

AVT 735 DC switched mode regulator Modeler drill controller Economical bulb dimmer





The device can be powered by a battery or DC power supply. The load can be any DC motor or bulb. Thanks to the switched-mode principle, slight energy loss is detected. The output transistor does not require a heatsink. The regulator module is ideal for use with the modeler driller. The regulator ensures that the driller is working at maximum torque even at low rotation speed.

Specifications

- used for speed control in modeler drills
- 6-24V/100W bulb brightness control
- near 100% efficiency at maximum output current 10A
- adjustment of the output waveform with potentiometer
- power supply: 6-25V DC

C switched mode regulat Modeler drill controller Economical bulb dimmer

Functional description

The U1A and U1B gates work in typical twoinverter oscillator mode. Frequency determines the C2 capacitor or in a few cases the C3, as well as the potentiometer PR1 and resistances R2, R3. MOSFET T1 transistor is controlled by two gates U1C, U1D connected in parallel. If the T1 is a MOSFET, then the R4 resistor is not needed and it could be replaced by jumper. If the transistor T1 is a Darlington transistor, use R4=2.2k to limit the base current. Potentiometer PR1 can vary the duty ratio of the output waveform in a wide range from 1 to 99%. Pulses on the T1 gate switch on and turn off the T1 transistor while the average power delivered to the load connected to the Z2 connector depends on the generator duty cycle. In this way the PR1 potentiometer makes it possible to control power delivered to the load. Clamp diode D4 is necessary when the regulator supplies the inductive loads (motors in particular).

Thanks to the switched mode operation principle the power loss of the T1 transistor is low and it does not need heatsink even at currents of several amperes and up to 100W loads. It should be remembered the kit is a power regulator and not a motor rotation regulator, so the speed of motor rotation depends on how heavily it is loaded.

AVT 735

Power is switched mode regulated by the kit that supplies square voltage wave load. This signal can be a source of electromagnetic interferences. The cables connecting the regulator and the load should be as short as possible. The cable connection should look very much like a twisted pair of cables. Additionally, it is recommended to connect the $1000...10000\mu$ F electrolytic capacitor to the power supply connector.

The extra C3 capacitor can be connected by jumper J1. As a result of this the oscillating frequency of the generator is lowered from about 700Hz to 25Hz. This reduces generated electromagnetic interferences. Such high frequency reduction might have a negative effect on some loads (i.e. it might cause the undesired bulb flashing effect). Should this be the case, the capacity of the C3 can be selected by the user himself.



Figure 1. Schematic diagram

Assembly and test

The schematic of the regulator is shown in Figure 1 while the PCB layout is shown in Figure 2. While assembling the regulator particular attention should be paid to the polarity of the components. Once the regulator has been assembled and checked, the corresponding load. (e.g. a bulb) should be connected. Then the power supply from 9 to 15V can be connected. A device assembled without errors will operate immediately after switching on the power supply.



2

DC switched mode regulator Modeler drill controller Economical bulb dimmer

Component list

Resistors:	be paid to th	ieir polarity. Symbols of	the Tricks
R1-R3, R5:1kΩ (brown-black-red-gold)	components on assembled sets may co	the PCB as well as phot ome in useful. To access h	os of
R4:0Ω (black)	resolution images, do	wnload the PDF file.	PDF DOWNLOAD
PR1:rotary potentiometer $100k\Omega$			
Capacitors:	C1 💼	D1	D4
C1:100µF !	io _{la} r Ser	D3	
C2:22nF (also marked as 223)			
C3:470nF (also marked as 474)			
C4:100nF (also marked as 104)	• •	0 0	G (4
Semiconductors:			
D1, D2:1N4148 or similar !	(49)	TAN	
D3:12V Zener diode !	T1	US1	
D4:1N5822 !			
US1:CMOS 4093 IC with 14-pin IC socket			
T1:BUZ11, STP55NF06 or similar !			
Others:		000 222000	
J1:goldpin connector with jumper		00000	
Z1:2-pin terminal block connector	000		
Z2:2-pin terminal block connector			

AVT 735

20

switch

ē

While assembling the components marked http://bit.ly/2Kmwxjd

with an exclamation mark attention should

回溯回

۵

Start off by soldering the printed circuit elements in order from smallest to largest. The unit assembled flawlessly, using the supplied components will operate immediately after switching on the power supply.

Assembly in 4 steps



3

Notes

Thank you for purchasing AVT product. Please take your time to read carefully the important information below concering use of this product.



Educational Electronics Kits are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications the purchaser assumes all responsibility for ensuring compliance with all local laws. In addition, they cannot be used as a part of life support systems, or systems that for use as or as a part of life support systems, or systems that might create a hazardous situation of any kind.

- Battery or wall-adaptor are safe devices. They do not require special attention unless main voltage is connected to an output e.g. a relay.
- If the kit is used to switch currents greater than 24V it is necessary to have the installation and performed by a trained professional authorized for such work. The kit may only be used in such application if it was installed in a safe to touch enclosure.
- · Never exceed the limits or ratings listed in the 'Specifications' section at the this user guide.
- If the kit is used in schools or educational facilities or similar institutions the operation must be supervised by trained and authorized staff.
- The product itself and all parts thereof (including packing material) are not suitable toys for childern! (choking hazard, risk of electric shock, ...)

Failures in modern electronic component are very rare as 95% of non-working kits are due to poor soldering or components placed in the wrong location or orientation so please check your work carefully.

DIFFICULTY LEVEL



AVT SPV Sp. z o.o.

Leszczvnowa 11 Street. 03-197 Warsaw, Poland http://avtkits.com/





This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical tion and electronic equipment.

AVT SPV reserves the right to make changes without prior notice. Assembly and connection of the device not in accordance with the instructions, unauthorized modification of components and any structural modifications may cause damage to the device and endanger the person using it. In this case, the manufacturer and its authorized representatives shall not be liable for any damages arising directly or indirectly from the use or malfunction of the product.