TPS-HCES1 Series
DCDC Module Power Supply

Product Feature

- Universal Input: 4:1
- Package Type: SIP7
- Operating temperature range: -40°C - +85°C
- Isolation voltage: 3000VDC
- High efficiency up to: 89% (Type)
- Equipped with input undervoltage protection, output short circuit protection, and overcurrent protection mechanisms

Selection Guide

Part No.	Input Voltage (VDC) Nominal (Range)	Out Voltage (VDC)	Out Current Max.(mA)	Full Load Efficiency % (Typ.)	Capacitive Load (μF) Max.
TPS-HCES103S03	3.3 (2.97-3.63)	3.3	303	82	4000
TPS-HCES103S05	3.3(2.97-3.63)	5	200	83	4000
TPS-HCES103S09	3.3 (2.97-3.63)	9	111	84	2000
TPS-HCES103S12	3.3 (2.97-3.63)	12	84	85	1000
TPS-HCES105S03	5 (4.5-5.5)	3.3	303	83	4000
TPS-HCES105S05	5 (4.5-5.5)	5	200	86	4000
TPS-HCES105S09	5(4.5-5.5)	9	111	86	2000
TPS-HCES105S12	5 (4.5-5.5)	12	84	88	1000
TPS-HCES105S15	5 (4.5-5.5)	15	67	88	680
TPS-HCES105S24	5 (4.5-5.5)	24	42	89	560
TPS-HCES105D03	5 (4.5-5.5)	±3.3	+152	84	#2000
TPS-HCES105D05	5 (4.5-5.5)	±5	±100	86	#2000
TPS-HCES105D09	5 (4.5-5.5)	±9	±56	86	#1000
TPS-HCES105D12	5 (4.5-5.5)	±12	±42	88	#560
TPS-HCES105D15	5 (4.5-5.5)	±15	±34	88	#220
TPS-HCES112S03	12 (10.8-13.2)	3.3	303	84	4000
TPS-HCES112S05	12 (10.8-13.2)	5	200	86	4000
TPS-HCES112S09	12 (10.8-13.2)	9	111	87	2000
TPS-HCES112S12	12 (10.8-13.2)	12	84	87	1000
TPS-HCES112S15	12 (10.8-13.2)	15	67	88	680
TPS-HCES112S24	12 (10.8-13.2)	24	42	89	560
TPS-HCES112D03	12 (10.8-13.2)	±3.3	±152	84	#2000
TPS-HCES112D05	12 (10.8-13.2)	±5	±100	86	#2000

Selection Guide

Part No.	Input Voltage (VDC) Nominal (Range)	Out Voltage (VDC)	Out Current Max.(mA)	Full Load Efficiency % (Typ.)	Capacitive Load (μF) Max.
HCES1-12D09	12 (10.8-13.2)	±9	±56	8	#560
HCES1-12D12	12 (10.8-13.2)	±12	±42	87	#220
HCES1-12D15	12 (10.8-13.2)	±15	±34	88	#220
HCES1-15S05	15(13.5-16.5)	5	200	86	2400
HCES1-15S09	15 (13.5-16.5)	9	111	87	1000
HCES1-15S12	15(13.5-16.5)	12	84	87	560
HCES1-15S15	15(13.5-16.5)	15	67	88	560
HCES1-15D05	15 (13.5-16.5)	±5	±100	86	#1000
HCES1-15D12	15 (13.5-16.5)	±12	±42	87	#220
HCES1-15D15	15 (13.5-16.5)	±15	±34	88	#220
HCES1-24S03	24 (21.6-26.4)	3.3	303	84	2400
HCES1-24S05	24 (21.6-26.4)	5	200	87	2400
HCES1-24S09	24(21.6-26.4)	9	111	88	1000
HCES1-24S12	24 (21.6-26.4)	12	84	88	560
HCES1-24S15	24 (21.6-26.4)	15	67	88	560
HCES1-24S24	24 (21.6-26.4)	24	42	89	220
HCES1-24D05	24(21.6-26.4)	±5	±100	87	#1000
HCES1-24D09	24 (21.6-26.4)	±9	±56	88	#560
HCES1-24D12	24 (21.6-26.4)	±12	±42	88	#220
HCES1-24D15	24 (21.6-26.4)	±15	±34	88	#220

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no load)	3.3VDC Input	--	370/3	--/15	mA
	5VDc Input	--	235/3	--/15	
	12VDC Input	--	99/3	--/15	
	15VDC Input	--	71/3	--/15	
	24VDC Input	--	51/3	--/15	
Reflected Ripple Current		--	15	--	
Impulse Voltage	3.3VDC Input	-0.7	--	5	VDC
	5vDc Input	-0.7	--	9	
	12VDC Input	-0.7	--	18	
	15VDC Input	-0.7	--	20	
	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	--	10	--	%
		5VDC output	--	8	--	
		12VDC output	--	6	--	
		15VDC output	--	6	--	
		24VDC output	--	6	--	
Ripple & Noise	20MHz Bandwidth (peak-peak)		--	45	100	mV
Temperature Drift Coefficient	Full Load		--	±0.03	--	%/℃
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	3000	--	--	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℃,nominal input, output load	--	25	--	℃
Storage Humidity	Non-condensing	--	--	95	%RH
Pin welding can withstand thehighest temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	℃
Switching Frequency	Full load, nominal input voltage	--	220	--	kHz
MTBF	MIL-HDBK-217F@25℃	>3500kh			

Mechanical Specifications

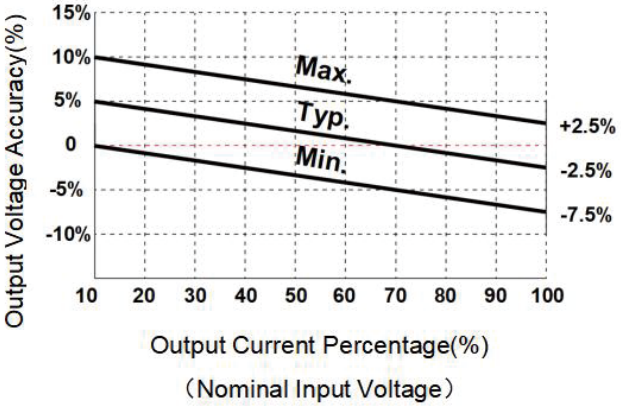
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0 rated)
Package Dimensions	19.65 x 6.0 x 10.16 mm
Weight	2.1g (Typ.)
Cooling Method	Free air convection

EMC Specifications

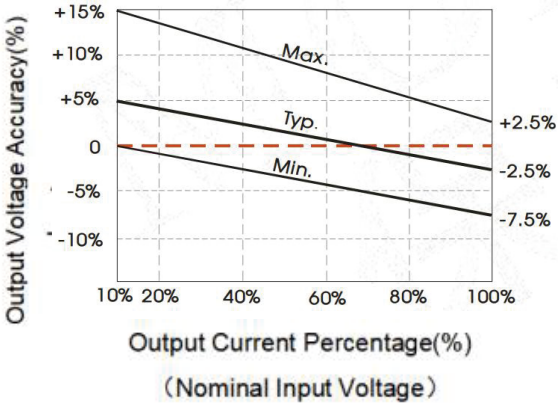
EMI	CE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
	RE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
EMS	ESD	IEC/EN61000-4-2 Contact ± 6KV	Perf. Criteria B

Typical Characteristic Curves

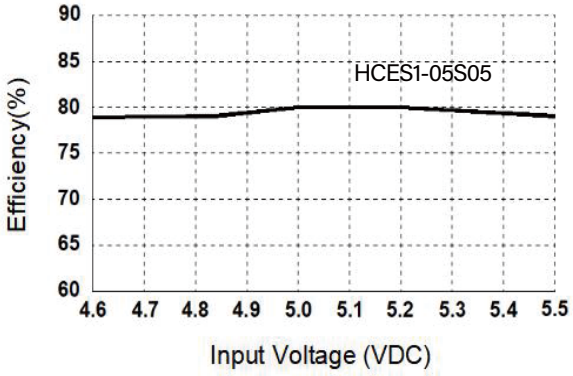
Output Regulation Curve（Figure 1-1）



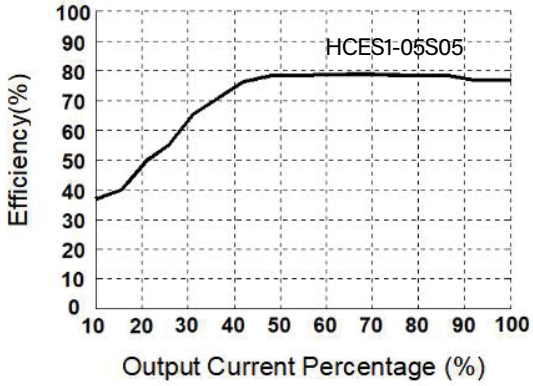
Output Regulation Curve 3.3Voutput（Figure 1-2）



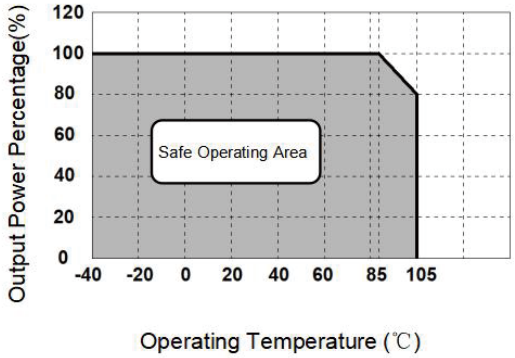
Efficiency VS Input Voltage Curve（full load）



Efficiency VS Output Load（Vin=5V）

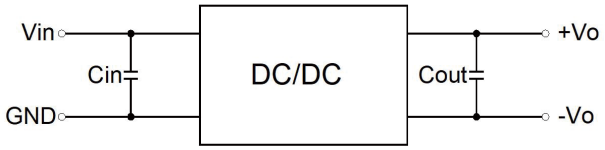


Temperature Derating Curve（Figure 2）



Typical Circuit Design and Application

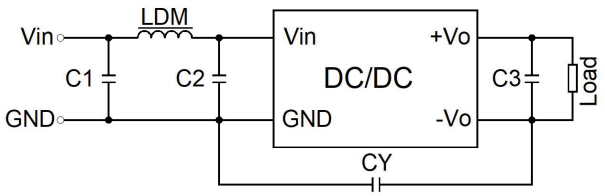
Application circuit（Figure 3）



Recommended Capacitive Load Value Table

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

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 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.

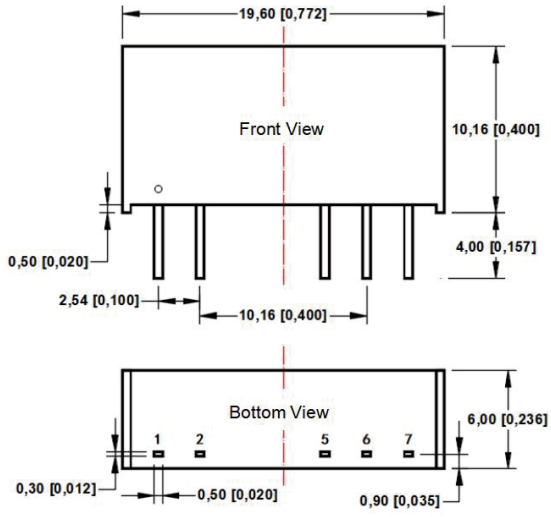
2.EMC typical recommended circuit See Figure 4

3.Output load requirements

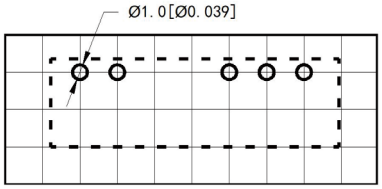
In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power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

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

Pin Function Table

Pin	1	2	5	6	7
Function (single)	Vin	GDN	-Vo	No Pin	+Vo
Function (double)	Vin	GDN	-Vo	COM	+Vo

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.