

## HIGH RELIABILITY HYBRID EMI FILTERS

### DESCRIPTION

The DVMH50 series of hybrid EMI filters are operable over the full military (-55 °C to +125 °C) temperature range with no power derating. The DVMH50 EMI filter is designed to filter conducted emissions of two SVLHF50 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 60 Volts per MIL-STD-704
- Up to 1 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 Projection Welded Hermetic Package
- Custom Versions Available
- Meets MIL-STD-461 Revisions C, D, E, F and G Requirements for Conducted Emissions
- Meets MIL-STD-461 Revisions C, D, E, F and G Requirements for Conducted Susceptibility as detailed in the Application Note, "MIL-STD-461 Compliance for VPT DC-DC Converters and EMI Filters"
- MIL-PRF-38534 Element Evaluated Components



**Figure 1** – DVMH50 EMI Filter  
(Exact marking may differ from that shown)

## SPECIFICATIONS (T<sub>CASE</sub> = -55°C to +125°C, V<sub>IN</sub> = +50V ± 5%, Full Load, Unless Otherwise Specified)

### ABSOLUTE MAXIMUM RATINGS

|   |                    |   |                 |
|---|--------------------|---|-----------------|
| Input Voltage (Continuous)                                | 60 V <sub>DC</sub> | Storage Temperature                     | -65°C to +150°C |
| Input Voltage (Transient, 1 second)                       | 80 Volts           | Lead Solder Temperature (10 seconds)    | 270°C           |
| Output Current  | 1 Amp              | Weight (Maximum) (Un-Flanged / Flanged) | (24 / 29) Grams |
| Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C) | 0.25 Watts         |   |                 |

| Parameter                         | Conditions                           | DVMH50                                      |       |       | Units |
|-----------------------------------|--------------------------------------|---|-------|-------|-------|
|                                   |                                      | Min   | Typ   | Max   |       |
| <b>STATIC</b>                     |                                      |   |       |       |       |
| INPUT Voltage <sup>2</sup>        | Continuous                           | 0   | 50    | 60    | V     |
|                                   | Transient, 1 sec                     | -   | -     | 80    | V     |
| Current <sup>1,2,3</sup>          | Continuous                           | 0   | -     | 1     | A     |
| OUTPUT Voltage <sup>2</sup>       | Continuous                           | $V_{OUT} = V_{IN} - (I_{IN} \times R_{DC})$ |       |       | V     |
|                                   | Current <sup>2,3</sup>               | Continuous                                  | 0     | -     | 1     |
| DC RESISTANCE                     | Continuous                           | -   | 150   | 250   | mΩ    |
| POWER DISSIPATION <sup>2</sup>    | Continuous                           | -   | -     | 0.250 | W     |
| NOISE REJECTION                   | f = 500 kHz                          | 40  | -     | -     | dB    |
| CAPACITANCE                       | Pin to Case                          | 70  | -     | 106   | nF    |
| ISOLATION                         | Any Pin to Case, 500 V <sub>DC</sub> | 100   | -     | -     | MΩ    |
| MTBF (MIL-HDBK-217F) <sup>4</sup> | SF @ T <sub>C</sub> = 55°C           | -   | 16.34 | -     | 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.
4. Correction factor of 0.12 added to ceramic capacitors.

### BLOCK DIAGRAM

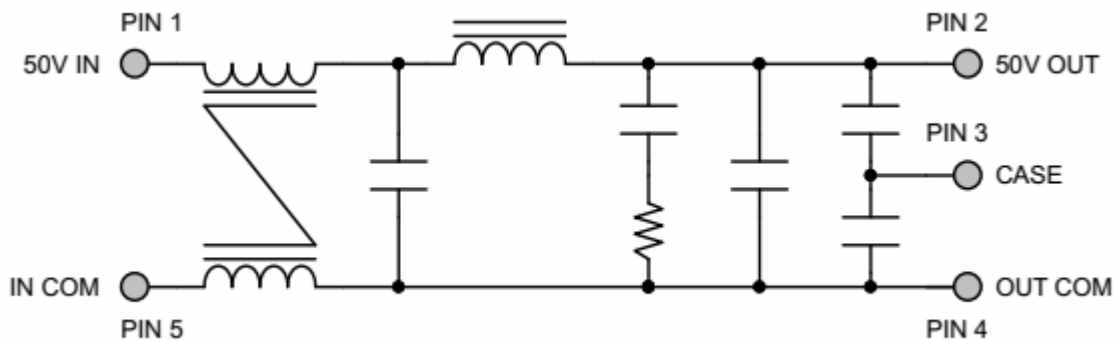
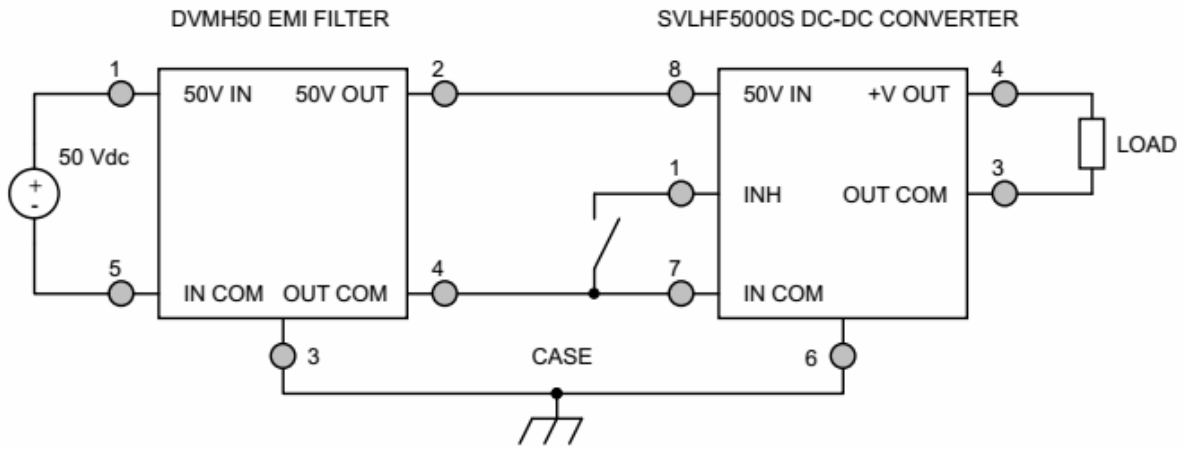


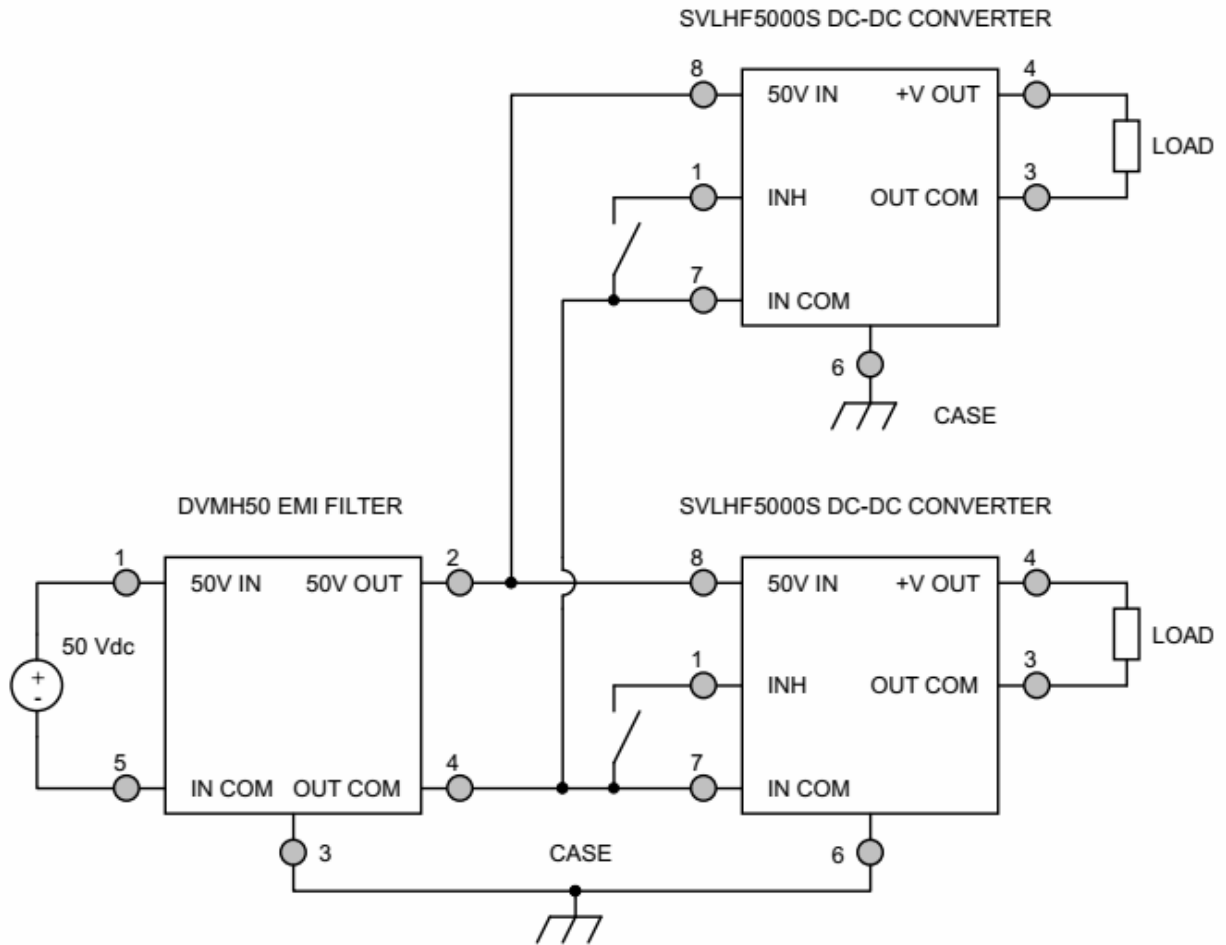
Figure 2

## CONNECTION DIAGRAMS



**Figure 3 – DVMH50 EMI Filter Hookup with Single Converter**

## CONNECTION DIAGRAMS



**Figure 4** – DVMH50 EMI Filter Hookup with Two Converters

EMI MEASUREMENT METHODS CONNECTION DIAGRAMS

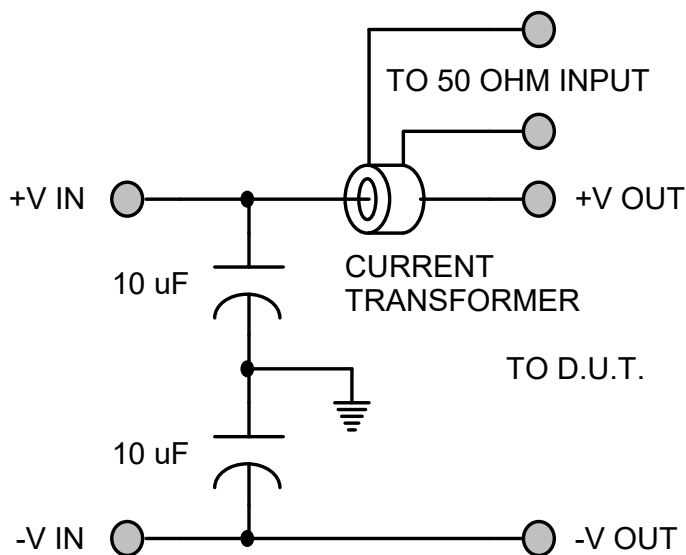


Figure 5 – MIL-STD-461C Measurement Method (Feedthrough Capacitor)

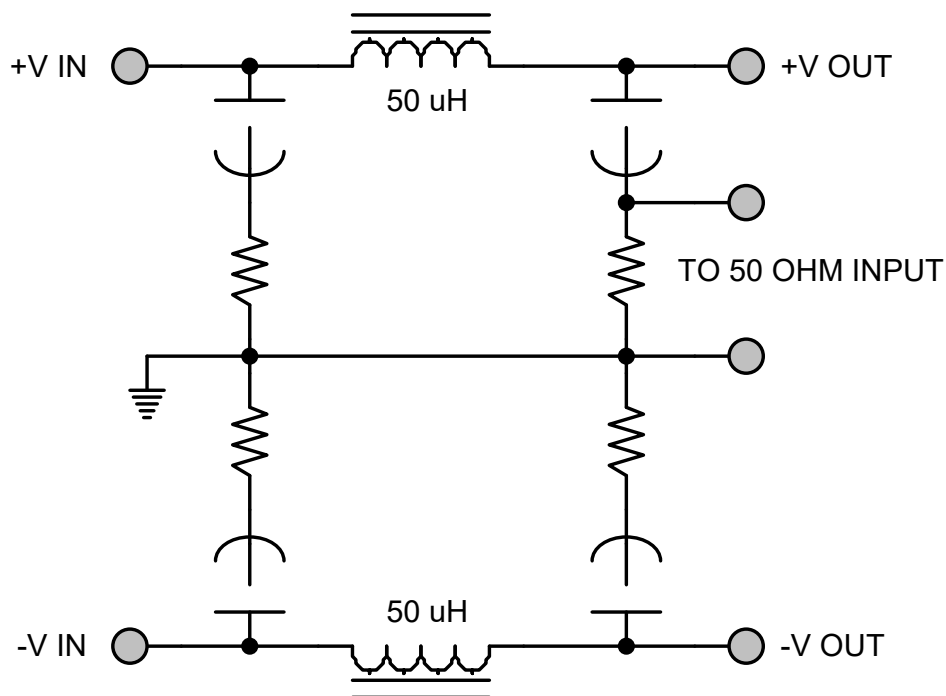
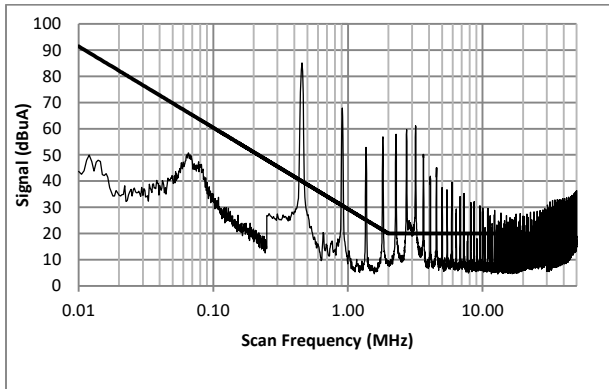


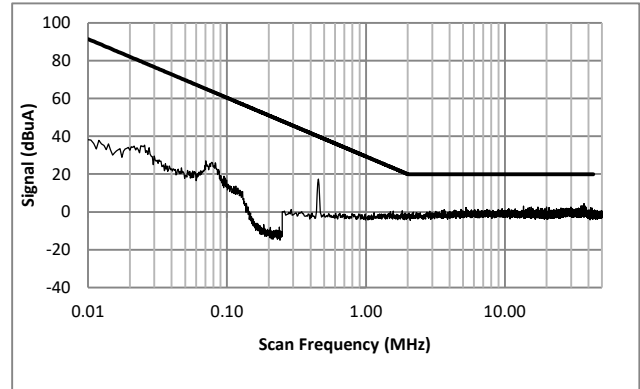
Figure 6 – MIL-STD-461D Measurement Method (LISN)

## EMI PERFORMANCE CURVES

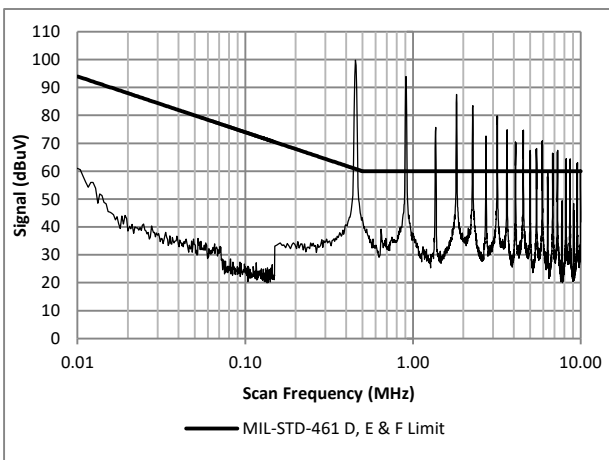
( $T_{CASE} = 25^{\circ}C$ ,  $V_{IN} = +50V \pm 5\%$ , Full Load, Unless Otherwise Specified)



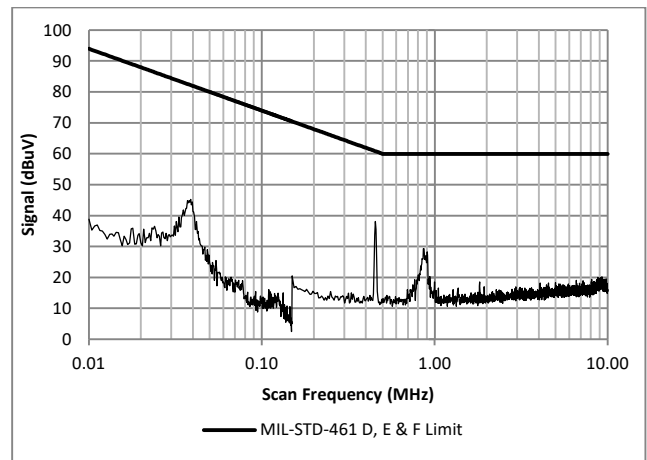
**Figure 7 – MIL-STD-461C**  
SVLSA5000S Without EMI Filter



**Figure 8 – MIL-STD-461C**  
Two SVLSA5000S's With DVMH50 EMI Filter

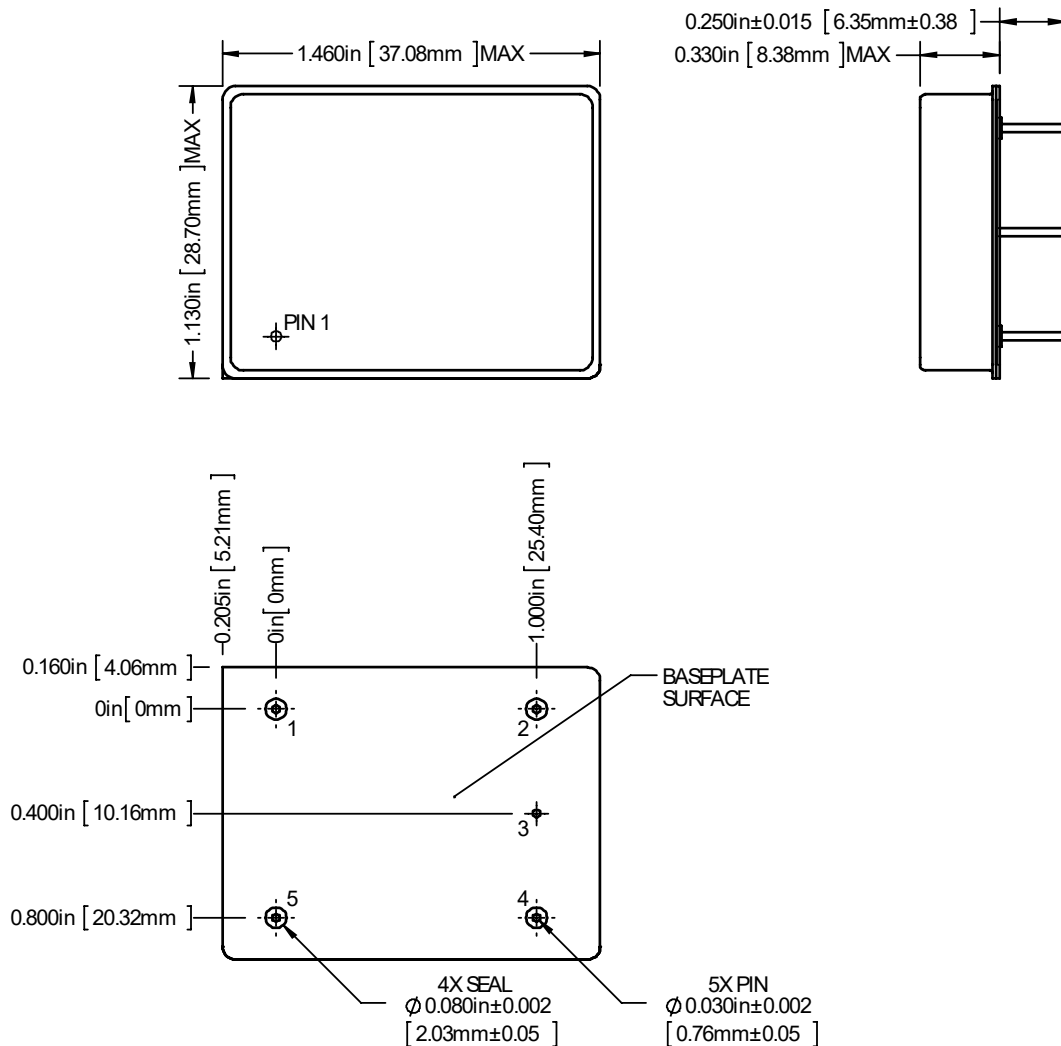


**Figure 9 – MIL-STD-461D, E, F & G**  
SVLSA5000S Without EMI Filter



**Figure 10 – MIL-STD-461D, E, F & G**  
Two SVLSA5000S With DVMH50 EMI Filter

## PACKAGE SPECIFICATIONS

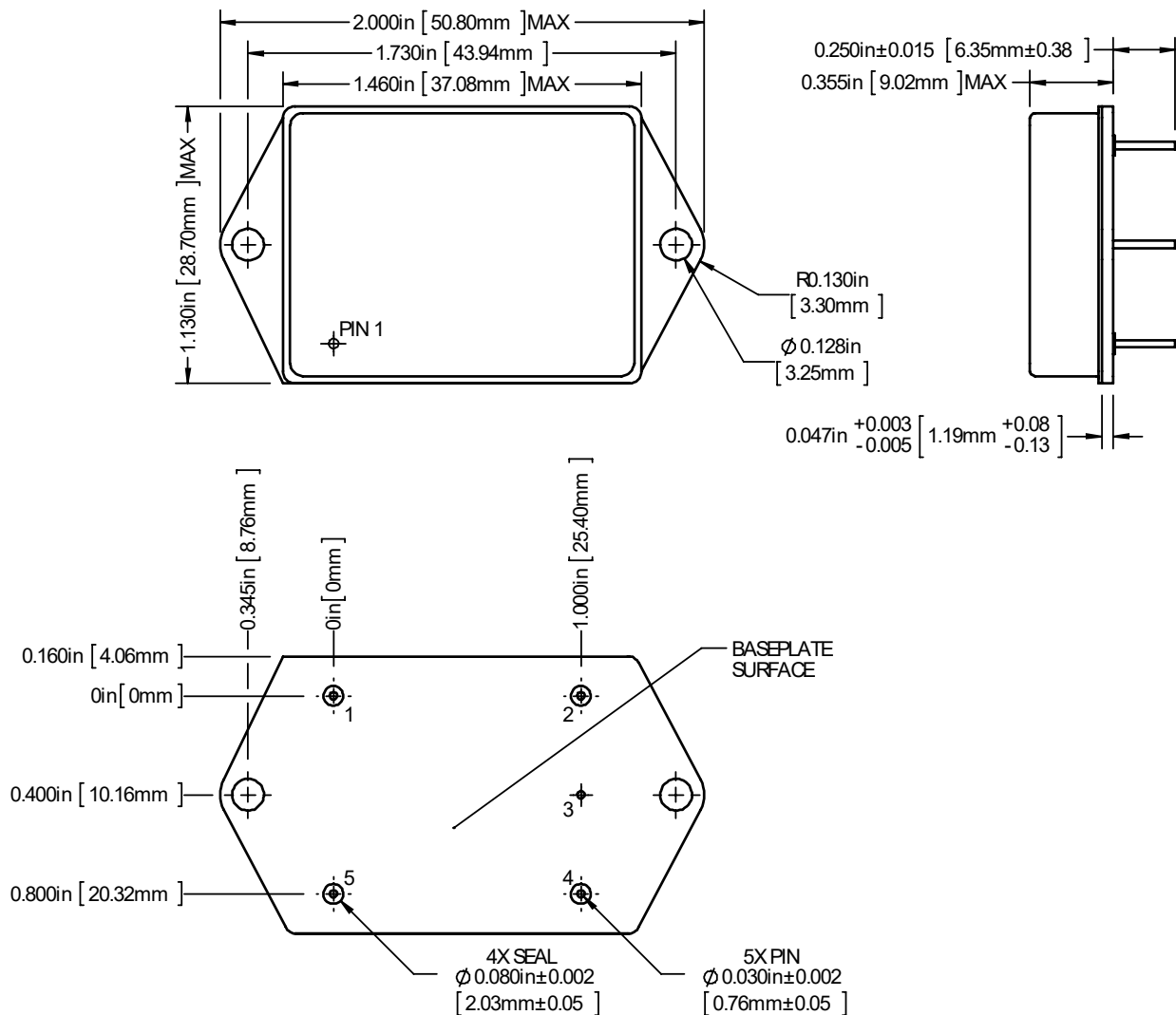


**Notes:**

1. Tolerance are +0.005" unless otherwise stated
2. Case temperature is measured on the center of the baseplate surface
3. Materials: Case (Steel, gold over nickel plated); Cover (Kovar, nickel plated); Pin (Copper-cored alloy 52, gold over nickel plated); Pin Seals (Glass)

| Pin | Function | Pin | Function | Pin | Function |
|-----|----------|-----|----------|-----|----------|
| 1   | 50V IN   | 3   | CASE     | 5   | IN COM   |
| 2   | 50V OUT  | 4   | OUT COM  |     |          |

**Figure 11 – Package and Pinout**



**Notes:**

1. Tolerance are +0.005" unless otherwise stated
2. Case temperature is measured on the center of the baseplate surface
3. Materials: Case (Steel, gold over nickel plated); Cover (Kovar, nickel plated); Pin (Copper-cored alloy 52, gold over nickel plated); Pin Seals (Glass)

| Pin | Function | Pin | Function | Pin | Function |
|-----|----------|-----|----------|-----|----------|
| 1   | 50V IN   | 3   | CASE     | 5   | IN COM   |
| 2   | 50V OUT  | 4   | OUT COM  |     |          |

**Figure 12 – Flanged Package and Pinout**



**PACKAGE PIN DESCRIPTION**

| Pin | Function | Description                        |
|-----|----------|------------------------------------|
| 1   | 50V IN   | Positive Input Voltage Connection  |
| 2   | 50V OUT  | Positive Output Voltage Connection |
| 3   | CASE     | Case Connection                    |
| 4   | OUT COM  | Output Common Connection           |
| 5   | IN COM   | Input Common Connection            |

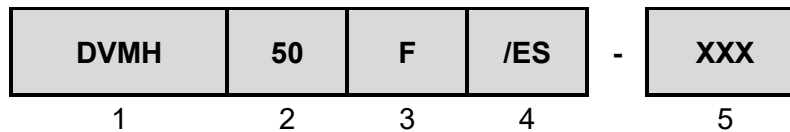
## ENVIRONMENTAL SCREENING (100% Tested Per MIL-STD-883 as referenced to MIL-PRF-38534)

| Test                     | MIL-STD-883 Test Method, Condition                                   | No Suffix (Standard) Non-QML <sup>4</sup> | /ES (Extended) Non-QML <sup>4</sup> | /H (Class H) | /K and /KL1 <sup>4,7</sup> (Class K) |
|--------------------------|--|---|-------------------------------------|--------------|--------------------------------------|
| 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>5</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, No Bomb, Visual Verification                             | •   |                                     |              |                                      |
| Radiography <sup>6</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.
- 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</sup> |                      | Additional Screening Code |
|----------------|-----------------------|----------|----------------|------------------------|-----------------------------|----------------------|---------------------------|
| DVMH           | 50                    | 50 Volts | None<br>F      | Non-Flanged<br>Flanged | None<br>/ES                 | Standard<br>Extended | Contact<br>Sales          |

**Notes:**

- 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.

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

| DLA Drawing | DVMH50Series<br>Similar Part Number |
|-------------|-------------------------------------|
| 24004-01HXC | DVMH50/H                            |
| 24004-01HXA | DVMH50/H-E                          |
| 24004-01KXC | DVMH50/K                            |
| 24004-01KXA | DVMH50/K-E                          |
| 24004-01HYC | DVMH50F/H                           |
| 24004-01HYA | DVMH50F/H-E                         |
| 24004-01KYC | DVMH50F/K                           |
| 24004-01KYA | DVMH50F/K-E                         |

Do not use the DVMH50 Series similar part number for DLA Land and Maritime Drawing product acquisition. It is listed for reference only. For exact specifications for the DLA drawing product, refer to the DLA drawing. DLA drawings can be downloaded from the DLA Land and Maritime (Previously known as DSCC) website at <https://landandmaritimeapps.dla.mil/programs/defaultapps.asp>. The DLA drawing 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 DLA drawing 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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