

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 85%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out

1W isolated DC-DC converter

Fixed input voltage, unregulated single output



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.		
--	B0303S-1WR3	3.3 (2.97-3.63)	3.3	303/30	30/80	2400
	B0305S-1WR3		5	200/20	30/80	2400
	B0309S-1WR3		9	111/11	30/80	1000
	B0312S-1WR3		12	83/8	30/80	560
	B0315S-1WR3		15	67/7	30/80	560
	B0324S-1WR3		24	42/4	30/80	220
	B0503S-1WR3	5 (4.5-5.5)	3.3	303/30	30/80	2400
	B0505S-1WR3		5	200/20	30/80	2400
	B0509S-1WR3		9	111/12	30/80	1000
	B0512S-1WR3		12	84/9	30/80	560
	B0515S-1WR3		15	67/7	30/80	560
	B0524S-1WR3		24	42/4	50/100	220
	B1203S-1WR3	12 (10.8-13.2)	3.3	303/30	30/80	2400
	B1205S-1WR3		5	200/20	30/80	2400
	B1209S-1WR3		9	111/12	30/80	1000
	B1212S-1WR3		12	83/9	30/80	560
	B1215S-1WR3		15	67/7	30/80	560
	B1224S-1WR3		24	42/5	30/80	220
	B1505S-1WR3	15 (13.5-16.5)	5	200/20	30/80	2400
	B1509S-1WR3		9	111/12	30/80	1000
	B1512S-1WR3		12	83/9	30/80	560
	B1515S-1WR3		15	67/7	30/80	560
	B1524S-1WR3		24	42/5	30/80	220
	B2403S-1WR3	24 (21.6-26.4)	3.3	303/30	30/80	2400
B2405S-1WR3	5		200/20	30/80	2400	
B2409S-1WR3	9		111/12	30/80	1000	
B2412S-1WR3	12		83/9	30/80	560	
B2415S-1WR3	15		67/7	30/80	560	
B2424S-1WR3	24		42/5	30/80	220	

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	3.3VDC output	--	384/10	405/--	mA
		Other output	--	370/18	389/--	
	5V input	3.3VDC output	--	271/8	286/--	
		5VDC output	--	244/8	257/--	
		9VDC/12VDC/15VDC output	--	241/12	254/--	
		24VDC output	--	241/18	254/--	
	12V input	3.3VDC output	--	112/8	118/--	
		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.)	3.3VDC input		-0.7	--	5	VDC
	5VDC input		-0.7	--	9	
	12VDC input		-0.7	--	18	
	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: $\pm 1\%$	3.3VDC output	--	--	1.5	--	
		Other output	--	--	1.2		
Load Regulation	3.3VDC input 10%-100% load	3.3VDC output	--	12	18	%	
		Other output	--	8	15		
		5VDC input 10%-100% load	3.3VDC output	--	15		20
			5VDC output	--	10		15
	9VDC output		--	8	10		
	12VDC output		--	7	10		
	12VDC/15VDC/24VDC input 10%-100% load	15VDC output	--	6	10		
		24VDC output	--	5	10		
		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	Other 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	Input-output electric strength test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC
	5V input, input-output electric strength test for 1 second with a leakage current of 1mA max.		3000	--	--	
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	20	--	pF
Operating Temperature	3.3V input	Derating when operating temperature ≥ 100°C, (see Fig. 2)	-40	--	105	°C
	Other output	Derating when operating temperature ≥ 85°C, (see Fig. 2)				
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		--	--	300	
Storage Humidity	Non-condensing	5V input	--	--	95	
		Other output	5	--	95	
Vibration	3.3V/12V/15V/24V input		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	3.3V input, full load, nominal input voltage		--	220	--	kHz
	5V input, full load, nominal input voltage		--	270	--	
	12V/15V/24V input, full load, nominal input voltage		--	260	--	
MTBF	MIL-HDBK-217F @ 25°C		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

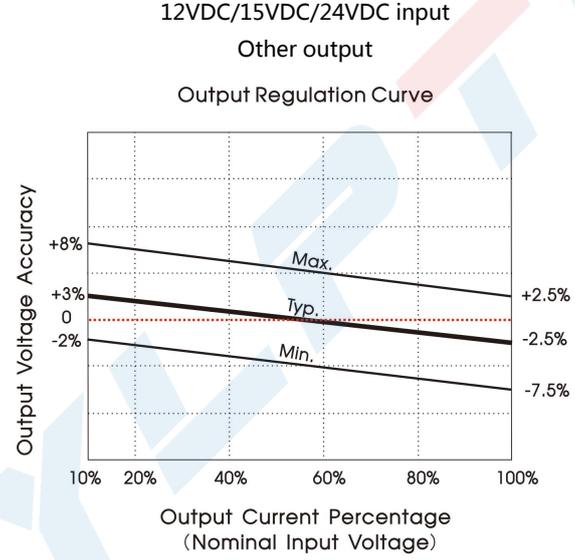
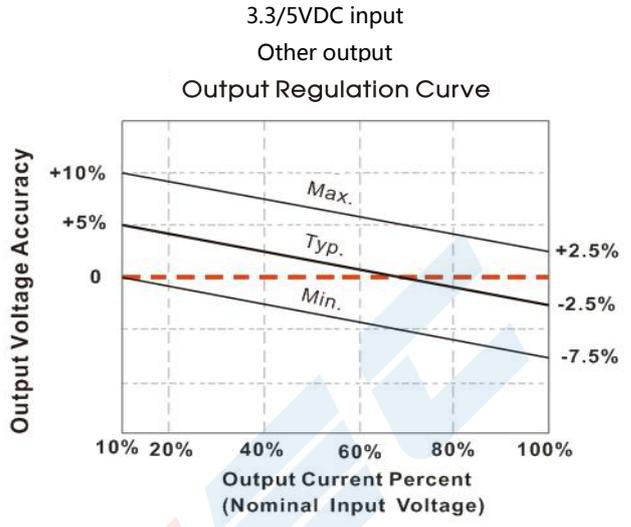
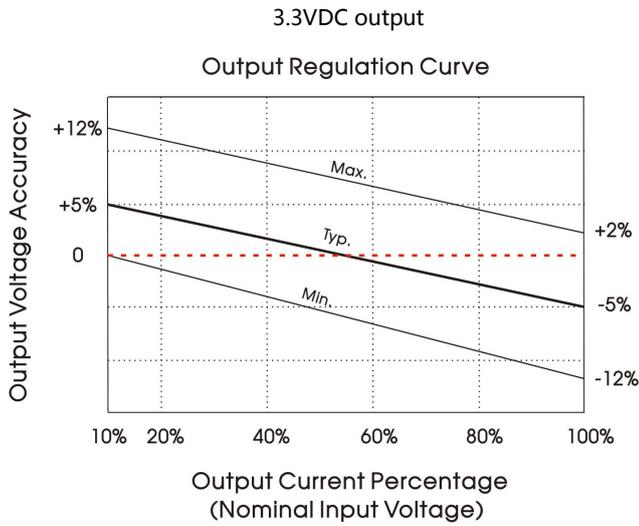


Fig. 1

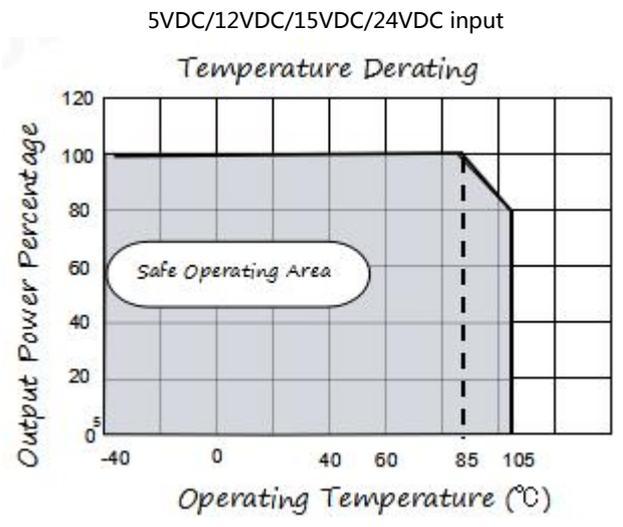
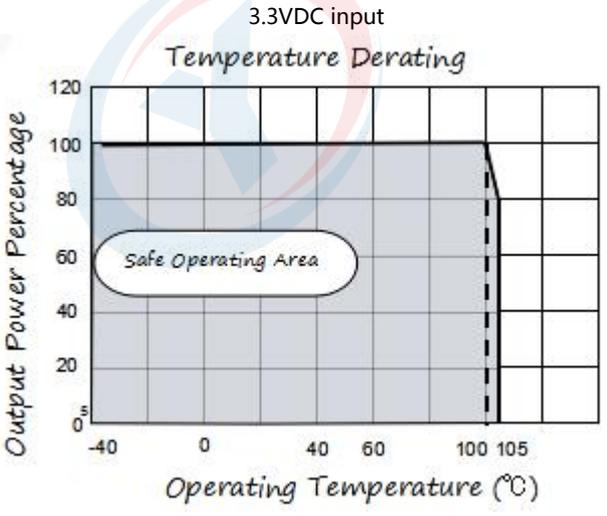
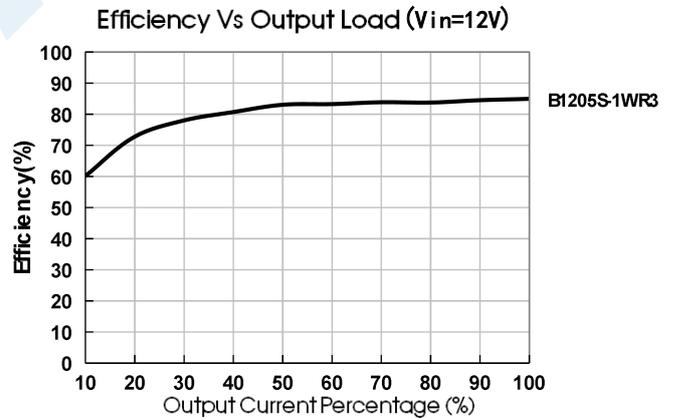
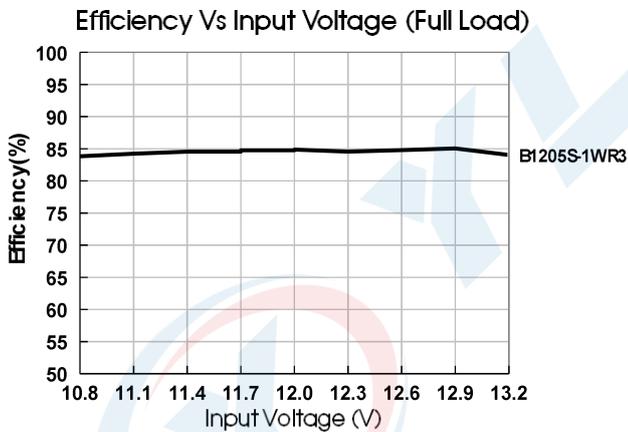
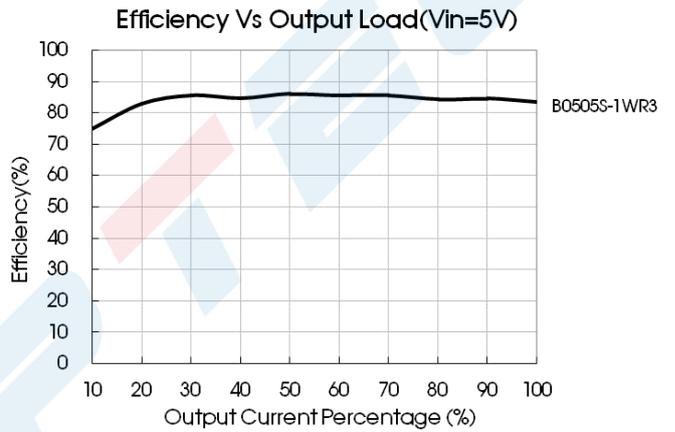
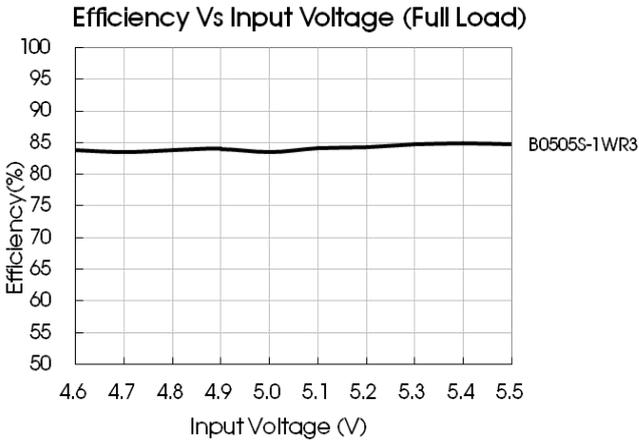
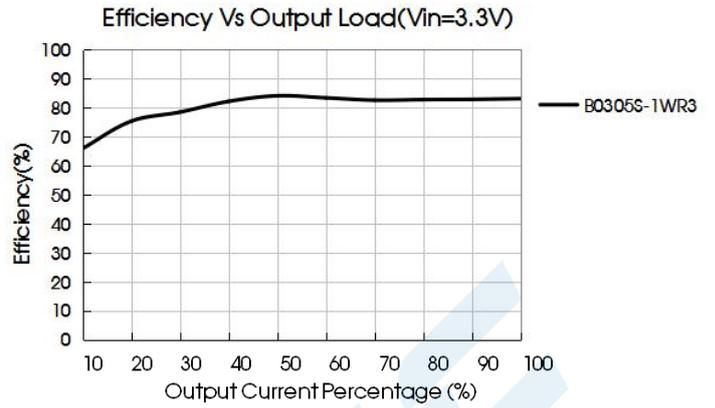
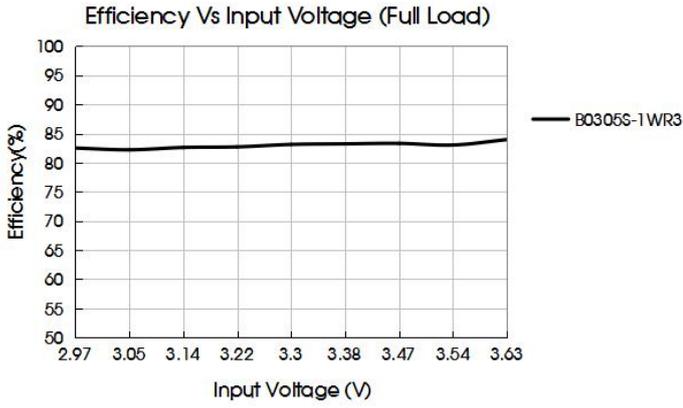


Fig. 2



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.

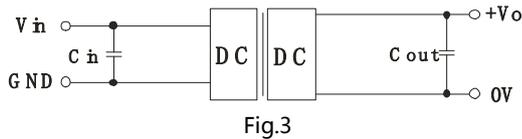


Table 1: Recommended input and output capacitor values

V_{in}	C_{in}	V_o	C_{out}
3.3VDC	10 μ F/25V	3.3VDC	10 μ F/16V
5VDC	4.7 μ F/16V	5VDC	10 μ F/16V
12VDC	2.2 μ F/25V	9VDC	2.2 μ F/16V
15VDC	2.2 μ F/25V	12VDC	2.2 μ F/25V
24VDC	1 μ F/50V	15VDC	1 μ F/25V
--	--	24VDC	1 μ F/50V

2. EMC compliance circuit

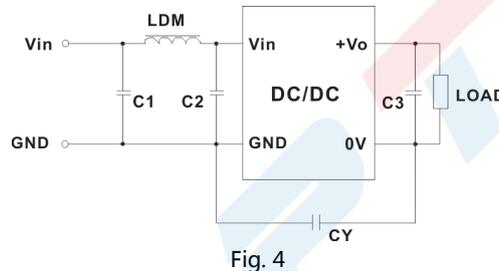
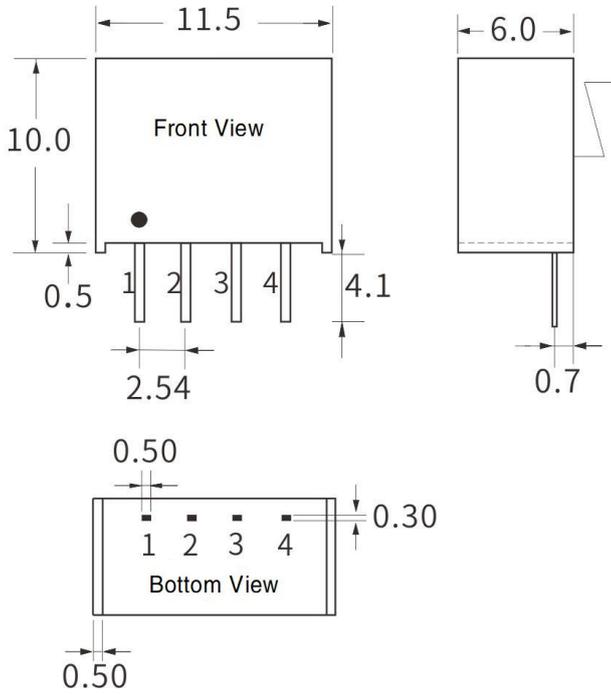


Table 2: Recommended EMC filter values

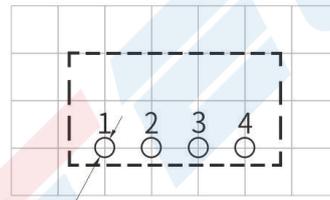
Input voltage	3.3DVC		5DVC		12/15/24DVC	
Output voltage	3.3/5VDC	9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	--	
Emissions	C1/C2	4.7 μ F /16V	4.7 μ F/16V	4.7 μ F/25V	4.7 μ F/50V	
	CY	--	270pF /4kVDC VISHAY HGZ102MBP	100pF/4kV	1000pF/4kV	270pF/2kV
	C3	Refer to the C_{out} in table 1				
	LDM	6.8 μ H				

Dimensions and Recommended Layout



1	2	3	4
-Vin	+Vin	-Vout	+Vout

THIRD ANGLE PROJECTION



φ1.0

Note:
Unit: mm[inch]
Pin section tolerances: $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.25[\pm 0.010]$