RGB LED Controller using Atmega328

This is a 3-channel, PWM based current-adjustable LED driver designed for RGB LED control. The circuit has been designed to control high current RGB LEDs or RGB LEDs strip. Colors of the three RGB LEDs can be set using 3 potentiometers, different colors are possible by adjusting these potentiometers.

RGB LED consists of 3 separate LEDs red, green, blue packaged in a single case. The RGB LEDs can emit different colors by mixing three basic colours.

We have used ATmega328 microcontroller to generate 3 PWM signals by reading analog inputs. These analog inputs are connected to 3 potentiometers. PWM outputs interfaced with gates of 3 x IRLR7843 MOSFETs which drive the high current loads. MC78M05 IC used to power the Atmega328 chip with 5V DC. The operating voltage of this circuit is 12V DC and each channel can drive a continuous load current up to 600mA or 1 A with cool air. Screw terminals provided for an easy connection for RGB LED strip or RGB LEDs. The circuit can drive 12V RGB strip/12V RGB LEDs. Any RGB LED strip with RGB and +V connection will work with this board or use a common anode RGB LED.

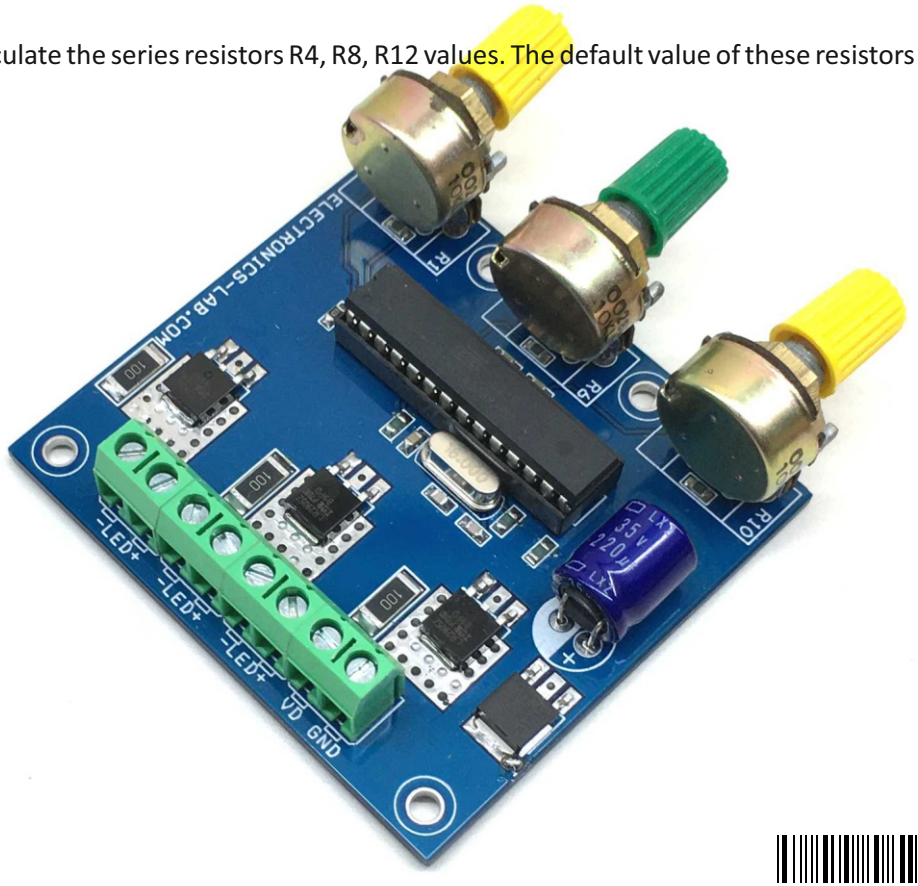
This project is built using an Atmega328 microcontroller which requires programming, example code can be found below. This example code is written using Arduino IDE, thus the Atmega328 chip requires boot-loader burning and code uploading. Follow this link to learn Atmega328 Chip programming and Boot-Loader burning.

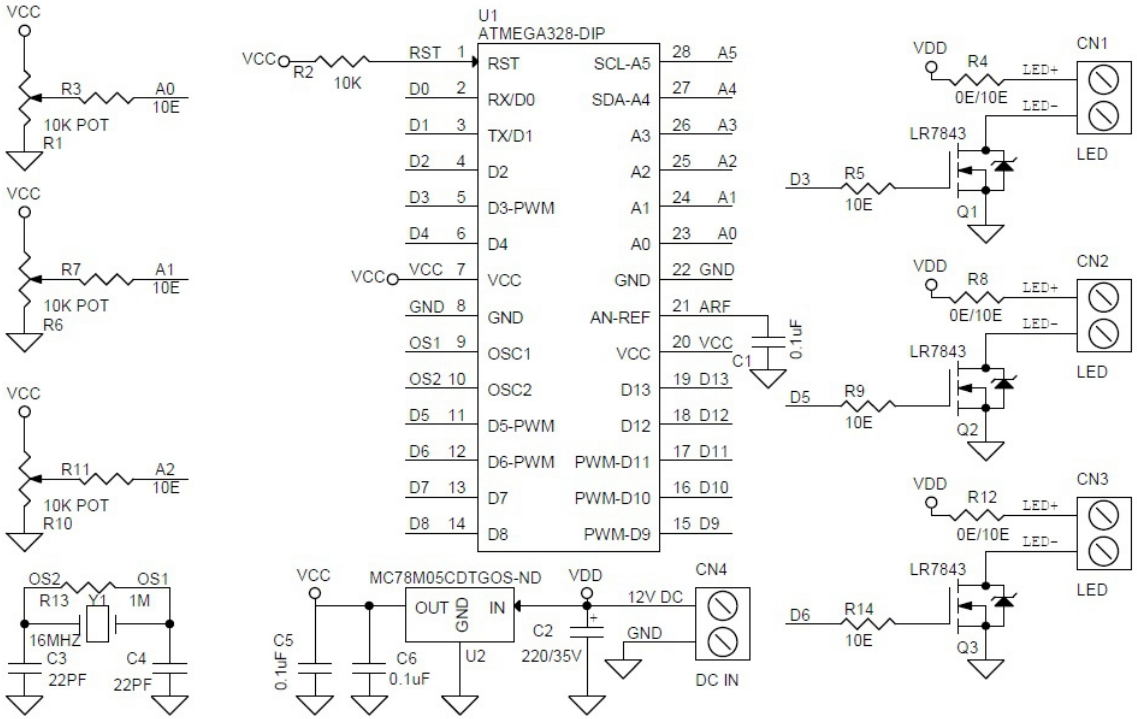
https://www.arduino.cc/en/Tutorial/BuiltInExamples/ArduinoToBreadboard

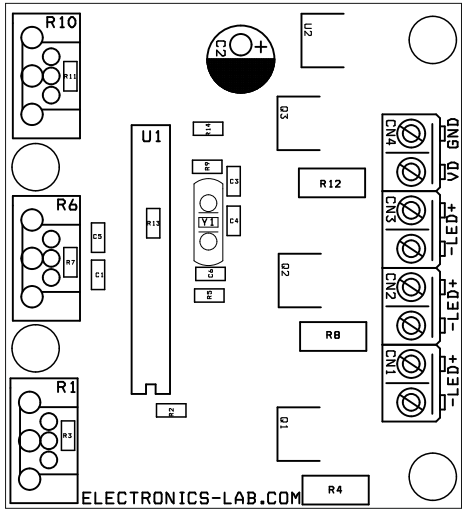
Note: RGB LED without series resistor can be interfaced with this board, in this case, calculate the series resistors R4, R8, R12 values. The default value of these resistors is 0-Ohms.

Features

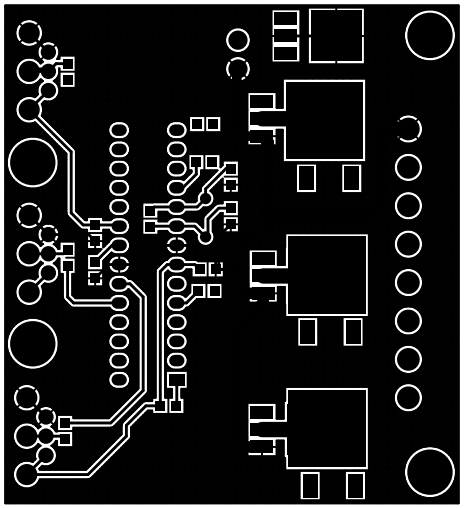
- Supply 12V DC (7V-15V)
- Load 600mA Each channel (1Amp with Fan)
- 3X Potentiometer to Adjust 3X LEDs
- PWM Duty Cycle Adjustable 0% to 100%
- Frequency 490/975 Hz
- Arduino Compatible Code
- PCB Dimensions 61MM X 67 MM



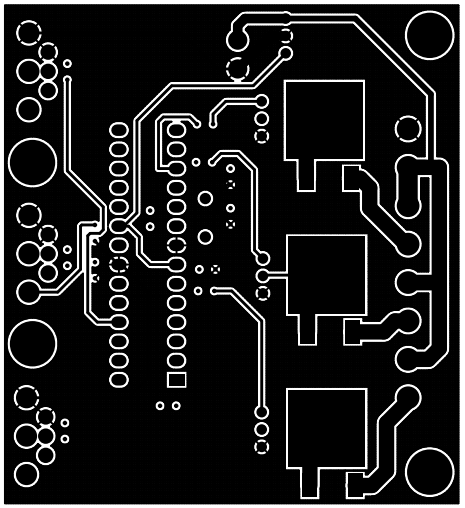

VCC
R3
A0
10E
10K POT
R1
R7
A1
R6
R11
A2
R10
OS2
OS1
R13
Y1
1M
16MHZ
C3
22PF
C4
U1
ATMEGA328-DIP
R2
10K
RST
D0
D1
D2
D3
D4
GND
OS1
OS2
D5
D6
D7
D8
SCL-A5
SDA-A4
A3
A2
A1
A0
AN-REF
D13
D12
PWM-D11
PWM-D10
PWM-D9
C1
0.1uF
MC78M05CDTGOS-ND
OUT
IN
C5
C6
U2
C2
220/35V
12V DC
DC IN
CN4
VDD
R4
0E/10E
LED+
LED-
LED
CN1
LR7843
D3
R5
10E
Q1
CN2
R8
D5
R9
Q2
CN3
R12
D6
R14
Q3



SILK SCREEN TOP

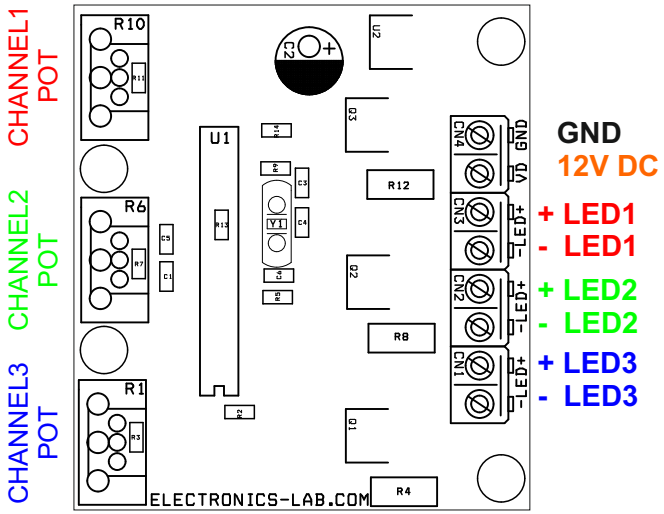


TOP LAYER

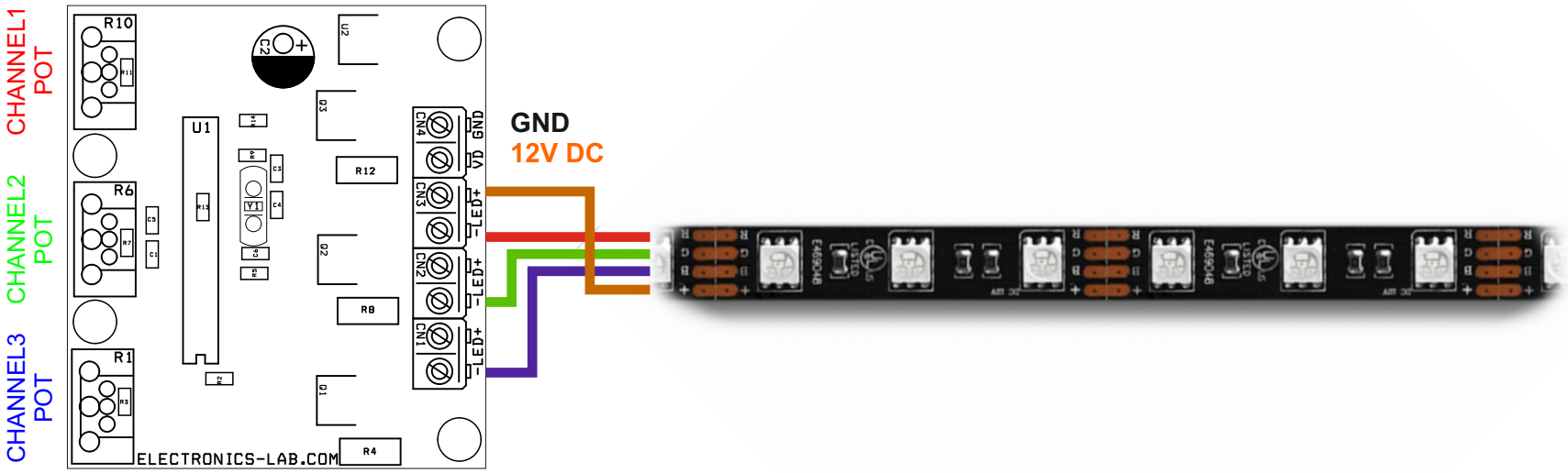


BOTTOM LAYER

PCB DIMENSIONS 61MM X 67MM



BOM				
SR	QNTY.	REF	DESC.	DIGIKEY/MOUSER
1	3	CN1,CN2,CN3	2 PIN SCREW TERMINLA	DIGIKEY-609-3918-ND
2	1	CN4	2 PIN SCREW TERMINLA	DIGIKEY-609-3918-ND
3	3	C1,C5,C6	0.1uF/50V SMD SIZE 0805	SIZE 0805
4	1	C2	220/35V	10MM RADIAL ELECTROLYTIC
5	2	C3,C4	22PF/50V SMD SIZE 0805	SIZE 0805
6	3	Q1,Q2,Q3	IRLR7843 MOSFET	DIGIKEY-IRLR2905ZTRPBFTR-ND
7	3	R1,R6,R10	10K POTENTIOMETER 16MM	DIGIKEY-987-1307-ND
8	1	R2	10K SMD RESISTOR SIZE 0805	5% SIZE 0805
9	6	R3,R5,R7,R9,R11,R14	10E SMD RESISTOR SIZE 0805	5% SIZE 0805
10	3	R4,R8,R12	0E OR 10E SMD RESISTOR SIZE 2512	5% SIZE 2512
11	1	R13	1M SMD RESISTOR SIZE 0805	5% SIZE 0805
12	1	U1	ATMEGA328-DIP	DIGIKEY-ATMEGA328P-PU-ND
13	1	U2	MC78M05CDTGOS-ND	DIGIKEY-MC78M05CDTGOS-ND
14	1	Y1	16MHZ CRYSTAL	DIGIKEY-X1103-ND
15	2	FEMALE -HEADER	14 PIN FEMALE HEADER PITCH 2.54MM	14 PIN FEMALE HEADER PITCH 2.54MM


CHANNEL1 POT
CHANNEL2 POT
CHANNEL3 POT
R10
R6
R1
U1
C2
R12
R8
R4
CN4
CN3
CN2
CN1
GND
VD
-LED+
-LED+
-LED+
ELECTRONICS-LAB.COM
GND
12V DC