TPS-HCLS1 Series
DC-DC Converter

Product Feature

- Package Type: SIP4
- Operating temperature range: -40°C - 105°C
- Isolation voltage: 1500VDC
- High efficiency up to 89%
- Complies with standards: International standard pin method
- Fields of application: Power, industrial control, communications, 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-HCLS103S03	3.3 (2.97-3.63)	3.3	0	303	82	2400
TPS-HCLS103S05		5	0	200	83	2400
TPS-HCLS103S09		9	0	111	84	1000
TPS-HCLS103S12		12	0	84	85	560
TPS-HCLS105S03	5 (4.5-5.5)	3.3	0	303	82	2400
TPS-HCLS105S05		5	0	200	84	2400
TPS-HCLS105S09		9	0	111	86	1000
TPS-HCLS105S12		12	0	84	88	560
TPS-HCLS105S15		15	0	67	88	560
TPS-HCLS105S24		24	0	42	89	220
TPS-HCLS109S09	9 (8.1-9.9)	9	0	111	87	1000
TPS-HCLS112S03	12 (10.8-13.3)	3.3	0	303	84	2400
TPS-HCLS112S05		5	0	200	88	2400
TPS-HCLS112S09		9	0	111	87	1000
TPS-HCLS112S12		12	0	84	89	560
TPS-HCLS112S15		15	0	67	88	560
TPS-HCLS112S24		24	0	42	89	220
TPS-HCLS115S03	15 (13.5-16.5)	3.3	0	303	85	2400
TPS-HCLS115S05		5	0	200	85	2400
TPS-HCLS115S09		9	0	111	88	1000
TPS-HCLS115S12		12	0	84	89	560
TPS-HCLS115S15		15	0	67	89	560
TPS-HCLS124S03	24 (21.6-26.4)	3.3	0	303	84	2400
TPS-HCLS124S05		5	0	200	87	2400
TPS-HCLS124S09		9	0	111	89	1000
TPS-HCLS124S12		12	0	84	88	560
TPS-HCLS124S15		15	0	67	88	560
TPS-HCLS124S24		24	0	42	89	220

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no load)	3.3VDC Input	--	370/3	390/15	mA
	5VDc Input	--	235/3	260/15	
	12VDC Input	--	99/3	105/15	
	15VDC Input	--	78/3	85/15	
	24VDC Input	--	50/3	55/15	
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	--	
		9VDC output	--	8	--	
		12VDC output	--	7	--	
		15VDC output	--	6	--	
		24VDC output	--	6	--	
Ripple & Noise	20MHz Bandwidth (peak-peak)		--	45	70	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	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℃,nominal input, output load	--	15	--	℃
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

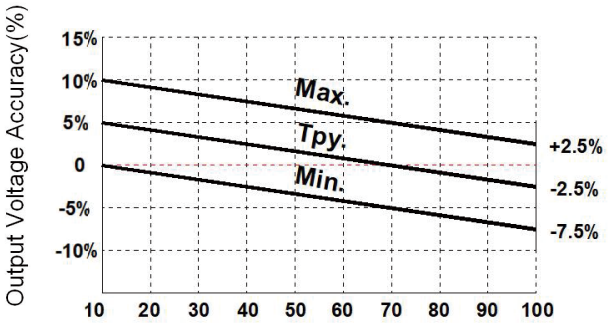
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0 rated)
Package Dimensions	11.6 x 6.00 x 10.20mm
Weight	1.6g (Typ.)
Cooling Method	Free air convection

EMC Specifications

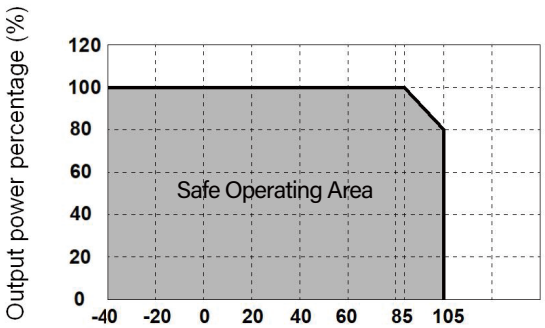
EMI	CE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
	RE	CISPR32/EN55032 CLASS B (The recommended circuit is shown in Figure 4)	
EMS	ESD	IEC/EN61000-4-2 Contact ± 6KV	Perf. Criteria B

Typical Characteristic Curves

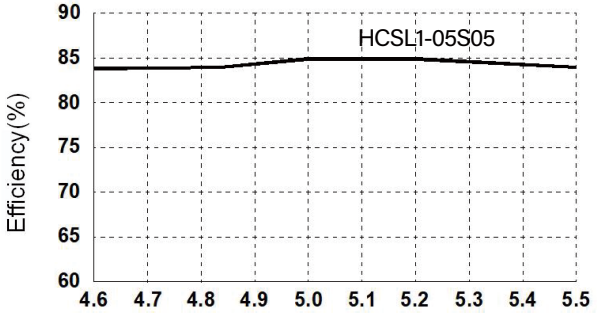
Output Regulation Curve



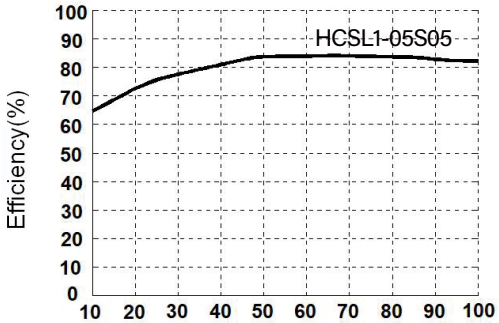
Temperature Derating Curve



Efficiency VS Input Voltage Curve (full load)

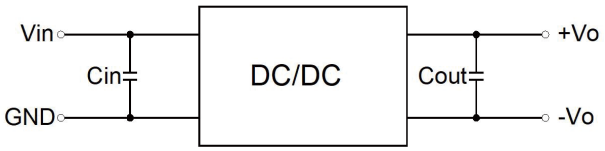


Efficiency VS Output Load Curve (Vin=5V)



Typical Circuit Design and Application

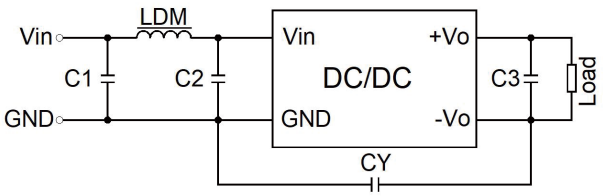
Application circuit（Figure 3）



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

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).

Note:

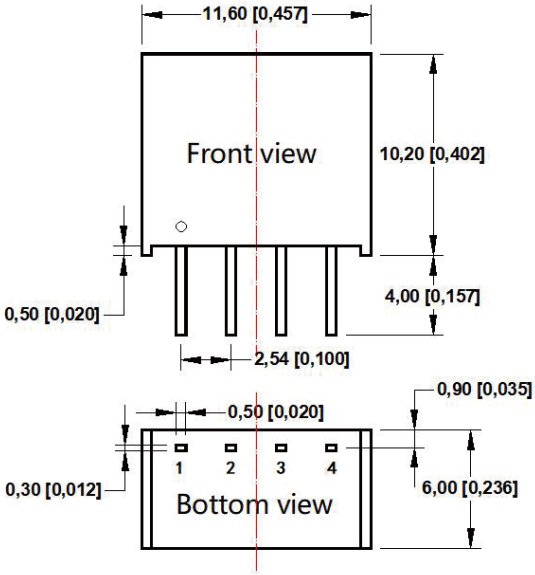
1.The input voltage cannot exceed the specified range value, otherwise permanent and irreparable damage may be caused ;

2.Unless otherwise specified,the parameters in this datasheet were measured at 25℃, humidity 40%~75%, input nominal voltage and output pure resistance mode under full load;

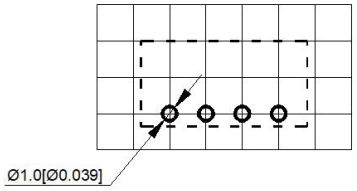
3.All index test methods are based on our company's enterprise standards;

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	3	4
Function	GDN	Vin	-Vo	+Vo