DVAB2800D Series

HIGH RELIABILITY HYBRID DC-DC CONVERTERS

DESCRIPTION

The DVAB series of high reliability DC-DC converters is operable over the full military (-55 ℃ to +125 ℃) temperature range with no power derating. Unique to the DVAB series are independent dual control loops which provide tight regulation and zero cross regulation error while maintaining high efficiency. 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
- Dual Outputs with Zero Cross Regulation Error
- Up to 15 Watts Output Power
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- Fault Tolerant Magnetic Feedback Circuit
- NO Use of Optoisolators
- Undervoltage Lockout
- Short Circuit Protection
- Current Limit Protection
- Precision Projection Welded Hermetic Package
- High Power Density
- Custom Versions Available
- Additional Environmental Screening Available
- Meets MIL-STD-461 Revisions C, D, E and F EMC Requirements When Used With VPT's EMI Filters
- Flanged and Non-flanged Versions Available.
- MIL-PRF-38534 Element Evaluated Components

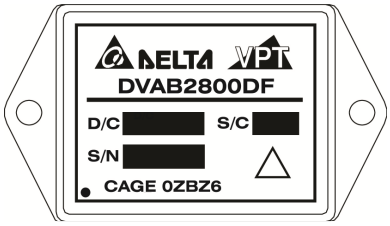


Figure 1 – DVAB2800D / DVAB2800DF DC-DC Converter
(Exact marking may differ from that shown)

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)	50 V_{DC}	Junction Temperature Rise to Case	+15°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power	15 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T_{CASE} = +125°C)	7.0 Watts	Weight (Maximum) (Un-Flanged / Flanged)	(24 / 28) Grams
ESD Rating per MIL-PRF-38534	3A		

Parameter		Conditions	DVAB2805D			DVAB2812D			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC									
INPUT Voltage		Continuous	15	28	50	15	28	50	V
		Transient[4], 1 sec	-	-	80	-	-	80	V
Current		Inhibited	-	2	5	-	2	5	mA
		No Load	-	20	60	-	20	60	mA
Ripple Current		Full Load, 20Hz to 10MHz	-	25	60	-	25	60	mA_{p-p}
Inhibit Pin Input[4]			0	-	1.5	0	-	1.5	V
Inhibit Pin Open Circuit Voltage[4]			12	14	17	12	14	17	V
UVLO Turn On			10.5	-	14.5	10.5	-	14.5	V
UVLO Turn Off[4]			8.5	-	13.5	8.5	-	13.5	V
OUTPUT Voltage	$\pm V_{OUT}$	T_{CASE} = 25°C	4.95	5.0	5.05	11.88	12.0	12.12	V
	$\pm V_{OUT}$	T_{CASE} = -55°C to +125°C	4.925	5.0	5.075	11.82	12.0	12.18	V
Power[1]	Total		0	-	15	0	-	15	W
	$\pm V_{OUT}$	Either Output	0	-	7.5	0	-	7.5	W
Current[1]	$\pm V_{OUT}$	Either Output	0	-	1.5	0	-	0.625	A
Ripple Voltage	$\pm V_{OUT}$	Full Load, 20Hz to 10MHz	-	25	60	-	20	60	mV_{p-p}
Line Regulation	$\pm V_{OUT}$	V_{IN} = 15V to 50V	-	1	20	-	1	20	mV
Load Regulation	$\pm V_{OUT}$	No Load to Full Load	-	4	50	-	2	50	mV
EFFICIENCY		Full Load	69	77	-	73	80	-	%
CAPACITIVE LOAD[4]		Either Output	-	-	500	-	-	500	µF
SWITCHING FREQUENCY			550	650	700	550	650	700	kHz
SYNCHRONIZATION FREQUENCY[2]			700	750	800	700	750	800	kHz
ISOLATION		500 V_{DC}, T_{CASE} = 25°C	100	-	-	100	-	-	MΩ
MTBF (MIL-HDBK-217F)		AIF @ T_C = 55°C	-	393	-	-	393	-	kHrs
DYNAMIC									
Load Step Output Transient	$\pm V_{OUT}$	Half Load to Full Load	-	100	300	-	300	600	mV_{PK}
Load Step Recovery[3]			-	100	300	-	200	400	µSec
Line Step Output Transient[4]	$\pm V_{OUT}$	V_{IN} = 16V to 40V	-	100	300	-	150	400	mV_{PK}
Line Step Recovery[3, 4]			-	100	300	-	150	300	µSec
Turn On Delay	$\pm V_{OUT}$	V_{IN} = 0V to 28V	-	10	20	-	10	20	mSec
Turn On Overshoot			-	0	25	-	0	50	mV_{PK}

Notes:
1. Derate linearly to 0 at 135°C.
2. Synchronization is TTL signal with $V_{SYNC\ MAX}$ = 6V.
3. Time for output voltage to settle within 1% of its nominal value.
4. Verified by qualification testing.

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

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous)	50 V_{DC}	Junction Temperature Rise to Case	+15℃
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65℃ to +150℃
Output Power	15 Watts	Lead Solder Temperature (10 seconds)	270℃
Power Dissipation (Full Load, T_{CASE} = +125℃)	7.0 Watts	Weight (Maximum) (Un-Flanged / Flanged)	(24 / 28) Grams
ESD Rating per MIL-PRF-38534	3A		

Parameter		Conditions	DVAB2815D			Units
			Min	Typ	Max	
STATIC						
INPUT Voltage		Continuous	15	28	50	V
		Transient[4], 1 sec	-	-	80	V
Current		Inhibited	-	2	5	mA
		No Load	-	25	60	mA
Ripple Current		Full Load, 20Hz to 10MHz	-	25	60	mA_{p-p}
Inhibit Pin Input[4]			0	-	1.5	V
Inhibit Pin Open Circuit Voltage[4]			12	14	17	V
UVLO Turn On			10.5	-	14.5	V
UVLO Turn Off[4]			8.5	-	13.5	V
OUTPUT Voltage	$\pm V_{OUT}$	T_{CASE} = 25℃	14.85	15.0	15.15	V
	$\pm V_{OUT}$	T_{CASE} = -55℃ to +125℃	14.775	15.0	15.225	V
Power[1]	Total		0	-	15	W
	$\pm V_{OUT}$	Either Output	0	-	7.5	W
Current[1]	$\pm V_{OUT}$	Either Output	0	-	0.5	A
Ripple Voltage	$\pm V_{OUT}$	Full Load, 20Hz to 10MHz	-	20	60	mV_{p-p}
Line Regulation	$\pm V_{OUT}$	V_{IN} = 15V to 50V	-	1	20	mV
Load Regulation	$\pm V_{OUT}$	No Load to Full Load	-	2	50	mV
EFFICIENCY		Full Load	73	80	-	%
FAULT POWER DISSIPATION[4]		Short Circuit	-	-	12	W
CAPACITIVE LOAD[4]		Either Output	-	-	500	µF
SWITCHING FREQUENCY			550	650	700	kHz
SYNCHRONIZATION FREQUENCY[2]			700	750	800	kHz
ISOLATION		500 V_{DC}, T_{CASE} = 25℃	100	-	-	MΩ
MTBF (MIL-HDBK-217F)		AIF @ T_C = 55℃	-	393	-	kHrs
DYNAMIC						
Load Step Output Transient	$\pm V_{OUT}$	Half Load to Full Load	-	350	600	mV_{PK}
Load Step Recovery[3]			-	200	400	µSec
Line Step Output Transient[4]	$\pm V_{OUT}$	V_{IN} = 15V to 50V	-	200	500	mV_{PK}
Line Step Recovery[3, 4]			-	100	300	µSec
Turn On Delay	$\pm V_{OUT}$	V_{IN} = 0V to 28V	-	10	20	mSec
Turn On Overshoot			-	0	50	mV_{PK}

Notes:
1. Derate linearly to 0 at 135℃.
2. Synchronization is TTL signal with $V_{SYNC\ MAX}$ = 6V.
3. Time for output voltage to settle within 1% of its nominal value.
4. Verified by qualification testing.

BLOCK DIAGRAM

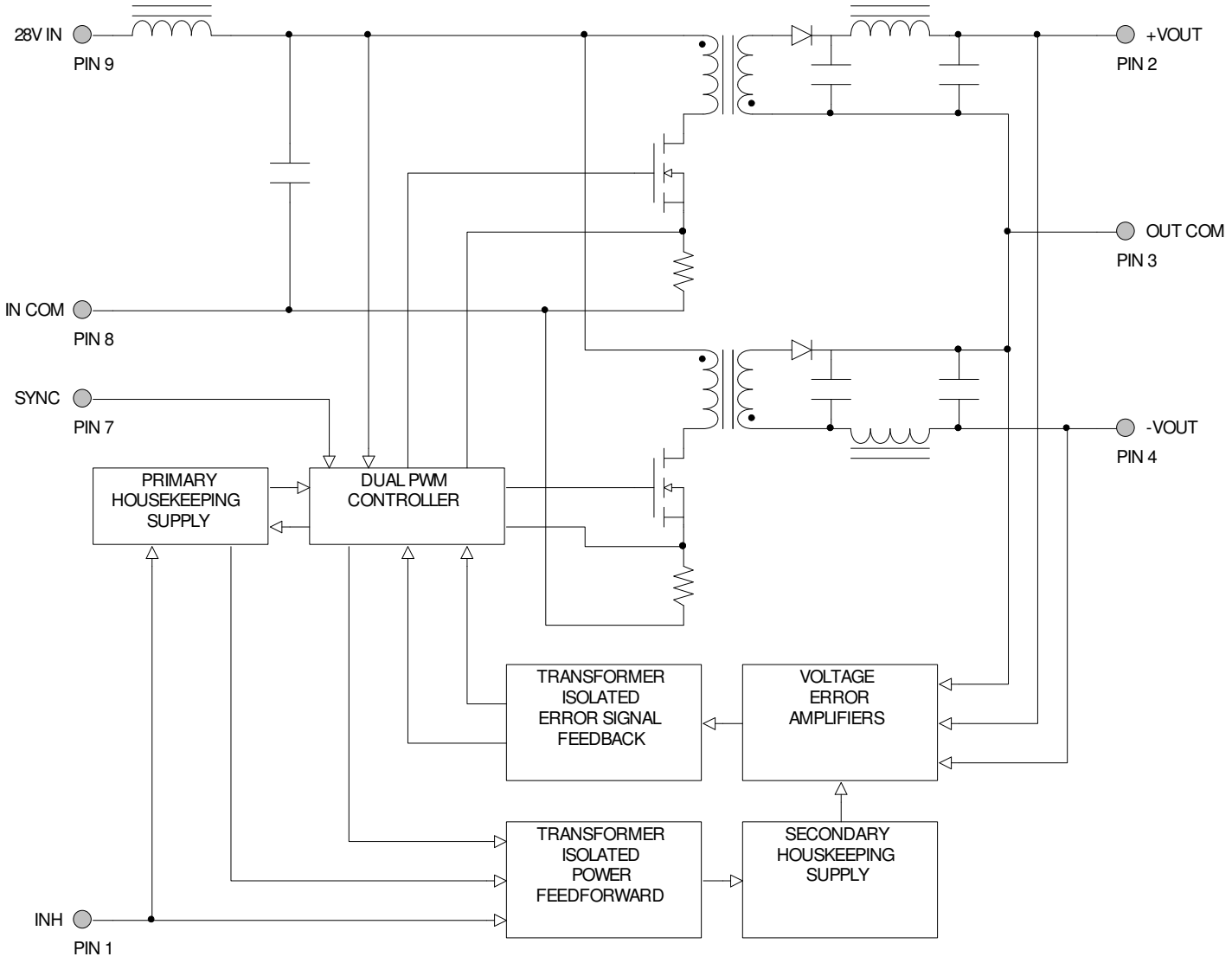


Figure 2

CONNECTION DIAGRAM

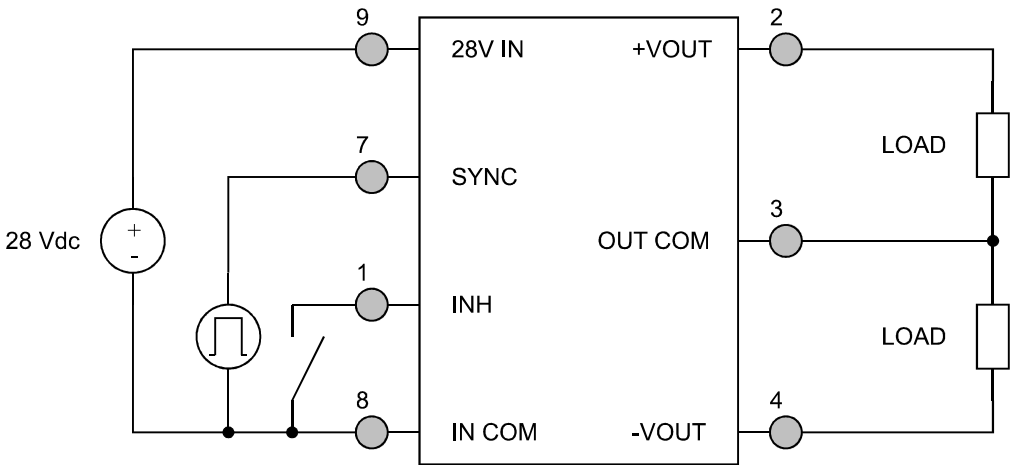


Figure 3

INHIBIT DRIVE CONNECTION DIAGRAMS

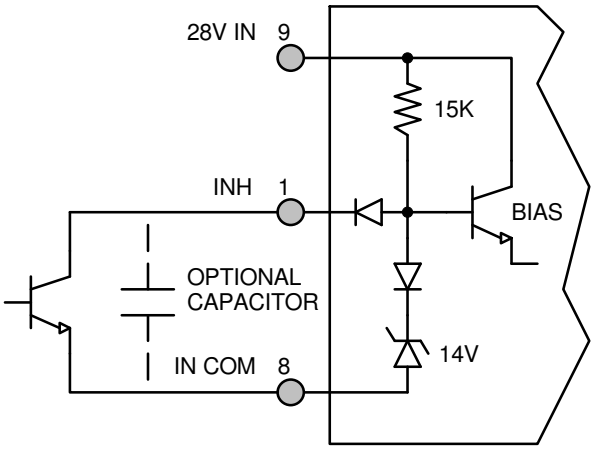


Figure 4 – Internal Inhibit Circuit and Recommended Drive
(Shown with optional capacitor for turn-on delay)

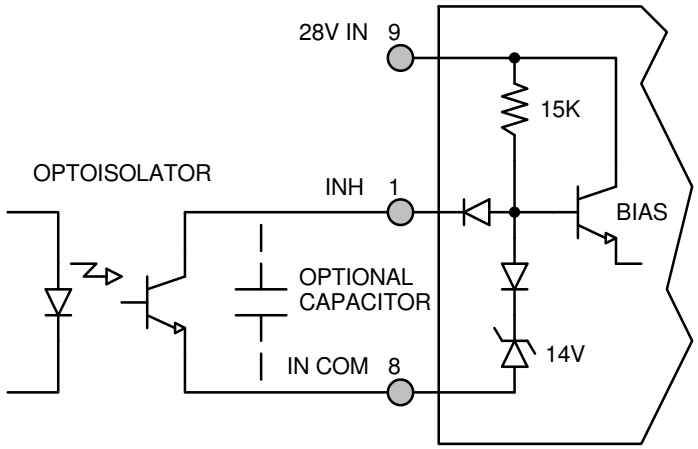


Figure 5 – Isolated Inhibit Drive
(Shown with optional capacitor for turn-on delay)

EMI FILTER HOOKUP DIAGRAM

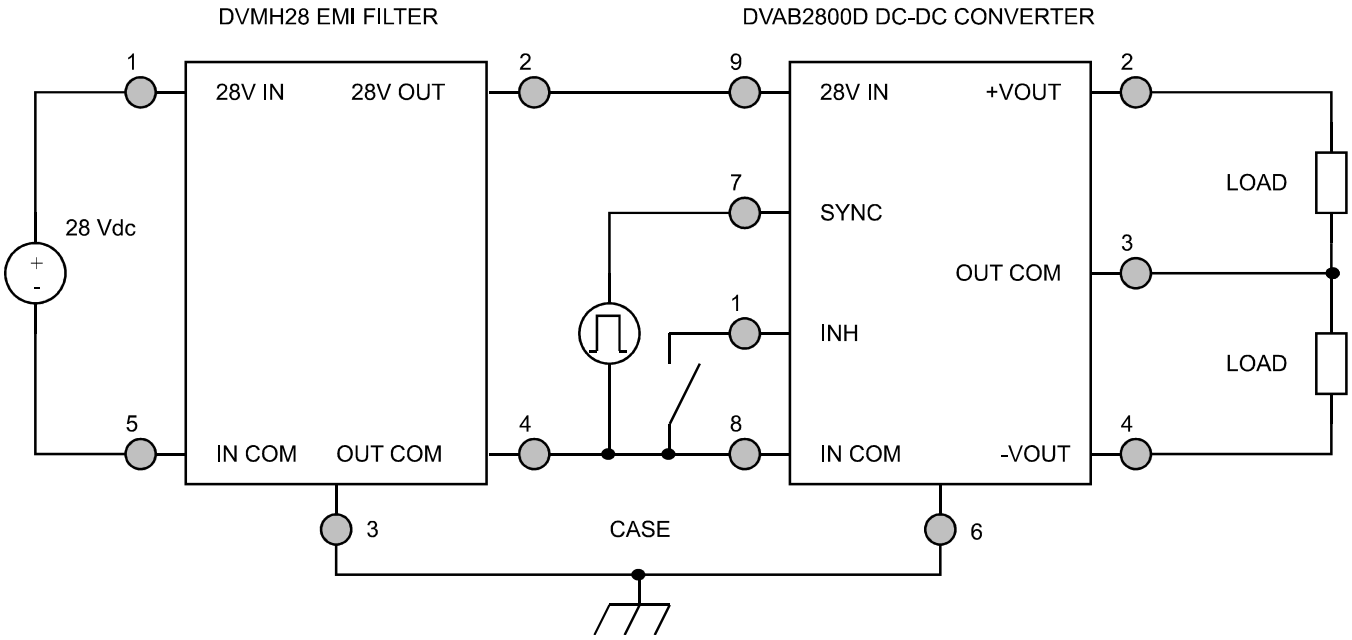


Figure 6 – Converter with EMI Filter

EFFICIENCY PERFORMANCE CURVES (T_{CASE} = 25°C, Full Load, Unless Otherwise Specified)

------- V_{IN} = 15V	——— V_{IN} = 28V	– – – – – V_{IN} = 50V

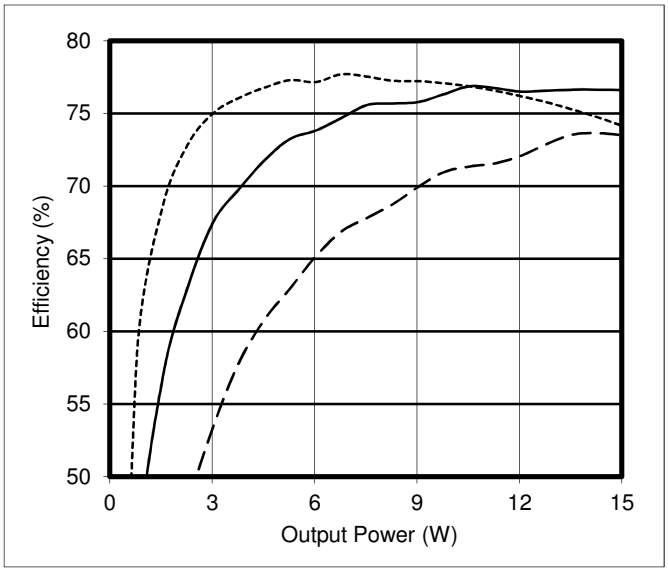


Figure 7 – DVAB2805D
Efficiency (%) vs. Output Power (W)

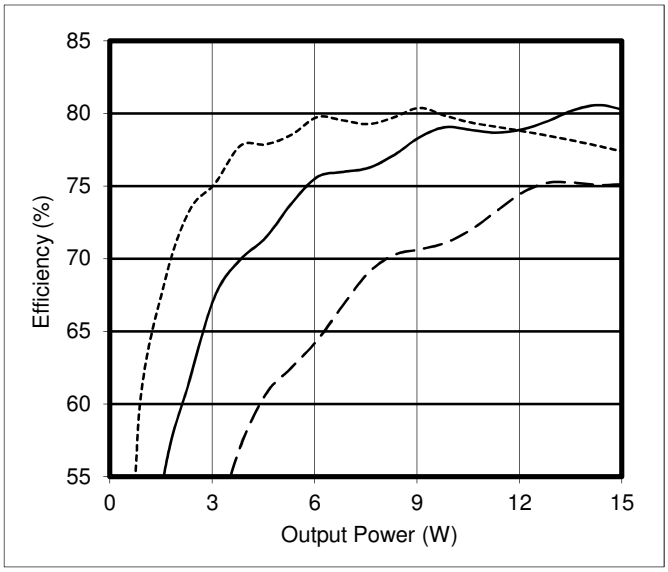


Figure 8 – DVAB2812D
Efficiency (%) vs. Output Power (W)

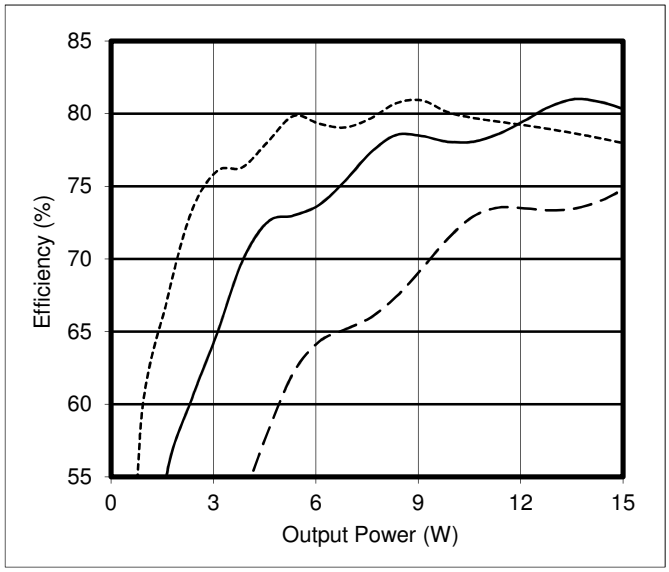
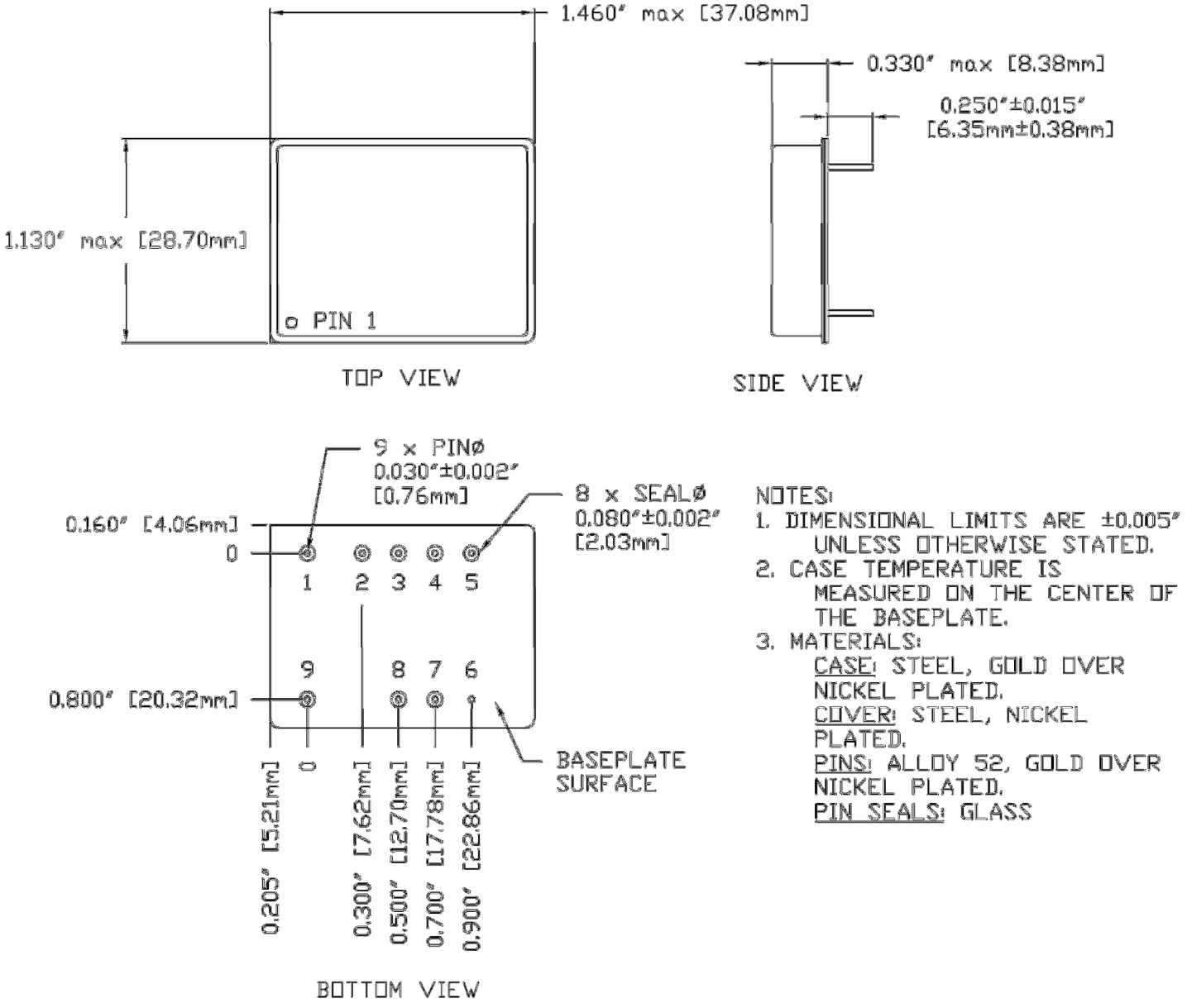


Figure 9 – DVAB2815D
Efficiency (%) vs. Output Power (W)

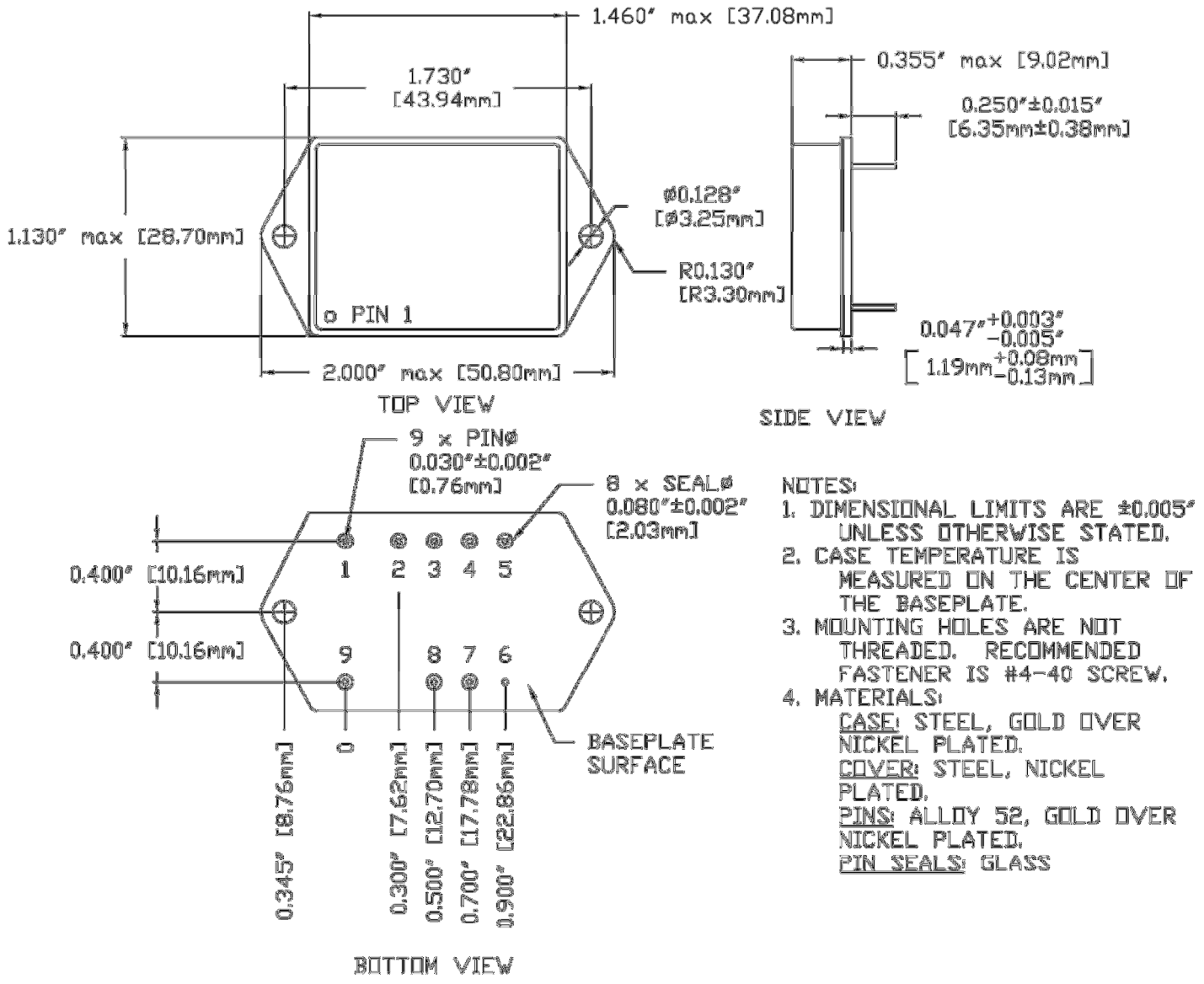
PACKAGE SPECIFICATIONS (NON-FLANGED)



Pin	Function	Pin	Function	Pin	Function
1	INHIBIT	4	-VOUT	7	SYNC
2	+VOUT	5	N/C	8	INCOM
3	OUTCOM	6	CASE	9	28VIN

Figure 10 – Non-Flanged Package and Pinout

PACKAGE SPECIFICATIONS (FLANGED)



Pin	Function	Pin	Function	Pin	Function
1	INHIBIT	4	-VOUT	7	SYNC
2	+VOUT	5	N/C	8	INCOM
3	OUTCOM	6	CASE	9	28VIN

Figure 11 – 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	+VOUT	Positive Output Voltage Connection
3	OUTCOM	Output Common Connection
4	-VOUT	Negative Output Voltage Connection
5	N/C	No Connection
6	CASE	Case Connection
7	SYNC	Synchronization Signal
8	INCOM	Input Common Connection
9	28VIN	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℃ to 150℃, Ambient			•	•
	TM1010, Condition B -55℃ to 125℃, Ambient		•		
Constant Acceleration	TM2001, 3000g, Y1 Direction			•	•
	TM2001, 500g, Y1 Direction		•		
PIND ⑦	TM2020, Condition A				•
Pre Burn-In Electrical	25℃				•
Burn-In	TM1015, 320 hrs, 125℃, Case Typ				•
	TM1015, 160 hrs, 125℃, Case Typ			•	
	96 hrs, 125℃, Case Typ		•		
	24 hrs, 125℃, Case Typ	•			
Final Electrical	MIL-PRF-38534, Group A Subgroups 1-6 -55℃, 25℃, 125℃ ③			•	•
	MIL-PRF-38534, Group A Subgroups 1 and 4 25℃	•	•		
Hermeticity (Seal)	TM1014, Fine Leak, Condition A2 or B1		•	•	•
	TM1014, Gross Leak, Condition C or B2		•	•	•
	Gross Leak, Dip (1 x 10^{-3})	•			
Radiography ⑧	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 Note intentionally not used.
⑦ PIND test Certificate of Compliance included in product shipment.
⑧ Radiographic test Certificate of Compliance and film(s) or data CD included in product shipment.

ORDERING INFORMATION

DVAB	28	05	D	F	/H	-	XXX
1	2	3	4	5	6		7

(1) (2) (3) (4)

Product Series	Nominal Input Voltage		Output Voltage		Number of Outputs	
DVAB	**28**	28 Volts	**05** **12** **15**	± 5 Volts ± 12 Volts ± 15 Volts	**D**	Dual

(5) (6) (7)

Package Option		Screening Code[1]		Additional Screening Code
None **F**	Non-Flanged Flanged	**None** **/ES** **/H** **/K**	Standard Extended Class H Class K	Contact Sales

Notes: 1. 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)	DVAB2800D Series Similar Part Number
5962-1423201HXC 5962-1423201HXA 5962-1423201HYC 5962-1423201HYA 5962-1423201KXC 5962-1423201KXA 5962-1423201KYC 5962-1423201KYA	DVAB2805D/H DVAB2805D/H-E DVAB2805DF/H DVAB2805DF/H-E DVAB2805D/K DVAB2805D/K-E DVAB2805DF/K DVAB2805DF/K-E
5962-1423202HXC 5962-1423202HXA 5962-1423202HYC 5962-1423202HYA 5962-1423202KXC 5962-1423202KXA 5962-1423202KYC 5962-1423202KYA	DVAB2812D/H DVAB2812D/H-E DVAB2812DF/H DVAB2812DF/H-E DVAB2812D/K DVAB2812D/K-E DVAB2812DF/K DVAB2812DF/K-E
5962-1423203HXC 5962-1423203HXA 5962-1423203HYC 5962-1423203HYA 5962-1423203KXC 5962-1423203KXA 5962-1423203KYC 5962-1423203KYA	DVAB2815D/H DVAB2815D/H-E DVAB2815DF/H DVAB2815DF/H-E DVAB2815D/K DVAB2815D/K-E DVAB2815DF/K DVAB2815DF/K-E

Do not use the DVAB2800D 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