TPS-HCFS1 Series
DC/DC Converter

Product Feature

- Medical Grade DC/DC Converter
- Package Type: SIP6
- Operating temperature range: -40℃ - +85℃
- Isolation voltage: 4200VAC/6000VDC
- High efficiency up to: 85% (Type)
- Compliant with standards: international standard pin method
- Fields of application: Mmedical, Power, Industrial control, Communication, Internet of Things, Automotive, etc

Product selection table

Part No.	Input Voltage (VDC)	Output			Full Load Efficiency% (Min./Typ.)	Capacitive Load (μF) Max.
	Nominal (Range)	Voltage (VDC)	Current Min.(mA)	Current Max.(mA)		
TPS-HCFS103S03	3.3 (2.97-3.63)	3.3	0	303	79	2400
TPS-HCFS103S05	3.3 (2.97-3.63)	5	0	200	81	2400
TPS-HCFS103S12	3.3 (2.97-3.63)	12	0	84	82	680
TPS-HCFS105S03	5 (4.5-5.5)	3.3	0	303	80	2400
TPS-HCFS105S05	5 (4.5-5.5)	5	0	200	84	2400
TPS-HCFS105S09	5 (4.5-5.5)	9	0	111	84	1000
TPS-HCFS105S12	5 (4.5-5.5)	12	0	84	85	680
TPS-HCFS105S15	5 (4.5-5.5)	15	0	85	85	680
TPS-HCFS112S03	12 (10.8-13.2)	3.3	0	82	82	2400
TPS-HCFS112S05	12 (10.8-13.2)	5	0	85	85	2400
TPS-HCFS124S03	24 (21.6-26.4)	3.3	0	81	81	2400
TPS-HCFS124S05	24 (21.6-26.4)	5	0	85	85	2400

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no load)	3.3VDC Input	--	380/4	--/10	mA
	5VDC Input	--	242/4	--/10	
	12VDC Input	--	80/6	--/12	
	24VDC Input	--	61/6	--/14	
Reflected Ripple Current		--	20	--	mA
Impulse Voltage	3.3VDC Input	-0.7	--	7	VDC
	5vDc Input	-0.7	--	9	
	12VDC Input	-0.7	--	18	
	24VDC Input	-0.7	--	30	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			See Envelope CurveFigure 1			
Linear Regulation Rate	Input Voltage Variation ±1%	3.3VDC output	--	±1.5	--	%
		Others output	--	±1.2	--	
Load Regulation Rate	10% - 100% load	3.3VDC output	--	15	--	%
		5VDC output	--	10	--	
		9VDC output	--	8	--	
		12VDC output	--	7	--	
		15VDC output	--	6	--	
		24VDC output	--	5	--	
Ripple & Noise	20MHz Bandwidth (peak-peak)		--	60	150	mV
Temperature Drift Coefficient	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 currentless than 1mA	6000	--	--	VDC
Insulation Resistance	Input-output, insulated voltage 500VDC	10000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature>85°C, (See Figure 2)	-40	--	85	°C
Storage Temperature		-55	--	105	°C
Case Temperature Rise	Ta=25°C,nominal input, output load	--	25	--	°C
Storage Humidity	Non-condensing	--	--	95	%RH
Pin welding can withstand thehighest temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	°C
Switching Frequency	Full load, nominal input voltage	--	220	--	kHz
MTBF	MIL-HDBK-217F@25°C	>3500kh			

Mechanical Specifications

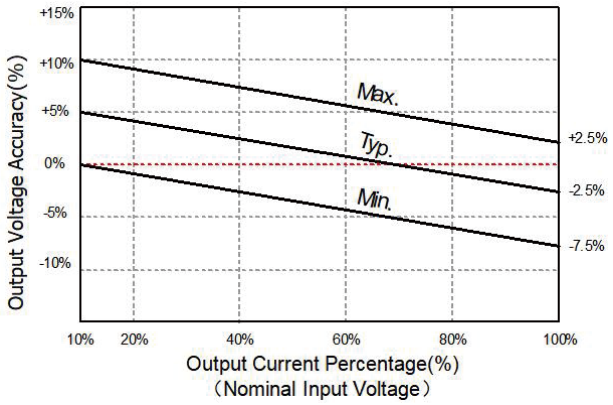
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0 rated)
Package Dimensions	19.60 x 6.00 x 10.10 mm
Weight	1.6g (Typ.)
Cooling Method	Free air convection

EMC Specifications

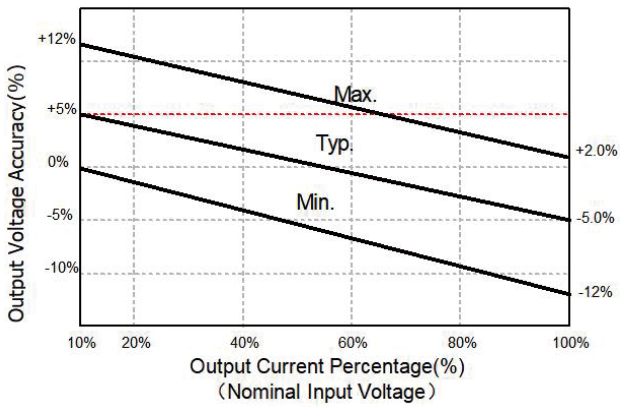
EMI	CE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
	RE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
EMS	ESD	IEC/EN61000-4-2 Contact ± 6KV	Perf. Criteria B

Typical Characteristic Curves

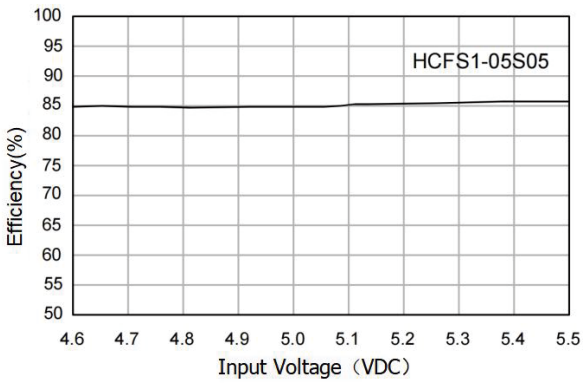
Output Regulation Curve（Figure 1-1）



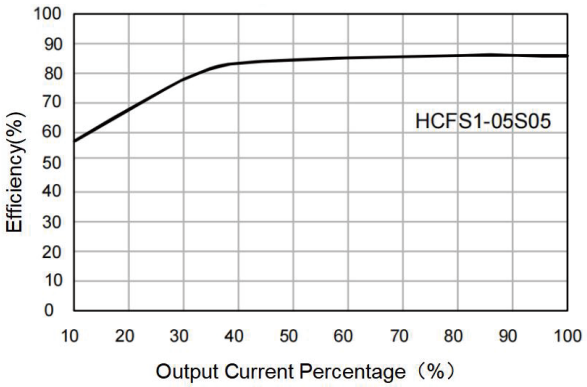
Output Regulation Curve 3.3Voutput（Figure 1-2）



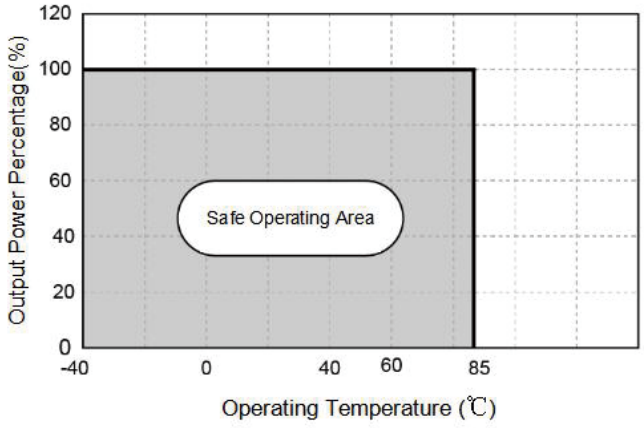
Efficiency VS Input Voltage Curve（full load）



Efficiency VS Output Load（Vin=5V）

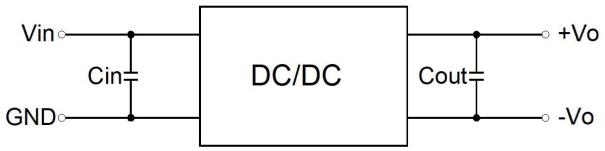


Temperature Derating Curve（Figure 2）



Typical Circuit Design and Application

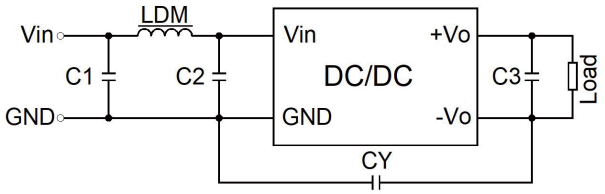
Application circuit（Figure 3）



Recommended Capacitive Load Value Table

Vin	Cin	Vo	Cout(μF)
3.3/5VDC	4.7μF/16V	3.3/5VDC	10
12VDC	2.2μF/25V	9VDC	4.7
15VDC	2.2μF/25V	12VDC	2.2
24VDC	1.0μF/50V	15VDC	1.0
--	--	24VDC	0.47

EMC Recommended Circuit（Figure 4）



EMI Recommended Parameter Table

EMI	Vin	3.3/5/12/15/24
	C1、C2	4.7μF/50V
	C3	Refer to the Cout parameter in Figure 3
	CY	1nF/500VAC
	LDM	6.8μH

1.Typical applications

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.

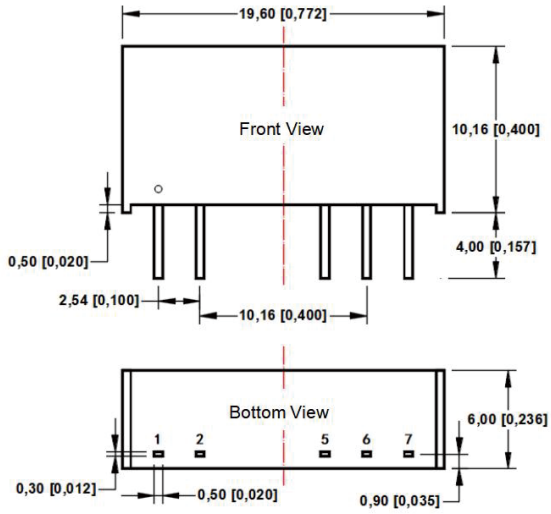
2.EMC typical recommended circuit See Figure 4

3.Output load requirements

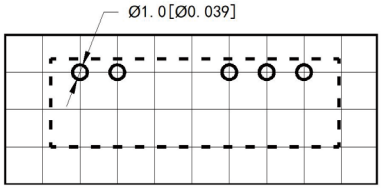
In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power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

Dimensions and Recommended Layout

Dimensions



PCB Printing Layout



Grid size: 2.54*2.54mm

Pin Function Table

Pin	1	2	6	7
Function	Vin	GDN	-Vo	+Vo

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

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.