



VPTPCM-12 Series



HIGH RELIABILITY COTS PRECONDITIONING MODULE

DESCRIPTION

The VPTPCM-12 is a Pre-Conditioning Module which allows VPT's DV and VPT series isolated DC-DC converters to operate over an extended input voltage range and provides compliance to both MIL-STD-704 and MIL-STD-1275 input power requirements. A wide input voltage range accommodates both nominal 12V and 28V inputs including avionics, mobile, ground systems, and other applications. A high efficiency design reduces input power requirements and eases thermal management. Low input and output ripple, fixed operating frequency, and companion EMI filters simplify system design and compliance. A proven design heritage, no optoisolators and a rugged all metal package ensure long term reliability.

The VPTPCM-12 intended for harsh environments including severe vibration, shock and temperature cycling. Testing is to JESD22, MIL-STD-810, and MIL-STD-883.

These converters are designed and manufactured in the USA in a facility certified to ISO9001, J-STD-001 and IPC-A-610.

This product may incorporate one or more of the following U.S. patents:

5,784,266
5,790,389
5,963,438
5,999,433
6,005,780
6,084,792
6,118,673

FEATURES

- High Reliability at Low Cost
- Up to 120 Watts of Output Power
- Wide Input Voltage Range: 9 to 40 Volts per MIL-STD-704 and MIL-STD-1275
- Transient Operation down to 6 Volts and up to 100 Volts per MIL-STD-1275
- High Efficiency, Up to 99%
- Inrush Current Limiting
- Input Undervoltage Lockout
- Fixed Frequency
- Output Soft Start
- Wide Temperature Range, -55°C to 100°C
- Internally Conformal Coated
- Six Sided Non-Hermetic Rugged Metal Enclosure



Figure 1 – VPTPCM-12 Pre-Conditioning Module
(Not To Scale)



VPTPCM-12 Series

SPECIFICATIONS ($T_{CASE} = -55^{\circ}\text{C}$ to $+100^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS

Input Voltage (Continuous)	40 V_{DC}	Junction Temperature Rise to Case	+15°C
Input Voltage (Transient, 50 ms)	100 Volts	Storage Temperature	-55°C to +125°C
Output Power	120 Watts	Lead Solder Temperature (10 seconds)	300°C
Power Dissipation (Full Load, $T_{CASE} = +100^{\circ}\text{C}$)	17 Watts	Weight (Maximum)	79 Grams

Parameter	Conditions	VPTPCM-12			Units	
		Min	Typ	Max		
STATIC						
INPUT Voltage	Continuous	9	-	40	V	
	Transient ³	10 sec	8	-	V	
	Transient ^{1,3}	1 sec, Pout = 100W maximum	6	-	V	
	Transient	1 sec	-	50	V	
	Transient	50 ms, 500 mΩ	-	-	100	V
	Transient	70 μs, 15 mJ	-250	-	250	V
	Transient	10 μs, 50Ω	-	-	600	V
Current	Inhibited	-	-	25	mA	
	$V_{in} = 12\text{V}$, No Load	-	-	300	mA	
	$V_{in} = 28\text{V}$, No Load	-	-	35	mA	
Inrush Current ³	$V_{in} = 0$ to 28V, Full Load	-	3	5	A	
Ripple Current	$V_{in} = 12\text{V}$, Full Load, 20Hz to 10MHz	-	-	250	mA _{p-p}	
Inhibit Pin Input ³		0	-	1.5	V	
Inhibit Pin Open Circuit Voltage		14	16	18	V	
UVLO Turn On		6.5	-	7.9	V	
UVLO Turn Off ³		4.5	-	5.9	V	
OUTPUT Voltage	Continuous	17	-	40	V	
	Transient	-	-	50	V	
Power ²		0	-	120	W	
Ripple Voltage	$V_{in} = 12\text{V}$, 20Hz to 10MHz	-	-	500	mV _{p-p}	
EFFICIENCY	$V_{in} = 28\text{V}$	97	99	-	%	
	$V_{in} = 12\text{V}$	88	92	-	%	
CAPACITIVE LOAD ³		-	-	500	μF	
SWITCHING FREQUENCY		400	500	550	kHz	
CASE ISOLATION	500 V_{DC}	100	-	-	MΩ	
MTBF (MIL-HDBK-217F)	GM @ $T_c = 55^{\circ}\text{C}$	-	400	-	kHrs	
DYNAMIC						
Turn On Delay	$V_{IN} = 0\text{V}$ to 28V	-	2	6	mSec	
	$V_{IN} = 0\text{V}$ to 12V	-	10	25	mSec	

- Notes:
1. Operation down to 6V is possible after the input voltage is taken above 8V to start the module.
 2. Derate linearly to 0 at 110°C.
 3. Verified by qualification testing.

BLOCK DIAGRAM

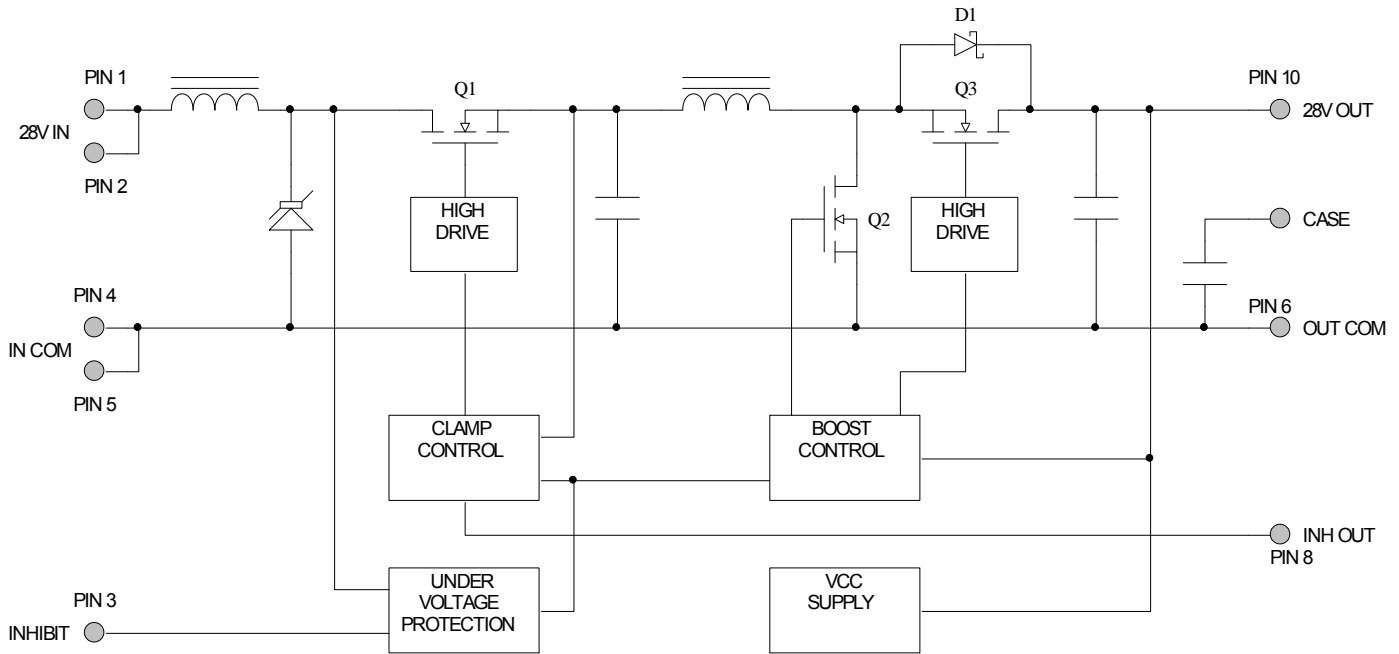


Figure 2

CONNECTION DIAGRAM

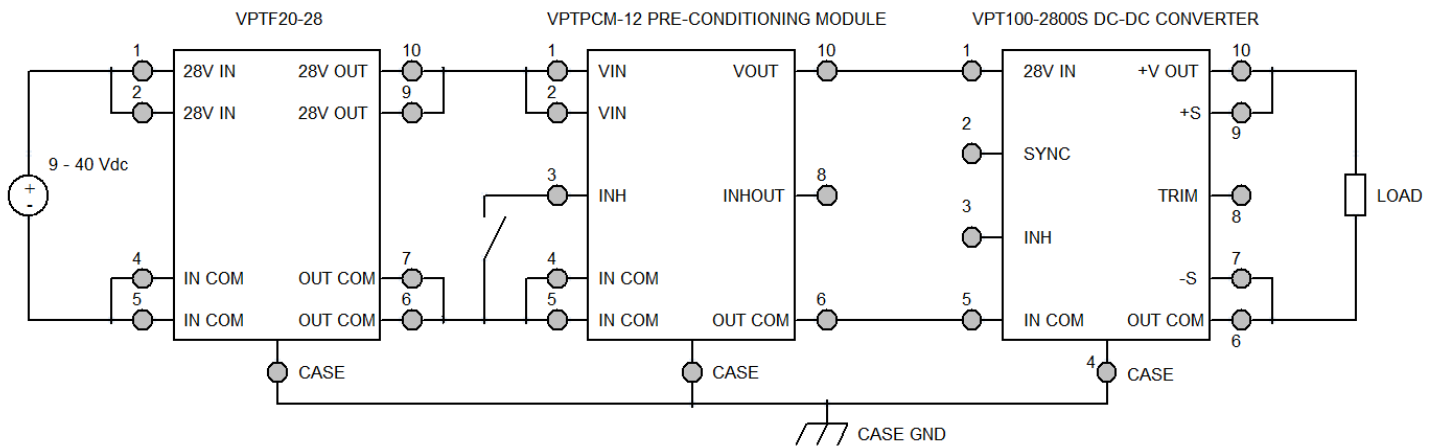


Figure 3

PERFORMANCE CURVES

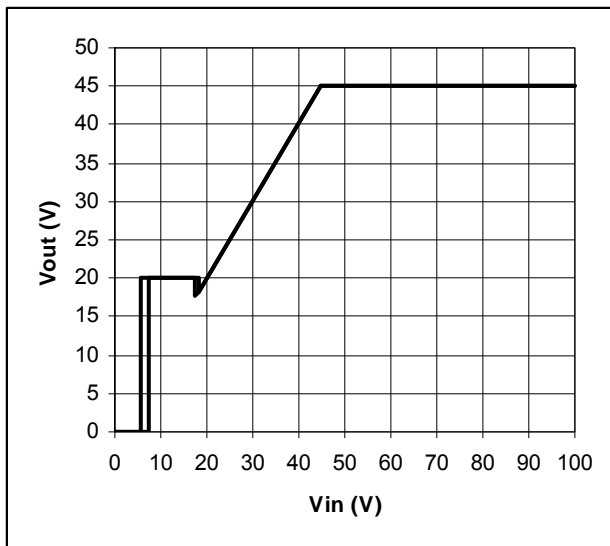


Figure 4 – Output Voltage vs Input Voltage

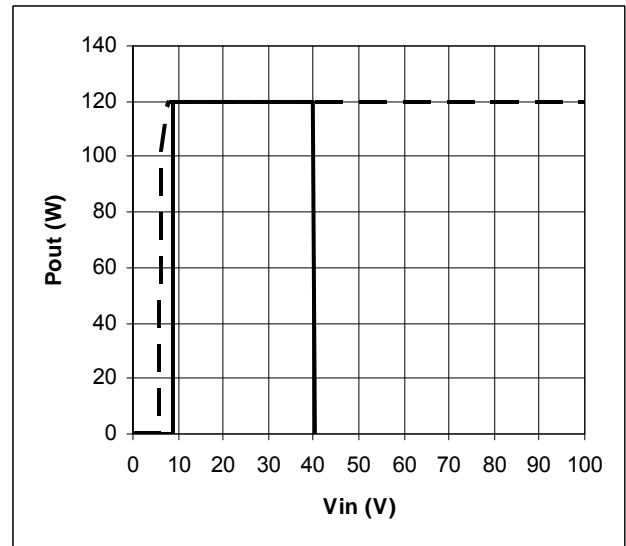


Figure 5 – Output Power Rating vs Input Voltage

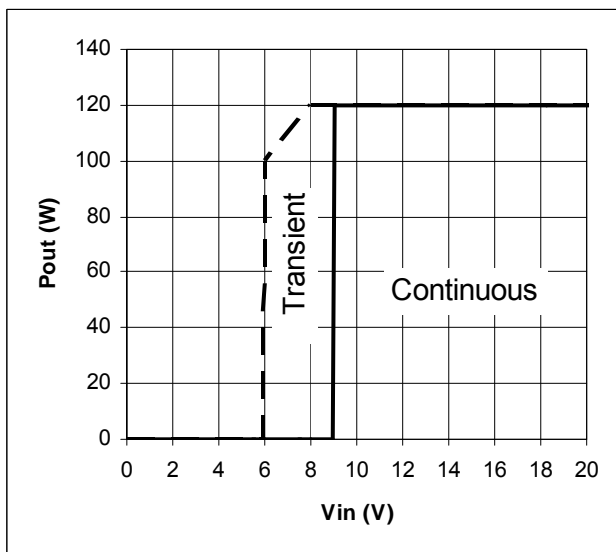


Figure 6 – Output Power Rating vs Input Voltage

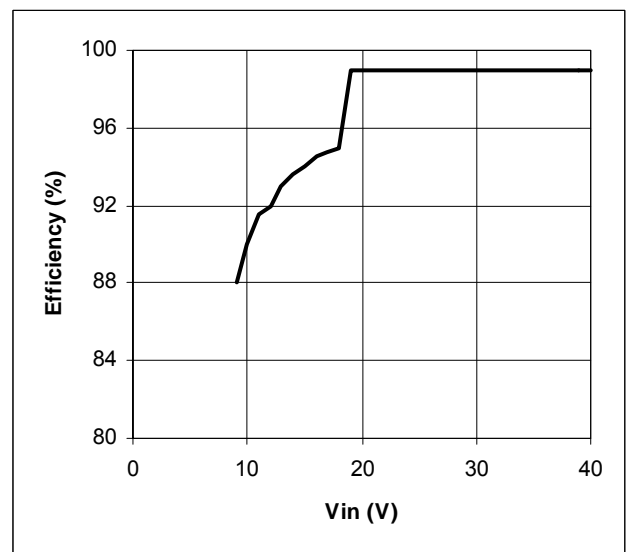


Figure 7 – Full Load Efficiency vs Input Voltage

PERFORMANCE CURVES

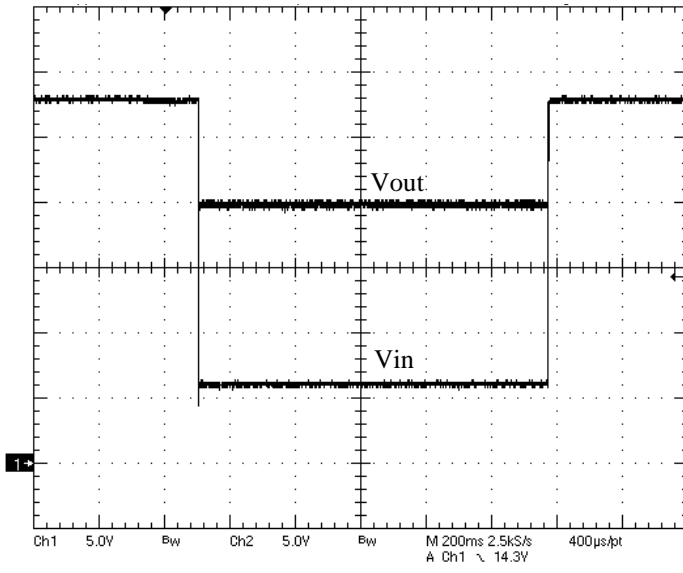


Figure 8 – Vin, Vout during 6V, 1 sec Transient

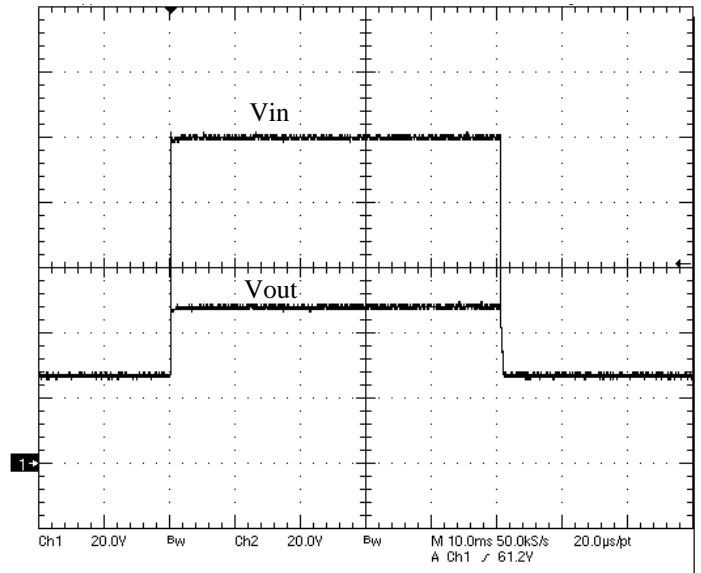


Figure 9 – Vin, Vout during 100V, 50ms Transient

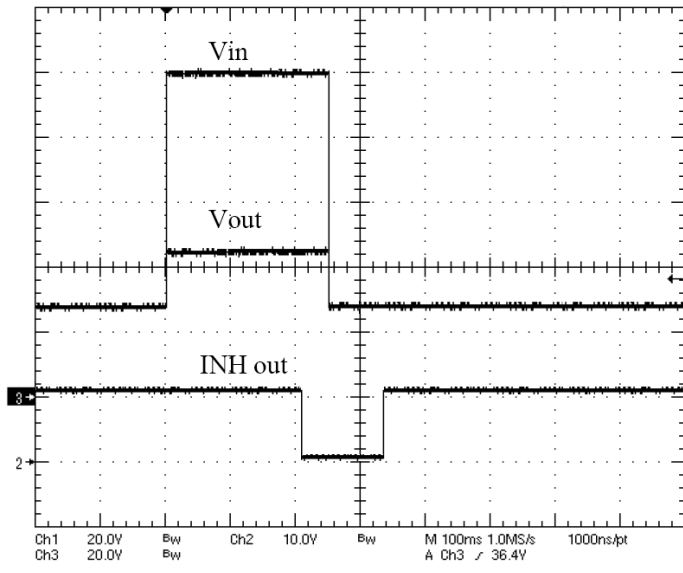


Figure 10 – Inhibit Out during 100V Transient

PERFORMANCE CURVES

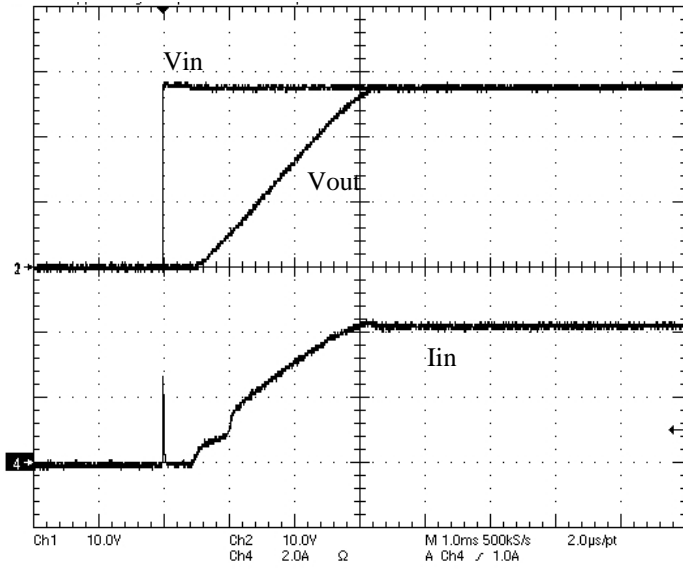


Figure 11 – Vout, Iin (inrush current) during turn-on at 28V

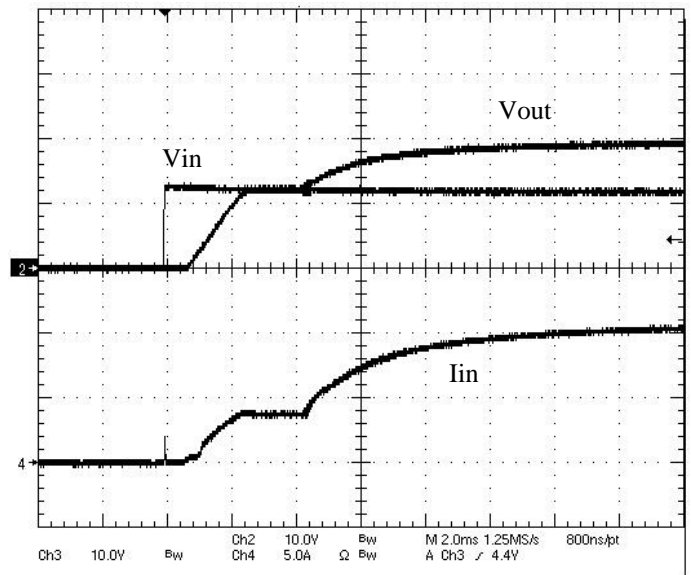


Figure 12 – Vout, Iin (inrush current) during turn-on at 12V

EMI PERFORMANCE CURVES

($T_{CASE} = 25^{\circ}C$, $V_{IN} = +12V \pm 5\%$, Full Load, Unless Otherwise Specified)

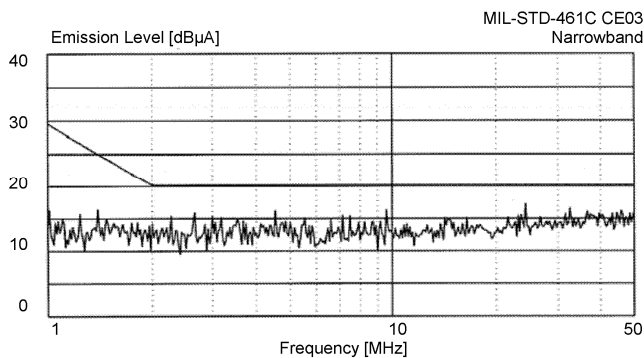
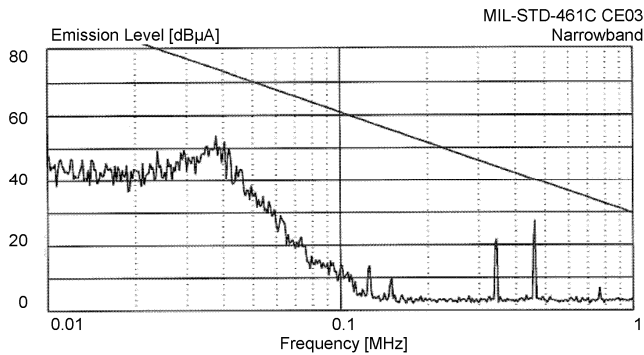


Figure 13 – VPTPCM with VPTF20-28

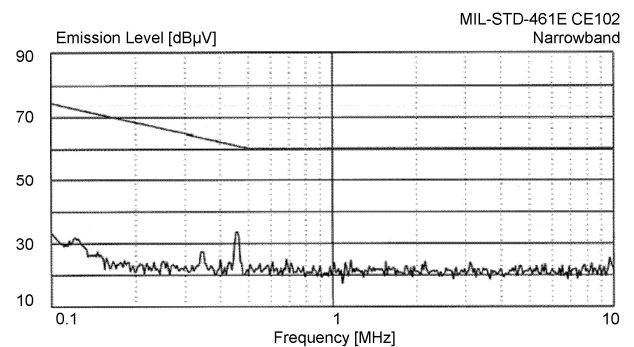
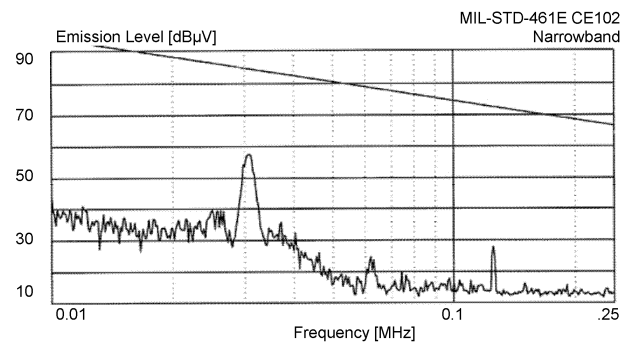


Figure 14 – VPTPCM with VPTF20-28

PACKAGE SPECIFICATIONS

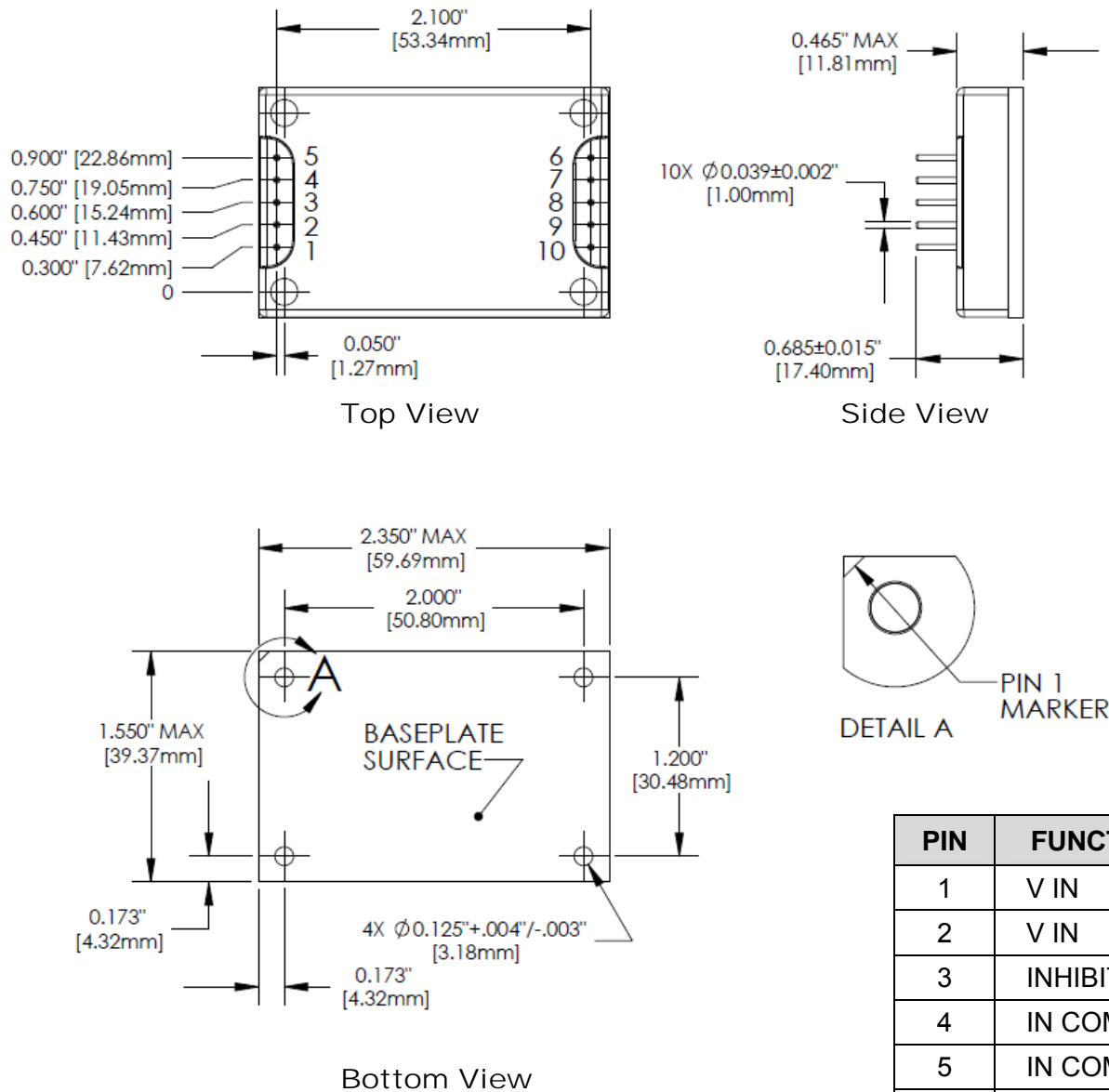


Figure 15 – Package and Pinout
Dimensional Limits are ± 0.005 " (Unless Otherwise Stated)

Package Notes:

- Case temperature is measured on the center of the baseplate surface.
- Materials: Baseplate – aluminum, conductive conversion coating.
Cover – nickel plated.
Pins – copper, gold over nickel plating.
- Mounting holes are not threaded. Recommended fastener is 4-40.
- This Package is not hermetic. VPT offers a wide range of hermetic products. Please contact VPT for details if hermetic products are required.
- For applications requiring exposure to liquid cleaning, please contact VPT.

PIN	FUNCTION
1	V IN
2	V IN
3	INHIBIT
4	IN COM
5	IN COM
6	OUT COM
7	CASE
8	INH OUT
9	N/C
10	V OUT

PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	VIN	Positive Input Voltage Connection
2	VIN	Positive Input Voltage Connection
3	INHIBIT	This is an open collector input. Logic Low = Disabled Output. Connect the inhibit pin to input common to disable the output. Unconnected, open collector or open drain = Enabled Output.
4	INCOM	Return Connection
5	INCOM	Return Connection
6	OUTCOM	Return Connection
7	CASE	Case Connection
8	INH OUT	This is an open collector output. It will activate low during a positive input voltage transient. It can be used as a status flag or connected to the Inhibit input of the downstream DC-DC converter to turn the converter off during a transient, when uninterrupted operation is not required. This connection is usually not required. This pin should be left open if not used.
9	N/C	No Connection
10	VOUT	Positive Output Voltage Connection

100% ENVIRONMENTAL SCREENING

Screening	Condition
Internal Visual	IPC-A-610
Stabilization Bake	MIL-STD-883, Method 1008, Condition B, 125°C, 24 hours
Temperature Cycling	MIL-STD-883, Method 1010, Condition B, -55°C to +125°C, 10 Cycles
Burn-In	96 hours at +100°C
Final Electrical	100% at 25°C
External Visual	Internal Procedure

ORDERING INFORMATION

VPTPCM-	12
1	2

(1)	(2)	
Product Series	Nominal Input Voltage	
VPTPCM	12	12 - 28 Volts

CONTACT INFORMATION

To request a quotation or place orders please contact your sales representative or the VPT Inc. Sales Department at:

Phone: (425) 353-3010
Fax: (425) 353-4030
E-mail: vpsales@vpt-inc.com

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