



# DVHF2800S Series

## HIGH RELIABILITY HYBRID DC-DC CONVERTERS

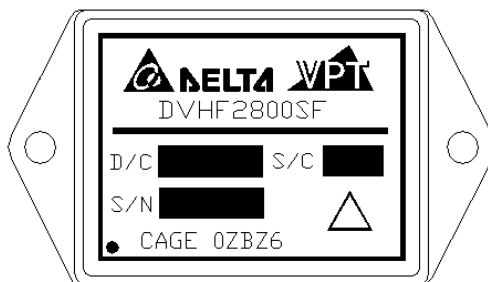
### DESCRIPTION

The DVHF 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 DVHF series is a magnetic feedback circuit that is radiation immune. Operating at a nominal fixed frequency of 450 kHz, these regulated, isolated units utilize well controlled undervoltage lockout circuitry to eliminate slow start-up problems.

These converters are designed and manufactured in a facility qualified to ISO9001, compliant to AS9000, and certified to MIL-PRF-38534 and MIL-STD-883.

### FEATURES

- High Reliability
- Very Low Output Noise
- Wide Input Voltage Range: 15 to 50 Volts per MIL-STD-704
- Up to 20 Watts Output Power
- Radiation Immune Magnetic Feedback Circuit
- NO Use of Optoisolators
- Undervoltage Lockout
- Industry Standard Pinout
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- Radiation Hardened Version Available
- Precision Projection Welded Hermetic Package
- High Power Density: > 37 W/in<sup>3</sup>
- 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 – DVHF2800S / DVHF2800SF DC-DC Converter**  
(Not To Scale)

## 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	+12°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power <sup>1</sup>	20 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6 Watts	Weight	24 grams

Parameter		Conditions	DVHF283R3S			DVHF2805S			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC									
INPUT Voltage <sup>4</sup>		Continuous	15	28	50	15	28	50	V
		Transient, 1 sec	-	-	80	-	-	80	V
Current		Inhibited	-	-	6	-	-	6	mA
		No Load	-	40	65	-	40	65	mA
Ripple Current		Full Load, 20Hz to 20MHz	-	-	60	-	-	60	mA <sub>p-p</sub>
Inhibit Pin Input <sup>4</sup>			0	-	1.5	0	-	1.5	V
Inhibit Pin Open Circuit Voltage <sup>4</sup>			9.0	11.0	13.0	9.0	11.0	13.0	V
UVLO Turn On			13.0	-	14.8	13.0	-	14.8	V
UVLO Turn Off <sup>4</sup>			11.0	-	14.5	11.0	-	14.5	V
OUTPUT Voltage	V <sub>OUT</sub>	T <sub>CASE</sub> = 25°C	3.267	3.30	3.333	4.95	5.00	5.05	V
	V <sub>OUT</sub>	T <sub>CASE</sub> = -55°C to +125°C	3.25	3.30	3.35	4.925	5.00	5.075	V
Power <sup>3</sup>			0	-	10	0	-	15	W
Current <sup>3</sup>	V <sub>OUT</sub>		0	-	3.0	0	-	3.0	A
Ripple Voltage	V <sub>OUT</sub>	Full Load, 20Hz to 20MHz	-	-	40	-	-	40	mV <sub>p-p</sub>
Line Regulation	V <sub>OUT</sub>	V <sub>IN</sub> = 15V to 50V	-	-	20	-	-	20	mV
Load Regulation	V <sub>OUT</sub>	No Load to Full Load	-	-	50	-	-	50	mV
EFFICIENCY			65	-	-	72	-	-	%
LOAD FAULT POWER DISSIPATION		Overload <sup>4</sup>	-	-	8	-	-	8	W
		Short Circuit	-	-	8	-	-	8	W
CAPACITIVE LOAD <sup>4</sup>			-	-	1000	-	-	1000	μF
SWITCHING FREQUENCY			350	450	500	350	450	500	kHz
ISOLATION		500 V <sub>DC</sub>	100	-	-	100	-	-	MΩ
THERMAL RESISTANCE		Case to Ambient (θCA)	-	25	-	-	25	-	°C/W
MTBF (MIL-HDBK-217F)		AIF @ T <sub>C</sub> = 55°C	-	427	-	-	427	-	kHrs
DYNAMIC									
Load Step Output Transient	V <sub>OUT</sub>	Half Load to Full Load	-	-	400	-	-	600	mV <sub>PK</sub>
Load Step Recovery <sup>2</sup>			-	-	500	-	-	500	μSec
Line Step Output Transient <sup>4</sup>	V <sub>OUT</sub>	V <sub>IN</sub> = 16V to 40V	-	400	700	-	400	800	mV <sub>PK</sub>
Line Step Recovery <sup>2, 4</sup>			-	300	500	-	300	500	μSec
Turn On Delay	V <sub>OUT</sub>	V <sub>IN</sub> = 0V to 28V	-	10	20	-	10	20	mSec
Turn On Overshoot <sup>2</sup>			-	0	15	-	0	25	mV <sub>PK</sub>

Notes: 1. Dependant on output voltage. 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.

## 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	+12°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power <sup>1</sup>	20 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6 Watts	Weight	24 grams

Parameter		Conditions	DVHF2812S			DVHF2815S			Units
			Min	Typ	Max	Min	Typ	Max	
STATIC									
INPUT Voltage <sup>4</sup>		Continuous	15	28	50	15	28	50	V
		Transient, 1 sec	-	-	80	-	-	80	V
Current		Inhibited	-	-	6	-	-	6	mA
		No Load	-	40	65	-	40	65	mA
Ripple Current		Full Load, 20Hz to 20MHz	-	-	60	-	-	60	mA <sub>p-p</sub>
Inhibit Pin Input <sup>4</sup>			0	-	1.5	0	-	1.5	V
Inhibit Pin Open Circuit Voltage <sup>4</sup>			9.0	11.0	13.0	9.0	11.0	13.0	V
UVLO Turn On			13.0	-	14.8	13.0	-	14.8	V
UVLO Turn Off <sup>4</sup>			11.0	-	14.5	11.0	-	14.5	V
OUTPUT Voltage	V <sub>OUT</sub>	T <sub>CASE</sub> = 25°C	11.88	12.0	12.12	14.85	15.0	15.15	V
	V <sub>OUT</sub>	T <sub>CASE</sub> = -55°C to +125°C	11.82	12.0	12.18	14.775	15.0	15.225	V
Power <sup>3</sup>			0	-	20	0	-	20	W
Current <sup>3</sup>	V <sub>OUT</sub>		0	-	1.67	0	-	1.34	A
Ripple Voltage	V <sub>OUT</sub>	Full Load, 20Hz to 20MHz	-	-	40	-	-	40	mV <sub>p-p</sub>
Line Regulation	V <sub>OUT</sub>	V <sub>IN</sub> = 15V to 50V	-	-	20	-	-	20	mV
Load Regulation	V <sub>OUT</sub>	No Load to Full Load	-	-	50	-	-	50	mV
EFFICIENCY			77	-	-	78	-	-	%
LOAD FAULT POWER DISSIPATION		Overload <sup>4</sup>	-	-	8	-	-	8	W
		Short Circuit	-	-	8	-	-	8	W
CAPACITIVE LOAD <sup>4</sup>			-	-	500	-	-	500	μF
SWITCHING FREQUENCY			350	450	500	350	450	500	kHz
ISOLATION		500 V <sub>DC</sub>	100	-	-	100	-	-	MΩ
THERMAL RESISTANCE		Case to Ambient (θCA)	-	25	-	-	25	-	°C/W
MTBF (MIL-HDBK-217F)		AIF @ T <sub>C</sub> = 55°C	-	427	-	-	427	-	kHrs
DYNAMIC									
Load Step Output Transient	V <sub>OUT</sub>	Half Load to Full Load	-	-	500	-	-	500	mV <sub>PK</sub>
Load Step Recovery <sup>2</sup>			-	-	500	-	-	500	μSec
Line Step Output Transient <sup>4</sup>	V <sub>OUT</sub>	V <sub>IN</sub> = 16V to 40V	-	500	900	-	500	900	mV <sub>PK</sub>
Line Step Recovery <sup>2, 4</sup>			-	300	500	-	300	500	μSec
Turn On Delay	V <sub>OUT</sub>	V <sub>IN</sub> = 0V to 28V	-	10	20	-	10	20	mSec
Turn On Overshoot <sup>2</sup>			-	0	50	-	0	50	mV <sub>PK</sub>

Notes: 1. Dependant on output voltage. 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.

## 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	+12°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power <sup>1</sup>	20 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T <sub>CASE</sub> = +125°C)	6 Watts	Weight	24 grams

Parameter	Conditions	DVHF285R2S			Units
		Min	Typ	Max	
STATIC					
INPUT Voltage <sup>4</sup>	Continuous	15	28	50	V
	Transient, 1 sec	-	-	80	V
Current	Inhibited	-	-	6	mA
	No Load	-	40	65	mA
Ripple Current	Full Load, 20Hz to 20MHz	-	-	60	mA <sub>p-p</sub>
Inhibit Pin Input <sup>4</sup>		0	-	1.5	V
Inhibit Pin Open Circuit Voltage <sup>4</sup>		9.0	11.0	13.0	V
UVLO Turn On		13.0	-	14.8	V
UVLO Turn Off <sup>4</sup>		11.0	-	14.5	V
OUTPUT Voltage	V <sub>OUT</sub> T <sub>CASE</sub> = 25°C	5.148	5.20	5.252	V
	V <sub>OUT</sub> T <sub>CASE</sub> = -55°C to +125°C	5.122	5.20	5.278	V
Power <sup>3</sup>		0	-	15	W
Current <sup>3</sup>	V <sub>OUT</sub>	0	-	3.0	A
Ripple Voltage	V <sub>OUT</sub> Full Load, 20Hz to 20MHz	-	-	40	mV <sub>p-p</sub>
Line Regulation	V <sub>OUT</sub> V <sub>IN</sub> = 15V to 50V	-	-	20	mV
Load Regulation	V <sub>OUT</sub> No Load to Full Load	-	-	50	mV
EFFICIENCY		72	-	-	%
LOAD FAULT POWER DISSIPATION	Overload <sup>4</sup>	-	-	8	W
	Short Circuit	-	-	8	W
CAPACITIVE LOAD <sup>4</sup>		-	-	1000	μF
SWITCHING FREQUENCY		350	450	500	kHz
ISOLATION	500 V <sub>DC</sub>	100	-	-	MΩ
THERMAL RESISTANCE	Case to Ambient (θCA)	-	25	-	°C/W
MTBF (MIL-HDBK-217F)	AIF @ T <sub>C</sub> = 55°C	-	427	-	kHrs
DYNAMIC					
Load Step Output Transient	V <sub>OUT</sub> Half Load to Full Load	-	-	600	mV <sub>PK</sub>
Load Step Recovery <sup>2</sup>		-	-	500	μSec
Line Step Output Transient <sup>4</sup>	V <sub>OUT</sub> V <sub>IN</sub> = 16V to 40V	-	400	800	mV <sub>PK</sub>
Line Step Recovery <sup>2, 4</sup>		-	300	500	μSec
Turn On Delay	V <sub>OUT</sub> V <sub>IN</sub> = 0V to 28V	-	10	20	mSec
Turn On Overshoot <sup>2</sup>		-	0	25	mV <sub>PK</sub>

Notes: 1. Dependant on output voltage. 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.

## BLOCK DIAGRAM

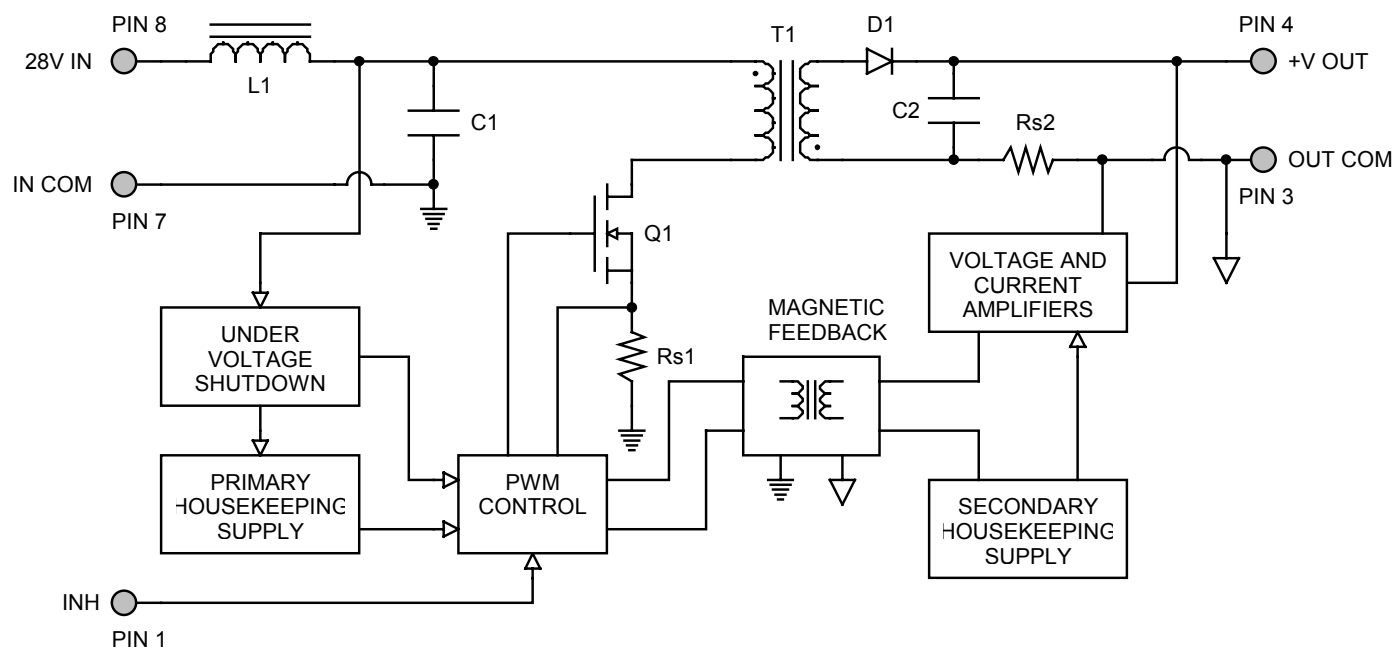


Figure 2

## CONNECTION DIAGRAM

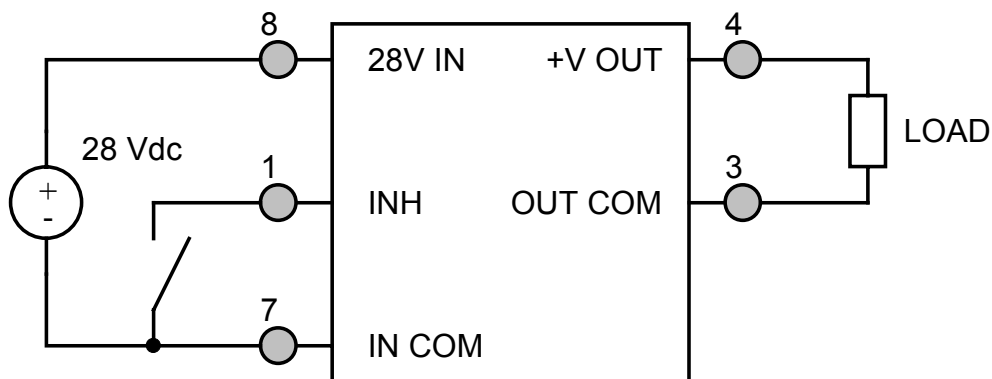


Figure 3

28V IN 8

10K

INH 1

BIAS

OPTIONAL CAPACITOR

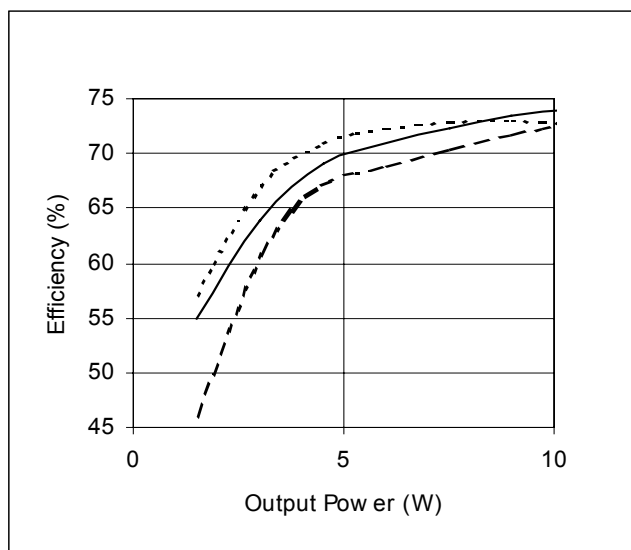
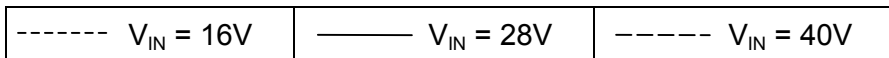
12V

IN COM 7

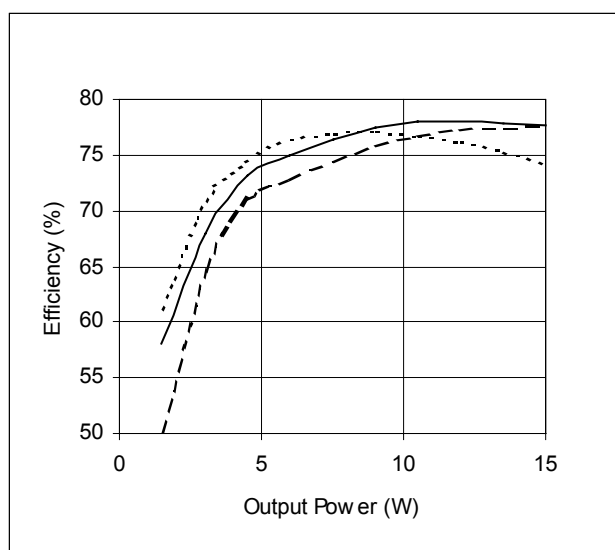
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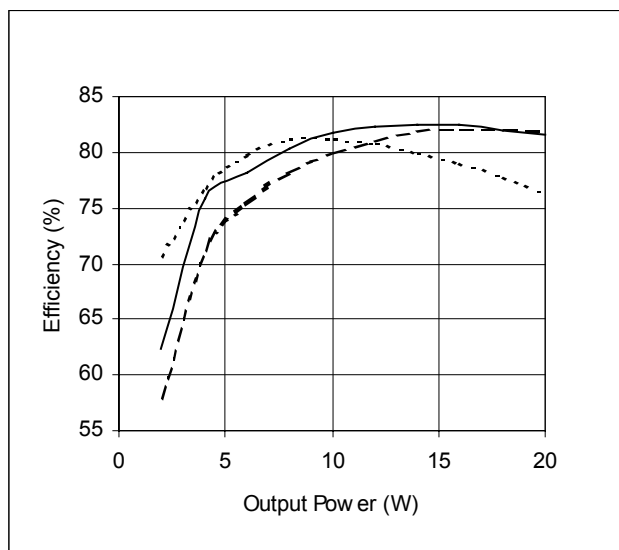
## EFFICIENCY PERFORMANCE CURVES ( $T_{CASE} = 25^{\circ}C$ , Full Load, Unless Otherwise Specified)



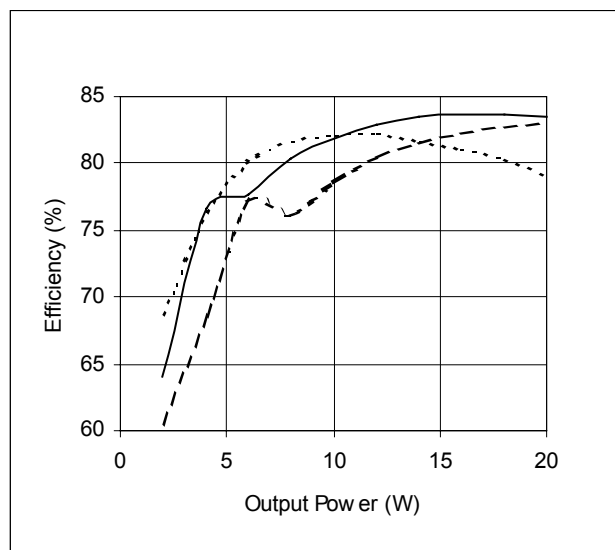
**Figure 7 – DVHF283R3S**  
Efficiency (%) vs. Output Power (W)



**Figure 8 – DVHF2805S / DVHF285R2S**  
Efficiency (%) vs. Output Power (W)



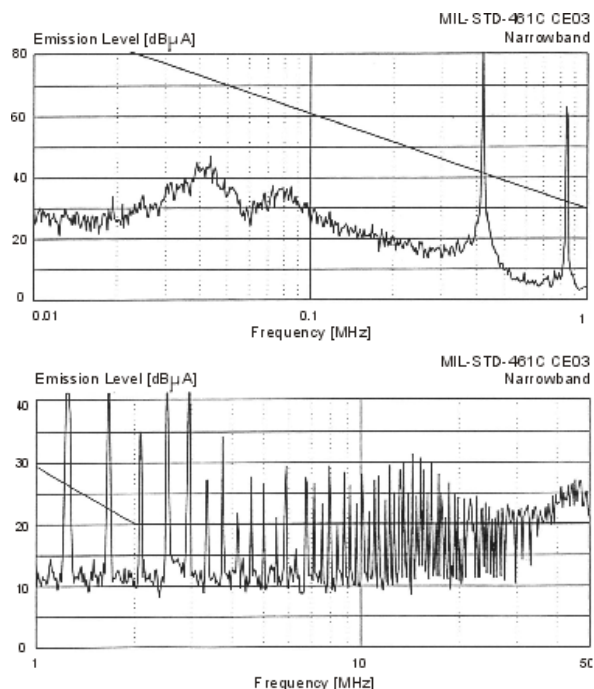
**Figure 9 – DVHF2812S**  
Efficiency (%) vs. Output Power (W)



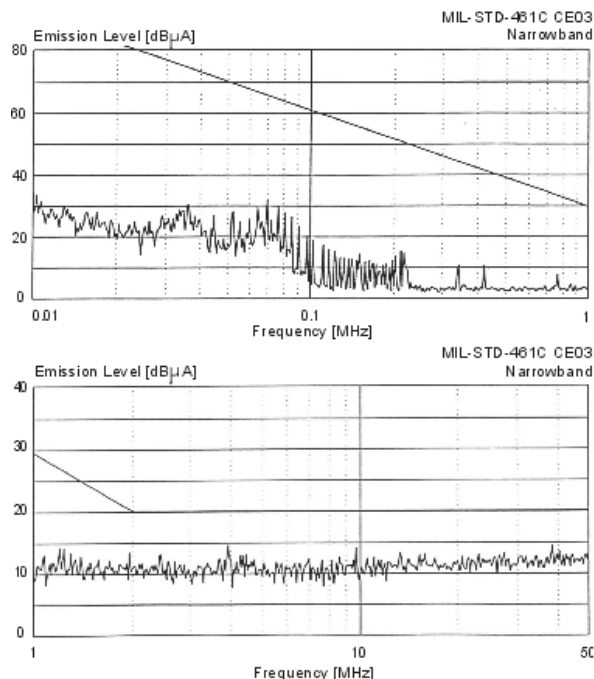
**Figure 10 – DVHF2815S**  
Efficiency (%) vs. Output Power (W)

## EMI PERFORMANCE CURVES

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



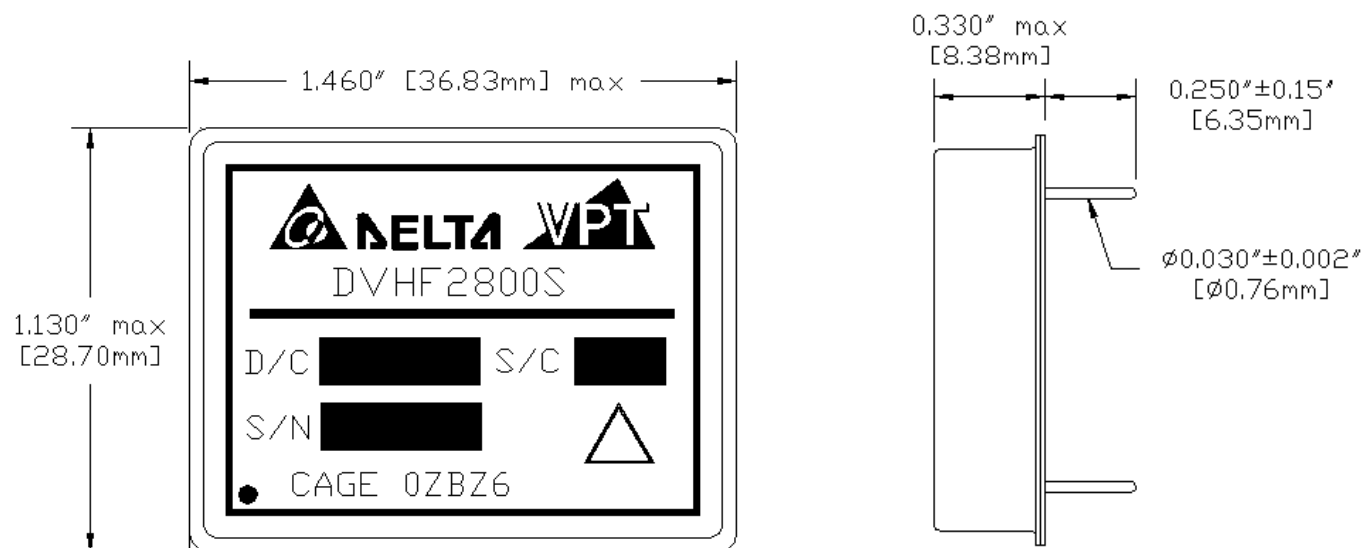
**Figure 11** – DVHF2800S without EMI Filter



**Figure 12** – DVHF2800S with EMI Filter

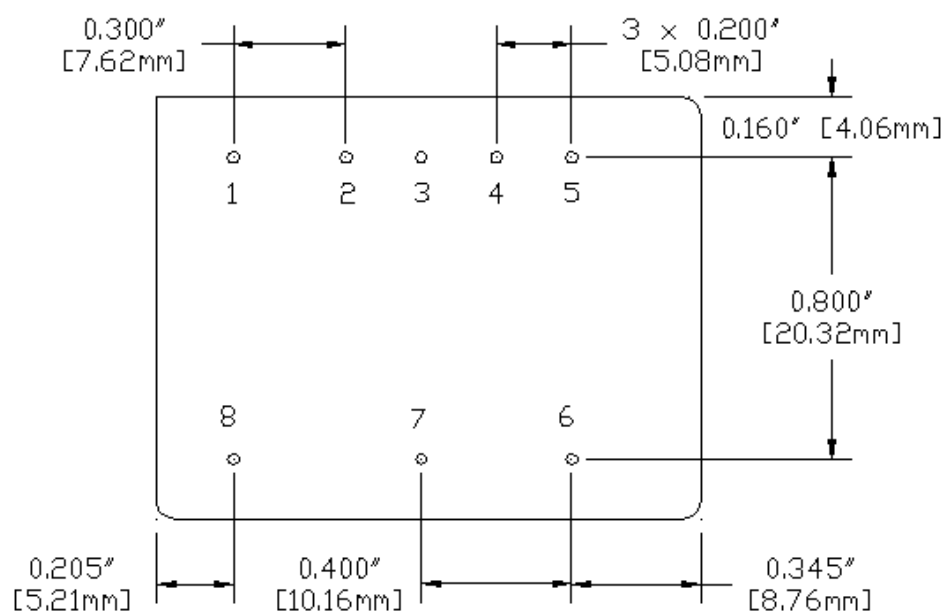


## PACKAGE SPECIFICATIONS (NON-FLANGED)



TOP VIEW

SIDE VIEW

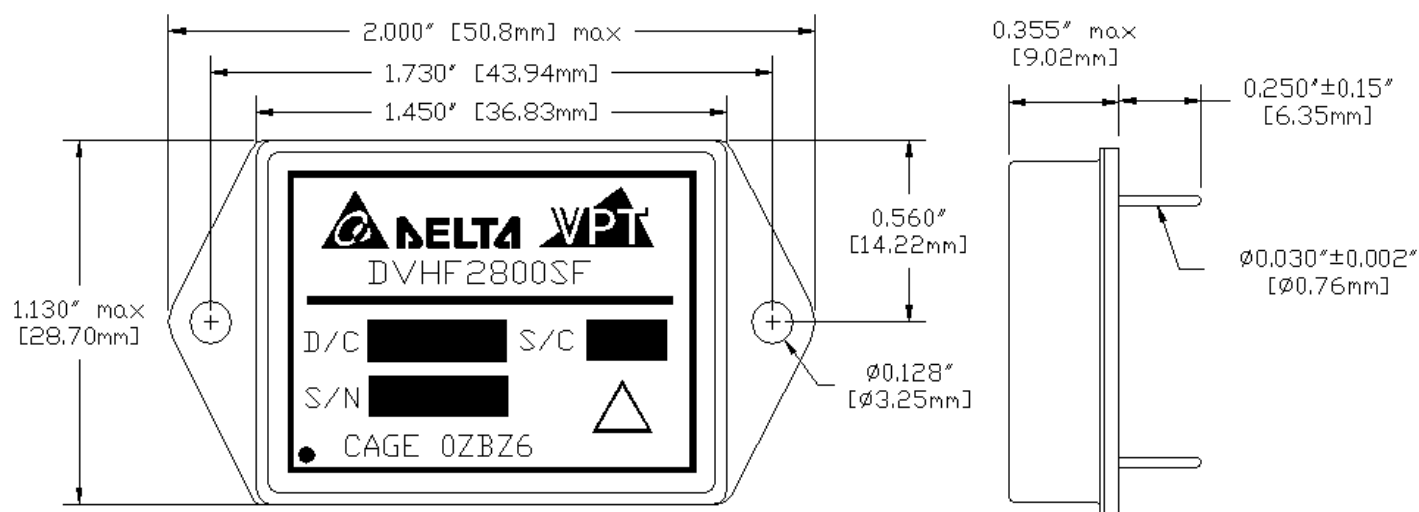


BOTTOM VIEW

PIN	FUNCTION
1	INHIBIT
2	N/C
3	OUT COM
4	+V OUT
5	N/C
6	CASE
7	IN COM
8	28V IN

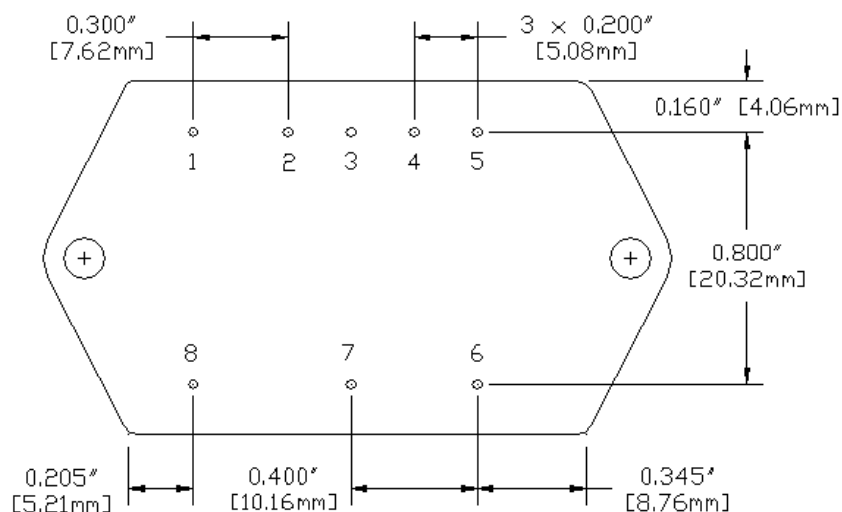
**Figure 13 – Non-Flanged Package and Pinout**  
(Dimensional Limits are  $\pm 0.005$ " Unless Otherwise Stated)

## PACKAGE SPECIFICATIONS (FLANGED)



TOP VIEW

SIDE VIEW



BOTTOM VIEW

PIN	FUNCTION
1	INHIBIT
2	N/C
3	OUT COM
4	+V OUT
5	N/C
6	CASE
7	IN COM
8	28V IN

**Figure 14** – Flanged Package and Pinout  
(Dimensional Limits are  $\pm 0.005$ " Unless Otherwise Stated)

## 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	N/C	No Connection
3	OUT COM	Output Common Connection
4	+V OUT	Positive Output Voltage Connection
5	N/C	No Connection
6	CASE	Case Connection
7	IN COM	Input Common Connection
8	28V IN	Positive Input Voltage Connection

## ENVIRONMENTAL SCREENING (Per MIL-STD-883 as referenced to MIL-PRF-38534, Class H)

Screening	MIL-STD-883	Standard (No Suffix)	Extended /ES	HB /HB
Pre-Cap Inspection	Method 2017, 2032 Internal Procedure	•	•	•
Temperature Cycling	Method 1010, Condition C Method 1010, -55°C to 125°C		•	•
Constant Acceleration	Method 2001, Condition A Method 2001, 500g		•	•
Burn-In	Method 1015, 160 hours at +125°C 96 hours at +125°C 24 hours at +125°C	•	•	•
Hermeticity	Method 1014, Fine Leak, Condition A Method 1014, Gross Leak, Condition C Dip ( $1 \times 10^{-3}$ )	•	• •	• •
Final Electrical	MIL-PRF-38534, Group A <sup>1</sup> 100% at 25°C	•	•	•
Final Inspection	Method 2009	•	•	•

Note: 1. 100% R&R testing at -55°C, +25°C, and +125°C with all test data included in product shipment.

## ORDERING INFORMATION

DVHF	28	05	S	F	R	/HB	-	XXX
1	2	3	4	5	6	7		8

(1) Product Series	(2) Nominal Input Voltage	(3) Output Voltage	(4) Number of Outputs
DVHF	28 28 Volts	3R3 05 5R2 12 15 3.3 Volts 5 Volts 5.2 Volts 12 Volts 15 Volts	S Single

(5) Package Option	(6) Rad-Hard Option	(7) Screening Code	(8) Additional Screening Code
None F Non-Flanged Flanged	None R Standard 100 kRad	None /ES /HB Standard Extended HB	Contact Sales

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.

## CONTACT INFORMATION

To request a quotation or place an order please contact your sales representative or the VPT Inc. Sales Department at:

**Phone:** (425) 487-4850  
**Fax:** (425) 487-4802  
**E-mail:** sales@vpt-inc.com

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