TPS-HVQ40 Series
DCDC Converter

Product Feature

- Package Type: 1"X 1"
- Operating temperature range: -40℃ - +105℃
- Isolation voltage: 1500VDC
- High efficiency up to 92%
- The mechanism has input undervoltage protection, output short circuit protection and over current protection
- 4:1 Ultra-wide input voltage range
- Fields of application: Power, industrial control, communications,Internet of Things, automotive, etc

Selection Guide

Part No.	Input Voltage (VDC)		Output Voltage (VDC)	Output Current (mA)	Full Load Efficiency% (Typ.)	Capacity load Max (µF)
	Nominal(Range)	Maximum				
TPS-HVQ4024S03V3	24 (9-36)	40	3.3	10000/0	89	10000
TPS-HVQ4024S05V3			5	8000/0	91	10000
TPS-HVQ4024S12V3			12	3333/0	91	2700
TPS-HVQ4024S15V3			15	2667/0	92	1680
TPS-HVQ4024S24V3			24	1667/0	91	680
TPS-HVQ4048S03V3	48 (18-75)	80	3.3	8000/0	89	10000
TPS-HVQ4048S05V3			5	8000/0	91	10000
TPS-HVQ4048S12V3			12	3333/0	92	2700
TPS-HVQ4048S15V3			15	2667/0	92	1680
TPS-HVQ4048S24V3			24	1667/0	91	680
TPS-HVQ4048S28V3			28	1428/0	91	680

Input Specifications

Item	Operating Conditions		Min .	Typ.	Max .	Unit
Input Current (full load/no load)	24VDC nominal input series	3.3VDC	--	1894/60	1938/100	mA
		5VDC	--	1852160	1894/100	
		Other	--	1852/12	1894/25	
	48VDC nominal input series	3.3VDC	--	958/60	998/100	
		5VDC	--	926/60	958/100	
		Other	--	926/12	947/25	
Reflected Ripple Current	Rated input voltage		--	60	--	
Impulse Voltage	24VDC nominal input series		-0.7	--	50	VDC
	48VDC nominal input series		-0.7	--	100	
Starting Voltage	24VDC nominal input series		--	--	9	
	48VDC nominal input series		--	--	18	
Input Under voltage Protection	24VDC nominal input series		5.5	7.5	--	
	48VDC nominal input series		12.0	15.5	--	
Ctrl	turn off module		Connected GND or (0-1.2V)			
	turn off module		No connected or (3.5-12V)			
	Input current when off		--	5	8	mA
Input Filter			PI filter			

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% load	--	±1.0	±3.0	%
Linear Regulation	Vin=Min. to Max. @Full Load	--	±0.2	±0.5	%
Load Regulation	5%-100% load	--	±0.5	±1.0	%
Ripple & Noise	20MHz bandwidth, 5%-100% load	--	100	200	mVp-p
Transient Recovery Time	25% Load Step Change,nominal input voltage	--	300	500	μs
Transient Response		--	±5	±8	%
Temperature Coefficient	Full Load	--	±0.01	±0.02	%/°C
Trim		--	±10.0	--	%
Over voltage Protection	input voltage range	110	140	--	%
Over current Protection		110	140	--	%
Short-circuit Protection		Continuous, Self-Recovery			

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, test time 1 minute	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,Fig 2	-40	--	+105	°C
Storage Temperature		-50	--	+125	°C
Storage Humidity	Non-condensing	--	--	95	%RH
Soldering Profile	1.5mm from case for 10 sec	--	--	300	°C
Switching Frequency	Full load, nominal input voltage	--	330	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K Hours

Mechanical Specifications

Case Material	Aluminum alloy
Package Dimensions	25.4mm * 25.40mm * 12.00 mm
Weight	21.00g(Typ.)
Cooling Method	Free air convection

EMC Characteristics

EMI	CE	EN55032, FCC part 15	CLASS B
	RE		
EMS	ESD	EN61000-4-2 Air ±8kV,Contact ±6kV	Perf. Criteria B
	RS	EN61000-4-3 10V/m	Perf. Criteria A
	EFT	EN61000-4-4 ±2kV	Perf. Criteria B
	Surge	EN61000-4-5 ±1kV	Perf. Criteria B
	CS	EN61000-4-6 3Vrms	Perf. Criteria A

Typical Characteristic Curves
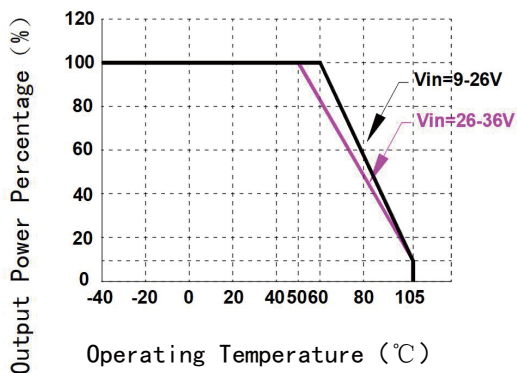
Temperature Derating (HVQ40-24S03/05)

Fig 1-1

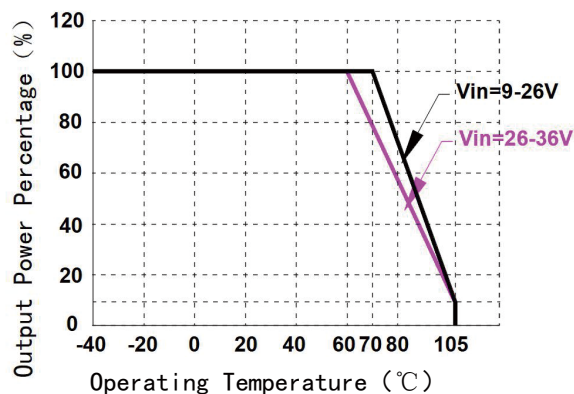Temperature Derating (HVQ40-24S12/24)
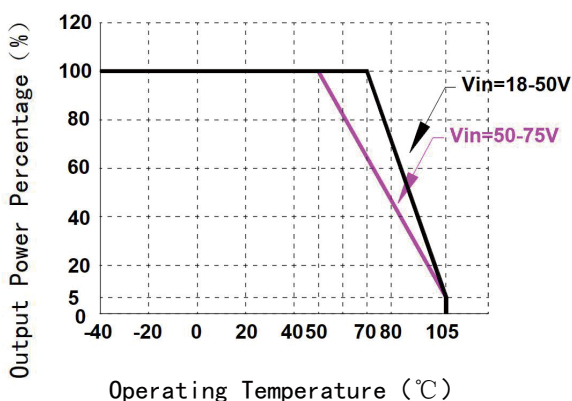

Fig 1-2

Temperature Derating (HVQ40-48S03/05V)
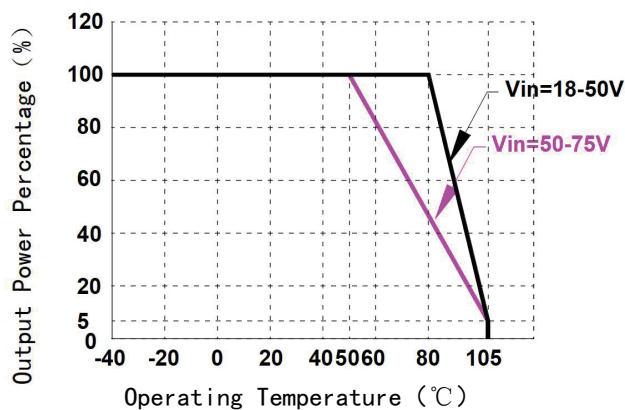

Fig 2-1

Temperature Derating (HVQ40-48S12/15)

Fig 2-2

Load VS Vin (24V)

Input Voltage(V)
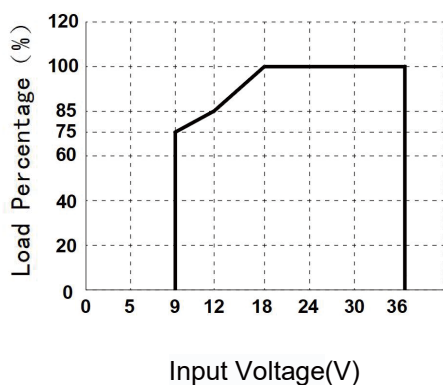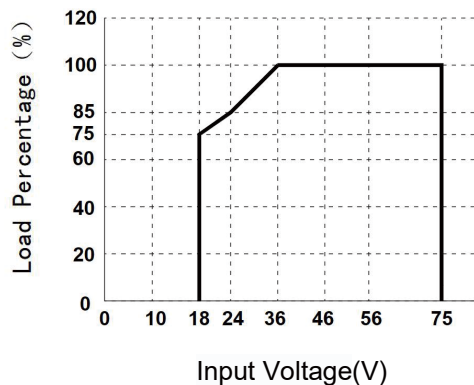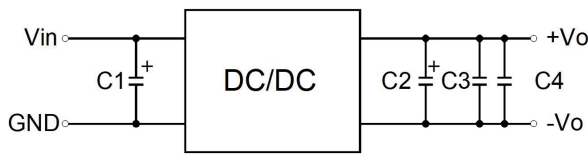
Load VS Vin (48V)

Input Voltage(V)

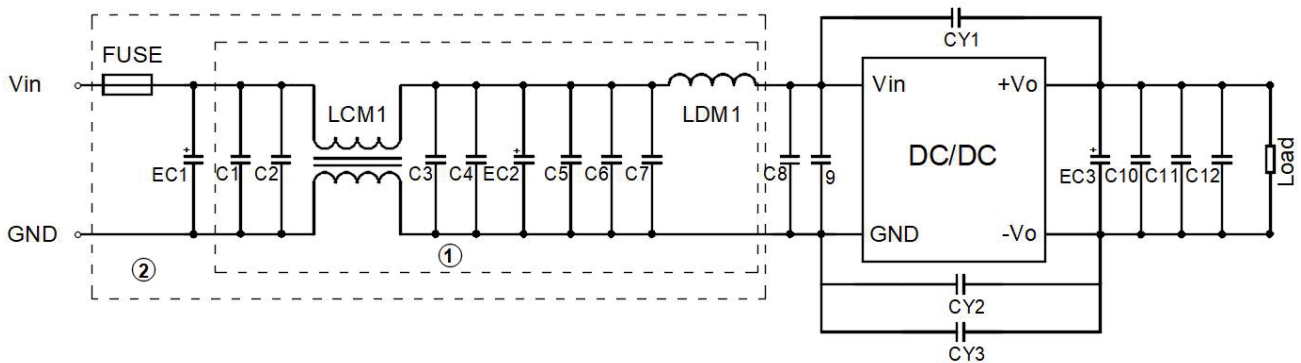## Typical Circuit Design And Application

• Figure 3

Recommended Capacitive Load Value Table

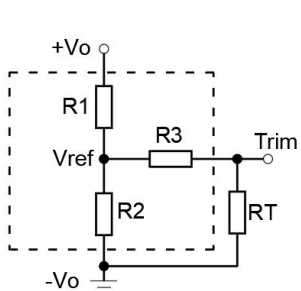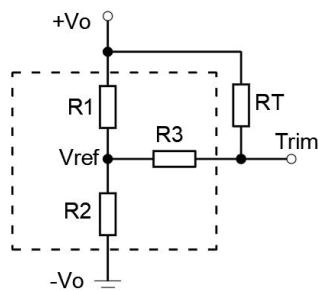| Vin(VDC)	C1(μF)	C2(μF)	C3(μF)	C4(μF)
24	100	470	10	0.1
48			22	10

• Figure 4

EMI Recommended Component Parameters

Vin (VDC)	FUSE	CEC1 (μF)	EC2 (μF)	C1,C2,C3, C4,C5	LCM1 (mH)	LDM1 (μH)	C8,C9 (μF)	CY2	CY1, CY3	EC3 (μF)	C10 (μF)	C11,C12
24	Choose according to actual input	1000	220	4.7	0.32	2.2	--	222	2200	470	10	1μF
48		680	100	4.7	10	6.8	4.7	102	2200	470	22	10μ

• Trim up

• Trim down

Trim resistor connections (dashed line shows internal resistor network)

Trim Recommended Component Parameters

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	10	6.064	13.622	1. 24
5	2.4	2. 344	13.622	2.5
12	8.2	2.153	17. 346	2. 5
15	12	2.388	21.016	2.5
24	10	1. 158	10.714	2.5
28	10	0. 979	13. 04	2.5

$$Up: \ Rt = \frac{nR2}{R2 - n} - R3 \qquad n = \frac{Vref}{Vo - Vref} * R1$$

$$Down: Rt = \frac{nR1}{R1 - n} - R3 \qquad n = \frac{Vo - Vref}{Vref} * R2$$

Note

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.
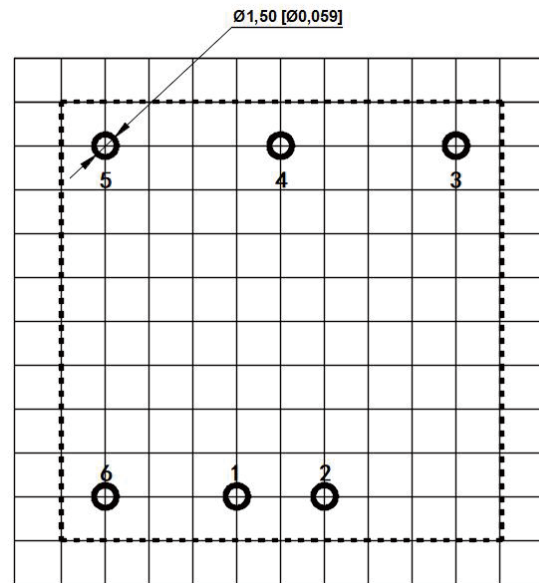
Dimensions and Recommended Layout

• Dimensions

Front view

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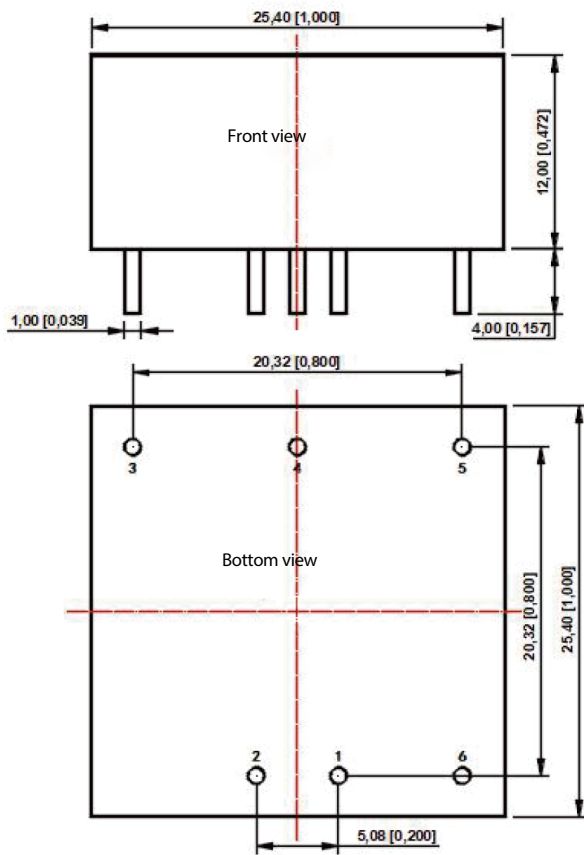
Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

• PCB Printing Layout & Pin Definition Table

The grid distance is 2.54*2.54mm

Pin Definition Table	
Pin	Function
1	GND
2	Vin
3	+Vo
4	Trim
5	-Vo
6	Ctrl

Note

1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;

2. The maximum capacitive load is tested under the input voltage range and full load condition;

3. Unless otherwise stated, all indexes in this manual are measured at Ta=25℃, humidity <75%RH, nominal input voltage and rated output load;

4. All index testing methods in this manual are based on the enterprise standards of the company;

5. Our company can provide product customization, specific needs can directly contact our technical staff;