



# **2-Way 3 Amps Step-Down DC-DC Regulator User's Guide**

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## Table of Contents

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<b>Chapter 1. Brief Introduction of 2-Way 3 Amps Step-Down DC-DC Regulator.....</b>	<b>1</b>
1-1. Overview .....	1
1-2. Products Images .....	2
1-3. Technical Parameters .....	3
<b>Chapter 2. Hardware Description .....</b>	<b>4</b>
2-1. Schematic .....	4
2-2. Parts Layout .....	5
2-3. Physical .....	7
2-4. Encoder Position Setting for Voltage Adjustment .....	8
2-5. How to Connect Load .....	9
<b>Chapter 3. Test Report .....</b>	<b>10</b>
3-1. Test Instance .....	10
<b>Chapter 4. Warning .....</b>	<b>14</b>
<b>Chapter 5. Contact Us .....</b>	<b>15</b>

## **Table of Contents**

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**NOTES:**

## Chapter 1. Brief Introduction of 2-Way 3 Amps Step-Down DC-DC Regulator

### 1-1. Overview

This 2-way 3 Amps step-down DC-DC regulator is manufactured by Sure Electronics and designed for heavy duty. It is a low cost, high reliability and heavy duty load DC-DC converter. Both ways could provide 3A continuous output and work stably. Output voltage could be switched among 3.3/5/9/12/15V by encode switches, and could be adjusted through multiturn potentiometers exactly. If needed, other output levels can be got by just changing some resistor value.

All regulators had been 100% tested in full load condition, and the burn in test time had been lasted for over 12 hours in several conditions. Test condition is 2-way 2ohm load connected to 5V output.

All test results were from real measurement, and all diagrams were printed directly from DSO' screen capture. We promise that all such snaps are reliable and trusty.

If not mentioned particularly, the test conditions are as follow.  
Open environment air flow cooling, without auxiliary fan cooling, and each test would last 12 -hours.

Digital Multimeter	YOKOGAWA 7555 5 1/2 Digit Multimeter
DSO	Tektronix TDS1012 with TDS2CMA Communication Module
Digital Infrared Thermometer	Tempgun Raytek MT4
Data Logger	Self-Designed Product of Sure Electronics
Power Source	Mean Well S-350-27 350Watt, 27V, 13A switching power adapter, output adjusted to 24V DC
Input Ripple and Noise	37.5mV RMS, 244mVp-p, @24V, 6A output

# Brief Introduction of 2-Way 3 Amps Step-Down DC-DC Regulator

This DC-DC regulator could work with most linear and switching power adapters with their voltage output between 9-24V, and current output not less than 5A. This regulator can't provide voltage higher than input voltage, and its maximum stable output is equal to input voltage minus 3 Volts.

## 1-2. Products Images

### 1. Top View

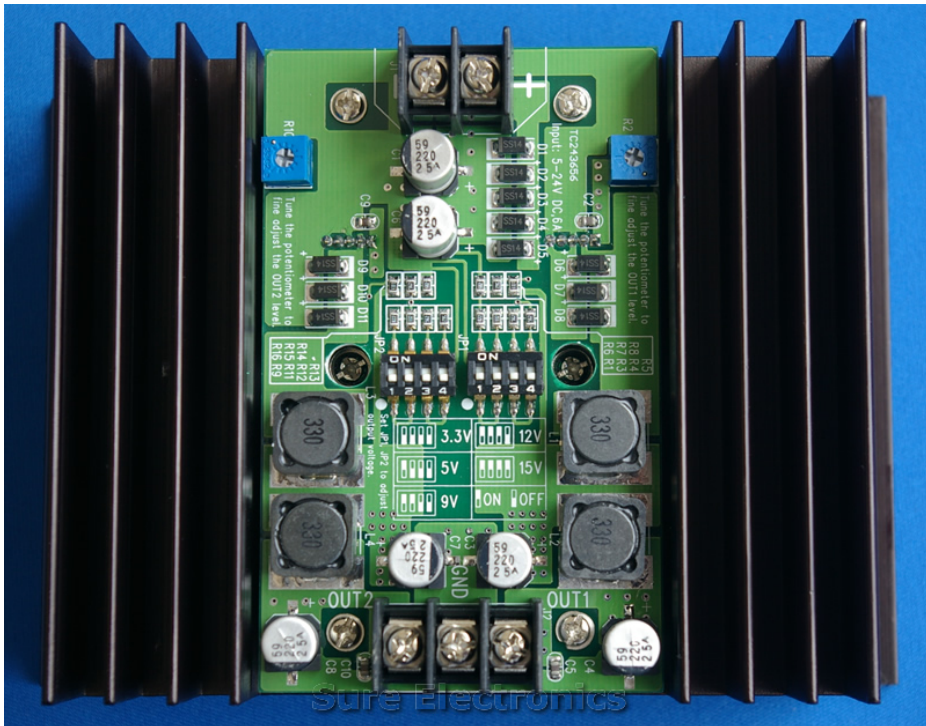


Figure 1

### 2. Block Diagram

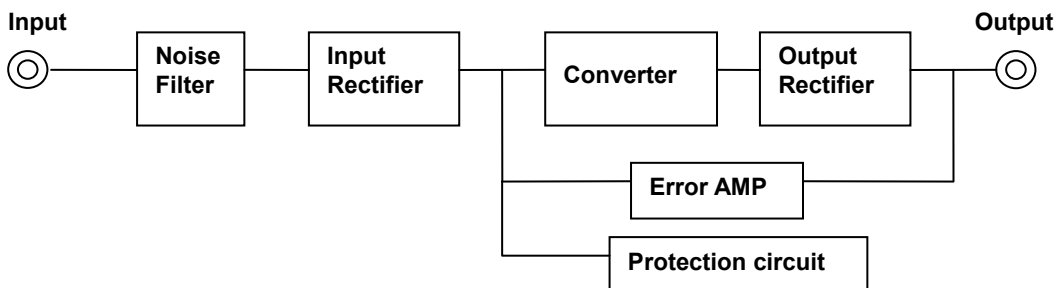


Figure 2

## Brief Introduction of 2-Way 3 Amps Step-Down DC-DC Regulator

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### 1-3. Technical Parameters

DC output range could be selected by encode switch. All regulators have passed full load burn-in test.

Protections . . . . .	Short Circuit / Overload/Wrong DC Input Polar
Cooling . . . . .	Cooling by Radiation and Air Flow
Temperature Increase . . . . .	28 Centigrade with Full Load, 12 Centigrade with 50% Load
DC Input Voltage Range . . . . .	5-24Volts DC
DC Inrush Current . . . . .	Cold Start, 40A at 24Volts DC, with 15Volts, 3A Dual Way Output
DC Adjustment Range . . . . .	+10% to -15% Rated Output Voltage (@15Volts Output)
DC Output Range . . . . .	3.3/5/9/12/15Volts, Adjustable by Encoder
Overload Protection . . . . .	Short Circuit Protection (Not Guaranteed)
Rise. Hold up. Adjust Time . . . . .	10ms. Not less than 2ms. Less than 100 $\mu$ s at Full Load and 24V DC Input 100% Threshold
Working Temperature . . . . .	0~45 $^{\circ}$ C@100%, -10 $^{\circ}$ C@80%, 55 $^{\circ}$ C@60% Load
Connection . . . . .	2P/7.62mm Pitch Terminal Block for DC Input, 3P/7.62mm Pitch Terminal Block for DC Output.
Packing . . . . .	Net Weight 0.38kg/13.4Ounce; Gross Weight 0.5kg/17.6Ounce

## Chapter 2. Hardware Description

### 2-1. Schematic

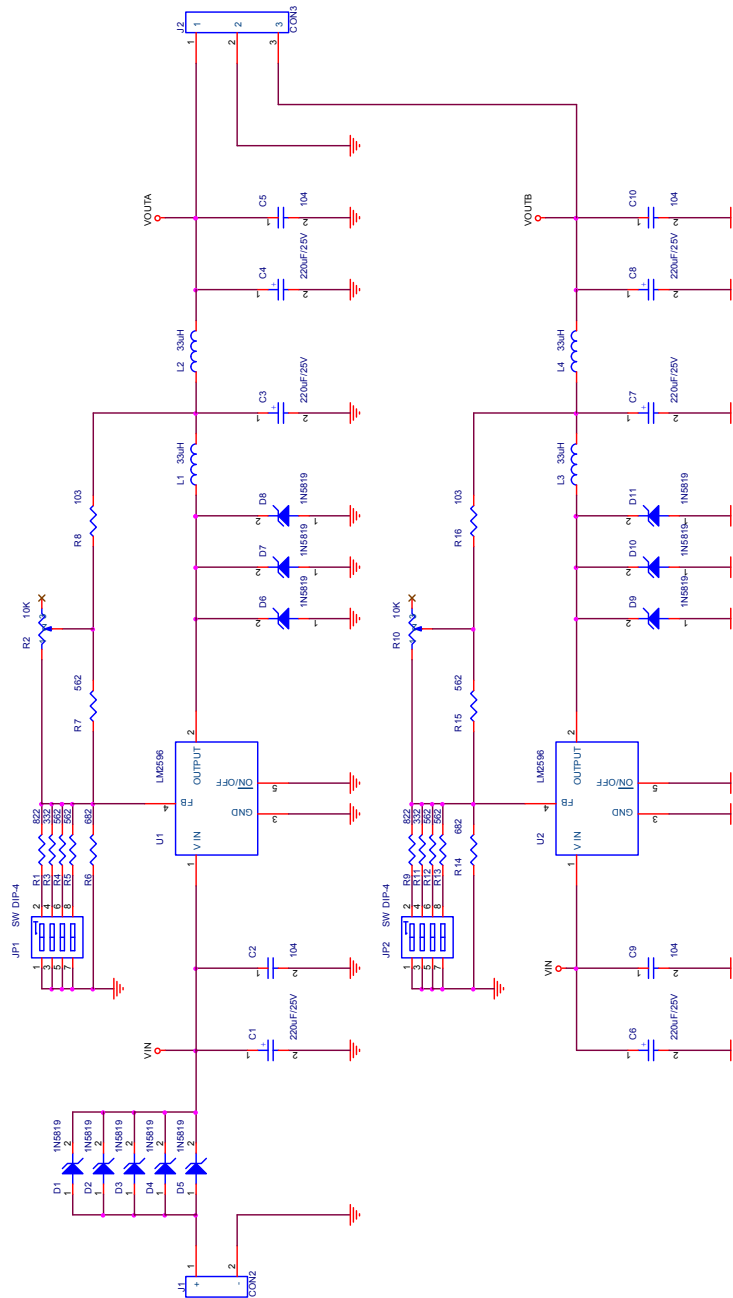


Figure 3

2-2. Parts Layout

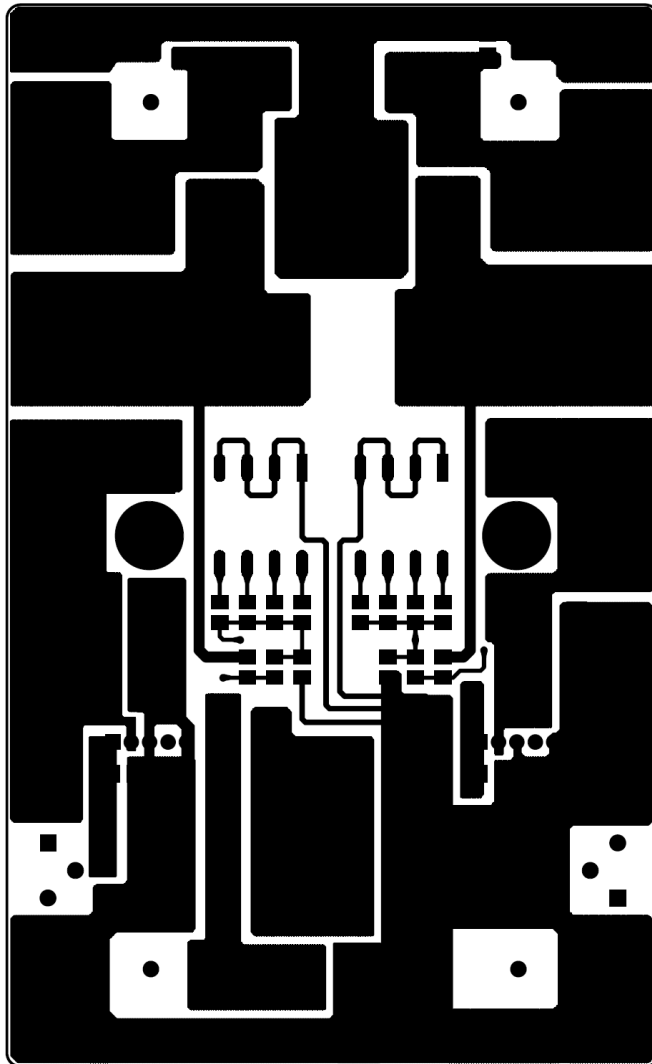


Figure 4 Connection of Top Layer



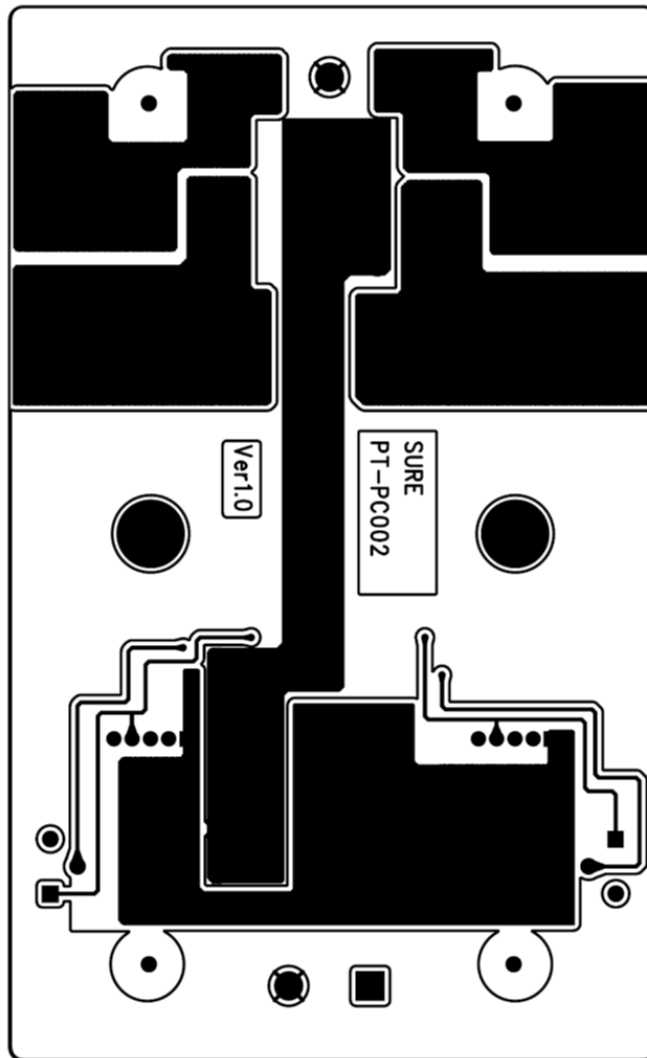


Figure 5 Connection of Bottom Layer

2-3. Physical

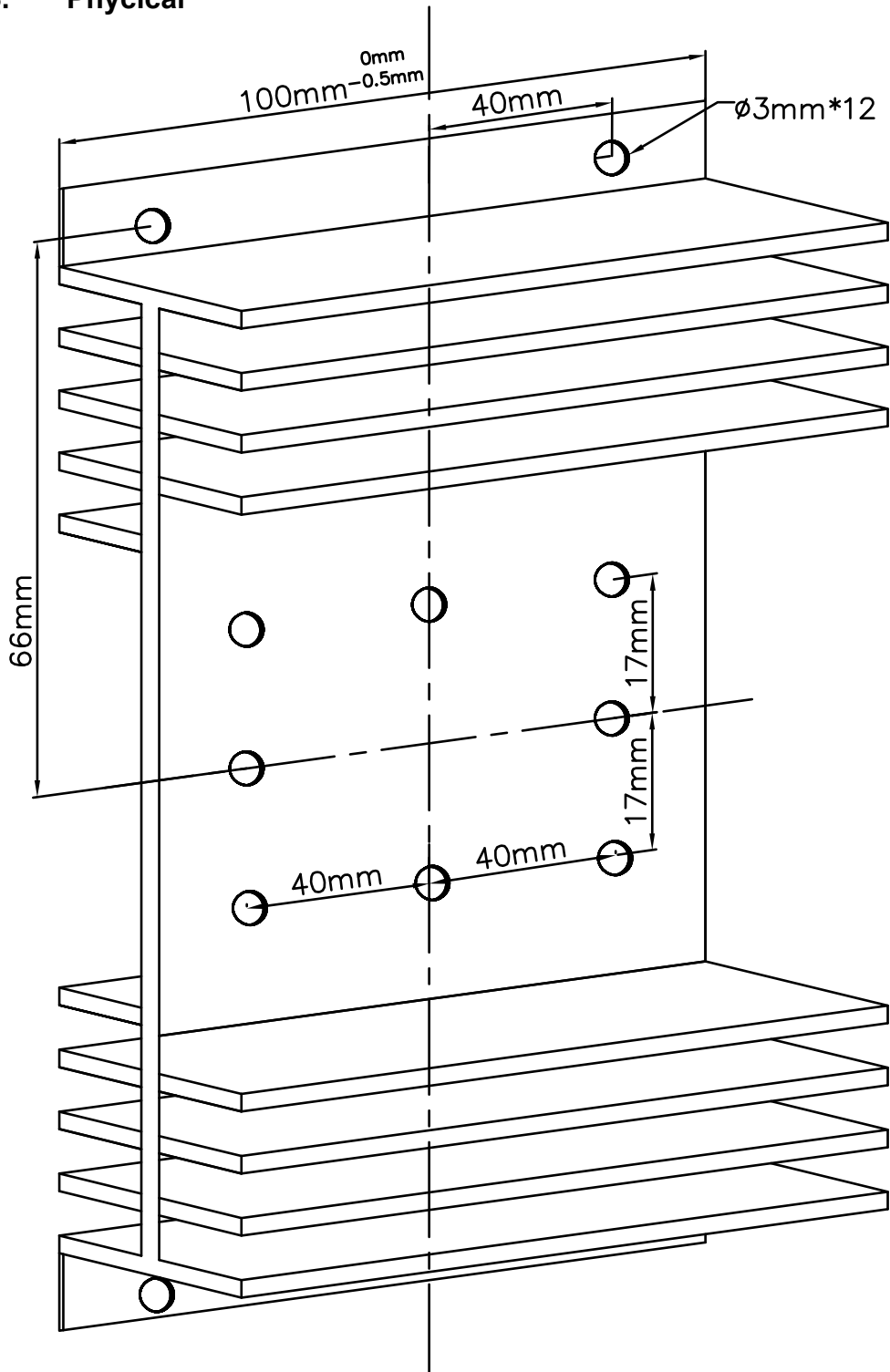
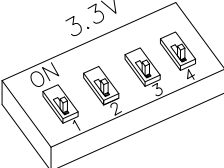
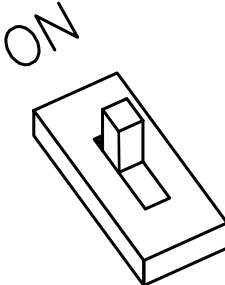
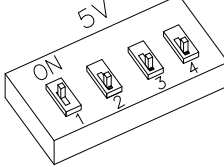
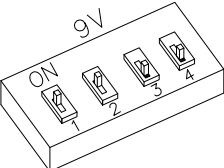
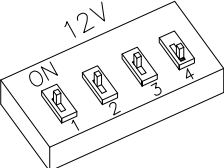
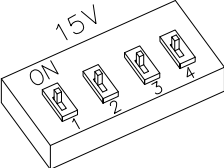


Figure 6

## Hardware Description

### 2-4. Encoder Position Setting for Voltage Adjustment

Output Voltage	Encoder Position Setting①②③	
3.3V	 <p style="text-align: right;">JP1/JP2</p>	
5V	 <p style="text-align: right;">JP1/JP2</p>	
9V	 <p style="text-align: right;">JP1/JP2</p>	
12V	 <p style="text-align: right;">JP1/JP2</p>	
15V	 <p style="text-align: right;">JP1/JP2</p>	

Set JP1,JP2 to adjust voltage

- ① Input Voltage must be 3V higher than output voltage. For example, if you need a 9V output, the input voltage must be not less than 12 volts.
- ② Input Voltage can never be AC source. Ripple and Noise should be less than 1Vp-p. Input power should be at least as 1.5 times as output power.
- ③ All power cable should be AWG14 or those which have larger diameter.

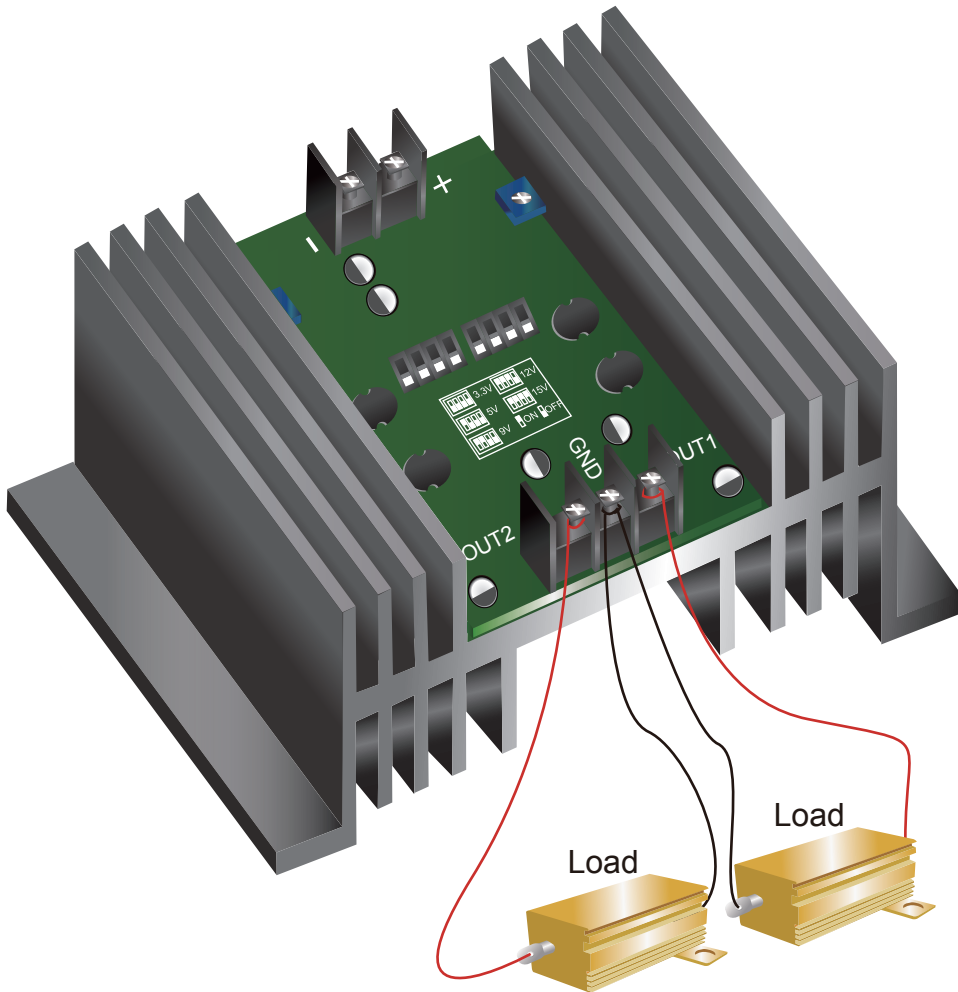
**2-5. How to Connect Load**

Figure 7

**Notice:**

1. Negative (Minus) output should be connected to GND or the housing of your instrument, which is also GND of the whole board.
2. Additional fan is suggested. With fan the temperature increasing could be as low as 10 centigrade when 100% load.
3. If this DC-DC adapter is used in sealed environment and work at fully output, the temperature increasing would be dangerous. Never place any flammable material near the converter.
4. Never connect inductive load.

## Chapter3. Test Report

### 3-1. Test Instance

Item and Test condition	Output	Tol. <sup>(1)</sup>	Noise		Efficiency
			P-P	RMS	
3.3V,1A	OUT1				
	OUT2				
3.3V,3A	OUT1				
	OUT2				
5V,1A	OUT1				
	OUT2				
5V,3A	OUT1				
	OUT2				
9V,1A	OUT1				
	OUT2				
9V,3A	OUT1				
	OUT2				
12V,1A	OUT1				
	OUT2				
12V,3A	OUT1				
	OUT2				
15V,1A	OUT1				
	OUT2				
15V,3A	OUT1				
	OUT2				

<sup>(1)</sup> Tol. =  $(V_1 - V_2) / V_1$   
 $V_1$ --- output voltage without load  
 $V_2$ --- output voltage with load

**SCREEN CAPTURE FROM DSO**

**RIPPLE OF 5V 1A OUTPUT, RMS AND P-P**

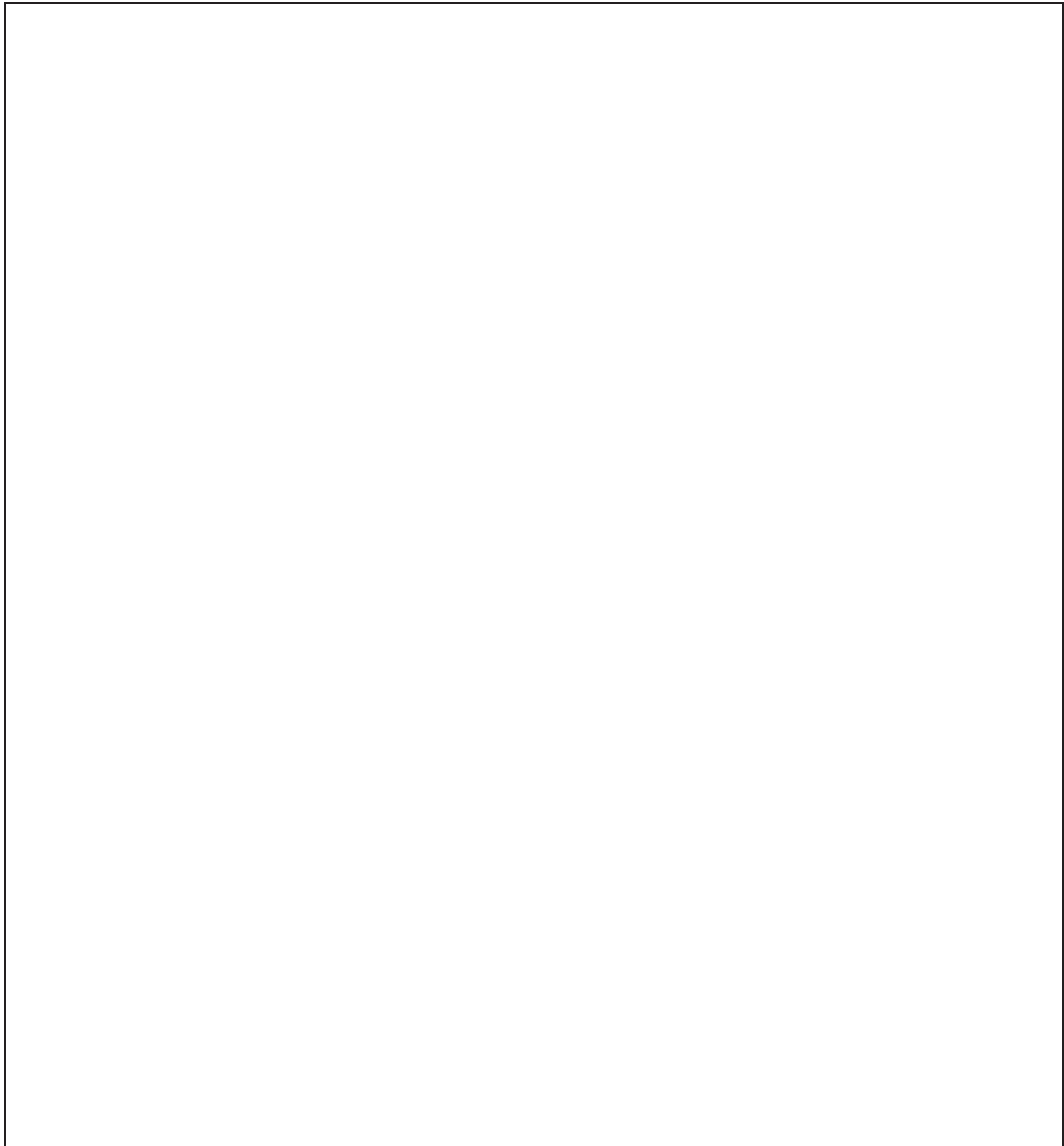


Figure 8

**RIPPLE OF 12V 1A OUTPUT, RMS AND P-P**

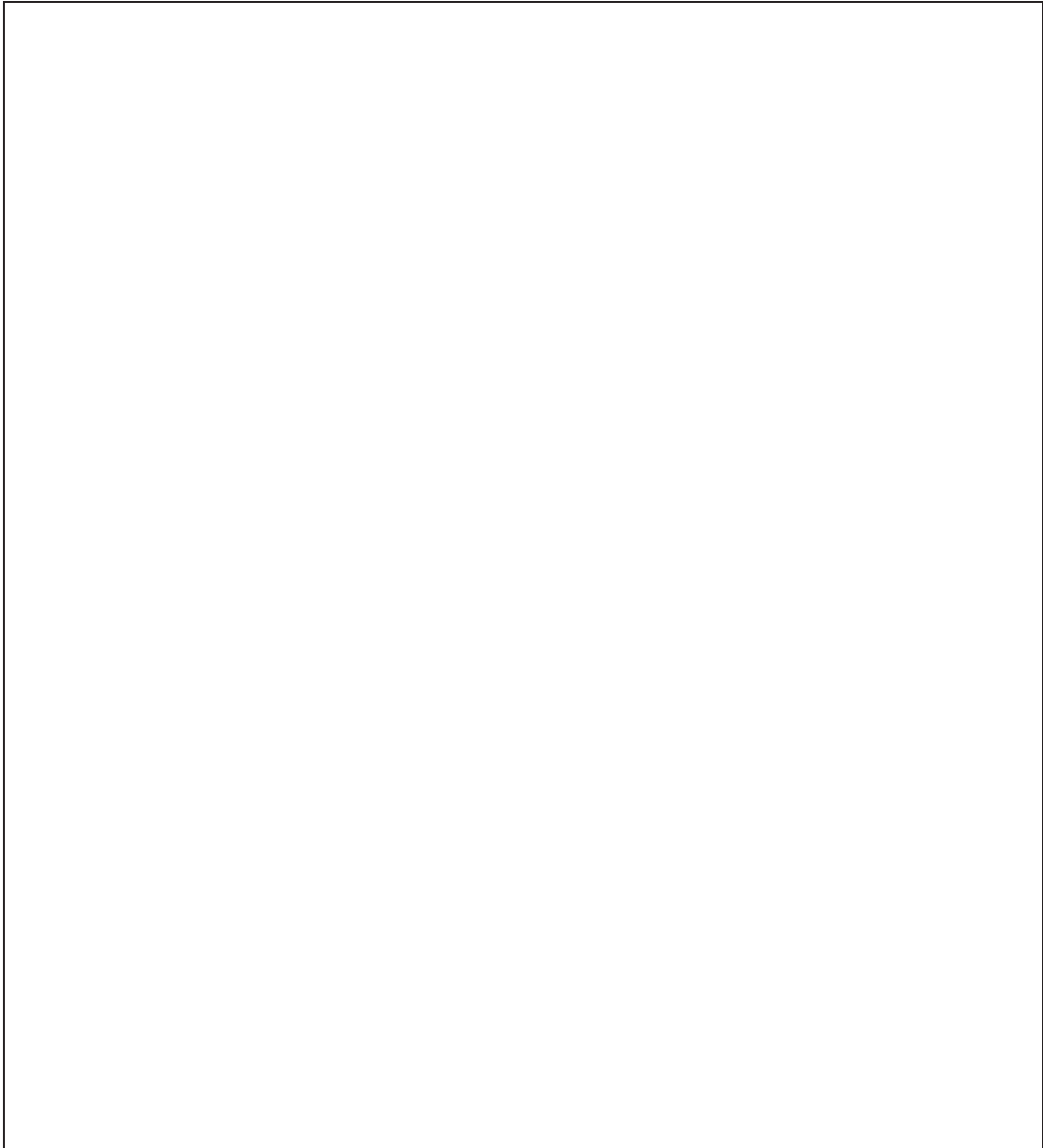


Figure 9

**OSCILLOGRAM OF OUTPUT WAY1 IS SHOWN IN CHANNEL 1 OF THE DSO.  
OSCILLOGRAM OF OUTPUT WAY2 IS SHOWN IN CHANNEL 2 OF THE DSO**

3-2. Output Power

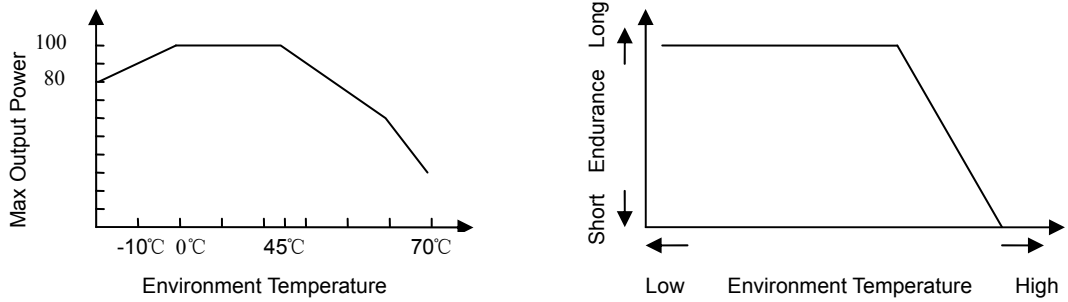


Figure 10



## **Chapter4.Warning**

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1. Please check the voltage and polarity of the input power. Make sure that the input voltage is lower than DC 24V and higher than 5V, and constant output current is not less than 5A, otherwise the output may not be stable enough.
2. Make sure that the output is not short, or it will burn the input adapter and the converter immediately. Protection built in short circuit could not act unless current is high enough but such current may damage the adapter.
3. Make sure that the metal screws do not short any circuit.
4. If users want to measure the RMS current, it is suggested that use a shunt resistor in the circuit and test the voltage drop. Be careful of the too high peak current.
5. Normally the GND of the converter should be connected to the Protection Earth (PE) terminally. Leave it float if you can't make sure how to connect the Protection GND. Use AWG14 or higher diameter cables in the circuit.

## Chapter5.Contact Us

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