	-55	—	+115	
DERATING OUTPUT POWER/CURRENT LINEARLY ¹		From 100% at 85 °C to 0% at 115 °C			
ISOLATION: INPUT TO OUTPUT, INPUT TO CASE, OUTPUT TO CASE ²	500 VDC AT 25 °C	100	—	—	Megohms
INPUT TO OUTPUT CAPACITANCE ¹		—	80	—	pF
CURRENT LIMIT	% OF FULL LOAD		125		%
SWITCHING FREQUENCY		—	250	—	kHz
INHIBIT ACTIVE LOW (OUTPUT DISABLED) Do not apply a voltage to the inhibit pin ⁴	INHIBIT PIN PULLED LOW ³	—	—	0.8	V
	INHIBIT PIN SOURCE CURRENT ¹	—	2	—	mA
	REFERENCED TO	INPUT COMMON			
INHIBIT ACTIVE HIGH (OUTPUT ENABLED) Do not apply a voltage to the inhibit pin ⁴	INHIBIT PIN CONDITION	OPEN COLLECTOR OR UNCONNECTED			
	OPEN PIN VOLTAGE ¹				
		—	10	—	V

Notes

1. Guaranteed by characterization test and/or analysis. Not a production test.
2. When testing isolation, input pins are tied together and output pins are tied together. They are tested against each other and against case. Discharge the pins before and after testing.
3. Tested with inhibit pin connected to input common.
4. An external inhibit interface should be used to pull the inhibit low or leave it floating. The inhibit pin can be left unconnected if not used.

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TABLE 4: ELECTRICAL CHARACTERISTIC 25 °C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

TRIPLE OUTPUT MODEL – MTO2812T		5 (MAIN)			±12 (AUXILIARIES)			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	FULL LOAD	4.95	5.00	5.05	±11.88	±12.00	12.12	V
OUTPUT CURRENT ¹	V _{IN} = 16 TO 36	100	—	2000	—	—	±208	mA
OUTPUT POWER		—	—	10	—	—	±2.5	W
	TOTAL ALL OUTPUTS	—	—	15	—	—	—	
OUTPUT RIPPLE	BW = 2 MHz	—	—	80	—	—	±30	mV p-p
LINE REGULATION	V _{IN} = 16 TO 36	—	5	10	—	±30	±48	mV
LOAD REGULATION	NO LOAD TO FULL	—	10	20	—	±30	±48	mV
INPUT VOLTAGE	CONTINUOUS	16	28	36	—	—	—	V
	TRANSIENT 50 ms	—	—	50	—	—	—	
INPUT CURRENT	NO LOAD	—	—	30	—	—	—	mA
	INHIBITED	—	8	10	—	—	—	
INPUT RIPPLE CURRENT		—	20	50	—	—	—	mA p-p
EFFICIENCY ²		76	79	—	—	—	—	%

Notes

1. Minimum load required on main (+5) for full output capability on auxiliary outputs.

2. Guaranteed by characterization test and/or analysis. Not a production test.

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TABLE 5: ELECTRICAL CHARACTERISTIC 25 °C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

TRIPLE OUTPUT MODEL – MTO2815T		5 (MAIN)			±15 (AUXILIARIES)			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	FULL LOAD	4.95	5.00	5.05	±14.88	±15.00	15.15	V
OUTPUT CURRENT ¹	V _{IN} = 16 TO 36	100	—	2000	—	—	±167	mA
OUTPUT POWER		—	—	10	—	—	±2.5	W
	TOTAL ALL OUTPUTS	—	—	15	—	—	—	
OUTPUT RIPPLE	BW = 2 MHz	—	—	80	—	—	±30	mV p-p
LINE REGULATION	V _{IN} = 16 TO 36	—	5	10	—	±30	±60	mV
LOAD REGULATION	NO LOAD TO FULL	—	10	20	—	±30	±60	mV
INPUT VOLTAGE	CONTINUOUS	16	28	36	—	—	—	V
	TRANSIENT 50 ms	—	—	50	—	—	—	
INPUT CURRENT	NO LOAD	—	—	30	—	—	—	mA
	INHIBITED	—	8	10	—	—	—	
INPUT RIPPLE CURRENT		—	20	50	—	—	—	mA p-p
EFFICIENCY ²		76	79	—	—	—	—	%

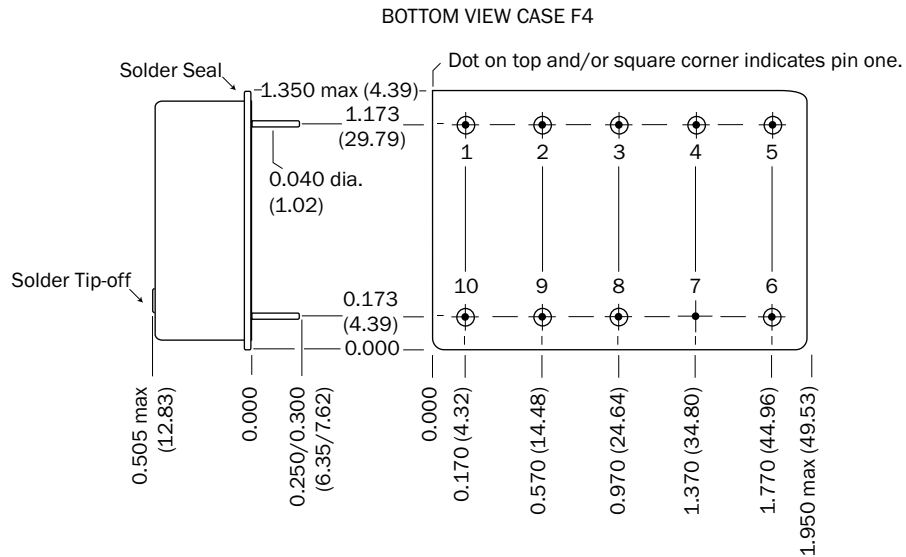
Notes

1. Minimum load required on main (+5) for full output capability on auxiliary outputs.

2. Guaranteed by characterization test and/or analysis. Not a production test.

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Weight: 53 grams typical

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.

Materials

Header Cold Rolled Steel/Nickel/Tin

Cover Cold Rolled Steel/Nickel/Tin

Pins #52 alloy, compression glass seal or ceramic seal

Seal hole: 0.083 ± 0.003 (2.11 ± 0.08)

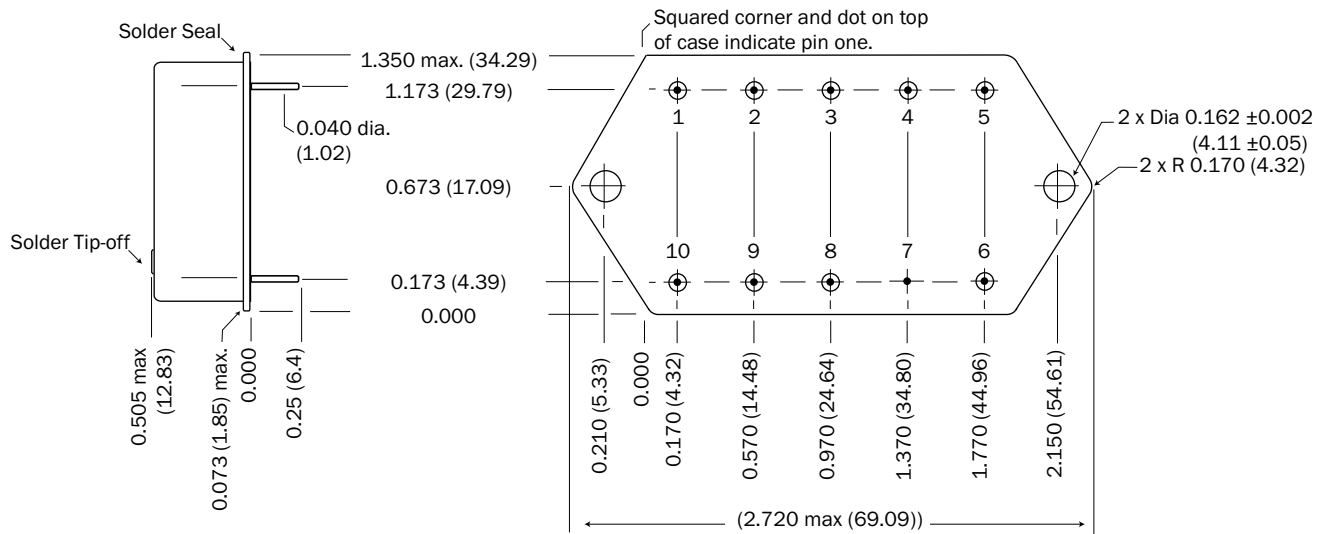
Please refer to the numerical dimensions for accuracy.

FIGURE 6: CASE F4

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BOTTOM VIEW CASE J5



Weight: 60 grams max.

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.

Please refer to the numerical dimensions for accuracy.

FIGURE 7: CASE J5

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ENVIRONMENTAL SCREENING DC-DC CONVERTERS AND EMI FILTERS STANDARD AND /ES ¹

TEST PERFORMED	STANDARD	/ES
Pre-cap Inspection Method 2017, 2032	■	■
Temperature Cycle (10 times) Method 1010, Cond. B, -55°C to +125°C, ambient		■
Constant Acceleration Method 2001, 500 g		■
Burn-in Method 1015 ² 96 hours		■
Final Electrical Test MIL-PRF-38534, Group A Subgroups 1 and 4: +25°C case	■	■
Hermeticity Test, Method 1014 Gross Leak, Cond. C ₁ , fluorocarbon		■
Fine Leak, Cond. A ₂ , helium		■
Gross Leak, Dip	■	
Final visual inspection Method 2009	■	■

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

Notes

- Standard and /ES products may not meet all of the requirements of MIL-PRF-38534.
- Burn-in temperature designed to bring the case temperature to the maximum case temperature of the product. Refer to the specific product information for the maximum case temperature. Burn-in is a powered test.

TABLE 6: ENVIRONMENTAL SCREENING