



# VPTF20-28 Series



## HIGH RELIABILITY COTS EMI FILTERS

### DESCRIPTION

The VPTF20 series of COTS EMI filters is a cost effective solution for many demanding high reliability applications. A wide input voltage range accommodates nominal 28V inputs including avionics, mobile, ground systems, and other applications. The VPTF20 EMI filter is designed to filter the conducted emissions of multiple VPT series DC-DC converters up to its current rating, providing compliance to MIL-STD-461C/D/E for conducted emissions. A proven design heritage and a rugged all metal package ensure long term reliability.

The VPTF20 series is intended for harsh environments including severe vibration, shock and temperature cycling. Testing is to JESD22, MIL-STD-810, and MIL-STD-883.

These EMI filters 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 20.0 Amp Maximum Current
- Up to 400W Output Power
- Wide Input Voltage Range: 0 to 50 Volts per MIL-STD-704 and MIL-STD-1275
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- 45 dB Minimum Attenuation at 500 kHz
- Wide Temperature Range, -55°C to 100°C
- Internally Conformal Coated
- Six Sided Non-Hermetic Rugged Metal Enclosure
- Meets MIL-STD-461C/D/E Conducted Emissions Requirements When Used With a VPT Series DC-DC Converter
- Meets Conducted Susceptibility Requirements of MIL-STD-461C, CS01 and CS02, and MIL-STD-461D/E when used with a VPT Series DC-DC Converter



**Figure 1** – VPTF20-28 EMI Filter  
(Not To Scale)

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)	50 V <sub>DC</sub>	Storage Temperature	-55°C to +125°C
Input Voltage (Transient, 1 second)	80 Volts	Lead Solder Temperature (10 seconds)	300°C
Output Current	20.0 Amps	Weight (Maximum)	75 Grams
Power Dissipation (Full Load, $T_{CASE} = +100^{\circ}\text{C}$ )	20 Watts		

Parameter	Conditions	VPTF20-28			Units
		Min	Typ	Max	
<b>STATIC</b>					
INPUT Voltage	Continuous	0	28	50	V
	Transient, 1 sec <sup>2</sup>	-	-	80	V
OUTPUT Voltage		$V_{OUT} = V_{IN} - (I_{IN} \times R_{DC})$			V
Current <sup>1</sup>		0	-	20	A
Power		0	-	400	W
DC RESISTANCE		-	25	50	mΩ
POWER DISSIPATION <sup>2</sup>		-	-	20	W
NOISE REJECTION	f = 500 kHz	45	-	-	dB
CAPACITANCE	Any Pin to Case	70	-	130	nF
ISOLATION	Any Pin to Case, 500 VDC	100	-	-	MΩ
MTBF (MIL-HDBK-217F)	GM @ TC = 55°C	-	739	-	kHrs

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

### BLOCK DIAGRAM

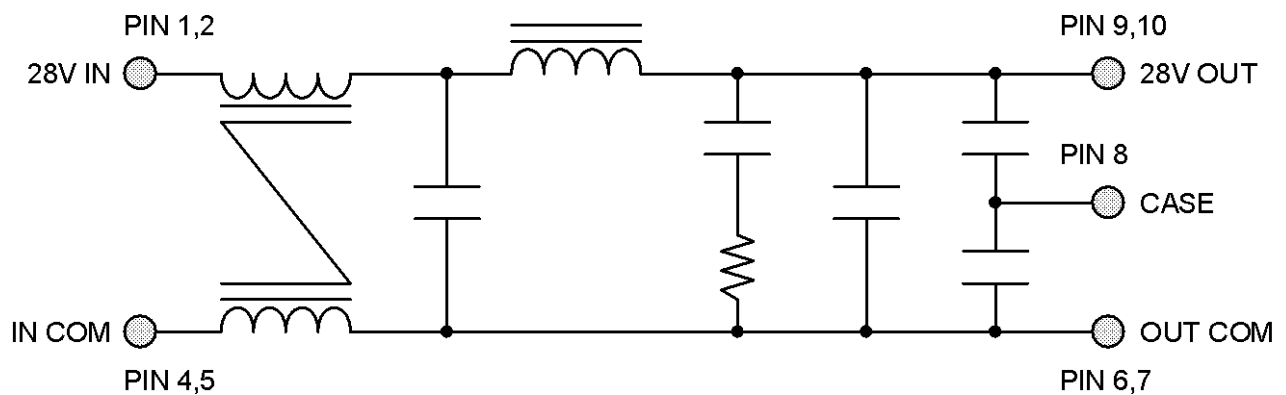
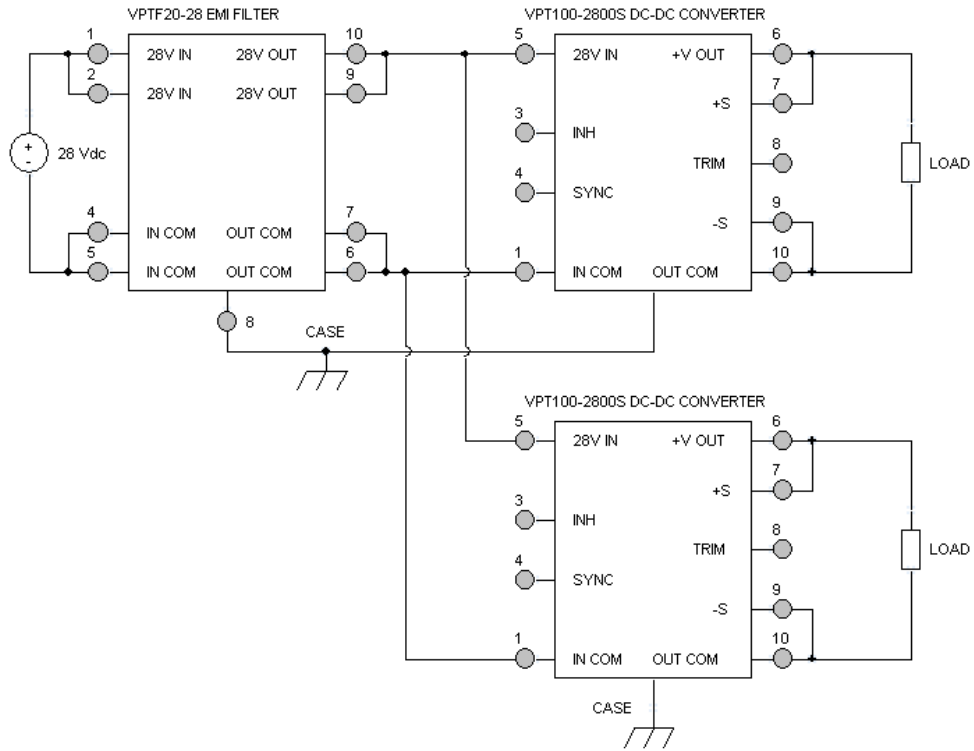


Figure 2

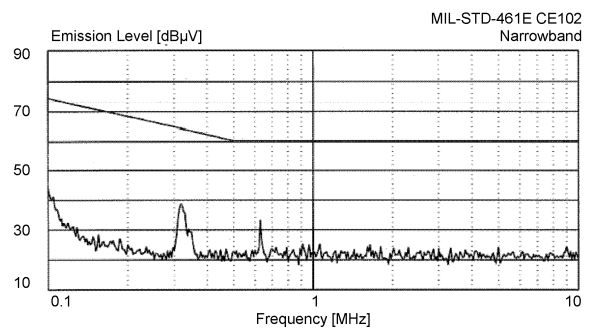
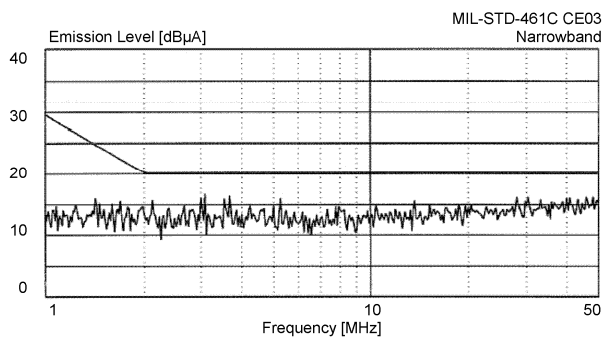
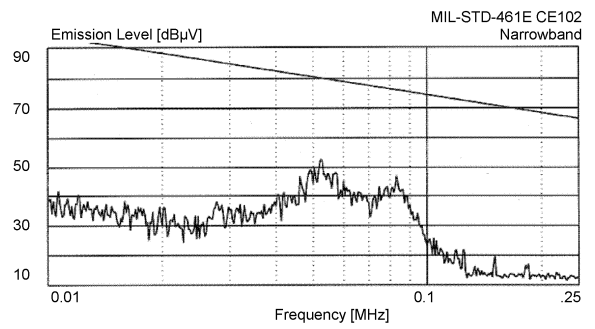
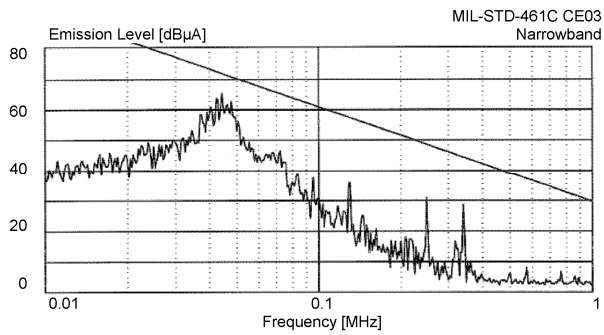
## CONNECTION DIAGRAM



**Figure 3**  
(Shown with multiple VPT Series DC-DC Converters)

## EMI PERFORMANCE CURVES

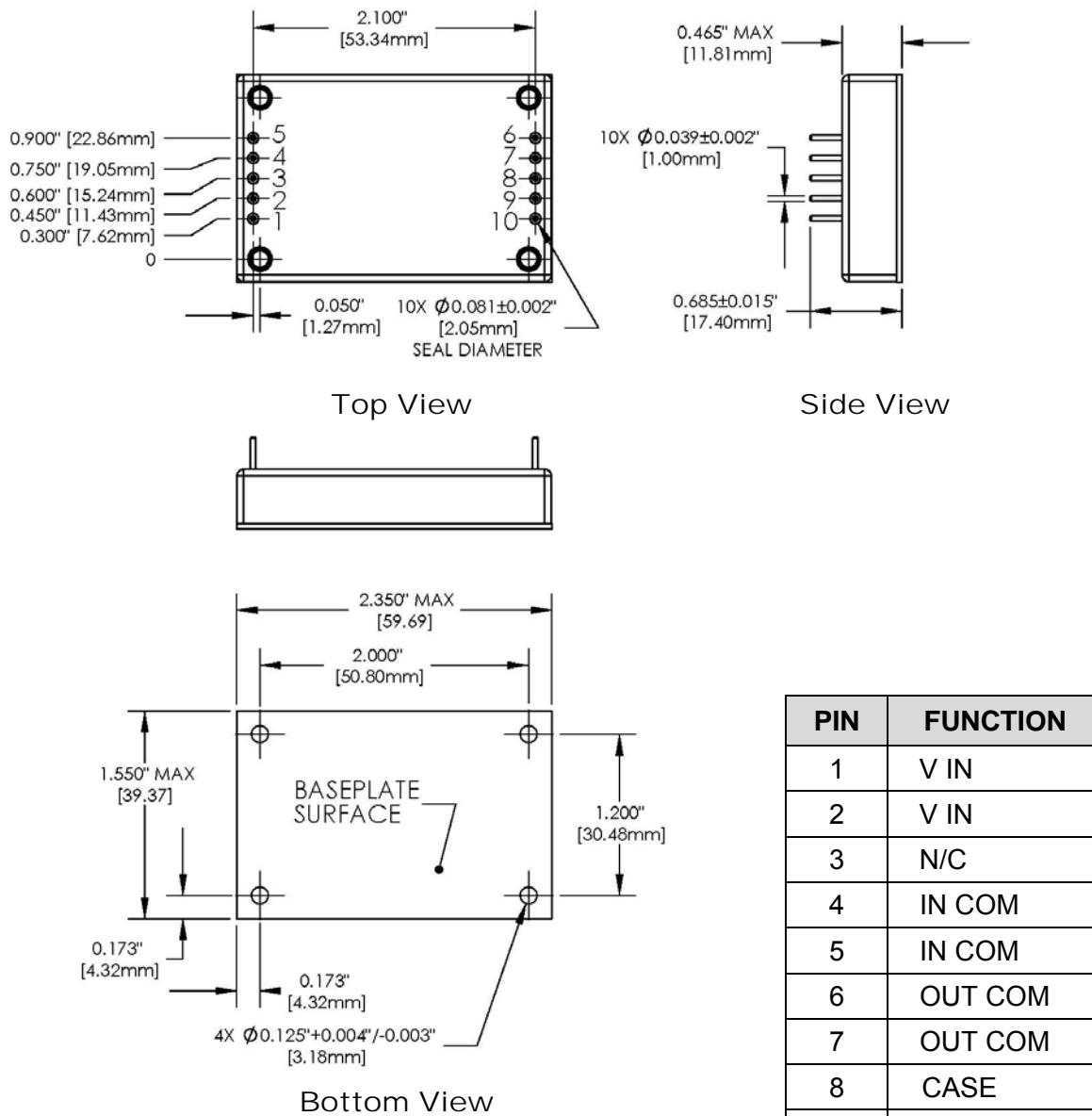
( $T_{CASE} = 25^{\circ}C$ ,  $V_{IN} = +28V \pm 5\%$ , Full Load, Unless Otherwise Specified)



**Figure 4 – MIL-STD-461C**  
Two VPT100-2800S With VPTF20-28 EMI Filter

**Figure 5 – MIL-STD-461D/E**  
Two VPT100-2800S With VPTF20-28 EMI Filter

## PACKAGE SPECIFICATIONS



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

**Figure 6 – Package and Pinout**  
(Dimensional Limits are  $\pm 0.005$ " 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	28V IN	Positive Input Voltage Connection
2	28V IN	Positive Input Voltage Connection
3	N/C	No Connection
4	IN COM	Input Return Connection
5	IN COM	Input Return Connection
6	OUT COM	Output Return Connection
7	OUT COM	Output Return Connection
8	CASE	Case Connection
9	28V OUT	Positive Output Voltage Connection
10	28V OUT	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

VPTF20-	28
1	2

(1)	(2)	
Product Series	Nominal Input Voltage	
VPTF20-	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  
**Fax:** (425) 353-4030  
**E-mail:** [vptsales@vpt-inc.com](mailto:vptsales@vpt-inc.com)

All information contained in this datasheet is believed to be accurate, however, no responsibility is assumed for possible errors or omissions. The products or specifications contained herein are subject to change without notice.