

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/in³
- 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)

DVHF2800S Series

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

Parameter		DVHF283R3S			DVHF2805S			11
		Min	Тур	Мах	Min	Тур	Мах	Units
				-	-		-	
	Continuous	15	28	50	15	28	50	V
	Transient, 1 sec	-	-	80	-	-	80	V
	Inhibited	-	-	6	-	-	6	mA
	No Load	-	40	65	-	40	65	mA
	Full Load, 20Hz to 20MHz	-	-	60	-	-	60	mA _{p-p}
		0	-	1.5	0	-	1.5	V
e ⁴		9.0	11.0	13.0	9.0	11.0	13.0	V
		13.0	-	14.8	13.0	-	14.8	V
		11.0	-	14.5	11.0	-	14.5	V
V _{OUT}	T _{CASE} = 25°C	3.267	3.30	3.333	4.95	5.00	5.05	V
V _{OUT}	T_{CASE} = -55°C to +125°C	3.25	3.30	3.35	4.925	5.00	5.075	V
		0	-	10	0	-	15	W
Vout		0	-	3.0	0	-	3.0	А
V _{OUT}	Full Load, 20Hz to 20MHz	-	-	40	-	-	40	mV_{p-p}
Vout	V _{IN} = 15V to 50V	-	-	20	-	-	20	mV
Vout	No Load to Full Load	-	-	50	-	-	50	mV
		65	-	-	72	-	-	%
	Overload ⁴	-	-	8	-	-	8	W
	Short Circuit	-	-	8	-	-	8	W
		-	-	1000	-	-	1000	μF
		350	450	500	350	450	500	kHz
	500 V _{DC}	100	-	-	100	-	-	MΩ
	Case to Ambient (0CA)	-	25	-	-	25	-	°C/W
	AIF @ T _c = 55°C	-	427	-	-	427	-	kHrs
		-	-	-	-	-	-	-
V _{OUT}		-	-	400	-	-	600	тV _{РК}
	Hait Load to Full Load	-	-	500	-	-	500	μSec
V _{OUT}		-	400	700	-	400	800	тV _{РК}
	$v_{IN} = 16V$ to 40V	-	300	500	-	300	500	μSec
V _{OUT}		-	10	20	-	10	20	mSec
	$v_{IN} = 0V$ to 28V	-	0	15	-	0	25	тV _{РК}
	е ⁴ V _{0UT} V _{0UT} V _{0UT} V _{0UT} V _{0UT} V _{0UT}	$\begin{array}{c c c c c c } \hline Transient, 1 sec \\ \hline Transient, 1 sec \\ \hline Inhibited \\ \hline No Load \\ \hline Full Load, 20Hz to 20MHz \\ \hline \\ e^4 \\ \hline \\ Full Load, 20Hz to 20MHz \\ \hline \\ V_{OUT} \\ \hline \\ T_{CASE} = -55^{\circ}C to +125^{\circ}C \\ \hline \\ V_{OUT} \\ \hline \\ V_{OUT} \\ \hline \\ V_{OUT} \\ \hline \\ V_{IN} = 15V to 50V \\ \hline \\ V_{OUT} \\ \hline \\ V_{IN} = 15V to 50V \\ \hline \\ V_{OUT} \\ \hline \\ OVerload^4 \\ \hline \\ Short Circuit \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \hline \hline \\ \hline \hline$	ConditionsMinImage: Continuous15Transient, 1 sec-Inhibited-No Load-Full Load, 20Hz to 20MHz-00e ⁴ 9.011.011.0VoutT_{CASE} = 25°C3.2673.267VoutT_{CASE} = -55°C to +125°C00Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout0Vout15V to 50VO-Vout0No Load to Full Load-0350500 V _{DC} 100Case to Ambient (θ CA)-AIF @ T_c = 55°C-VoutHalf Load to Full LoadVoutV _{IN} = 16V to 40VVoutV _{IN} = 0V to 28V	Conditions Min Typ Inhibited 15 28 Transient, 1 sec - - Inhibited - - No Load - 40 Full Load, 20Hz to 20MHz - - 0 - 40 Full Load, 20Hz to 20MHz - - 0 - 40 Full Load, 20Hz to 20MHz - - 0 - - 0 - - 0 - - Vout Tcase = 25°C 3.267 3.30 Vout Tcase = -55°C to +125°C 3.267 3.30 Vout Tcase = -55°C to +125°C 3.267 3.30 Vout Full Load, 20Hz to 20MHz - - Vout Full Load, 20Hz to 20MHz - - Vout No Load to Full Load - - ON Overload ⁴ - - - ION Overload ⁴ -	Conditions Min Typ Max Image: Continuous 15 28 50 Transient, 1 sec - - 80 Inhibited - - 6 No Load - 40 65 Full Load, 20Hz to 20MHz - - 60 Full Load, 20Hz to 20MHz - - 60 Constance 0 - 11.0 13.0 Full Load, 20Hz to 20MHz - 14.8 11.0 14.8 Tcase = 25°C 3.267 3.30 3.333 3.35 Vout Tcase = -55°C to +125°C 3.267 3.30 3.35 Vout Tcase = -55°C to +125°C 3.267 3.30 3.35 Vout Full Load, 20Hz to 20MHz - 40 10 Vout Full Load, 20Hz to 20MHz - - 40 Vout Full Load, 20Hz to 20MHz - - 50 ON No Load to Full Load - - 50	Conditions Min Typ Max Min Image: Continuous 15 28 50 15 Transient, 1 sec - - 80 - Inhibited - - 6 - No Load - 40 65 - Full Load, 20Hz to 20MHz - - 60 - Imbibited - - 60 - Full Load, 20Hz to 20MHz - - 60 - Imbibited - - 60 - - Imbibited - - 60 - - Imbibited - - - 60 - Imbibited - - 11.0 13.0 9.0 11.0 Imbibited - 3.267 3.30 3.333 4.95 Vour Tcase = 25°C 0 - 10 0 - Vour Full Load, 20Hz to 20MHz - <td< td=""><td>Conditions Min Typ Max Min Typ Continuous 15 28 50 15 28 Transient, 1 sec - 80 - - Inhibited - 40 65 - 40 Full Load, 20Hz to 20MHz - 60 - - 40 Full Load, 20Hz to 20MHz - - 60 - - 40 fed 9.0 11.0 13.0 9.0 11.0 - - 60 - - e^4 9.0 11.0 13.0 9.0 11.0 - - - 60 - <</td><td>Conditions Min Typ Max Min Typ Max</td></td<>	Conditions Min Typ Max Min Typ Continuous 15 28 50 15 28 Transient, 1 sec - 80 - - Inhibited - 40 65 - 40 Full Load, 20Hz to 20MHz - 60 - - 40 Full Load, 20Hz to 20MHz - - 60 - - 40 fed 9.0 11.0 13.0 9.0 11.0 - - 60 - - e^4 9.0 11.0 13.0 9.0 11.0 - - - 60 - <	Conditions Min Typ Max Min Typ Max

Notes: 1. Dependant on output voltage.

3. Derate linearly to 0 at 135°C. 4. Ve

Time for output voltage to settle within 1% of its nominal value.
 Verified by qualification testing.

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

ABSOLUTE MAXIMUM RATINGS			
Input Voltage (Continuous) Input Voltage (Transient, 1 second)	50 V _{DC} 80 Volts	Junction Temperature Rise to Case Storage Temperature	+12°C -65°C to +150°C
Output Power ¹	20 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T _{CASE} = +125°C)	6 Watts	Weight	24 grams

O a malifi a ma	DVHF2812S			DVHF2815S			Unite
Conditions	Min	Тур	Max	Min	Тур	Max	Units
-						-	
Continuous	15	28	50	15	28	50	V
Transient, 1 sec	-	-	80	-	-	80	V
Inhibited	-	-	6	-	-	6	mA
No Load	-	40	65	-	40	65	mA
Full Load, 20Hz to 20MHz	-	-	60	-	-	60	mA _{p-p}
	0	-	1.5	0	-	1.5	V
	9.0	11.0	13.0	9.0	11.0	13.0	V
	13.0	-	14.8	13.0	-	14.8	V
	11.0	-	14.5	11.0	-	14.5	V
T _{CASE} = 25°C	11.88	12.0	12.12	14.85	15.0	15.15	V
T_{CASE} = -55°C to +125°C	11.82	12.0	12.18	14.775	15.0	15.225	V
	0	-	20	0	-	20	W
	0	-	1.67	0	-	1.34	Α
Full Load, 20Hz to 20MHz	-	-	40	-	-	40	mV _{p-p}
V_{IN} = 15V to 50V	-	-	20	-	-	20	mV
No Load to Full Load	-	-	50	-	-	50	mV
	77	-	-	78	-	-	%
Overload ⁴	-	-	8	-	-	8	W
Short Circuit	-	-	8	-	-	8	W
	-	-	500	-	-	500	μF
	350	450	500	350	450	500	kHz
500 V _{DC}	100	-	-	100	-	-	MΩ
Case to Ambient (0CA)	-	25	-	-	25	-	°C/W
AIF @ T _c = 55°C	-	427	-	-	427	-	kHrs
	÷	-	-	-	-	÷	<u>-</u>
Holf Lood to Full Lood	-	-	500	-	-	500	тV _{РК}
Load Step Output Transient V _{OUT} Load Step Recovery ² Half Load to Full Load		-	500	-	-	500	μSec
	-	500	900	-	500	900	тV _{РК}
$v_{\rm IN} = 16V \text{ to } 40V$	-	300	500	-	300	500	μSec
	-	10	20	-	10	20	mSec
$V_{\rm IN} = 0V$ to 28V	-	0	50	-	0	50	mV _{РК}
	Transient, 1 sec Inhibited No Load Full Load, 20Hz to 20MHz Inhibited T_CASE T_CASE T_CASE T_CASE T_CASE Inhibited No Load, 20Hz to 20MHz Inhibited Inhibited	ConditionsMinContinuous15Transient, 1 sec-Inhibited-No Load-Full Load, 20Hz to 20MHz-Full Load, 20Hz to 20MHz09.013.011.011.0T_{CASE} = 25°C11.88T_{CASE} = -55°C to +125°C11.8200Full Load, 20Hz to 20MHz-VIN = 15V to 50V-No Load to Full Load-VIN = 15V to 50V-No Load to Full Load-Short Circuit-Short Circuit-AIF @ T_c = 55°C-Half Load to Full Load-VIN = 16V to 40V-VIN = 16V to 28V-	Conditions Min Typ Continuous 15 28 Transient, 1 sec - - Inhibited - - No Load - 40 Full Load, 20Hz to 20MHz - - 0 - - 11.0 - - 11.0 - 11.0 - 11.0 - Tcase = 25°C 11.88 12.0 Tcase = 25°C to +125°C 11.82 12.0 Tcase = -55°C to +125°C 11.82 12.0 VIN = 15V to 50V - - Short Circuit - - Short Circuit - - Short Circuit - - Case to Ambient (0CA) - 25 AIF @ T_c = 55°C - 427 Half Load to Full Load -	Conditions Min Typ Max Continuous 15 28 50 Transient, 1 sec - - 80 Inhibited - - 6 No Load - 40 65 Full Load, 20Hz to 20MHz - - 60 0 - 1.5 - 60 Inhibited - - 60 - Full Load, 20Hz to 20MHz - - 60 13.0 - 14.8 - 14.5 T_CASE = 25°C 11.88 12.0 12.12 T_GASE = -55°C to +125°C 11.82 12.0 12.18 0 - 20 0 - Full Load, 20Hz to 20MHz - - 40 V _{IN} = 15V to 50V - - 20 No Load to Full Load - - 500 Overload ⁴ - - 8 Short Circuit - - 500	Conditions Min Typ Max Min Continuous 15 28 50 15 Transient, 1 sec - - 80 - Inhibited - - 6 - No Load - 40 65 - Full Load, 20Hz to 20MHz - - 60 - 0 - 1.5 0 - 1.5 0 - 00 - 1.5 0 - 1.5 0 - 0 - 14.8 13.0 9.0 11.0 13.0 9.0 T_CASE = 25°C 11.88 12.0 12.12 14.85 11.0 T_CASE = 25°C to +125°C 11.82 12.0 12.18 14.775 - 0 - 20 0 - Full Load, 20Hz to 20MHz - - 40 - Vin = 15V to 50V - - 78 - <	Conditions Min Typ Max Min Typ Continuous 15 28 50 15 28 Transient, 1 sec - 80 - - Inhibited - 40 65 - 40 Full Load, 20Hz to 20MHz - - 60 - - Vin Load - 40 65 - 40 Full Load, 20Hz to 20MHz - - 60 - - 0 - 1.5 0 -<	Conditions Min Typ Max Min Typ Max Continuous 15 28 50 15 28 50 Transient, 1 sec - - 80 - - 80 Inhibited - - 6 - - 6 No Load - 40 65 - 40 65 Full Load, 20Hz to 20MHz - - 60 - 1.5 60 0 - 1.5 0 - 1.5 0 - 1.5 9.0 11.0 13.0 9.0 11.0 13.0 - 14.8 13.0 - 14.5 TcASE = 25°C 11.82 12.0 12.18 14.775 15.0 15.225 TCASE = 25°C to +125°C 11.82 12.0 12.18 14.775 15.0 15.225 TCASE = 25°C to 50 to -125°C 11.82 12.0 1.67 0 - 1.34

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.

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

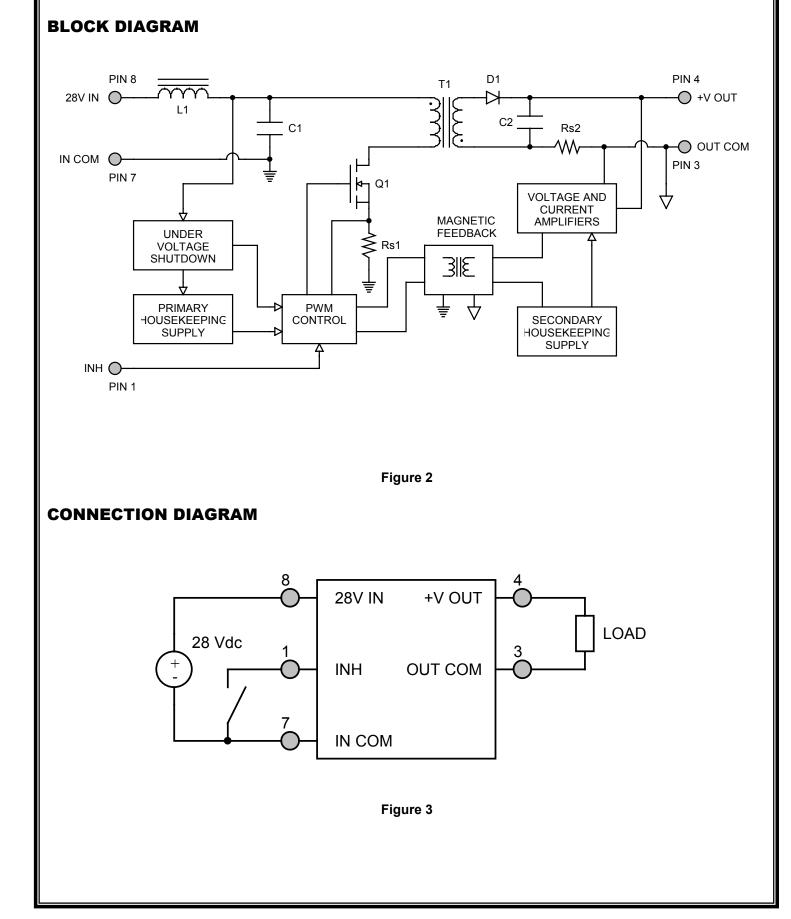
ABSOLUTE MAXIMUM RATINGS

Input Voltage (Continuous)	50 V_{DC}	Junction Temperature Rise to Case	+12°C
Input Voltage (Transient, 1 second)	80 Volts	Storage Temperature	-65°C to +150°C
Output Power ¹	20 Watts	Lead Solder Temperature (10 seconds)	270°C
Power Dissipation (Full Load, T _{CASE} = +125°C)	6 Watts	Weight	24 grams

Demonster	O a malifi a ma	D	VHF285R	2S	
Parameter	Conditions	Min	Тур	Мах	Units
STATIC			2		•
INPUT	Continuous	15	28	50	V
Voltage ⁴	Transient, 1 sec	-	-	80	V
Current	Inhibited	-	-	6	mA
Current	No Load	-	40	65	mA
Ripple Current	Full Load, 20Hz to 20MHz	-	-	60	mA_{p-p}
Inhibit Pin Input⁴		0	-	1.5	V
Inhibit Pin Open Circuit Voltage	1	9.0	11.0	13.0	V
UVLO Turn On		13.0	-	14.8	V
UVLO Turn Off⁴		11.0	-	14.5	V
	OUT T _{CASE} = 25°C	5.148	5.20	5.252	V
Voltage V	$T_{CASE} = -55^{\circ}C \text{ to } +125^{\circ}C$	5.122	5.20	5.278	V
Power ³		0	-	15	W
Current ³ V	оит	0	-	3.0	А
Ripple Voltage V	OUT Full Load, 20Hz to 20MHz	-	-	40	mV _{p-p}
Line Regulation V	_{OUT} V _{IN} = 15V to 50V	-	-	20	mV
Load Regulation V	OUT No Load to Full Load	-	-	50	mV
EFFICIENCY		72	-	-	%
LOAD FAULT POWER DISSIPATIO	Overload ⁴	-	-	8	W
LOAD FAOLT FOWER DISSIFATIO	Short Circuit	-	-	8	W
CAPACITIVE LOAD ⁴		-	-	1000	μF
SWITCHING FREQUENCY		350	450	500	kHz
ISOLATION	500 V _{DC}	100	-	-	MΩ
THERMAL RESISTANCE	Case to Ambient (0CA)	-	25	-	°C/W
MTBF (MIL-HDBK-217F)	AIF @ T _c = 55°C	-	427	-	kHrs
DYNAMIC			-		
Load Step Output Transient		-	-	600	mV_{PK}
Load Step Recovery ²	Half Load to Full Load	-	-	500	μSec
Line Step Output Transient ⁴		-	400	800	mV _{РК}
Line Step Recovery ^{2, 4}	$V_{\rm IN} = 16V \text{ to } 40V$	-	300	500	μSec
Turn On Delay		-	10	20	mSec
Turn On Overshoot ²	$V_{\rm IN} = 0V$ to 28V	-	0	25	тV _{РК}

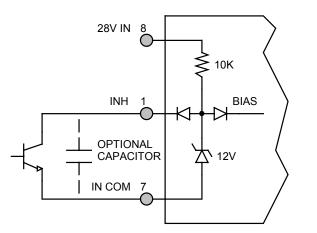
Notes: 1. Dependant on output voltage. 2. Time for output voltage to settle within 1% of its nominal value. 3. Derate linearly to 0 at 135°C. 4. Verified by qualification testing.

DVHF2800S Series



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INHIBIT DRIVE CONNECTION DIAGRAMS



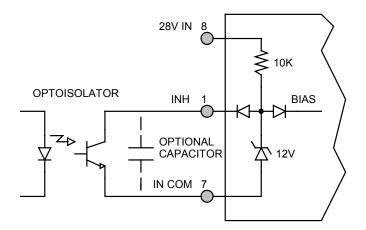
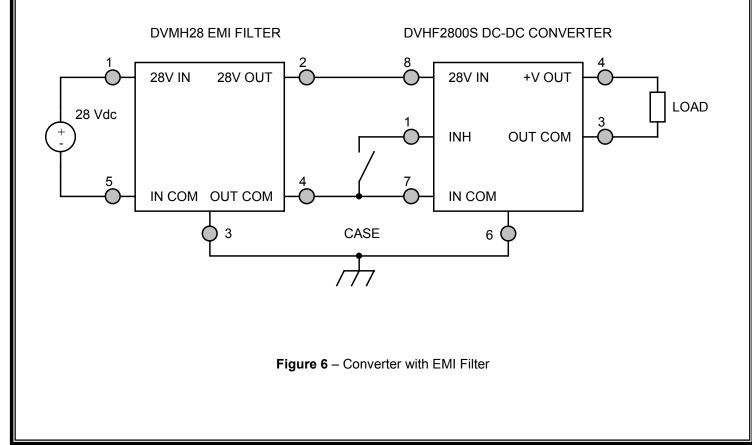
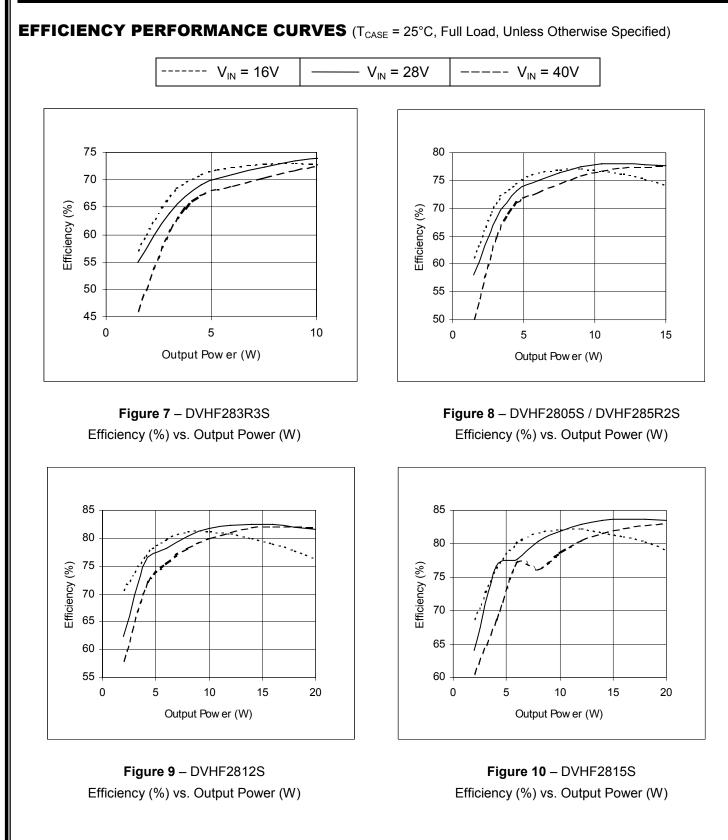


Figure 4 – Internal Inhibit Circuit and Recommended Drive (Shown with optional capacitor for turn-on delay) Figure 5 – Isolated Inhibit Drive (Shown with optional capacitor for turn-on delay)

EMI FILTER HOOKUP DIAGRAM



DVHF2800S Series



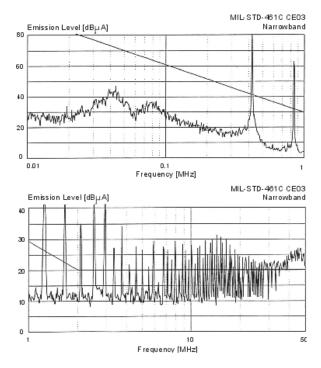
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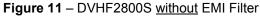


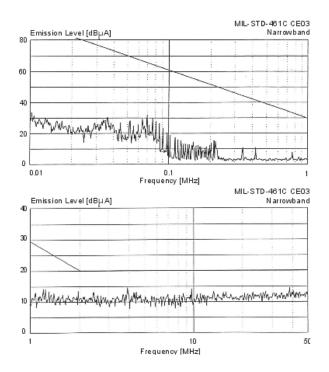
DVHF2800S Series

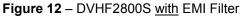
EMI PERFORMANCE CURVES

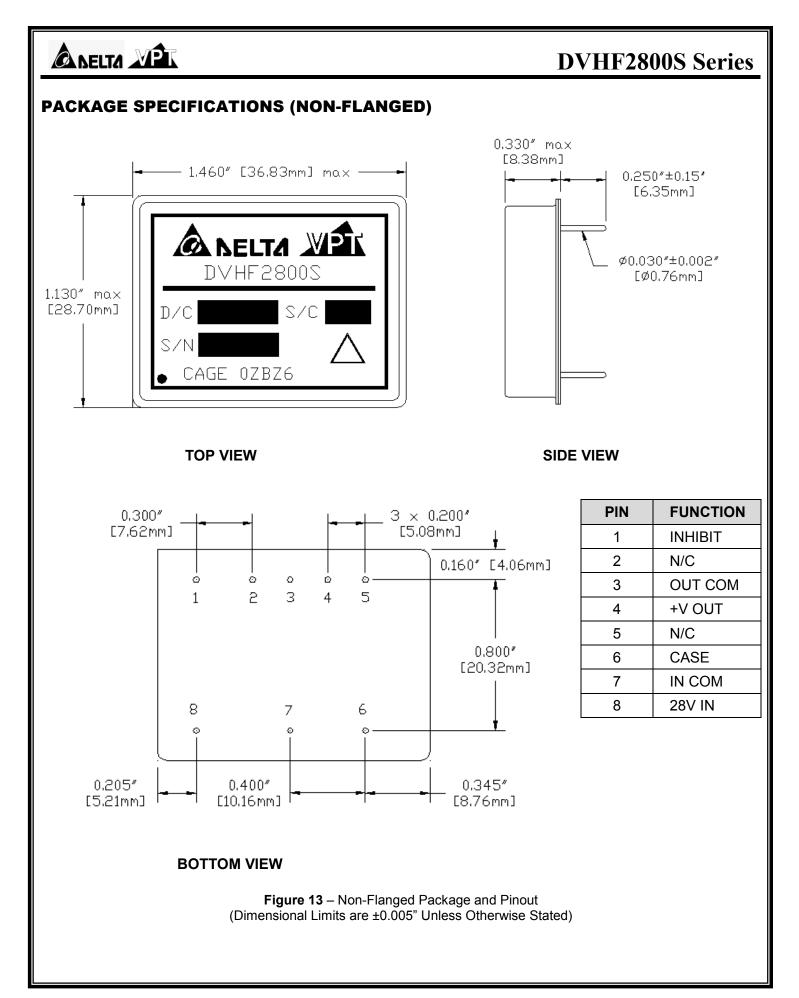
(T_{CASE} = 25°C, V_{IN} = +28V \pm 5%, Full Load, Unless Otherwise Specified)

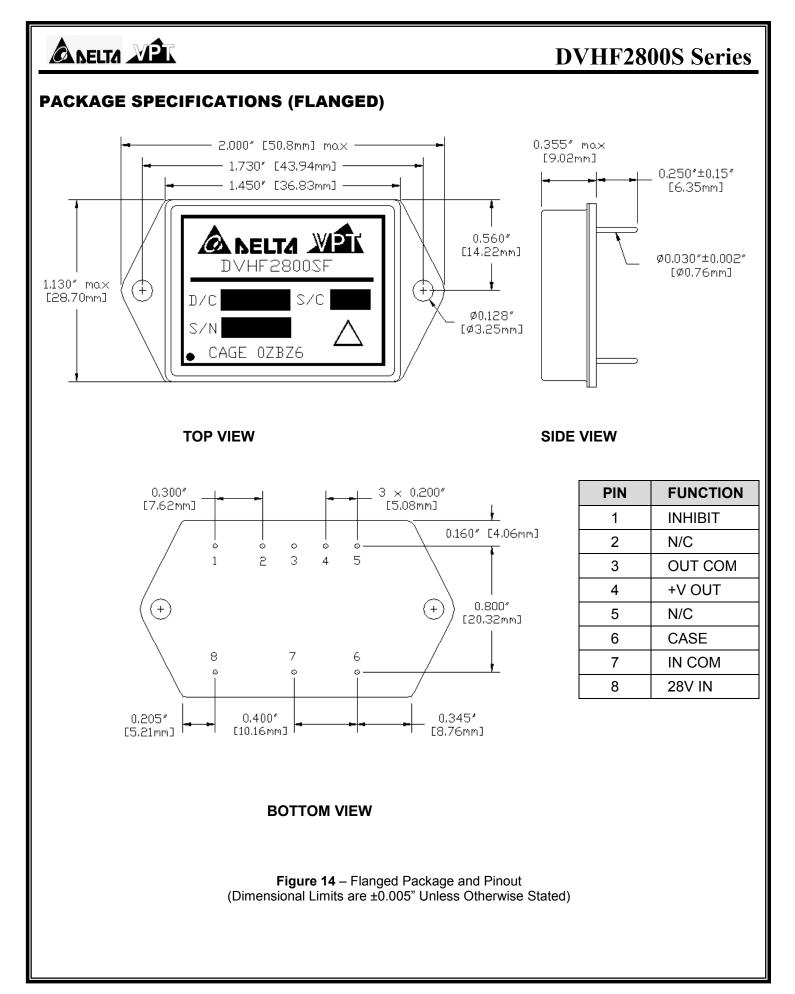












PACKAGE PIN DESCRIPTION

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

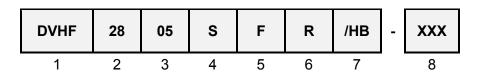
ENVIRONMENTAL SCREENING (Per MIL-STD-883 as referenced to MIL-PRF-38534, Class H)

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 x 10 ⁻³)	•	•	•
Final Electrical	MIL-PRF-38534, Group A ¹ 100% 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.

DVHF2800S Series

ORDERING INFORMATION



(1)	(2	2)	(3)		(4	-)
Product Series	Nominal Input Voltage		Output	Voltage	Number o	f 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)	()	(6)		7)	(8)
Packa	ge Option	Rad-Hard Option		Screening Code		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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