

1W Isolated DC-DC converter,
Fixed input voltage, unregulated dual output



RoHS

Patent Protection

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 5mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 84%
- DIP package
- I/O Isolation test voltage: 3k VDC
- Industry standard pin-out
- Designed to meet UL62368 safety standards

E05_D-1WR3 series are specially designed for applications where two 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.	Max. Capacitive* Load(μF)
		Nominal (Range)	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN	E0503D-1WR3	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
	E0505D-1WR3		±5	±100/±10	78/82	1200
	E0509D-1WR3		±9	±56/±6	80/84	470
	E0512D-1WR3		±12	±42/±5	80/84	220
	E0515D-1WR3		±15	±34/±3	80/84	220

Note:* The capacitive load for positive and negative outputs is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3VDC output	--	270/5	286/25	mA
	5VDC output	--	244/5	256/10	
	9VDC/12VDC output	--	238/10	250/20	
	15VDC output	--	238/18	250/30	
Reflected Ripple Current*		--	15	--	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

Note: * Please refer to DC-DC Converter Application Note for detailed description of Reflected ripple current testing method.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See Output Regulation Curve (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	1.5	--
		Other output	--	--	1.2	
Load Regulation	10%-100% load	3.3VDC output	--	15	20	%
		5VDC output	--	10	15	
		9VDC output	--	8	10	
		12VDC output	--	7	10	
		15VDC output	--	6	10	
Ripple & Noise *	20MHz bandwidth			30	75	mVp-p
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.	3000	--	--	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 $\geq 85^{\circ}\text{C}$, (see Fig. 2)	-40	--	105	$^{\circ}\text{C}$
Storage Temperature		-55	--	125	
Case Temperature Rise	$T_a=25^{\circ}\text{C}$ 3.3VDC output	--	25	--	
	Other output	--	15	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%RH
Vibration		10-150Hz, 0.75mm, 5g, 90min, along X, Y and Z			
Switching Frequency	Full load, nominal input voltage	--	260	--	kHz
MTBF	MIL-HDBK-217F@25 $^{\circ}\text{C}$	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	20.00 x 10.00 x 7.00mm
Weight	2.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Air $\pm 8\text{kV}$, Contact $\pm 4\text{kV}$ perf. Criteria B

Typical Characteristic Curves

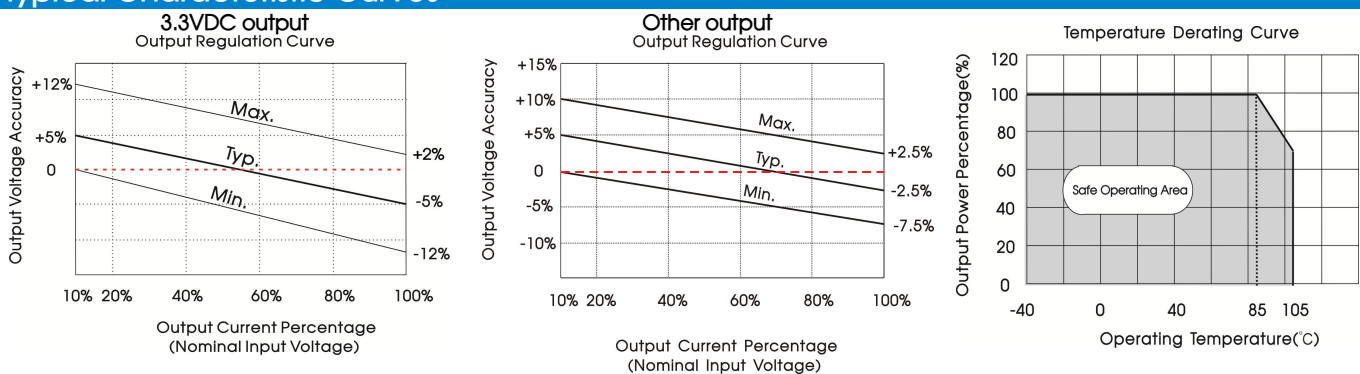
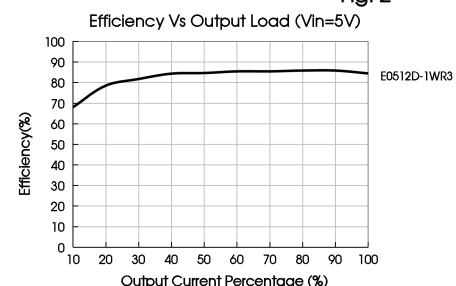
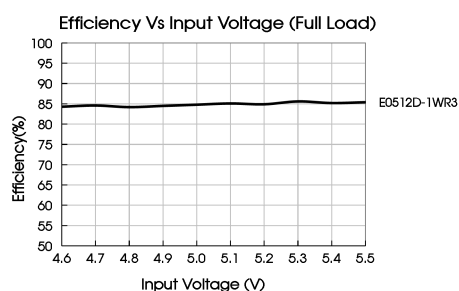


Fig. 1

Fig. 2



Design Reference

1. Typical application circuit

Input and/or output ripple can be further reduced by connecting capacitor filters to the input and/or output terminals of the DC-DC converter as shown in Figure 3. Also, the capacitance of the output filter capacitor must be properly selected. If the capacitor value that is too high, the converter may not be able to properly start up. To ensure safe and reliable operation, the specified filter capacitor value in Table 1 must not be exceeded.

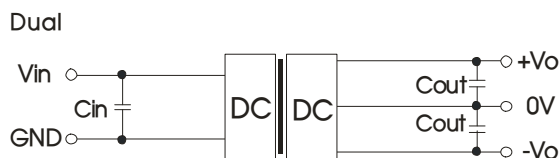


Fig. 3

Table 1 Recommended capacitive load value table

Vin	Cin	Vo	Cout
5VDC	4.7μF/16V	3.3/5VDC	4.7μF/16V
		9/12VDC	1μF/25V
		15VDC	0.47μF/50V

2. EMC compliance circuit

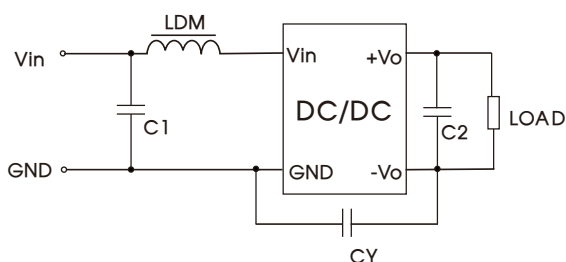


Fig. 4

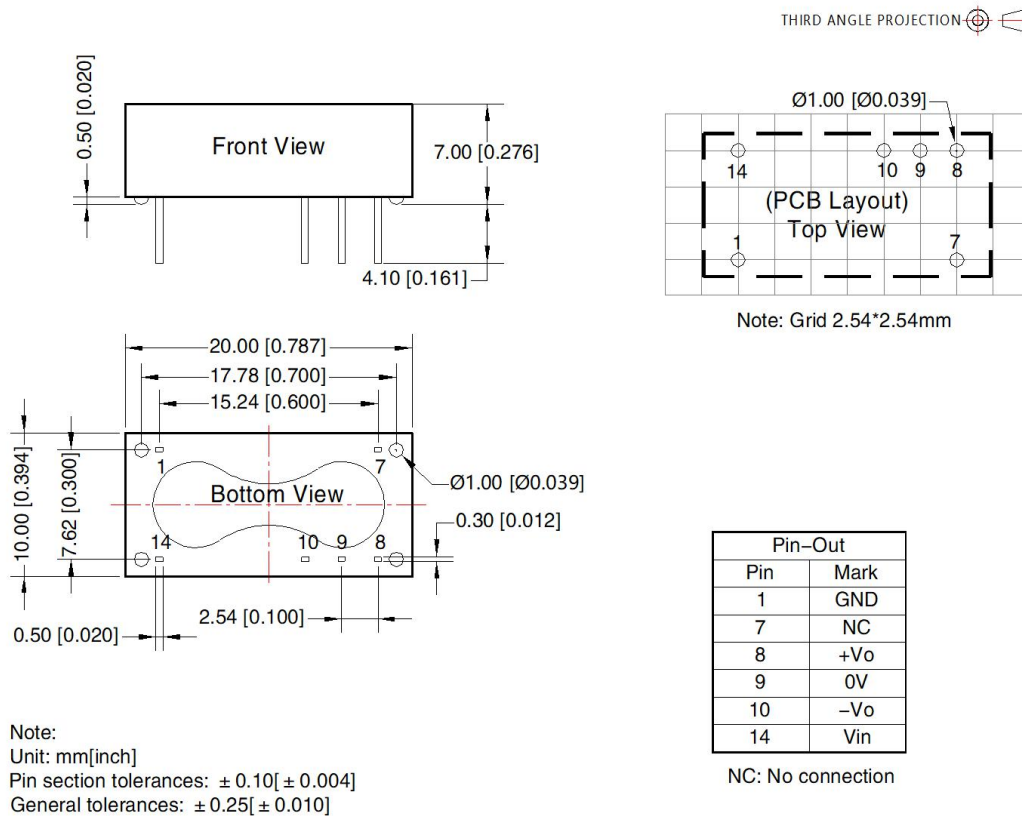
Input voltage 5VDC	Output voltage		3.3/5/9VDC	12/15VDC
	Emissions	C1/C2	4.7μF /50V	4.7μF /50V
		LDM	6.8μH	6.8μH
		CY	--	1nF /3kV

3. Output load requirements

For a reliable and efficient operation of the converter, the minimum load should never be below 10% of the rated output load. If the total required output power is less than 10%, a parallel bleeding resistor is required, ensuring that the sum of the power consumption is always maintained at 10% minimum.

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

Dimensions and Recommended Layout



Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number of Horizontal packaging: 58200009;
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 company corporate 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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