DV-704A Series

HIGH RELIABILITY HYBRID EMI FILTERS

DESCRIPTION

The DV-704A is a combined hybrid EMI filter and voltage spike protection module that is operable over the full military (-55 °C to +125 °C) temperature range with no power derating. The DV-704A EMI filter is designed to be used with VPT/Delta's DVSA, DVHF, DVTR, and DVFL series DC-DC converters to comply with the surge requirements of MIL-STD-704A, B, C, and D with 40 watts maximum output power. This device also reduces the reflected noise of the DC-DC converters to meet MIL-STD-461C CE03 and MIL-STD-461D CE102 limits. It also protects the DC-DC converters against the voltage spikes specified in MIL-STD-461C CS06 and conducted susceptibility in MIL-STD-461C CS01 and CS02.

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
- Up to 2.0 Amps Maximum Current
- 45 dB Minimum Attenuation at 500 kHz
- Industry Standard Pinout
- Inrush Current Limit and Soft Start
- Under Voltage Lockout
- Clamps Output Voltage to 45 Volts Maximum
- Precision Seam Welded Hermetic Package
- Custom Versions Available
- Additional Environmental Screening Available
- Meets MIL-STD-704A, B, C, and D Surge Limits
- Compliant to MIL-STD-461C CE03 and MIL-STD-461D CE102 EMC Requirements
- Protects Against Conducted Susceptibility Specified in MIL-STD-461C, CS01 and CS02 and Against Voltage Spikes Specified in MIL-STD-461C CS06
- MIL-PRF-38534 Element Evaluated Components

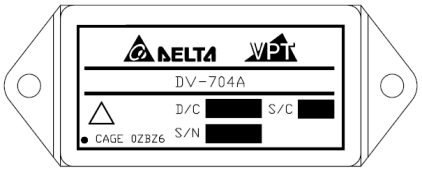


Figure 1 – DV-704A EMI Filter
(Exact marking may differ from that shown)

http://www.vptpower.com
Sales Information:
Phone: (425) 353-3010
Fax: (425) 353-4030
E-mail: vptsales@vptpower.com

SPECIFICATIONS (T_{CASE} = -55°C to +125°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	40 V_{DC}	Power Dissipation (Continuous)	15 Watts
Input Voltage (Transient, up to 20µs)	600 Volts	Power Dissipation (Peak)	500 Watts
Output Current[3]	2.0 Amps	Storage Temperature	-65°C to +150°C
Weight (Maximum)	50 grams	Lead Solder Temperature (10 seconds)	300°C
ESD Rating per MIL-PRF-38534	1B		

Parameter		Conditions	DV-704A			Units
			Min	Typ	Max	
STATIC						
INPUT Voltage	Continuous	No Load	0	28	40	V
	Continuous	2.0 A Load	15	28	40	V
	Transient	100 ms, R_S = 0.0 Ω	-	-	80	V
	Transient[2]	60 ms, R_S = 0.5 Ω	-	-	100	V
	Transient	20 µs, R_S = 50 Ω	-	-	600	V
Current[1]		No Load	-	-	10	mA
		Inhibited	-	-	2.0	mA
OUTPUT Voltage		Continuous	$V_{OUT} = V_{IN} – (I_{IN} \times R_{DC})$			V
Current[3,4]		Continuous	0	-	2.0	A
INHIBIT PIN VOLTAGE[2]		Open Circuit	-	14	16	V
		Inhibited	0	-	0.8	V
INHIBIT PIN CURRENT[2]		Inhibit Pin Voltage = 0 to 0.8 V	-	-	-300	µA
UNDERVOLTAGE LOCKOUT			7.0	-	14	V
OUTPUT CLAMP VOLTAGE			43	-	47	V
INPUT SURGE LIMIT[2]		2.0 A Load, 80 V	-	-	100	ms
		2.0 A Load, 100 V	-	-	80	ms
INPUT SPIKE LIMIT[2]		2.0 A Load, 600 V, R_S = 50 Ω	-	-	20	µs
		2.0 A Load, 400 V, R_S = 0.5 Ω	-	-	20	µs
INPUT INRUSH CURRENT[2]		V_{IN} = 0 – 28V, No Load C_L = 100µF	-	0.25	0.5	A_{PK}
DC RESISTANCE		Continuous, Tcase= 25°C	-	-	450	mΩ
POWER DISSIPATION		Continuous	-	-	15	W
		Peak	-	-	500	W
NOISE REJECTION		f = 500 kHz	45	-	-	dB
CAPACITANCE[2]		Pin to Case	-	20	-	nF
ISOLATION		Any Pin to Case, 500 V_{DC}	100	-	-	MΩ
MTBF (MIL-HDBK-217F)		AIF @ T_C = 55°C	-	0.627	-	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. Maximum output power is linearly derated to 0 A from +125°C to +135°C.
4. Rated current applies at any voltage.

BLOCK DIAGRAM

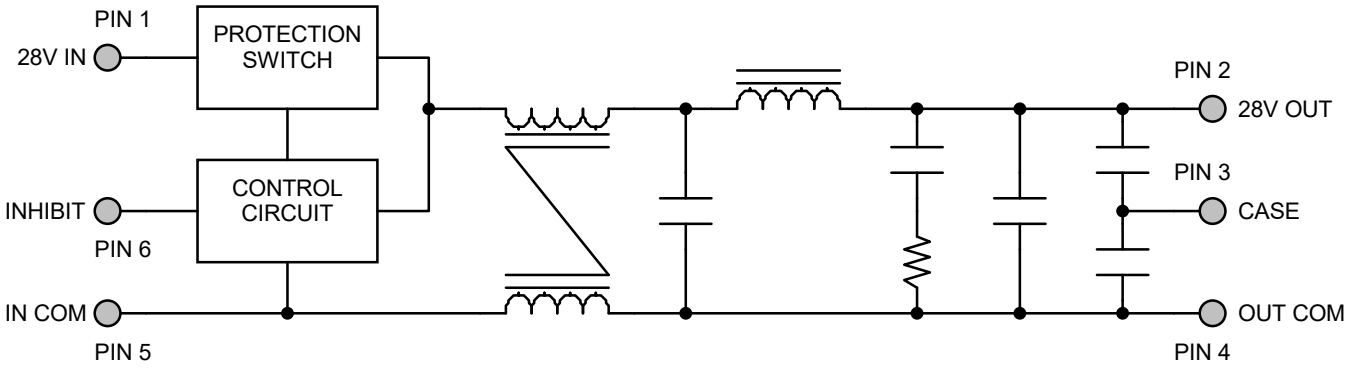


Figure 2

CONNECTION DIAGRAM

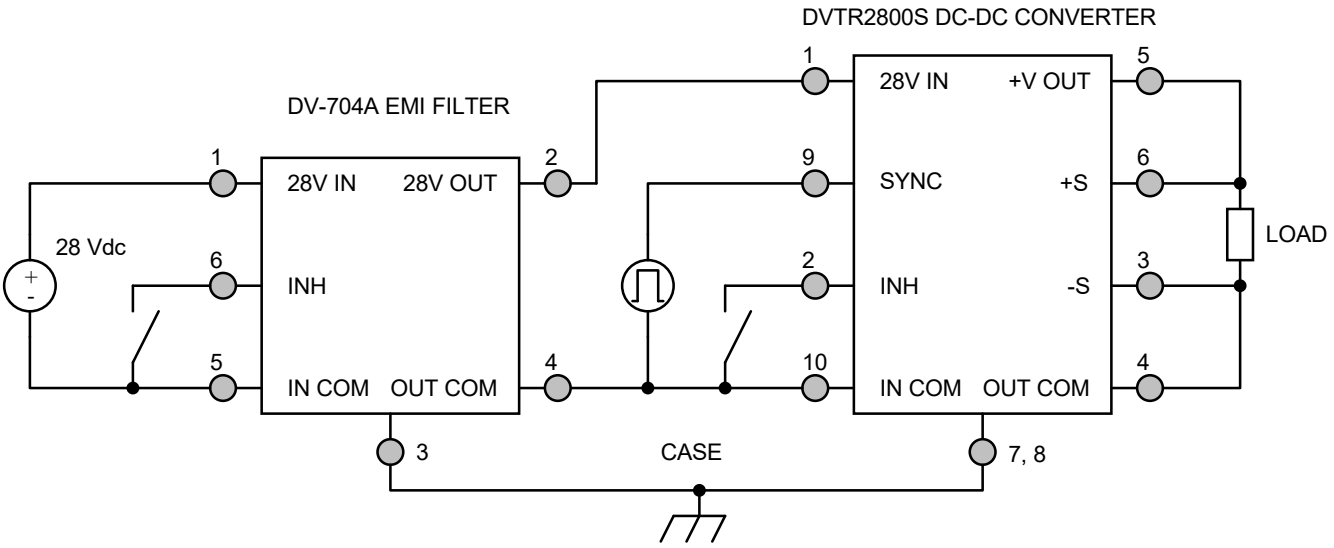


Figure 3 – DV-704A EMI Filter Hookup with Single Converter

INHIBIT DRIVE CONNECTION DIAGRAM

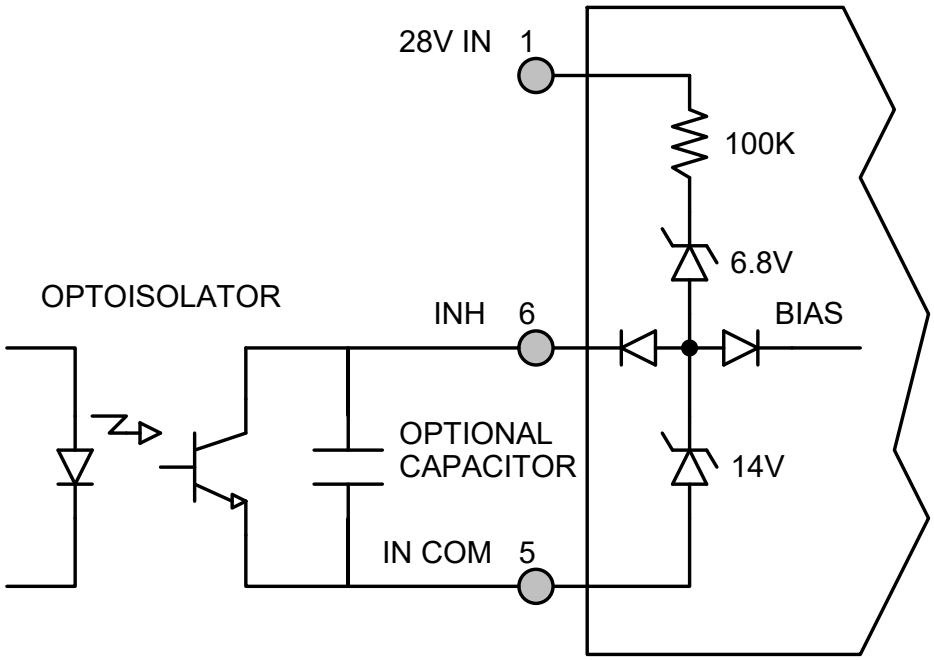


Figure 4 – Isolated Inhibit Drive
(Shown with optional capacitor for turn-on delay)

EMI MEASUREMENT METHODS CONNECTION DIAGRAMS

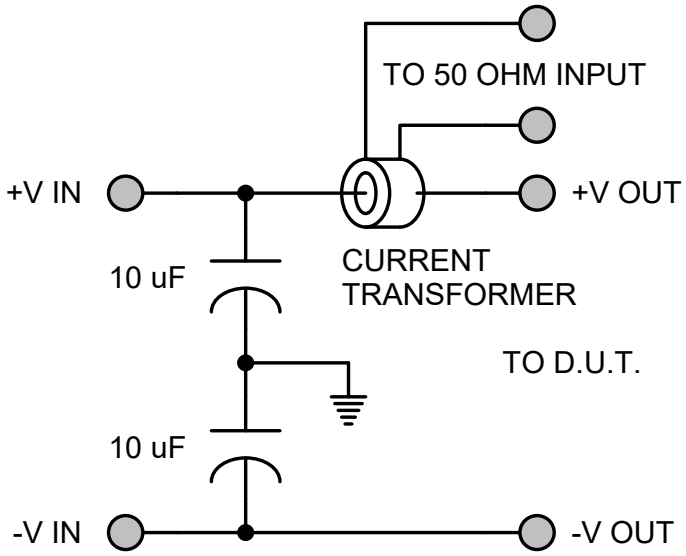


Figure 5 – MIL-STD-461C Measurement Method (Feedthrough Capacitor)

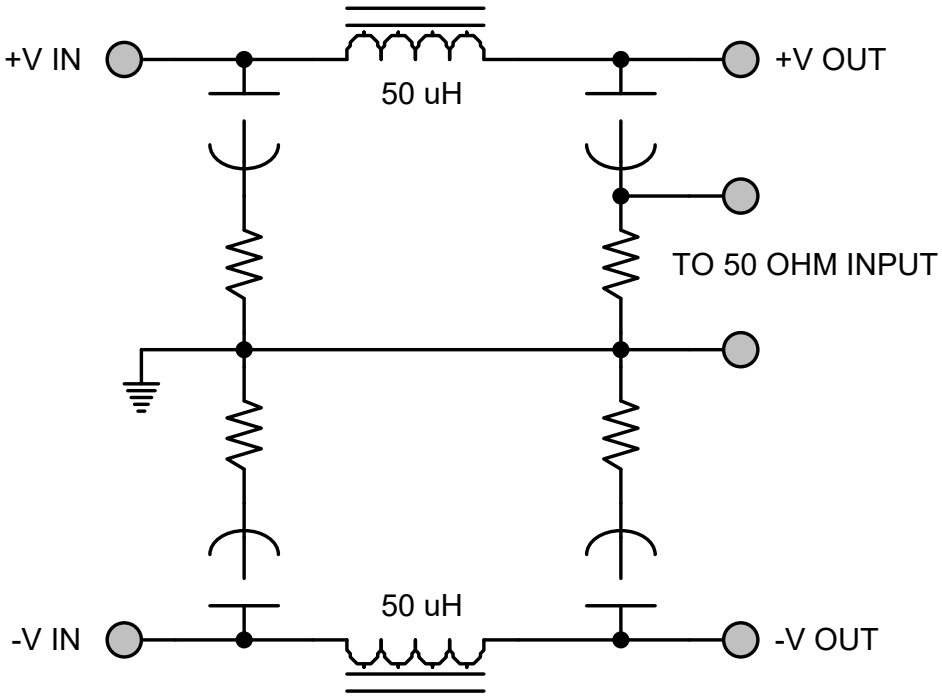


Figure 6 – MIL-STD-461D Measurement Method (LISN)

EMI PERFORMANCE CURVES

(T_{CASE} = 25°C, V_{IN} = +28V ± 5%, Full Load, Unless Otherwise Specified)

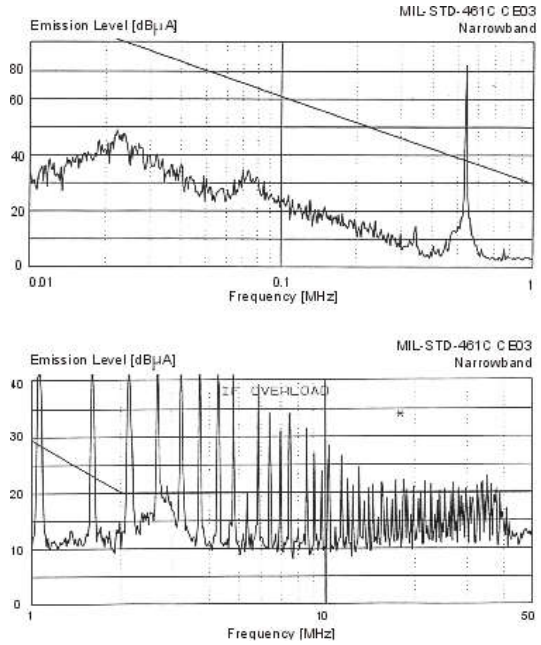


Figure 7 – MIL-STD-461C
DVTR2800S Without EMI Filter

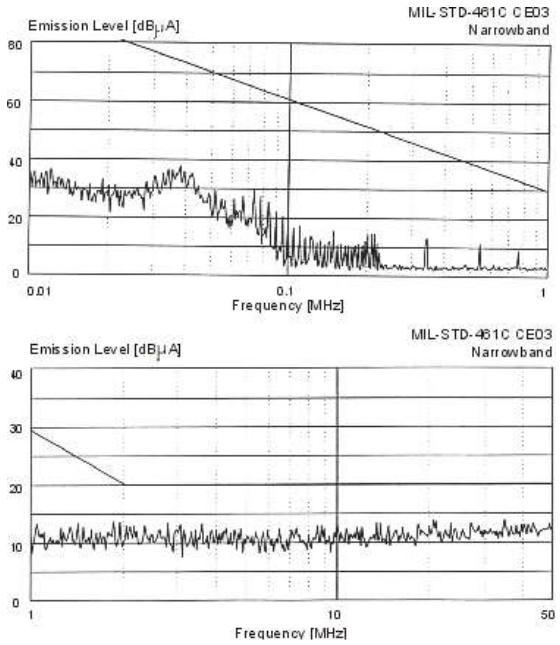


Figure 8 – MIL-STD-461C
DVTR2800S With DV-704A EMI Filter

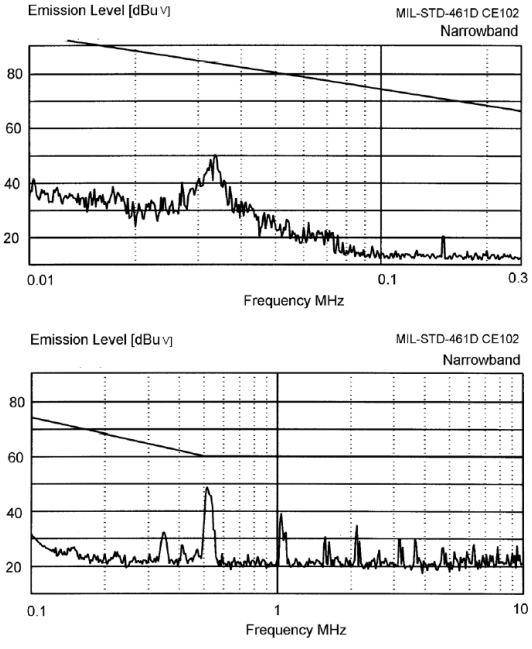
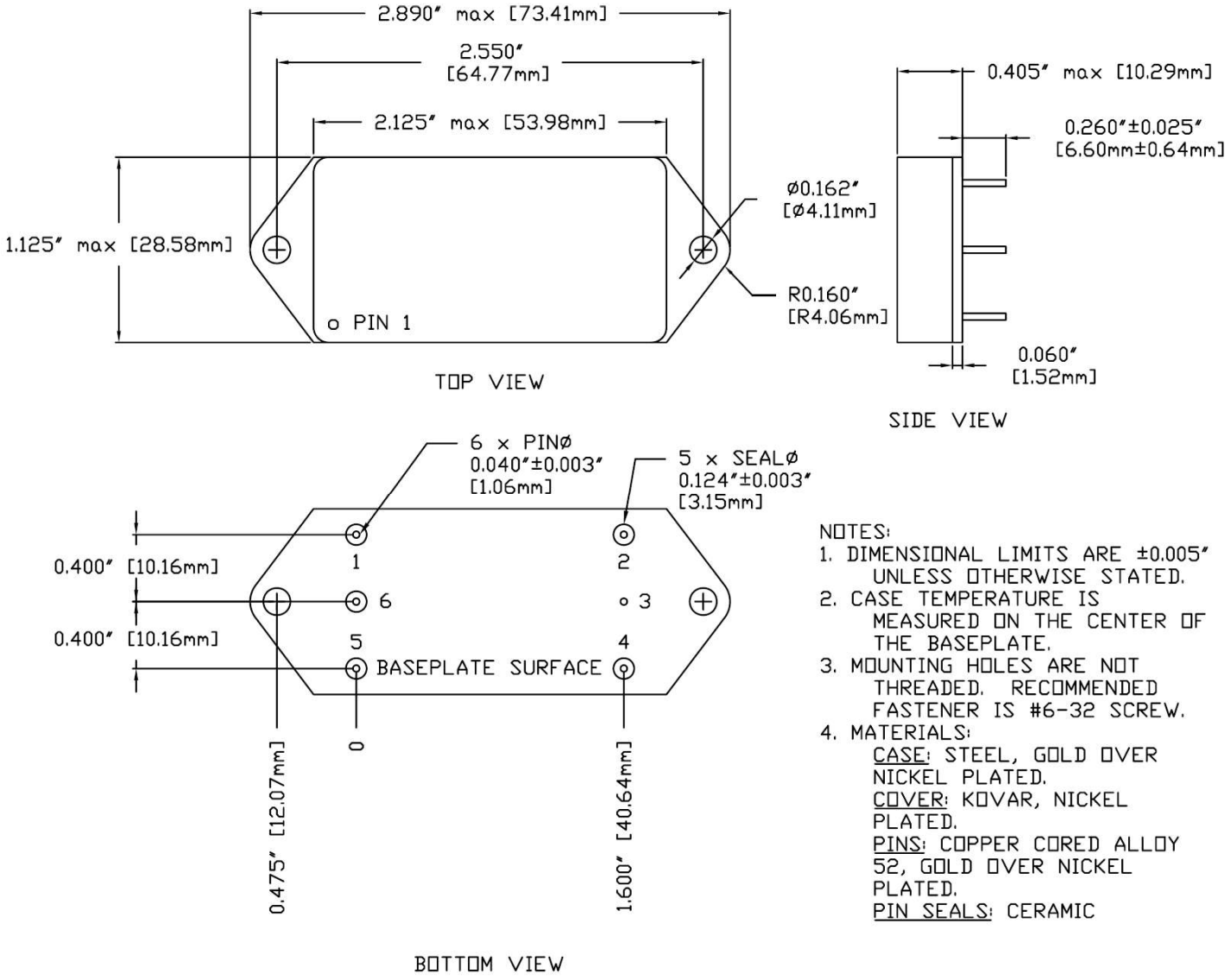


Figure 9 – MIL-STD-461D
DVTR2800S With DV-704A EMI Filter

PACKAGE SPECIFICATIONS (SEAM SEAL)



Pin	Function	Pin	Function	Pin	Function
1	28V IN	3	CASE	5	IN COM
2	28V OUT	4	OUT COM	6	INHIBIT

Figure 11 – Seam Seal Package and Pinout

PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	28V IN	Positive Input Voltage Connection
2	28V OUT	Positive Output Voltage Connection
3	CASE	Case Connection
4	OUT COM	Output Common Connection
5	IN COM	Input Common Connection
6	INHIBIT	Logic Low = Disabled Output. Connecting the inhibit pin to input common causes filter shutdown. Logic High = Enabled Output. Unconnected or open collector TTL.

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[5]	/ES (Extended) Non-QML[5]	/H (Class H)	/K and /KL1[5,8] (Class K)
Non-Destructive Bond Pull	TM2023	•[4]	•[4]	•[4]	•
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[6]	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[3]			•	•
	MIL-PRF-38534, Group A Subgroups 1 and 4 25°C	•	•		
Hermeticity (Seal)	TM1014, Fine Leak, Condition A2 or B1		•	•	•
	TM1014, Gross Leak, Condition C or B2		•	•	•
	Gross Leak, Dip (1 x 10^{-3})	•			
Radiography[7]	TM2012				•
External Visual	TM2009	•	•	•	•

Notes:

1. Contact Sales for more information concerning additional environmental screening and testing options desired.
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.
3. 100% R&R testing with all test data included in product shipment.
4. Not required per MIL-PRF-38534. Test is performed for additional product quality assurance.
5. Non-QML products may not meet all requirements of MIL-PRF-38534.
6. PIND test Certificate of Compliance included in product shipment.
7. Radiographic test Certificate of Compliance and film(s) or data CD included in product shipment.
8. -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

DV-704A	/K	-	XXX
1	2		3

(1)	(2)		(3)
Product Series	**Screening Code[1,2,3]**		**Additional Screening Code**
DV-704A	**None** **/ES** **/H** **/K** **/KL1**	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.

SMD (STANDARD MICROCIRCUIT DRAWING) NUMBERS

Standard Microcircuit Drawing (SMD)	DV-704A Series Similar Part Number
5962-2021301HXC	DV-704A/H+
5962-2021301HXA	DV-704A/H+-E
5962-2021301KXC	DV-704A/K
5962-2021301KXA	DV-704A/K-E

Do not use the DV-704A 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 DLA Land and Maritime (Previously known as DSCC) website at https://landandmaritimeapps.dla.mil/programs/defaultapps.asp. 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. 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

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.