SB D-1WR4

Product Feature



- Package Type：DIP7
- Operating temperature range：-40℃ - +105℃
- Isolation voltage：1500VDC
- Full load efficiency：89%（Typ.）
- Compliant with standard: International standard pin method
- Fields of application：Power, Industrial control, Communication, Internet of Things, Automotive, etc

c US UL62368-1 CE EN62368-1 CB IEC62368-1

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%)Typ.①	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
EN	SB-0303 D-1WR4	3.3 (2.97-3.63)	3.3	303/30	82	2400
	SB-0305 D-1WR4		5	200/20	83	2400
	SB-0309 D-1WR4		9	111/11	84	1000
	SB-0312 D-1WR4		12	84/8	85	560
	SB-0315 D-1WR4		15	67/7	85	560
	SB-0324 D-1WR4		24	42/4	85	220
UL/EN/IEC	SB-0503 D-1WR4	5 (4.5-5.5)	3.3	303/30	80	2400
	SB-0505 D-1WR4		5	200/20	84	2400
EN	SB-0509 D-1WR4		9	111/11	86	1000
UL/EN/IEC	SB-0512 D-1WR4		12	84/8	89	560
	SB-0515 D-1WR4		15	67/7	88	560
	SB-0524 D-1WR4		24	42/4	88	220
	SB-0909 D-1WR4	9(8.1-9.9)	9	111/11	87	1000
	SB-1203 D-1WR4	12 (10.8-13.2)	3.3	303/30	83	2400
	SB-1205 D-1WR4		5	200/20	86	2400
	SB-1209 D-1WR4		9	111/11	89	1000
	SB-1212 D-1WR4		12	84/8	89	560
	SB-1215 D-1WR4		15	67/7	89	560
	SB-1224 D-1WR4		24	42/4	89	220
EN	SB-1503 D-1WR4	15 (13.5-16.5)	3.3	303/30	82	2400
	SB-1505 D-1WR4		5	200/20	85	2400
	SB-1509 D-1WR4		9	111/11	88	1000
	SB-1512 D-1WR4		12	84/8	89	560
	SB-1515 D-1WR4		15	67/7	89	560
	SB-1524 D-1WR4		24	42/4	89	220
	SB-2403 D-1WR4	24 (21.6-26.4)	3.3	303/30	84	2400
	SB-2405 D-1WR4		5	200/20	87	2400
	SB-2409 D-1WR4		9	111/11	89	1000
	SB-2412 D-1WR4		12	84/8	88	560
	SB-2415 D-1WR4		15	67/7	89	560
	SB-2424 D-1WR4		24	42/4	89	220

Notes:

①Efficiency is measured at nominal input voltage and rated output load.

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Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no load)	3.3VDC Nominal input series	3.3VDC Output	--	370/10	388/15	mA
		Other Output	--	356/12	365/18	
	5VDC Nominal input series	3.3VDC Output	--	250/8	260/15	
		5VDC Output	--	238/8	250/15	
		15/24VDC Output	--	224/18	236/25	
		Other Output	--	232/10	240/15	
	9VDC Nominal input series	9VDC Output	--	123/8	129/15	
	12VDC Nominal input series	3.3VDC Output	--	101/7	105/15	
		Other Output	--	94/8	99/15	
	15VDC Nominal input series	3.3/5VDC Output	--	82/6	85/15	
		Other Output	--	75/6	79/15	
	24VDC Nominal input series	3.3VDC Output	--	50/3	53/15	
		Other Output	--	48/4	50/15	
Reflected Ripple Current			--	15	--	
Impulse Voltage (1sec.max)	3.3VDC Input		-0.7	--	5	VDC
	5VDC Input		-0.7	--	9	
	9VDC Input		-0.7	--	15	
	12VDC Input		-0.7	--	18	
	15VDC Input		-0.7	--	21	
	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 Curve Figure.1			
Linear Regulation Rate	Input Voltage Variation ±1%	3.3VDC Output	--	±1.5	--	--
		Other Output	--	±1.2	--	
Load Regulation Rate	10% - 100% Load	3.3/5VDC Output	--	10	--	%
		9/12/15VDC Output	--	8	--	
		24VDC Output	--	6	--	
Ripple & Noise	20MHz bandwidth,100% load,use the parallel line test		--	45	120	mVp-p
Temperature Drift Coefficient	Full Load		--	±0.02	--	%/℃
Short-circuit Protection			Continuous, Self-Recovery			

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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	℃
Storage Humidity	Non-condensing	--	25	--	℃
Case Temperature Rise	Input nominal, output full load	5	--	95	%RH
Soldering Profile	Wave-soldering	260±5℃;time：5 - 10s			
	Manual-welding	360±10℃;time：3 - 5s			
Switching Frequency	Full Load, Nominal Input Voltage	--	220	--	kHz
MTBF	MIL-HDBK-217F@25℃	3500	--	--	k hours

Mechanical Specification

Case Material	Black plastic; flame-retardant and heat-resistant（UL 94V-0）
Package Dimensions	12.70 x 10.10 x 7.00 mm
Weight	1.65g（Typ.）
Cooling Method	Free air convection

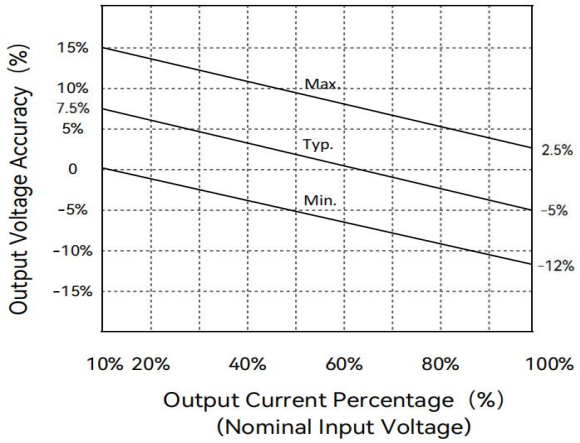
EMC Specifications

EMI	CE	CISPR32/EN55032 CLASS B （see Figure. 4 for EMC recommended circuit）
	RE	CISPR32/EN55032 CLASS B （see Figure. 4 for EMC recommended circuit）
EMS	ESD	IEC/EN61000-4-2 Contact±6KV perf. Criteria B

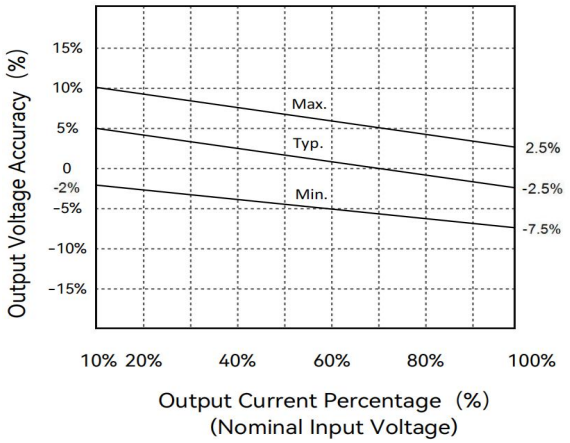
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Typical Characteristic Curves

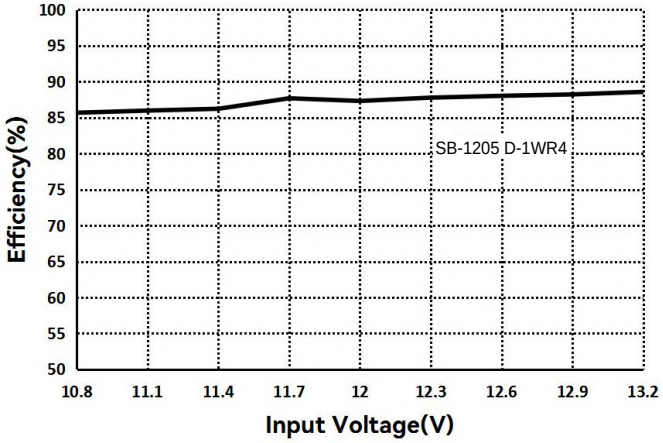
Output Regulation Curve 3.3VDC output (Figure.1-1)



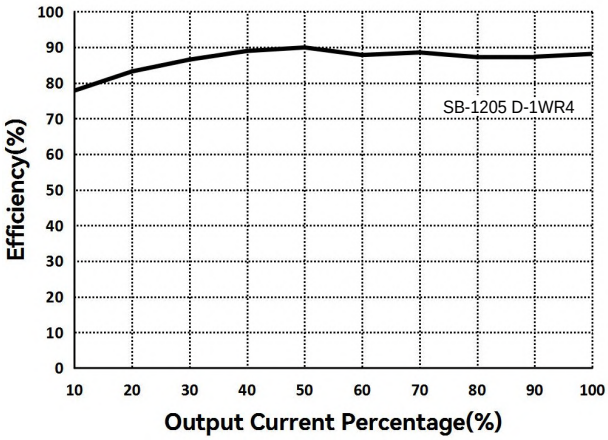
Output Regulation Curve Other Output（Figure.1-2）



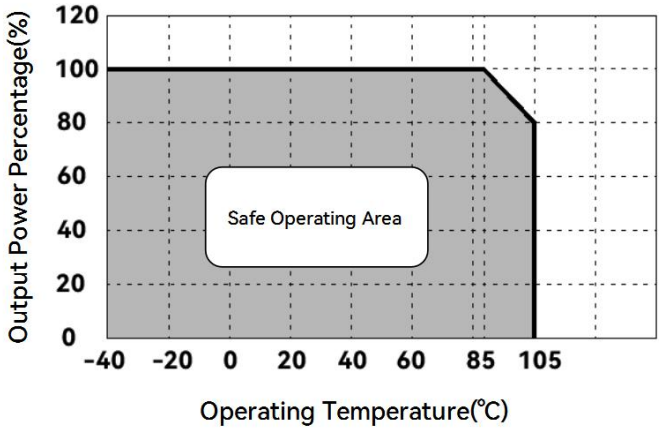
Efficiency VS Input Voltage Curve(Full load)



Efficiency VS Output Load Curve（Vin=12V）



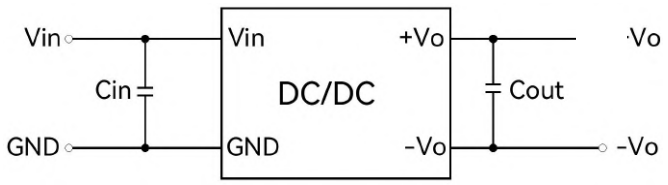
Temperature Derating Curve（Figure.2）



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Typical Circuit Design And Application

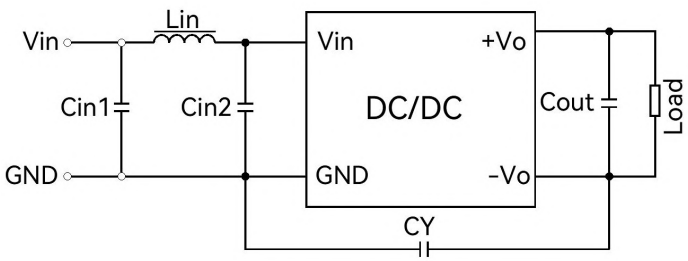
Application Circuit（Figure.3）	Recommended Capacitive Load Value Table



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

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Figure.3. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

EMC Recommended Circuit（Figure.4）	EMC Recommended Parameter Table



EMC	Cin1/Cin2	4.7μF / 50V
	Cout	Refer Figure.3 Capacitive load value table
	CY	1000pF /2kVDC
	Lin	6.8μH

Note：

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. See Figure. 4 for EMC recommended circuit.

3.Output load requirements

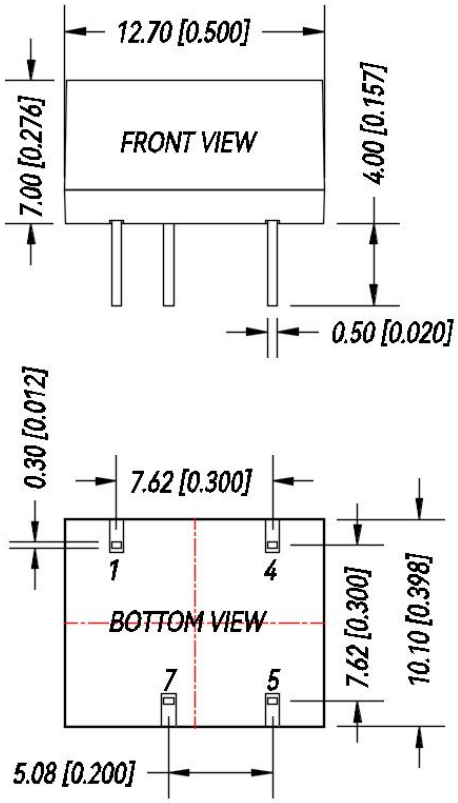
In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power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

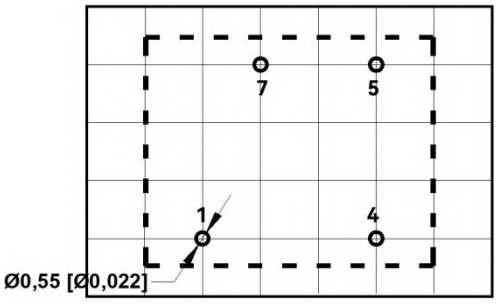
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Dimensions and Recommended Layout

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
4	Vin
5	+Vo
7	-Vo

Packaging instructions

Packaging Information			
Product quantity of single tube (pcs/tube)	Electrostatic bag quantity (pcs/ bag)	Inner carton quantity (pcs/carton)	Outer carton quantity (pcs/carton)
41	410	1640	6560

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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 ℃, 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.

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