



# 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.

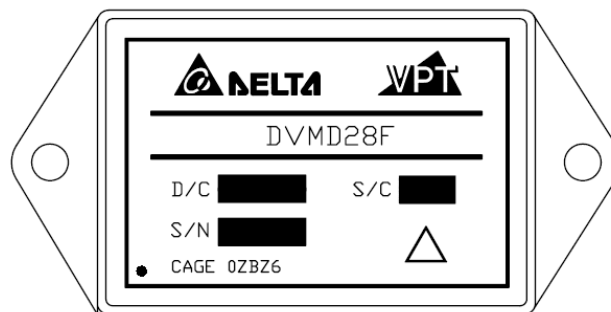
These filters are designed and manufactured in a facility qualified to ISO9001 and certified to MIL-PRF-38534 and MIL-STD-883.

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-461 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**  
(Exact marking may differ from that shown)

## SPECIFICATIONS (T<sub>CASE</sub> = -55°C to +125°C, V<sub>IN</sub> = +28V ± 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) (Un-Flanged / Flanged)	(53 / 57) Grams
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6 Watts		

Parameter	Conditions	DVMD28			Units
		Min	Typ	Max	
<b>STATIC</b>					
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	$V_{OUT} = V_{IN} - (I_{IN} \times R_{DC})$			V
	Current <sup>2,3</sup>	Continuous	0	-	7
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 initial electrical design verification. Post design verification, parameter shall be guaranteed to the limits specified.
  3. Rated current applies at any voltage.

### BLOCK DIAGRAM

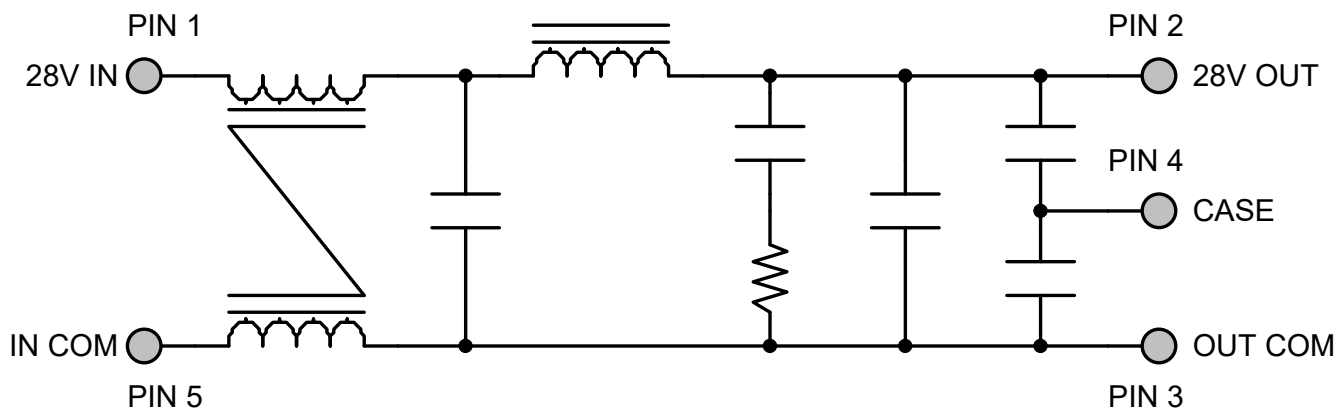
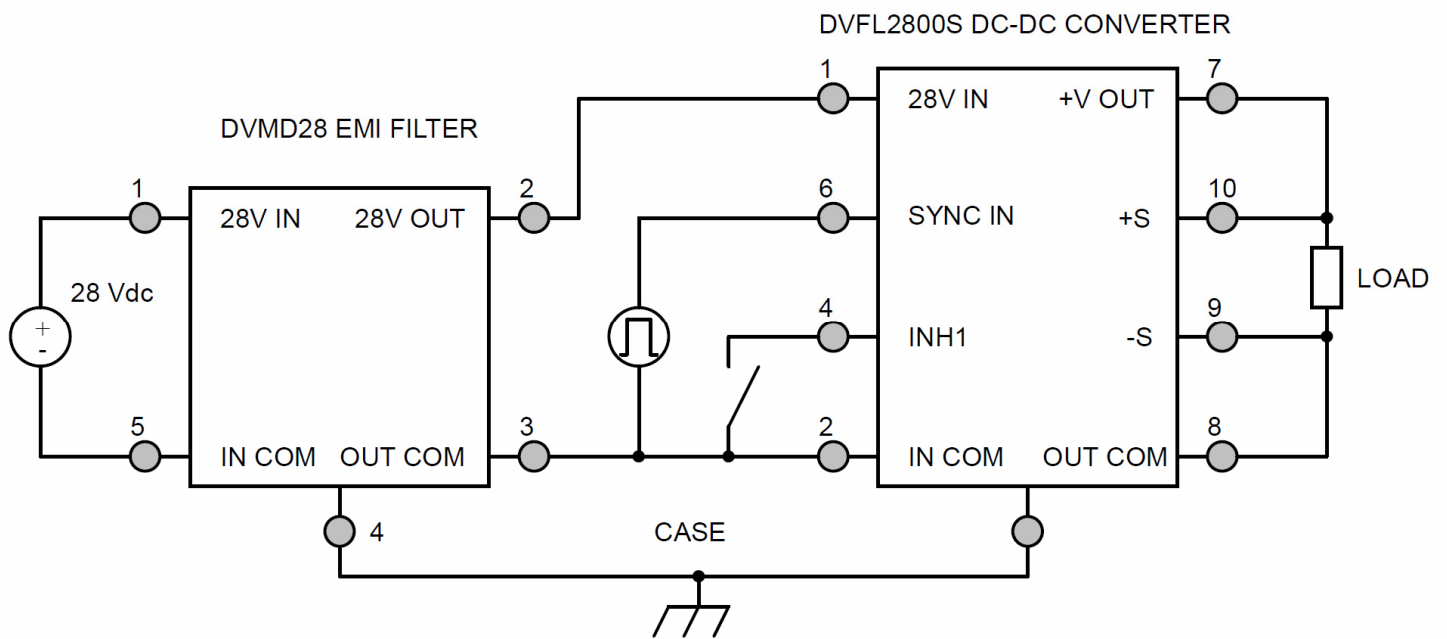


Figure 2

**CONNECTION DIAGRAMS**



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

CONNECTION DIAGRAMS

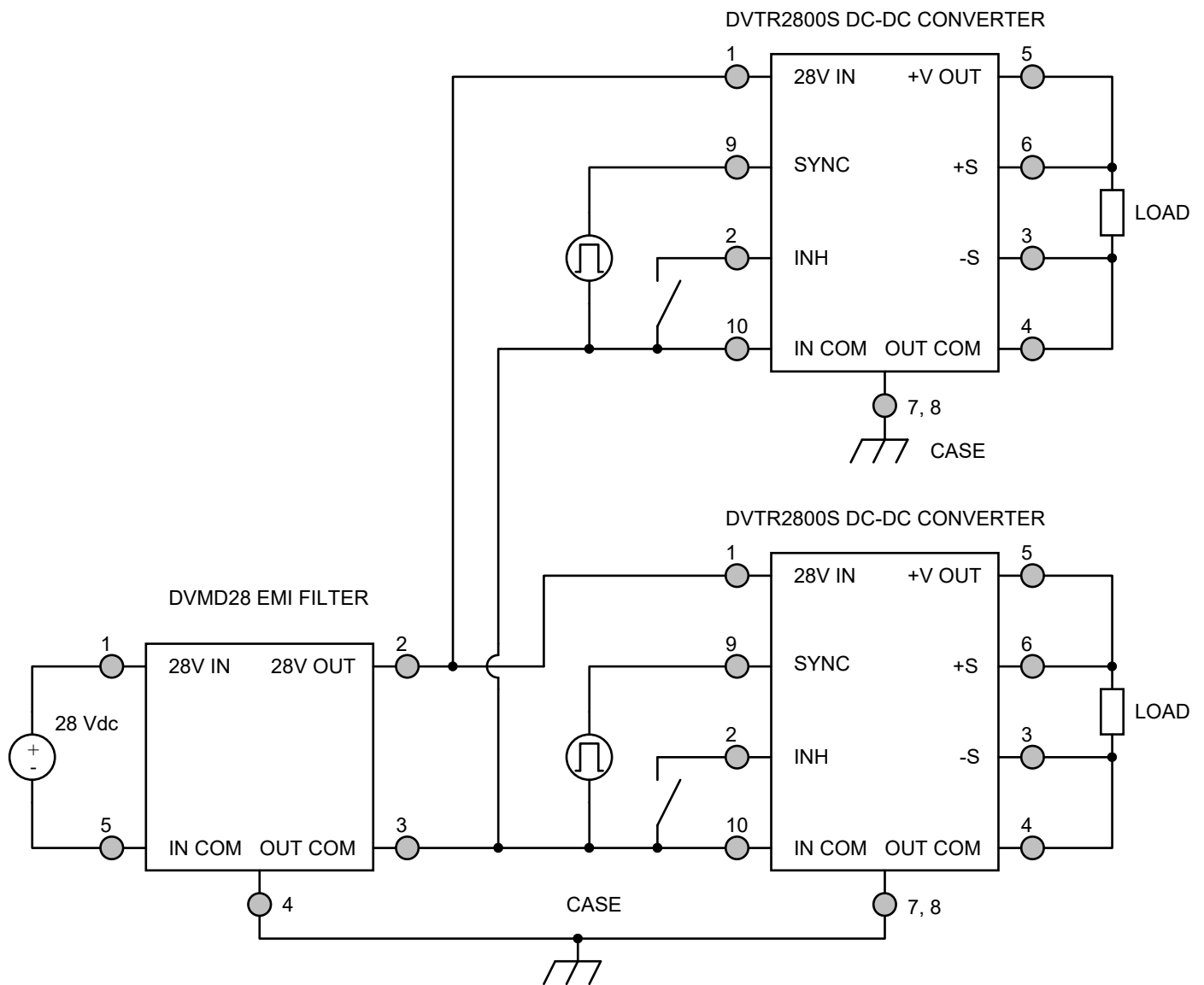


Figure 4 – DVMD28 EMI Filter Hookup with Two Converters

EMI MEASUREMENT METHODS CONNECTION DIAGRAMS

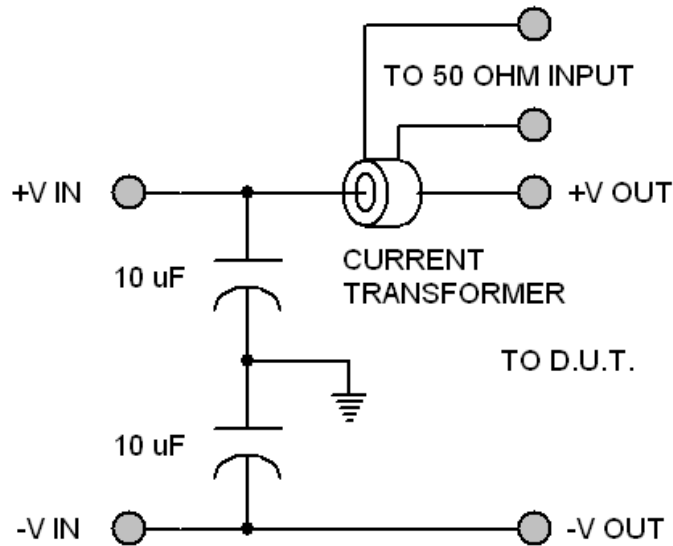


Figure 5 – MIL-STD-461C Measurement Method (Feedthrough Capacitor)

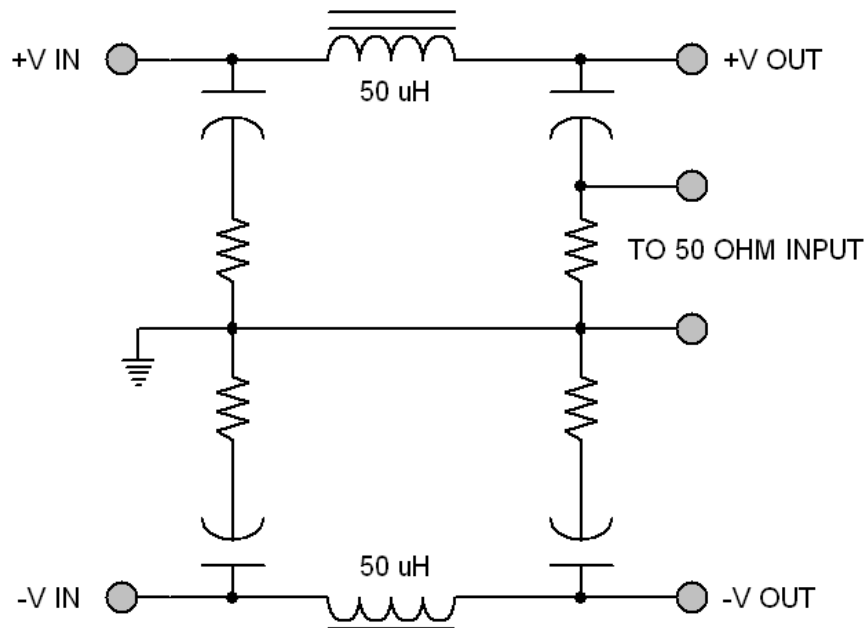
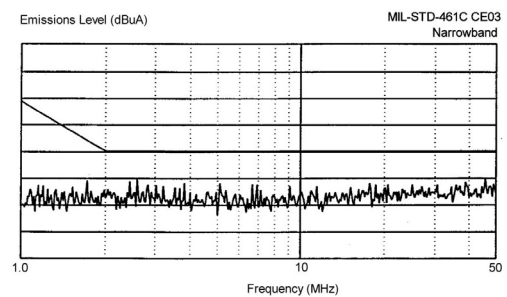
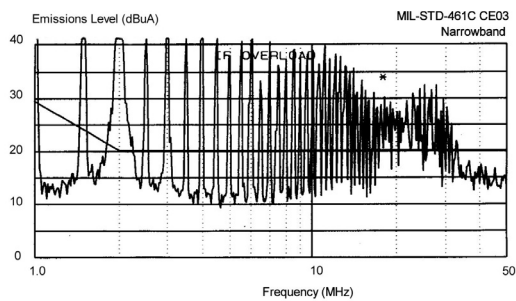
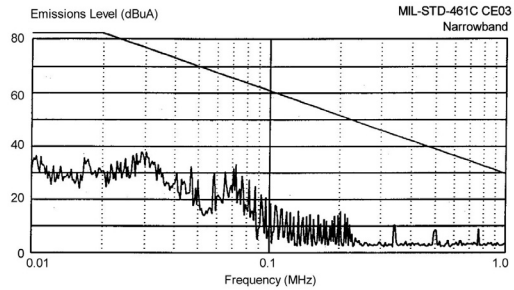
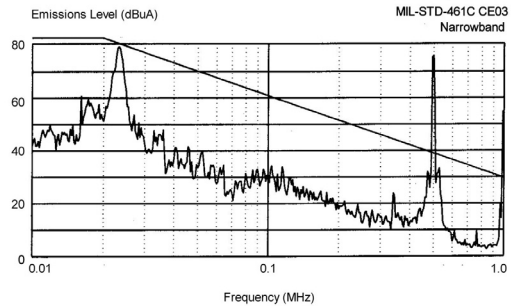


Figure 6 – MIL-STD-461D Measurement Method (LISN)

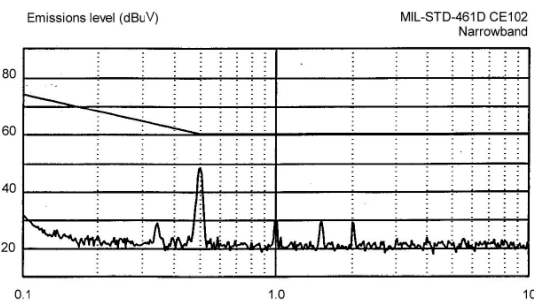
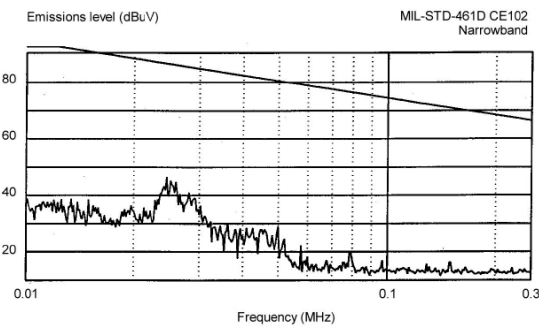
**EMI PERFORMANCE CURVES**

(T<sub>CASE</sub> = 25°C, V<sub>IN</sub> = +28V ± 5%, Full Load, Unless Otherwise Specified)



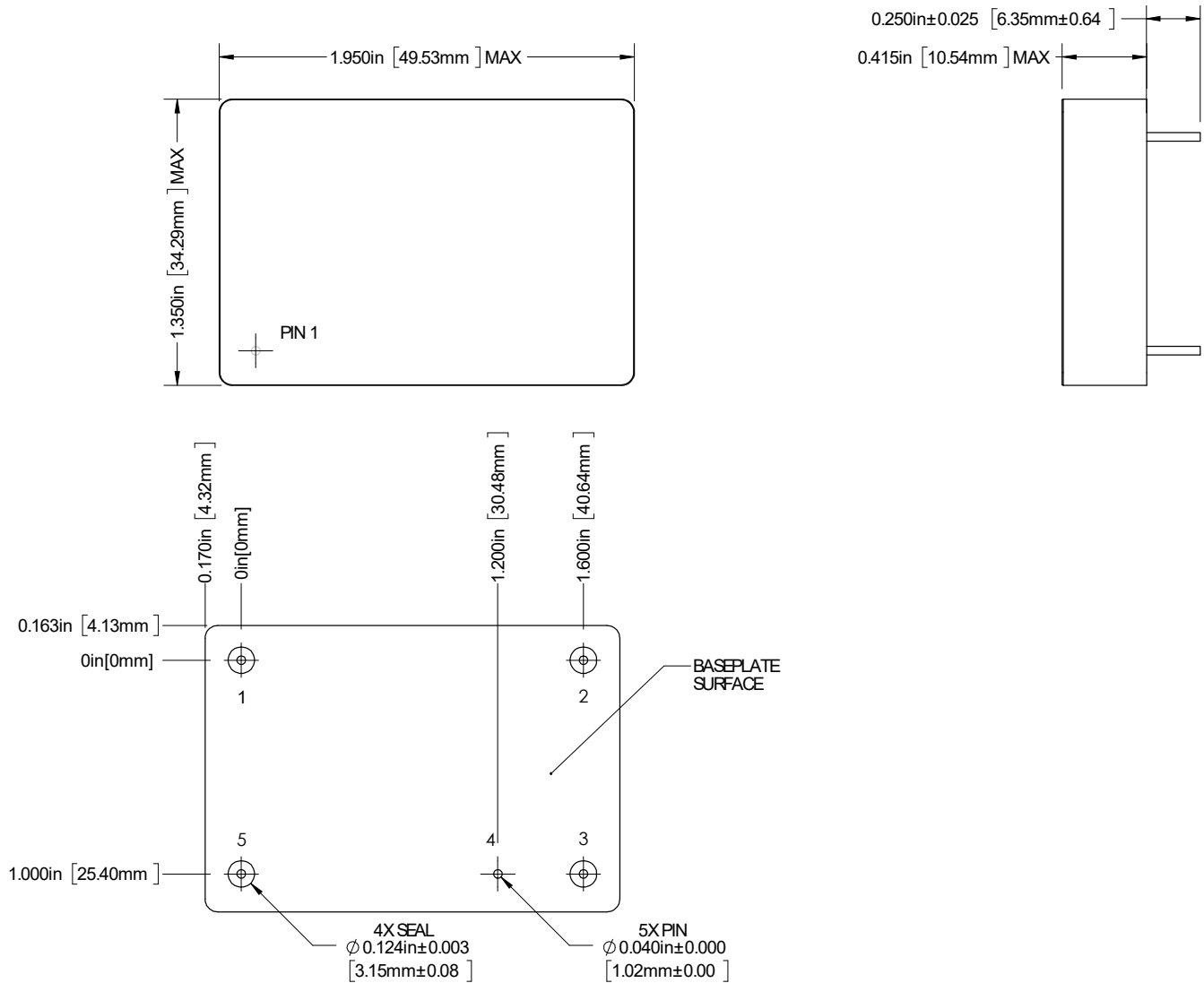
**Figure 7 – MIL-STD-461C**  
(2) DVTR2800S Without EMI Filter

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



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

**PACKAGE SPECIFICATIONS (NON-FLANGED, SEAM SEAL)**



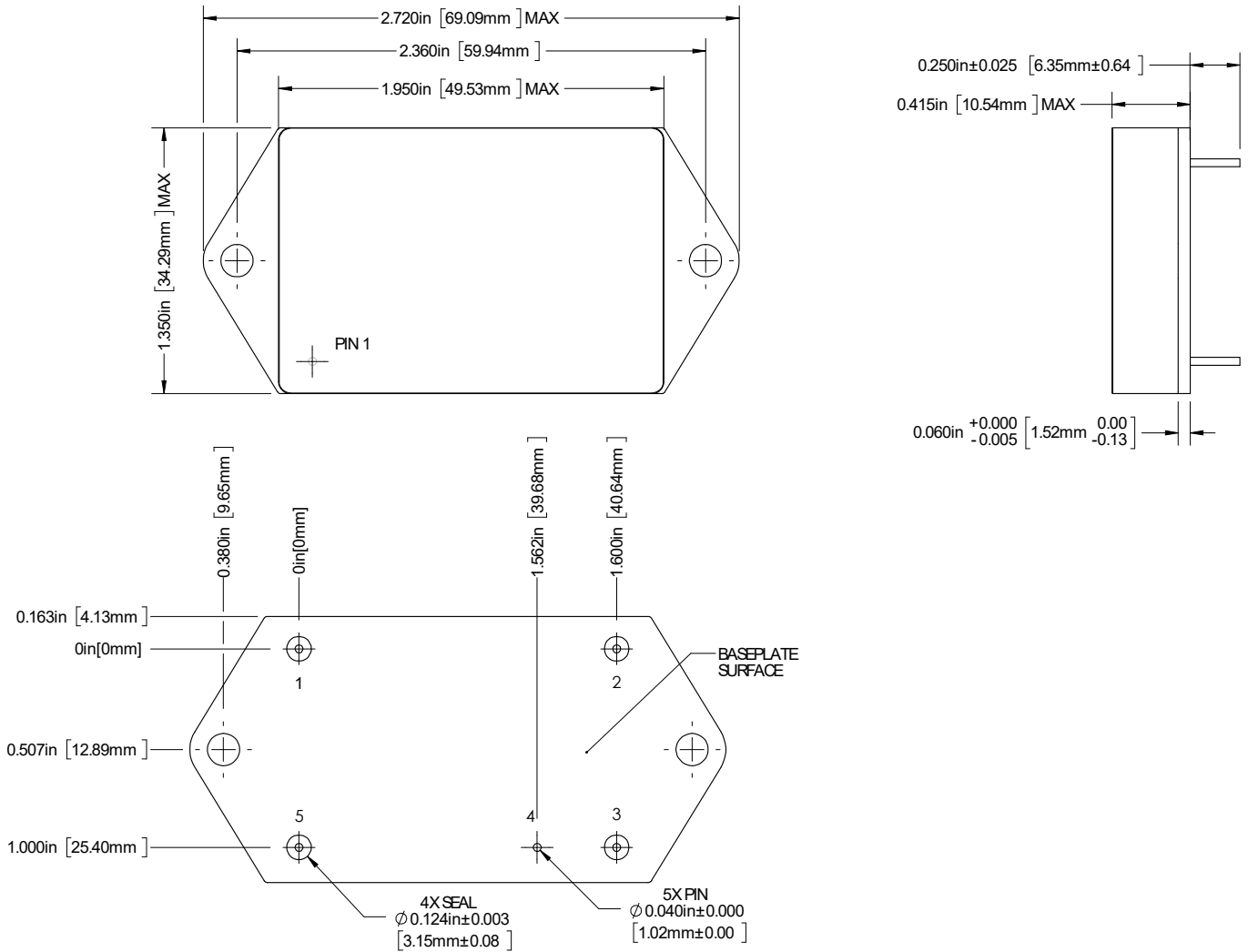
**Notes:**

1. Dimensional limits are  $\pm 0.005"$  unless otherwise specified.
2. Case temperature is measured on the center of the baseplate.
3. Material: Case (Steel, Gold over Nickel Plated), Cover (Kovar, Nickel Plated), Pins (Copper Cored Alloy 52, Gold over Nickel Plated), Pin Seal (Ceramic)

Pin	Function	Pin	Function	Pin	Function
1	28V IN	3	OUT COM	5	IN COM
2	28V OUT	4	CASE		

**Figure 10 – Package and Pinout**

**PACKAGE SPECIFICATIONS (FLANGED, SEAM SEAL)**



**Notes:**

1. Dimensional limits are ±0.005" unless otherwise specified.
2. Case temperature is measured on the center of the baseplate.
3. Mounting holes are not threaded. Recommended fastener is #6-32 screw.
4. Material: Case (Steel, Gold over Nickel Plated), Cover (Kovar, Nickel Plated), Pins (Copper Cored Alloy 52, Gold over Nickel Plated, Pin Seal (Ceramic)

Pin	Function	Pin	Function	Pin	Function
1	28V IN	3	OUT COM	5	IN COM
2	28V OUT	4	CASE		

**Figure 11 – Package and Pinout**



**PACKAGE PIN DESCRIPTION**

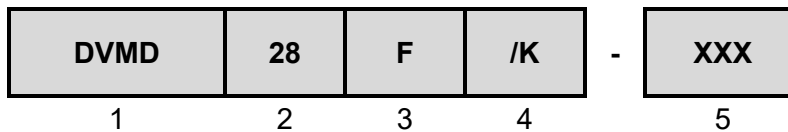
Pin	Function	Description
1	28V IN	Positive Input Voltage Connection
2	28V OUT	Positive Output Voltage Connection
3	OUT COM	Output Common Connection
4	CASE	Case Connection
5	IN COM	Input Common Connection

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

Test	MIL-STD-883 Test Method, Condition	No Suffix (Standard) Non-QML <sup>5</sup>	/ES (Extended) Non-QML <sup>5</sup>	/H (Class H)	/K and /KL <sup>5,8</sup> (Class K)
Non-Destructive Bond Pull	TM2023	• <sup>4</sup>	• <sup>4</sup>	• <sup>4</sup>	•
Internal Visual	TM2010, TM2017, TM2032 (MIL-STD-750, TM2072, TM2073)	•	•	•	•
Temperature Cycling	TM1010, Condition C -65°C to 150°C, Ambient			•	•
	TM1010, Condition B -55°C to 125°C, Ambient		•		
Constant Acceleration	TM2001, 3000g, Y1 Direction			•	•
	TM2001, 500g, Y1 Direction		•		
PIND <sup>6</sup>	TM2020, Condition A				•
Pre Burn-In Electrical	25°C				•
Burn-In	TM1015, 320 hrs, 125°C, Case Typ				•
	TM1015, 160 hrs, 125°C, Case Typ			•	
	96 hrs, 125°C, Case Typ		•		
	24 hrs, 125°C, Case Typ	•			
Final Electrical	MIL-PRF-38534, Group A Subgroups 1-6 -55°C, 25°C, 125°C <sup>3</sup>			•	•
	MIL-PRF-38534, Group A Subgroups 1 and 4 25°C	•	•		
Hermeticity (Seal)	TM1014, Fine Leak, Condition A2 or B1		•	•	•
	TM1014, Gross Leak, Condition C1 or B2		•	•	•
	Gross Leak, Dip (No Bomb), Visual Verification	•			
Radiography <sup>7</sup>	TM2012				•
External Visual	TM2009	•	•	•	•

- Notes:
- Contact Sales for more information concerning additional environmental screening and testing options desired.
  - 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.
  - 100% R&R testing with all test data included in product shipment.
  - Not required per MIL-PRF-38534. Test is performed for additional product quality assurance.
  - Non-QML products may not meet all requirements of MIL-PRF-38534.
  - PIND test Certificate of Compliance included in product shipment.
  - Radiographic test Certificate of Compliance and film(s) or data CD included in product shipment.
  - KL1 products are identical in every way with Class K products in compliance with MIL-PRF-38534 revision L and later revisions except they contain elements evaluated to the requirements of MIL-PRF-38534 revision K and previous revisions. These devices are not marked with an SMD number or MIL-PRF-38534 certification mark and are marked with -KL1 screening code in place of -K.

## ORDERING INFORMATION



	(1)	(2)	(3)	(4)	(5)		
Product Series	Nominal Input Voltage		Package Option		Screening Code <sup>1,2,3</sup>	Additional Screening Code	
<b>DVMD</b>	<b>28</b>	28 Volts	<b>None F</b>	Standard Flanged	<b>None /ES /H /K /KL1</b>	Standard Extended Class H Class K Class K (KL1)	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 DSCC Drawing products to meet lower screened orders at our sole discretion unless specifically forbidden by customer contract.
3. -KL1 products are identical in every way with Class K products in compliance with MIL-PRF-38534 revision L and later revisions except they contain elements evaluated to the requirements of MIL-PRF-38534 revision K and previous revisions. These devices are not marked with an SMD number or MIL-PRF-38534 certification mark and are marked with -KL1 screening code in place of -K.

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.

## DSCC DRAWING NUMBERS

DSCC Drawing	DVMD28 Series Similar Part Number
06024-01HXC	DVMD28F/H
06024-01HXA	DVMD28F/H-E
06024-01HYC	DVMD28/H
06024-01HYA	DVMD28/H-E
06024-01KXC	DVMD28F/K
06024-01KXA	DVMD28F/K-E
06024-01KYC	DVMD28/K
06024-01KYA	DVMD28/K-E

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. SMDs can be downloaded from the DLA Land and Maritime (Previously known as DSCC) website at <https://landandmaritimeapps.dla.mil/programs/defaultapps.asp>. The SMD number listed above represents the Federal Stock Class, Device Type, Device Class Designator, Case Outline, Lead Finish and RHA Designator (where applicable). Please reference the SMD for other screening levels, lead finishes, and radiation levels. All SMD products are marked with a "Q" on the cover as specified by the QML certification mark requirement of MIL-PRF-38534.

## 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@vptpower.com](mailto:vptsales@vptpower.com)

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