



# DVMD28 Series

## HIGH RELIABILITY HYBRID EMI FILTERS

### DESCRIPTION

The DVMD series of hybrid EMI filters is operable over the full military (-55 °C to +125 °C) temperature range with no power derating. The DVMD EMI filter is designed to filter conducted emissions of two DVTR or one DVFL series DC-DC converters.

These filters are designed and manufactured in a facility qualified to ISO9001 and certified to MIL-PRF-38534 and MIL-STD-883.

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
- Wide Input Voltage Range: 0 to 50 Volts per MIL-STD-704
- Up to 7.0 Amp Maximum Current
- 40 dB Minimum Attenuation at 500 kHz
- Industry Standard Pinout
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- Precision Seam Welded Hermetic Package
- Custom Versions Available
- Additional Environmental Screening Available
- Meets MIL-STD-461C and MIL-STD-461D EMC Requirements
- Protects Against Conducted Susceptibility Specified in MIL-STD-461C, CS01 and CS02
- MIL-PRF-38534 Element Evaluated Components

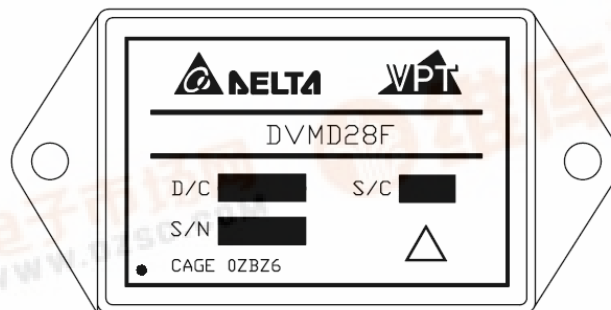


Figure 1 – DVMD28F EMI Filter  
(Not To Scale)

SPECIFICATIONS ( $T_{CASE} = -55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ,  $V_{IN} = +28\text{V} \pm 5\%$ , Full Load, Unless Otherwise Specified)

## ABSOLUTE MAXIMUM RATINGS

Input Voltage (Continuous)	50 V <sub>DC</sub>	Storage Temperature	-65°C to +150°C
Input Voltage (Transient, 1 second)	80 Volts	Lead Solder Temperature (10 seconds)	300°C
Output Current	7 Amps	Weight (Maximum)	63 Grams
Power Dissipation (Full Load, $T_{CASE} = +125^{\circ}\text{C}$ )	6 Watts		

Parameter	Conditions	DVMD28			Units
		Min	Typ	Max	
STATIC					
INPUT Voltage <sup>2</sup>	Continuous	0	28	50	V
	Transient, 1 sec	-	-	80	V
Current <sup>1,2,3</sup>	Continuous	0	-	7	A
OUTPUT Voltage <sup>2</sup>	Continuous	V <sub>OUT</sub> = V <sub>IN</sub> – (I <sub>IN</sub> x R <sub>DC</sub> )			V
Current <sup>2,3</sup>	Continuous	0	-	7	A
DC RESISTANCE	Continuous	-	-	120	mΩ
POWER DISSIPATION <sup>2</sup>	Continuous	-	-	6	W
NOISE REJECTION	f = 500 kHz	40	-	-	dB
CAPACITANCE	Pin to Case	25	-	55	nF
ISOLATION	Any Pin to Case, 500 V <sub>DC</sub>	100	-	-	MΩ
MTBF (MIL-HDBK-217F)	AIF @ T <sub>C</sub> = 55°C	-	1.225	-	MHrs

- Notes:
1. Derate linearly to 0 at 135°C.
  2. Verified by qualification testing.
  3. Rated current applies at any voltage.

## BLOCK DIAGRAM

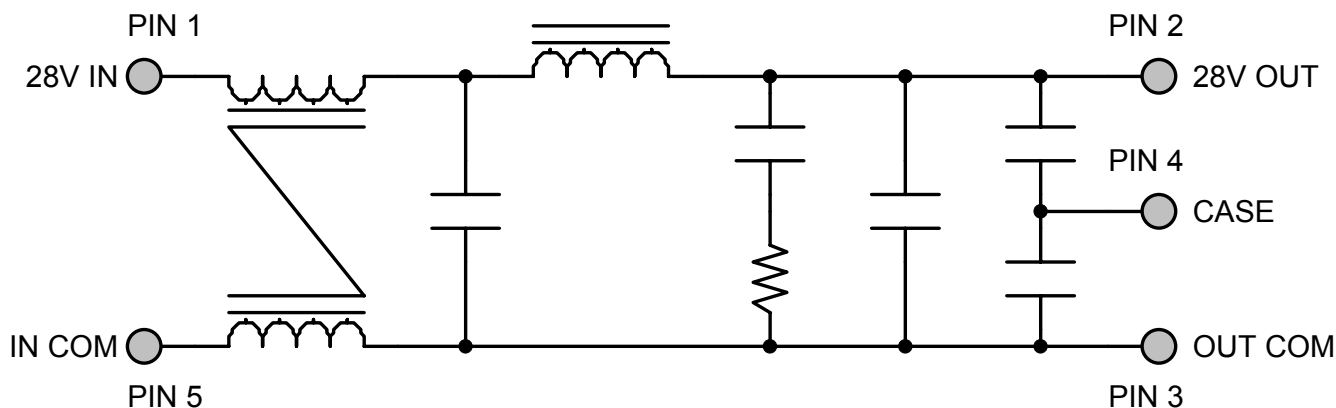
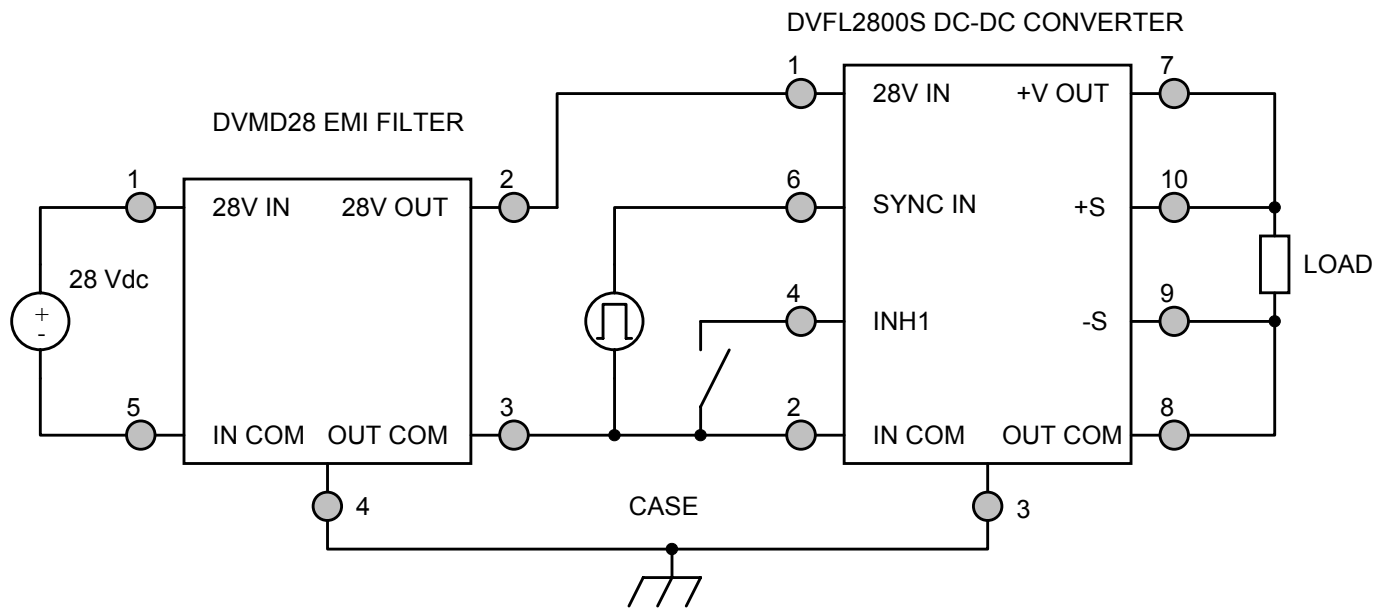


Figure 2

## CONNECTION DIAGRAMS

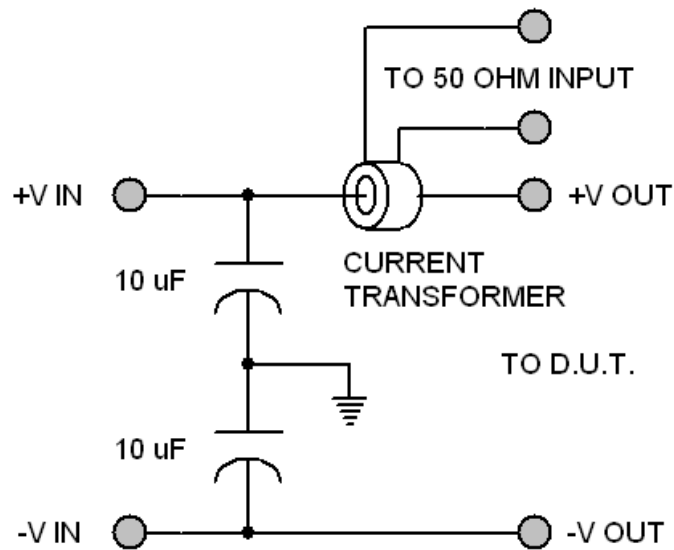


**Figure 3** – DVMD28 EMI Filter Hookup with Single Converter

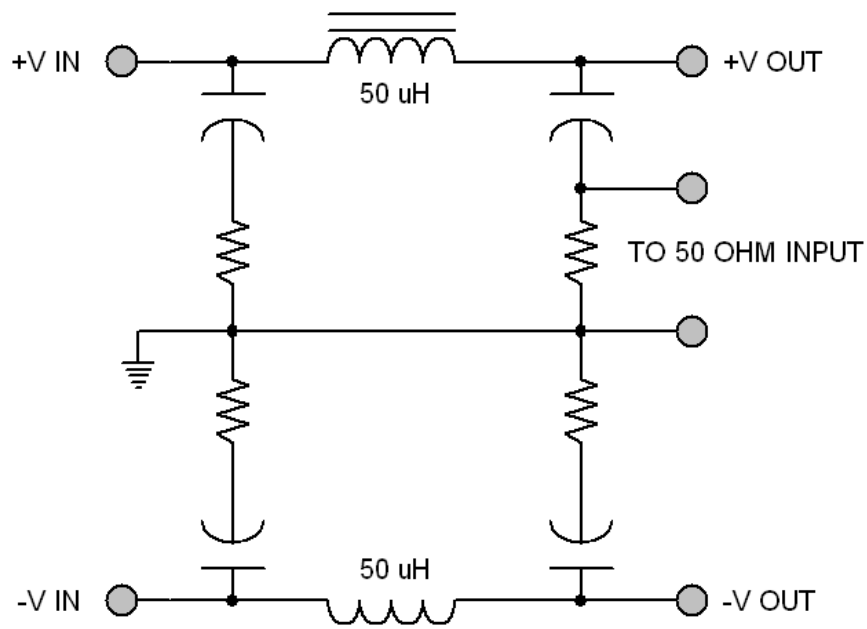
The diagram illustrates the electrical connections for a DVMD28 EMI filter and two DVTR2800S DC-DC converters. A 28 Vdc source is connected to the 28V IN and IN COM (pin 5) of the DVMD28 EMI filter. The 28V OUT (pin 2) of the filter is connected to the 28V IN (pin 1) of the top DVTR2800S DC-DC converter. The IN COM (pin 4) of the filter is connected to the IN COM (pin 10) of the bottom DVTR2800S DC-DC converter. Both converters have their SYNC (pin 9) and INH (pin 2) pins connected to a common ground through a switch and a pulse generator. The +V OUT (pin 5) and -S (pin 3) pins of both converters are connected to a common load. The -S (pin 3) and OUT COM (pin 4) pins of both converters are connected to a common ground through a switch and a pulse generator. The CASE (pin 7, 8) of both converters is connected to a common ground through a switch and a pulse generator.

**Figure 4 – DVMD28 EMI Filter Hookup with Two Converters**

EMI MEASUREMENT METHODS CONNECTION DIAGRAMS



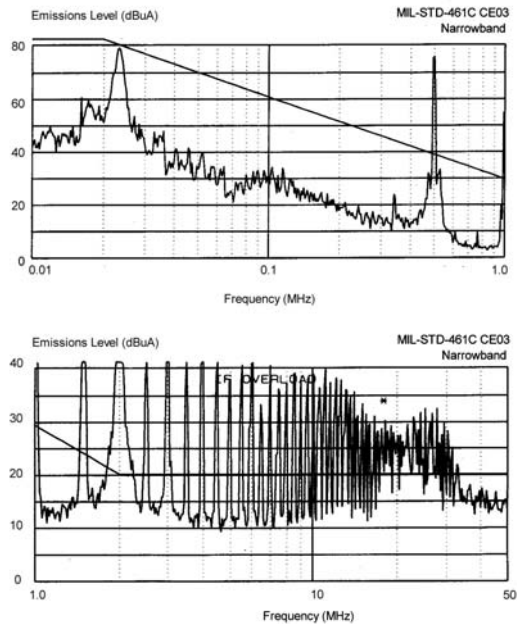
**Figure 5** – MIL-STD-461C Measurement Method (Feedthrough Capacitor)



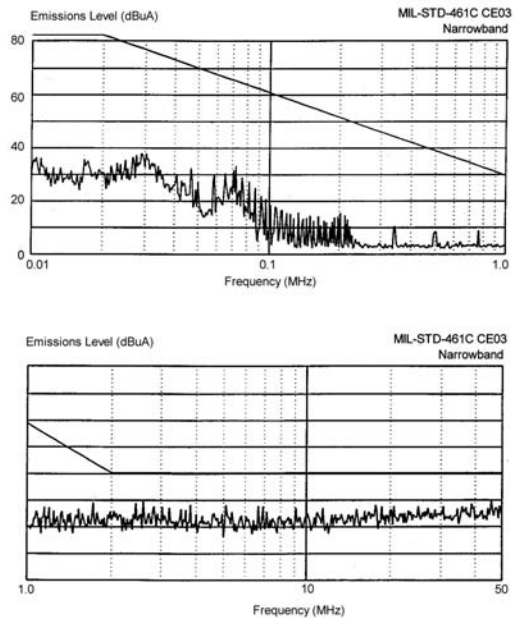
**Figure 6** – MIL-STD-461D Measurement Method (LISN)

## EMI PERFORMANCE CURVES

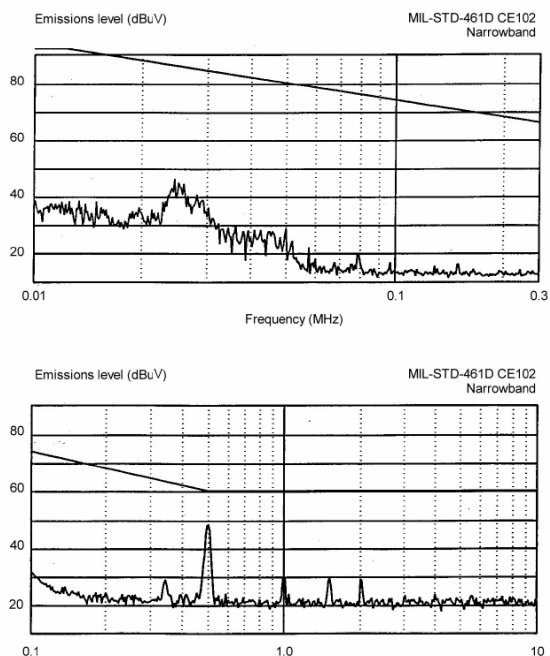
( $T_{CASE} = 25^{\circ}\text{C}$ ,  $V_{IN} = +28\text{V} \pm 5\%$ , Full Load, Unless Otherwise Specified)



**Figure 7 – MIL-STD-461C**  
(2) DVTR2800S Without EMI Filter

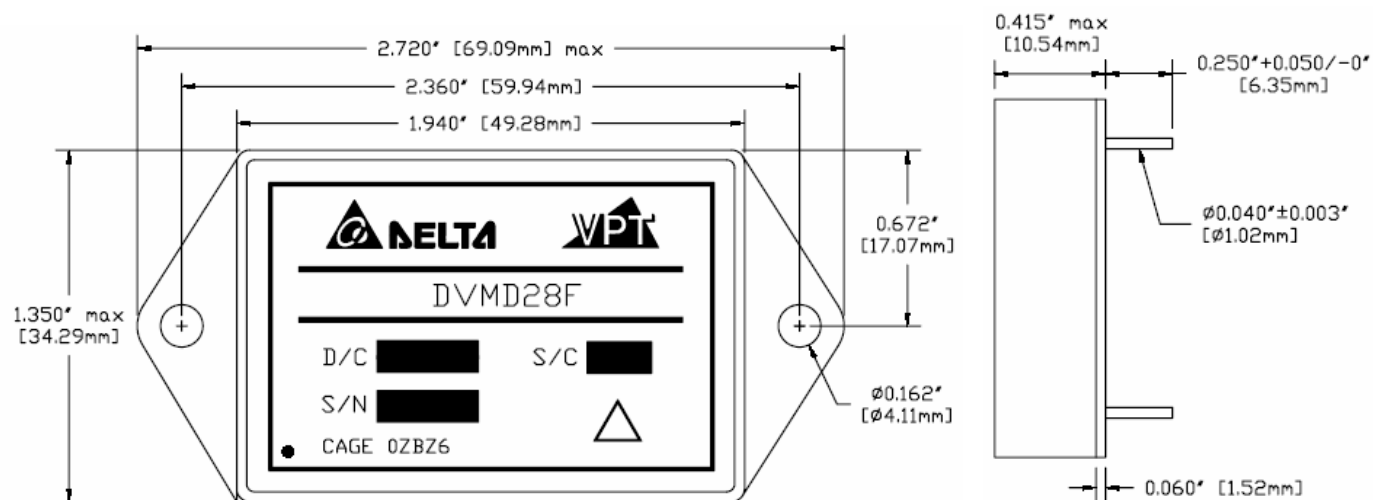


**Figure 8 – MIL-STD-461C**  
(2) DVTR2800S With DVMD28 EMI Filter



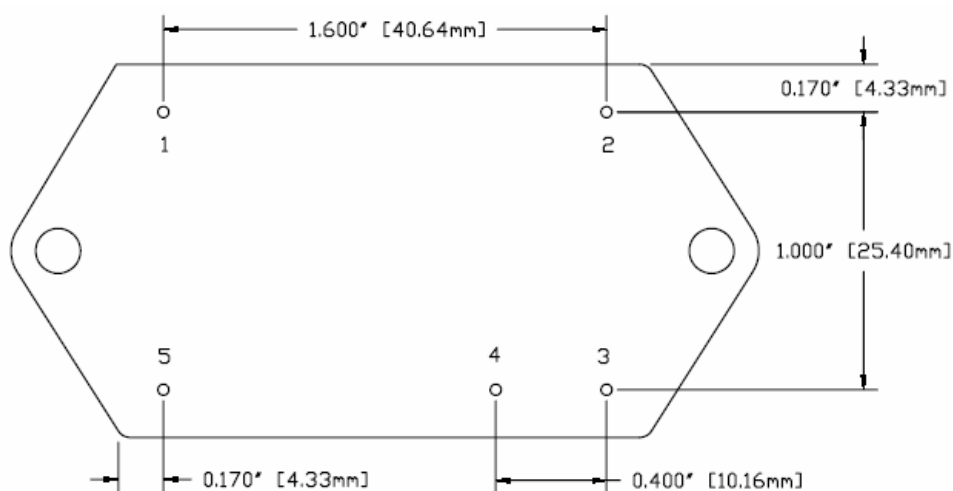
**Figure 9 – MIL-STD-461D**  
(2) DVTR2800S With DVMD28 EMI Filter

## PACKAGE SPECIFICATIONS



**TOP VIEW**

**SIDE VIEW**



**BOTTOM VIEW**

PIN	FUNCTION
1	28V IN
2	28V OUT
3	OUT COM
4	CASE
5	IN COM

**Figure 10 – Package and Pinout**  
(Dimensional Limits are  $\pm 0.005"$  Unless Otherwise Stated)

## PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	28V IN	Positive Input Voltage Connection
2	28V OUT	Positive Output Voltage Connection
3	OUT COM	Output Common Connection
4	CASE	Case Connection
5	IN COM	Input Common Connection



## ENVIRONMENTAL SCREENING (100% Tested Per MIL-STD-883 as referenced to MIL-PRF-38534)

Screening	MIL-STD-883	Standard (No Suffix)	Extended /ES	HB /HB	Class H /H	Class K /K
Non-Destructive Bond Pull	N/A – Products do not contain Wirebonds	N/A	N/A	N/A	N/A	N/A
Internal Visual	Method 2017, 2032 Internal Procedure	•	•	•	•	•
Temperature Cycling	Method 1010, Condition C Method 1010, -55°C to 125°C		•	•	•	•
Constant Acceleration	Method 2001, 3000g, Y1 Direction Method 2001, 500g, Y1 Direction		•	•	•	•
PIND	Method 2020, Condition A <sup>2</sup>					•
Pre Burn-In Electrical	100% at 25°C					•
Burn-In	Method 1015, 320 hours at +125°C Method 1015, 160 hours at +125°C 96 hours at +125°C 24 hours at +125°C	•	•	•	•	•
Final Electrical	MIL-PRF-38534, Group A <sup>1</sup> 100% at 25°C	•	•	•	•	•
Hermeticity	Method 1014, Fine Leak, Condition A Method 1014, Gross Leak, Condition C Dip (1 x 10 <sup>-3</sup> )	•	• •	• •	• •	• •
Radiography	Method 2012 <sup>3</sup>					•
External Visual	Method 2009	•	•	•	•	•

- Notes:
1. 100% R&R testing at -55°C, +25°C, and +125°C with all test data included in product shipment.
  2. PIND test Certificate of Compliance included in product shipment.
  3. Radiographic test Certificate of Compliance and film(s) included in product shipment.

## ORDERING INFORMATION

<b>DVMD</b>	<b>28</b>	<b>F</b>	<b>/HB</b>	-	<b>XXX</b>
1	2	3	4		5

(1)

(2)

(3)

(4)

(5)

Product Series	Nominal Input Voltage		Package Option		Screening Code <sup>1,2</sup>		Additional Screening Code
<b>DVMD</b>	<b>28</b>	28 Volts	<b>F</b>	Flanged	<b>None</b> <b>/ES</b> <b>/HB</b> <b>/H</b> <b>/K</b>	Standard Extended HB Class H Class K	Contact Sales

- Notes:
1. Contact the VPT Inc. Sales Department for availability of Class H (/H) or Class K (/K) qualified products.
  2. VPT Inc. reserves the right to ship higher screened or SMD products to meet lower screened orders at our sole discretion unless specifically forbidden by customer contract.

Please contact your sales representative or the VPT Inc. Sales Department for more information concerning additional environmental screening and testing, different input voltage, output voltage, power requirement, source inspection, and/or special element evaluation for space or other higher quality applications.



## DVMD28 Series

### SMD (STANDARD MICROCIRCUIT DRAWING) NUMBERS

Standard Microcircuit Drawing (SMD)	DVMD28 Series Similar Part Number
*T.B.D.	DVMD28F/H

Do not use the DVMD28 Series similar part number for SMD product acquisition. It is listed for reference only. For exact specifications for the SMD product, refer to the SMD drawing. SMD's can be downloaded from the DSCC website at <http://www.dscclia.mil/programs/smcr/>. The SMD number listed above is for MIL-PRF-38534 Class H screening, standard gold plated lead finish, and no RHA (Radiation Hardness Assurance) level. Please reference the SMD for other screening levels, lead finishes, and radiation levels.

### 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)