TPS-HCT1 Series
DC/DC Converter

Product Feature

- Package Type: SMD
- Operating temperature range: -40℃ - +105℃
- Isolation voltage: 1500VDC
- High efficiency up to: 88%(Type)
- No-load input current as low as 5mA
- Fields of application: Electricity, Industrial control, Communication, Internet of Things, Automotive.

Selection Guide

Part No.	Input Voltage (VDC) Nominal(Range)	Output Voltage (VDC)	Output Current (mA)Min.	Output Current (mA)Max.	Full Load Efficiency%(Typ.)	Capacity Load (μF) Max.
TPS-HCT103S03	3.3 (2.97-3.63)	3.3	30	303	80	2400
TPS-HCT103S05	3.3 (2.97-3.63)	5	20	200	82	2400
TPS-HCT103S09	3.3 (2.97-3.63)	9	11	111	83	1200
TPS-HCT103S12	3.3 (2.97-3.63)	12	8	84	84	820
TPS-HCT105S03	5 (4.5-5.5)	3.3	30	303	82	3000
TPS-HCT105S05	5 (4.5-5.5)	5	20	200	85	3000
TPS-HCT105S09	5 (4.5-5.5)	9	11	111	86	1200
TPS-HCT105S12	5 (4.5-5.5)	12	8	84	86	820
TPS-HCT105S15	5 (4.5-5.5)	15	7	67	86	680
TPS-HCT105S24	5 (4.5-5.5)	24	4	42	87	330
TPS-HCT112S03	12 (10.8-13.2)	3.3	30	303	82	3000
TPS-HCT112S05	12 (10.8-13.2)	5	20	200	85	3000
TPS-HCT112S09	12 (10.8-13.2)	9	11	111	86	1200
TPS-HCT112S12	12 (10.8-13.2)	12	8	84	86	820
TPS-HCT112S15	12 (10.8-13.2)	15	7	67	86	680
TPS-HCT112S24	12 (10.8-13.2)	24	4	42	88	330
TPS-HCT115S05	15 (13.5-16.5)	5	20	200	86	3000
TPS-HCT115S12	15 (13.5-16.5)	12	8	84	87	820
TPS-HCT115S15	15 (13.5-16.5)	15	7	67	88	680
TPS-HCT124S03	24 (21.6-26.4)	3.3	30	303	82	3000
TPS-HCT124S05	24 (21.6-26.4)	5	20	200	85	3000
TPS-HCT124S09	24 (21.6-26.4)	9	11	111	86	1200
TPS-HCT124S12	24 (21.6-26.4)	12	8	84	87	820
TPS-HCT124S15	24 (21.6-26.4)	15	7	67	87	680
TPS-HCT124S24	24 (21.6-26.4)	24	4	42	88	330

Each Output

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage (full load/no load)	3.3VDC Input	--	370/6	--/17	mA
	5VDC Input	--	230/5	--/15	
	12VDC Input	--	99/4	--/15	
	15VDC Input	--	78/3	--/15	
	24VDC Input	--	51/3	--/15	
Reflected Ripple Current		--	15	--	
Impulse Voltage	3.3VDC Input	-0.7	--	9	VDC
	5VDC Input	-0.7	--	15	
	12VDC Input	-0.7	--	18	
	15VDC Input	-0.7	--	21	
	24VDC Input	-0.7	--	21	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage			See Envelope Curve Figure 1			
Linear Regulation	Input Voltage Variation ±1%	3.3VDC Output	--	--	±1.5	%
		OtherS Output	--	--	±1.2	
Load Regulation	10% - 100% load	3.3VDC Output	--	15	--	%
		5VDC Output	--	10	--	
		9VDC Output	--	9	--	
		12VDC Output	--	8	--	
		15VDC Output	--	7	--	
		24VDC Output	--	6	--	
Ripple & Noise	20MHz bandwidth (peak to peak)		--	60	120	mV
Temperature Coeffcient	Full Load		--	--	±0.03	%/°C
Short-circuit Protection			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	--	20	--	pF
Operating Temperature	Derating when operating temperature≥85℃(See Figure 2)	-40	--	105	℃
Storage Temperature		-55	--	125	℃
Case Temperature Rise	Ta=25℃, Input nominal, output full load	--	25	--	℃
Storage Humidity	Non-condensing	--	--	95	%RH
Reflow Soldering Temperature	Peak temp.≤245℃, maximum duration time ≤60s over 217℃				
Switching Frequency	Full Load, Nominal Input Voltage	--	220	--	KHz
MTBF	MIL-HDBK-217F@25℃	>3500Kh			

Mechanical Specifications

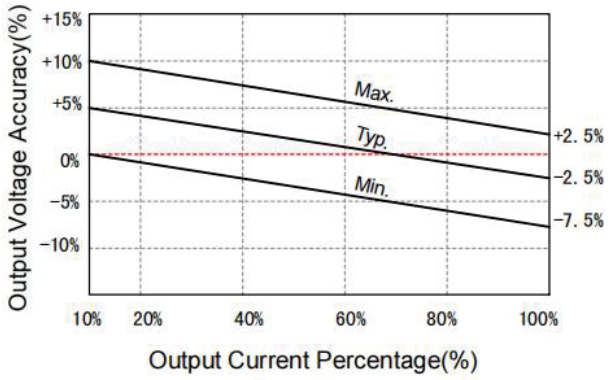
Case Material	Black plastic; flame-retardant and heat-resistant)UL94V-0 rated)
Package Dimensions	13.50 x 11.10 x 7.250mm
Weight	1.7g(Typ.)
Cooling Method	Free air convection

EMC Characteristics

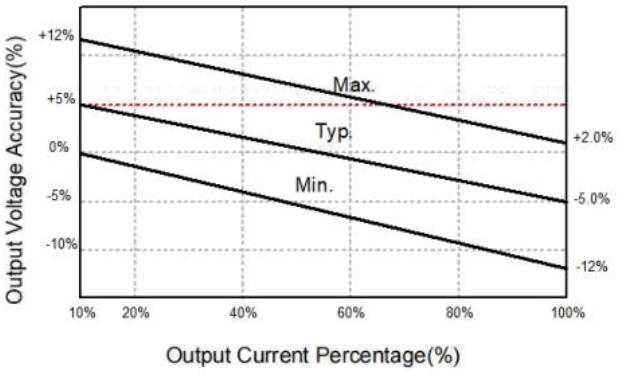
EMI	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
EMS	ESD	IEC/EN61000-4-2 Air±8KV,Contact ±4KV	Perf. Criteria B

Typical Characteristic Curves

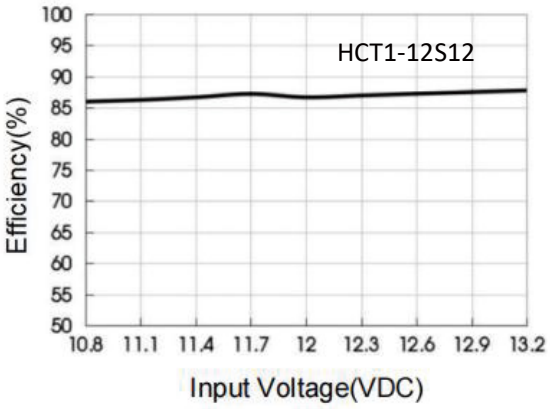
Output Regulation Curve (Other Output) Figure 1-1



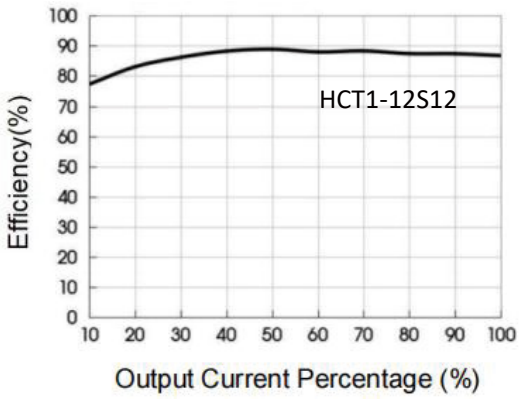
Output Regulation Curve (3.3VDC Output) Figure 1-2



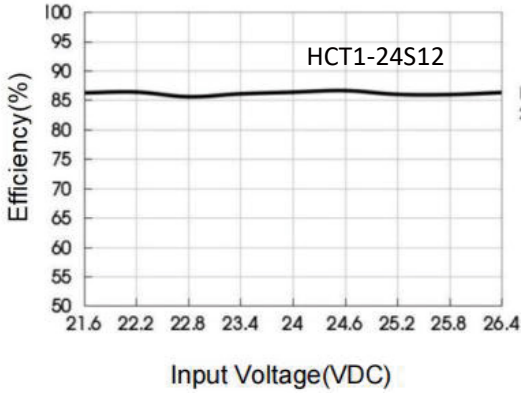
Efficiency VS Input Voltage Curve (full load)



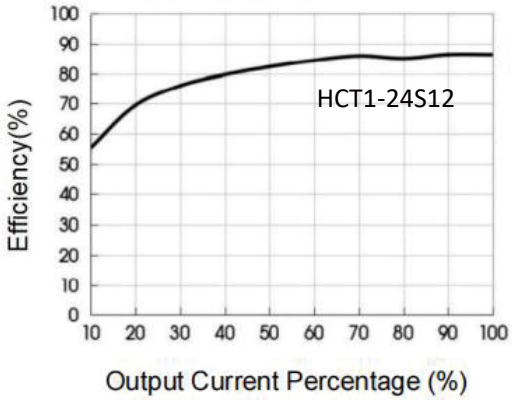
Efficiency VS Output Load (Vin=12V)



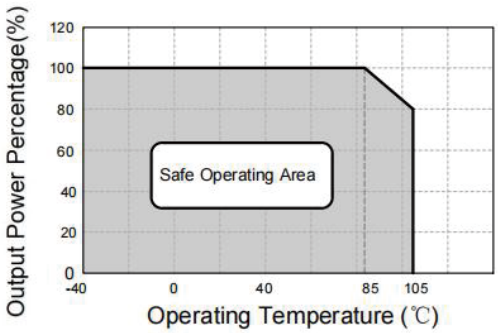
Efficiency VS Input Voltage Curve (full load)



Efficiency VS Output Load (Vin=12V)

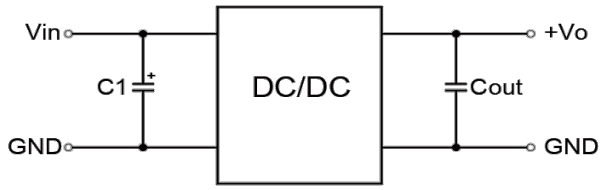


Temperature Derating Curve (Figure 2)



Typical Circuit Design and Application

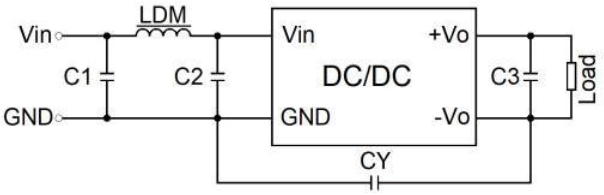
- Application circuit (Figure 3)



Recommended Capacitive Load Value Table

Vin(VDC)	Cin(μF)	Vo(VDC)	Cout(μF)
3.3/5	10	3.3/5	10
12	4.7	9	4.7
15	2.2	12	2.2
24	1	15	1
--	--	24	0.47

- Application circuit (Figure 4)



EMI Recommended Parameter Table

EMI	C1, C2	4.7μF/50V
	C3	Refer to the Cout parameter in Figure 3
	CY	270pF / 2kV
	LDM	6.8μH

- 1. Typical application

To further reduce input and output ripple, a capacitor filtering network can be connected at the input and output terminals.The application circuit is shown in Figure 3.However, care should be taken to select a suitable filter capacitor. If the capacitance is too large, it is likely to cause start-up problems. For each output, the recommended capacitive load values are shown in "Recommended Capacitive Load Value Table" for safe and reliable operation.

- 2.EMC typical recommended circuit

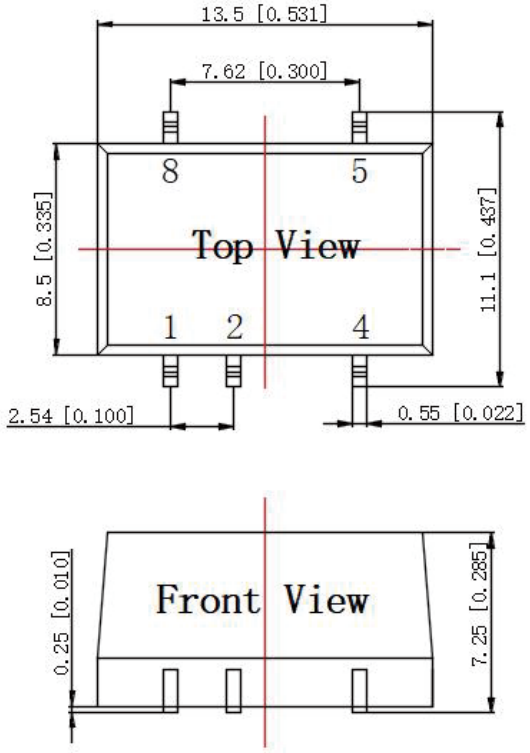
See Figure 4.

- 3.Output load requirements.

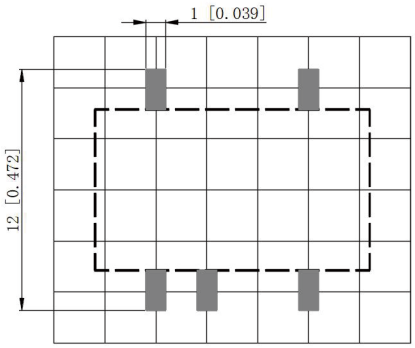
In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power actually used is greater than or equal to 10% of the rated power).

Dimensions and Recommended Layout

- Dimensions



- PCB Printing Layout



The grid distance is 2.54mm x2.54mm

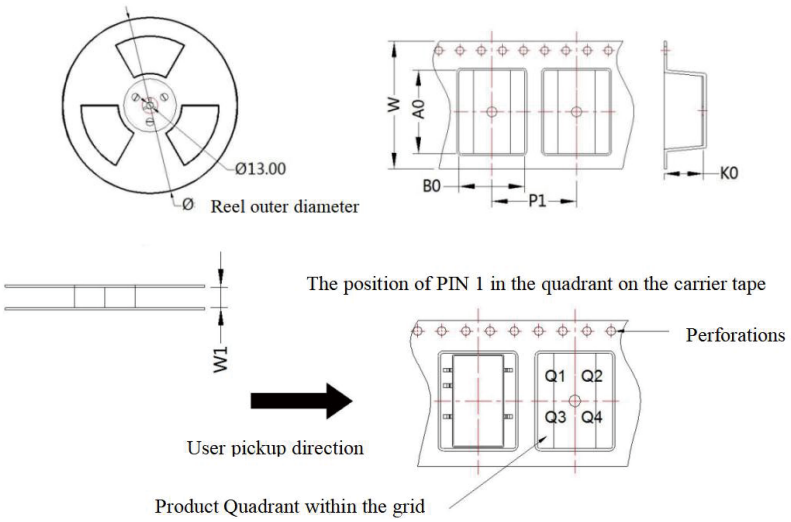
Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

Pin Definition Table

Pin	Function
1	GND
2	Vin
4	-Vo
5	+Vo
8	NC
NC: cannot be connected to any external circuit	

Packing diagram

- Carrier tape packaging diagram



Part Number	Package Type	Pin	MPQ	Reel Outer Diameter(mm)	Reel width W1(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
HCT1-S	SDM	5	500	330.0	24.5	13.4	11.7	7.5	16.0	24.0	Q1

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;
- 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.