



VPTc10-28 Series



HIGH RELIABILITY COTS EMI FILTER / TRANSIENT PROTECTION MODULE

DESCRIPTION

The VPTc10-28 input module is a combined EMI filter and voltage transient protection module with built-in reverse polarity protection. Compatible with VPT's DV and VPT series isolated DC-DC converters, the VPTc10-28 provides compliance for both ISO 7637-2 and DEF STAN 61-5 Part 6 Issue 6 input power requirements for vehicle systems. The VPTc10-28 also provides compliance for DEF STAN 61-5 Part 6 Issue 5, MIL-STD-1275, and MIL-STD-704, and reduces the reflected noise of the DC-DC converters to meet conducted emissions and conducted susceptibility requirements of DEF STAN 59-411 Part 3 Issue 1 and MIL-STD-461. A proven design heritage, no optoisolators and a rugged all metal package ensure long term reliability.

The VPTc10-28 is 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 10 Amps of Output Current
- Up to 150W of Output Power
- Wide Input Voltage Range
- Transient Operation up to 202 Volts per the Load Dump Requirement of ISO 7637-2 and DEF STAN 61-5 Part 6 Issue 6
- Transient Operation up to 100 Volts per DEF STAN 61-5 Part 6 Issue 5 and MIL-STD-1275
- Transient Operation up to 80 Volts per MIL-STD-704
- 45 dB Minimum Attenuation at 500 kHz
- Provides Inrush Current Limiting
- True Reverse Polarity Protection
- Wide Temperature Range, -55°C to 100°C
- Internally Conformal Coated
- Six Sided Non-Hermetic Rugged Metal Enclosure
- Meets Conducted Emissions Requirements of DEF STAN 59-411 Part 3 Issue 1 and MIL-STD-461C/D/E/F When Used With VPT Series DC-DC Converters
- Meets Conducted Susceptibility Requirements of DEF STAN 59-411 Part 3 Issue 1 for Land Applications, MIL-STD-461C, CS01 and CS02, and MIL-STD-461D/E/F when used with VPT Series DC-DC Converters



Figure 1 – VPTc10-28 Input Module (Not To Scale)



VPTc10-28 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)	202 Volts	Storage Temperature	-55°C to +125°C
Output Current	10 Amps	Lead Solder Temperature (10 seconds)	300°C
Power Dissipation (Full Load, $T_{CASE} = +100^{\circ}\text{C}$)	12 Watts	Weight (Maximum)	66 Grams

Parameter	Conditions	VPTc10-28			Units	
		Min	Typ	Max		
STATIC						
INPUT Voltage	Continuous	-40	28	40	V	
	Transient	1 sec ²	-	-	50	V
	Transient	100 ms, 500 mΩ per MIL-STD-1275	-	-	100	V
	Transient	350ms, 1Ω per ISO 7637-2 Load Dump ²	-	-	202	V
	Transient	1μs, 50Ω or 70 μs, 15 mJ	-250	-	250	V
	Transient	10 μs, 50Ω	-	-	600	V
Current	Inhibited	-	-	10	mA	
Inrush Current ²	V _{in} = 0 to 28V, Full Load	-	5	10	A	
Inhibit Pin Input ²		0	-	1.5	V	
Inhibit Pin Open Circuit Voltage ²		10	12	16	V	
UVLO Turn On		-	9	11	V	
UVLO Turn Off ²		5	8	-	V	
OUTPUT Voltage	Continuous	0	-	40	V	
	Transient	0	-	50	V	
Current ¹		0	-	10	A	
Power ¹		0	-	150	W	
DC RESISTANCE		-	50	120	mΩ	
NOISE REJECTION	f = 500 kHz	45	65	-	dB	
CAPACITANCE	Any Pin to Case	57	-	135	nF	
CASE ISOLATION	1500 V _{DC}	100	-	-	MΩ	
MTBF (MIL-HDBK-217F)	GM @ T _c = 55°C	-	501	-	kHrs	
DYNAMIC						
Turn On Delay	V _{IN} = 0V to 28V	-	4	10	mSec	

- Notes: 1. Derate linearly to 0 at 110°C.
2. Verified by qualification testing.

BLOCK DIAGRAM

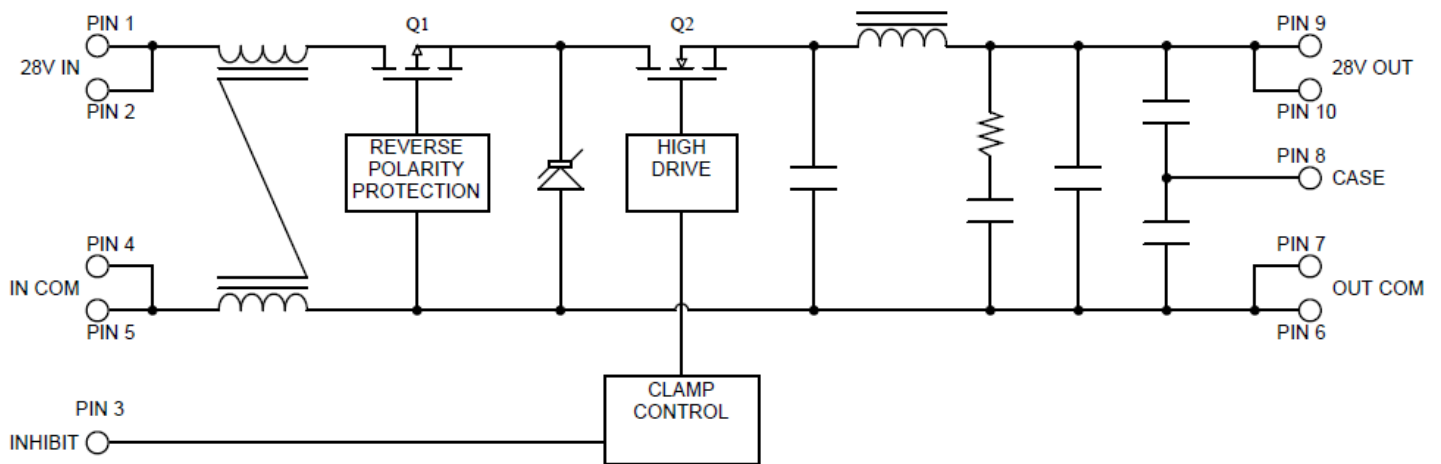


Figure 2

CONNECTION DIAGRAM

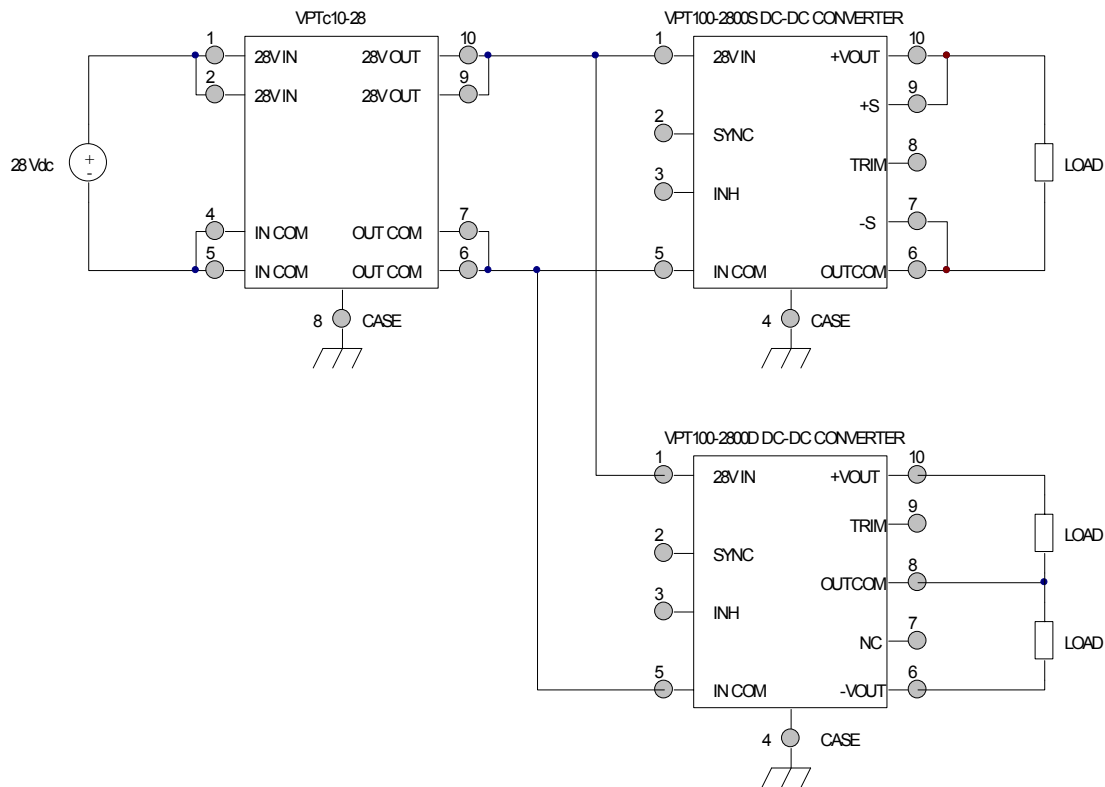


Figure 3

(Shown with Two VPT100-2800S&D Series DC-DC Converters)

PERFORMANCE CURVES

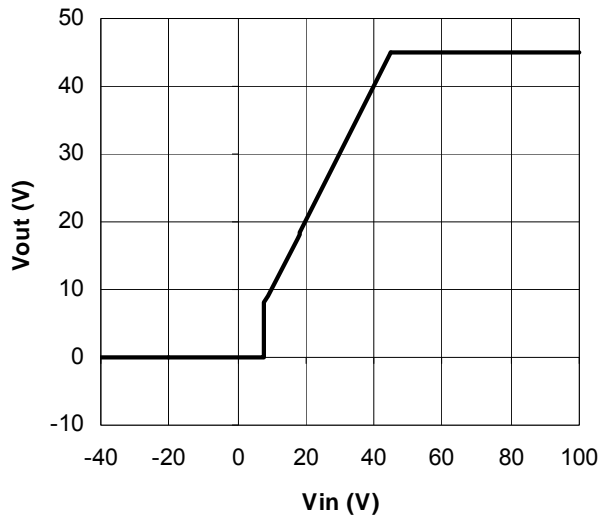


Figure 4 – Output Voltage vs Input Voltage

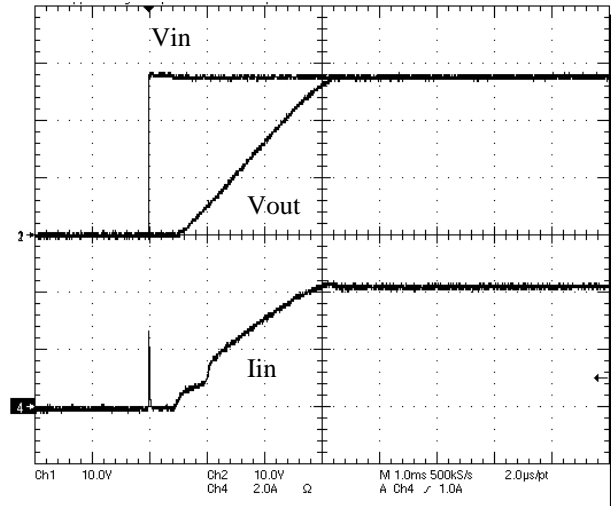


Figure 5 – Vout, Iin (Inrush current) during turn-on

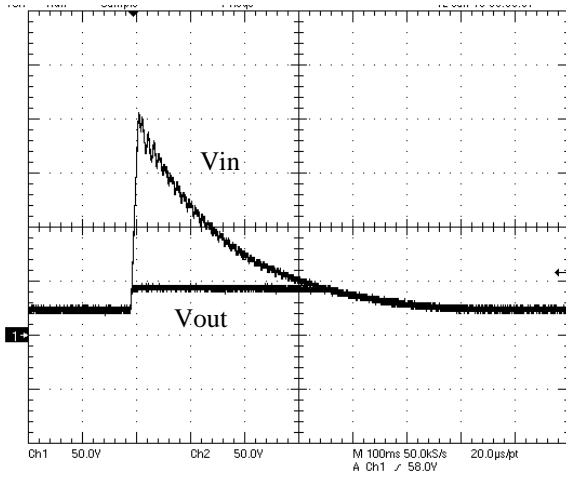


Figure 6 – Vin, Vout during 202V, 350ms Transient

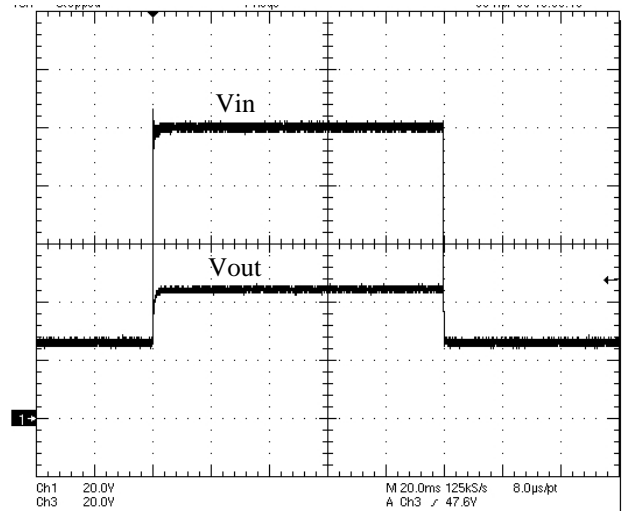


Figure 7 – Vin, Vout during 100V, 100ms Transient

EMI PERFORMANCE CURVES

($T_{CASE} = 25^{\circ}C$, $V_{IN} = +28V \pm 5\%$, Full Load, Unless Otherwise Specified)

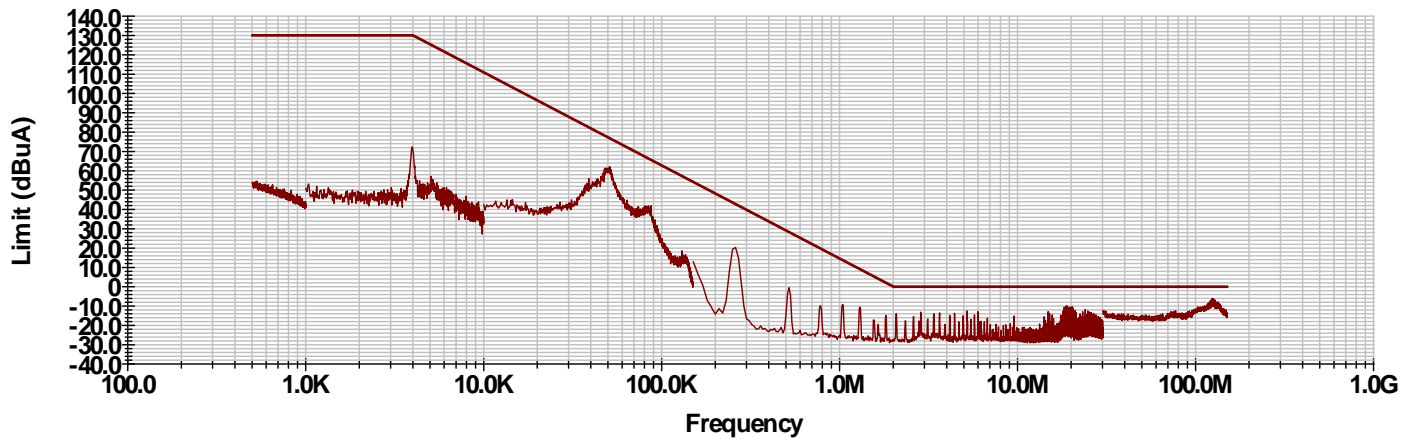


Figure 8 – DEF STAN 59-411 Part 3 Issue 1, DCE01.B for Land Service Use, Class A
(Two VPT100-2800S With VPTc10-28 Input Module at 150W)

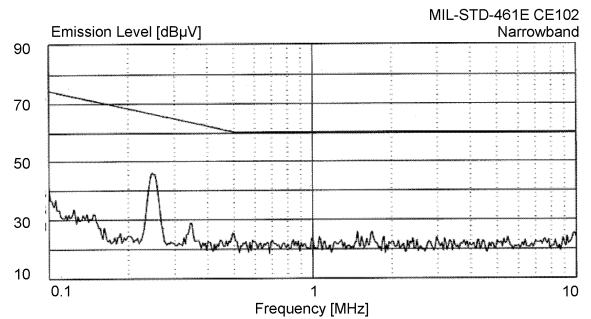
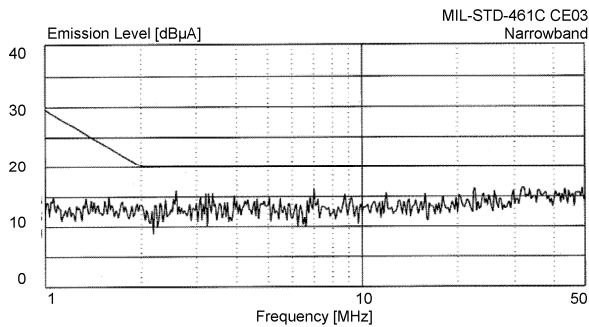
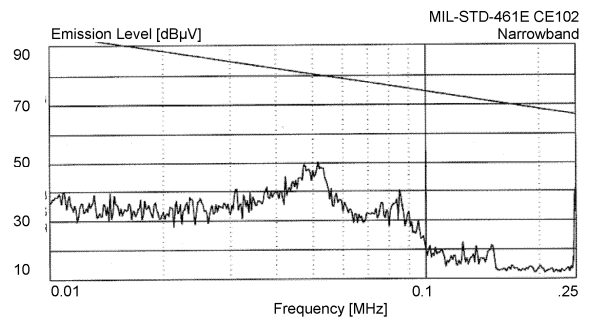
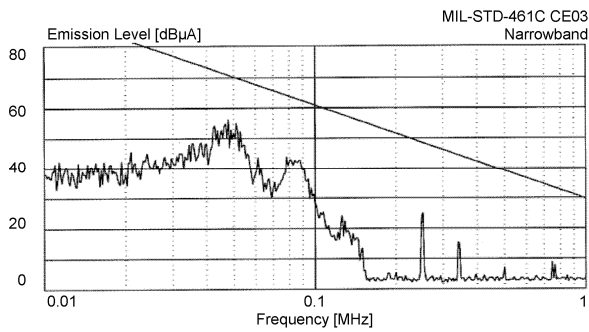


Figure 9 – MIL-STD-461C
Two VPT100-2800S With VPTc10-28 Input Module

Figure 10 – MIL-STD-461D/E/F
Two VPT100-2800S With VPTc10-28 Input Module

PACKAGE SPECIFICATIONS

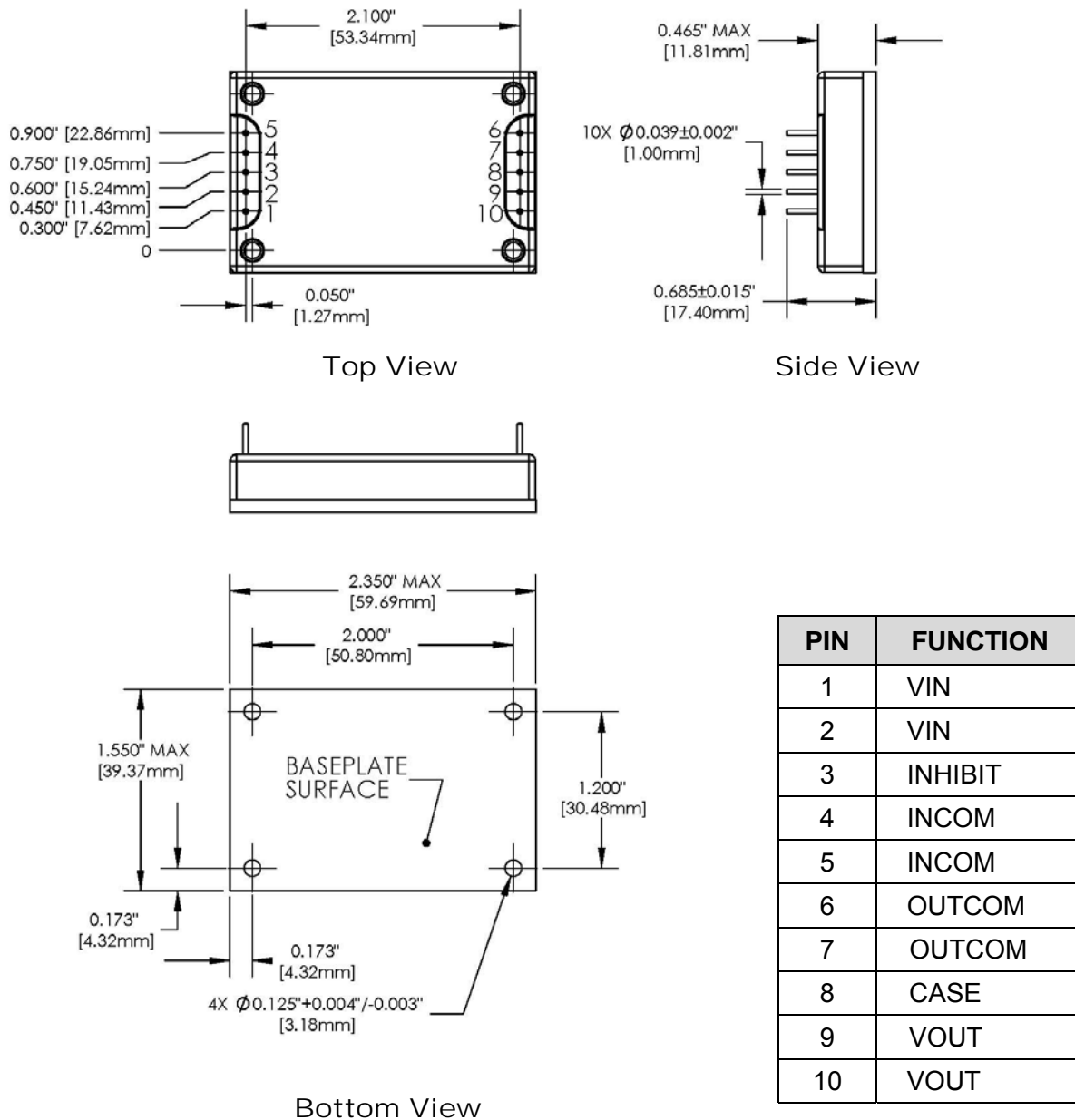


Figure 11 – Package and Pinout
(Dimensional Limits are ± 0.005 " Unless Otherwise Stated)

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.

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	Input Return Connection
5	INCOM	Input Return Connection
6	OUTCOM	Output Return Connection
7	OUTCOM	Output Return Connection
8	CASE	Case Connection
9	VOUT	Positive Output Voltage 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	MIL-STD-883, Method 1015, 96 hours at +100°C
Final Electrical	100% at 25°C
External Visual	MIL-STD-883, Method 2009

ORDERING INFORMATION

VPTc10-	28
1	2

(1)	(2)	
Product Series	Nominal Input Voltage	
VPTc10	28	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
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E-mail: vpsales@vpt-inc.com

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