TPS-HVP10 Series
DC/DC Converter

Product Feature

- Package Type: DIP24
- Universal Input: 4:1
- Operating temperature range: -40℃ - +85℃
- Isolation voltage: 1500VDC
- High efficiency up to: 88% (Type)
- Input undervoltage protection.Output short-circuit protection, overvoltage protection, overcurrent protection mechanism.
- Fields of application: Industry, Power, Instrumentation, Communication, Rail transit.

Selection Guide

Part No.	Input Voltage (VDC)		Output Voltage (VDC)	Output Current (mA)Max.	Full Load Efficiency% (Typ.)	Capacity Load (μF) Max.
	Nominal(Range)	Max.				
TPS-HVP1012505V3	12 (4.5-18)	20	5	2000	82	1000
TPS-HVP1012512V3	12 (4.5-18)	20	12	833	84	470
TPS-HVP1012515V3	12 (4.5-18)	20	15	667	84	330
TPS-HVP1012S24V3	12 (4.5-18)	20	24	416	86	100
TPS-HVP1012D12V3	12 (4.5-18)	20	±12	±416	84	#470
TPS-HVP1012D15V3	12 (4.5-18)	20	±15	±333	84	#330
TPS-HVP1024503V3	24 (9-36)	40	3.3	2400	87	1200
TPS-HVP1024505V3	24(9-36)	40	5	2000	87	1000
TPS-HVP1024512V3	24(9-36)	40	12	833	87	470
TPS-HVP1024515V3	24(9-36)	40	15	667	87	330
TPS-HVP1024S24V3	24 (9-36)	40	24	416	88	100
TPS-HVP1024D05V3	24 (9-36)	40	±5	±1000	83	#1000
TPS-HVP1024D12V3	24(9-36)	40	±12	±416	87	#470
TPS-HVP1024D15V3	24(9-36)	40	±15	±333	87	#330
TPS-HVP1048503V3	48(18-75)	80	3.3	2400	87	1200
TPS-HVP1048505V3	48(18-75)	80	5	2000	88	1000
TPS-HVP1048512V3	48(18-75)	80	12	833	87	470
TPS-HVP1048515V3	48(18-75)	80	15	667	87	330
TPS-HVP1048524V3	48(18-75)	80	24	416	88	100
TPS-HVP1048D05V3	48(18-75)	80	±5	±1000	83	#1000
TPS-HVP1048D12V3	48(18-75)	80	±12	±416	87	#470
TPS-HVP1048D15V3	48(18-75)	80	±15	±333	87	#330

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no load)	12VDC Nominal input series, nomina input voltage	Single 5VDC Output	--	1016/20	1056/50	mA
		Other Output	--	980/20	1006/40	
	24VDC Nominal input series, nominal input voltage	Single 3.3VDC Output	--	379/12	388/25	mA
		Single 5VDC Output	--	473/6	484/15	
		Other Output	--	502/5	515/12	
	48VDC Nominal input series, nominal input voltage	Single 3.3VDC Output	--	192/5	197/20	mA
		Single 5VDC Output	--	239/6	245/12	
		Other Output	--	251/4	258/8	
Reflected Ripple Curren	12VDC Nominal input series, nominal input voltage		--	60	--	mA
	24VDC Nominal input series, nominal input voltage		--	40	--	
	48VDC Nominal input series, nominal input voltage		--	30	--	
Input Impulse Voltage	12VDC Nominal input series, nominal input voltage		-0.7	--	30	VDC
	24VDC Nominal input series, nominal input voltage		-0.7	--	50	
	48VDC Nominal input series, nominal input voltage		-0.7	--	100	
Starting Voltage	12VDC Nominal input series, nominal input voltage		--	--	5	VDC
	24VDC Nominal input series, nominal input voltage		--	--	9	
	48VDC Nominal input series, nominal input voltage		--	--	18	
Input Undervoltage Protection	12VDC Nominal input series, nominal input voltage		3.5	4	--	VDC
	24VDC Nominal input series, nominal input voltage		5.5	6.5	--	
	48VDC Nominal input series, nominal input voltage		12	15.5	--	
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			
Ctrl	Module enabled		Suspended or 3.5-12V open			
	Module shutdown		0-0.7V shutdown			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	0%- 100% load	Single 3.3/5VDC Output	--	±0.5	±2	%
		Other Output	--	±1	±3	
Linear Regulation	Input voltage from low limitto high limit, full load	Positive output	--	±0.2	±0.5	%
		Negative output	--	±0.5	±1	
Load Regulation	10%- 100% load	Positive output	--	±0.5	±1	%
		Negative output	--	±0.5	±1.5	
Ripple & Noise	20MHz bandwidth		--	40	80	mVp-p
Transient Recovery Time	25% load step change		--	300	500	ms
Transient response Deviation	25% load step change	Single 3.3/5VDC Output	--	±5	±8	%
		Other Output	--	±3	±5	
Temperature Coefficient	Full Load		--	--	±0.03	%/°C
Over current protection	Input voltage range	Single 3.3/5VDC Output	110	160	--	%Io
		Other Output	110	140	--	
Short-Circuit Protection	Input voltage range		Continuous, Self-Recovery			

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulated voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2000	--	pF
Operating Temperature	See Fig 1	-40	--	85	℃
Storage Temperature		-55	--	125	℃
Storage Humidity	Non-condensing	5	--	95	%RH
Pin welding can withstand the highest temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	℃
Switching Frequency	Full load, nominal input voltage	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	>1000K Hours			

Mechanical Specifications

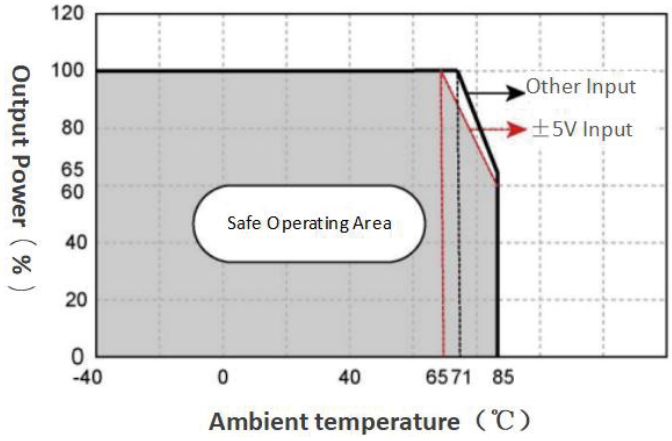
Case Material	Aluminum alloy
Package Dimensions	32.00 x 20.0 x 11.10mm
Weight	12.70g (Typ.)
Cooling Method	Free air convection

EMC Characteristics

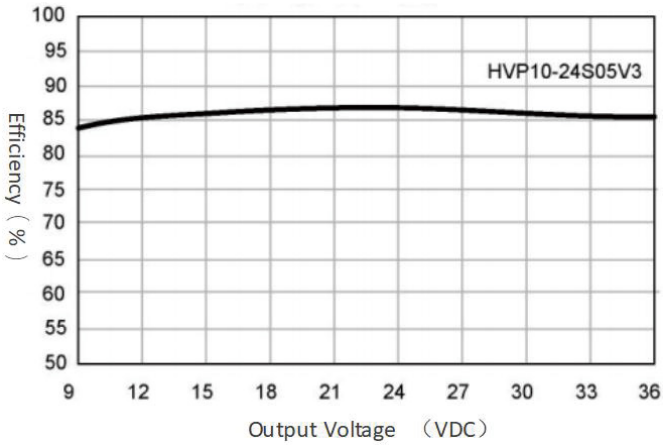
EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)	
	RE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)	
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV	Perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Recommended circuit diagram 3-①)	Perf. Criteria B
	Surge	IEC/EN61000-4-5 ±2KV (Recommended circuit diagram 3-①)	Perf. Criteria B
	CS	IEC/EN61000-4-6 10Vr.m.s	Perf. Criteria A
	Voltage sag, drop, and short-term interruption immunity	IEC/EN61000-4-29 0-70%	Perf. Criteria B

Typical Characteristic Curves

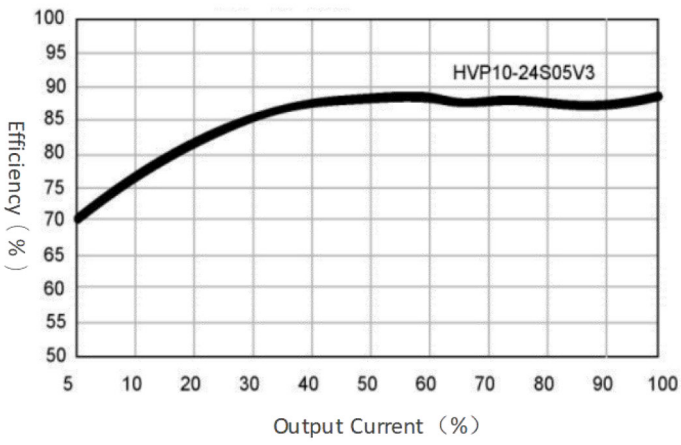
Temperature Derating Curve(Figure 1)



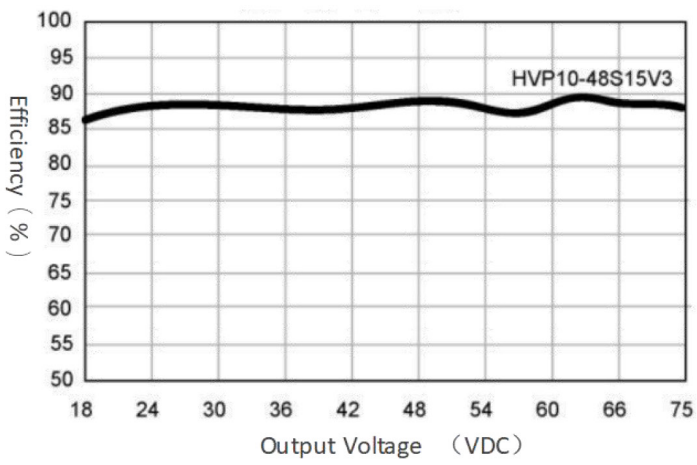
Efficiency VS Input Voltage Curve (Full load)



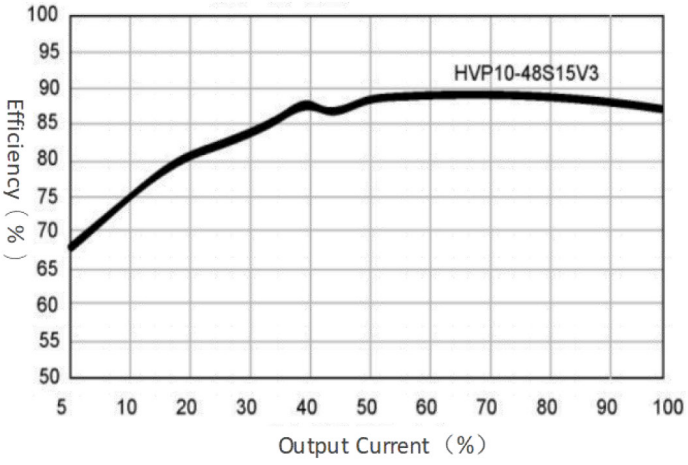
Efficiency VS Output Load (Vin=24V)



Efficiency VS Input Voltage Curve (Full load)

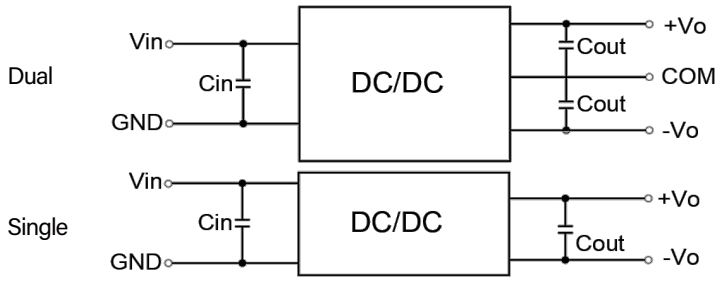


Efficiency VS Output Load (Vin=24V)



Typical Circuit Design and Application

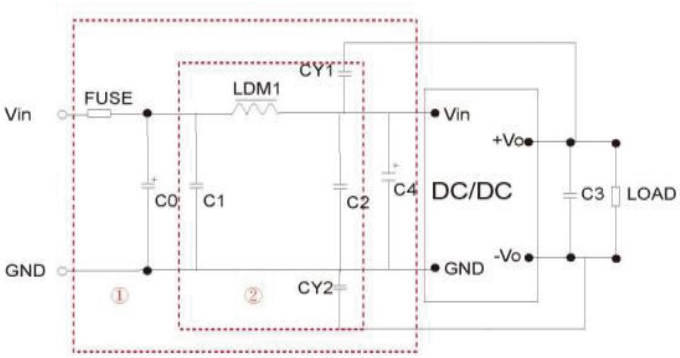
- Application circuit (Figure2)



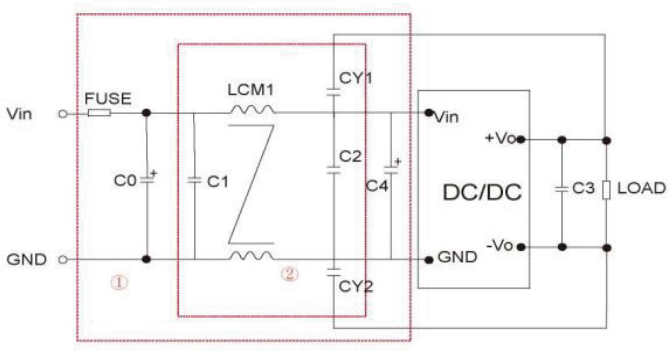
Recommended Component Parameters			
Vin	12VDC	24VDC	48VDC
Cin	330μF	100μF	10-47μF
Cout	10μF		

EMC Solutions - Recommended Circuits

- 3.3VDC、5VDC Output (Figure 3)



- Other Output (Figure 4)



Note: Part ① of Figure 3 is used for EMC testing; Part 2 is used for EMI filtering and can be selected according to requirements.

EMI Recommended Parameter Table			
Vin	12V	24V	48V
FUSE	Select based on the actual input current of the customer		
C0、C4	470μF/50V	330μF/50V	330μF/100V
C1、C2	10F/25V	10F/50V	10μF/100V
C3	Refer to the Cout in Fig.2		
LCM1	1.4-1.7mH		
LDM1	10uH		
CY1、CY2	1nF/2KV		

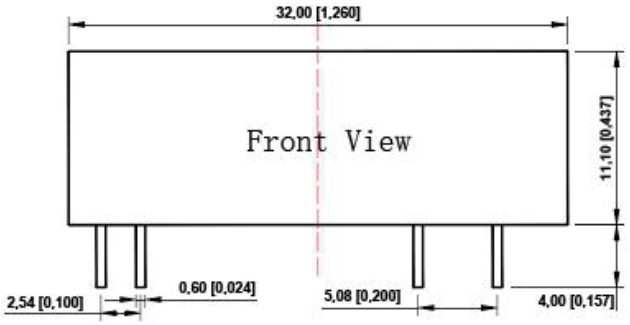
Application circuit description:

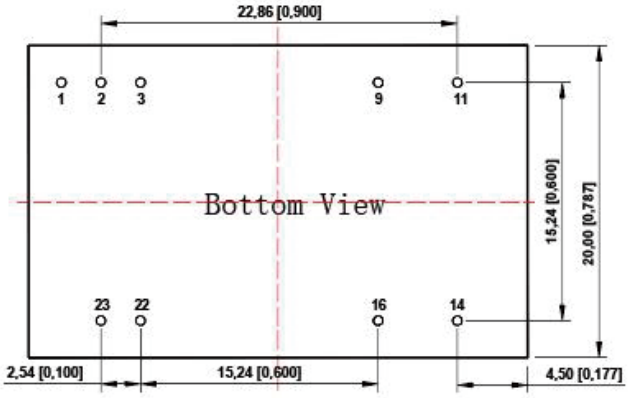
1. All DC/DC converters in this series are tested according to the recommended testing circuit (Figure 2) before leaving the factory.

2. If further reduction of input and output ripple is required, the input and output external capacitors C0, C1, C2, C3 , C4 can be increased or a capacitor with a small series equivalent impedance value can be selected.

Dimensions and Recommended Layout

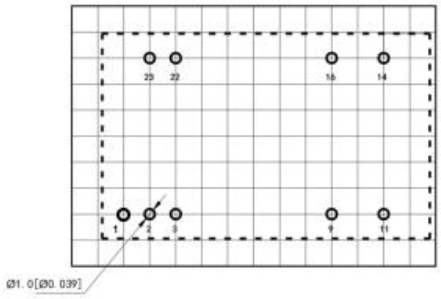
- Dimensions





Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

- PCB Printing Layout



The grid distance is 2.54mm x2.54mm

Pin Definition Table

Pin	Single	Dual
1	CTRL	CTRL
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	NC
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin
NC： Pin to be isolated from circuity		

Note

- The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
- It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
- Suggested dual output module load imbalance: ≤ ± 5%. If it exceeds ± 5%, it cannot be guaranteed that the product performance meets all performance indicators in this manual;
- The maximum capacitive load is tested within the input voltage range and under full load conditions;
- Unless otherwise specified, all indicators in this manual are measured at Ta=25°C, humidity<75% RH, nominal input voltage, and output rated load;
- All indicator testing methods in this manual are based on our company's corporate standards;
- Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
- Product specifications are subject to change without prior notice.