



DVEHF2800T Series

HIGH RELIABILITY HYBRID DC-DC CONVERTERS WITH INTEGRAL EMI FILTER

DESCRIPTION

The DVEHF 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 DVEHF series is a fault tolerant magnetic feedback circuit. Operating at a nominal fixed frequency of 450 kHz per stage, 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 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 10 Watts Output Power
- Fault Tolerant Magnetic Feedback Circuit
- NO Use of Optoisolators
- Undervoltage Lockout
- Indefinite Short Circuit Protection
- Current Limit Protection
- Industry Standard Pinout
- High Input Transient Voltage: 80 Volts for 1 sec per MIL-STD-704A
- Solder Seal Hermetic Package
- Custom Versions Available
- Additional Environmental Screening Available
- No External EMI Filter Required
- Meets MIL-STD-461C and MIL-STD-461D EMC Requirements
- Protects Against Conducted Susceptibility Specified in MIL-STD-461C, SC01 and CS02
- Non-flanged Version Available
- MIL-PRF-38534 Element Evaluated Components

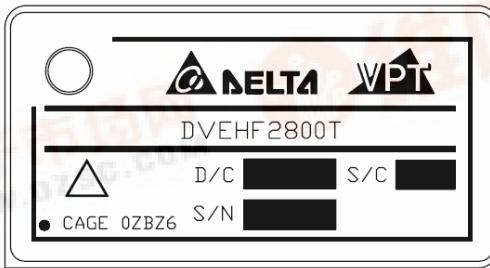


Figure 1 – DVEHF2800T DC-DC Converter
(Not To Scale)



DVEHF2800T Series

SPECIFICATIONS ($T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$, Full Load⁵, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS									
Parameter		Conditions	DVEHF28512T			DVEHF28515T			Units
Min	Typ		Max	Min	Typ	Max	Min	Typ	
STATIC									
INPUT Voltage	Continuous	$T_{CASE} = 25^{\circ}\text{C}$	15	28	50	15	28	50	V
	Transient, 1 sec ⁴		-	-	80	-	-	80	V
Current	Inhibited	$T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	-	3.5	6.0	-	3.5	6.0	mA
	No Load		-	-	70	-	-	70	mA
Inhibit Pin Input ⁴			0	-	1.5	0	-	1.5	V
Inhibit Pin Open Circuit Voltage ⁴			9.0	11.0	13.0	9.0	11.0	13.0	V
UVLO Turn On			8.0	-	12.0	8.0	-	12.0	V
UVLO Turn Off ⁴			4.0	-	8.0	4.0	-	8.0	V
OUTPUT Voltage	V_{MAIN}	$T_{CASE} = 25^{\circ}\text{C}$	4.95	5.0	5.05	4.95	5.0	5.05	V
	$\pm V_{AUX}$		11.88	12.0	12.12	14.85	15.0	15.15	V
	V_{MAIN}	$T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	4.925	5.0	5.075	4.925	5.0	5.075	V
	$\pm V_{AUX}$		11.4	12.0	12.6	14.25	15.0	15.75	V
Power ⁴	Total		0	-	10	0	-	10	W
	V_{MAIN}		0.15	-	5.0	0.15	-	5.0	W
	$\pm V_{AUX}$ ⁶	Either Output	0	-	3.5	0	-	3.5	W
Current ³	V_{MAIN}		0	-	1.0	0	-	1.0	A
	$\pm V_{AUX}$	Either Output ⁶	0	-	0.29	0	-	0.23	A
Ripple Voltage	V_{MAIN}	Full Load ⁵ , 20Hz to 10MHz	-	15	50	-	15	50	$\text{mV}_{\text{p-p}}$
	$\pm V_{AUX}$		-	15	50	-	15	50	$\text{mV}_{\text{p-p}}$
Line Regulation	V_{MAIN}	$V_{IN} = 15\text{V}$ to 50V	-	10	20	-	10	20	mV
	$\pm V_{AUX}$		-	15	50	-	15	50	mV
Load Regulation	V_{MAIN}	No Load to Full Load ⁵	-	5	20	-	5	20	mV
	$\pm V_{AUX}$		-	10	50	-	10	50	mV
Cross Regulation	$\pm V_{AUX}$	$+V_{OUT} = 30\%$, $-V_{OUT} = 70\%$ $+V_{OUT} = 70\%$, $-V_{OUT} = 30\%$	-	-	50	-	-	50	mV
EFFICIENCY		Full Load ⁵	67	72	-	67	72	-	%
LOAD FAULT POWER DISSIPATION		Overload ⁴	-	-	7.5	-	-	7.5	W
		Short Circuit	-	-	7.5	-	-	7.5	W
CAPACITIVE LOAD ⁴			-	-	500	-	-	500	μF
SWITCHING FREQUENCY			350	450	550	350	450	550	kHz
ISOLATION		500 V_{DC} , $T_{CASE} = 25^{\circ}\text{C}$	100	-	-	100	-	-	$\text{M}\Omega$
MTBF (MIL-HDBK-217F)		AIF @ $T_c = 55^{\circ}\text{C}$	-	350	-	-	350	-	kHrs



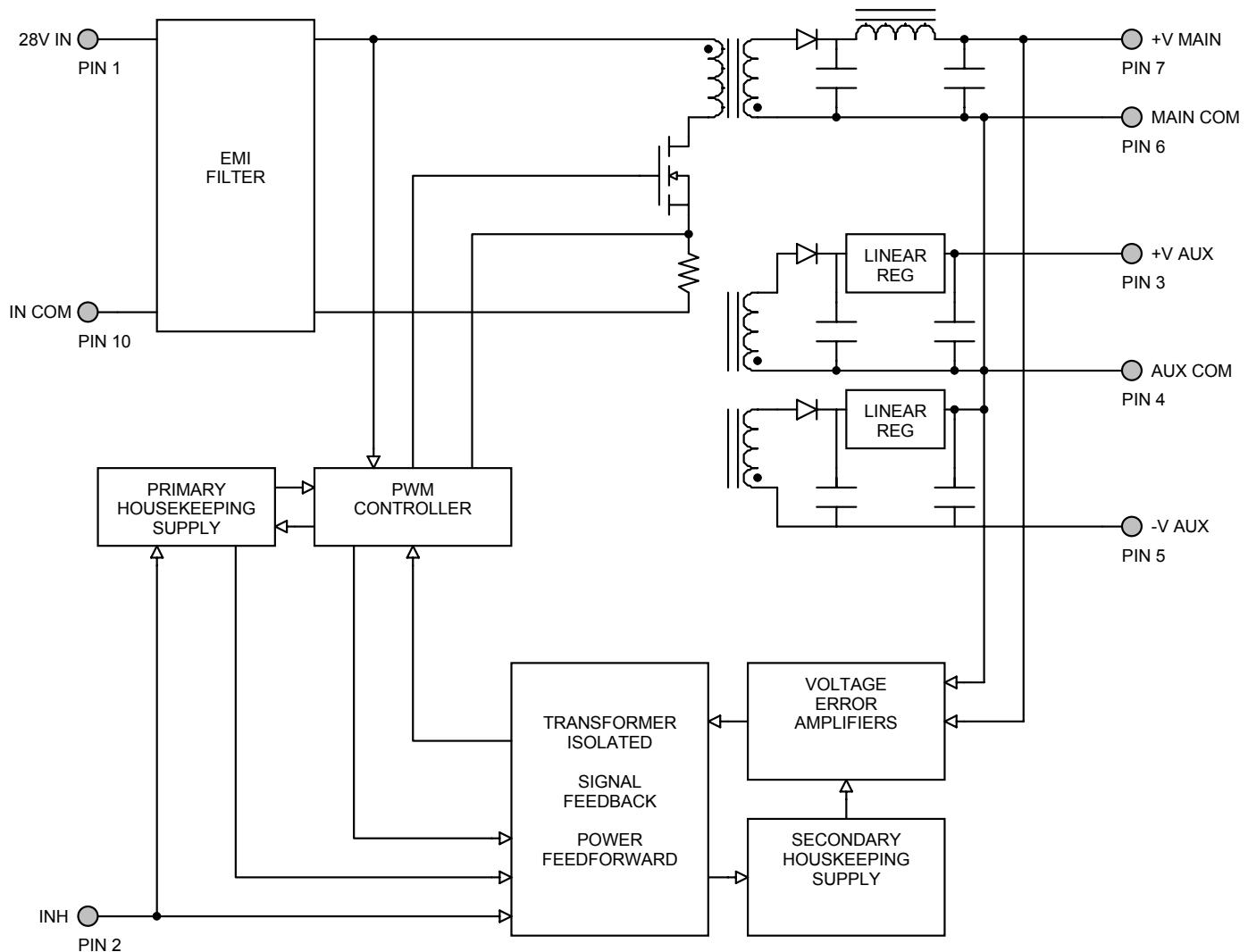
DVEHF2800T Series

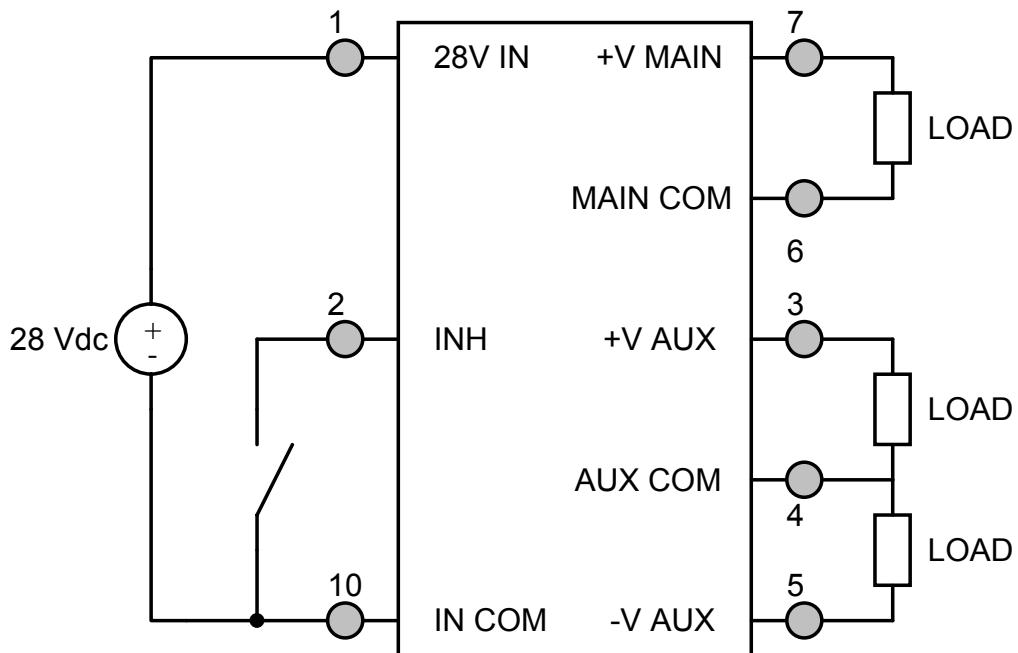
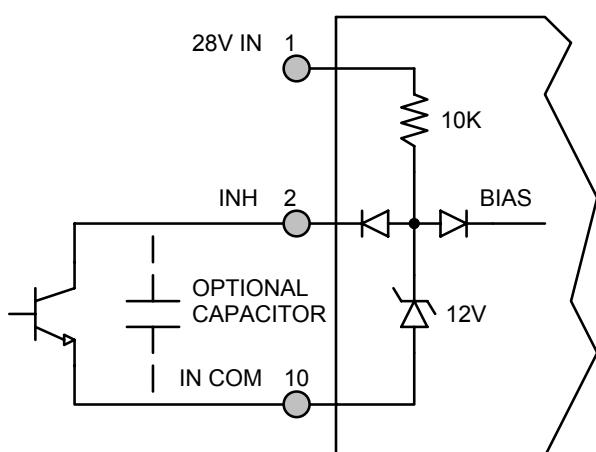
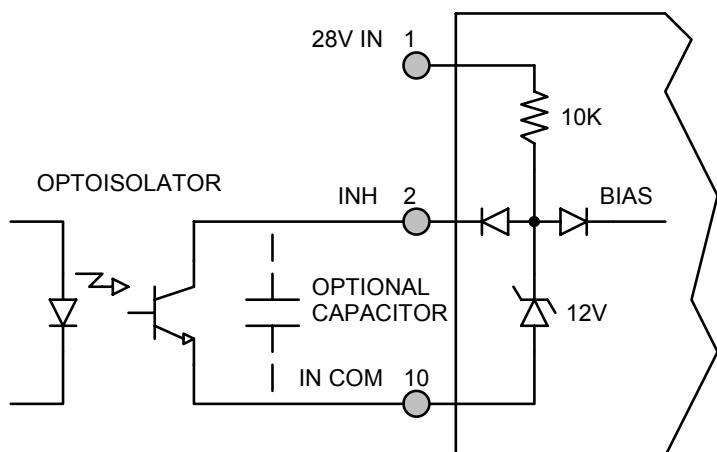
SPECIFICATIONS ($T_{CASE} = -55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = +28\text{V} \pm 5\%$, Full Load⁵, Unless Otherwise Specified)

ABSOLUTE MAXIMUM RATINGS								Units		
Parameter	Conditions	DVEHF28512T			DVEHF28515T					
Parameter	Conditions	Min	Typ	Max	Min	Typ	Max			
DYNAMIC										
Load Step Output Transient	V_{MAIN} $\pm V_{AUX}$	Half Load to Full Load	-	200	500	-	200	500	mV_{PK}	
Load Step Recovery ²			-	100	400	-	100	400	mV_{PK}	
Line Step Output Transient ⁴	V_{MAIN} $\pm V_{AUX}$		-	200	500	-	200	500	μSec	
Line Step Recovery ^{2,4}			-	200	500	-	200	500	μSec	
Turn On Delay	$V_{IN} = 16\text{V}$ to 40V	$V_{IN} = 0\text{V}$ to 28V	-	200	600	-	200	600	mV_{PK}	
Turn On Overshoot			-	50	100	-	50	100	mV_{PK}	
			-	200	500	-	200	500	μSec	
			-	200	500	-	200	500	μSec	
			-	20	30	-	20	30	mSec	
			-	-	25	-	-	25	mV_{PK}	
			-	-	50	-	-	50	mV_{PK}	

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. 5.0W on V_{MAIN} and 2.5W on $\pm V_{AUX}$.
6. Up to 70% of the total auxiliary power or current can be drawn from either of the auxiliary outputs.

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)

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

----- $V_{IN} = 15\text{V}$ ——— $V_{IN} = 28\text{V}$ - - - - $V_{IN} = 50\text{V}$

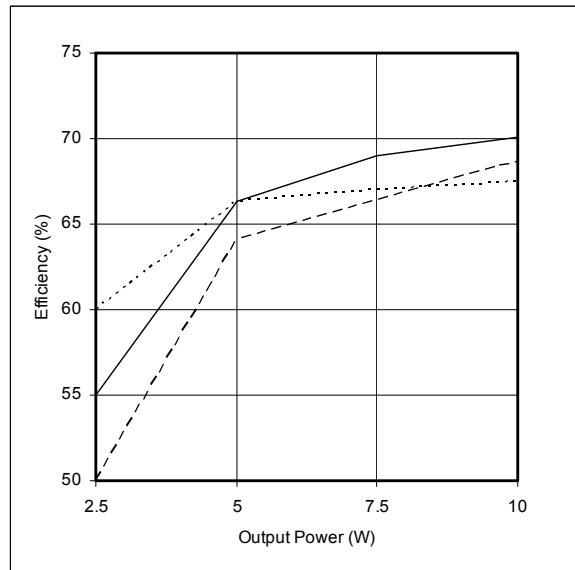


Figure 7 – DVEHF28512T
Efficiency (%) vs. Output Power (W)

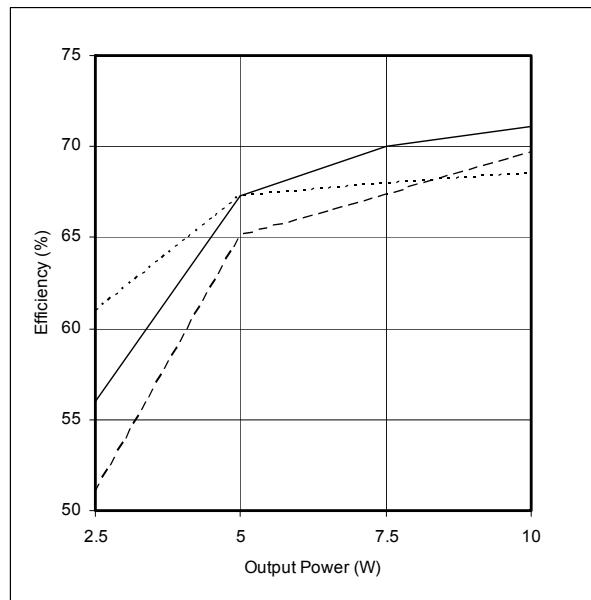


Figure 8 – DVEHF28515T
Efficiency (%) vs. Output Power (W)

EMI PERFORMANCE CURVES

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

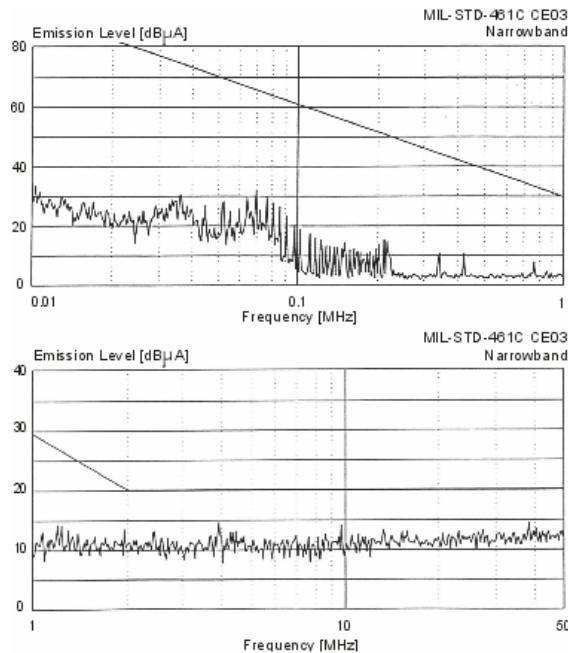


Figure 9 – MIL-STD-461C
DVEHF2800T

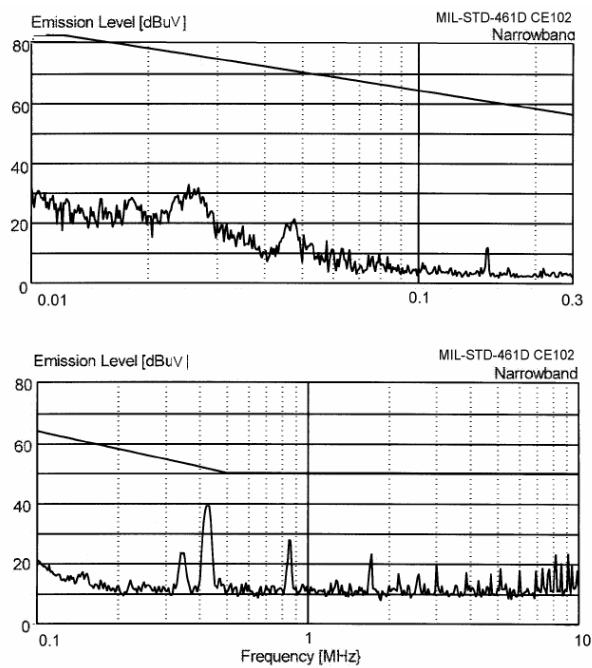


Figure 10 – MIL-STD-461D
DVEHF2800T



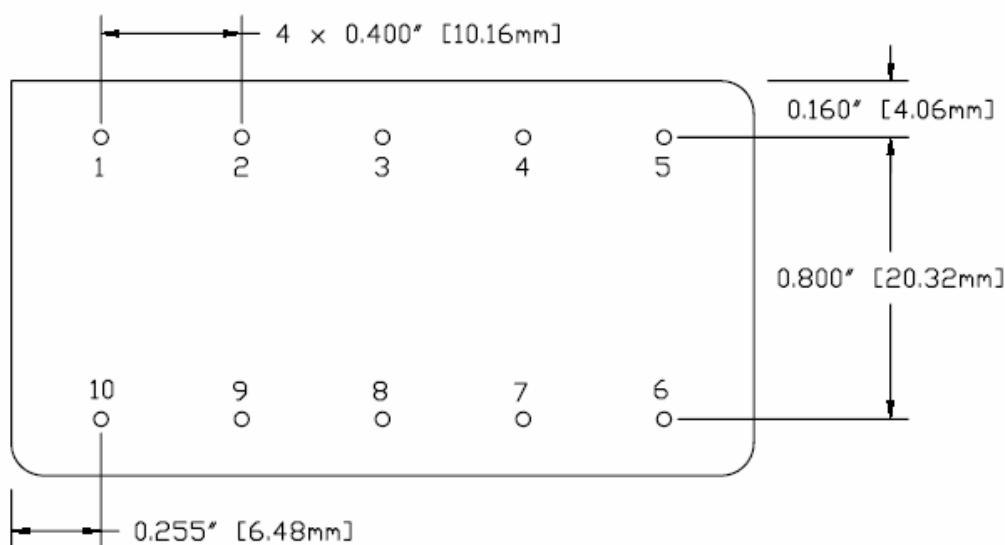
DVEHF2800T Series

PACKAGE SPECIFICATIONS (NON-FLANGED, SOLDER SEAL)



TOP VIEW

SIDE VIEW



BOTTOM VIEW

PIN	FUNCTION
1	28V IN
2	INHIBIT
3	+V AUX
4	AUX COM
5	-V AUX
6	MAIN COM
7	+V MAIN
8	CASE
9	N/C
10	IN COM

Figure 11 – Non-Flanged, Solder Seal Tin Plated Package and Pinout
(Dimensional Limits are $\pm 0.005"$ Unless Otherwise Stated)



DVEHF2800T Series

PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	28V IN	Positive Input Voltage Connection
2	INHIBIT	Logic Low = Disabled Output. Connecting the inhibit pin to input common causes converter shutdown. Logic High = Enabled Output. Unconnected or open collector TTL.
3	+V AUX	Positive Auxiliary Output Voltage Connection
4	AUX COM	Auxiliary Output Common Connection
5	-V AUX	Negative Auxiliary Output Voltage Connection
6	MAIN COM	Main Output Common Connection
7	+V MAIN	Positive Main Output Voltage Connection
8	CASE	Case Connection
9	N/C	No Connection
10	IN COM	Input Common Connection



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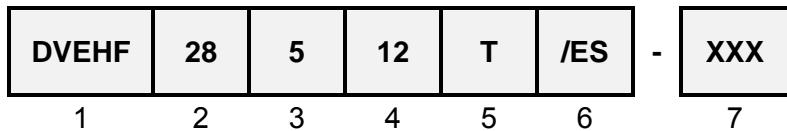
ENVIRONMENTAL SCREENING (100% Tested Per MIL-STD-883 as referenced to MIL-PRF-38534)

Screening	MIL-STD-883	Standard (No Suffix)	Extended /ES
Non-Destructive Bond Pull	Method 2023	•	•
Internal Visual	Method 2017, 2032 Internal Procedure	•	•
Temperature Cycling	Method 1010, -55°C to 125°C		•
Constant Acceleration	Method 2001, 500g, Y1 Direction		•
Burn-In	96 hours at +125°C 24 hours at +125°C	•	•
Final Electrical	100% at 25°C	•	•
Hermeticity	Method 1014, Fine Leak, Condition A Method 1014, Gross Leak, Condition C Dip (1×10^{-3})	•	•
External Visual	Method 2009	•	•



DVEHF2800T Series

ORDERING INFORMATION



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

Product Series	Nominal Input Voltage		Main Output Voltage		Auxiliary Output Voltages	
DVEHF	28	28 Volts	5	+ 5 Volts	12 15	± 12 Volts ± 15 Volts

(5) (6) (7)

Number of Outputs		Screening Code ¹		Additional Screening Code
T	Triple	None /ES	Standard Extended	Contact Sales

Notes: 1. VPT Inc. reserves the right to ship higher screened 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.

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@vpt-inc.com