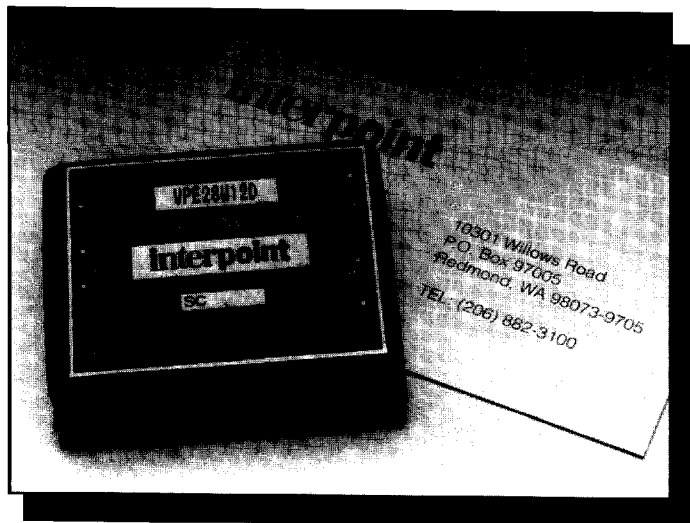


VPE  
Series  
DC/DC  
Converters



### GENERAL DESCRIPTION

The VPE Series™ DC/DC converters feature a wide input voltage range of 20 to 72 volts and supply up to 15 watts of output power. Nominal input voltage is 28 VDC with dual outputs of  $\pm 12$  or  $\pm 15$  VDC. Either of the dual output models can be used to provide a single output of 24 VDC or 30 VDC. The tolerance of the output voltages is within 1%. The case operating temperature is  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$ .

### CONVERTER DESIGN

VPE Series DC/DC converters are current mode pulse-width modulated switching regulators which use a single-ended forward converter topology. Switching frequency is 120 kHz.

### CONVENIENT ON/OFF FUNCTION

A logic low on the on/off terminal disables the pulse width modulator and turns the converter off. The on/off terminal (pin 4) is referenced to the input common and is compatible with TTL open collector, CMOS and relays. The on/off terminal is protected up to 100 VDC and can be left floating if not used.

### PROTECTION FEATURES

Several protection functions are incorporated in the VPE Series to protect both your system and the converter. Internal suppressor diodes protect the converter from input transients of up to 85 volts for 100 milliseconds. Additionally, current limiting circuitry provides short circuit protection while the overvoltage circuitry protects your system by diode limiting the outputs to 18 volts. Further protection is provided with a thermal shutdown which occurs at  $105^{\circ}\text{C}$  (case). Normal operation resumes when the temperature falls below the thermal limit.

### TRIMMABLE OUTPUTS

The trim terminal (pin 8) can be used to adjust the output voltage or to compensate for voltage drops. The wide trim range of +5% to -34% provides a variety of non-standard outputs to accommodate your special system requirements. Trimming adjusts both outputs equally.

### FULL ISOLATION

Full isolation of 1544 VDC reduces ground loops and provides greater versatility for your application.

### REGULATION AND STABILITY

Line regulation is just 0.04% of the output voltage, load regulation is 0.15%, and cross regulation is 1.5%. Short term stability, over a period of 24 hours, results in output voltage drift of less than 0.02%. Long term stability is less than 0.2% of output voltage drift.

### NOISE MANAGEMENT

Input ripple rejection is greater than 60 dB. Output noise is less than 70 mV p-p and, with an external capacitor, output noise can fall below 30 mV p-p.

### SMALL PACKAGE

The 2.02 by 1.02 by 0.55 inch package weighs 64 grams. This five-sided copper package provides both EMI shielding and heat sinking and is water washable. The case is tied to the positive input terminal (pin 1).

**Note:** The above paragraphs refer to typical specifications. See characteristics chart for detailed information.

# interpoint

## VPE SERIES DC/DC CONVERTERS

- Up to 15 watts of output power
- Dual trimmable outputs: +5% to -34%
- On/Off function
- Efficiencies up to 82%
- Low noise
- Wide input voltage range: 20 to 72 VDC
- $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$  operating temperature
- Over temperature and overvoltage protection
- Small size:  
2.02 x 1.62 x 0.55 inches

To order, call  
**1-800-822-8782**

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P.O. Box 97005  
Redmond, WA 98073-9705  
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(206) 882-3100  
FAX: (206) 882-1990  
Internet: power@intp.com

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**CHARACTERISTICS:**  $T_c = 25^\circ\text{C}$ , nominal input voltage, full load unless otherwise specified.

### Operating Temperature Range (Case)

- Full Power:  $-40^\circ\text{C}$  to  $+100^\circ\text{C}$

### Storage Temperature Range (Case)

- $-55^\circ\text{C}$  to  $+105^\circ\text{C}$

### Thermal Impedance:

- case rise over ambient

- $10^\circ\text{C}/\text{watt}$  dissipated

### Temperature Coefficient

- $50\text{ ppm}/^\circ\text{C}$ , typical —  $150\text{ ppm}/^\circ\text{C}$ , max.

### Isolation

- Input to output: 1544 VDC

### Weight

- 64 grams, typical

### Capacitance

- Input to output: 450 pF, typical

### Conversion Frequency

- 120 kHz, typical

### Overvoltage clamp

- 18 volts, typical

### On/Off:

- referenced to input common

- Output enabled = open or high ( $\geq 8$  volts)

- Output disabled = low ( $\leq 2$  volts), input

- current is typically 2 mA

### Resistance

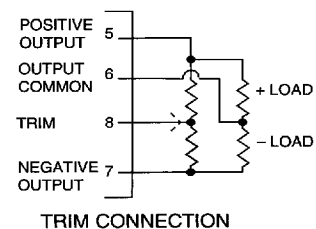
- On/Off (pin 4): 100 k ohms

- Trim (pin 8): 40 k ohms

PARAMETERS	CONDITION	VPE28W12D			VPE28W15D			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
INPUT VOLTAGE	NORMAL	20	28	72	20	28	72	VDC
	TRANSIENT (100 ms)	—	—	85	—	—	85	
INPUT CURRENT	NO LOAD	—	5	—	—	5	—	mA
	FULL LOAD	—	661	—	—	653	—	
OUTPUT VOLTAGE <sup>1</sup>	NOMINAL INPUT V	$\pm 11.90$	$\pm 12.00$	$\pm 12.10$	$\pm 14.9$	$\pm 15.00$	$\pm 15.10$	VDC
OUTPUT CURRENT	FULL LOAD	0	—	$\pm 625$	0	—	$\pm 500$	mA
OUTPUT POWER	FULL LOAD	—	—	15	—	—	15	W
EFFICIENCY	FULL LOAD	—	81	—	—	82	—	%
LINE REGULATION	$V_{in} = \text{MIN TO MAX}$	—	0.04	0.2	—	0.04	0.2	%
LOAD REGULATION <sup>2</sup>	25% TO FULL LOAD	—	0.15	0.4	—	0.15	0.4	%
CROSS REGULATION <sup>3</sup>	FULL LOAD TO 25%	—	1.5	3.0	—	1.5	3.0	%
OUTPUT RIPPLE	0 TO 20 MHz	—	70	—	—	70	—	mV p-p
	with 0.1 $\mu\text{F}$ capacitor	—	30	—	—	30	—	mV p-p
INPUT RIPPLE <sup>4</sup>	0 TO 20 MHz	—	660	—	—	660	—	mA p-p
INPUT RIPPLE REJECTION	DC TO 120 Hz	—	> 60	—	—	> 60	—	dB
TRANSIENT RECOVERY <sup>5</sup>	50% TO 75%	—	100	—	—	120	—	$\mu\text{s}$
RESPONSE <sup>6</sup>		—	130	—	—	150	—	mV pk
STABILITY	SHORT TERM <sup>7</sup>	—	< 0.02	—	—	< 0.02	—	% / 24 HRS
	LONG TERM	—	< 0.2	—	—	< 0.2	—	% / 1000 HRS
START-UP TIME		—	2	—	—	2	—	ms

### Notes:

1. A 10k trimpot or a fixed resistor may be used to adjust the output voltage. Both the output power (trimming up) and the output current (trimming down) must stay within the maximum allowable limits. The trim resistor should be connected between the positive output and the negative output with the trim pin connected in between. (See figure at right.)
2. Output voltage changes when both outputs are changed from maximum to minimum load at the same time.
3. Output voltage changes in one output when the other output is changed from full load to 25% load. Both outputs or one output may be run at no load with no damage to the converter.
4. An external input capacitor is required — 220  $\mu\text{F}$ , low ESR ( $< 9\text{ ohms}$ ).
5. The time required to settle from a 50% to 75% step load change to within a 1% error band with a step rise time of 2 $\mu\text{s}$ .
6. The peak overshoot during a transient as defined in note 5.
7. Following a 60 minute warm-up at full load and constant line voltage — the output voltage drift over a 24 hour period.



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### TYPICAL PERFORMANCE CURVES (ALL MODELS UNLESS OTHERWISE NOTED)

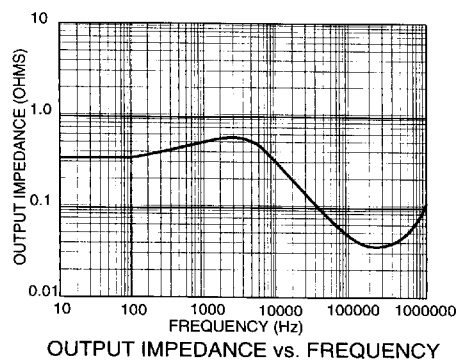


Figure 1

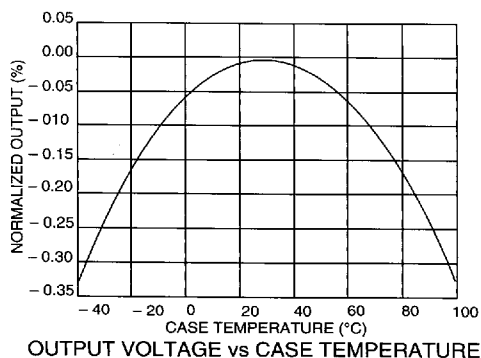


Figure 2

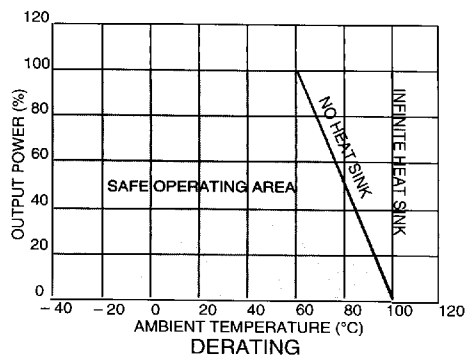


Figure 3

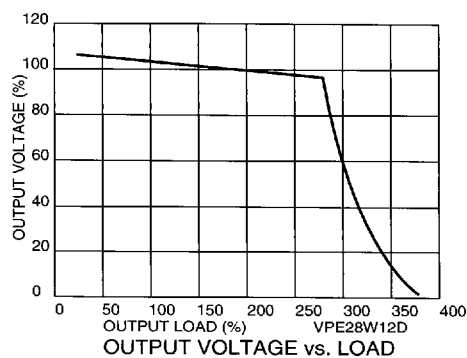


Figure 4

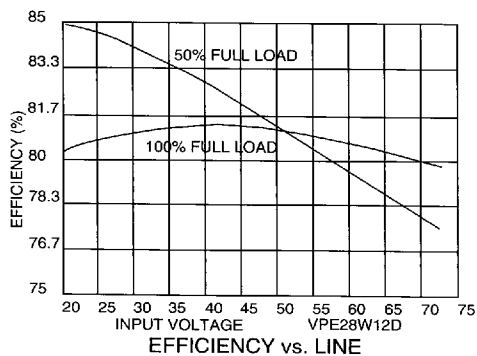


Figure 5

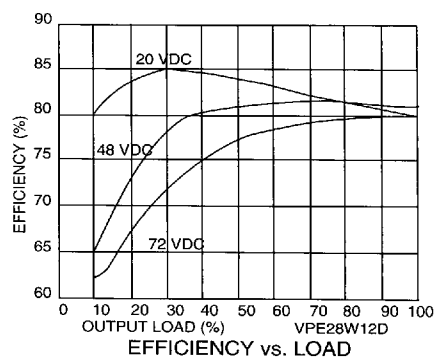


Figure 6

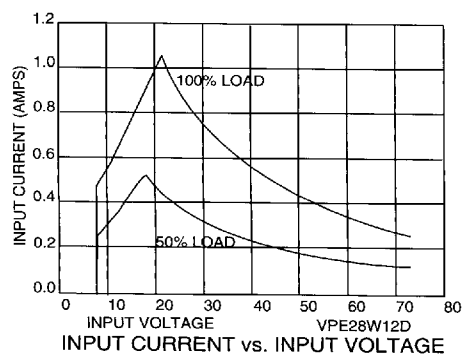


Figure 7

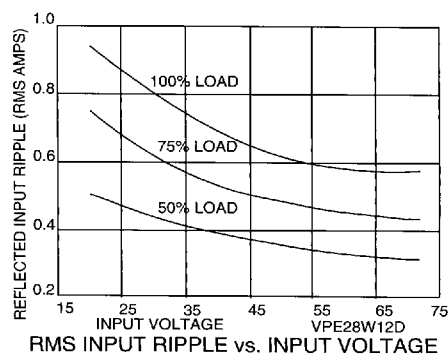


Figure 8

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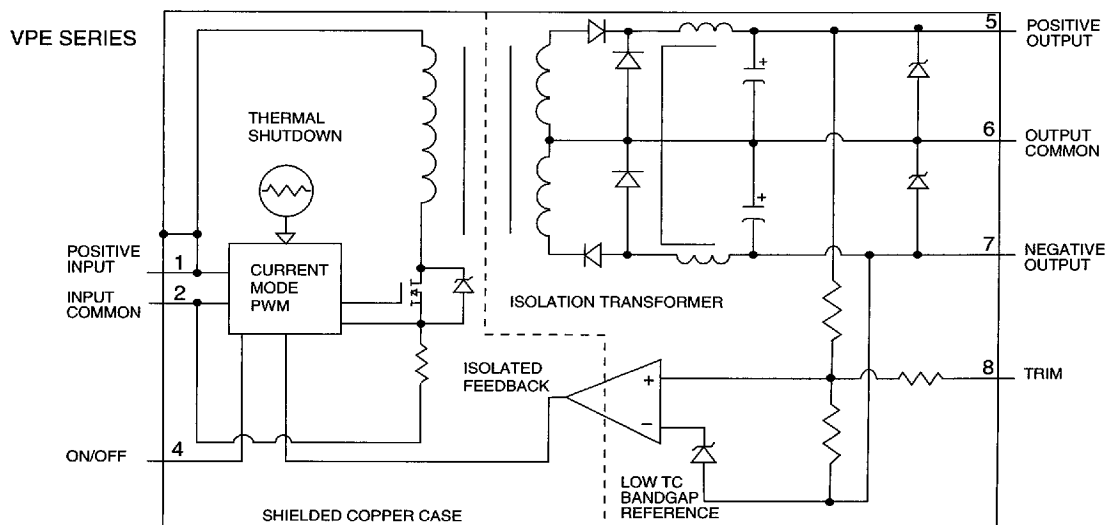
### OPTIONAL ENVIRONMENTAL SCREENING

Environmental screening consists of the following procedures (Methods and Conditions refer to MIL-STD-202):

- 96 hours of burn-in at 85°C, per method 108.
- Mechanical shock per method 213, condition D.
- Temperature shock per method 107, condition A (modified).
- Final electrical test per Interpoint acceptance test procedure.

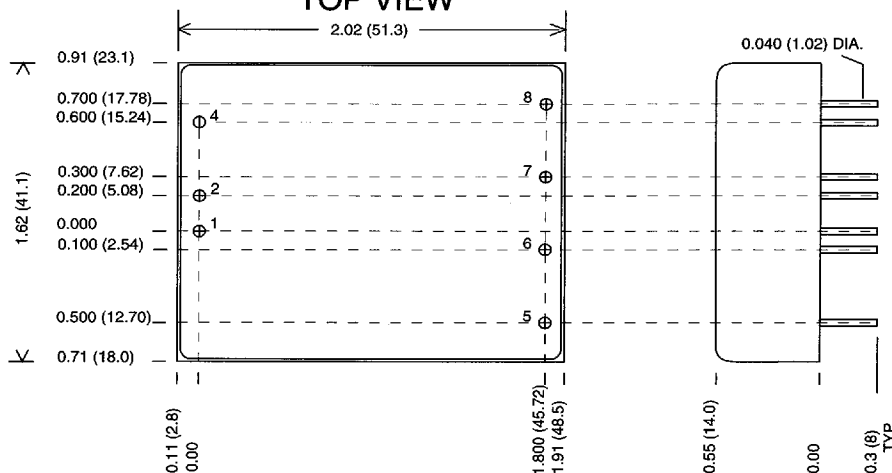
To order optional screening, add suffix -ST to model number. Example: VPE28W15D/ST. On unscreened parts, the screening code block is blank. On screened parts, the block is marked "ST."

### BLOCK DIAGRAM



### METAL AND EPOXY CASE

#### TOP VIEW



VPE SERIES CASE DRAWING  
NOMINAL CASE DIMENSIONS IN INCHES (MM)  
TOLERANCE X.XX  $\pm 0.010$  (0.25), X.XXX  $\pm 0.005$  (0.13)

Designation	Pin #
Positive input	1
Input common	2
On/Off	4
Positive output	5
Output common	6
Negative output	7
Trim	8

Note: Case is connected to positive input (pin1).

VPE SERIES is a trademark of Interpoint Corporation.

All technical information in this data sheet has been carefully checked and is believed to be accurate, but no responsibility is assumed for errors or omissions. Interpoint reserves the right to make changes without notice in products or specifications.

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