AC-DC 110V to 12V LM317 Buck Voltage Converter DIY Kit

1.Introduction:

It is a AC-DC 110V to 1.25V-12V LM317 Adjustable Step Down Power Supply Buck Voltage Converter LED Display DIY Kit. It can output stable voltage. User can change output by operate potentiometer. It also can be used a signal generator or logic circuit or buzzer alarm circuit.

2.Feature:

- 1>.AC 110V input work voltage
- 2>.Adjustable output voltage
- 3>.RC Signal generator
- 4>.Logic signal test circuit
- 5>.Buzzer alarm circuit
- 6>.DIY manual soldering
- 7>.Simple and easy to operate

3.Parameter:

1>.Item name: AC-DC 110V to 12V LM317 Buck Voltage Converter DIY Kit

2>.Input voltage:AC 110V

3>.Output voltage:DC 1.25V-12V

- 4>.Output current:200mA
- 5>.Output power:2.5W
- 6>.Power wire length:100cm
- 7>.Output wire length:20cm

8>.Work Temperature:-40°C~85°C

9>.Work Humidity:0%~95%RH

10>.Size(Installed):112*68*40mm

4. Function:

1>.Voltage converter: Input AC 110V and adjustable output DC 1.25V-12V 200mA. It can provide work power for low power electrical appliances.

2>.Signal generator: It can output one PWM signal for laboratory circuit test. User can adjust output frequency by blue/white potentiometer.

3>.Logic test circuit: It can set input high or low TTL signal and indicator by LED.4>.Buzzer alarm circuit: Circuit test and alarm by buzzer.

5.Circuit Principle:

1>.Voltage converter:

The transformer converter the household power supply AC 110V to AC 12V power, and converts it into DC power through the bridge rectifier circuit composed of D3, p4, D5 and D6. C4 is the input filter capacitor that suppresses input voltage ripple. C1 is that output filter capacitor used to cushion the impact load and ensure stable operation of the circuit. Because of the existence of the capacitor C1, the LM317 is easily damaged by capacitor discharge. When the capacitor C1 is discharged by the external protection diode D1, the LM317 can be protected by discharging the capacitor C1 through D1. C5 is that filter capacitor at the regulating end and has the function of stabilize the output. D2 is a protection diode for preventing damage to the LM317 during discharge of the C5. The D7 blue LED is the voltage output operation indication, and R2 is the current limiting resistor for D7. R1 and RP1 form a resistive network with adjustable output. The output voltage can be adjusted by changing the resistance of RP1. The resistance of R1 is 120-2400hm. The output voltage is calculated as V-out= $(1 + RP1/R1)^{*1}$. 25.

2>.Signal generator:

U2A, U2B, R5 and C6 form a non-gate oscillation circuit. Assuming the U2B output is high, since the voltage across capacitor C6 cannot be abrupt, then the U2A input is also high. The U2A output is low as well as the U2B input. The output at U2B is high. At this point, the output pulse of U2B is guaranteed to be high. With the charging of the C6 capacitor, the C6 is charged to the voltage of a+, b-, and the negative voltage at the terminal b of the capacitor decreases the input voltage of the U2A. When the voltage drops to the non-gate-off voltage, the U2A outputs a high level and the U2B outputs a low level. Since the U2A outputs a high level, the capacitor C6 is reverse charged. As the voltage at terminal b rise to the open level of U2A, U2A outputs a low level and U2B output a high level, so that a square wave is generated. The square wave signal is output backwards through U2F, while the square wave status is indicated through the D8 yellow LED. By adjusting the resistance value of R5, the charge and discharge time can be adjusted. thereby adjusting the oscillation frequency.

3>.Logic test circuit:

DS05 is the logic level input. When the input is low, the U2E output is high, the U2D output is low, and since the U2C output is high, D9 is bright (green LED) indicating low. When the input is high, the U2E output is low, the- e output is high, and since the U2C output is low. D10 is bright(Red LED). indicating high. If the input is floating, it is vulnerable to external interference and is in an uncertain state.

4>.Buzzer alarm circuit:

It is composed of transistor Q1 and buzzer. When high level is added to the transistor base (DS03), the buzzer produces sound. For example, the DS03 is connected to the power supply by a wire, If the wire is on, the transistor turns on and the buzzer sounds. If the wire is broken, the transistor turns off and the buzzer does not sound. This principle can be used to test the wire on and of. Similarly, if a low frequency square wave signal is added to the DS03 terminal, the transistor is intermittently turned on, and the buzzer emits intermittent drop-drop-drop sound.

6.Component listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	Metal Film Resistor	R1	240ohm	1
2	Metal Film Resistor	R0,R2,R3	1Kohm	3
3	Metal Film Resistor	R6	10Kohm	1
4	Metal Film Resistor	R4	100Kohm	1
5	IN4007 Rectifier Diode	D1-D6	DO-41	6
6	IC Socket	U2	DIP-16	1
7	CD4069	U2	DIP-16	1
8	S9014 Transistor	Q1	TO-92	1
9	Blue LED	D7	5mm	1
10	Yellow LED	D8	5mm	1
11	Green LED	D9	5mm	1
12	Red LED	D10	5mm	1
13	Ceramic Capacitor	C2,C3	0.1uF 104	2
14	Electrolytic Capacitor	C5,C6	10uF	2
15	Electrolytic Capacitor	C1,C4	680uF	2
16	Blue/White Potentiometer	R5	100Kohm	1
17	5V Active Buzzer	LS1	12*9.5mm	1
18	KF301-2P Terminal	P1	5.08mm	1
19	KF301-3P Terminal	P2	5.08mm	1
20	LM317T Regulator	U1	TO-220	1
21	Heat Sink		25*23*16mm	1
22	Black Potentiometer	RP1	5Kohm	1
23	0.36in DC0-30V Voltmeter		Red	1
24	AC-DC Transformer		AC 12V 2.5W	1
25	Power Supply Wire		100cm	1
26	Crocodile clip		4cm	2
27	Red/Black Output Wire		50cm	2
28	Heat Shrinkable Tube		D3*50mm	1
29	6mm Potentiometer Cap		15*17mm	1
30	Self Tapping Screw	for PCB	M1.7*5mm	5
31	M2*6mm Screw	for case	M2*6mm	5
32	M3*6mm Screw		M3*6mm	3
33	M2 Nut		M2	5
34	M3 Nut		M3	2
35	Transparent Case Set			1
36	РСВ		72*62*1.6mm	1

Note:Users can complete the installation according to the PCB silk screen and component list.

7.Schematic Diagram:



8.Note:

- 1>.It is a DIY kit so that need finish install by user.
- 2>.lts max output power is 2.5W.
- 3>.It can not be used as charger.

9.Application:

- 1>.Low power supply
- 2>.Logic signal test instrument
- 3>.Signal generator

10.Installation Tips:

- 1>.User needs to prepare the soldering tool at first.
- 2>.Please be patient until the installation is complete.
- 3>.The package is DIY kit.It need finish install by user.

4>.The soldering iron can't touch the components for a long time(1.0 second), otherwise it will damage the components.

5>.Pay attention to the positive and negative of the components.

6>.Strictly prohibit short circuit.

7>.Install complex components preferentially.

8>.Make sure all components are in right direction and right place.

9>.Please wear anti-static gloves or anti-static wristbands when installing electronic components.

10>.It is strongly recommended to read the installation manual before starting installation!!!

11.Installation Steps(Please be patient install!!!):

1>.Step 1: Install 1pcs 240ohm Metal Film Resistor at R1. Identify the resistor value as shown in color: Red/Yellow/Black/Black/Brown.

2>.Step 2: Install 1pcs 10Kohm Metal Film Resistor at R6. Identify the resistor value as shown in color: Brown/Black/Black/Red/Brown.

3>.Step 3: Install 1pcs 100Kohm Metal Film Resistor at R4. Identify the resistor value as shown in color: Brown/Black/Black/Orange/Brown.

4>.Step 4: Install 3pcs 1Kohm Metal Film Resistor at R0,R2,R3. Identify the resistor value as shown in color: Brown/Black/Black/Brown/Brown.

5>.Step 5: Install 6pcs DO-41 IN4007 Rectifier Diode at D1-D6.Pay attention to the white mark. The white mark on PCB and IN4007 is the corresponding relationship.

6>.Step 6: Install 2pcs 0.1uF 104 Ceramic Capacitor at C2,C3.Pay attention to the screen printing on the surface of capacitor.

7>.Step 7: Install 1pcs DIP-16 IC Socket at U2.There is a mark(notch) on one end of the IC Socket and there is a mark(curved silk screen printing) on PCB where the IC Socket can place on.These two marks are corresponding to each other and are used to specify the installation direction of the IC Socket.

8>.Step 8: Install 1pcs TO-92 S9014 Transistor at Q1. Pay attention to the installation direction.Arc screen printing corresponds to arc case.

9>.Step 9: Install 2pcs 10uF Electrolytic Capacitor at C5,C6. There is a white '+' on PCB silk screen printing where the positive(anode) can insert into.The longer lead is positive(anode)

10>.Step 10: Identify the positive(anode) and negative(cathode) lead of LED.The leads of the LED must be installed correctly, otherwise the LED cannot be turned on.Here are four methods as following:

10.1>.According to the length of the LED lead to distinguish. The longer pin is positive(anode) lead. The shorter pin is negative(cathode) lead.

10.2>.Identify the negative(cathode) of the LED is to look into the plastic case where one can see that the negative(cathode) is much thicker/bigger inside the plastic case than the anode lead.

10.3>.Identify by edge of plastic case.The negative(cathode) lead of the LED

should be the pin nearest the flat on the plastic case.

10.4>.Test by 3V battery or multimeter.The pin is positive(anode) lead which has connect to the positive of 3V if LED can light up after connect 3V power supply.(LED should not be powered directly from the 3V for a short time:less then 0.5second)

10.5>.It is positive(anode) where the white mark "+" pointing to on PCB. 11>.Step 11: Install 4pcs 5mm LED at D7-D10. Pay attention to distinguish between positive and negative. Blue at D7, Yellow at D8, Red at D10, Green at D9.

12>.Step 12: Install 1pcs 100Kohm Blue/White Potentiometer at R5.

13>.Step 13: Install 1pcs KF301-2P Terminal at P1.

14>.Step 14: Install 1pcs KF301-3P Terminal at P2.

15>.Step 15: Install 1pcs 5V Active Buzzer at LS1.

16>.Step 16: Install 3pcs metal pins on the back of the voltmeter as shown. Metal pins come from the redundant pin of LED.

17>.Step 17: Bend voltmeter pin and then fix them on PCB.

18>.Step 18: Install 2pcs 680uF Electrolytic Capacitor at C1,C4. There is a white '+' on PCB silk screen printing where the positive(anode) can insert into.The longer lead is positive(anode)

19>.Step 19: Install 1pcs 5Kohm Black Potentiometer at RP1.

20>.Step 20: Fix TO-220 LM317T Regulator on black Heat Sink by 1pcs M3*6mm Screw.

21>.Step 21: Install LM317T Regulator at U1.

22>.Step 22: Install 1pcs DIP-16 IC CD4069 on IC Socket.There are mark(notch) on one end of the CD4069 and Socket where the IC can place on.These two marks are corresponding to each other and are used to specify the installation direction of the CD4069 and IC Socket.

23>.Step 23: Install 6mm cap for black Potentiometer.

24>.Step 24: Cut the red lead of the transformer a little short, and then put about 2cm heat shrinkable tubes on each lead.

25>.Step 25: Connect blue lead from transformer to PCB.There is no need to distinguish the positive and negative poles.

26>.Step 26: Fix transformer and PCB on case.

27>.Step 27: Fix the power connector and make sure it stuck on the case.

28>.Step 28: Fix another case.

29>.Step 29: Making alligator clip wire.

30>.Step 30: Connect to power supply and adjust potentiometer to change output voltage. If there is a fault, it is recommended to check whether each component is installed correctly and whether the pad has false soldering and so on. Please contact us if you have any other questions.

12.Install shown steps:







Step 10: Identify the positive(anode) and negative(cathode) lead of LED. The leads of the LED must be installed correctly, otherwise the LED cannot be turned on. Here are four methods as following:

10.1>.According to the length of the LED lead to distinguish. The longer pin is positive(anode) lead. The shorter pin is negative(cathode) lead.

10.2>.Identify the negative(cathode) of the LED is to look into the plastic case where one can see that the negative(cathode) is much thicker/bigger inside the plastic case than the anode lead.

10.3>.Identify by edge of plastic case.The negative(cathode) lead of the LED should be the pin nearest the flat on the plastic case.

10.4>.Test by 3V battery or multimeter.The pin is positive(anode) lead which has connect to positive of 3V if LED can light up after connect 3V power supply. (LED can not be powered directly from 3V for a short time:less then 0.5second)

10.5>.Note: If the flat on the package disagrees with other indicators (short lead, large cathode lead end), then other indicators take priority. I.e. if the flat disagrees with the lead length, use the lead length as the cathode indicator.























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