



# DVSB2800D Series

## HIGH RELIABILITY HYBRID DC-DC CONVERTERS

### DESCRIPTION

The DVSB series of high reliability DC-DC converters is operable over the full military (-55 °C to +125 °C) temperature range with no power derating. Unique to the DVSB series are robust and effective input and output filters which provide dramatically reduced input and output noise performance when compared to other manufacturers competing devices. Operating at a nominal fixed frequency of 325 kHz, per stage, these regulated, isolated units utilize a high speed magnetic feedback design and well controlled undervoltage lockout circuitry to eliminate slow start-up problems.

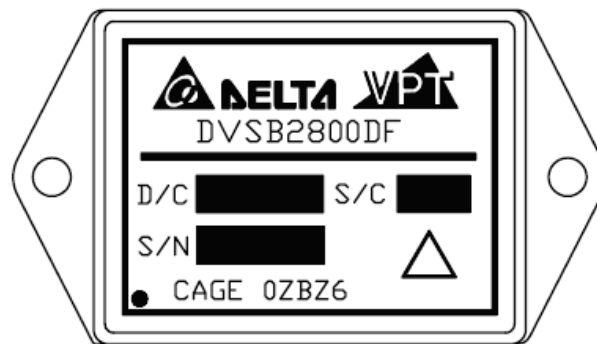
These converters are designed and manufactured in a facility qualified to ISO9001 and certified to MIL-PRF-38534 and MIL-STD-883.

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
- Very Low Output Noise
- Wide Input Voltage Range: 15 to 50 Volts per MIL-STD-704
- Up to 12.5 Watts Output Power
- Fault Tolerant Magnetic Feedback Circuit
- NO Use of Optoisolators
- Undervoltage Lockout
- Indefinite Short Circuit Protection
- Current Limit Protection
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- Precision Projection Welded Hermetic Package
- High Power Density
- Custom Versions Available
- Additional Environmental Screening Available
- Meets MIL-STD-461C and MIL-STD-461D EMC Requirements When Used With a DVMH28 EMI Filter
- Flanged and Non-flanged Versions Available.
- MIL-PRF-38534 Element Evaluated Components



**Figure 1** – DVSB2800D / DVSB2800DF DC-DC Converter  
(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>	Junction Temperature Rise to Case	+15°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power	12.5 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6.0 Watts	Weight (Maximum) (Un-Flanged / Flanged)	(24 / 28) Grams
ESD Rating per MIL-PRF-38534	3A		

Parameter	Conditions	DVSB2853R3D			Units	
		Min	Typ	Max		
<b>STATIC</b>						
INPUT Voltage <sup>4</sup>	Continuous	15	28	50	V	
	Transient, 1 sec <sup>4</sup>	-	-	80	V	
Current	Inhibited	-	3.5	5.0	mA	
	No Load	-	-	60	mA	
Ripple Current	Full Load, 20Hz to 10MHz	-	40	60	mA <sub>p-p</sub>	
Inhibit Pin Input <sup>4</sup>		0	-	1.5	V	
Inhibit Pin Open Circuit Voltage <sup>4</sup>		12	14	17	V	
UVLO Turn On		10.5	-	14.5	V	
UVLO Turn Off <sup>4</sup>		8.5	-	13.5	V	
OUTPUT Voltage	V <sub>OUT1</sub>	T <sub>CASE</sub> = 25°C	4.95	5.0	5.05	V
	V <sub>OUT2</sub>		3.267	3.3	3.333	V
	V <sub>OUT1</sub>	T <sub>CASE</sub> = -55°C to +125°C	4.925	5.0	5.075	V
	V <sub>OUT2</sub>		3.25	3.3	3.35	V
Power <sup>3,4</sup>	Total		0	-	12.5	W
	V <sub>OUT1</sub>		0	-	7.5	W
	V <sub>OUT2</sub>		0	-	5	W
Current <sup>3</sup>	V <sub>OUT1</sub>		0	-	1.5	A
	V <sub>OUT2</sub>		0	-	1.5	A
Ripple Voltage	V <sub>OUT1</sub> V <sub>OUT2</sub>	Full Load, 20Hz to 10MHz	-	40	60	mV <sub>p-p</sub>
Line Regulation	V <sub>OUT1</sub> V <sub>OUT2</sub>	V <sub>IN</sub> = 15V to 50V	-	0	25	mV
Load Regulation	V <sub>OUT1</sub> V <sub>OUT2</sub>	No Load to Full Load	-	10	50	mV
Cross Regulation	V <sub>OUT1</sub> V <sub>OUT2</sub>	V <sub>OUT1</sub> = 0%, V <sub>OUT2</sub> = 100% V <sub>OUT1</sub> = 100%, V <sub>OUT2</sub> = 0%	-	10	50	mV
EFFICIENCY		Full Load	69	74	-	%
LOAD FAULT POWER DISSIPATION		Overload <sup>4</sup>	-	-	10	W
		Short Circuit	-	-	10	W
CAPACITIVE LOAD <sup>4</sup>		Either Output	-	-	500	μF
SWITCHING FREQUENCY			550	650	700	kHz
SYNCHRONIZATION FREQUENCY <sup>5</sup>			700	750	800	kHz
ISOLATION		500 V <sub>DC</sub> , T <sub>CASE</sub> = 25°C	100	-	-	MΩ
MTBF (MIL-HDBK-217F)		AIF @ T <sub>C</sub> = 55°C	-	350	-	kHrs

## 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>	Junction Temperature Rise to Case	+15°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power	12.5 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6.0 Watts	Weight (Maximum) (Un-Flanged / Flanged)	(24 / 28) Grams
ESD Rating per MIL-PRF-38534	3A		

Parameter	Conditions	DVSB2853R3D			Units	
		Min	Typ	Max		
<b>DYNAMIC</b>						
Load Step Output Transient	V <sub>OUT1</sub> V <sub>OUT2</sub>	Half Load to Full Load	-	200	400	mV <sub>PK</sub>
Load Step Recovery <sup>2</sup>	V <sub>OUT1</sub> V <sub>OUT2</sub>		-	450	700	μSec
Line Step Output Transient <sup>4</sup>	V <sub>OUT1</sub> V <sub>OUT2</sub>	V <sub>IN</sub> = 16V to 40V	-	100	400	mV <sub>PK</sub>
Line Step Recovery <sup>2, 4</sup>	V <sub>OUT1</sub> V <sub>OUT2</sub>		-	300	600	μSec
Turn On Delay		V <sub>IN</sub> = 0V to 28V	-	-	20	mSec
Turn On Overshoot	V <sub>OUT1</sub>		-	-	25	mV <sub>PK</sub>
	V <sub>OUT2</sub>		-	-	15	mV <sub>PK</sub>

- Notes:
1. This note intentionally not used.
  2. Time for output voltage to settle within 1% of its nominal value.
  3. Derate linearly to 0 at 135°C.
  4. Verified by qualification testing.
  5. Synchronization is TTL signal with V<sub>SYNC MAX</sub> = 6V.

**BLOCK DIAGRAM**

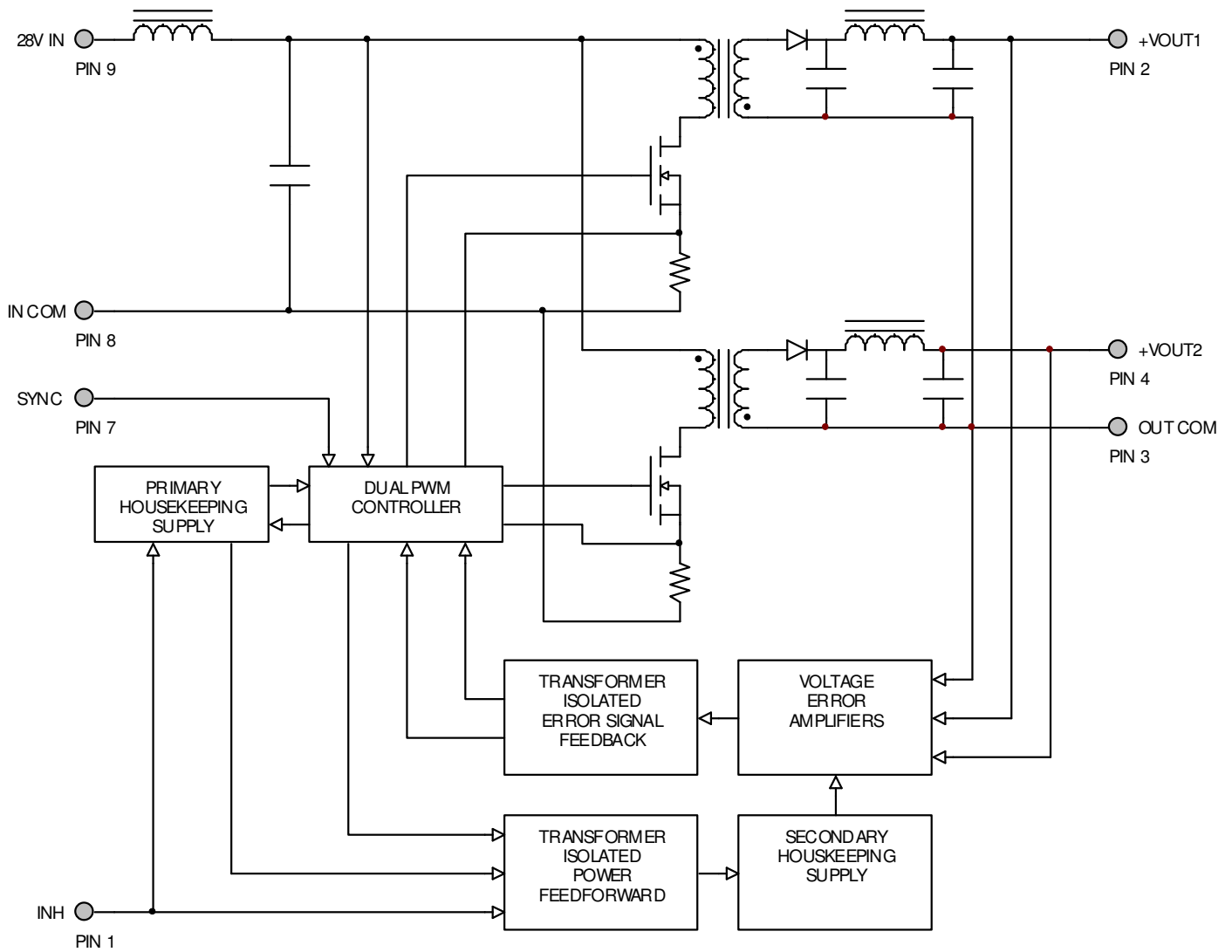


Figure 2

**CONNECTION DIAGRAM**

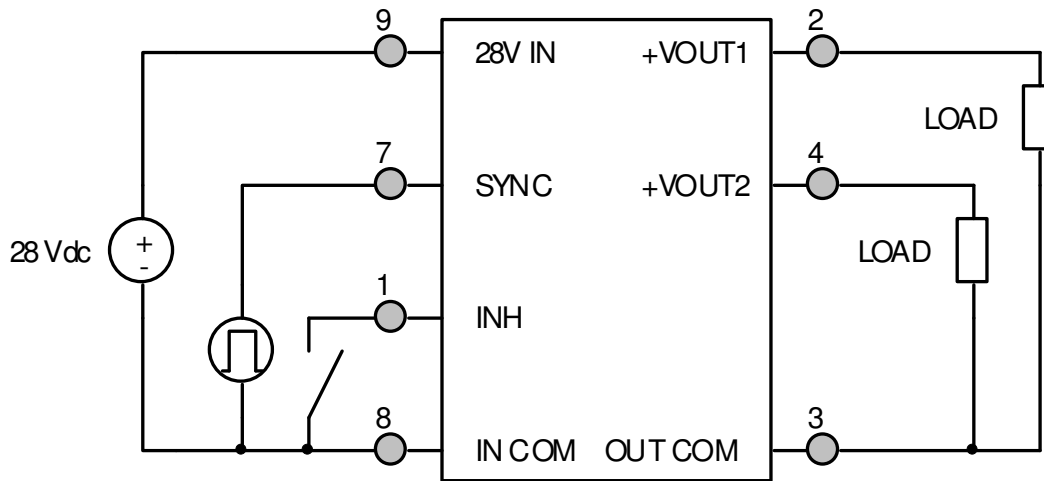


Figure 3

**INHIBIT DRIVE CONNECTION DIAGRAMS**

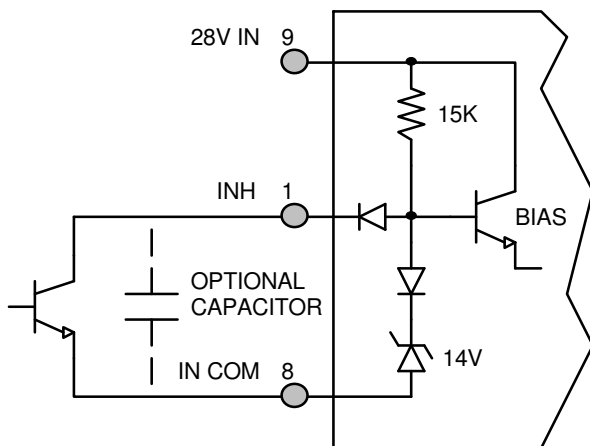


Figure 4 – Internal Inhibit Circuit and Recommended Drive  
(Shown with optional capacitor for turn-on delay)

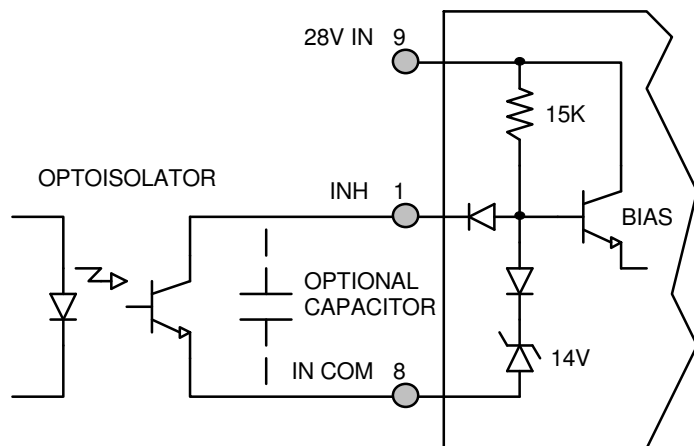
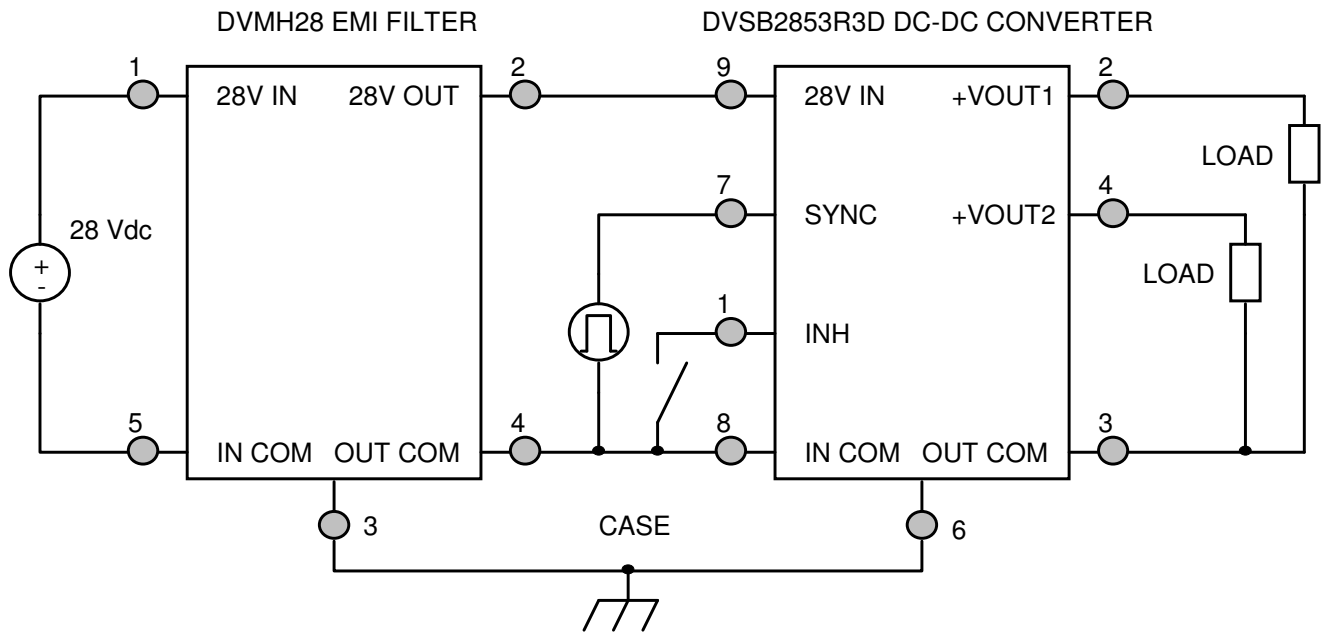


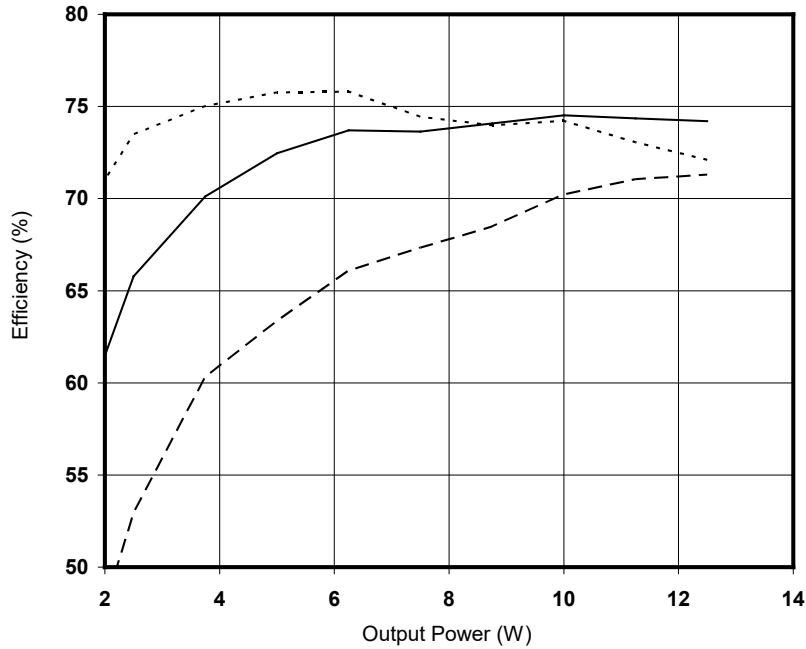
Figure 5 – Isolated Inhibit Drive  
(Shown with optional capacitor for turn-on delay)

**EMI FILTER HOOKUP DIAGRAM**



**Figure 6 – Converter with EMI Filter**

**EFFICIENCY PERFORMANCE CURVES** ( $T_{CASE} = 25^{\circ}C$ )



**Figure 7 – DVSB2853R3D**  
Efficiency (%) vs. Output Power (W)

**EMI PERFORMANCE CURVES**

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

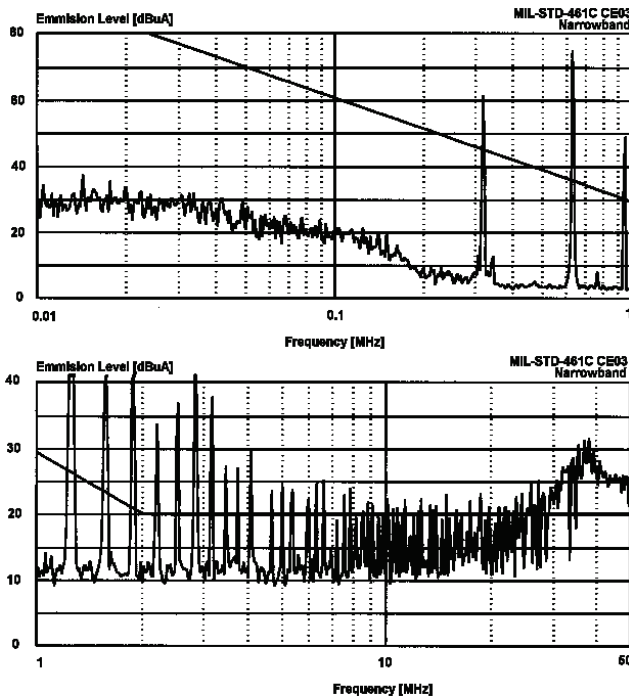


Figure 9 – DVSB2853R3D without EMI Filter

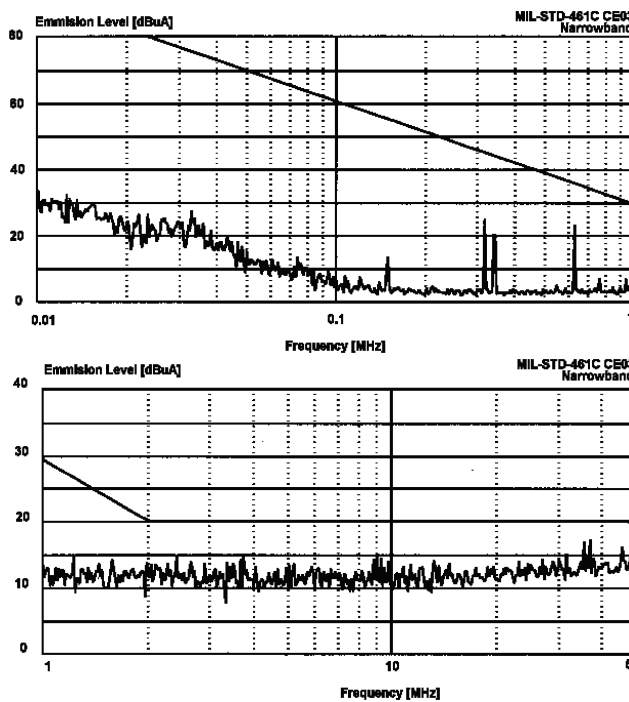
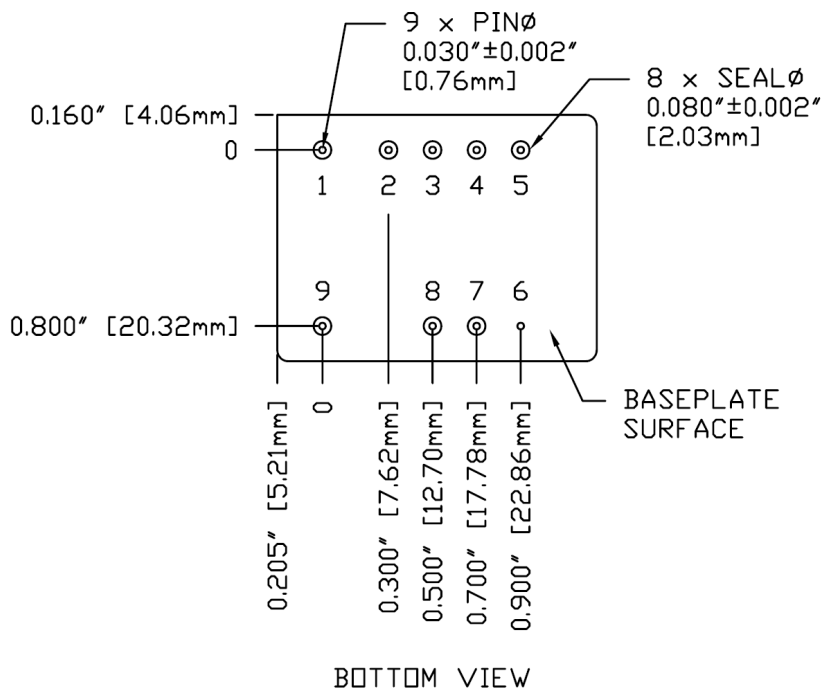
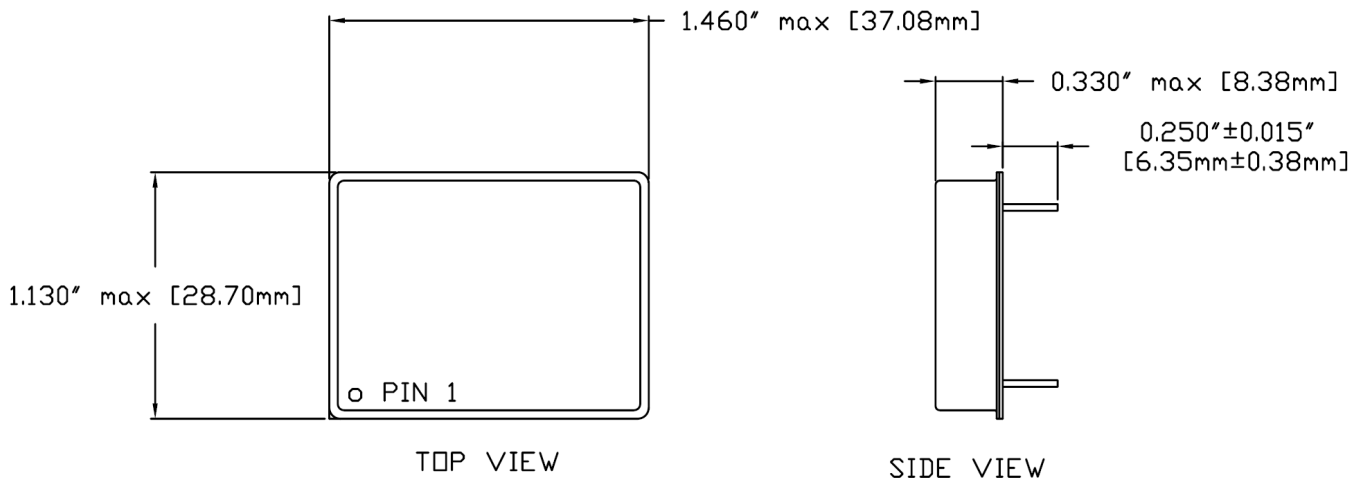


Figure 10 – DVSB2853R3D with EMI Filter



**PACKAGE SPECIFICATIONS (NON-FLANGED)**

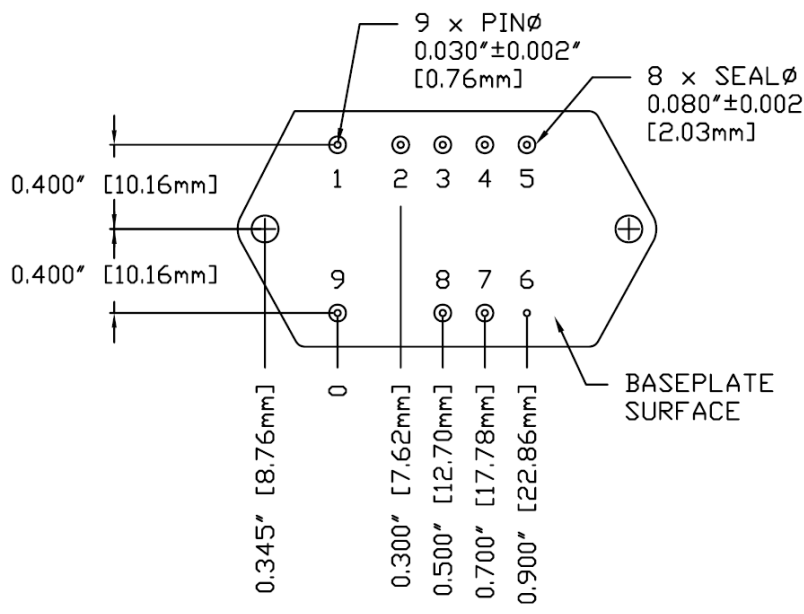
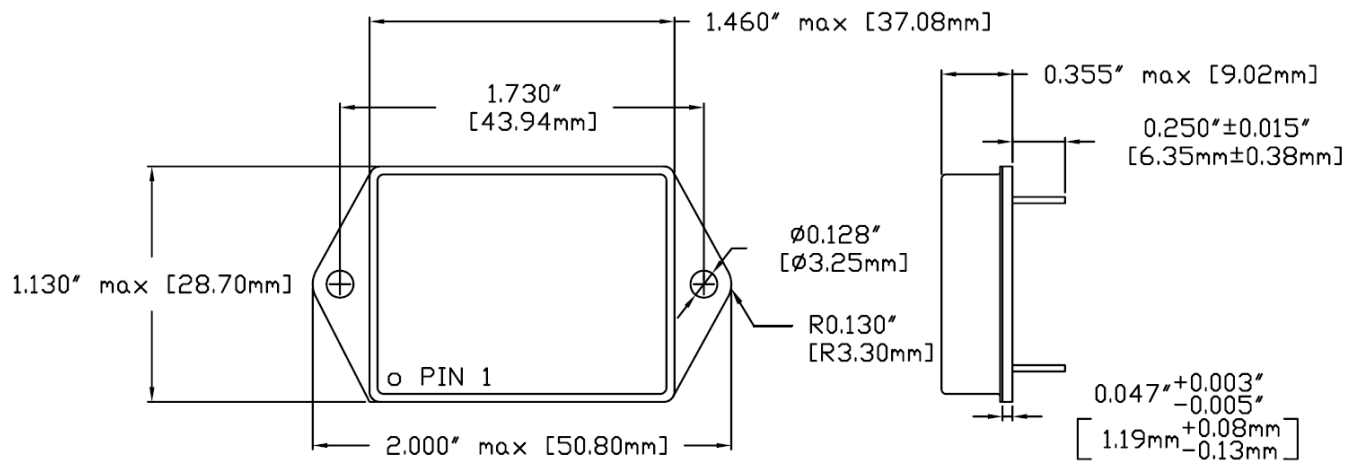


- NOTES:
1. DIMENSIONAL LIMITS ARE ±0.005" UNLESS OTHERWISE STATED.
  2. CASE TEMPERATURE IS MEASURED ON THE CENTER OF THE BASEPLATE.
  3. MATERIALS:  
CASE: STEEL, GOLD OVER NICKEL PLATED.  
COVER: STEEL, NICKEL PLATED.  
PINS: ALLOY 52, GOLD OVER NICKEL PLATED.  
PIN SEALS: GLASS

Pin	Function	Pin	Function	Pin	Function
1	INHIBIT	4	+VOUT2	7	SYNC
2	+VOUT1	5	N/C	8	IN COM
3	OUT COM	6	CASE	9	28V IN

Figure 11 – Non-Flanged Package and Pinout

**PACKAGE SPECIFICATIONS (FLANGED)**



- NOTES:
1. DIMENSIONAL LIMITS ARE ±0.005" UNLESS OTHERWISE STATED.
  2. CASE TEMPERATURE IS MEASURED ON THE CENTER OF THE BASEPLATE.
  3. MOUNTING HOLES ARE NOT THREADED. RECOMMENDED FASTENER IS #4-40 SCREW.
  4. MATERIALS:  
CASE: STEEL, GOLD OVER NICKEL PLATED.  
COVER: STEEL, NICKEL PLATED.  
PINS: ALLOY 52, GOLD OVER NICKEL PLATED.  
PIN SEALS: GLASS

Pin	Function	Pin	Function	Pin	Function
1	INHIBIT	4	+VOUT2	7	SYNC
2	+VOUT1	5	N/C	8	IN COM
3	OUT COM	6	CASE	9	28V IN

**Figure 12** – Flanged Package and Pinout

## PACKAGE PIN DESCRIPTION

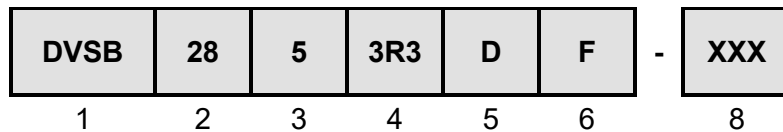
Pin	Function	Description
1	INHIBIT	Logic Low = Disabled Output. Connecting the inhibit pin to input common causes converter shutdown. Logic High = Enabled Output. Unconnected or open collector TTL.
2	+VOUT1	Positive Output 1 Voltage Connection
3	OUT COM	Output Common Connection
4	+VOUT2	Positive Output 2 Voltage Connection
5	N/C	No Connection
6	CASE	Case Connection
7	SYNC	Synchronization Signal
8	IN COM	Input Common Connection
9	28V IN	Positive Input Voltage 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 ⑤	/ES (Extended) Non-QML ⑤	/H (Class H)	/K (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 ⑦	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 <sup>-3</sup> )	•			
Radiography ⑧	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.
  - Note intentionally not used.
  - PIND test Certificate of Compliance included in product shipment.
  - Radiographic test Certificate of Compliance and film(s) or data CD included in product shipment.

## ORDERING INFORMATION



(1) Product Series	(2) Nominal Input Voltage		(3) Output 1 Voltage		(4) Output 2 Voltage	
<b>DVSB</b>	<b>28</b>	28 Volts	<b>5</b>	+5 Volts	<b>3R3</b>	+3.3 Volts

(5) Number of Outputs		(6) Package Option		(7) Screening Code <sup>1,2</sup>		(8) Additional Screening Code
<b>D</b>	Dual	<b>None</b> <b>F</b>	Non-Flanged Flanged	<b>None</b> <b>/ES</b> <b>/H</b> <b>/K</b>	Standard Extended 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.

## SMD (STANDARD MICROCIRCUIT DRAWING) NUMBERS

Standard Microcircuit Drawing (SMD)	CAGE Number	DVSB2800D Series Similar Part Number
5962-0820701HXC	0ZBZ6	DVSB2853R3D/H
5962-0820701HXA	0ZBZ6	DVSB2853R3D/H-E
5962-0820701HYC	0ZBZ6	DVSB2853R3DF/H
5962-0820701HYA	0ZBZ6	DVSB2853R3DF/H-E
5962-0820701KXC	0ZBZ6	DVSB2853R3D/K
5962-0820701KXA	0ZBZ6	DVSB2853R3D/K-E
5962-0820701KYC	0ZBZ6	DVSB2853R3DF/K
5962-0820701KYA	0ZBZ6	DVSB2853R3DF/K-E

Do not use the DVSB2800D 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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