

# VPF150W VPD150W Series

DC-DC Converter up to 200 Watts



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2250 VDC Isolation Voltage	4 : 1 Wide Input Range	6 sided Shielding	ADJ. Output Voltage	Constant Current	Constant Voltage	Internal EN55032 Class A Filter	NO Min. Load Required	REMOTE ON OFF	REVERSE POLARITY PROTECTION	OCP	OTP
OVP	SCP	UVP									

## PART NUMBER STRUCTURE

VPF150	-	24	S	12	W	-	N	F	HC	S
VPD150										
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote Control Options	Filter Options	Assembly Options	Connector Options		
	24:9~36 48:18~75 110:43~160	S:Single	12:12 15:15 24:24 28:28 48:48	4:1	□:Positive logic N:Negative logic	□: NC F: With EMI filter module (For Euro Screw Type terminal block only)	□: None HC: H=0.670" Horizontal 7G-0058A-F	□: Euro Screw Type S: Spring Clamp Type		

\*EMI filter meet EN55032 Class B  
This EMI filter is only used for  
WAD150-24S□□W and  
WAD150-48S□□W  
Not for other items  
(Ex: WAD150-24S24W-F)

**TECHNICAL SPECIFICATION** All specifications are typical at nominal input, full load and 25°C unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	A	mA	%	µF
VPF(D)150-24S12W	9 ~ 36	12	12.5	70	86	40000
VPF(D)150-24S15W	9 ~ 36	15	10	80	86	26000
VPF(D)150-24S24W	9 ~ 36	24	6.3	95	87	10000
VPF(D)150-24S28W	9 ~ 36	28	5.4	120	87	7600
VPF(D)150-24S48W	9 ~ 36	48	3.2	130	86	2600
VPF(D)150-48S12W	18 ~ 75	12	12.5	50	88	40000
VPF(D)150-48S15W	18 ~ 75	15	10	60	89	26000
VPF(D)150-48S24W	18 ~ 75	24	6.3	60	89	10000
VPF(D)150-48S28W	18 ~ 75	28	5.4	70	89	7600
VPF(D)150-48S48W	18 ~ 75	48	3.2	70	88	2600
VPF(D)150-110S12W	43 ~ 160	12	12.5	25	88	40000
VPF(D)150-110S15W	43 ~ 160	15	10	25	89	26000
VPF(D)150-110S24W	43 ~ 160	24	6.3	25	89	10000
VPF(D)150-110S28W	43 ~ 160	28	5.4	25	89	7600
VPF(D)150-110S48W	43 ~ 160	48	3.2	35	88	2600

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	24Vin(nom)		9	24	36	VDC
	48Vin(nom)		18	48	75	
	110Vin(nom)		43	110	160	
Start up voltage	24Vin(nom)				9	VDC
	48Vin(nom)				18	
	110Vin(nom)				43	
Shutdown voltage	24Vin(nom)		7.9	8.2	8.5	VDC
	48Vin(nom)		15.6	16.2	16.8	
	110Vin(nom)		33.0	34.5	36.0	
Start up time	Constant resistive load	Power up Remote ON/OFF		35 35		ms
Input surge voltage	1 second, max.	24Vin(nom) 48Vin(nom) 110Vin(nom)			50 100 185	VDC
Input filter					Pi type	
Remote ON/OFF	Referred to -Vin pin	Positive logic (Standard) Negative logic (Option) Input current of Ctrl pin Remote off input current	DC-DC ON DC-DC OFF DC-DC ON DC-DC OFF		Open or 3 ~ 12VDC Short or 0 ~ 1.2VDC Short or 0 ~ 1.2VDC Open or 3 ~ 12VDC	-0.5 1 3.5 mA mA

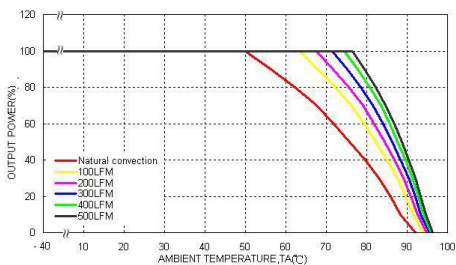
OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy		-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load	-0.2		+0.2	%
Load regulation	No Load to Full Load	-0.4		+0.4	%
Voltage adjustability	Use a resistor across on the Trim1 and Trim2 to adjust the output voltage.			+20	%
Ripple and noise	Measured by 20MHz bandwidth 12Vout, 15Vout 24Vout, 28Vout 48Vout		100 200 350		mVp-p
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change		200		µs
Over voltage protection	% of Vout(nom); Hiccup mode	125		140	%
Over load protection	% of Iout rated; CC Mode	105		120	%
Short circuit protection		Continuous, automatic recovery			

GENERAL SPECIFICATIONS						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
Isolation voltage	1 minute Input to Output	2250			VDC	
	For Euro Screw Type terminal block Input (Output) to Case	1600				
	1 minute Input to Output	3000			VDC	
	For Spring Clamp Type terminal block Input (Output) to Case	2250			VDC	
Isolation resistance	500VDC	1			GΩ	
Isolation capacitance				3500	pF	
Switching frequency	24VDC input	48Vout	248	275	303	kHz
		Others	270	300	330	
	48VDC input	48Vout	248	275	303	
	Others	270	300	330		
	110VDC input	All	203	225	248	
Safety approvals	IEC /EN/ UL62368-1				UL:E193009 CB:UL(Demko)	
Standard approvals	EN50155 EN45545-2					
Case material					Aluminum	
Base material					Aluminum	
Potting material					Silicone (UL94 V-0)	
Weight	VPF150				225g (7.94oz.)	
	VPD150				220g (7.76oz.)	
MTBF	MIL-HDBK-217F, Full load				4.954 x 10 <sup>5</sup> hrs	

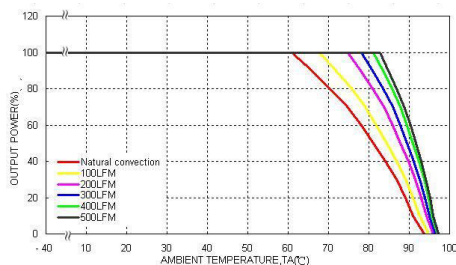
ENVIRONMENTAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating case temperature		-40		+100	°C
Maximum case temperature			100		°C
Over temperature protection			110		°C
Storage temperature range		-55		+125	°C
Thermal impedance	Only mount on the iron base-plate		2.55		°C/W
	Mount on the iron base-plate and top side with 7G-0058A Heat-sink		2.0		
Thermal shock					MIL-STD-810F
Shock					EN61373, MIL-STD-810F
Vibration					EN61373, MIL-STD-810F
Relative humidity					5% to 95% RH

EMC SPECIFICATIONS			
Parameter	Conditions		Level
EMI	EN55032, EN50121-3-2	Without external components	DC-DC module Class A
EMS	EN55035, EN50121-3-2		
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
	VPF(D)150-24S□□W	With an external input filter capacitor (Nippon chemi-con KY series, 470µF/50V.)	
	VPF(D)150-48S□□W	With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V)	
	VPF(D)150-110S□□W	With an external input filter capacitor (Nippon chemi-con KXJ series, 150µF/200V.)	
Surge	EN61000-4-5	EN55035 ±1kV and EN50121-3-2 ±2kV	Perf. Criteria A
	VPF(D)150-24S□□W	With an external input filter capacitor (Nippon chemi-con KY series, 470µF/50V.)	
	VPF(D)150-48S□□W	With an external input filter capacitor (Nippon chemi-con KY series, 220µF/100V)	
	.VPF(D)150-110S□□W	With an external input filter capacitor (Nippon chemi-con KXJ series, 150µF/200V.)	
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

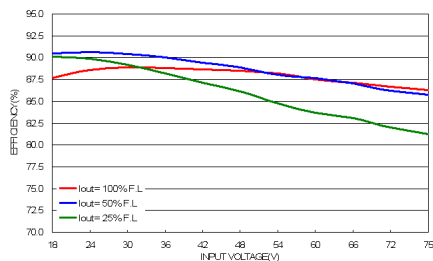
**CAUTION:** This power module is not internally fused; an input line fuse must always be used.  
If the load have sourcing capability (Ex: Battery or Super Capacitor), an output line fuse must always be used.



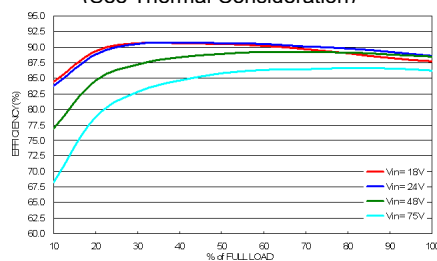
VPF(D)150-48S24W  
Derating Curve  
(See Thermal Consideration)



VPF(D)150-48S24W  
Derating Curve With Heat-sink  
(See Thermal Consideration)

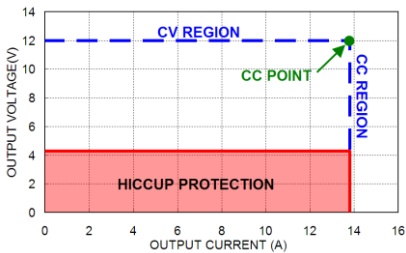


VPF(D)150-48S24W  
Efficiency vs. Input Voltage

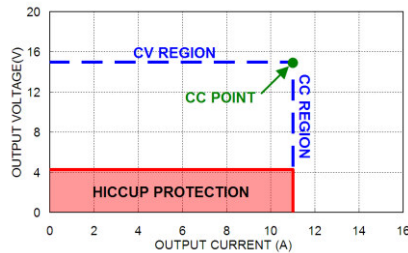


VPF(D)150-48S24W  
Efficiency vs. Output Load

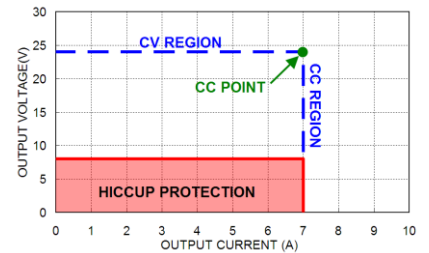
**CHARACTERISTIC CURVE(CONTINUED)**



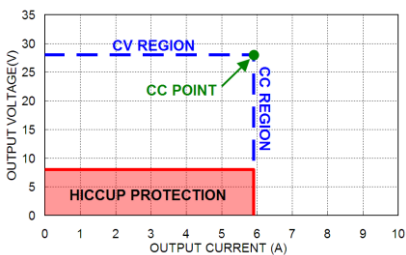
VPF(D)150-□□S12W  
Vout vs. Iout



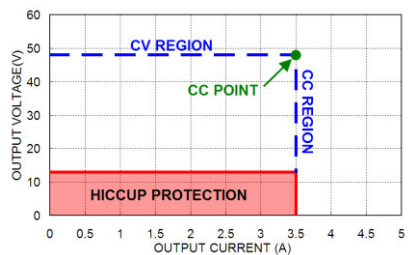
VPF(D)150-□□S15W  
Vout vs. Iout



VPF(D)150-□□S24W  
Vout vs. Iout



VPF(D)150-□□S28W  
Vout vs. Iout



VPF(D)150-□□S48W  
Vout vs. Iout

MODE	DESCRIPTION	CONDITION
CV Region	In normal operation, the output current is shown in datasheet	Resistance Load > Vout / Iout (CC Point)
CC Region	If the output load current are over rating, the output current will keep in a constant value, and the output voltage will fall.	Resistance Load < Vout / Iout (CC Point)
Hiccup Protection	If the output resistance become short, it will operate in hiccup protection.	VPF(D)150-□□S12W, VPF(D)150-□□S15W: Vout < 4.3V (typ.) to Output Short.  VPF(D)150-□□S24W, VPF(D)150-□□S28W: Vout < 8.0V(typ.) to Output Short.  VPF(D)150-□□S48W: Vout < 13V(typ.) to Output Short.

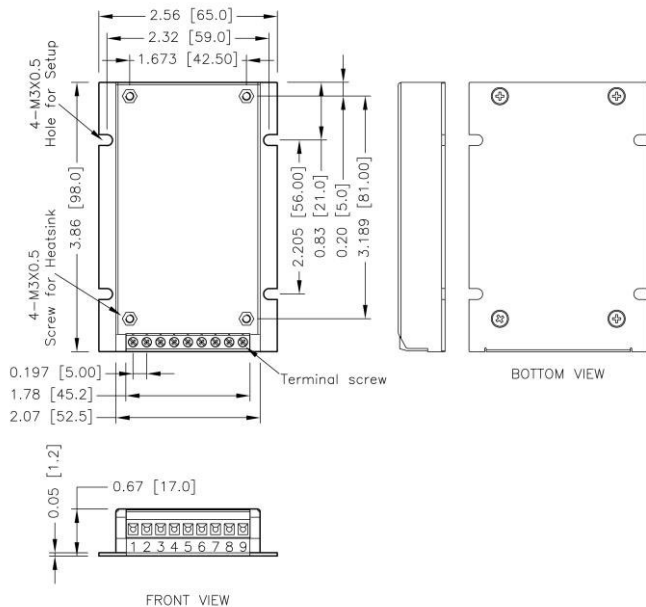
This power module is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

Model	Fuse Rating (A)	Fuse Type
VPF(D)150-24S□□W	30	Fast-Acting
VPF(D)150-48S□□W	15	Fast-Acting
VPF(D)150-110S□□W	6.3	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

## MECHANICAL DRAWING

### VPE

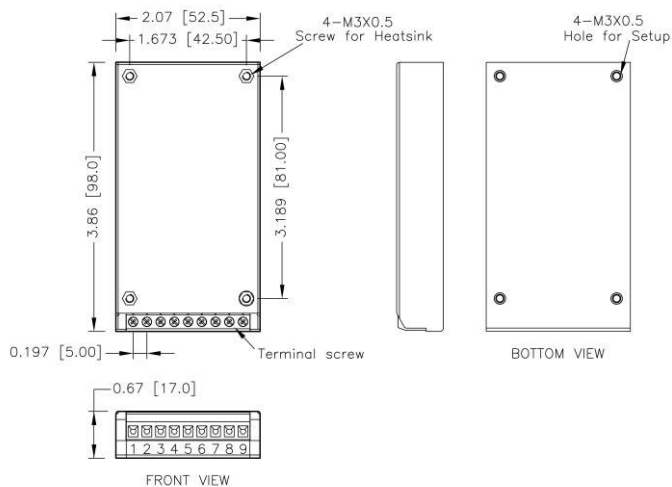


### TERMINAL CONNECTION

PIN	DEFINE	WIRE GAUGE RECOMMENDATIONS
1	+Vin	14~16AWG
2	+Vin	14~16AWG
3	-Vin	14~16AWG
4	-Vin	14~16AWG
5	Ctrl	14~24AWG
6	+Vout	14~16AWG
7	-Vout	14~16AWG
8	Trim 1	14~24AWG
9	Trim 2	14~24AWG

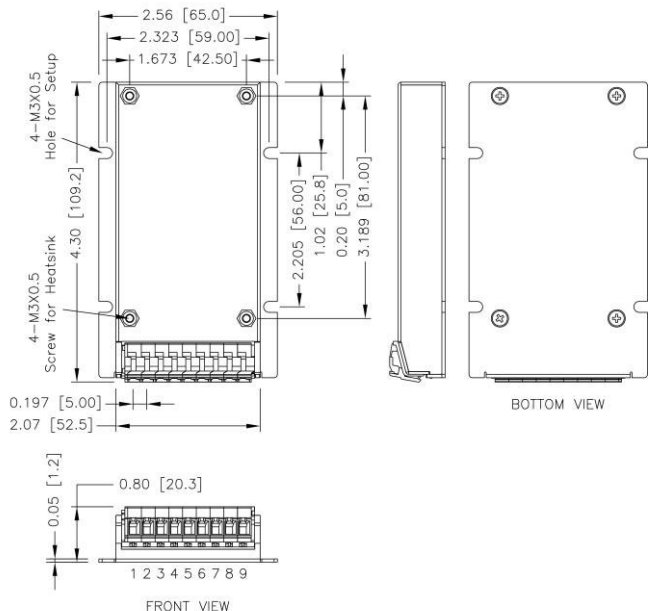
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.010 [x.xx±0.25]
3. The screw locked torque: MAX 5.0kgf-cm[0.49N-m]
4. Terminal screw locked torque: MAX 2.5kgf-cm[0.25N-m]

### VPD



**MECHANICAL DRAWING (CONTINUED)**

**VPE-S**

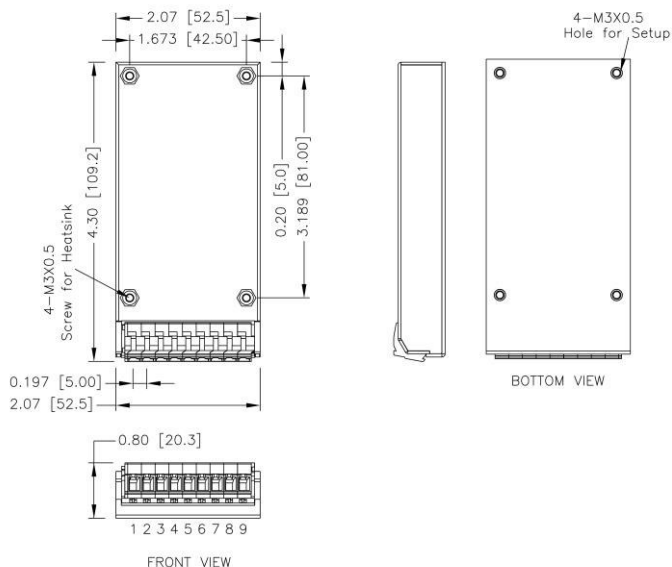


**TERMINAL CONNECTION**

PIN	DEFINE	WIRE GAUGE RECOMMENDATIONS
1	+Vin	14~16AWG
2	+Vin	14~16AWG
3	-Vin	14~16AWG
4	-Vin	14~16AWG
5	Ctrl	14~24AWG
6	+Vout	14~16AWG
7	-Vout	14~16AWG
8	Trim 1	14~24AWG
9	Trim 2	14~24AWG

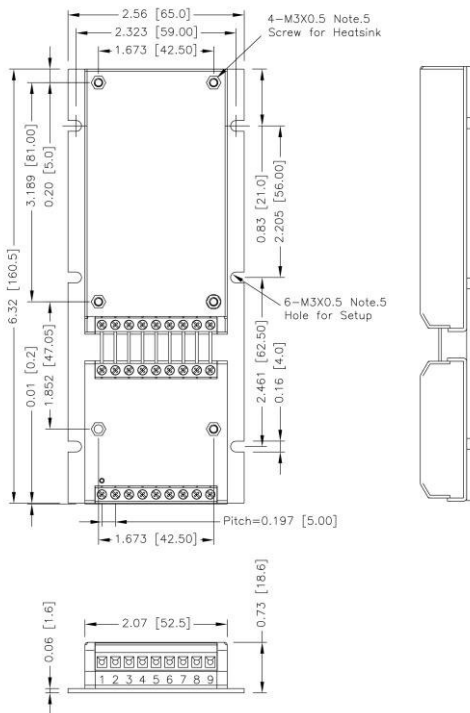
1. All dimensions in inch [mm]
2. Tolerance :  $x.xx \pm 0.02$  [ $x.x \pm 0.5$ ]  
 $x.xxx \pm 0.010$  [ $x.xx \pm 0.25$ ]
3. The screw locked torque: MAX 5.0kgf-cm[0.49N-m]

**VPD-S**



## MECHANICAL DRAWING (CONTINUED)

**VPD150-24S□□W-F**  
**VPD150-48S□□W-F**



FRONT VIEW

### TERMINAL CONNECTION

PIN	DEFINE	WIRE GAUGE RECOMMENDATIONS
1	+Vin	14~16AWG
2	+Vin	14~16AWG
3	-Vin	14~16AWG
4	-Vin	14~16AWG
5	Ctrl	14~24AWG
6	+Vout	14~16AWG
7	-Vout	14~16AWG
8	Trim 1	14~24AWG
9	Trim 2	14~24AWG

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.01 [x.xx±0.25]
3. Pole pitch tolerance ±0.01 [0.25]
4. Screw locked torque: MAX 5.0kgf-cm[0.49N-m]
5. Terminal screw locked torque: MAX 2.5kgf-cm[0.25N-m]

## CONNECTOR OPTIONS

Blank:



Euro Screw Type

Mates with  
**Screw locked torque**  
**MAX 2.5Kgf.cm/0.25N.m**

**Wire dimension range**  
**14 ~ 24AWG**

-S



Spring Clamp Type

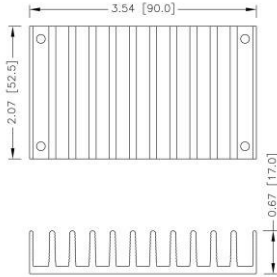
Mates with  
**Wire strip length**  
**5 ~ 6mm**

**Wire dimension range**  
**14 ~ 24AWG**



**HEAT-SINK OPTIONS**

Heat-sink Part No: 7G-0058A-F, Suffix:-HC



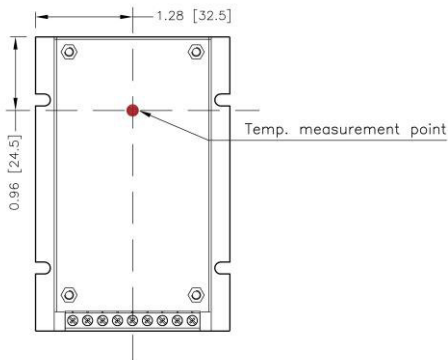
\* All dimensions in inch [mm]

**THERMAL CONSIDERATIONS**

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed "Maximum case temperature". When operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature". You can limit this temperature to a lower value for extremely high reliability.

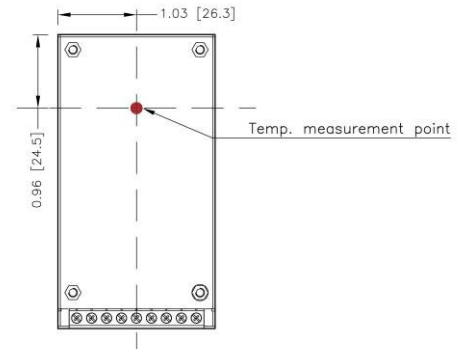
- Thermal test condition with vertical direction by natural convection (20LFM).

**VPF**



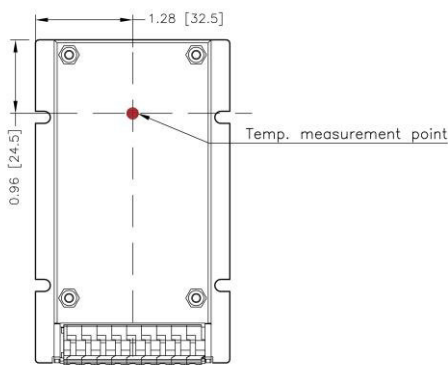
TOP VIEW

**VPD**



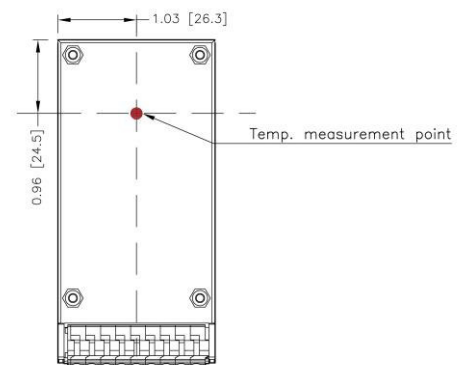
TOP VIEW

**VPF-S**



TOP VIEW

**VPD-S**



TOP VIEW

**OUTPUT VOLTAGE ADJUSTMENT**

The output voltage is adjustable from 0% to +20% trim up of nominal output voltage by connecting an external resistor between the Trim1 and Trim2 pins. With an external resistor between the Trim1 and Trim2 pins, the output voltage set point increases.

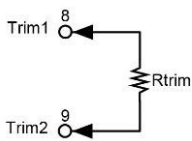
The maximum output deviation is +20%.

The external TRIM resistor needs to be at least 1/16W resistors.

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.

Trim-up



**□□S12W**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2
RU (kΩ)	222.64	105.09	66.35	47.06	35.51	27.83	22.34	18.23	15.03	12.48

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	13.32	13.44	13.56	13.68	13.8	13.92	14.04	14.16	14.28	14.4
RU (kΩ)	10.39	8.65	7.18	5.91	4.82	3.86	3.02	2.27	1.60	0.99

**□□S15W**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5
RU (kΩ)	238.62	113.62	71.95	51.12	38.62	30.29	24.33	19.87	16.40	13.62

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	16.65	16.8	16.95	17.1	17.25	17.4	17.55	17.7	17.85	18
RU (kΩ)	11.35	9.45	7.85	6.48	5.29	4.25	3.33	2.51	1.78	1.12

**□□S24W**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4
RU (kΩ)	212.47	106.69	68.79	49.30	37.43	29.44	23.70	19.37	15.99	13.28

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.64	26.88	27.12	27.36	27.6	27.84	28.08	28.32	28.56	28.8
RU (kΩ)	11.06	9.20	7.63	6.28	5.11	4.08	3.18	2.37	1.65	1.00

**□□S28W**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	28.28	28.56	28.84	29.12	29.4	29.68	29.96	30.24	30.52	30.8
RU (kΩ)	255.65	121.72	77.08	54.76	41.36	32.44	26.06	21.28	17.56	14.58

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	31.08	31.36	31.64	31.92	32.2	32.48	32.76	33.04	33.32	33.6
RU (kΩ)	12.14	10.11	8.40	6.93	5.65	4.53	3.55	2.67	1.89	1.19

**□□S48W**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	48.48	48.96	49.44	49.92	50.4	50.88	51.36	51.84	52.32	52.8
RU (kΩ)	268.86	127.44	80.57	57.19	43.17	33.84	27.17	22.18	18.29	15.18

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	53.28	53.76	54.24	54.72	55.2	55.68	56.16	56.64	57.12	57.6
RU (kΩ)	12.64	10.52	8.73	7.20	5.87	4.70	3.67	2.76	1.94	1.21