

DC/DC Converter

B_D-1WR3 Series

MORNSUN®

1W isolated DC-DC converter
Fixed input voltage, unregulated single output



CB Report

RoHS

Patent Protection

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 81%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out

UL 62368-1 EN 62368-1 BS EN 62368-1 IEC 62368-1

B_D-1WR3 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(µF) Max.	
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.			
UL/EN/BS EN/IEC	B1203D-1WR3	12 (10.8-13.2)	3.3	303/30	71/75	2400	
	B1205D-1WR3		5	200/20	76/80	2400	
--	B1209D-1WR3		9	111/12	74/78	1200	
UL/EN/BS EN/IEC	B1212D-1WR3		12	83/9	76/80	560	
	B1215D-1WR3		15	67/7	77/81	560	
	B1224D-1WR3		24	42/5	77/81	220	
--	B1505D-1WR3		15 (13.5-16.5)	5	200/20	76/80	2400
--	B1509D-1WR3			9	111/12	76/80	1200
--	B1515D-1WR3			15	67/7	77/81	560
UL/EN/BS EN/IEC	B2403D-1WR3	24 (21.6-26.4)	3.3	303/30	69/75	2400	
	B2405D-1WR3		5	200/20	73/79	2400	
--	B2409D-1WR3		9	111/12	74/80	1200	
UL/EN/BS EN/IEC	B2412D-1WR3		12	83/9	75/81	560	
	B2415D-1WR3		15	67/7	75/81	560	
	B2424D-1WR3		24	42/5	75/81	220	

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	12V input	3.3VDC output	--	112/8	118/--	mA
		5VDC/9VDC/12VDC output	--	105/8	110/--	
		15VDC/24VDC output	--	103/8	109/--	
	15V input	5VDC/9VDC output	--	83/8	88/--	
		15VDC output	--	82/8	87/--	
	24V input	3.3VDC output	--	56/8	61/--	
		5VDC output	--	53/8	58/--	
		9VDC output	--	52/8	57/--	
		12VDC/15VDC/24VDC output	--	52/8	56/--	
Reflected Ripple Current		--	15	--		
Surge Voltage(1sec. max.)	12VDC input	-0.7	--	18	VDC	
	15VDC input	-0.7	--	21		
	24VDC input	-0.7	--	30		
Input Filter			Capacitance filter			
Hot Plug			Unavailable			

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Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	1.5	--
		5VDC/9VDC/12VDC/15VDC/24VDC output	--	--	1.2	
Load Regulation	10%-100% load	3.3VDC output	--	8	20	%
		5VDC output	--	5	15	
		9VDC output	--	3	10	
		12VDC output	--	3	10	
		15VDC output	--	3	10	
		24VDC output	--	2	10	
Ripple & Noise*	20MHz bandwidth	3.3VDC/5VDC/9VDC/12VDC/15VDC output	--	30	75	mVp-p
		24VDC output	--	50	100	
			--			
Temperature Coefficient	Full load		--	±0.02	--	%/°C
Short-Circuit Protection			Continuous, self-recovery			

Note: * The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature ≥85°C, (see Fig. 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25°C	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	260	
Storage Humidity	Non-condensing	5	--	95	%RH
Vibration		10-150Hz, 5G, 0.75mm, along X, Y and Z			
Switching Frequency	Full load, nominal input voltage	--	260	--	kHz
MTBF	MIL-HDBK-217F @ 25°C	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	12.70 x 10.16 x 8.20 mm
Weight	1.8g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B

Note: Refer to Figure 4 for recommended circuit test.

Typical Performance Curves

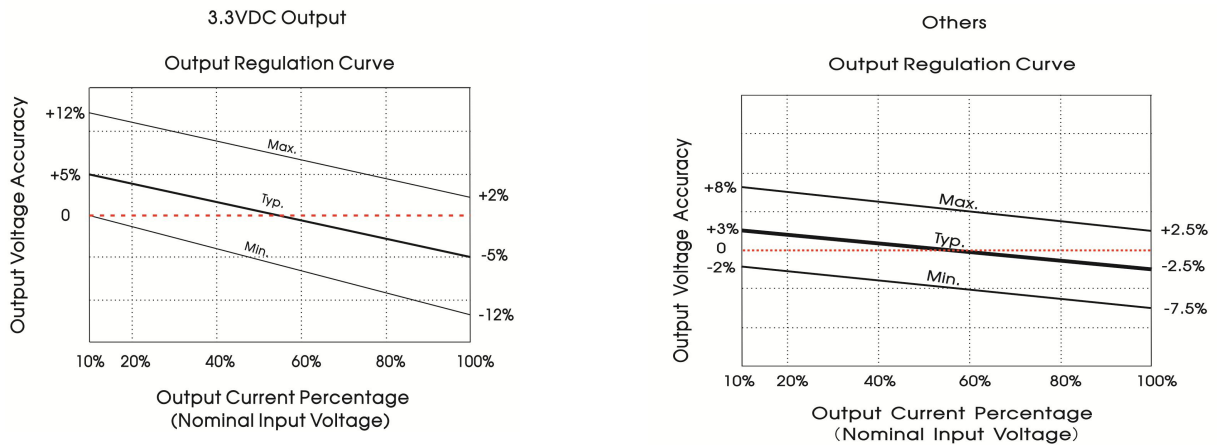


Fig. 1

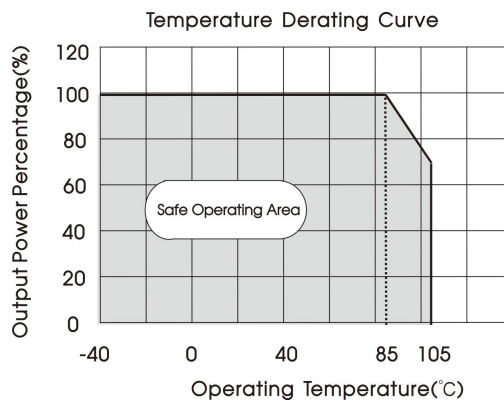
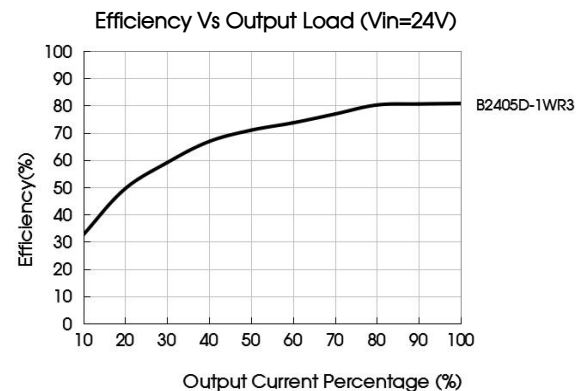
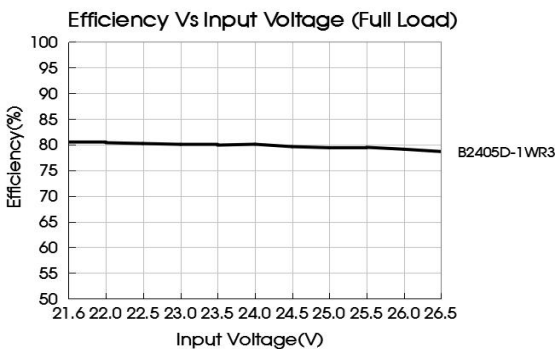
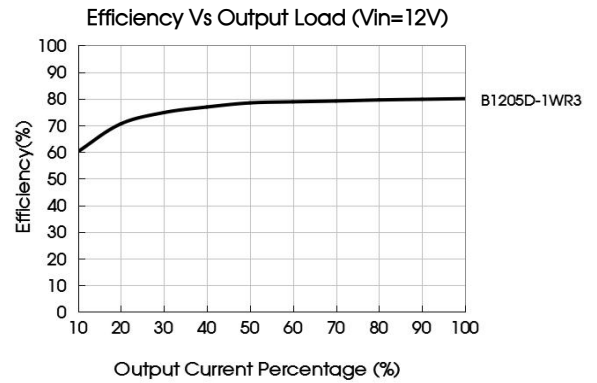
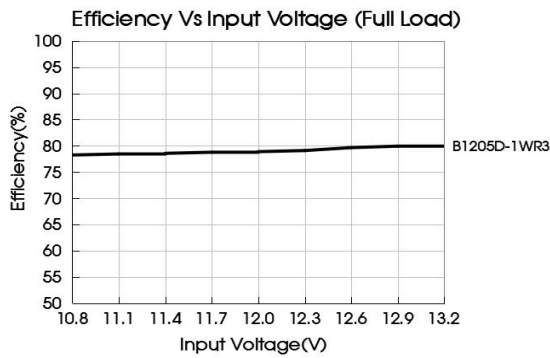


Fig. 2



Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

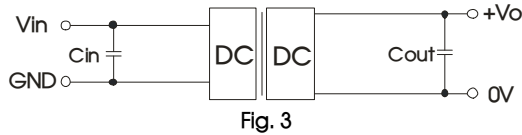
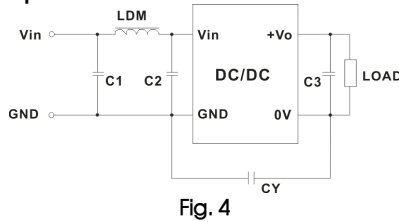


Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
12VDC	2.2µF/25V	3.3/5VDC	10µF/16V
15VDC	2.2µF/25V	9VDC	4.7µF/25V
24VDC	1µF/50V	12VDC	2.2µF/25V
--	--	15/24VDC	1µF/50V

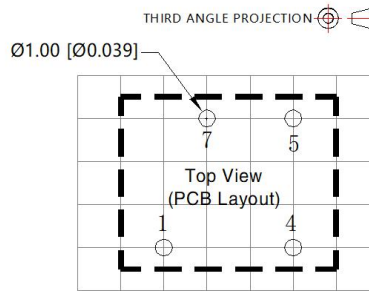
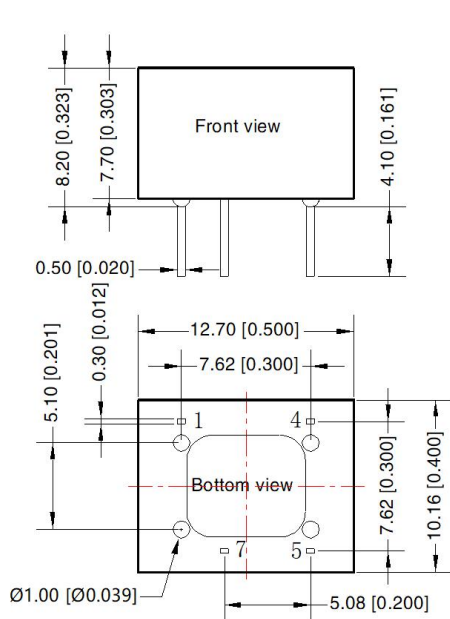
2. EMC compliance circuit



Emissions	C1/C2	4.7µF /50V
	C3	Refer to the Cout in Fig.3
	LDM	6.8µH
	CY	270pF /2kVDC

3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Pin-Out	
Pin	Mark
1	GND
4	Vin
5	+Vo
7	0V

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200011;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our corporate company standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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