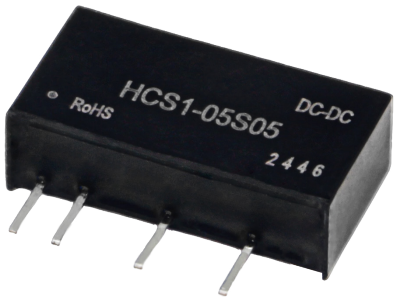
TPS-HCS1 Series
DC/DC Module Power Supply



Product Feature

- Packaging form: SIP 6
- Operating temperature: - -40℃ - + 85℃
- Isolate voltage: 3,000 VDC
- Full-load efficiency: 89% (typical)
- Compliance standards: international standard
- Application fields: electric power, industrial control, communication, IoT, automobile, etc

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-HCS103S03	3.3(2.97-3.63)	3.3	0	303	78/82	4000
TPS-HCS103S05	3.3(2.97-3.63)	5	0	200	80/83	4000
TPS-HCS103S09	3.3(2.97-3.63)	9	0	111	81/84	2000
TPS-HCS103S12	3.3(2.97-3.63)	12	0	84	82/85	1000
TPS-HCS105S03	5(4.5-5.5)	3.3	0	303	80/83	4000
TPS-HCS105S05	5(4.5-5.5)	5	0	200	84/86	4000
TPS-HCS105S09	5(4.5-5.5)	9	0	111	84/86	2000
TPS-HCS105S12	5(4.5-5.5)	12	0	84	85/88	1000
TPS-HCS105S15	5(4.5-5.5)	15	0	67	85/88	680
TPS-HCS105S24	5(4.5-5.5)	24	0	42	86/89	560
TPS-HCS105D05	5(4.5-5.5)	±5	0	±100	84/86	#2000
TPS-HCS105D09	5(4.5-5.5)	±9	0	±56	86/86	#1000
TPS-HCS105D12	5(4.5-5.5)	±12	0	±42	85/88	#560
TPS-HCS105D15	5(4.5-5.5)	±15	0	±34	85/88	#220
TPS-HCS112S03	12 (10.8-13.2)	3.3	0	303	84/84	4000
TPS-HCS112S05	12 (10.8-13.2)	5	0	200	82/86	4000
TPS-HCS112S09	12 (10.8-13.2)	9	0	111	84/87	2000
TPS-HCS112S12	12 (10.8-13.2)	12	0	84	84/87	1000
TPS-HCS112S15	12 (10.8-13.2)	15	0	67	86/88	680
TPS-HCS112S24	12 (10.8-13.2)	24	0	42	86/89	560
TPS-HCS112D03	12 (10.8-13.2)	±3.3	0	±152	81/84	#2000
TPS-HCS112D05	12 (10.8-13.2)	±5	0	±100	82/86	#2000
TPS-HCS112D09	12 (10.8-13.2)	±9	0	±56	84/87	#1000
TPS-HCS112D12	12 (10.8-13.2)	±12	0	±42	84/87	#560
TPS-HCS112D15	12 (10.8-13.2)	±15	0	±34	86/88	#220
TPS-HCS115S05	15(13.5-16.5)	5	0	200	82/86	4000
TPS-HCS115S09	15(13.5-16.5)	9	0	111	84/87	2000
TPS-HCS115S12	15(13.5-16.5)	12	0	84	84/87	1000
TPS-HCS115S15	15(13.5-16.5)	15	0	67	86/88	680

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.
HCS1-15D05	15(13.5-16.5)	±5	0	±100	82/86	#2000
HCS1-15D12	15(13.5-16.5)	±12	0	±42	84/87	#560
HCS1-15D15	15(13.5-16.5)	±15	0	±34	86/88	#220
HCS1-24S03	24 (21.6-26.4)	3.3	0	303	82/84	4000
HCS1-24S05	24 (21.6-26.4)	5	0	200	85/87	4000
HCS1-24S09	24 (21.6-26.4)	9	0	111	85/88	2000
HCS1-24S12	24 (21.6-26.4)	12	0	84	85/88	1000
HCS1-24S15	24 (21.6-26.4)	15	0	67	85/88	680
HCS1-24S24	24 (21.6-26.4)	24	0	42	86/89	560
HCS1-24D05	24 (21.6-26.4)	±5	0	±100	85/87	#2000
HCS1-24D09	24 (21.6-26.4)	±9	0	±56	85/88	#1000
HCS1-24D12	24 (21.6-26.4)	±12	0	±42	85/88	#560
HCS1-24D15	24 (21.6-26.4)	±15	0	±34	85/88	#220

Each Output

Input Specifications

Item	Working Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no load)	3.3VDC Input	--	370/3	390/15	mA
	5 the VDC Input	--	230/3	260/15	
	12 Out of the VDC Input	--	99/3	105/15	
	24 the VDC Input	--	51/3	85/15	
Reflected Ripple Current		--	15	--	
Impulse Voltage	3.3VDC Input	-0.7	--	5	VDC
	5 the VDC input	-0.7	--	9	
	12 Out of the VDC Input	-0.7	--	18	
	24 the VDC Input	-0.7	--	30	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

Output Specifications

Item	Working Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			See the Envelope Diagram (1)			
Linear Regulation Rate	Input voltage change of ± 1%	3.3VDC output	--	±1.5	±1.5	%
		Other output	--	±1.2	±1.2	
Load Regulation Rate	10% -100% load	3.3VDC output	--	10	--	%
		5VDC output	--	8	--	
		9VDC output	--	8	--	
		12VDC output	--	7	--	
		15VDC output	--	6	--	
		24VDC output	--	6	--	
Ripple & Noise	20 MHz bandwidth (peak-peak value)		--	45	120	mV
Temperature Coeffcient	Full Load		--	±0.03	±0.03	%/°C
Short-circuit Protection			Continuous, Self-Recovery			

General Specifications

Item	Working conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, the test time is 1 min, leakage current less than 1mA	3000	--	--	VDC
Insulation Resistance	Input-output, insulation voltage of 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input- -output, 100KHz/0.1V	--	20	--	pF
Working Temperature	Temperature ⩾85℃ derating (see Figure 2)	-40	--	105	℃
Storage Temperature		-55	--	125	℃
Case Temperature Rise During Operation	Ta=25℃, input nominal, output full load	--	25	--	℃
Storage Humidity	No condensation	--	--	95	%RH
Lead Soldering Temperature Tolerance	The solder joint is 1.5mm from the shell in 10 seconds	--	--	300	℃
Switching Frequency	Full load, and the nominal input voltage	--	220	--	KHz
Average Time Failure Time (MTBF)	MIL-HDBK-217F@25℃	>3500Kh			

Mechanical Specifications

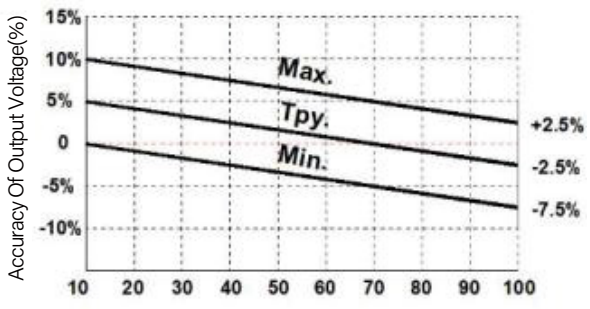
Case Material	Black flame retardant heat resistant plastic (UL 94 V-0)
Package Dimensions	19.60 x 6.00 x 10.10 mm
Weight	2.05g(Typ.)
Cooling Method	Natural air cooling

EMC Characteristics

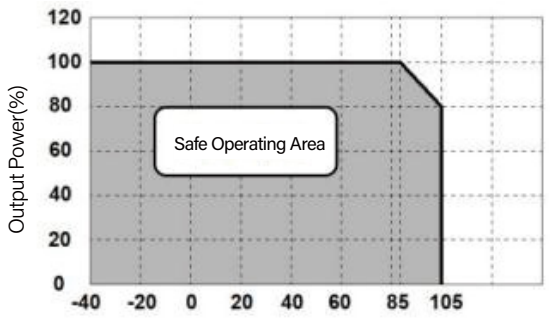
EMI	Conducted Emission	CISPR32/EN55032 CLASS B (See Figure 4 for the recommended circuit)	
	Radiated Disturbance	CISPR32/EN55032 CLASS B (See Figure 4 for the recommended circuit)	
EMS	ESD	IEC/EN61000-4-2 Contact ±8KV	Perf. Criteria B

Typical Characteristic Curves

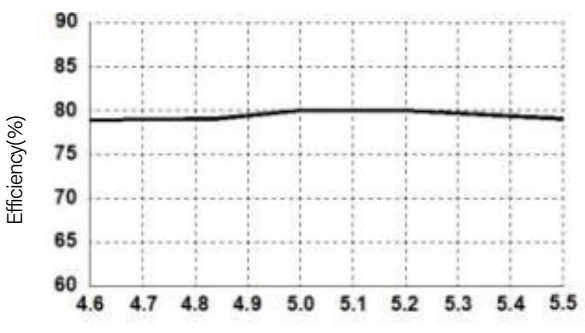
Output Regulation Curve (Other Output) Figure 1-1



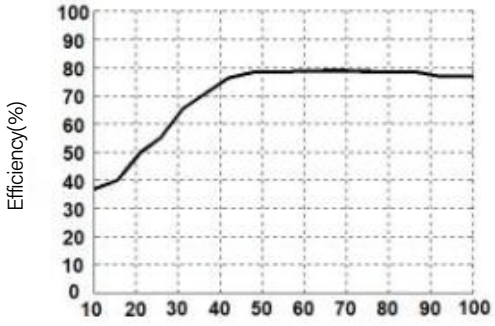
Output Regulation Curve (3.3VDC Output) Figure 1-2



Efficiency VS Input Voltage Curve (full load)

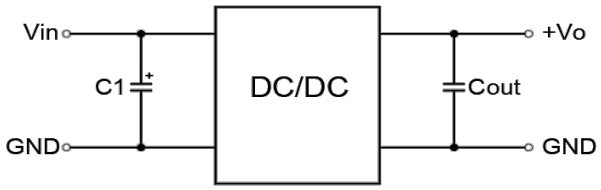


Efficiency VS Output Load (Vin=12V)



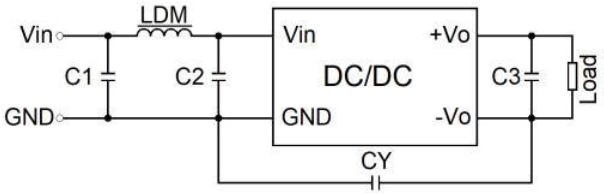
Typical Circuit Design and Application

- Application



Recommended Capacitive Load Value Table			
Vin	Cin	Vo	Cout
3.3/5VDC	4.7μF/16V	3.3/5VDC	10μF/16V
12VDC	2.2μF/25V	9VDC	4.7μF/16V
15VDC	2.2μF/25V	12VDC	2.2μF/25V
24VDC	1.0μF/50V	15VDC	1.0μF/25V
--	--	24VDC	0.47μF/50V

- Application circuit (Figure 4)



EMI Recommended Parameter Table		
EMI	C1	4.7μF /50V
	C2	4.7μF /50V
	C3	Refer to the Cout parameter in Figure 3
	CY	1000pF/2kV
	LDM	6.8μH

- 1. Typical application

If further reduction of input and output ripple is required, a capacitance filter network can be connected at the input and output end, and the application circuit is shown in Figure 3.

However, attention should be paid to choosing the appropriate filter capacitor. If the capacitor is too large, it is likely to cause startup problems. For each output, the recommended capacitive load values are shown in the table.

- 2.EMC typical recommended circuit

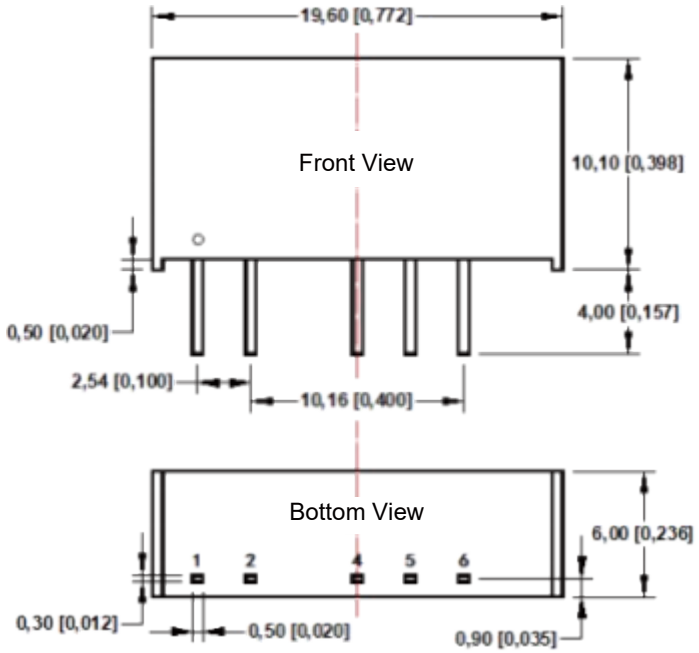
See Figure 4.

- 3.Output load requirements.

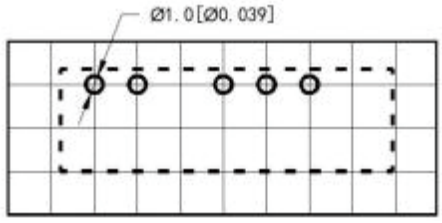
In order to ensure that the module can work efficiently and reliably, its output minimum load cannot be less than 10% of the rated load. If your power is really small, parallel a resistance at the output (the sum of the resistance consumption and the actual power is greater than 10% of the rated power).

Appearance Size, Recommended PCB Printing Layout

- Dimensions



- PCB printing



The distance size of the grid is 2.54x 2.54 mm

Pin Definition Table

Pin	Function (single path)	Function (dual road)
1	Vin	Vin
2	GND	GND
4	-Vo	-Vo
5	No Pin	COM
6	+Vo	+Vo

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

Remarks

- The input voltage shall not exceed the specified range value, otherwise it may cause permanent and unrecoverable damage;
- It is recommended to use the load above 5%. If the load is less than 5%, the ripple index of the product may exceed the specification, but it does not affect the reliability of the product;
- It is suggested that the load imbalance of dual output module is: ± 5%. If exceeding ± 5%, it cannot be guaranteed that the product performance meets all the performance indicators in this manual;
- The maximum capacitive load is tested in the input voltage range and under full load conditions;
- Except for special instructions, all indicators in this manual are measured at Ta=25℃, humidity <75% RH, nominal input voltage and output rated load;
- All the index test methods in this manual are based on the enterprise standards of the company;
- Our company can provide product customization, specific needs can be directly contact our technical personnel;
- Product specifications are subject to change without notice.