

VPL06W Series

DC-DC converter

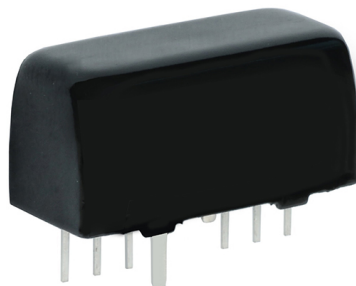
up to 6 Watts

3

YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Railway



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV

c **UL** [®] **US**

CB **CE**

3000
VDC
Isolation
Voltage

4 : 1
Wide
Input
Range

LOW
Standby
Power

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

SCP

PART NUMBER STRUCTURE

VPL06

Series Name

48

Input
Voltage
(VDC)

S

Output
Quantity

05

Output
Voltage
(VDC)

W

Input
Range

-

M3

Operating ambient
temperature

24:9~36
48:18~75
110:43~160

S: Single

3P3:3.3
05:5
09:9
12:12
15:15
24:24

4:1

□:-40~+100°C
M3:-55~+100°C

D: Dual

05:±5
12:±12
15:±15

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	mA	mA	%	μF
VPL06-24S3P3W	9 ~ 36	3.3	1500	4	81	2200
VPL06- 24S05W	9 ~ 36	5	1200	4	84	1100
VPL06- 24S09W	9 ~ 36	9	666	4	86	680
VPL06- 24S12W	9 ~ 36	12	500	4	87	470
VPL06- 24S15W	9 ~ 36	15	400	4	88	470
VPL06- 24S24W	9 ~ 36	24	250	4	87	180
VPL06- 24D05W	9 ~ 36	±5	±600	6	84	±680
VPL06- 24D12W	9 ~ 36	±12	±250	6	87	±330
VPL06- 24D15W	9 ~ 36	±15	±200	8	87	±180
VPL06- 48S3P3W	18 ~ 75	3.3	1500	4	81	2200
VPL06- 48S05W	18 ~ 75	5	1200	4	84	1100
VPL06- 48S09W	18 ~ 75	9	666	4	85	680
VPL06- 48S12W	18 ~ 75	12	500	4	87	470
VPL06- 48S15W	18 ~ 75	15	400	4	87	470
VPL06- 48S24W	18 ~ 75	24	250	4	87	180
VPL06- 48D05W	18 ~ 75	±5	±600	6	84	±680
VPL06- 48D12W	18 ~ 75	±12	±250	6	87	±330
VPL06- 48D15W	18 ~ 75	±15	±200	8	87	±180
VPL06- 110S3P3W	43 ~ 160	3.3	1500	2	80	2200
VPL06- 110S05W	43 ~ 160	5	1200	2	83	1100
VPL06- 110S09W	43 ~ 160	9	666	2	85	680
VPL06- 110S12W	43 ~ 160	12	500	2	86	470
VPL06- 110S15W	43 ~ 160	15	400	2	86	470
VPL06- 110S24W	43 ~ 160	24	250	2	86	180
VPL06- 110D05W	43 ~ 160	±5	±600	2	83	±680
VPL06- 110D12W	43 ~ 160	±12	±250	2	86	±330
VPL06- 110D15W	43 ~ 160	±15	±200	2	86	±180

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 time	Constant resistive load	Power up		50	75	ms	
		Remote ON/OFF		50	75		
Input surge voltage	1 second, max.	24Vin(nom)			50	VDC	
		48Vin(nom)			100		
		110Vin(nom)			185		
Input filter	Capacitor type						
Remote ON/OFF	Referred to –Vin pin	DC-DC ON		Open or 0 ~ 0.5VDC			mA
		DC-DC OFF		3 ~ 12VDC			
		Input current of Ctrl pin	2		4		
		Remote off input current		2.5			

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	-0.5		+0.5	%
	Single	-1.0		+1.0	%
	Dual				
Cross regulation	Asymmetrical load 25%/100% FL	-5.0		+5.0	%
Ripple and noise	Measured by 20MHz bandwidth With a 1µF/50V X7R MLCC		50	75	mVp-p
Temperature coefficient		-0.02		+0.02	%/°C
Transient response recovery time	25% load step change		250		µs
Over load protection	% of Iout rated; Hiccup mode		180		%
Short circuit protection		Continuous, automatic recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	3000			VDC
	Input to Output	1500			
	Input (Output) to Case				
Isolation resistance	500VDC	1			GΩ
Isolation capacitance				100	pF
Switching frequency	110Vin	270	300	330	kHz
	Others	520	580	640	
Safety approvals	IEC /UL/ EN60950-1 IEC /UL/ EN62368-1			UL:E193009 CB:UL(Demko)	
Standard approvals	EN50155 EN45545-2				
Case material					Copper
Base material					None
Potting material					Silicone (UL94 V-0)
Weight				5.9g (0.21oz)	
MTBF	MIL-HDBK-217F, Full load			2.948 x 10 ⁶ hrs	

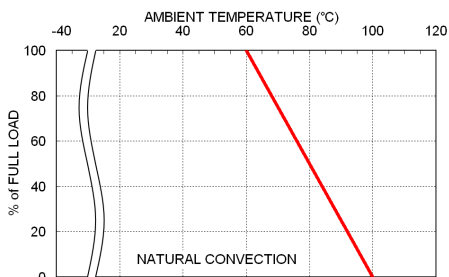
ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating case temperature	With derating	-40		+100	°C
	M3 version	-55		+100	°C
Maximum case temperature	With derating			+100	°C
Storage temperature range		-55		+125	°C
Thermal shock				MIL-STD-810F	
Shock				EN61373, MIL-STD-810F	
Vibration				EN61373, MIL-STD-810F	
Relative humidity				5% to 95% RH	

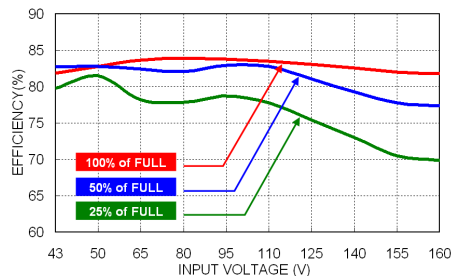
EMC SPECIFICATIONS

Parameter	Conditions		Level
EMI	EN55011, EN55032	With external components	Class A, Class B
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	Perf. Criteria A
Radiated immunity	EN61000-4-3	20V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2\text{kV}$	Perf. Criteria A
	VPL06-24 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	VPL06-48 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	VPL06-110 W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 $\mu\text{F}/200\text{V}$) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.	
Surge	EN61000-4-5	$\pm 2\text{kV}$	Perf. Criteria A
	VPL06-24 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	VPL06-48 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 $\mu\text{F}/100\text{V}$) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	VPL06-110 W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 $\mu\text{F}/200\text{V}$) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.	
Conducted immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

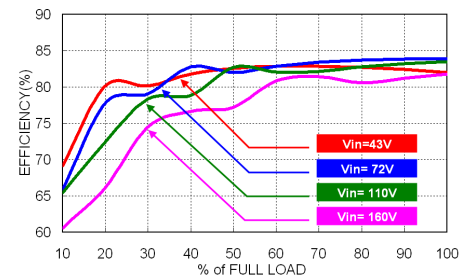
CAUTION: This power module is not internally fused. An input line fuse must always be used.

CHARACTERISTIC CURVE

VPL06-110S05W Derating Curve



VPL06-110S05W Efficiency vs. Input Voltage



VPL06-110S05W Efficiency vs. Output Load

FUSE CONSIDERATION

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.

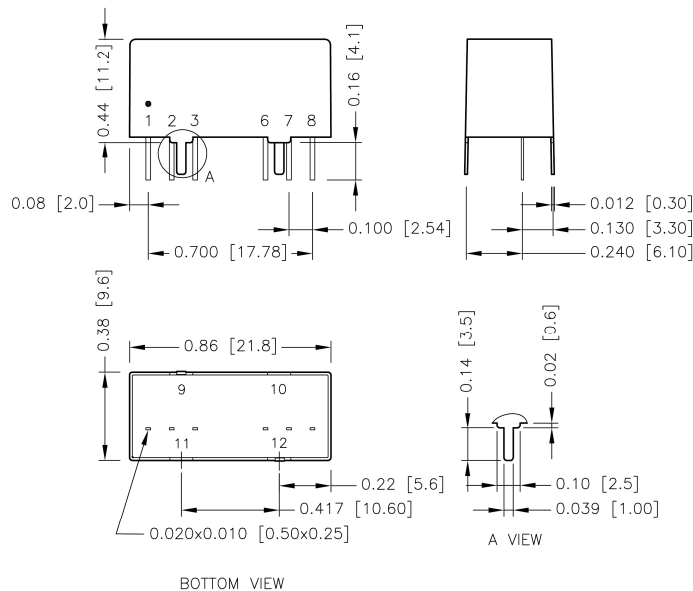
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
VPL06-24□□□W	1.25	Slow-Blow
VPL06-48□□□W	0.63	Slow-Blow
VPL06-110□□□W	0.315	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



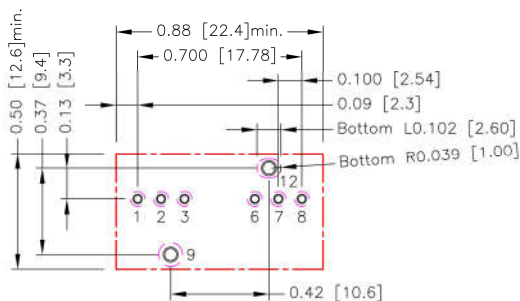
PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	+Vin	+Vin
3	Ctrl	Ctrl
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout
9	Case	Case
10	Stand off	Stand off
11	Stand off	Stand off
12	Case	Case

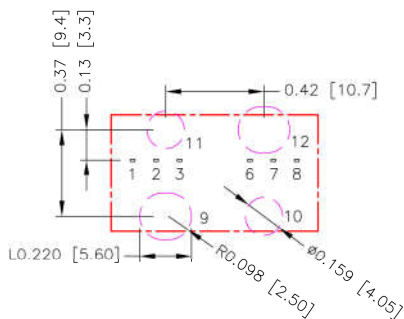
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

* Case pins should not be connected to any circuit.

RECOMMENDED PAD LAYOUT



All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.6.7.8: $\Phi 0.031$ [0.80]
 Through hole 9.12: $\Phi 0.051$ [1.30]
 Top view pad 1.2.3.6.7.8: $\Phi 0.039$ [1.00]
 Top view pad 9.12: $\Phi 0.064$ [1.63]
 Bottom view pad 1.2.3.6.7.8: $\Phi 0.063$ [1.60]
 Bottom view pad 9: $\Phi 0.102$ [2.60]
 Bottom view pad 12: Groove R0.039[1.00]L0.102[2.60]



Area 9.10.11.12 don't layout
 Area 10.11 size: $\Phi 0.159$ [4.05]
 Area 9.12 size: Groove R0.098[2.50]L0.220[5.60]
 The layout distance between Pin3 and Pin6 is at least 3mm

* We recommend putting PCB trace on bottom side.

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).



TOP VIEW