

48 Channel Mono/16 Channel RGB LED Controller

The 48 Channel Mono/16 Channel RGB LED Controller by Chromation Systems can be used to independently control 48 groups/channels (up to 120ma per group) of mono color LEDs or 16 groups/channels of common anode RGB LEDs. It utilizes 3x TLC5940 LED drivers controlled with a PIC 18F2550 microcontroller. The device runs at 48mhz, connects through a type-B USB port, and controls the LED drivers through a SPI interface. The default firmware uses 8-bit PWM(256 brightness levels) and has a 1.5khz PWM frequency. All LED anodes are connected in parallel and the LED cathodes are connected to the controller, as the controller outputs sink current, the outputs are constant current, no need for LED resistors. There are 3 connection options for the LEDs, direct soldering, screw down terminal blocks, and headers/housings.

Great for infinity mirrors, computer case mods, ambient lights, and decoration.

Features:

- 48 Channels of mono(single color) or 16 channels of RGB LEDs.
- Up to 120ma per channel.
- Up to 17v LED source voltage.
- Selectable constant current, via Iref resistors. Discussed pg. 4
- USB Connectivity, default Emulated Serial Port. Many types of USB devices are possible, see website for more details.
- 3 Button inputs, pattern up, pattern down, LEDs off.
- ICSP Header, for PIC programming, optional.
- 18F2550, 48mhz microcontroller with 16k words memory.
- Wide Input Voltage.
- Compatible computer software for creating and uploading patterns and settings, ColorMotion.
- Firmware Options: Open-Source code with MPLAB project files available. And the premium ColorMotion Compatible Firmware.
- Various LED Configurations, series(up to 17v) or parallel. (up to 120ma per channel)
- Channels can be ran in parallel to allow more than 120ma worth of LEDs to be controlled. (3 channels = 360ma)
- 1/8" mounting holes on all 4 corners.

For Updates, Source Code, More Information,
and To Purchase Visit

www.Chromationsystems.com/48channed.html

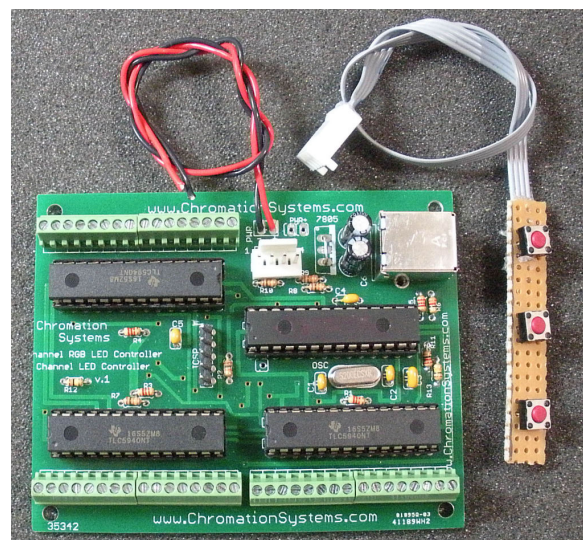


Fig. 1a Assembled Controller with Buttons

Specification:

Controller Input Voltage	5v, 7v - 32v*
LED Input Voltage	3.6v - 17v
Input Current	< 100ma**
Max Current Per Channel	120ma***
Max Dissipation	varies****
Output	48 channels, Sink
PWM Frequency	1.5khz
Connectors	0.1" Pitch
Dimension	3.5" x 2.75" x 0.5"

*Voltages above 5v require the usage of a 7805 Voltage regulator.(Included) 5 volt input requires no 7805.

**Controller's current draw, not including LED current

***Outputs are constant current, with current set via the Iref resistors, R1, R3, & R4 see pg. 4

****Each TLC5940 dissipates power to produce a constant current. In most configurations, dissipation doesn't have to be considered, but to avoid over dissipation, use the lowest possible voltage for your LED configuration.

To calculate, view the TLC5940 datasheet at <http://www.ti.com/lit/ds/symlink/tlc5940.pdf> and use the equations there.

Parts List:

C1	22 pF	R1	Iref*
C2	22 pF	R2	10 kohm
C3	220 nF	R3	Iref*
C4	0.1uF	R4	Iref*
C5	0.1uF	R5	22 ohm
C6	1uF	R6	22 ohm
C7	1uF	R7	10 kohm
OSC	20mhz	R8	10 kohm
7805	Optional	R9	10 kohm
IC1	TLC5940	R10	10 kohm
IC2	TLC5940	R11	2.2 kohm
IC3	TLC5940	R12	100 kohm
18F2550	18F2550	R13	100 kohm
USB-B	Right-Angle USB Type-B		
ICSP	5-pin header		

*See Page 4 for Value Details

Buttons Pinout:

1. GND
2. Pattern Select Up
3. Turn LED Outputs off
4. Pattern Select Down

All Resistors are 1/6w
I.C.s are all DIP

LED Connection:

The solder pads along the outside of the PCB are for connecting the LED's cathodes.(negative lead) The LED anodes are wired in parallel(all together) and wired to their voltage source. (In some cases the PWR+ on PCB can be used.) There are 3 options:

Screw Down Terminals: The preferred method, six 8-position screw down terminals.

Direct Soldering: The wires that connect the LEDs are soldered directly to the PCB.

Headers and Housings: 3-pin headers are used on the PCB and they mate with compatible housings and crimps.

Buttons Schematic & Layout:

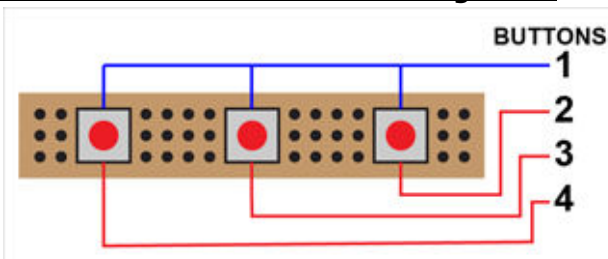


Fig. 2c - Buttons Layout(optional)

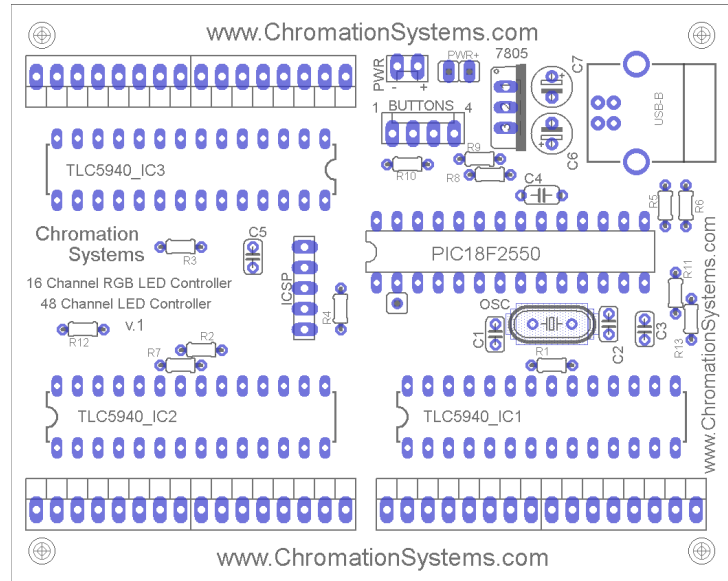


Fig. 2a - PCB Labeled

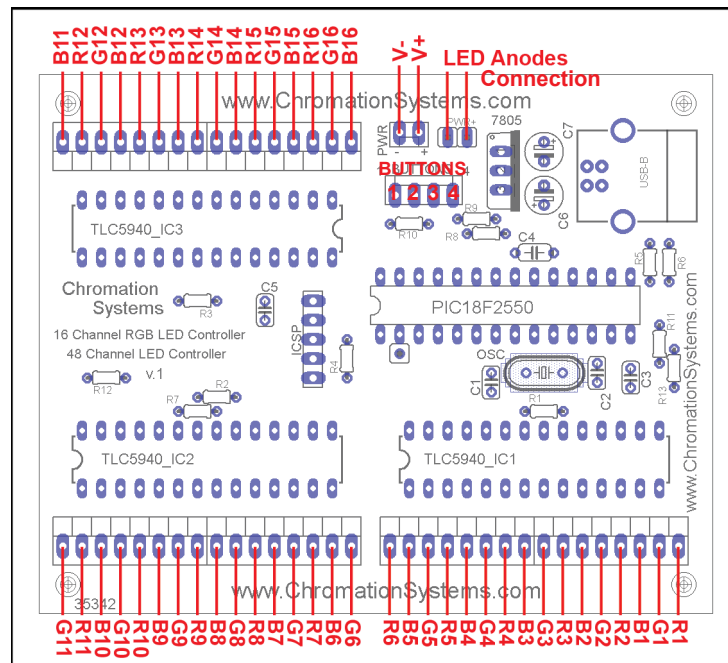


Fig. 2b - Output Labels - Same for Mono LEDs

Print This and Use a Template for Drilling

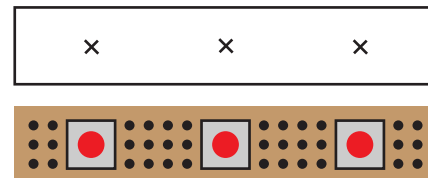


Fig. 2d - Buttons Templates

Common Usage LED Wiring:

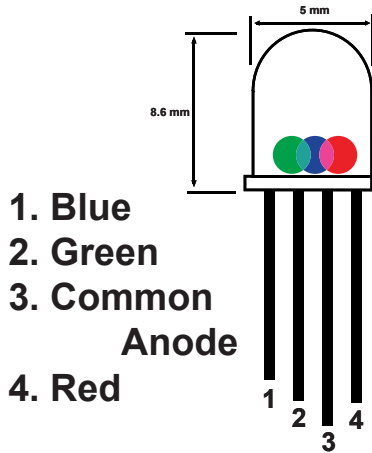


Fig. 3a - Common Anode 5mm RGB LED

The most common use for this controller is to drive common anode 5mm RGB LEDs(20ma per), either a single RGB LED per channel or 2-5 RGB LEDs in parallel per channel.

Driving LEDs in parallel may cause some LEDs to be a different shade / brightness level. Only use the same batch of RGB LEDs when driving them in parallel.

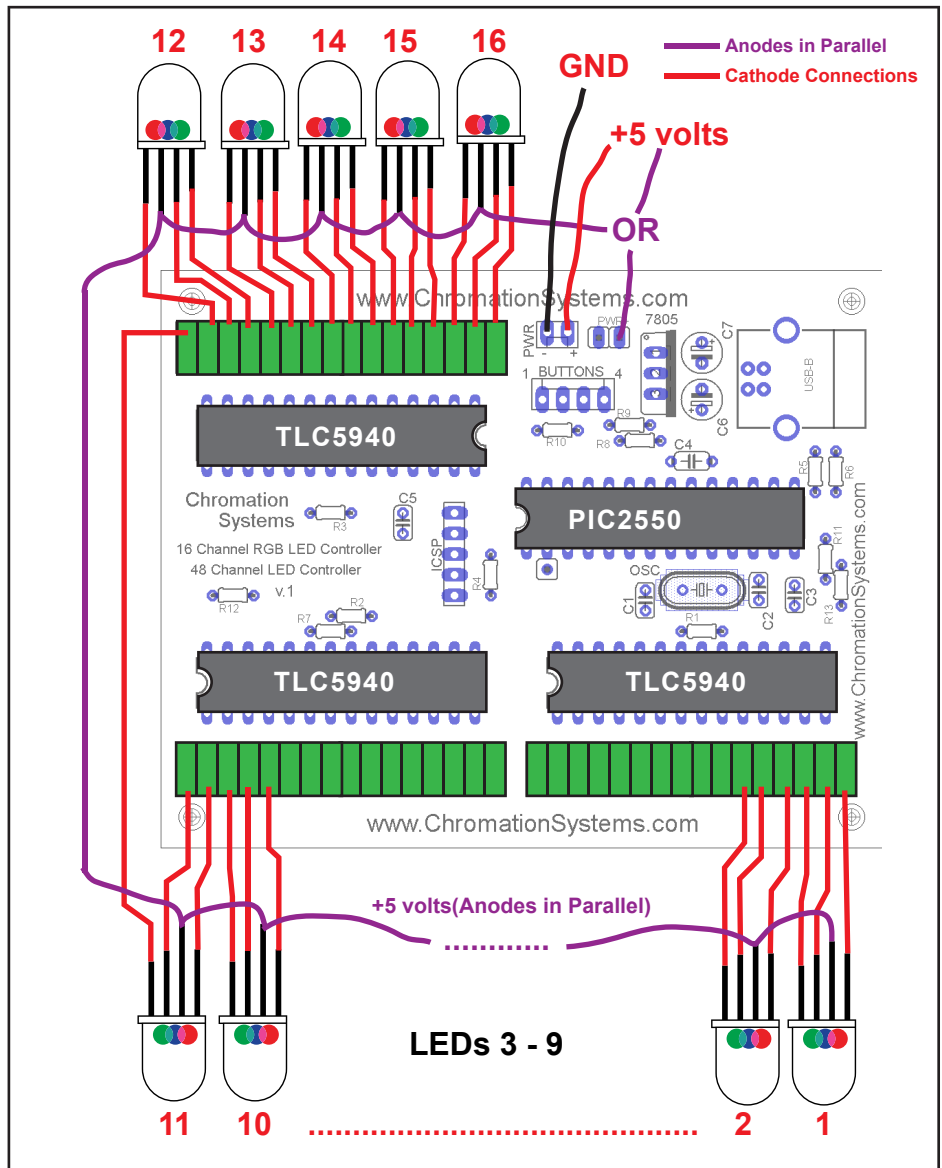


Fig. 3b - Hookup Diagram For 5mm RGB LEDs

Other LED Configurations:

Always use the lowest input voltage for the LEDs as possible to prevent the TLC5940 from dissipating more power than it has to.

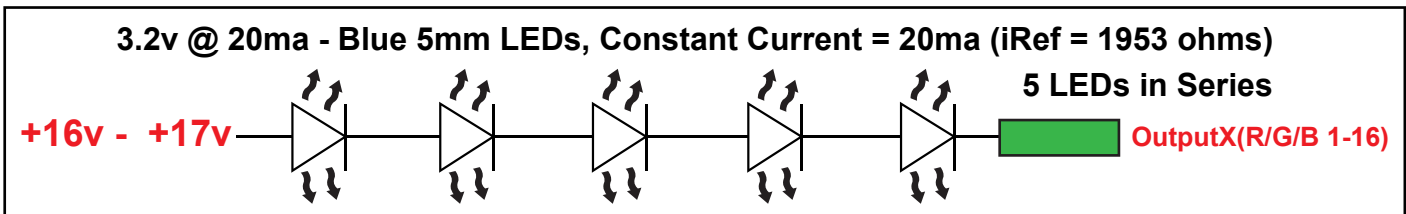


Fig. 3c

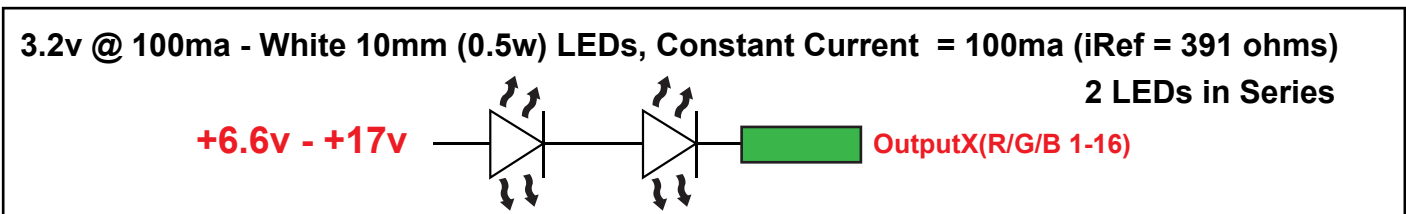
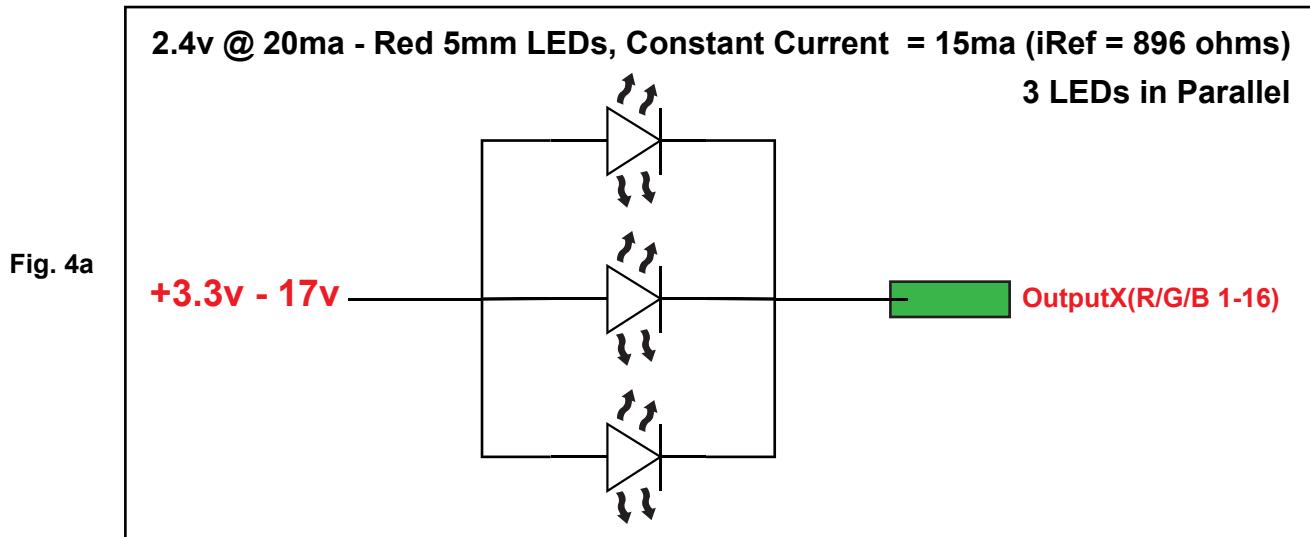


Fig. 3d

Other LED Configurations: (Continued)

Always use the lowest input voltage as possible for the LEDs.



More configurations are possible, please visit the website or contact for more information.

iRef Resistors:

Each TLC5940 produces the same constant current for all channels. The current value is selected via the iRef resistor, one resistor for each of the three TLC5940s. More details on the TLC5940 datasheet.

$$R = (1.24 / I_{max}) * 31.5$$

I_{max} = the desired current for each channel

R = iRef Resistor Value

There is a web calculator, to calculate iRef, available on this device's webpage. (see bottom for URL)

Version 1 Fix: Version 1 hardware requires a jumper and 2 cut traces

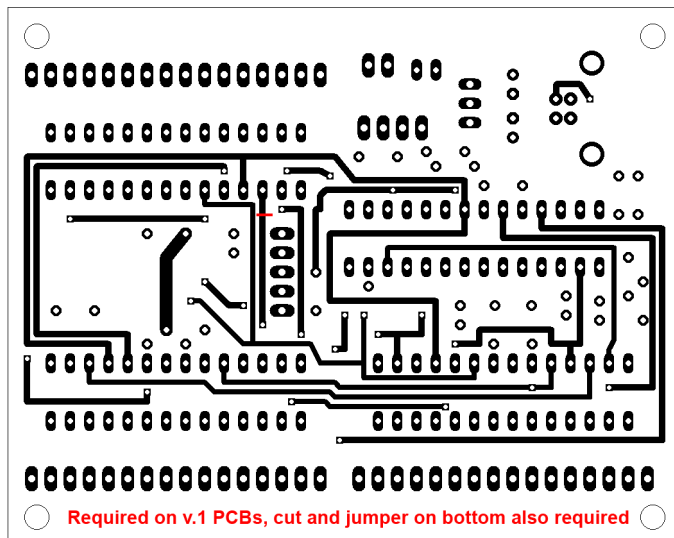


Fig. 4b - Top Copper

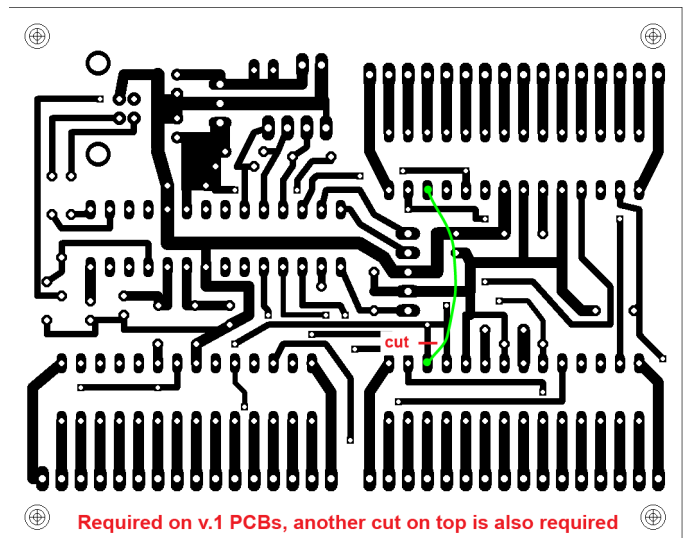


Fig. 4c - Bottom Copper