

VPL03W Series

DC-DC converter

up to 3 Watts



Railway



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



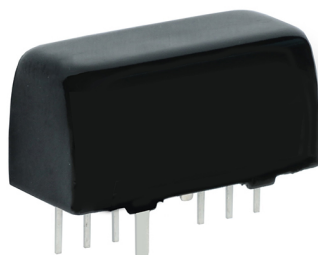
Charger



Medical



PV



3000
VDC
Isolation
Voltage

4 : 1
Wide
Input
Range

LOW
Standby
Power

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

SCP

PART NUMBER STRUCTURE

VPL03 - 48 S 05 W - M3

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating ambient temperature
	24:9~36	S: Single	3P3:3.3	4:1	□: -40~+100°C M3: -55~+100°C
	48:18~75		05:5		
	110:43~160		09:9		
			12:12		
			15:15		
			24:24		
		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
VPL03-24S3P3W	9 ~ 36	3.3	700	4	76	1100
VPL03-24S05W	9 ~ 36	5	600	4	81	550
VPL03-24S09W	9 ~ 36	9	333	4	81	340
VPL03-24S12W	9 ~ 36	12	250	4	83	240
VPL03-24S15W	9 ~ 36	15	200	4	83	240
VPL03-24S24W	9 ~ 36	24	125	4	82	90
VPL03-24D05W	9 ~ 36	±5	±300	6	80	±340
VPL03-24D12W	9 ~ 36	±12	±125	6	82	±170
VPL03-24D15W	9 ~ 36	±15	±100	8	82	±90
VPL03-48S3P3W	18 ~ 75	3.3	700	4	75	1100
VPL03-48S05W	18 ~ 75	5	600	4	81	550
VPL03-48S09W	18 ~ 75	9	333	4	81	340
VPL03-48S12W	18 ~ 75	12	250	4	82	240
VPL03-48S15W	18 ~ 75	15	200	4	82	240
VPL03-48S24W	18 ~ 75	24	125	4	82	90
VPL03-48D05W	18 ~ 75	±5	±300	6	80	±340
VPL03-48D12W	18 ~ 75	±12	±125	6	82	±170
VPL03-48D15W	18 ~ 75	±15	±100	8	82	±90
VPL03-110S3P3W	43 ~ 160	3.3	700	2	76	1100
VPL03-110S05W	43 ~ 160	5	600	2	80	550
VPL03-110S09W	43 ~ 160	9	333	2	81	340
VPL03-110S12W	43 ~ 160	12	250	2	82	240
VPL03-110S15W	43 ~ 160	15	200	2	83	240
VPL03-110S24W	43 ~ 160	24	125	2	83	90
VPL03-110D05W	43 ~ 160	±5	±300	2	80	±340
VPL03-110D12W	43 ~ 160	±12	±125	2	83	±170
VPL03-110D15W	43 ~ 160	±15	±100	2	81	±90

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	360	400	440	
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			5.535 x 10 ⁶ hrs	

ENVIRONMENTAL SPECIFICATIONS

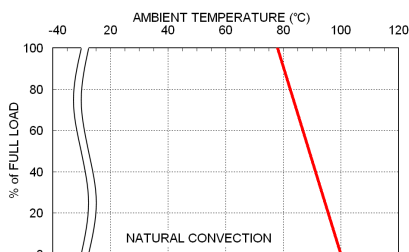
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating case temperature	With derating	-40		+100	°C
	M3 version	-55		+100	°C
Maximum case temperature	With derating			+100	°C
Storage temperature range		-55		+125	°C
Thermal shock				MIL-STD-810F	
Shock				EN61373, MIL-STD-810F	
Vibration				EN61373, MIL-STD-810F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

EMC SPECIFICATIONS

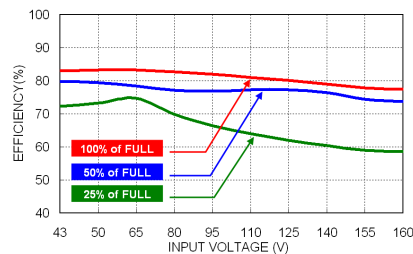
Parameter	Conditions		Level
EMI	EN55011, EN55032	With external components	Class A, Class B
ESD	EN61000-4-2	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	Perf. Criteria A
Radiated immunity	EN61000-4-3	20V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2\text{kV}$	Perf. Criteria A
	VPL03-24 W W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μF /100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	VPL03-48 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μF /100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	VPL03-110 W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 μF /200V) and a TVS (SMB250A, 250V, 600Watt peak pulse power) to connect in parallel.	
Surge	EN61000-4-5	$\pm 2\text{kV}$	Perf. Criteria A
	VPL03-24 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μF /100V) and a TVS (SMDJ70A, 70V, 3000Watt peak pulse power) to connect in parallel.	
	VPL03-48 W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μF /100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.	
	VPL03-110 W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 μF /200V) 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.

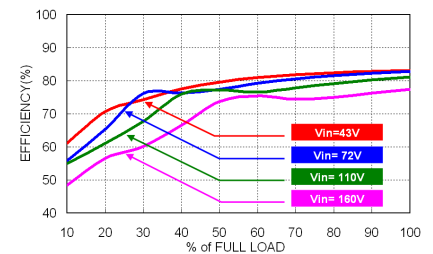
CHARACTERISTIC CURVE



VPL03-110S05W Derating Curve



VPL03-110S05W Efficiency vs. Input Voltage



VPL03-110S05W 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.

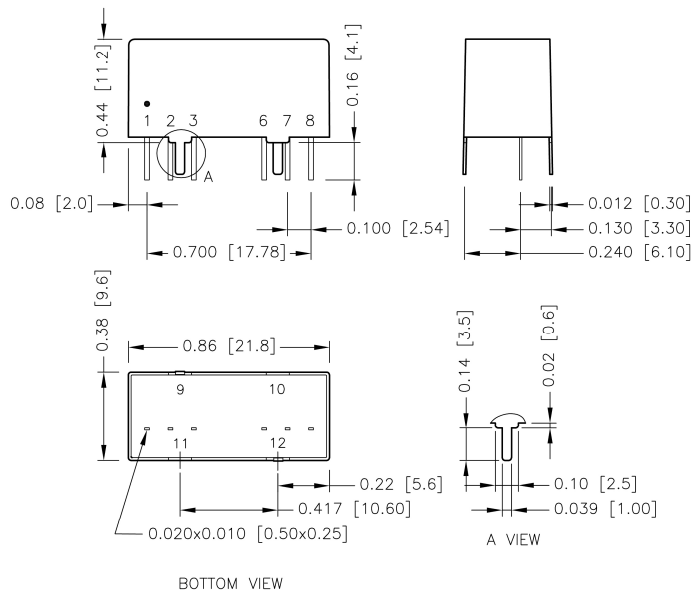
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
VPL03-24□□□W	0.8	Slow-Blow
VPL03-48□□□W	0.5	Slow-Blow
VPL03-110□□□W	0.16	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



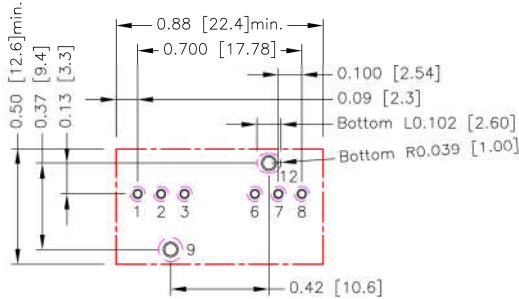
PIN CONNECTION

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

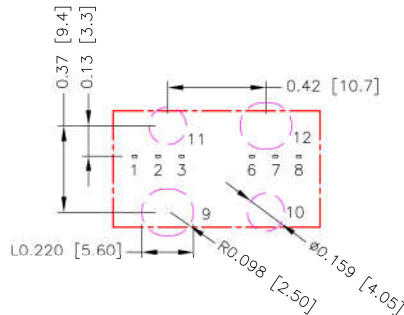
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

* 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