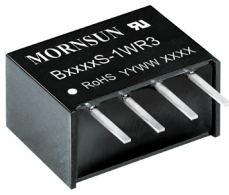
1W isolated DC-DC converter
Fixed input voltage, unregulated single output



Patent Protection

Continuous Short Circuit Protection

3 years Warranty

UL 62368-1 | EN 62368-1 | BS EN 62368-1 | CB Report IEC 62368-1 | RoHS

FEATURES

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

B_S-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	B1203S-1WR3	12 (10.8-13.2)	3.3	303/30	71/75	2400
	B1205S-1WR3		5	200/20	76/80	2400
	B1209S-1WR3		9	111/12	76/80	1000
	B1212S-1WR3		12	83/9	76/80	560
	B1215S-1WR3		15	67/7	77/81	560
	B1224S-1WR3		24	42/5	77/81	220
	B1505S-1WR3	15 (13.5-16.5)	5	200/20	76/80	2400
	B1509S-1WR3		9	111/12	76/80	1000
	B1512S-1WR3		12	83/9	76/80	560
	B1515S-1WR3		15	67/7	77/81	560
--	B1524S-1WR3		24	42/5	77/81	220
UL/EN/BS EN/IEC	B2403S-1WR3	24 (21.6-26.4)	3.3	303/30	69/75	2400
	B2405S-1WR3		5	200/20	73/79	2400
	B2409S-1WR3		9	111/12	74/80	1000
	B2412S-1WR3		12	83/9	75/81	560
	B2415S-1WR3		15	67/7	75/81	560
	B2424S-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/12VDC output	--	84/8	88/--	
		15VDC/24VDC output	--	83/8	87/--	
	24V input	3.3VDC output	--	56/8	61/--	
		5VDC output	--	53/8	58/--	
		9VDC output	--	53/8	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
Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.		

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	--	%/℃
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	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℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃, nominal input, full load output	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
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℃	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	11.60 x 6.00 x 10.16 mm
Weight	1.3g (Typ.)
Cooling Method	Free air convection

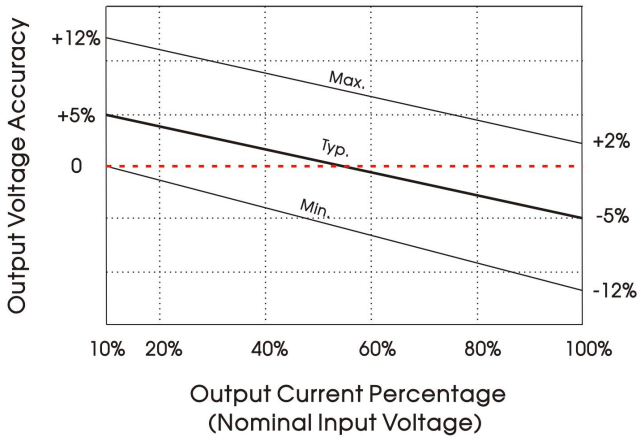
Electromagnetic Compatibility (EMC)

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 Fig.4 for recommended circuit test.		

Typical Characteristic Curves

3.3VDC output

Output Regulation Curve



5VDC/9VDC/12VDC/15VDC/24VDC output

Output Regulation Curve

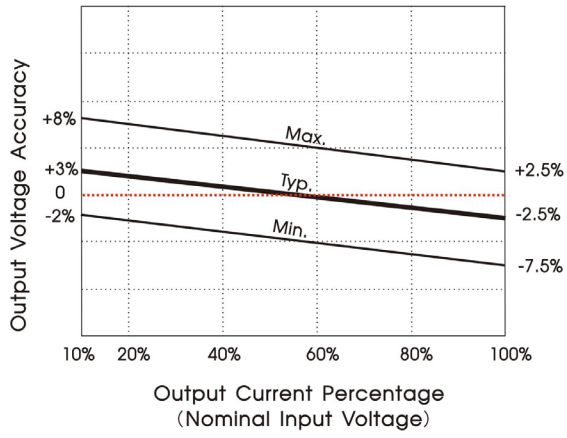


Fig. 1

Temperature Derating Curve

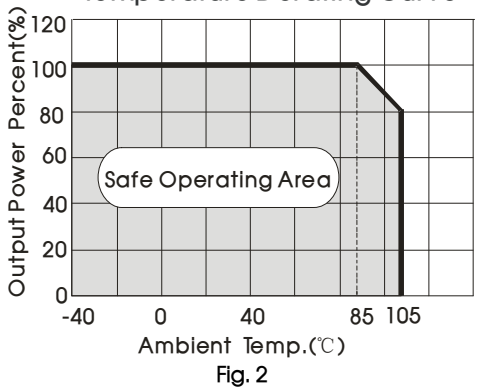
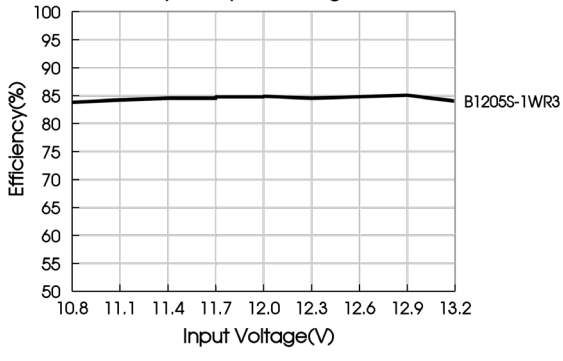
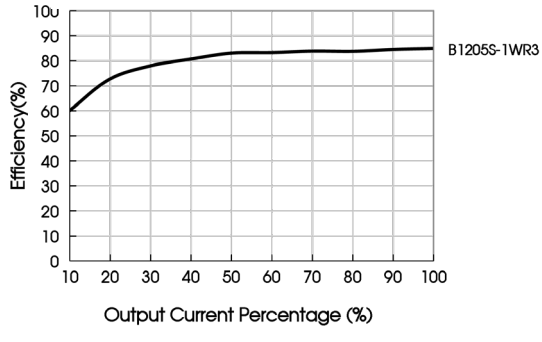


Fig. 2

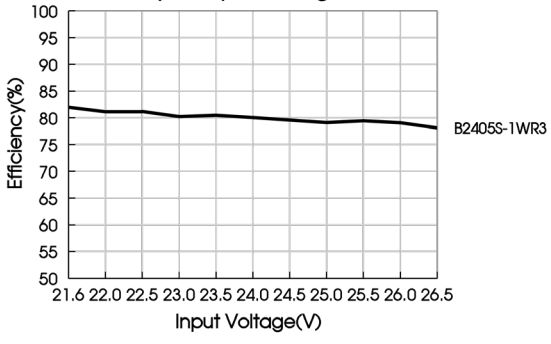
Efficiency Vs Input Voltage (Full Load)



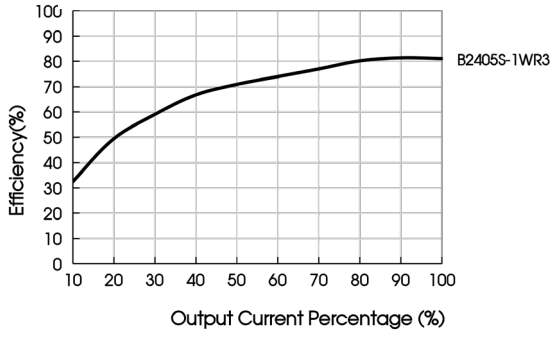
Efficiency Vs Output Load (Vin=12V)



Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=24V)



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.

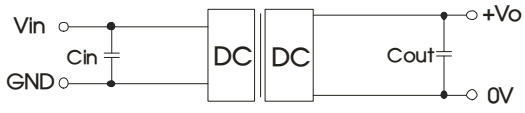


Fig.3

Table 1: Recommended input and output capacitor values

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

2. EMC compliance circuit

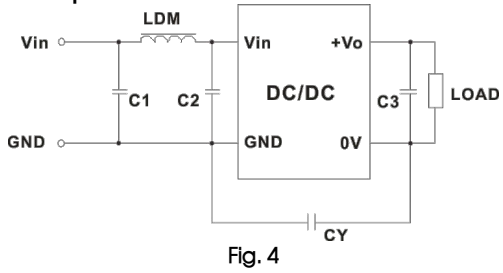


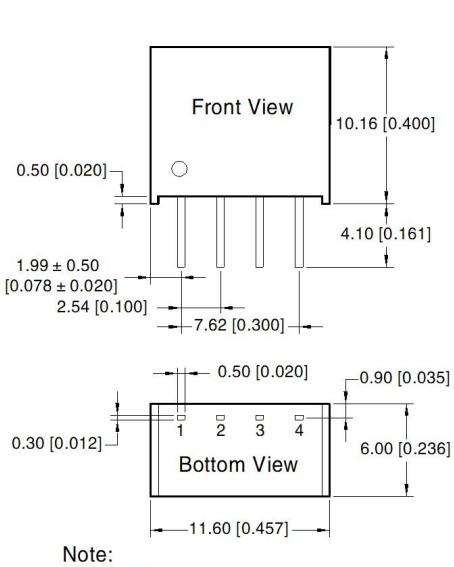
Fig. 4

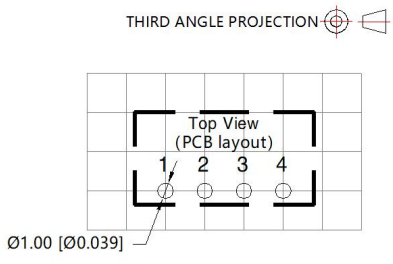
Emissions	C1/C2	4.7μF /50V
	C3	Refer to the Cout in Fig.3
	LDM	6.8μH
	CY	270pF /2kV

3. For additional information please refer to DC-DC converter application notes on

www.mornsun-power.com

Dimensions and Recommended Layout





Note: Grid 2.54*2.54mm

Pin	Mark
1	GND
2	Vin
3	0V
4	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]