

Power Your Critical Mission Today

VHR100+2800D SERIES

HIGH RELIABILITY COTS DC-DC CONVERTERS

Models Available

Input: 16 V to 40 V continuous, 50 V transient
100 W, dual outputs of 12 V, 15 V
-40 °C to 100 °C Operation

1.0 DESCRIPTION

The VHR series of industrial grade DC-DC converters provides cost effective, high reliability solutions for use in defense, avionics and manufacturing industries. The VHR industrial grade products leverage decades of VPT's proven heritage in military and aerospace electronics.

VPT's VHR100+2800D series is ideal for non flight-critical solutions in military, avionics, unmanned systems as well as manufacturing equipment and controls. A wide input voltage range which accommodates nominal 28 V inputs, low input and output ripple, fixed operating frequency and companion EMI filters simplify system design while ensuring operating success in the most rugged of environments.

These converters are designed and manufactured in a facility certified to ISO9001, J-STD-001 and IPC-A-610.

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



1.1 FEATURES

- High Reliability at Low Cost
- Up to 100 Watts Maximum Output Power
- High Efficiency, Up to 89%
- Wide Input Voltage Range: 16 to 40 Volts per MIL-STD-704 and MIL-STD-1275
- High Input Transient Voltage: 50 Volts for 1 sec
- Input Undervoltage Lockout
- Fixed Frequency
- Output Voltage Trim (+10% / -20%)
- Output Soft Start
- Current Limit Protection
- Short Circuit Protection
- Magnetic Feedback, no Optoisolators
- Wide Temperature Range, -40 °C to 100 °C
- Internally Conformal Coated
- Standard Six Sided Non-Hermetic Rugged Metal Package

1.2 COMPLIANCE

- MIL-STD-1275
- MIL-STD-704
- Meets MIL-STD-461C-F and EN55022 when used with an appropriate VHR EMI Filter

1.3 PACKAGING

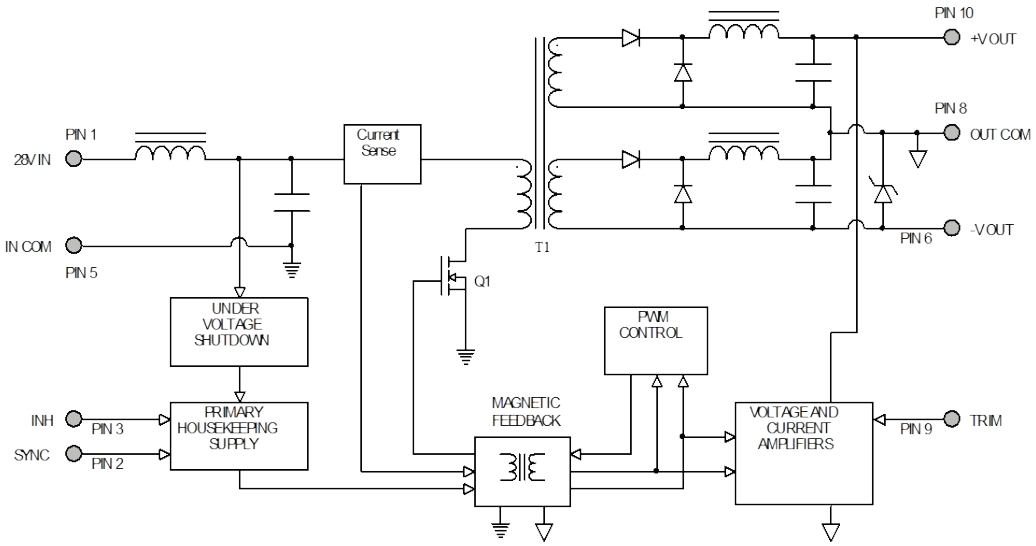
- Low-profile: 2.350" x 1.550" x 0.465"
- Max weight: 76 g

1.4 SIMILAR PRODUCTS AND ACCESSORIES

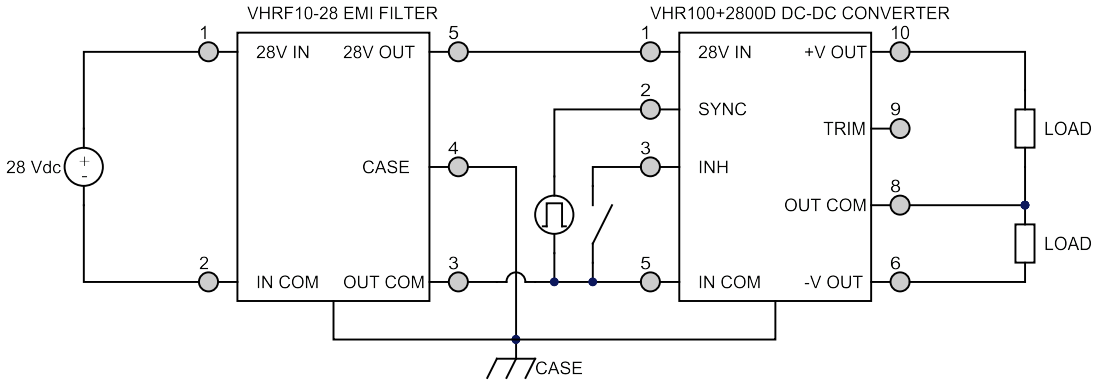
- DVFL 120 W dual output DC-DC Converter
- VPT100 100 W dual output COTS DC-DC Converter
- EMI filters, Thermal Pads, Front-End Modules and Accessories

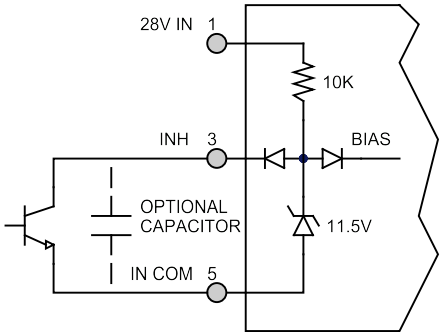
2.0 DESCRIPTION

2.1 BLOCK DIAGRAM

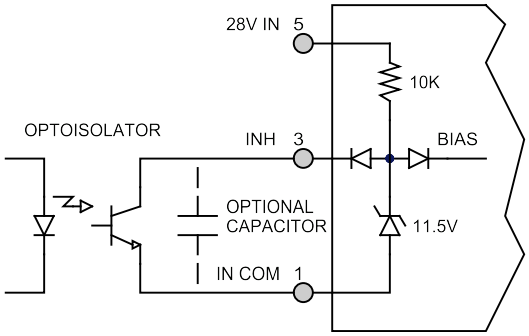


2.2 CONNECTION DIAGRAM





Inhibit Circuit (Shown with optional capacitor for turn-on delay)



Output Voltage Trim Circuit

3.0 SPECIFICATIONS

3.1 ABSOLUTE MAXIMUM RATINGS

Absolute Maximum Ratings			
Input Voltage (Continuous):	40 V	Operating Temperature (Full Load):	-40 °C to 100 °C
Input Voltage (Transient, 1 second):	50 V	Storage Temperature:	-55 °C to 125 °C
		Lead Solder Temperature (10 seconds):	300 °C

3.2 PERFORMANCE SPECIFICATIONS

Tcase = -40 °C to 100 °C, Vin = +28 V ± 5%, Full Load[4], Unless Otherwise Specified

		VHR100+2812D			VHR100+2815D			
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Units**
INPUT								
Voltage	Continuous	16	28	40	16	28	40	V
	Transient, 1 sec[3]	-	-	50	-	-	50	V
Current	INH < 1.5 V	-	-	5	-	-	5	mA
	No Load	-	50	100	-	50	100	mA
Ripple Current	20 Hz to 10 MHz	-	-	200	-	-	200	mApp
Undervoltage Lockout	Turn On	14.5	-	15.8	14.5	-	15.8	V
	Turn Off[3]	14	-	15	14	-	15	V
OUTPUT STATIC								
Voltage	+Vout, Tcase = 25 °C	11.82	12	12.18	14.775	15	15.225	V
	+Vout, Tcase = -40 °C to 100 °C	11.7	12	12.3	14.625	15	15.375	V
	-Vout, Tcase = 25 °C	11.7	12	12.3	14.625	15	15.375	V
	-Vout, Tcase = -40 °C to 100 °C	11.58	12	12.42	14.475	15	15.525	V
Power[2,5]	Total	-	-	100	-	-	100	W
	Either Output	-	-	70	-	-	70	W
Current[2,5]	Either Output	-	-	5.83	-	-	4.66	A
Ripple Voltage	20 Hz to 10 MHz	-	-	100	-	-	100	mVpp
Line Regulation	+Vout, Vin = 16 V to 40 V	-	-	20	-	-	20	mV
	-Vout, Vin = 16 V to 40 V	-	-	100	-	-	100	mV
Load Regulation	+Vout, No Load to Full Load	-	-	100	-	-	100	mV
	-Vout, No Load to Full Load	-	-	150	-	-	150	mV
Cross Regulation, -Vout	+Vout: 70% load, -Vout: 30% load +Vout: 30% load, -Vout: 70% load	-	-	450	-	-	450	mV
Load Fault Power Dissipation	Overload[3]	-	-	24	-	-	24	W
	Short Circuit	-	-	24	-	-	24	W
OUTPUT DYNAMIC								
Load Step, Half to Full Load	Output Transient	-	-	600	-	-	600	mVpk
	Recovery[1]	-	-	300	-	-	300	µs
Line Step[3], Vin = 16 V to 40 V	Output Transient	-	-	900	-	-	1200	mVpk
	Recovery[1]	-	-	300	-	-	300	µs
Turn On, Vin = 0 to 28 V	Delay	-	6	10	-	6	10	ms
	Overshoot	-	0	50	-	0	50	mVpk
FUNCTION								
INH Pin Input[3]	Output Inhibited	0	-	1.5	0	-	1.5	V
INH Pin Open Circuit Voltage[3]	Output Enabled	9	12	14	9	12	14	V
SYNC Frequency Range	$V_H - V_L$ = 5V, D = 50%	300	-	380	300	-	380	kHz
Voltage Trim Range		-20	-	10	-20	-	10	%
GENERAL								
Efficiency		86	88	-	87	89	-	%
Capacitive Load[3]	Either Output	-	-	500	-	-	500	µF
Switching Frequency		300	-	380	300	-	380	kHz
Isolation	500 V DC, Tcase = 25 °C	100	-	-	100	-	-	MΩ
Weight		-	-	76	-	-	76	g
MTBF (MIL-HDBK-217F)	GM @ Tcase = 55 °C	-	344	-	-	344	-	kHr

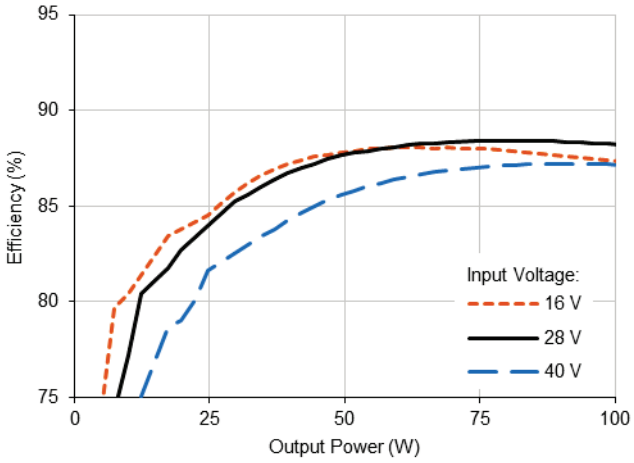
1. Time for output voltage to settle within 1% of its nominal value
2. Derate linearly at 110 °C
3. Verified by qualification testing
4. Half load at +VOUT and half load at -VOUT
5. Up to 70% of the total power or current can be drawn from either of the two outputs

4.0 PERFORMANCE CURVES

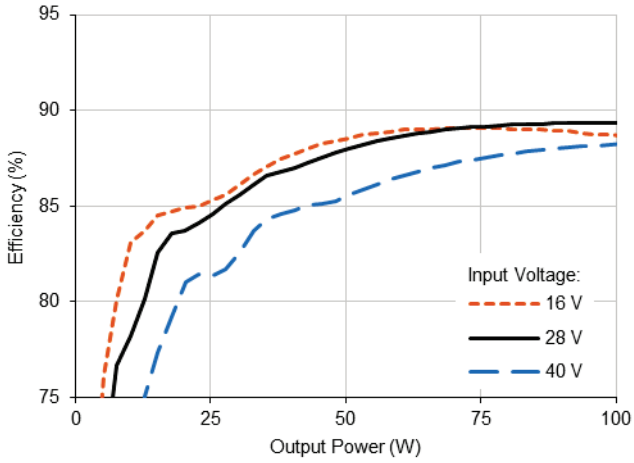
Tcase = 25 °C, Full Load, Unless Otherwise Specified

4.1 EFFICIENCY PERFORMANCE CURVES

4.1.1 VHR100+2812D Efficiency (%) vs. Output Power (W)

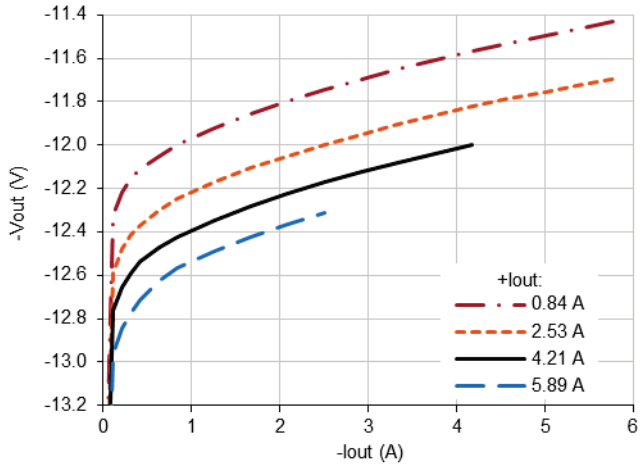


4.1.2 VHR100+2815D Efficiency (%) vs. Output Power (W)

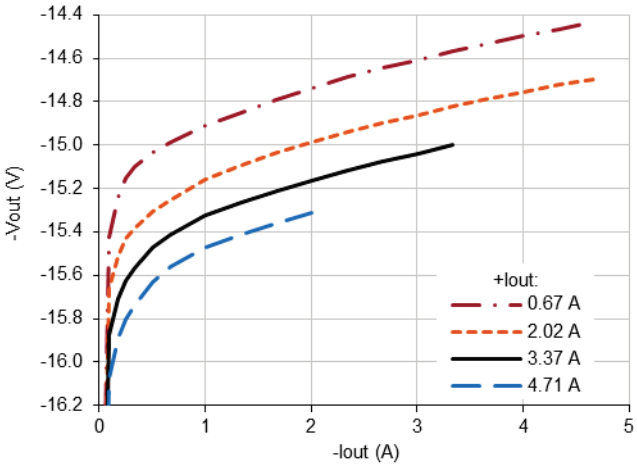


4.2 CROSS REGULATION CURVES

4.2.1 VHR100+2812D -Vout (V) vs. -Iout (A)

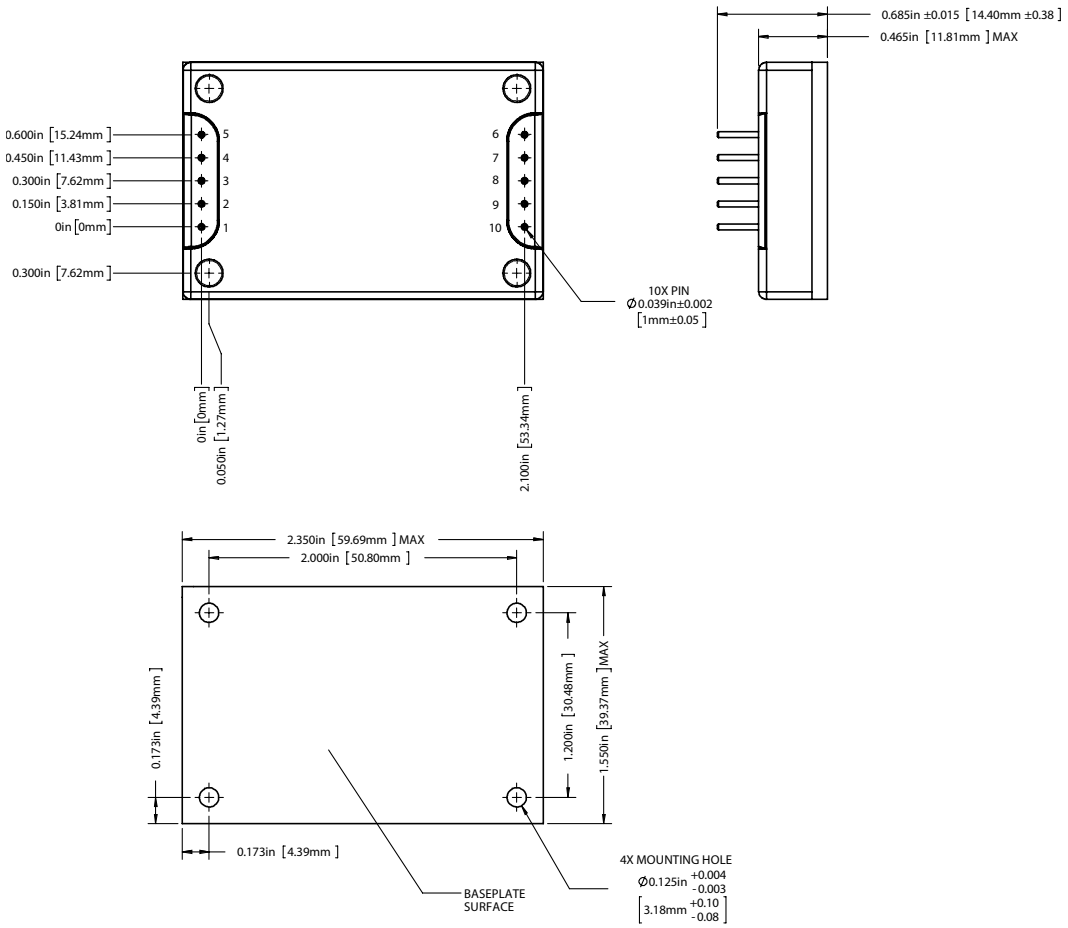


4.2.2 VHR100+2815D -Vout (V) vs. -Iout (A)



5.0 MECHANICAL OUTLINES AND PINOUT

Standard Package:



1. Case temperature is measured on the center of the baseplate surface.
2. Materials: Baseplate (Aluminum, conductive conversion coating); Cover (Nickel Plated); Pins (Copper, gold over nickel plating)
3. Mounting holes are not threaded. Recommended fastener is 4-40
4. This Package is not hermetic. VPT offers a wide range of hermetic products. Please contact VPT for details if hermetic products are required.

Pin	Function	Pin	Function
1	28VIN	6	-VOUT
2	SYNC	7	NC
3	INHIBIT	8	OUTCOM
4	CASE	9	TRIM
5	INCOM	10	+VOUT

6.0 PACKAGE PIN DESCRIPTION

Pin	Function	Description
1	28VIN	Positive Input Voltage Connection
2	SYNC	Input Synchronization Signal. TTL squarewave, 5 Vpp, 20 - 80% duty cycle, internally capacitively coupled.
3	INHIBIT	This is an open collector input. Logic Low = Disabled Output. Connect the inhibit pin to input common to disable the output. Unconnected, open collector or open drain = Enabled Output.
4	CASE	Case Connection
5	INCOM	Input Return Connection
6	-VOUT	Negative Output Voltage Connection
7	NC	No Connection.
8	OUTCOM	Output Return Connection
9	TRIM	Trim Output Voltage to +10%, -20% of Nominal Value. Leave open if not used.
10	+VOUT	Positive Output Voltage Connection

7.0 OUTPUT VOLTAGE TRIM

The output voltage can be trimmed down by connecting a resistor between the TRIM pin and the +VOUT pin, or can be trimmed up by connecting a resistor between the TRIM pin and the OUTCOM pin as shown in Section 2.2. The maximum trim range is +10% up and –20% down. The appropriate resistor values versus the output voltage are given in the trim table below.

VHR100+2812D		VHR100+2815D	
+Vout (V)	Rtrim (Ω)	+Vout (V)	Rtrim (Ω)
13.2	1.14k	16.50	686
13.0	2.39k	16.25	1.69k
12.8	4.26k	16.00	3.19k
12.6	7.39k	15.75	5.7k
12.4	13.6k	15.50	10.7k
12.2	32.4k	15.25	25.9k
12.0	--	15.00	--
11.8	548k	14.75	551k
11.6	266k	14.50	270k
11.4	172k	14.25	175k
11.2	126k	14.00	128k
11.0	97.4k	13.75	99.5k
10.8	78.6k	13.50	80.6k
10.6	65.3k	13.25	67k
10.4	55.2k	13.00	56.9k
10.2	47.4k	12.75	49k
10.0	41.1k	12.50	42.6k
9.8	36k	12.25	37.5k
9.6	31.8k	12.00	33.2k

8.0 ENVIRONMENTAL SCREENING

Screening	Condition
Internal Visual	IPC-A-610, Class 3
Final Electrical	100% at 25 °C
External Visual	Internal Procedure

9.0 ORDERING INFORMATION

VHR100+	28	05	D
1	2	3	4

(1) Product Series	(2) Nominal Input Voltage		(3) Output Voltage		(4) Number of Outputs	
VHR100+	**28**	28 Volts	**12** **15**	12 Volts 15 Volts	**D**	Dual

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 requirements, and source inspection.

10.0 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

All information contained in this datasheet is believed to be accurate, however, no responsibility is assumed for possible errors or omissions. The products or specifications contained herein are subject to change without notice. VPT, its logo and tagline are registered trademarks in the U.S. Patent and Trademark Office.

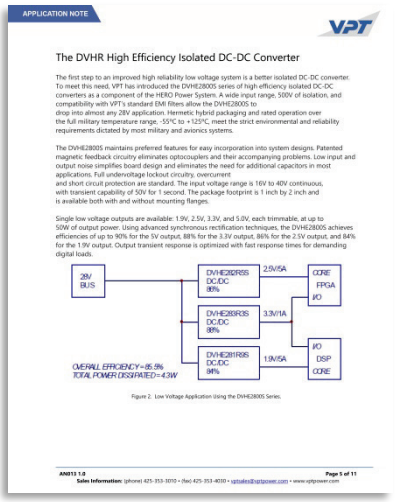
11.0 ADDITIONAL INFORMATION

Visit the VPT website for additional technical resources, including:

Product Literature



Application Notes and White Papers



Technical Video Labs



Additional Products For Avionics/Military, Hi-Temp, Hi-Rel COTS, and Space Applications

